MOTT MACDONALD

Environmental Scoping Report

Cambridge South East Transport (CSET) Phase 2

13 October 2020

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1 Introduction

1.1 Context

This document comprises a request to the Secretary of State for an opinion on the scope of an environmental statement proposed to be submitted in support of an application to be made under the Transport and Works Act Order process for the development known as Phase 2 of Cambridge South East Transport Scheme (CSET). Phase 1 of CSET is a series of minor schemes delivering improvements to the road layout and public footways along the A1307 to improve traffic flow and road safety generally. CSET Phase 1 is not part of this scoping report.

Whilst no firm decision has yet been made, at this stage the current intention is that the Application will be submitted by Cambridgeshire County Council (CCC) (hereinafter referred to as the Applicant, where appropriate) acting as the lead authority for the Greater Cambridge Partnership (GCP)

The GCP is the local delivery partner (representing the Cambridgeshire County Council (CCC), the South Cambridgeshire District Council (SCDC) and the Cambridge City Council (City Council) with the Mayor of the Cambridge and Peterborough Combined Authority, a representative from the University of Cambridge and a representative from business on the GCP Executive Board) for a City Deal with central Government, bringing powers and investment to Cambridge and Greater Cambridgeshire, worth up to £1 billion over 15 years. In this report the Applicant and GCP are used interchangeably.

Through investment in transport and infrastructure, GCP will bring forward schemes to connect people to places of employment and allow communities to grow sustainably in the coming years, by creating better and greener transport networks, reducing congestion and making better use of limited road space by prioritising sustainable transport.

1.2 Background

GCP is proposing to procure the construction of infrastructure required to enable a High Quality Public Transport (HQPT) service to operate between the A11 / A1307 junction (near Babraham) and Cambridge – this scheme is known as Cambridge South East Transport (hereafter referred to as the 'CSET Scheme'). A fuller description of the CSET Scheme is provided in Chapter 2, but in summary the project is made up of three core elements:

- A new segregated and guided public transport route, with public transport priority measures between the A11 and A1307 junction and Cambridge Biomedical Campus (CBC), that avoids general traffic congestion.
- A new Travel Hub which will be an area where car parking is provided and an interchange with the HQPT will be available.
- New high-quality non-motorised user facilities.

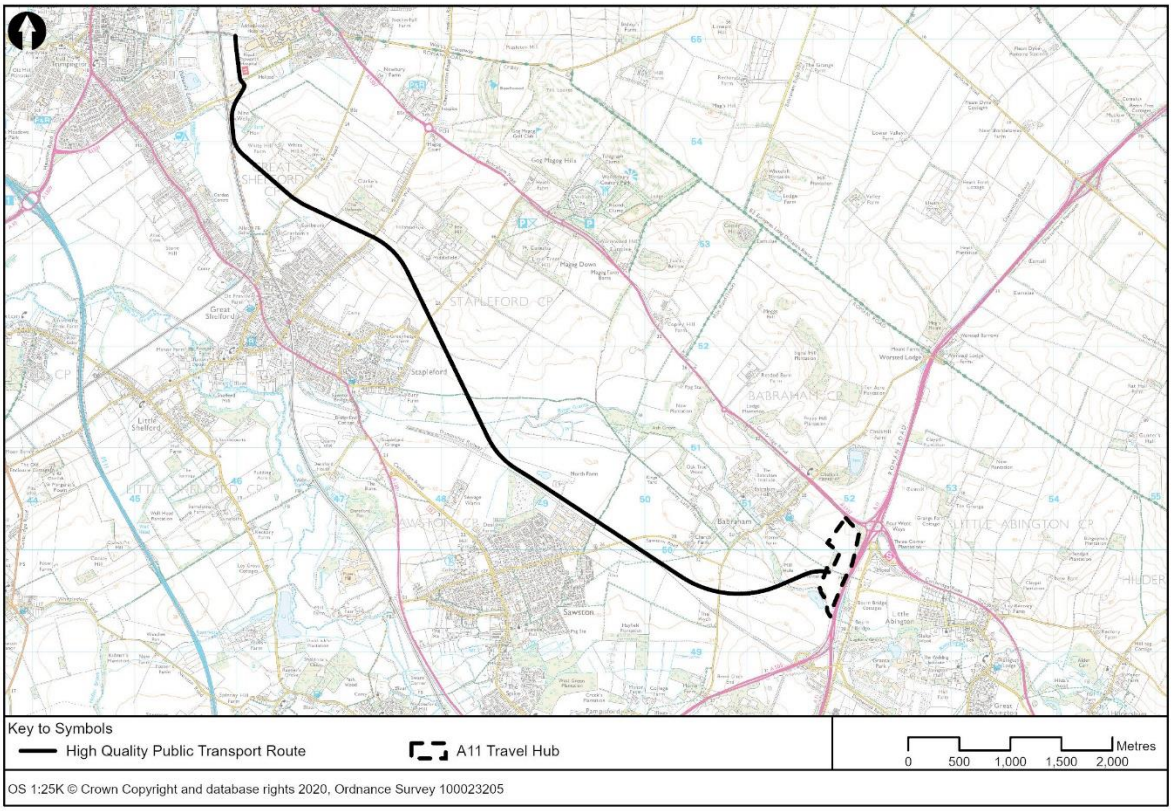
There are a number of sub-elements to the CSET Scheme as described below:

- Where the route is independent of the existing road network it is referred to as "the segregated alignment";
- Where the route is along existing roads the route is referred to as "the on-road alignment";
- The segregated shared use path for pedestrians, cyclists and equestrians is referred to as the shared use path;

- Stops are those places where passengers can get on or off the HQPT along the route;

Figure 1.1 shows the location of the CSET Scheme in the context of Cambridge and its surroundings.

Figure 1.1: CSET Scheme Location



Source: Mott MacDonald

1.3 Other Transport Schemes in the Area

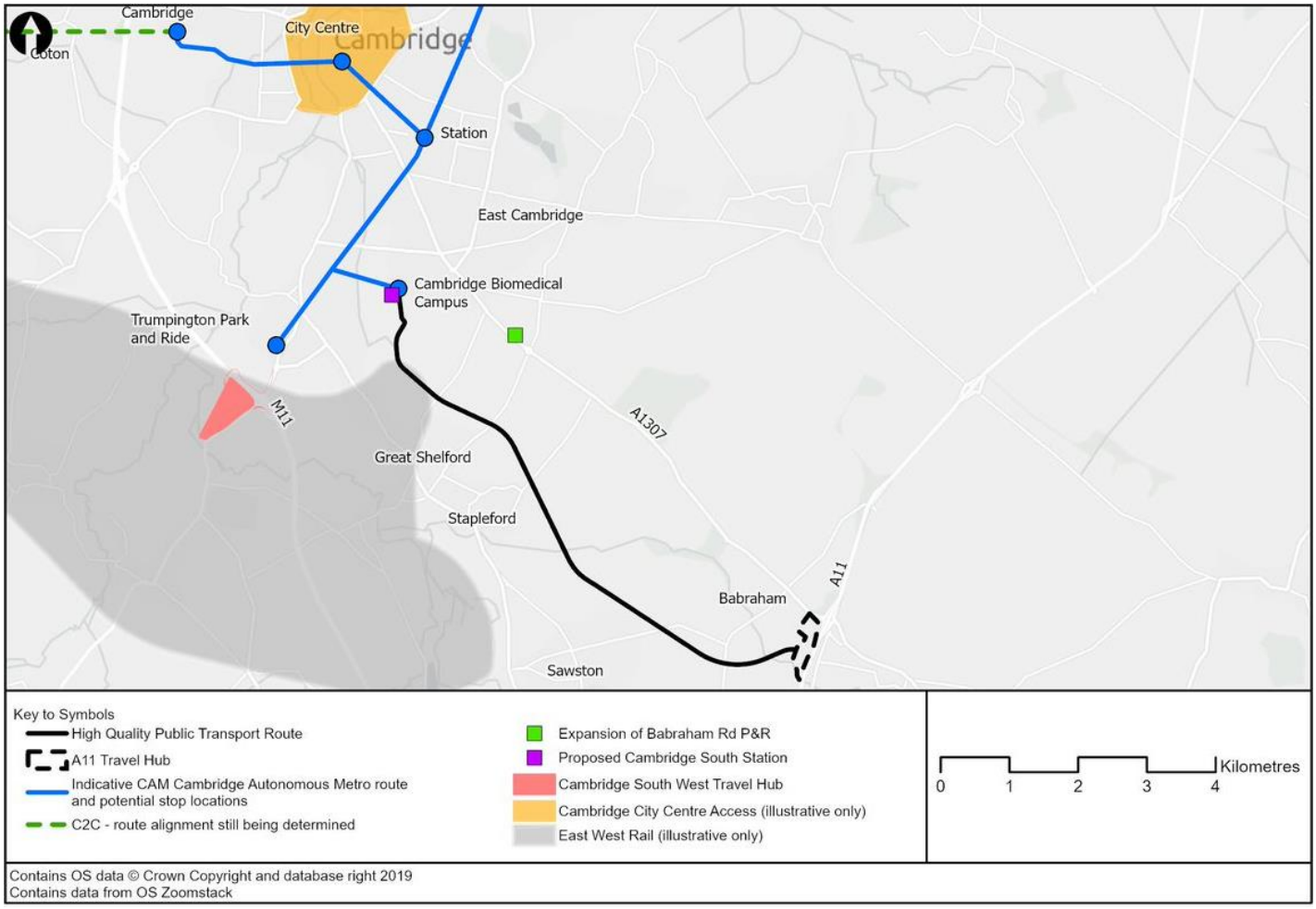
There are a number of transport schemes in the area between Babraham and Cambridge at various stage of development (not all are committed but are in the process of being developed). These include;

- A505 Royston to Granta Park Study
- East West Rail
- Cambridge South Station
- Cambridge Autonomous Metro (CAM)
- Cambridge City Centre Access
- Greater Cambridge Partnership – CSET Phase 1 Schemes
- Sawston Greenway

- Whittlesford Rural Travel Hub

A map showing the location of other schemes in the greater Cambridge area is given in Figure 1.2. The schemes will either be assessed as part of the cumulative impact assessment or within the Transport Assessment (depending on how well developed the schemes are at the time of preparing this Environmental Statement (ES)).

Figure 1.2: Other Transport Schemes in the Cambridgeshire area



Source: Mott MacDonald

1.4 Preferred Scheme Optioneering

The development of the CSET Scheme has taken place since 2016. A full outline of the Optioneering process since then is summarised in Section 18 of the Strategic Case[1] (document reference: 403394-MMD-BCA-00-RP-BC-0247). This sets out the various stages of options appraisal that have been undertaken to identify a preferred scheme.

[1] Mott MacDonald, (2020). Outline Business Case – Strategic Case. Available online at: https://www.greatercambridge.org.uk/asset-library/Transport/Transport-Projects/CSET/Outline-Business-Case-2020/CSET-OBC-Strategic-Case-403394-MMD-BCA-00-RP-BC-0247-Rev-C.pdf

In order to identify a preferred option, five shortlisted options were appraised which were made up of:

- Travel Hub Site A between Babraham and the A505 and a HQPT route from the hub site to CBC, this was called the Purple Option
- Travel Hub Site B between Babraham and the A11/A1308 junction, and a HQPT route that followed one of two route alignments between the hub site to CBC (making up two options called the Brown and Pink Options)
- Travel Hub Site C to the east of the A11 and north of the A1308 and a HQPT route that followed one of two route alignments from the hub site to CBC (making up two options called the Blue and the Black Options)

These options were appraised from multiple perspectives utilising three mechanisms:

1. Multi-Criteria Assessment aligned to the Scheme's objectives based on the Department for Transport's (DfT) WebTAG guidance (including environmental appraisal of the options under consideration that took specific account of air quality, climate change, noise, landscape and townscape, heritage, biodiversity and water resources);
2. Benefit Cost Ratio (BCR) calculation and Value for Money (VfM); and,
3. Consultation Feedback – information on consultation to date is provided in Section 3.

Following an assessment against the above referenced elements, the preferred route alignment was either the Brown route based on the multi-criteria assessment and consultation or the Purple route based on the BCR. The Black and Blue route options which connected to Travel Hub Site C were discounted from further consideration.

In order to assess the relative advantages and disadvantages between Travel Hub Site A and Site B, further analysis was undertaken using VISSIM microsimulation modelling software to consider the traffic impacts of the two Travel Hub sites and associated access junctions, it was found that there was no material difference in traffic impact between the two options.

Following consideration of all of the appraisal perspectives and mechanisms outlined above, it was concluded that the Brown route option to Travel Hub Site B was the best performing option in terms of both route alignment and Travel Hub site, performing best under the multi-criteria appraisal process and being the preferred option in the public consultation, while ranking second for VfM.

Although the BCR calculation showed that the Purple Option provided the best VfM, this is only one element of rationale for implementing the CSET Scheme and it considers only a narrow set of economic criteria in the appraisal process. The main factor influencing the better performance of the Purple Option in terms of VfM relative to the Brown Option is the lower cost of the Purple Option. This reflects the shorter route length require to connect to Site A and avoidance of the need for a second crossing of the River Granta. However, Site A had poor access from the A11 and A1307 which negated this benefit.

Travel Hub Site B ultimately had greater potential to fulfil the role of a multi-modal Travel Hub and to facilitate enhancements to sustainable transport connectivity to both CBC, Babraham Research Park and Granta Park than Site A. Travel Hub Site B is also better located to intercept traffic on both the A1307 and A11, and to act as a public Transport Hub than Site A, to which access is compromised by the lack of a northbound exit from the A11 at the A505 junction. Site A is also more remote from Granta Park than Travel Hub Site B.

The Brown route from Travel Hub Site B (henceforth referred to as the A11 Travel Hub) was therefore determined to be the best option to recommend to the GCP Executive Board for EIA and design development to support a future Transport and Works Act application to DfT.

1.5 Transport and Works Act 1992 Requirements

For the purposes of consenting the CSET Scheme, an application is required to be made to the Secretary of State for an order under the Transport and Works Act 1992. If authorised, the resulting Transport Works and Act Order (TWAO) would provide the relevant powers for the construction, maintenance and operation of the CSET Scheme.

The procedure for TWAO applications is described in The TWA (Applications and Objections Procedure) (England and Wales) Rules 2006 (the Application Rules). The Application Rules, as amended by the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017, provide that an application for a TWAO shall (unless the Secretary has made a direction under rule 7(3)), be accompanied by an ES. This Rule is applicable if the project for which consent is sought is of a type mentioned in Annex I of the EIA Directive[2], or of a type mentioned in Annex II of the EIA Directive unless, in the case of an Annex II project, the Secretary of State has issued a negative screening opinion under rule 7(13).

The CSET Scheme does not fall within the types of development listed in Annex I of the EIA Directive. Annex II of the EIA Directive lists projects for which the process of environmental impact assessment is required to be followed where they are likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location. Although Annex II does not list rapid transport schemes as a single category of project, the component parts of the CSET Scheme fall within Annex II (10) categories of infrastructure, as set out below:

(a) urban development projects, including the construction of shopping centres and car parks;

(b) the construction of inter-module terminals; and

(c) the construction of roads.

The Applicant considers that the CSET Scheme should be regarded as an Annex II project. As such, the EIA process is required to be applied if the Scheme is predicted have likely significant environmental effects.

1.6 Environmental Impact Assessment

The process of EIA is intended to ensure that a decision-maker has full information on the likely significant environmental effects of certain types of projects before deciding whether or not to grant consent. The process requires specified information to be provided by the applicant and for consultation to be undertaken with consultees and members of the public so that information provided by them can also be taken into account in the decision-making process. The Secretary of State for Transport cannot lawfully grant a TWAO for the CSET Scheme without taking into account the environmental information required. This comprises the information provided by the Applicant in the form of the ES and any further information, any representations made by specified consultees and any representations duly made by any other person about the environmental effects of the CSET Scheme.

[2] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, amended by Directive 2014/52/EU.

The Applicant requests that the CSET Scheme is considered as a Schedule 2 development under the Application Rules for which EIA is required. This is because the Applicant considers that the information available suggests that the CSET Scheme will give rise to likely significant environmental effects during the construction and operation of the Scheme. The Applicant intends to submit an ES as defined in Rule 4(1) of the Application Rules in support of the proposed TWAO application. The ES will be produced by competent experts.

Under Rule 8 of the Application Rules the Applicant now requests that the Secretary of State issues a scoping decision in relation to the CSET Scheme.

1.7 Purpose of this ES Scoping Report

This document is the ES Scoping Report for the CSET Scheme. It is prepared in support of the request made under rule 8(1) of the Application Rules requesting the Secretary of State (SoS) to issue a scoping decision as to the information to be provided in the ES for the CSET Scheme. This Report is based on the requirements of Rule 8(2) under the Application Rules.

The report identifies and describes the key environmental information that will be considered and reported (in the form of technical chapters) in the ES. In doing this the following is presented:

- Plans and drawings to show the extent of the land affected by the proposals (see Figure 1.1 and in Figures 2.2 to 2.7);
- A brief description of the nature and purpose of the proposed works (see Sections 2 to 4).

Furthermore, in sections 5 to 19 the following information is presented:

- A brief description of the possible effects on the environment of the proposed CSET Scheme in relation to different environmental receptors;
- The assessment methodology that will be used to produce each technical assessment;
- The environmental surveys and studies required to evaluate the baseline conditions, and
- Any environmental matters of substance that are not considered likely to create potentially significant environmental effects. Such matters are proposed to be ‘scoped out’ (i.e. not considered further) in the EIA for the CSET Scheme.

1.8 Acknowledgement

The preparation of this Scoping Report has benefitted from consultation meetings with officers of CCC, SCDC, Cambridge City Council, the Environment Agency, Natural England and Historic England. Consultation has also been undertaken with key community stakeholders through a Local Liaison Forum (LLF), and two working groups (covering Non-Motorised User (NMU) needs and Landscape, Heritage and Ecology interests).

2 CSET Scheme Description

2.1 Project Need

To meet the growing economy in the project area the role of the CSET Scheme as defined in the OBC is as follows:

"Delivery of new, sustainable transport infrastructure is fundamental to securing the rate of growth anticipated for south east Cambridge. A new public transport route, associated Travel Hub and cycling and walking infrastructure will provide existing, new and growing communities to the south east of Cambridge, in South Cambridgeshire and beyond, with improved access to jobs, services and other opportunities in and around the city.

Investing in sustainable travel and providing a viable and attractive alternative to car travel could encourage a modal shift, reducing reliance on private car travel and its damaging effects on the environment, economy and quality of life for users now and in the future".

The Cambridgeshire and Peterborough Independent Economic Review[3] found evidence that, across the regional economy, growth is higher than official figures suggest. Examination of employment growth in individual companies suggests firms are increasing employment at a rate greater than that captured by ONS data; similarly, turnover growth is strong. There are, however: "*major doubts as to how well the area is set up to cope with future growth, particularly where the strain is already evident*."

Based on this evidence, and in line with existing policy and strategies, the key underlying drivers for the need for change along the A1307 route and for investment in the CSET Scheme can be summarised as follows:

- The A1307 is a key radial route between central Cambridge and Haverhill which serves the CBC and other employment centres, such as Babraham Research Campus and Granta Park.
- Many of the staff working at the CBC, and at other employment hubs along the A1307, do not live in the immediate area, resulting in a high number of commuter trips. The geographical distribution of the workforce, coupled with limited modal choice has resulted in a car dependent culture, resulting in congestion and capacity constraints.
- There is large-scale commercial and residential led development across south east Cambridge as well as in Haverhill.
- Employment is growing rapidly within Greater Cambridge[4], including within destinations around the city such as CBC on the southern edge, with a need to provide effective transport connections from existing and future settlements.
- At present, transport infrastructure in south east Cambridge is not adequate to accommodate demand associated with the level of proposed development.

[3] The Cambridgeshire and Peterborough Independent Economic Review (CPIER) Final Report published on the CPIER website - https://www.cpier.org.uk/final-report/

[4] The Greater Cambridge area covers the footprint of the Cambridge city and South Cambridgeshire district councils – as defined in the City Deal agreement. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/321722/Greater_Cambridge_City_Deal_Document.pdf

- Active travel infrastructure[5] is inadequate or non-existent in some areas along the A1307 route, and does not cater for existing demand, nor does it encourage uptake for these journeys.
- Congestion on the route means that current public transport services are unable to offer an attractive alternative to a private car.
- The A1307 corridor to Haverhill is detached from the rail network as it does not have easy access to a train service into Cambridge.
- Failure to deliver new public transport infrastructure and walking and cycling provision will further exacerbate congestion and delay along the corridor, as users are left with no alternative option other than to travel by car.

2.2 CSET Scheme Location and Surrounding Area

As shown in Figure 1.1, the CSET Scheme lies to the south east of Cambridge, running for approximately 8.5kms between the A1307/A11/A505 junction and CBC skirting the eastern edges of Sawston, Stapleford and Great Shelford. In addition, it is proposed that connections will be provided from the Travel Hub to Babraham, Babraham Research Campus and Granta Park. 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 the stations and Cambridge City Centre via the Busway. The CSET Scheme will provide improved connectivity for peripheral communities such as;

- Linton;
- The Abingtons;
- Babraham;
- Pampisford;
- Sawston;
- Stapleford, and;
- Great and Little Shelford.

The majority of the CSET Scheme runs on a new off-road alignment for the segregated carriageway. This alignment is proposed to be on land used for agricultural purposes (largely arable) and some land that is occupied by grassland, woodland or scrub. The Travel Hub and the length of the route until the CBC Boundary is within the Cambridgeshire Green Belt.

The CSET Scheme would cross five public roads, bridleways and Public Right of Ways (PRoW) which would remain open during operation but may require temporary closure or diversions during construction. The CSET Scheme would also cross the River Granta in two locations.

2.3 CSET Scheme Route - Detailed Description

The route is divided into a series of sections which are described below. Where reference is made to the route this includes a segregated non-motorised user path intended for shared use by pedestrians, cyclists and equestrians (here after referred to as the share used path) and the HQPT road. Stops and crossings are identified in the description below where appropriate.

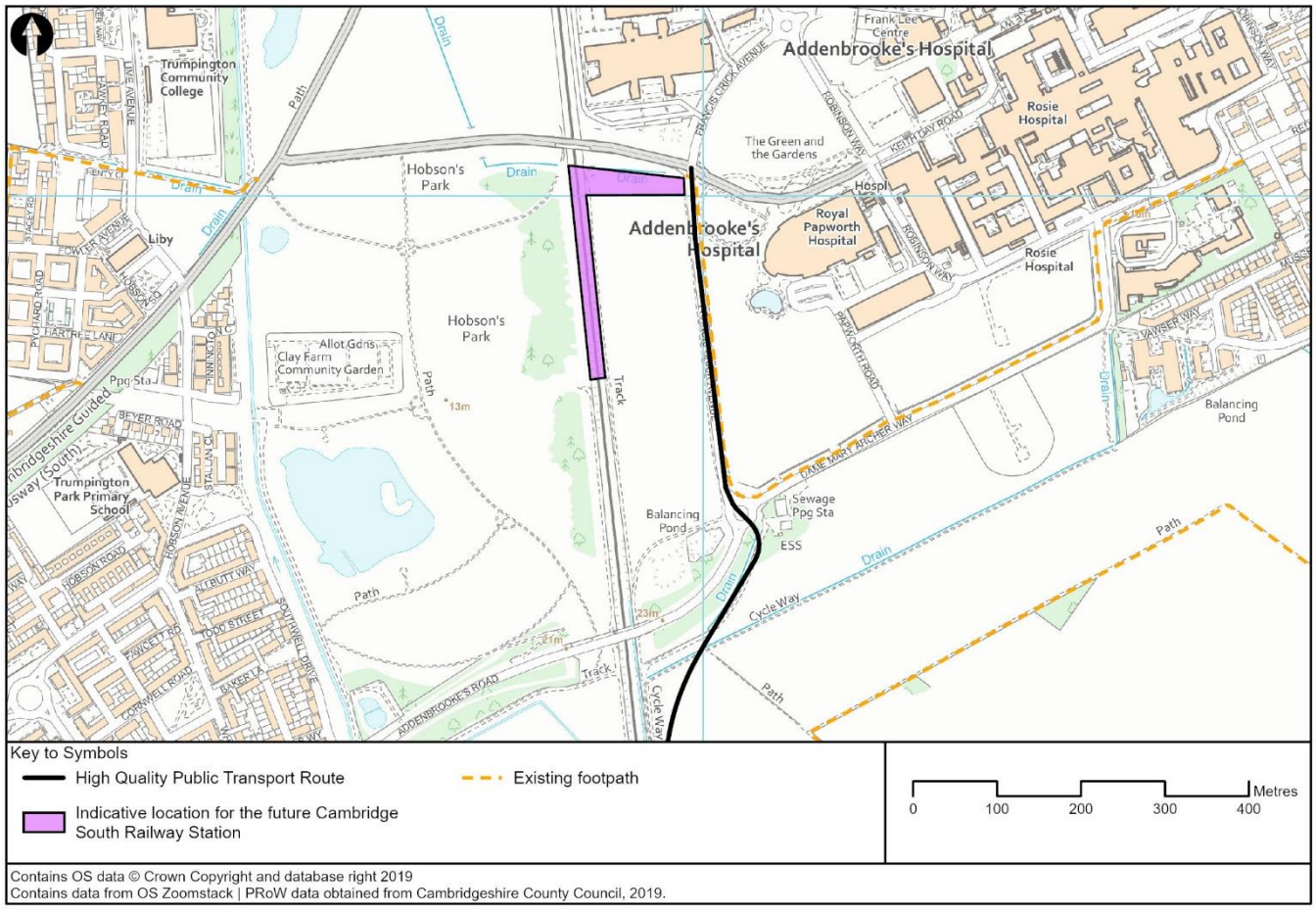
[5] Designed to support and encourage travel using physical means such as walking and cycling, but also including equestrian needs.

2.3.1 Section 1: CBC

The first 680m of the route alignment starts in the CBC at the junction of the existing guided busway with Francis Crick Avenue. The route then runs on the existing road network on Francis Crick Avenue down to the roundabout at the junction of Addenbrooke's Road, Francis Crick Avenue and Dame Mary Archer Way. Along this section of the route there would be a stop for passengers to alight to and from the HQPT, called the CBC Stop. The route would then leave the existing road network on a segregated route towards the existing railway line before heading south as shown in Figure 2.1.

This area will also be the location for the proposed Cambridge South Station being developed by Network Rail. GCP and Network Rail are collaborating on producing an integrated design for this section of the CSET Scheme. The two proposals are happening in similar timescale to the CSET Scheme, but each will be subject to its own environmental assessment and approvals process. The location of the proposed station is shown in Figure 2.1.

Figure 2.1: On-line Route at the CBC

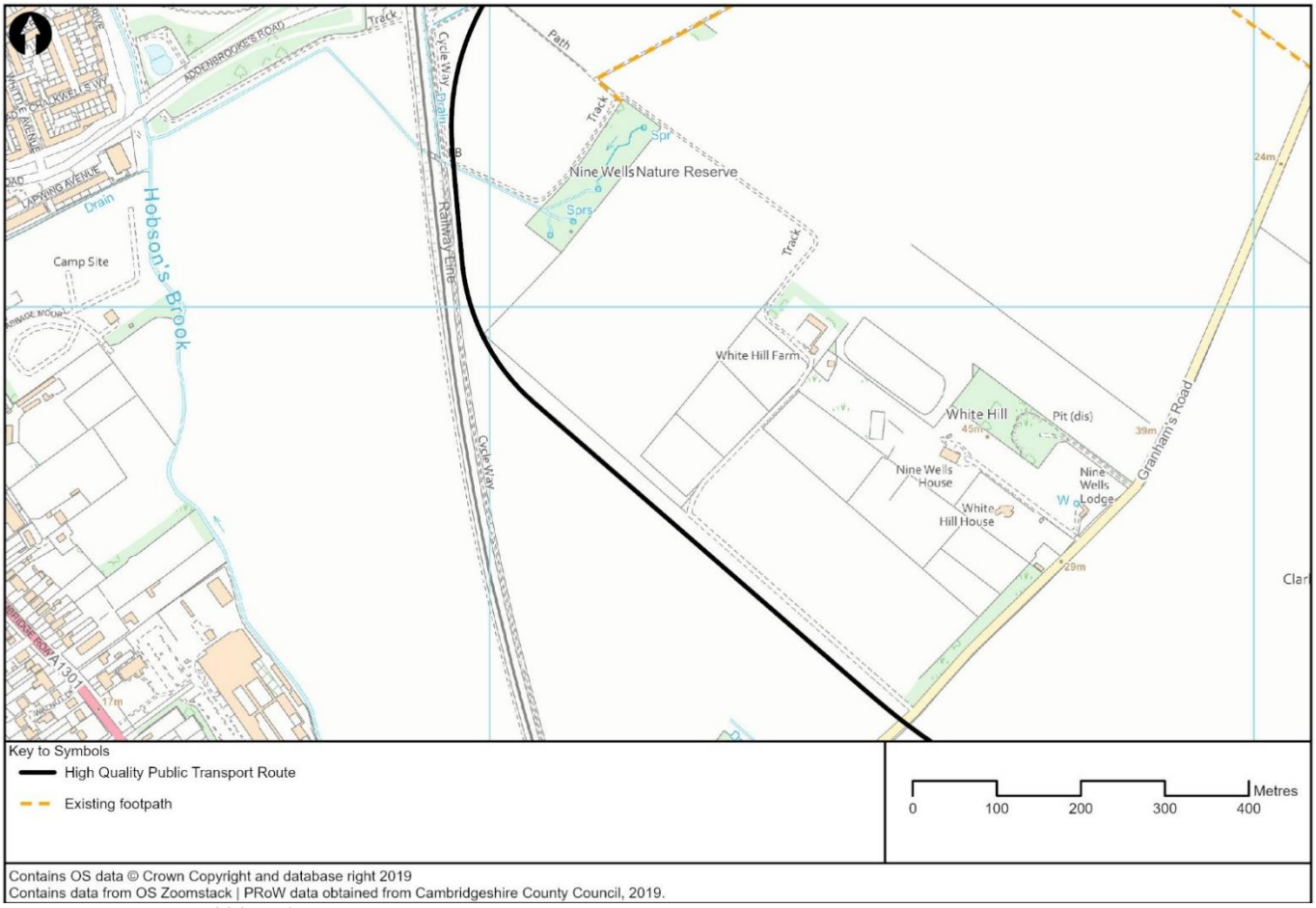


Source: Mott MacDonald (2020)

2.3.2 Section 2: CBC to Granham's Road

The segregated public transport route would then run for 1.18kms to the west of Nine Wells Nature Reserve, adjacent to and parallel with the mainline railway before curving along the eastern hedge line running down to Granham's Road. This section of the route crosses the Hobson's Conduit (a watercourse with historic significance) but is otherwise in arable fields. There are hedge lines that provide breeding and winter shelter habitats for ground nesting and other bird species in this area.

Figure 2.2: CBC to Granham's Road

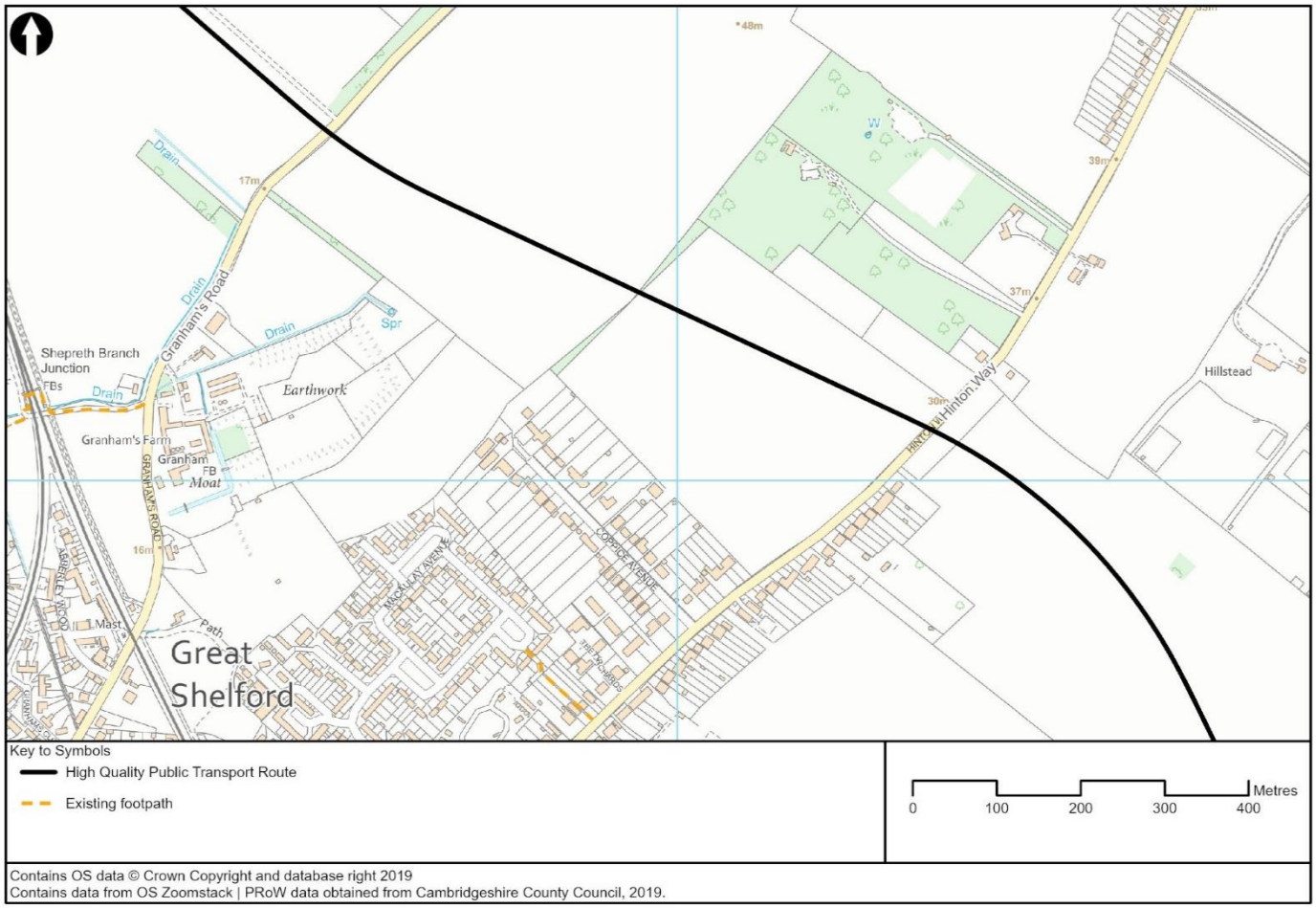


Source: Mott MacDonald (2020)

2.3.3 Section 3: Granham's Road to Hinton Way

The route crosses Granham's Road through a signalised crossing and continues in a south easterly alignment through two fields before crossing Hinton Way. This stretch is about 0.88km long. The route would be close to the easternmost residential properties in Great Shelford where it crosses Hinton Way. There would be a stop at the Hinton Way crossing (the Great Shelford Stop) for local residents to access the CSET Scheme with cycle stands, disabled parking and a pick and drop off point for other passengers. There would be shelters for waiting passengers with real time message boards and lighting provided appropriate to the setting.

Figure 2.3: Granham's Road to Hinton Way

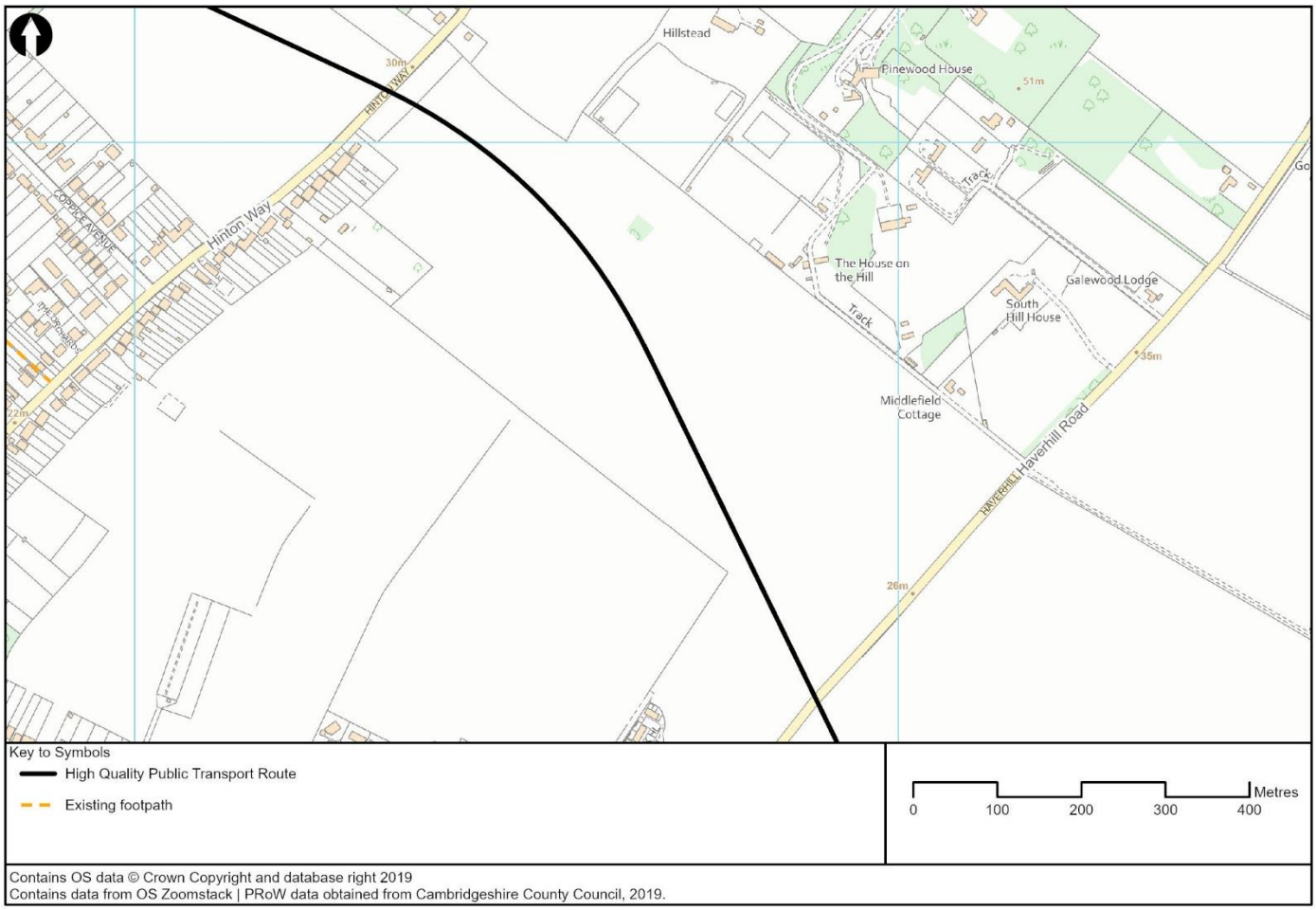


Source: Mott MacDonald (2020)

2.3.4 Section 4: Hinton Way to Haverhill Road

From Hinton Way the route runs for a short distance across arable fields to the crossing with Haverhill Road (total distance about 1km). On the southern side of the Haverhill Road signalised crossing there would be another stop – the Stapleford Stop. This would have the same facilities as described for the Great Shelford Stop.

Figure 2.4: Hinton Way to Haverhill Road



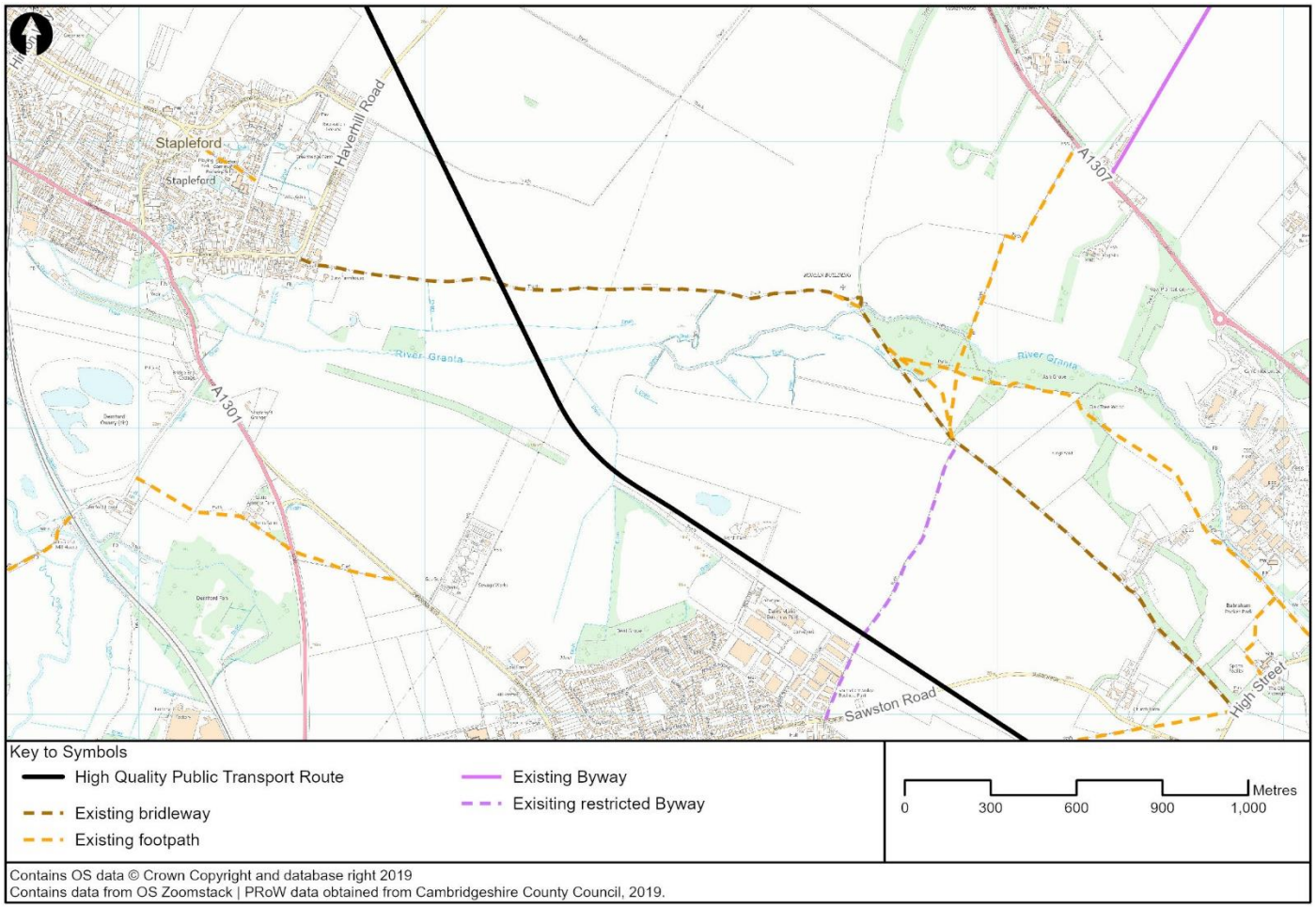
Source: Mott MacDonald (2020)

2.3.5 Section 5: Haverhill Road to Sawston Road

This section of the route is about 3kms long and crosses a Public Right of Way (PRoW 212/2 which is a bridleway), the River Granta flood plain and river channel (a County Wildlife Site) and PRoW 12/10 (a restricted byway). The river crossing in this section is called the River Granta (Stapleford) crossing to differentiate it from a second crossing of the river further south along the route.

The land use for the majority of the route is arable fields with some pasture and scrub and tree belts between the River Granta crossing and Sawston Road. There route also passes within a residential property at North Farm where the route is parallel to a disused railway alignment. The route is close up to the boundary of the South Cambridge Business Park in Sawston (an area of light manufacturing and storage facilities). Between the business park and Sawston Road the field is designated for new housing which has commenced construction. At the Sawston Road crossing there will be another stop, called the Sawston Stop, with similar facilities to those described for the Great Shelford Stop.

Figure 2.5: Haverhill Road to Sawston Road

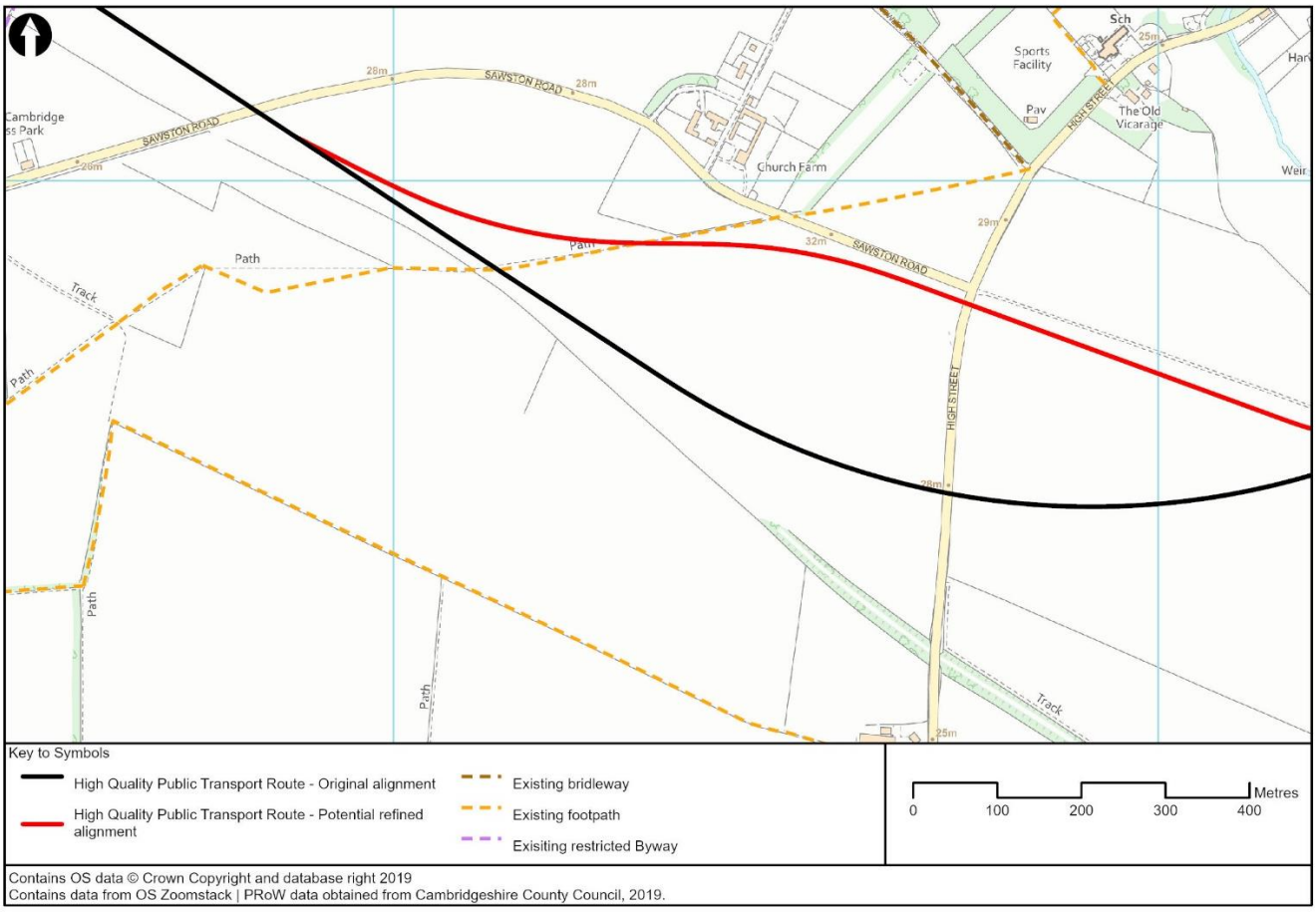


Source: Mott MacDonald (2020)

2.3.6 Section 6: Sawston Road to High Street

From Sawston Road the route continues for about 1km in a south easterly direction to where it crosses the High Street that runs into Babraham. In this area, there are currently still two route options under consideration which are shown in Figure 2.6. The route options will be evaluated taking into account feedback on the refined alignment (red line below) compared to the original alignment (black line below). The land use in the area is arable fields and there is one public footpath (PRoW 12/9) crossed in this stretch.

Figure 2.6: Sawston Road to High Street



Source: Mott MacDonald (2020)

2.3.7 Section 7: High Street to A11 Travel Hub

From the High Street crossing the route curves around in a north easterly direction to enter into the Travel Hub site, crossing the river at the River Granta (Babraham) crossing. This section is around 1.08kms in length. In this area, there are currently still two route options under consideration which are shown in Figure 2.7. The route options will be evaluated taking into account feedback on the refined alignment (red line below) compared to the original alignment (black line below).

The Travel Hub is located to adjacent to the A11, south west of the separated grade junction between the A1307 and A11. General traffic would access the Travel Hub off the A1307 via a

new roundabout junction. The Travel Hub will cover an area of approximately 15.5ha – further details are provided in Section 2.5.3.

There is a high pressure gas main running south-south-west to north-north-east on the western boundary of the Travel Hub. This fixes the potential Travel Hub layout to a 200m wide strip of arable field between the gas main and the A11. The CSET Scheme would cross the main near to the departure/entrance of the HQPT route to the Travel Hub.

There is a public footpath (PRoW 12/4) which traverses the Travel Hub site and crosses the A11 across an existing footbridge. Improving the access for cyclists and pedestrians to the footbridge on either side of the A11 would form part of the CSET Scheme.

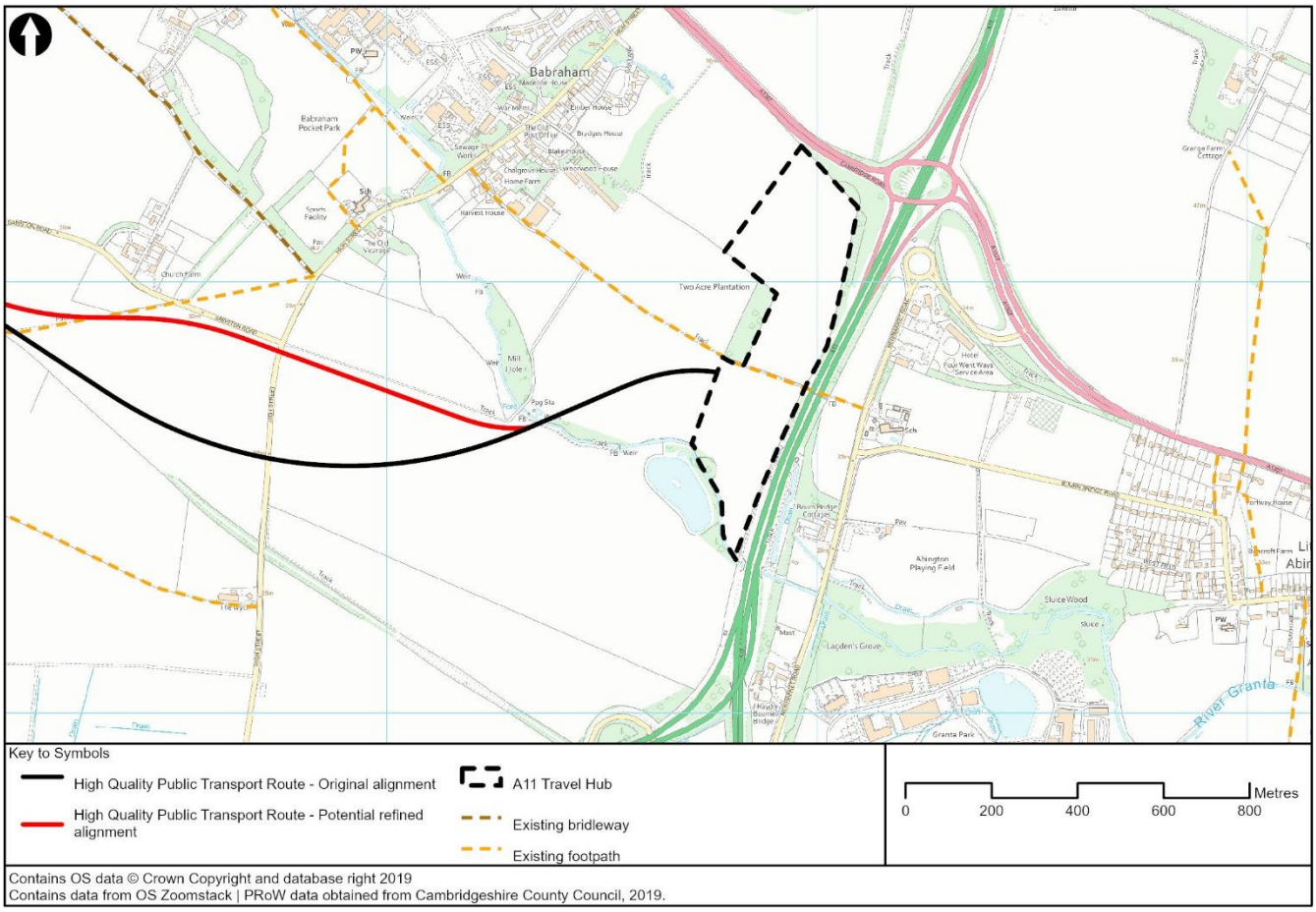
Equestrian access to cross the A11 is being considered via a new path alongside the A11 down to the River Granta passing under the A11 and then back alongside the A11 to the footbridge.

Pedestrian and cycling access to the Babraham Research Park and Granta Park from the Travel Hub is likely to form part of the CSET Scheme. These new access routes are still being identified.

The southern part of the Travel Hub site is in Flood Zones 2 and 3 of the River Granta, in this area the site drainage will be completed along with suitable habitat creation but there would be no car parking or other infrastructure in this area.

The parking areas, access roads and user facilities would be lit with LED lighting columns.

Figure 2.7: High Street to A11 Travel Hub



Source: Mott MacDonald (2020)

2.4 CSET Scheme Operating System

GCP's objective is to deliver a Scheme that provides a modern, guided HQPT service. GCP is currently pursuing technological guidance systems for CSET, with an idea of moving away from a physical guidance system. This is being considered for a number of reasons including the restrictions of a physical guidance system impacting future proofing in relation to other schemes. In this regard, GCP is working with the Cambridgeshire and Peterborough Combined Authority (CPCA) to ensure the CSET Scheme is aligned with the emerging proposals for the Cambridge Autonomous Metro (CAM).

The GCP undertook a market sounding exercise in October 2018 to determine market interest and the availability of technological guidance solutions for deployment on the Cambridgeshire Rapid Transit schemes. Six guidance technology options have been investigated:

- Kerb;
- Optical;
- Trolley;
- Slot/rail;

- Magnetic; and
- Wire/cable.

The exercise concluded that both kerb guidance and optical guidance achieve most or all of the guidance requirements for the CSET Scheme and should both be developed/investigated further (see the Options Study Report produced for GCP[6]).

To robustly account for either scenario, the ES will assess both kerb and optical guidance systems. The ES will take a 'Rochdale Envelope' approach to the assessment of these options as discussed further in Section 4.5 of this Scoping Report.

Although the physical infrastructure required for each system would differ slightly, the overall CSET Scheme footprint would be broadly similar and each could operate on the route alignment described in Section 2.3. The key differences between the two systems on the design of the CSET Scheme is discussed further at Sections 2.5.1 and 2.5.2. A comparison of the environmental impact between the guidance options is presented in Chapter 4 at Table 4.1.

Irrespective of which operating system is employed, the CSET Scheme will include the following facilities:

- A suitable segregated carriageway for the HQPT vehicles.
- Four number stops at CBC (CBC), Hinton Way (Great Shelford), Haverhill Road (Stapleford) and Sawston Road (Sawston).
- Travel Hub with capacity for around 2,800 cars at the A11 Travel Hub site to the east of the A11, with HQPT pick up/drop off point, coach parking, waiting room and welfare facilities, possibly solar panel power generation, connections to shared use paths, secure cycle parking, recharging points for electric powered vehicles.
- Signalised junctions with priority for the HQPT vehicles where the route crosses existing roads (e.g. Granham's Road, Hinton Way, Haverhill Road, Sawston Road and High Street).
- Non-motorised user path for the full length of the CSET Scheme within the route corridor.
- Appropriate environmental mitigation and landscaping to deliver Biodiversity Net Gain (BNG) along the route.

2.5 Scheme Design Description

This section outlines the two design options available for the CSET Scheme. Appendix A includes drawings showing the current outline design of the proposed CSET Scheme, that is based on an optical guidance system. The optical guidance system has a slightly larger footprint than the kerb-based guidance but there is no marked difference between the land take requirements of the guidance systems (see Figure 4.1) nor in the infrastructure and design elements required for each.

2.5.1 Optical Guidance Design

The Applicant is working to develop a design that utilises an optically guided system as it's preferred guidance mechanism. Optical guidance systems are typically deployed on a single standard asphalt road surfacing of about 7.3m width that would permit bi-direction movement of the HQPT vehicles. Higher specification pavement construction would be required, compared to a standard carriageway to avoid channelisation of the surface as the vehicles follow the same path as they follow the optical line. The design parameters for optical guidance would be

[6] Mott MacDonald (2020), Outline Business Case. Appendix C: Guidance Technology Options. [Online]. Available at: https://www.greatercambridge.org.uk/asset-library/Transport/Transport-Projects/CSET/Outline-Business-Case-2020/CSET-OBC-Appendix-C-Guidance-Technology-Options-403394-MMD-BCA-00-RP-BC-0369-Rev-B.pdf

expected to be closely aligned to commonly understood road construction guidance and regulations e.g. Department for Transport DMRB.

Optical guidance systems use the following technology to operate:

- A camera at the front of the vehicle constantly records a defined area, scanning bands of paint on the ground representing a reference path.
- An on-board computer which combines signals obtained from a camera with the dynamic parameters of the vehicle to generate commands. Parameters include:
  - Vehicle speed.
  - Yaw rate (turning angle around the vehicle's axis).
  - Steering wheel angle (to detect deviations).
  - Commands are transmitted to the guidance motor on the steering column to correct any deviation of the vehicle from the reference path.

Benefits of the technology include:

- It allows for precise positioning at boarding platforms, helping those with limited mobility as access can be perfectly aligned.
- Vehicles can follow a fixed path around corners.
- Technology can be retrofitted to any HQPT vehicle.
- Smooth transition between continuous guidance and no guidance modes.
- Limited fixed infrastructure required.

The carriageway would be drained through a positive drainage system design in accordance with standard design principles and would be SuDS compliant.

2.5.2 Kerb Guided Design

Should an optically guided scheme not be possible then an alternative method of guidance would involve some form of kerb guidance. A kerb guided design (sometimes referred to as side guidance in other documents) would involve the construction of robust kerbs (generally concrete) at prescribed widths to accommodate the guidance mechanism installed on the vehicles on both sides of the carriageway. There is a separate carriageway for each direction of travel, so there would be two carriageways along the route. The width of the two carriageways would normally be around 6.3m in total, less than a conventional two-lane carriageway.

A kerb guided system will require the ability for emergency vehicles to gain access to the any point on the route. This would be enabled by providing access along the non-motorised user path, which would need to be a minimum of 4m wide to accommodate the emergency access.

Construction would potentially take longer than for an optical system and require higher quantities of raw materials.

Kerb-guided systems all have the following distinct attributes:

- Small horizontal guide wheels fixed to the steering track of the vehicles using the system.
- Horizontal wheels on axles make contact with the kerbs, guiding the vehicle.
- The vehicle approaches a guided section at low speed, ensuring a smooth entry.
- On the guided section the driver only controls the acceleration and braking.
- The width of the guided section is determined by the width of the vehicle and the additional guidewheels.

Benefits of the technology include:

- The guideway allows for high speed operation (over 85 km/h on the existing CGB) despite narrow corridor.
- A narrow guideway takes up less space than a conventional multi-vehicle road (3.2/6.3m as opposed to 3.5/7.3m).
- Allows for precise positioning at boarding platforms, helping those with limited mobility as access can be perfectly aligned.
- Technology can be retrofitted to any vehicle.

2.5.3 Travel Hub Design

The Travel Hub will be designed to segregate the movement of the HQPT vehicles from cars using the parking areas. Current assessment is that there will be up to 2,800 car parking spaces, and there may be some coach parking for visiting coaches to Cambridge.

The potential for solar photovoltaic (PV) panels to be installed over some of the car parking area will be investigated, as has been carried out on the Cambridge South West Transport Hub Scheme. The PV panels, if included, would be on roofs over parking areas, about 5 metres above the ground level of the Travel Hub.

There would be a building providing a waiting area, welfare facilities and shelter for passengers. There would be facilities to purchase tickets and provide information on the services and the Travel Hub operations for the site users.

The drop off/pick up points would have real time displays to indicate waiting times between services.

Lighting would be LED lighting on overhead columns that minimises light spillage and potential impacts on sensitive receptors.

2.5.4 Non-Motorised User Path

Along the entire route it is planned to create a shared use path to a design that meets the current and future demand from walkers, cyclists and horse riders. Along the majority of the route the new shared use path would provide a new facility and would be segregated from other road users.

There are a number of guidance documents setting out how non-motorised user facilities should be designed. GCP intends that this path be a multi-user facility and will generally have a design that provides for shared use across different user groups.

If a kerb-guided solution is adopted, then the shared use path will be at least 4m wide at all points and will provide the emergency access route along the route. For an optically guided system the shared use path would generally be 3m wide.

The shared use path will be designed taking into account system requirements, demand projections of use, safety considerations and stakeholder views.

A Non-Motorised User Working Group has been set up by the GCP to review and contribute advice and input to the design of the shared use path.

2.5.5 Environmental Design

The design of the CSET Scheme is iterative, meaning that as constraints and opportunities have been identified to-date they have been taken into account in the design, so far as possible. The Applicant expects that further iterations of the detailed design will be made during the process of compiling the ES as a result of the consultations, evaluations and assessments undertaken. It is expected that the ES will distinguish between the following categories of measures:

- Measures that are embedded in the description of the CSET Scheme: these will be presented in the ES as part of the description of the development for which the TWAO is sought;
- Measures that are not embedded within the description of the CSET Scheme but that are known to be effective, for example because they are industry standard construction measures or required to be undertaken under other regulatory frameworks. These will be described in documents to be submitted with the application, for example a code of construction practice and/or construction environmental management plan, and whose delivery will be secured either through the TWAO and deemed planning conditions or through other regulatory frameworks (e.g. species licences or environmental permitting);
- Measures that are proposed to avoid or reduce likely significant environmental effect that are identified during the preparation of the ES but are not embedded measures nor best practice construction techniques. The Secretary of State may wish to consider the imposition of monitoring requirements in respect of mitigation measures proposed in respect of likely significant environmental effects and the ES will identify any such measures where monitoring may be appropriate;
- During the course of following the mitigation hierarchy of avoiding, reducing, remedying, compensating and off-setting likely significant effects, consideration will be given to the potential for enhancements to the environment, although these will not be considered as part of the assessment process to avoid obscuring potential likely significant environmental effects.

At this stage of the Scoping process the key elements relevant to the environmental design are considered to include:

- Biodiversity: The Applicant is committed to delivering a minimum Net Biodiversity Gain of 10% for this project but aspires to achieve 20%. This gain will be achieved by identifying areas for suitable new habitat of high quality to be created along the route. The habitat will be designed to fit into the landscape setting.
- Heritage: the first stage in planning the mitigation will be intrusive surveys (trial trenching) as part of the EIA, to build on geophysical and walkover surveys. Designs to preserve or protect heritage assets will be documented in the environmental design.
- Fitting into the Landscape: The majority of the route alignment from CBC to the Travel Hub site at Babraham, crosses an open area of Green Belt. The design of the CSET Scheme will need to fit into the landscape setting as closely as it can. This may mean the landscaping design focuses on minimising the footprint whilst screening close and distant views of the CSET Scheme.
- Visual Impact on Residents: There will be screening included in the design to minimise the visual impact of the CSET Scheme on residents where this is practical, particularly in the setting of Sawston, Stapleford and Great Shelford.
- Noise impacts: Design of noise mitigation will be considered in areas where noise sensitive receptors are adversely affected by operational noise. These receptors are understood to be

located closest to the scheme alignment and include residential properties near Sawston, Stapleford and Great Shelford.

- Lighting: all lighting will be designed to minimise both vertical and horizontal light spill. Lighting will only be installed in areas of high use, i.e. road crossings, stops along the route, and on the Travel Hub. The shared use path will have solar studs or similar lighting to provide an indication of the path layout in the darker areas of the countryside.
- Climate change: the design will aim to reduce embedded carbon in the final CSET Scheme design. Opportunities for further refinement during detailed design will be highlighted in the environmental design.
- Climate change: the design will include installation of photo-voltaic panels to provide a renewable energy source for the operation of the Travel Hub.
- Climate change: the design will factor in climate change to ensure the CSET Scheme is resilient to changes in climate, particularly in relation to flood risk where the route crosses the River Granta.
- Future proofing against climate change: The design will take into account future climate where the elements of the design cannot be easily modified or upgraded in future. The overall resilience to climate change will be assessed as part of the ES.
- Active travel: the shared use path design aims to encourage and facilitate an increase in all non-motorised users to commute to and from work, and to gain greater access to the Green Belt between Babraham and Cambridge.
- Sustainable urban drainage: the CSET Scheme will include a SuDS drainage design to ensure acceptable levels of discharge from the Scheme, and to treat surface runoff to remove suspended solids, metals and hydrocarbons from discharged water.

2.6 Overall Project Timetable

The indicative programme for the CSET Scheme is provided below.

Table 2.1: Indicative Timetable for CSET Scheme

Key Stage	Target Date
Outline Business Case and GCP Executive Board decision	25 June 2020
Submission of TWAO Application (including ES)	Q3 2021
Public Inquiry (assumed will be required)	Assumed Q4 2021/ Q2 2022
Secretary of State's Decision and GCP Executive Board approval	Assumed Q2/Q3 2020
Procurement, Full Business Case and Final Designs	TBC
GCP Executive Board approval for Construction	TBC
Construction Commences	Assumed early 2023
Handover and Scheme Opening	Assumed Q4 2024

There are no plans to decommission the CSET Scheme at this stage.

3 Consultation

3.1 Consultation to Date

Since the CSET project's inception in 2016 community and stakeholder engagement has taken place using differing methodologies and produced a number of outcomes. The feedback from the wide consultation has informed and shaped the CSET Scheme optioneering process, which has led to the preferred Scheme approved by the GCP Executive Board.

Public and stakeholder involvement has taken place at every key stage in the optioneering process. It has allowed transparency in the development of the emerging CSET Scheme and it has given key stakeholders and communities the opportunity to raise any concerns and provide direct feedback on the proposals. The direct community involvement has provided an understanding of transport users' needs and the impact that a HQPT Scheme could have on their travel behaviour.

Consultations that have taken place include, but are not restricted to, engagement with the following Stakeholders:

- Addenbrooke's Hospital
- Babraham Parish Council
- Babraham Research Campus
- British Horse Society
- Bus Operators
- Cambridge Biomedical Campus
- Cambridge Campaign for Future Transport
- Cambridgeshire City Council
- Cambridge Past, Present and Future
- Cambridge Water
- Cambridge Walking Groups
- Cambridgeshire County Council
- Cambridgeshire Local Access Forum
- Cambridgeshire and Peterborough Combined Authority
- Cambridge University Hospitals NHS Foundation Trust
- CamCycle
- Campaign to Protect Rural England
- C G Myall & Son
- Cheveley Park Farms
- Great Abington Parish Council
- Great Shelford Parish Council
- Haverhill Town Council
- Highways England
- Historic England
- Local Liaison Forum (LLF)
- Little Abington Parish Council
- Magog Trust
- National Express
- National Grid
- Network Rail
- Pampisford Parish Council
- Ramblers Association
- Residents Associations
- Royal Papworth Hospital NHS Foundation Trust
- Sawston Parish Council
- Smarter Cambridge Transport
- South Cambridgeshire District Council
- Sport England

- Countryside Properties
- Creative Places
- Dalehead Foods
- East West Rail
- Environment Agency
- Granta Park
- Stapleford Parish Council
- Stephensons of Essex
- Trumpington Residents Association
- Travelodge Fourwentways
- University of Cambridge, its Colleges and other institutions
- Wildlife Trust

Table 3.1 summarises when consultation has taken place, along with the outcomes and their impact on the CSET Scheme development.

Table 3.1: Consultation to Date

Consultation	Outcome / Impact on Scheme Development
2016 Public Consultation	• The majority of respondents supported the concept of bus, cycling and walking improvements on the A1307. • A preference for solutions to be delivered within the available highway land where possible. • Additional Park & Ride capacity was generally well supported.
January 2017 Local Liaison Forum (LLF) established	• Continuous engagement with LLF throughout Scheme history. • Further work on options development with the LLF. • Provides a platform for the local community and elective representatives to share views and suggestions outside of consultation periods. • Meetings also held in February and September 2017, February, June and September 2018 and June 2019.
2018 Public Consultation	• New public transport links, new and improved walking and cycling routes and road safety improvements along the A1307 between Haverhill and Cambridge were presented. • The consultation presented three strategies for both on-line and off-line routes. • Strategy 1 (off-line) was the most supported overall.
2019 Public Consultation	• Public consultation presented Travel Hub options, proposed stops and shortlisted route alignments for CSET. • There was no majority support for any of the three Travel Hub locations. • There was no majority support for any of the five routes for accessing the Travel Hub sites.
2019 Landholder Meetings	• Landholder meetings took place to ensure those directly affected by the Scheme properly understood the impact of the proposal could have on their land. • Identify route adjustments to minimise the impact of the Scheme on individual landholders and about potential BNG.
May 2019 NMU and Landscape, Heritage and Ecology (LHE) Working groups established	• The working groups provide a forum for technical stakeholders to contribute to the development of the GCP Schemes. • The working groups principles are considered within the CSET Scheme design. • Further meetings are planned once the preferred Scheme during the EIA process.
2019 Joint Projects Working Group established	• The joint projects working group purpose is to identify interfaces between the major transport projects under concurrent development in Cambridge and the surrounding areas. • Meetings held in November 2019 and another session is planned soon after the June 2020 GCP Executive Board Meeting.

Source: Mott MacDonald, 2020

Full details of consultation carried out between July 2016 and April 2020 is presented in the Statement of Community Involvement prepared by Mott MacDonald to accompany the OBC.

3.2 Future Consultation

Ongoing consultation with key environmental statutory bodies will continue, including with local authority officers, Historic England, Natural England and the Environment Agency. Following the Executive Board meeting on June 25th, a period of further engagement with landholders will take place to present the preferred option and explain the impact the route might have on their home, land or business.

Community events for the CSET Scheme are planned for Autumn 2020 – the precise nature of the events will be determined in the light of the emerging COVID-19 public consultation policy from central government[7] together with any relaxations provided for under Rule 18 of the TWA Rules and could require undertaking virtual events[8]. If a public event takes place, it is likely these will be at the same locations as events were held for the optioneering in the following communities:

- CBC
- Great Shelford
- Stapleford
- Sawston

At each event the emerging design will be presented, including information on proposed mitigation measures based on feedback from consultation undertaken during the optioneering process (between 2016 and the end of 2019). Communities will be given an opportunity to comment on the emerging design and their comments will be taken into consideration in developing the final preliminary design of the Scheme. Stakeholders will also be able to review documents on-line and in local libraries and submit comments via GCP's website or in written form.

Further engagement with directly impacted landowners, and with residents in close proximity to the Scheme alignment, will continue through the EIA process.

3.3 Working Groups

In addition to the project specific engagement with stakeholders two working groups have been established to help to establish a consistent and robust approach for CSET and other GCP Schemes, the two working groups are:

- The Non-Motorised User Working Group; and
- The Landscape, Heritage and Ecology Working Group.

Membership of these working groups includes statutory regulators as well as relevant national and local organisations representing cycling, equestrian, walking, conservation, heritage and landscape interests. The objective is that the two working groups will meet about every month. They have already been instrumental in reviewing and commenting on emerging designs of GCP transport schemes. The outputs from these working groups will continue to inform the ongoing Scheme development for CSET.

[7] The Town and Country Planning (Development Management Procedure, Listed Buildings and Environmental Impact Assessment) (England) (Coronavirus) (Amendment) Regulations 2020 will be applied to all consultation until these regulations are annulled or superseded.

[8] Business and Planning Act 2020

4 Approach to Environmental Statement

4.1 The Scoping Process

The purpose of scoping is to establish the scope and methodology for the ES. As explained in section 1.7, EIA is a process consisting of the preparation of an ES the carrying out of consultation, publication and notification as required by the Application Rules and the undertaking by the Secretary of State of steps required under section 13 B of the Transport and Works Act 1992. The entirety of the process of EIA must ensure that the direct and indirect significant effects of the proposed development on identified environmental factors is identified, described and assessed in an appropriate manner. To ensure that the information provided in the ES is as full as possible to enable the Secretary of State, the public, statutory consultees and others to undertake the necessary assessments, the scoping process enables the Applicant to request from the Secretary of State an opinion on the scope and content of the ES. A Scoping Opinion does not bind the Secretary of State, who may subsequently require further information to be provided in order for the EIA process to be undertaken fully and nor is the Applicant required to adhere to the Scoping Opinion, although the ES should be based on the Scoping Opinion. Scoping is undertaken based on a consideration of the likely significant environmental effects that could arise during the construction and operation of the CSET Scheme. Although there is no prescribed format for an environmental statement, Application Rules 4(1) and 11(1) and Schedule 1 of the Application Rules specify information that must be included in environmental statements:

- A description of the development – the ES will provide a detailed description of the CSET Scheme including:
  - The site location, size and design and other relevant features of the proposed works;
  - a description of the likely significant effects of the proposed works on the environment;

  and land use requirements of the CSET Scheme during the demolition and construction works and the completed development;
  - The main characteristics of the operational phase of the proposed works including the energy demand and the nature and quantity of materials and natural resources using or affected;
  - The expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the CSET Scheme;
- An outline of the reasonable alternatives considered – the ES will report on the design evolution of the CSET Scheme and the alternatives which have been considered and the main reasons for the Applicant's choice taking into account the environmental effects;
- A description of the current baseline state of the environment and an outline of the likely evolution of the environment without implementation as far as natural changes from the baseline can be assessed with reasonable effort – this is likely to largely cover the changes due to climate change given the location of the proposed works is in an area designated as Green Belt land.
- Indication of any difficulties encountered in the EIA – any difficulties encountered including any assumptions used in the EIA will be reported in the ES;
- A description of design measures proposed to prevent, reduce and where possible avoid significant adverse effects on the environment – the CSET Scheme will identify the embedded design and mitigation measures already incorporated within its design;

- A description of the aspects of the environment likely to be significantly affected by the CSET Scheme, including:
  - People and communities;
  - Fauna and flora;
  - Soil;
  - Water;
  - Air;
  - Climate;
  - Material assets, including the landscape, townscape, heritage, and archaeological assets;
  - the interrelationship between the above factors;
- A description of the likely significant effects of the proposed project on the environment, which, so far as relevant, will cover the direct effects, and any indirect, secondary, cumulative, short-term, medium-term, and long-term, permanent, temporary, positive and negative effects of the project resulting from:
  - The existence of the project;
  - The use of natural resources;
  - The emission of pollutants;
  - the creation of nuisances; and
  - the elimination of waste;
- The description by the Applicant of the forecasting methods used to assess the effects on the environment; and
- Non-Technical Summary (NTS) – this will be provided as a free-standing document which will report the key findings of the ES in plain English for the general public. Consideration is being given to the NTS being provided in a web-based format for ease of reference, with links to story maps based on the project GIS. A PDF copy of the NTS will also be provided for stakeholders who would not have access to a web-based NTS.

Having regard to the nature of the development, the receiving environment and the information collated through consultation, surveys and other evaluations, information on the following environmental factors has been considered and included in this Scoping Report:

- Air Quality;
- Biodiversity;
- Climate change;
- Community and Human Health;
- Historic Environment;
- Landscape and Visual;
- Noise and Vibration;
- Land use and Land take;
- Policies and Plans;
- Soils, Geology and Land Contamination;
- Water resources and Flood Risk;
- Major Accidents and Hazards;
- Traffic and Transport; and
- Resources and Waste.

Where it has been possible to conclude at this stage that no likely significant environmental effects are predicted in respect of certain environmental factors it is proposed to scope these out of the ES so that no further identifications and an assessment of effects are presented in the ES. The environmental factors that are proposed to be "scoped out" of the ES for the CSET Scheme are set out in Chapter **19** of this Scoping Report together with justification for the proposal to not provide further assessment. However, if the design of the CSET Scheme changes substantially, or additional information on sensitivities is obtained during the process of compiling the ES, then a review of these environmental matters will be undertaken. Based on professional judgment and following consultation with the relevant statutory organisations/bodies, if required, matters previously excluded could be ‘scoped back’ into the ES.

The scope of the ES will be determined having regard to the Scoping Opinion provided by the Secretary of State for Transport.

4.2 General Approach to Technical Assessment

Each technical chapter in the ES (e.g. landscape and visual) will present a general approach to the environmental assessment, which is expected to include the following:

- General scope (spatial/temporal) of assessments;
- Plans and policies of relevance
- Relevant guidance and best practice followed;
- Baseline conditions relevant to the topic
- Consultation undertaken during preparation of the ES;
- Measures incorporated at design stage to avoid or reduce predicted environmental effects;
- A list of committed developments relevant to the consideration of cumulative effects in the ES;
- Identification and assessment of likely significant environmental effects;
- Mitigation measures proposed in respect of likely significant environmental effects;
- Assessment of residual effects; and
- Assumptions used and difficulties encountered in preparing the ES.

Each technical chapter will refer to the relevant current legislative and regulatory requirements, relevant planning and transport policies, guidance from professional institutes, industry standards and best practice.

The ES will also contain detailed assessment of baseline information, mitigation design measures and predicted effects. The individual assessment methodologies and impact prediction techniques used for each of the technical chapters are provided in Chapters 5 to 18 of this Scoping Report.

There is no statutory definition of what constitutes a likely significant effect. The primary purpose of identifying the significant effects of a proposal is to inform the decision maker so that a balanced decision in respect of the development can be reached.

DMRB LA104 defines significant effects as those which are material or should be considered in the decision making process, and identifies effects which are moderate, large or very large as

being significant[9]. These categories of effect are defined by considering the value of receptors and the magnitude of an impact and are discussed in each topic chapter of this scoping report.

As advised above, project design is an iterative process. If preliminary assessment findings indicate there is potential for significant environmental effect, appropriate mitigation measure(s) will be identified and included in the scheme description, where possible. The ES will report on the assessment of environmental effects predicted to arise in respect of identified impacts/changes to environmental receptors of the proposed CSET Scheme. Where mitigation measures are proposed that are either not certain to be effective or that may take time before becoming effective (for example landscaping measures) or that the Secretary of State may wish to consider monitoring of post implementation owing to the nature and extent of the predicted effect in the event of the measures not being effective, then the assessment presented in the ES will first be presented without those mitigation measures in place. The measures will then be identified and the likely significant effects of the CSET Scheme will then be reassessed with the proposed mitigation measures in place and a conclusion reached regarding any residual likely significant environmental effects. In this way the Secretary of State will be able to understand the nature and extent of likely significant environmental effects and the appropriate controls/requirements, including any monitoring regarding the effectiveness of the proposed mitigation measures, and to incorporate these in determining the application and the conditions/requirements to be included within the making of a TWAO. The significance of environmental effects in the absence of mitigation will not be reported in the ES.

In order to provide a consistent approach to the presentation of residual effects, the following terminology will be used throughout the ES:

- Adverse - detrimental or negative effect to an environmental resource or receptor;
- Neutral - no measurable effect to an environmental resource or receptor; and
- Beneficial - advantageous or positive effect to an environmental resource or receptor.

Predicted effects would be classified according to the following semantic scale unless otherwise prescribed by particular technical assessment published guidance:

- Negligible - imperceptible effect;
- Minor - slight, very short or highly localised effect;
- Moderate - limited effect (by magnitude, duration, reversibility, value and sensitivity of receptor) which may be considered significant; and
- Major - considerable effect (by magnitude, duration, reversibility, value and sensitivity of receptor) which may be more than of a local significance or lead to a breach of a recognised environmental threshold, policy, legislation or standard.

4.2.1 Supporting Documents

Supporting documents will be produced as part of the ES for the technical disciplines listed below.

Air Quality

A baseline monitoring report will be presented.

Noise and Vibration

A baseline noise monitoring report will be presented.

[9] LA104 Environmental Assessment and Monitoring, Revision 1. Table 3.1.

Climate Change

An embedded carbon assessment of the design will be provided to support the climate change chapter. The construction and operational carbon assessments will be included in the Climate Change chapter of the ES.

Landscape and Visual

The landscape and visual assessment will provide a description of the baseline conditions for landscape and visual amenity and an assessment of their existing value. These will form the basis for the assessment of landscape and visual effects predicted to arise as a result of the CSET Scheme in construction and operation. The assessment will also include figures illustrating the likely visibility of the CSET Scheme, landscape character areas, the location of visual receptors, the landscape and other relevant designations within the study area and the landscape design for the CSET Scheme.

Biodiversity

Survey reports for a range of species and habitats will be presented to support the biodiversity assessment, including but not limited to:

- Phase 1 Habitat surveys
- Hedgerow regulation surveys
- Botanical surveys
- Badger surveys
- Barn Owl surveys
- Bat roost and bat transect surveys
- Great crested newt surveys
- Invertebrate surveys
- Reptile surveys
- White clawed crayfish surveys
- River corridor surveys
- Water vole and otter surveys and,
- Winter and breeding bird surveys

In addition, a BNG assessment will be provided to support the ES.

A Habitats Regulations Assessment (HRA) report will be produced in parallel to the EIA process in accordance with the Conservation of Habitats and Species Regulations 2017, in relation to European designated sites.

Sustainability

It is anticipated that the local authorities will expect a Sustainability Assessment of the CSET Scheme to be submitted to support the TWAO application.

Historic Environment

A detailed historic environmental desk-based assessment report will be produced. It will assess the potential and value (significance) of all the historic environment assets (built heritage, buried archaeology and historic landscape) and assess the impact of the CSET Scheme on these assets.

Water Resources and Flood Risk

As the CSET Scheme will increase the area of hardstanding along the route and the route crosses the River Granta flood zone, a full flood risk assessment (Level 2 with Modelling) will be carried out to assess the drainage design of the CSET Scheme against the requirements of the local lead flood authority. This will be carried out as part of the EIA process and included as an appendix to the ES.

Traffic and Transport

The Transport ES chapter will set out the existing and future baseline conditions based on the local transport network associated with the Scheme. It will then provide an overview of the proposed Travel Hub and Public Transport Route and how these, together with local committed developments and growth in the corridor, are expected to impact on the surrounding highway network, compared to the 'without' CSET future baseline.

This assessment will be drawn from the Transport Assessment which will be submitted as an appendix to the ES or as a standalone part of the TWA documents.

A TA Scoping Note will be submitted to CCC (as the highway authority) and Highways England to agree the scope of the TA and the associated methodology through pre-application discussions.

The scope of the TA will, subject to agreeing scope as noted previously, likely include the following:

- Baseline transport data will be reviewed including transport provision in the study area across all modes and consideration of committed development and transport infrastructure improvements;
- 5-year accident data to be reviewed for the study area identifying any accident patterns on the network in the (to be agreed) study area;
- Identify the trip generation and distribution for trips to and from the proposed Travel Hub through both a first principles approach, and demand-led, through Cambridge Sub Regional Model (CSRM) model runs and other mechanisms to be agreed with the relevant authorities which will inform the proposed local VISSIM model inputs and traffic flows;
- Details of the new access points onto the highway network to serve the proposed Travel Hub site, and the proposed junctions to accommodate the proposed public transport route to cross or interact with the existing highway network; and
- Identification of the impact of the CSET Scheme on the local and strategic highway network in terms of capacity and highway safety, and identification of potential mitigation measures as appropriate.

Preparation of a Construction Traffic Management Plan (CTMP) will be produced as a high level plan explaining the likely levels of construction traffic and the restrictions and routes traffic will be expected to follow. This will include information on construction compounds and any requirements for temporary closures of roads and public rights of way in the area. A more detailed CTMP will be developed by the future appointed contractor assigned to the works.

4.3 Spatial Scope

The spatial (geographic) scope of the ES will be defined in the ES, in order to assess any potential for significant effects on the environmental receptors identified. For the purpose of the ES, the spatial scope will comprise the following areas:

- Area within the CSET Scheme Order limits – this is expected to cover the footprint of the route, Travel Hub and any additional land take (permanent / temporary) that may be required during its construction and operation; and
- Areas beyond the CSET Scheme Order limits where environmental impacts could occur – each individual technical chapter will identify its specific study area (Zone of Influence, or ZoI) for impact assessment.

4.4 Temporal Scope

The ES will identify and assess the potential for construction and operational impacts arising from the CSET Scheme. At this stage, the temporal scope, based on the high level construction programme is assumed to be:

- 2023 – 2025 – commencement of construction activities; and
- 2025 – completion of works and CSET Scheme becomes operational.

The CSET Scheme is expected to operate for at least 60 years. Once built, it will be regularly repaired and maintained to ensure its operation is safe, reliable and efficient. The ES will provide further information on the maintenance requirements of the CSET Scheme. In view of the relatively long lifespan of the CSET Scheme, the maintenance that would be undertaken throughout its operational use and the considerable uncertainties now as to the options that will exist in decades to come for re-use, adaptation, decommissioning and other options that can only be the subject of speculation, it is not considered helpful to undertake an assessment of likely significant effects over some form of future decommissioning of the CSET Scheme. However, it is recognised that the nature of the materials used in the construction of the CSET Scheme and construction techniques have implications for the re-use of component parts of the development and in the opportunities for recycling, recovery or disposal at a later date. Accordingly, as set out in Chapter 18, the ES will include information on the process to be followed for the selection of materials to ensure that regard is had to life-cycle assessment. As such, the ES will not discuss the decommissioning of the CSET Scheme.

4.5 Rochdale Envelope

As the project has key elements of the CSET Scheme design that remain open to final decisions it is proposed to undertake the preparation of the ES using two design options (as set out in Chapter 2.5).

The Planning Inspectorate have published guidance[10] on how an EIA can accommodate uncertainty in the development's design. It is clear that the flexibility in the design must not be so large as to give rise to two or more different schemes and the details that are not yet finalised should be clearly identified and described in all application documents. Furthermore, the assessment of the yet to be agreed elements of the design need to be clearly described in all consultations undertaken with stakeholders.

Where it is not possible to define all details of the CSET Scheme at the time of submission of the TWAO, and where some details may not be finalised until after an Order has been made, it is possible to ensure that the process of EIA is not compromised in its objective of providing the decision-maker and stakeholders with full information on likely significant effects by using a Rochdale Envelope approach in the ES. This means identifying the realistic maximum/worst-case effects of the options for the description of the CSET Scheme. Each technical assessment

[10] The Planning Inspectorate: Using the Rochdale Envelope, July 2018 Version 3.0. https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf

will be undertaken using the scheme design that gives rise to the greatest predicted likely significant effects for that particular assessment topic. The ES will clearly set out the parameters that have been identified as giving rise to such effects, how the parameters will be defined so as to ensure that they can be secured in the TWAO/deemed planning permission and, in the case of each of the technical assessments, which parameters are used in undertaking the assessment of the likely significant effects of the proposed development. For example, there may be defined areas within which specified development may take place, or maximum heights of components or maximum noise levels. This approach will ensure that the Secretary of State and stakeholders can have confidence that the grant of a TWAO will not give rise to any greater level of environmental effects than those which were assessed in the decision-making process. In the case of the CSET scheme, current uncertainty concerns the nature of the carriageway to be constructed on all segregated sections of the route. This is because the relevant guidance to apply to the selection of the carriageway has not yet been determined. Using the guidance that is available, as explained in Chapter 2.5, leads to the identification of the following options:

- Optical guidance: requires a standard single carriageway asphalt road surface with surface road markings (likely to be painted) enabling two way travel within a 7.3m wide carriageway.
- Kerb guidance: requires two separate carriageways with a kerb (normally concrete) that the vehicle is physically in contact with via wheels projecting from the side of the vehicle, this would enable one way traffic in each carriage within a carriageway corridor likely to be about 6.3m wide.
- The maximum difference in land take between the two options (per metre length of the route) is about 7%.
- Depending on the precise construction methods for a kerb guided solution there is a potentially longer construction period for this mode than for a standard road constructed to enable an optically guided solution.
- The kerb guidance system requires a single carriageway adjacent to the route for emergency vehicle access (which would double as a shared use path) that would be about 4m wide. The optical guidance system would not need a dedicated emergency access roadway so the shared use path would generally only be 3m wide along the route.

All other elements of the infrastructure required for the CSET Scheme remain guidance neutral and so would be assessed based on a standard design regardless of the mode of guidance. This would apply to:

- The route alignment itself;
- The Travel Hub;
- All traffic controls and lighting at junctions;
- HQPT stops en-route, and
- The shared use path.

An assessment of the potential impacts on the different environmental topics was completed as part of this scoping phase. The results of this high level review are presented in Table 4.1.

Table 4.1: Comparison of Environmental Impacts between Guidance Options

Topic	Optical Guidance Design		Kerb Guided Design	
	Construction Phase	Operational Phase	Construction Phase	Operational Phase
Air quality	Potentially shorter construction phase reduces impact on air quality from plant. Slightly larger footprint not notable enough to affect air quality from construction	Neutral between guidance options assuming the mode of vehicular propulsion is the same between options.	Slightly smaller footprint not notable enough to be differentiator to air quality from construction	Neutral between guidance options assuming the mode of vehicular propulsion is the same between options.
Biodiversity	No difference between options – but potentially quicker construction could reduce overall time of any effects on species in the area of the route. Marginally better than kerb guidance as a result.	No difference between options – slightly larger footprint will have slightly worse impact on biodiversity value requiring additional habitat creation to achieve BNG.	No difference between options – but potentially longer construction could increase overall time of any effects on species in the area of the route. Marginally worse than optical guidance as a result.	No difference between options – slightly smaller footprint will have slightly lower impact on biodiversity value requiring less additional habitat creation to achieve BNG. Depending on scale of kerbs and double carriages could be increased risk to small mammals / reptiles trapped in the carriageway than for optical guidance.
Carbon	Slightly shorter construction period decreases vehicle carbon – notably lower embedded carbon in the road infrastructure.	Neutral between guidance assuming mode of propulsion is same between options.	Longer construction phase has higher vehicle emissions and notably higher embedded carbon in road infrastructure.	Neutral between guidance assuming mode of propulsion is same between options.
Community and Health	Slightly less impact due to potentially shorter construction phase.	Neutral between guidance on communities and health. Larger footprint results in overall slightly larger land take which may affect some socio-economic land use more than kerb guided. But marginal as increase is 1 metre wider per m length.	Slightly more impact due to potentially longer construction phase.	Neutral between guidance on communities and health.
Historic Environment	Potential for greater land take means during construction slightly higher potential impact on	Neutral between options – assume landscaping will ensure same effect on setting between options.	Potential for deeper excavation in places to ensure sufficiently robust kerb structure may increase risk of	Neutral between options – assume landscaping will ensure same effect on setting between options.

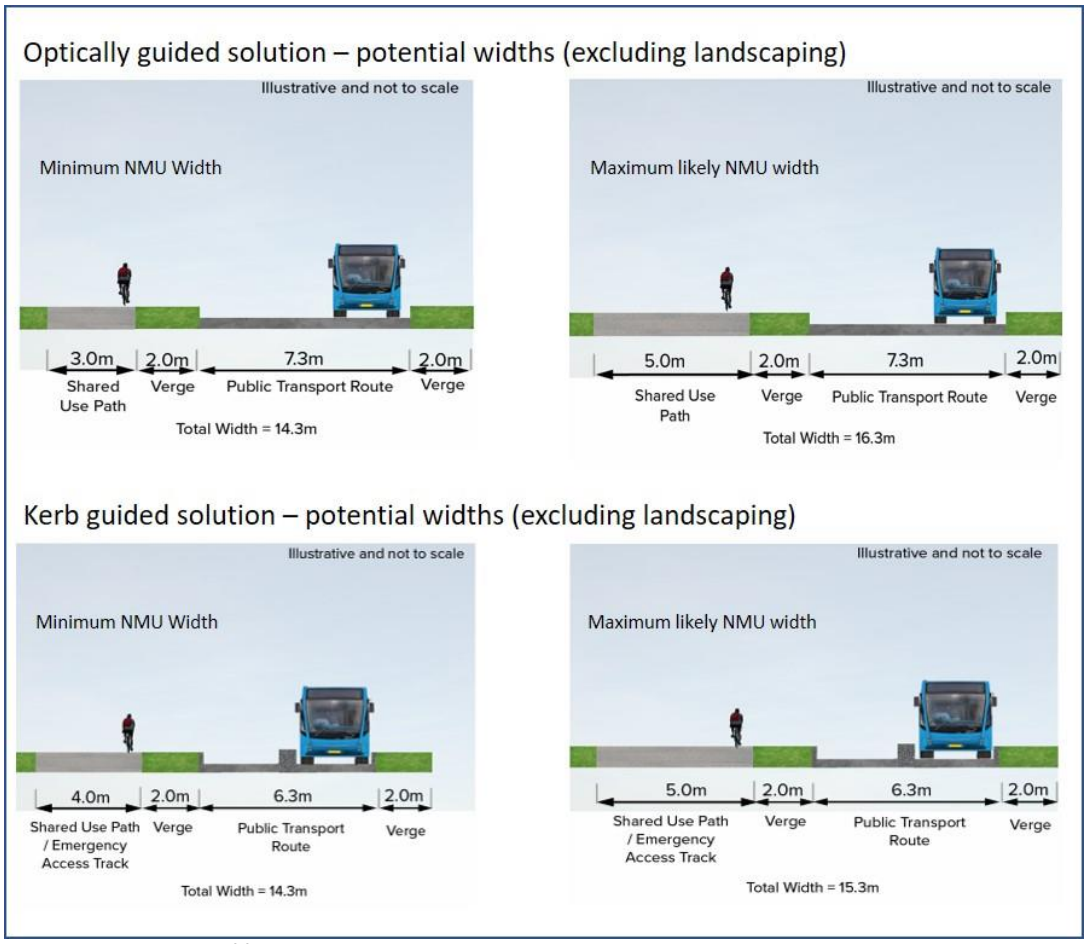
Topic	Optical Guidance Design		Kerb Guided Design	
	Construction Phase	Operational Phase	Construction Phase	Operational Phase
	buried heritage assets.		encountering buried heritage assets.	
Landscape and Visual	Greater potential land take - marginal increase in construction visual impact, but over shorter time frame. Assume similar number of batching plants/construction compounds between designs.	Road has slightly softer visual impact locally compared to kerb guided design. Marginal difference in impact on landscape character between guidance assuming appropriate landscaping in place.	Slightly smaller land take - marginal reduction in construction visual impact, but over potentially longer time frame. Assume similar number of batching plants/construction compounds between designs.	Kerb guidance is more urban in appearance – mitigated if grass grows within & between carriageways. Marginal difference in impact on landscape character between guidance assuming appropriate landscaping in place.
Noise and Vibration	No notable difference other than shorter construction phase reducing duration of noise impacts.	No notable difference between guidance options. Nature of noise arising from Scheme likely to be more from tyre noise.	No notable difference other than longer construction phase increasing duration of noise impacts.	No notable difference between guidance options. Nature of noise arising from Scheme potentially higher from combination of noise from kerb guidance mechanism and from tyre noise on road surface.
Land	Increased footprint has slightly increased land take for physical infrastructure.	No notable difference between options.	Lower footprint reduced land take for physical infrastructure.	No notable difference between options.
Major Accidents	Neutral between guidance options	Neutral between guidance options	Neutral between guidance options	Neutral between guidance options
Soils and Geology	Larger land take results in increased impact on soils and geology – but not likely to be a notable impact.	Neutral impacts on soil and geology	Smaller land take results in reduced impact on soils and geology but not likely to be a notable impact.	Neutral impacts on soil and geology
Traffic and Transport	Shorter construction phase – reduced impact from construction traffic	Neutral between guidance option	Long construction phase – increased duration of impact from construction traffic.	Neutral between guidance option
Water resources and flood risk	Neutral impact on water resources between options	Slightly larger hard surface results in larger volume of rainfall runoff – increased flood risk from this option as less opportunity for in-carriageway SuDS	Neutral impact on water resources between options	Smaller surface area results in lower volume of runoff from rainfall. Greater opportunity to install SuDS within carriageway to reduce flood risk from Scheme.

The following figure (Figure 4.1) shows the typical widths associated with the main scheme elements for each guidance method. The figures show the minimum likely width and a likely maximum width (the final design will look into the shared use path width in more detail). These show the likely maximum width difference for the main scheme elements is 1m.

The implications on the design between the two methods of guidance are reasonably well understood and can be clearly identified in all application and consultation documentation. Therefore, the EIA process will be able to accommodate the uncertainty and provide a robust assessment of the environmental effects in the final ES.

In common with other schemes of this scale, nature and anticipated level of design at the consenting stage, the Applicant will require a proportionate degree of flexibility to be built into the consent for the CSET Scheme to enable the detailed design to be developed within the parameters (limits of deviation) of the consent. This would be necessary to ensure that the CSET Scheme can respond to developments in technology, unforeseen ground conditions and to ensure that any consent granted can be practicably implemented. As advised, the Applicant will ensure that the parameters used in the assessment chapters to identify and assess likely significant environmental effects will reflect the realistic worst case scenarios so that the development, once constructed and operated, will not give rise to any greater environmental effects than those that informed the decision-making process.

Figure 4.1: Comparison of Potential Route Width by Guidance Method



Source: Mott MacDonald

4.6 Cumulative Impact Assessment

4.6.1 Methodology of Assessment

The proposed methodology for assessing the cumulative effects is based on The Planning Inspectorate guidance[11] within which the ES will consider the following types of cumulative effects:

- Combined effects - the combination of individual environmental topic effects from the CSET Scheme on a particular receptor; and
- Cumulative effects - effects due to interactions between the CSET Scheme and other reasonably foreseeable, nearby future developments of an appropriate scale outside the Scheme boundary.

Cumulative effects from the CSET Scheme alongside other developments in its vicinity will be assessed according to each topic and summarised in a Cumulative Effect chapter in the ES.

4.6.2 Area of Non-Traffic Related Cumulative Assessment

On the 10th of February 2020, a meeting was held with the Strategic Sites Team from the Greater Cambridge Planning Service. At this meeting, a number of transport schemes being promoted by the GCP were discussed, which included a discussion regarding the approach to cumulative assessment and the Zone of Influence (ZOI).

The approach to ZOI for this project and the long list of sites to be included as part of the cumulative assessment, is in the process of being agreed with the Strategic Sites Team at Greater Cambridge Shared Planning Service. An update will be provided on this.

Long list

The long list of developments was identified for the preparation of the Scoping Report (June 2020). The developments were identified based on the adopted Local Plans for Cambridge City Council and South Cambridgeshire District Council, along with a map/application search of major applications in nearby wards/parishes to the proposed site.

To identify the study area of interest for each environmental topic a review of the potential zone of influence for each topic was carried out. It is assumed that other developments would have similar zones of influence and therefore it is appropriate to identify a total cumulative impact zone of influence that allows for some overlap between the impacts of other developments. This review is presented in the following table.

Table 4.2: Topic Sensitive Zone of Influence to Identify Tier 1, 2 and 3 Development

Topic	Normal study area	Potential for impacts from CSET Scheme outside study area	Cumulative assessment boundary proposed
Air quality	Based on traffic model. Determine affected links showing a particular level of change in traffic. For GCP projects main traffic changes of interest likely to	Traffic model boundary will normally include allowance for future development included in local plan. Need to check that other major developments that could change traffic which are Tier 1 or 2 are within plan	Traffic model area and local plan boundary. Cumulative assessment is inherent in model makeup.

[11] The Planning Inspectorate (2015). Cumulative Effects Assessment. Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

Topic	Normal study area	Potential for impacts from CSET Scheme outside study area	Cumulative assessment boundary proposed
	be relatively close to Scheme alignment		
Biodiversity	Generally within 500m of Scheme boundary. Barn owl studies looking out to 5km for winter presence and 1.5km either side for breeding populations. For SACs with bats can be 30kms.	Minimal on habitats and species outside boundary of GCP schemes – but some mobile species could come into GCP scheme area. So assume up to 2km either side for important birds and bats as a reasonable area of assessment.	Allow up to 3kms from Scheme boundary to allow overlap from another development with similar impact footprint.
Climate Change	Resilience is a Scheme specific issue – only relevant within Scheme footprint	n/a	n/a
Greenhouse gases	Assessed at national scale. Not suited to cumulative impact assessment.	Assessed at national scale, includes impacts from Scheme outside of study area.	Traffic model area and local plan boundary. Cumulative assessment is inherent in model makeup.
Community and Human Health	Community impacts (including impact on private property, walking, cycling and horse rising routes and community resources) generally within 500m of Scheme. Traffic impact assessed separately Health largely related to air quality and noise issues (see these topics). However, a Wider Impact Area, the area covered by the local authorities of Cambridge City and South Cambridgeshire consideration of community and health effects in a broader area and economic impacts.		1km
Historic Environment	Normally around 1km from the Scheme boundary to enable setting to be assessed	Negligible	2kms from Scheme Boundary to allow overlap from another development with similar footprint.
Landscape and visual	2km from Scheme boundary for GCP schemes.	Very minor impact due to limited visibility at distances over 1km and topographic and vegetative screening restricting long views in Cambridgeshire area.	2km generally, some areas could be up to 3km where topographic would permit some distant views.

Topic	Normal study area	Potential for impacts from CSET Scheme outside study area	Cumulative assessment boundary proposed
Noise and vibration	As with air quality the area of impact assessed within limits of traffic model to define links with sufficient change. Vibration tends to be much more localised, within a few hundred meters of Scheme footprint.	Traffic model boundary will normally include allowance for future development included in local plan. Need to check that other major developments that could change traffic which are Tier 1 or 2 are within plan.	Traffic model area and local plan boundary. Cumulative assessment is inherent in model makeup.
Land Use and Land Take	Generally in close proximity to Scheme (i.e. change in land use due to Scheme is limited to footprint plus immediate surroundings).	Negligible	500m
Soils, Geology and Land Quality	Within Scheme Footprint only.	N/A	N/A
Water Resources	For GCP schemes consider within 1km to allow for runoff entering watercourses.	Negligible given the nature of the Scheme.	2kms.
Major Accidents	Scoped out – N/A	N/A	N/A
Traffic and Transport	The study area is the area of the transport model.	Inherent in the model as this covers all planned growth under local plan. Need to check that other major developments that could change traffic which are Tier 1 or 2 are within plan.	Traffic model area and local plan boundary. Cumulative assessment is inherent in model makeup.
Resources and Waste	Resources scoped out – N/A Waste – related to mass balance within Scheme footprint only.	N/A	N/A

At the meeting held with the Case Officer held on 10th February 2020, it was agreed that 3km either side of the route would be an appropriate zone of influence (ZOI) for other GCP promoted schemes, although this scheme was not discussed directly. As a precautionary approach, given the landscape sensitivity of Gog Magog and views from Gog Magog to the surrounding landscape a 5km ZOI was selected for this scheme.

It should be noted that the transport modelling for the scheme, included a review of Local Plan growth within an significantly wider area of Cambridgeshire. Detail of the methodology used for the Transport Modelling will be assessed in the transport and traffic chapter of the ES.

The level of uncertainty was identified for each proposed development based on the following:

- Tier 1 developments (i.e. under construction; permitted application(s); submitted application(s));

- Tier 2 developments (i.e. projects with the local authorities where a scoping report has been submitted) were considered; and,
- Tier 3 developments (i.e. projects which the local authorities are aware of but where nothing has been submitted even if they are identified in the SCDC or City Local Plans; or identified in other plans and programmes).

Review of the long list

The Scoping Report included a list of new developments to be included in the cumulative assessment. The list of developments does not currently include the sites being promoted as part of the emerging Greater Cambridge Local Plan on the basis they have no status in planning terms. The proposed transport projects, identified in the emerging Local Transport Plan, currently being consulted on by the Combined Authority, have also not been included, because they cannot currently be considered as committed developments. However, it does include the Cambridge to Cambourne Scheme, which is a GCP scheme that is pending approval for the preferred route, the South- West Travel Hub scheme, which is within the ZOI, and Foxton Park and Rail Schemes which is just outside the ZOI was also included.

The list of developments to include in the cumulative impact assessment will be reviewed within 3 months of submitting the ES.

When it comes to impacts due to changes in traffic a transport model that does include all the major transport schemes in preparation around Cambridge will be run (see Section 4.6.3). This will be used to inform the cumulative assessment of the air quality, noise and greenhouse gas topics.

Short list of developments to be included

The current proposed short list of development to be included in the assessment was based on the certainty of outcome and is presented in Table 4.3. Where the potential impacts of a proposed Tier 1 development would be limited to transport, these have been excluded from the proposed list of developments as they have been included in the traffic modelling.

Table 4.3: Proposed Developments Considered in Cumulative Impact Assessment

Development	Certainty of outcome (PINS methodology[12])	Approximate distance from the Scheme (km)	Description	Inclusion in assessment
Arcc Innovations Pampisford Road, Great Abington, CB21 6AH	Tier 1	1.74	Expansion of the existing ARCC Campus facilitates to create 4no, studio pavilions providing shared workspace for start-up companies.	Scoped in. The application was not subject to an EIA and it is of a modest scale and not likely to have significant effects. However, given close proximity of the site to the Scheme and that it is within the ZOI, it has been scoped in.
Granta Park, Great Abington, CB21 6AL	Tier 1	1.72	Phase 2 Land (Zone 1) Granta Park Great Abington Cambridgeshire CB21 6AL	Scoped in, in close proximity to the location of the park and ride site in Babraham.
Genome Campus, Hinxton, Saffron	Tier 2	5.6	Outline planning permission with all matters reserved for a phased mixed use development comprised of up to 150000 square metres of Gross	Scoped in, the application is outside the ZOI. However, it is a major development that could in particular result in a

[12] Planning Inspectorate (PINS) Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects available at - https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

Development	Certainty of outcome (PINS methodology[12])	Approximate distance from the Scheme (km)	Description	Inclusion in assessment
Walden, CB10 1RG			External Area (GEA) of flexible employment uses including research and development office and workspace and associated uses.	significant transport impact, and therefore it is recommended that this is scoped in, but only of relevance to the transport chapter of the ES.
8 Greenacres, Duxford, CB22 4RB	Tier 1	5.0	Application for approval of reserved matters (appearance landscaping layout and scale) for the development of up to 35 dwellings following outline planning permission.	Scoped out, some distance from the application site and it is a development of a modest scale.
Lion Works Station Road, West Whittlesford, CB22 4WL	Tier 1	4.8	Redevelopment of site for residential use (outline planning application all matters reserved). 42 houses and 18 flats.	Scoped out, some distance from the application site and it is a development of a modest scale.
Land off Mill Lane, Sawston, CB22 3HY	Tier 1	3.8	Residential development of 48 new dwellings with associated works including landscaping and open space.	Scoped out, modest development that is some distance from the application site and not subject to an EIA.
Former Waste Water Treatment Facility Cambridge Road Hauxton	Tier 2	3.6	Demolition of structures remediation and redevelopment for up to 32 dwellings with new areas of open space associated infrastructure and other associated works.	Scoped out, modest development that is some distance from the application site and not subject to an EIA.
Land adjacent to Mores Meadow Great Shelford CB22 5LS	Tier 2	1.3	Erection of 21 dwellings (alms houses) the relocation of existing allotments and public open space provision together with associated landscaping and infrastructure.	Scoped in, due to close proximity to the proposed route alignment.
Mingle Lane Stapleford CB22 5BG	Tier 1	0.9	Change of use of agricultural land to burial ground.	Scoped in, not a large proposal but very close to the proposed route.
2 Station Road Great Shelford CB22 5LR	Tier 2	2.3	Demolition of existing buildings and structures and the erection of a 63-bed care home (Use Class C2) with external amenity space access car parking landscaping and other associated works.	Scoped in, not a large proposal, but it is within the ZOI of the development site.
1 Peterhouse Technology Park Fulbourn Road CB1 9PT	Tier 1	2.9	Detailed planning application consisting of the demolition of ARM2; the construction of new buildings for B1 use; two multi-storey car parking structures; additional temporary car parking spaces; new cycle parking spaces; hard and soft landscaping works; new internal roads, foot and cycle paths; ancillary and associated facilities and site infrastructure.	Scoped in, extensive proposal that was subject to its own ES and located within the ZOI of the proposed route.
66-80B Colville Road CB1 9EJ	Tier 1	3.5	Demolition of existing flats 66-80b Colville Road and erection of 69 affordable dwellings, including 6 houses and 63 apartments, including	Scoped in, it is on the edge of the ZOI but recommended to include as a precautionary approach.

Development	Certainty of outcome (PINS methodology[12])	Approximate distance from the Scheme (km)	Description	Inclusion in assessment
			resident and public car parking, landscaping and associated works.	
291 Hills Road CB2 8RP	Tier 1	1.6	Residential development containing 14 flats comprising 8 x 2-bed units and 6 x 1-bed units, along with access, car parking and associated landscaping following demolition of the existing buildings.	Scoped out, modest Scheme and separated from the development by existing built development within Cambridge city.
Anstey Hall Maris Lane CB2 9LG	Tier 2	1.7	Listed building consent to construct 87 2bedroomed apartments, flanking a new public park to the south of Anstey Hall in order to provide assisted-living accommodation for people over 65. The Listed house will be adapted to serve as the central facilities for the retirement community.	Scoped in, change of use of existing building, however, may have a transport impact. It is also located in close proximity to the route and is a heritage asset.
Trumpington Meadows, Hauxton Road	Tier 1	1.8	OUTLINE Demolition of existing buildings and structures, redevelopment for approximately 600 dwellings, two new accesses onto Hauxton Road, recreation/leisure uses including change of use from agriculture to public open space, with associated parking, infrastructure and earthworks	Scoped in, but only during construction. This development is close to being completed and is very likely to be complete prior to the operation of the CSET development.
Ridgeons 75 Cromwell Road Cambridge CB1 3YB	Tier 1	4.1	Outline application for erection of up to 245 dwellings, including affordable housing, a nursery and/or community facility, open space, car parking, cycle parking and associated works following the demolition of all existing buildings on the site.	Scoped out. Just outsider ZOI and it is physically separated from the proposed Scheme by existing built development in and around Cambridge.
Wests Garage 217 Newmarket Road CB5 8HD	Tier 1	4.8	Erection of student accommodation with 219 student rooms (following demolition of existing buildings), together with ancillary accommodation comprising common / study rooms, laundry room, management office, plant room, bin and bicycle enclosures, landscaping and associated infrastructure including a sub-station.	Scoped out, some distance from development site and separated from the development by substantial existing development.
St Regis and 108 Chesterton Road CB4 1BY	Tier 1	5.2	Erection of College accommodation providing 85 no. units, comprising 53 no. single rooms (incl. 2 x DDA rooms), 9 no. flats, 15 no. studios, and minor works to No. 108 Chesterton Road with the retention of 8 no. single rooms, together with ancillary facilities including kitchen/communal areas, laundry room, plantroom, bin and bicycle enclosures, access. Erection of 14 no. residential flats (Use Class C3)	Scoped out, some distance from development site and separated from the development by substantial existing development.

Development	Certainty of outcome (PINS methodology[12])	Approximate distance from the Scheme (km)	Description	Inclusion in assessment
			comprising 1 bed and 2 bed units, together with landscaping and associated infrastructure, following demolition of the existing buildings.	
Clay Farm, Land between Long Road and Shelford Road (Clay Farm/Showground Site), Cambridge	Tier 1	1.8	Up to 2,300 homes (40% affordable housing). New secondary and primary school, community sport, creation facilities and shops. 49 hectares of public open space, including allotments	Scoped in, but only for construction purposes. All reserved matters applications have been approved and it is highly likely that the development will be complete by the time that the development is operation.
Glebe Farm, Land east of Hauxton Road, north of the Addenbrooke's Access Road and south of Bishop's Road, Trumpington, Cambridge	Tier 1	2.4	Detailed application for 286 new mixed-tenure dwellings, associated landscaping, open spaces, vehicular access to the south from the Addenbrooke's Access Road, augmented landscape treatment to the north of the Addenbrooke's Access Road and all related infrastructure including connection to the Clay Farm infrastructure on highway land to the east adjoining Addenbrooke's Access Road.	This development has recently been completed. Scope out.
CBC, Land to the west and south-west of Addenbrooke's Campus, Robinson Way, Cambridge	Tier 1	0.5	Up to 215,000sqm floorspace (excluding plant areas) comprising 60,000sqm of clinical research and treatment (D1 and/or clinical in-patient treatment), 115,000sqm of biomedical and biotech research and development (B1(b)), 15,000sqm of biomedical and biotech research and development (B1(b)) or clinical research and treatment (D1 and/or clinical in-patient treatment), and 25,000sqm of either clinical research and treatment (D1 and/or clinical in-patient treatment) or higher education or sui generis medical research institute uses.	Scoped in, adjacent to planning application site and major application with significant environmental effects, that was subject to a full EIA.
Cambourne to Cambridge	Tier 2	5.5	Cambourne to Cambridge Rapid Transit route to provide high speed public transport between Cambridge and Cambourne, to include new cycleway. At current stage a business case is being worked up for the scheme. The scheme is directly referenced within the adopted South Cambridgeshire Local Plan. It has not yet been subject to a Public Inquiry.	Scoped in. This development would usually have been scoped out of the assessment as there is no preferred scheme at the time of writing. However, as a development currently being pursued by the Greater Cambridge Partnership, the decision was made to include the development in the cumulative assessment.
Cambridge South West Travel Hub	Tier 2	4.6	Proposed Travel Hub, to include car parking, cycle coach, and horse parking, Travel Hub building, photovoltaic panels, sub-station, lighting and CCTV; significant infrastructure improvements to include road widening of the A10	Scoped in. Development is also being promoted by the Greater Cambridge Partnership. It is important that the Cumulative impact of all major GCP schemes are assessed, particularly having

Development	Certainty of outcome (PINS methodology[12])	Approximate distance from the Scheme (km)	Description	Inclusion in assessment
			along Cambridge Road, Hauxton Road and M11 Junction 11 north bound slip road, and a new dedicated public transport route to include strengthening of existing agricultural bridge; provision for a new Shared Use Path, including new bridge across the M11; with associated drainage, landscaping (including reconfiguration of bunds), biodiversity enhancement areas and infrastructure	regard to cumulative impact in transport terms.
Foxton Travel Hub	Tier 3	5.4	Proposed Travel Hub site at Foxton. It has been identified as a Transport Hub within the emerging Foxton Neighbourhood Plan.	Early stages of Scheme development and scope of project at this stage is not certain. It is also located some distance from the application site. Scoped out of ES.
Land at Newbury Farm, Babraham Road	Tier 1	1.4	Outline application (all matters reserved except for means of access in respect of junction arrangements onto Worts Causeway and Babraham Road) for erection of up to 230 residential dwellings (including affordable housing), community facilities within Use Classes A1/A2/A3/A4/B1/D1/D2, new landscaping and public realm, car and cycle parking, infrastructure, other associated works following the demolition of all existing buildings on the site.	Scope in. Allocated site within City Council Local Plan, located in close proximity to the application site.
Netherhall Farm Worts Causeway CB1 8RJ	Tier 1	1.5	Outline application (all matters reserved except for means of Access) for the erection of up to 200 residential dwellings, with associated infrastructure works, including access (vehicular, pedestrian and cycle), drainage, public open space and landscape.	Scope in, allocated site within Cambridge City Local Plan, located in close proximity to the application site.
Land West of ARM 1 Peterhouse Technology Park Fulbourn Road CB1 9PT	Tier 1	3.2	Detailed planning application consisting of the demolition of ARM2; the construction of new buildings for B1 use; two multi-storey car parking structures; additional temporary car parking spaces; new cycle parking spaces; hard and soft landscaping works; new internal roads, foot and cycle paths; ancillary and associated facilities and site infrastructure	Status of planning application to be confirmed during EIA.

4.6.3 Traffic Related Assessments and Cumulative Assessment

The traffic modelling for the Cambridge Region is carried out by CCC using the CSRM model. The modelling takes into account predicted traffic growth under agreed scenarios the region. It

does this by including likely future developments, such as housing developments, that have the potential to affect traffic flows. Outputs from the traffic modelling are produced for scenarios with or without the CSET Scheme (referred to as the Do Minimum and Do Something modelling scenarios). Both of these scenarios include the likely future developments, so any differences caused in traffic flows is a result of the CSET Scheme itself. Further detail on the modelling scenarios is provided in Chapter 17 (Transport and Traffic chapter).

In addition to the individual scheme assessments, the environmental assessment will consider the impact of the cumulative impact of the proposed GCP transport strategy, which is referred to as a 'Do-All'.

This GCP Do-All includes the following schemes, in addition to those specified in the Do-Minimum:

- Cambourne to Cambridge (C2C) (including Travel Hub site);
- Cambridge South East Transport Strategy (CSET) (including Travel Hub site);
- Cambridge South West Travel Hub (CSWTH);
- Foxton Travel Hub;
- Waterbeach to Cambridge North (including P&R site); and
- Eastern Access from Transport Innovation Fund.

This cumulative assessment will be consistent with the scheme assessment utilising the CSRM demand model and subsequent highway assignment. This will be based on the application of the 2026 & 2036 Core Minus assumptions.

Following the completion of the highway modelling, the required transport model data will be extracted for comparison with the individual assessments, as previously defined.

If a noticeable variance is observed in the traffic data which will directly impact the results presented for the individual assessment, the cumulative assessment will be evaluated in a consistent manor.

Based on the scale of schemes included within the cumulative scenario, it is likely that a further assessment is required for air quality, noise and greenhouse gases. The outcome of this cumulative scenario will be reported within the cumulative assessment.

4.7 Construction Strategy

A construction strategy for the CSET Scheme will be prepared for consideration in the ES. This strategy will provide the principles (including phasing and programming) of works which will form the basis of contract specifications. The appointed contractor will be expected to adopt the contract specifications when delivering the CSET Scheme. It is currently anticipated that the delivery of the CSET Scheme will be phased over a period of approximately 25 months (Table 2.1), to include: enabling works and construction activities. Construction is anticipated to commence in April 2023.

4.8 Code of Construction Practice

The Code of Construction Practice (CoCP) is a document that is prepared to minimise / control any likely harm on the environment and human beings arising from construction activities. The CoCP sets out the appointed contractor's general obligations with respect to the impact of construction activities on local residents, businesses, the general public and the surroundings in the vicinity of the works. It applies to the construction phase and is in addition to statutory regulations and other contractual requirements. The appointed contractor is normally required to

expand on the CoCP in the implementation of their construction management plan which should have more site-specific information to demonstrate how the requirements of CoCP will be complied with.

It is anticipated that if a TWAO is granted for the CSET Scheme, the provision of an approved construction management plan will be one of the conditions attached to the deemed planning permission. A draft CoCP will be submitted as an appendix to the ES.

It is expected that CSET Scheme draft CoCP will include a description of appropriate mitigation measures although some details may be proposed for approval under and in accordance with the deemed planning permission that will be sought in parallel with the TWAO.

4.9 Construction Environmental Management Plan

Mitigation measures included in the design or operational plan for the Scheme will be drawn together and reported in the Construction Environmental Management Plan (CEMP). The CEMP and the CoCP will be key documents for the appointed contractor to take forward into the construction phase of the Scheme. The CEMP would also contain information on management practices required during operation as well.

The CEMP will be included in an appendix to the ES.

5 Policies and Plans

5.1 Legislation and Policy

Whilst Section 38(6) of the Planning and Compulsory Purchase Act (2004) does not apply to the CSET Scheme as a consequence of it being promoted via a Transport and Works Act Order, we have identified the key policies and plans that have particularly informed the shaping of the Scheme.

5.1.1 Planning Policies

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied (including those on the Green Belt functions, which are particularly relevant). The Framework is predicated on a presumption in favour of sustainable development and makes clear that proposals which are consistent with an up to date statutory development plan should be approved without delay.

The National Policy Statement for National Networks (NPSNN) sets out the Government's policy relating to strategic road and rail infrastructure. Whilst this Scheme is not a strategic road project there are some useful guidance statements in the NPSNN that will be reviewed and taken into account (e.g. the guidance on the role of good design in developing a scheme), particularly if other policy statements (national or local) are silent on a particular issue, or have potentially contradictory advice. It is also the case that in some instances the NPSNN requirements may not be appropriate given the scale of the CSET Scheme, and in these instances NPSNN will not be taken into consideration.

The statutory development plan for SCDC comprises the South Cambridgeshire Local Plan (September 2018), which will be reviewed in the ES. This Local Plan sets out the planning policies and land allocations of the district up to 2031. The statutory development plan for City Council comprises the Cambridge Local Plan (October 2018), which will be reviewed in the ES. This Local Plan sets out policies and proposals for future development and spatial planning requirements up to 2031.

The new Greater Cambridge Local Plan is currently being prepared. This will be a joint Local Plan for both City Council and SCDC. The draft plan consultation (Regulation 18) is planned for Autumn 2020 with a target adoption date of Summer 2023.

5.1.2 Transport Policies

The transport specific policies within the NPPF and statutory development plans will be identified along with relevant policies in the Transport Strategy for Cambridge and South Cambridgeshire (March 2014), the Cambridgeshire Local Transport Plan 2011-2031 (July 2015) and the Cambridgeshire and Peterborough Local Transport Plan (February 2020).

The focus of these documents is to provide sustainable travel and transport choices in Cambridgeshire with improved connectivity between centres.

5.2 Baseline Information

The NPPF aims to promote a strong, competitive economy and encourages local planning authorities to promote investment in infrastructure. Section 9 specifically promotes sustainable

transport and its role in facilitating sustainable development and wider sustainability and health objectives.

Regionally, the **Transport Strategy for Cambridge and South Cambridgeshire (March 2014)** states that the over-arching approach for the Haverhill to Cambridge corridor is to consider the potential for a Guided Bus (or other HQPT priority option) would provide greater benefit for improving travel in the corridor. Specific attention on the corridor to Saffron Walden and the Business Parks and Science Park son both corridors should inform the assessment. There is a specific intention for HPQT to enable the interception of as many trips as possible along the corridor to minimise additional vehicles on the main road network in and around Cambridge City itself and includes a park and ride site along the corridor to reduce demand on the Babraham Park and Ride site. The plan includes *Policy TSCSC12: Encouraging cycling and walking* with a commitment to increase healthy and active travel, making special note of the expectation that pedestrian and cycling facilities will be provided alongside HQPT and new road infrastructure.

The **Cambridgeshire and Peterborough Combined Authority Local Transport Plan (February 2020)** sets out to deliver a strategy that must facilitate economic growth, delivering opportunity and prosperity for all communities by providing good connectivity for commuters and businesses. More specifically, the plan identifies that the CBC is expanding rapidly, and is expected to be home to 26,000 workers by 203138. The plan goes on to state that the CBC will linked directly to the A1307 corridor by the CSET scheme, which will deliver a segregated public transport corridor from Granta Park to the Cambridge Biomedical Campus and a new Park & Ride site near the A11, which will form part of the CAM network at opening. This will be combined with additional bus priority measures along the A1307 corridor to Haverhill.

Locally, Table 5.1 and Table 5.2 below summarise the key policies of relevance to the CSET scheme taken from the statutory development plans of SCDC and Cambridge City Council.

Table 5.1: Relevant Policies in the South Cambridgeshire Local Plan (September 2018) for the CSET Scheme

Policy	Relevant Detail
S/2 – Objectives of the Local Plan	One of the key objectives for the Local Plan is to maximise potential for journeys to be undertaken by sustainable modes of transport including walking, cycling, bus and train.
S/5 – Provision of New Jobs and Homes	22,000 additional jobs and 19,500 new homes will be provided over the period of 2011-2031.
TI/2 – Planning for Sustainable Travel	Development must be located and designed to reduce the need to travel, particularly by car, and promoted sustainable travel appropriate to its location.
Other Relevant Policies	
S/1 – Vision, S/3 – Presumption in Favour of Sustainable Development, S/4 – Cambridge Green Belt, CC/6 – Construction Methods, CC/8 – Sustainable Drainage Systems, CC/9 – Managing Flood Risk, HQ/1 – Design Principles, NH/2 – Protecting and Enhancing Landscape Character, NH/3 – Agricultural Land, NH/4 – Biodiversity, NH/7 – Ancient Woodlands and Veteran Trees, NH/8 – Mitigating the Impact of Development In and Adjoining the Green Belt, NH/13 – Important Countryside Frontage, NH/14 – Heritage Assets, SC/8 – Protection of Existing Recreation Areas, Playing Fields, Allotments and Community Orchards, Policy SC/9 – Lighting Proposals, SC/10 – Noise Pollution, SC/12 – Air Quality.	

Table 5.2: Relevant Policies in the Cambridge Local Plan (October 2018) for the CSET Scheme

Policy	Relevant Detail
Policy 3 – Spatial Strategy for the Location of Residential Development	Provision will be made for the development of not less than 14,000 additional dwellings within Cambridge City Council's administrative boundary from 2011 to 2031.
Policy 5 – Strategic Transport Infrastructure	Emphasis on securing modal shift and the greater use of more sustainable forms of transport. Cambridge City Council will work with partners to support the implementation of transport schemes that will improve linkages across the region and by doing so increase the use of sustainable transport modes to get to and from Cambridge.
Policy 17 – Cambridge Biomedical Campus (including Addenbrookes Hospital) Are of Major Change	The principal uses of land will be to meet local, regional or national health cares or for biomedical and biotechnology research and development activities within class B1(b), related higher education and sui generis medical research institutes. Development needs to make provision for extension of existing bus services, the Cambridgeshire Busway and Park and Ride Services.
Policy 80 – Supporting Sustainable Access to Development	Major developments on the edge of the city and in the urban extensions should be supported by high quality public transport linking them to Cambridge's city centre and major centres of employment.
Other Relevant Policies	
Policy 1 – The Presumption in Favour of Sustainable Development, Policy 2 – Spatial Strategy for the Location of Employment Development, Policy 4 – The Cambridge Green Belt, Policy 8 – Setting of the City, Policy 28 – Carbon Reduction, Community Energy Networks, Sustainable Design and Construction, and Water Use, Policy 32 – Flood Risk, Policy 34 – Light Pollution Control, Policy 35 – Protection of Human Health and Quality of Life from Noise and Vibration, Policy 36 – Air Quality, Odour and Dust, Policy 43 – University Development, Policy 55 – Responding to Context, Policy 56 – Creating Successful Places, Policy 59 – Designing Landscape and the Public Realm, Policy 61 – Conservation and Enhancement of Cambridge's Historic Environment, Policy 62 – Local Heritage Assets, Policy 65 – Visual Pollution, Policy 67 – Protection of Open Space, Policy 70 – Protection of Priority Species and Habitats, Policy 71 - Trees	

5.3 Summary

The Policies and Plans chapter of the ES will identify all relevant planning policy documents. The assessment of the Scheme against particular technical matters covered by policies and plans will be addressed in the individual technical chapters. The overarching assessment of the Scheme in relation to policies and plans will be include in the Statement of Aims submitted to support the TWAO application.

6 Air Quality

6.1 Introduction

This chapter presents relevant legislation, describes the proposed approach for the assessment of air quality, determines what the potential impacts on air quality are and describes the scope of the assessment. The assessment will be undertaken using the description of the proposed development so far as it has been possible to detail by the time of the submission of the Environmental Statement. This will include measures that have been identified and embedded within the project description during the iterative design process to avoid or reduce environmental effects, measures that will be undertaken during the construction process where there is certainty regarding their effectiveness together with any measures that are required by other regulations or licences, where the activities could not be lawfully undertaken without such compliance. Where mitigation measures are proposed to mitigate likely significant environmental effects, these will be identified following the assessment of air quality effects and an assessment of the residual environmental effects undertaken following a description of the mitigation measures.

6.2 Legislation and Policy

The following legislation and standards are currently relevant to the air quality assessment of the CSET Scheme. Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union:

- Directive 2008/50/EC on ambient air quality and cleaner air for Europe;
- The Air Quality Standards Regulations, 2010
- The Air Quality Standards (Amendment) Regulation, 2016
- The Air Quality (amendment of Domestic Regulations) (EU Exit) Regulations, 2019
- Part IV of the Environment Act, 1995
- Air Quality (England) Regulations, 2000 (as amended)
- The Clean Air Strategy, 2019.
- National Policy Statement for National Networks 2014
- National Planning Policy Framework 2019
- National Planning Practice Guidance
- Cambridge City Council Local Plan 2018
- South Cambridgeshire Local Plan 2018
- Greater Cambridge Sustainable Design and Construction Supplementary Planning Document, 2020

Relevant air quality standards relevant to the assessment are summarised in Table 6.1.

Table 6.1: Relevant Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Air Quality Objectives and Limit Values		Attainment Date
		Concentration	Allowance	
Nitrogen Dioxide (NO_2)	1-hour	200 µg/m^3	18 per calendar year[(d)]	31 December 2005[(a)] 1 January 2010[(b)]
	Annual	40 µg/m^3	-	31 December 2005[(a)] 1 January 2010[(b)]
Particulates (PM_{10})	24-hour	50 µg/m^3	35 per calendar year[(e)]	31 December 2004[(a)] 1 January 2005[(b)]
	Annual	40 µg/m^3	-	31 December 2004[(a)] 1 January 2005[(b)(c)]
Particulates ($PM_{2.5}$)	Annual	25 µg/m^3	-	2020[(f)] 1st January 2010[(b)]

Notes: [(a)] Air Quality (England) Regulations 2000 as amended.
[(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.
[(c)] In March 2011, the Commission agreed the UK's revised application for a time extension for meeting the daily PM_{10} limit value, granting a "temporary and conditional exemption" for the Greater London urban area.
[(d)] Can be expressed as the 99.79th percentile of 1 hour means.
[(e)] Can be expressed as the 90.41st percentile of 24 hour means.
[(f)] Also a 'Target' of 15% reduction in annual mean concentrations at urban background between 2010 and 2020.

6.3 Study Area

During the construction phase, the Scheme could introduce temporary new emission sources to nearby sensitive receptors in the form of:

- Potentially dust-generating activities, such as earthmoving and construction works
- Increased construction traffic along the local road network.

The spatial scope for construction dust impacts will be confined to a study area within 350m of the CSET application boundary and will consider the entire construction phase. This is in accordance with the Institute of Air Quality Management (IAQM) 'guidance on assessment of dust from demolition and construction'.

To determine the need to assess construction traffic, the same approach for screening changes in traffic as outlined for the operational phase below, will be used. The predicted changes in traffic flows would need to be triggered for a two year period for them to lead to likely significant effects outlined in Section 4.2 and therefore if changes occur for a period less than this, a detailed assessment will not be undertaken and construction traffic will be assessed qualitatively.

The study area for operational phase traffic impacts will be based on DMRB LA105 Air Quality[13] guidance which advises that contributions from vehicle emissions are generally imperceptible above background concentrations farther than 200m from the road source. Therefore, only sensitive receptors which are located within 200m of affected roads will be considered within the assessment.

The traffic data will be used in the air quality modelling that forms the basis of the impact assessment of operational effects. The model to be used is the City Council air quality model.

[13] Design Manual for Road a Bridges LA 105 Air Quality
http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/LA%20105%20Air%20quality-web.pdf

Model runs for the EIA will be carried out by the City Council's consultants in collaboration with the Mott MacDonald air quality technical leader.

The study area for the cumulative assessment would include the same area determined for the Scheme and any other areas where the affected roads criteria are met within 200 metres of currently declared Air Quality Management Areas (AQMAs).

Affected roads included in the assessment will be those which meet the DMRB traffic scoping criteria, which is used to determine whether air quality effects of a scheme can be scoped out or require an assessment. The criteria is based on the changes between the "with scheme" and "without scheme" traffic scenarios. The criteria are:

- A change in annual average daily traffic (AADT) >= 1,000; or
- A change in heavy duty vehicle (HDV)[14] AADT >=200; or
- A change of speed band[15]
- A change of carriageway alignment by more than 5m

The traffic data generated for the CSET Scheme is being prepared based on a regional traffic model (CRSM). This is considered best practice for determining changes in traffic across a wide area as a result of a Scheme such as this and this model is being used to inform other aspects of the Scheme appraisal such as the economic benefits. Applying the DMRB affected road criteria to determine the study area is considered appropriate in this instance because DMRB LA105 states "The 1,000 vehicles and 200 HDVs represent the lowest threshold above which the traffic model can represent change in traffic conditions to a reasonable level of confidence". Therefore, application of alternative criteria to determine the study area would therefore not be appropriate as it could be assessing changes which were not as a result of the Scheme rather changes in flows due to 'model noise'. Using traffic flow outputs from a regional traffic model as is being done for this assessment is considered appropriate to assess the air quality effects of the Scheme.

6.4 Assessment Methodology

6.4.1 Baseline Survey

A Scheme specific NO_2 monitoring survey will be undertaken as part of the assessment, monitoring will be undertaken at locations along the Scheme route and in the wider study area. The locations for air quality monitoring will be discussed with the Environmental Health Officer from CCC prior to it taking place. The proposed locations for the monitoring are shown in Figure 6.1. Monitoring will be undertaken using diffusion tubes, which is consistent with monitoring undertaken by the local authority and will take place for a period of six months. Monitoring data from the six month survey will be annualised and bias adjusted in accordance with guidance issued by DEFRA (Department for Environment, Food and Rural Affairs).

Monitoring will be commenced in the summer of 2020 and the pending ongoing restrictions regarding COVID-19 results will be discussed within this context.

[14] HDVs include goods vehicles with a gross weight greater than 3.5 tonnes and buses and coaches

[15] Unadjusted traffic model speeds will be used to define the speed bands for individual links within the traffic model for the purpose of defining study area

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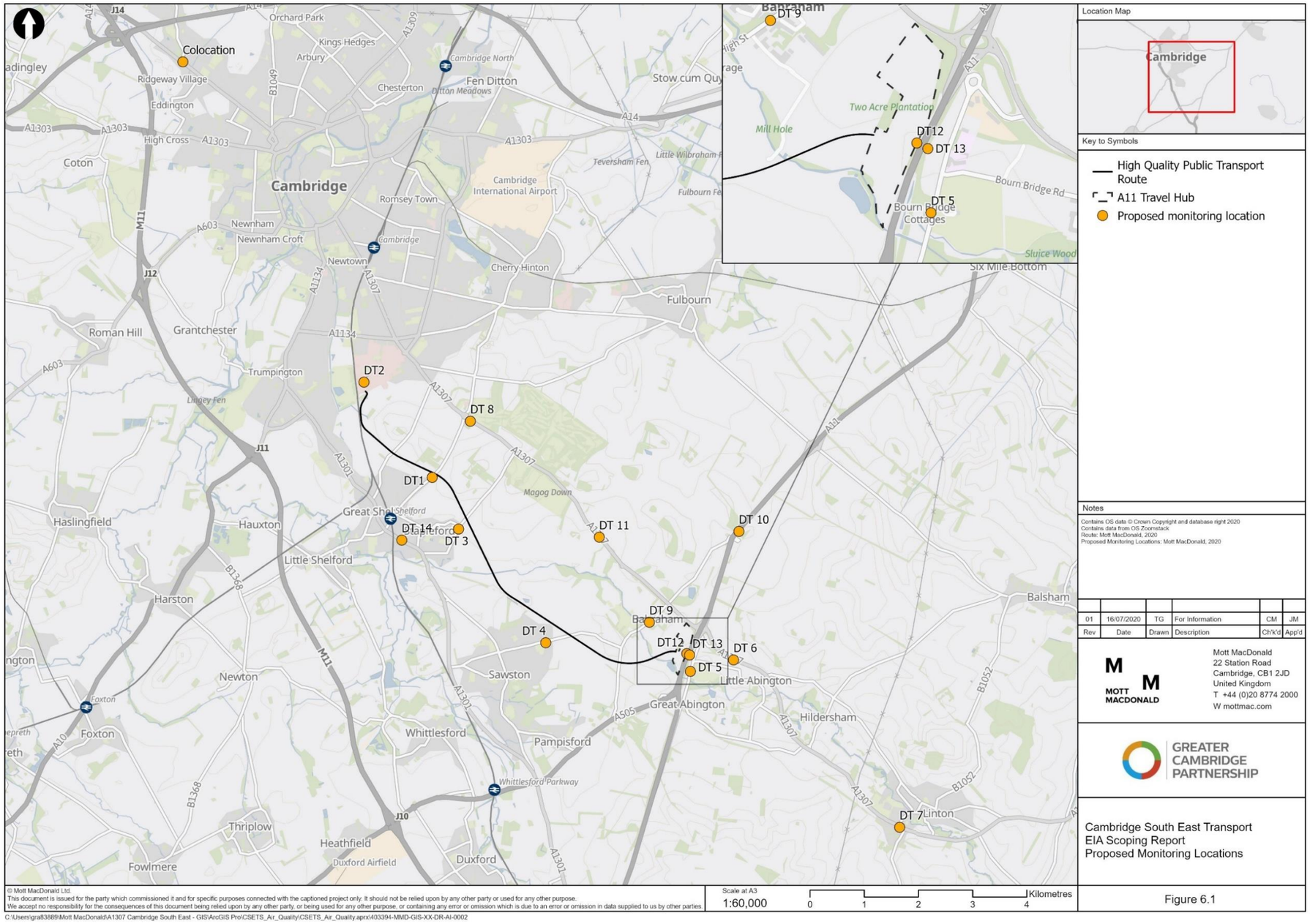
Figure 6.1: Proposed Air Quality Monitoring Locations



Source: Mott MacDonald (2020)

6.4.2 Assessment Approach

Construction Dust

Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter; the most common impacts from dust emissions are soiling and increased ambient PM_{10} concentrations. Dust can be mechanically transported either by wind or re-suspension by vehicles. It can also arise from wind erosion of material stockpiles and earth moving activities.

The usefulness of numerical criteria to determine effects from construction dust is limited, as the perception of loss of amenity or nuisance is affected by a wide range of factors such as character of the locality and sensitivity of receptors. As a result, assessment methodologies that are based on a qualitative approach are advocated. The EIA will assess construction dust effects in accordance with the Institute of Air Quality Management's (IAQM) 'guidance on assessment of dust from demolition and construction', this is because the construction phase has the potential to cause dust effects at:

- A 'human receptor' within:
  - 350m of the boundary of the Scheme; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- An 'ecological receptor' within:
  - 50m of the boundary of the Scheme; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Operational Phase

The following scenarios will be considered in the operational phase assessment:

- Base Year (Traffic flows from the base year will be used to inform the air quality model verification process).
- Opening Year Do-Minimum - this scenario would include committed developments in the area but would not include the Scheme.
- Opening Year Do-Something - this scenario would include committed developments in the area and would include the Scheme.
- Opening year Do-Something cumulative - this scenario would include committed developments in the area and would include the Scheme, other GCP schemes including a Cambourne to Cambridge corridor, C2C, CSWTH, Foxton Travel Hub, Waterbeach to North Cambridge, Eastern Access and any Scheme dependant development.

The CSRM uncertainty log which details which developments and transport schemes are included in each CSRM scenario will be provided as part of the ES submission.

The opening year traffic flows is expected to generate the worst-case air quality impacts. Future emissions across the UK are predicted to improve over time as newer less polluting vehicles enter the national fleet and older more polluting vehicles are removed from the roads. This means air quality in later years should see improvements in air quality and justifies the reason why the opening year is used to assess potential air quality impacts. The improvement in vehicle emissions is predicted to be greater than the increase in traffic in future years.

It should be noted that the assessment for the opening year of the Scheme will be conservative as the traffic model developed by the County Council, which will inform the assessment, has been developed assuming future traffic growth up to 2026. This is one year after the proposed opening year of 2025 and therefore the traffic used in the assessment will include additional growth and developments which will not be present in 2025. Therefore, as the assessment will be based on emission factors which are based on a predicted fleet mix appropriate for 2025 rather than 2026 it will represent a worse case assessment for the EIA.

Assessment of operational phase local air quality effects will be undertaken using the advanced dispersion model known as ADMS-Roads and supplemented by the following tools listed below. This is consistent with the approach required with DEFRA's Local Air Quality Management Technical Guidance (LAQM TG16) and City Council's "Air Quality in Cambridge - Developers Guide".

- The latest version of the Emission Factor Toolkit
- The latest version of DEFRA's Local Air Quality Management NOx to NO_2 conversion
- The latest version of DEFRA's background pollutant maps

Receptors

Key sensitive receptors are human health or ecological receptors located within 200 metres of the Scheme or roads that are described as 'affected' in accordance with the DMRB criteria outline above.

Sensitive human health receptors, which are representative of the likely worst-case impacts from the Scheme will be selected and included within the assessment.

Ecological designations of importance when considering air quality effects include Natura 2000 sites, sites of special scientific importance (SSSI), local nature reserves (LNR), local wildlife sites LWS), nature improvement areas (NIA), ancient woodlands and veteran trees. As per DMRB LA 105 sites sensitive to nitrogen deposition which are with 200 metres of affected roads will be included.

Receptors to be included within the assessment will be determined once the schemes traffic modelling is complete and the affected criteria is defined.

Assumptions and Limitations

Dispersion modelling has associated with it an inherent level of uncertainty, primarily as a result of:

- Uncertainties associated with traffic data
- Uncertainties with emissions data
- Uncertainties with recorded meteorological data
- Simplifications made in the model algorithms or post processing of the data that represent atmospheric dispersion or chemical reactions

To address these uncertainties, the base year model outputs will be verified against monitoring data in accordance with DEFRA's Local Air Quality Management Technical Guidance 2016 (TG16).

6.4.3 Significance Criteria

The assessment of significance will be undertaken in accordance with the EPUK and IAQM (2017) guidance. This is to ensure that the descriptions of effects within the assessment will be

clear, consistent and in accordance with specific air quality guidance. Table 6.2 provides effect descriptors for changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the Scheme.

The magnitude of any concentration change identified will be considered in relation to the air quality assessment level (AQAL), which may be an air quality objective, EU limit or target value or an environment agency environmental assessment level (EAL). For this Scheme, the relevant AQAL have been presented in Table 6.2.

EPUK recognises that professional judgement is required in the interpretation of air quality assessment significance is intended as a tool to help interpret the results to the air quality assessment and would therefore be employed in conjunction with professional judgement.

Table 6.2: Description of Effects for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76%-94% of AQAL	Negligible	Slight	Moderate	Moderate
95%-102% of AQAL	Slight	Moderate	Moderate	Substantial
103%-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes: [(a)] AQAL = Air Quality Assessment Level i.e. 40µg/m^3 for annual mean NO_2 and PM_{10} and 25µg/m^3 for annual mean $PM_{2.5}$. The table is only designed to be used with annual mean concentrations
[(b)] Percentage pollutant concentrations are intended to be rounded to whole numbers. For example, the '<1%' category in this table includes all changes from 0.5% to 1.4% (equivalent to an annual mean NO_2 or PM_{10} absolute concentration change of between 0.2µg/m^3 and 0.6µg/m^3). Changes of 0% (i.e. less than 0.5%) are described as negligible.
[(c)] When defining the concentration as a percentage of the AQAL, use the 'do minimum' concentrations where there is a decrease in pollutant concentration and the 'do something' concentration for an increase.

6.5 Baseline

The City Council declared an Air Quality Management Area (AQMA) in 2005 for exceedances of the annual mean objective for nitrogen dioxide (NO_2). The AQMA is located in the centre of Cambridge bounded by the inner ring road. The CSET Scheme is located 2.3km south of the AQMA.

SCDC declared an AQMA in 2008 for exceeding the annual mean objectives for NO_2 and the daily objectives for particulate matter (PM_{10}). The AQMA is located along the A14 and M11 north of Cambridge, at a distance of approximately 7km north of the CSET Scheme.

Baseline pollutant concentrations of NO_2 and particulate matter will be obtained from existing data sources and collection of site-specific monitoring data. The data sources include:

- All relevant local authority Local Air Quality Management (LAQM) Review and Assessment documents (including monitoring data); and
- DEFRA's UK Air Quality Information Resource (AIR) website.
- A Scheme specific NO_2 monitoring survey will be undertaken along the CSET Scheme alignment and in the wider study area as described in Section 6.4.1.

6.5.1 Local Authority Monitoring

6.5.1.1 Automatic Monitoring

The City Council undertakes automatic monitoring at five locations within its boundary, none of these are considered representative of the area around the CSET Scheme as they are located within the inner ring road of Cambridge whereas the CSET Scheme is set in a more rural location.

SCDC undertakes automatic monitoring at three locations within its boundary, two of these sites are considered to be representative of different areas along the CSET Scheme route which consists of both on route and off route sections.

Annual mean concentrations for the past three years are presented in Table 6.3 which shows there are no exceedances of the long-term air quality objectives for either site. Table 6.4 presents the short-term monitoring results which show no exceedances of the short-term air quality objectives. Figure 6.2 presents the location of these monitoring sites.

Table 6.3: SCDC Annual Mean Monitoring Results

Site ID	OS Grid reference		Distance to site (km)	Annual mean concentration µg/m^3					
				NO_2			PM_{10}		
	X	Y		2016	2017	2018	2016	2017	2018
ORCH	544558	261579	7.1	18	18	14	16	14	14
GIRT	542676	260667	7.0	23	23	18	17	17	17

Source: Data Capture for 2018 was >95% for NO_2 Data capture was greater than 90% for PM_{10}. SCDC Air Quality Annual Status Report 2019

Table 6.4: SCDC Short Term Monitoring Results

Site ID	OS Grid reference		Distance to site (km)	Number of hours exceeding 1-hour NO_2 objective (200 µg/m^3, 18 hours allowed)			Number of days exceeding the 24 hours PM_{10} objective (50 µg/m^3, 35 days allowed)		
				NO_2			PM_{10}		
	X	Y		2016	2017	2018	2016	2017	2018
ORCH	544558	261579	7.1	0	0	0	1	1	1
GIRT	542676	260667	7.0	0	0	0	1	1	1

Source: Insert Notes or Source Data Capture for 2018 was >95% for NO2 Data capture was greater than 90% for PM10. SCDC Air Quality Annual Status Report 2019

6.5.1.2 Non-Automatic Monitoring

The City Council undertook non-automatic monitoring of NO_2 at 69 sites during 2018. Four of which are considered representative of the CSET Scheme due to their close proximity. These are presented in Table 6.5.

SCDC undertook non-automatic monitoring of NO_2 at 27 sites during 2018. Three of which are considered representative of the CSET Scheme due to their close proximity. These are presented in Table 6.5 and Figure 6.2.

Monitored concentrations at all sites are well below the annual mean NO_2 air quality objective.

Table 6.5: Non-Automatic Monitoring for City Council and SCDC

Site Name	Local Authority	Site Type	Distance to Scheme (km)	OS Grid Reference		Annual mean NO_2 concentration		
				x	y	2016	2017	2018
DTS 4	City Council	Roadside	0.7	545237	254212	22.0	18.0	17.0
DTS 5	City Council	Roadside	1.0	546702	255380	27.0	24.0	22.0
DTS 6	City Council	Roadside	1.0	546700	255374	27.0	22.0	21.0
DT 28	City Council	Roadside	1.1	546953	255138	-	39.0	32.0
DT 29	SCDC	Urban Background	1.2	552961	249251	12.5	11.0	10.0
DT 17	SCDC	Roadside	1.3	548545	249366	16.4	14.1	13.1
DT 4	SCDC	Roadside	1.5	548600	249136	26.6	26.1	24.7

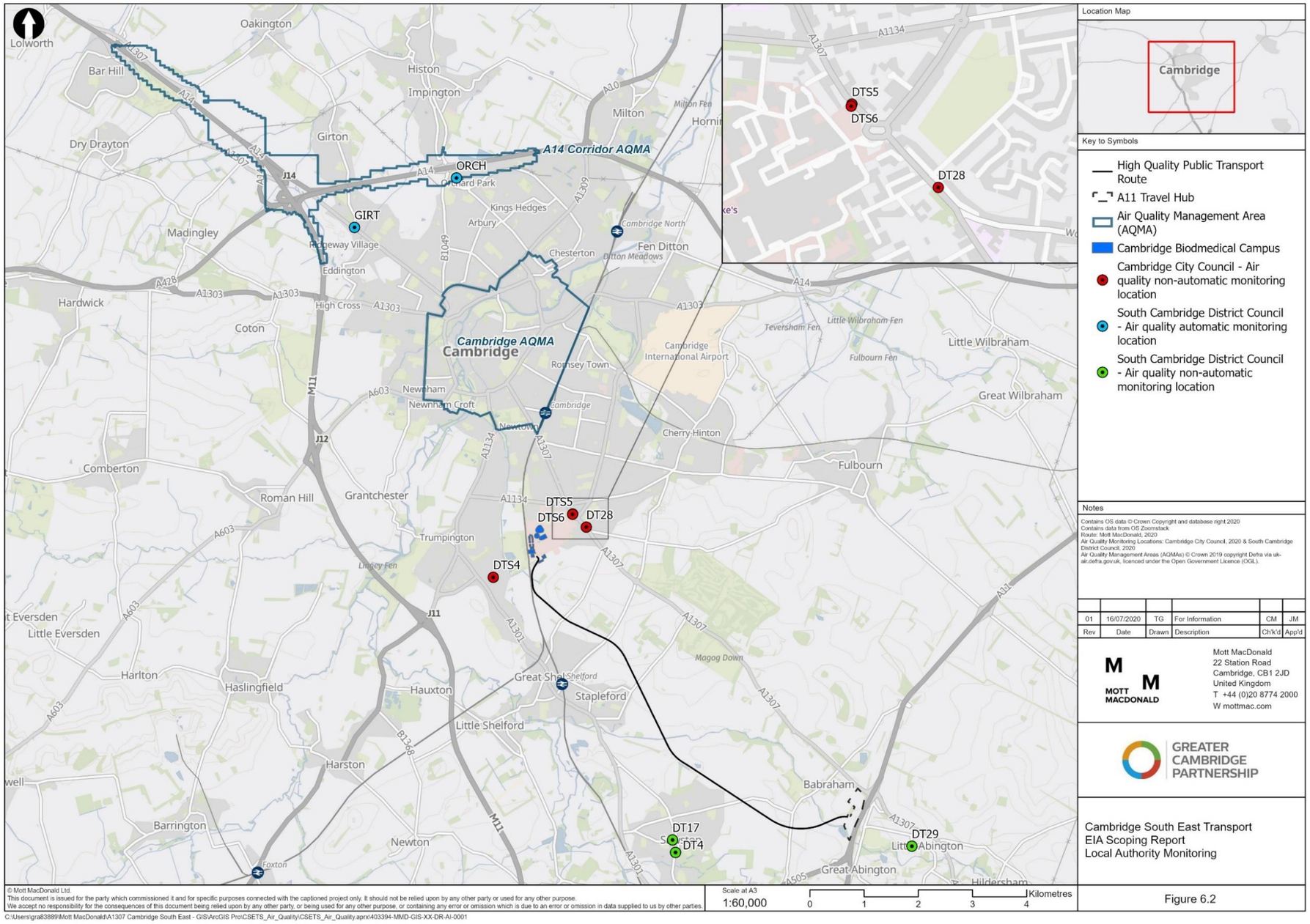
Source: Data Capture was greater than 90% for all sites
Diffusion tube data has been bias adjusted by their respective local authorities

6.5.1.3 DEFRA Projected Background Concentrations

DEFRA provides mapped future year projections of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ for each one-kilometre grid square across the UK for all years between 2017 to 2030.The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2017 (the baseline year) UK monitoring data.

Table 6.6 presents background concentrations for the 1km grid squares containing the CSET Scheme in the current year of 2020 and the opening year of Scheme is 2025. The maximum background concentrations that the CSET Scheme passes through is presented below and shows that pollutant concentrations are all below the relevant objectives.

Figure 6.2: Local Authority Monitoring



Source: Mott MacDonald

Table 6.6: DEFRA Projected Background Concentrations (µg/m3) of NOX, NO2, PM10 and PM2.5 along the Scheme

Pollutant	2020	2025
NO_X	14.5	11.5
NO_2	10.7	8.7
PM_{10}	17.5	16.8
$PM_{2.5}$	10.3	9.6

Source: Defra 2019. https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017, From grid square 551500, 249500

6.5.1.4 Pollution Climate Mapping (PCM) Model

DEFRA uses the Pollution Climate Mapping (PCM) model to report compliance with the EU Air Quality Directive (Directive 2008/50/EC). PCM model projections are available for all years from 2019 to 2030 and these are derived from the base year of 2018. In general, the model suggests NO_2 concentrations decline into the future, mainly in response to cleaner vehicles and technologies, and actions in DEFRA's Air Quality Action Plan. The most recent PCM model was published in May 2020.

The closest PCM link is located on the A1301 which is approximately 0.7km south of the CSET Scheme. The NO_2 concentration for this link in the opening year (2025) is 12.3µg/m^3, which is well below the EU Limit Value and therefore suggests that the changes in air quality caused by the CSET Scheme would not result in an exceedance and therefore a non-compliance of the EU Air Quality Directive.

6.6 Potential Impacts

6.6.1 Construction

Potential effects during the construction phase could include:

- On-site dust emissions arising from construction activities and vehicle movements
- Emissions associated with on-site plant and vehicles used in the construction of the CSET Scheme
- Emissions associated with construction traffic on the local road network

Air quality effects associated with construction dust emissions could result in loss of amenity and/or nuisance caused by, for example, soiling of buildings and washing, and reduced visibility.

Construction work requires the use of a range of site plant, such as excavators, piling rigs, cranes and on-site generators. All construction plant has an energy demand, and some may result in direct emissions to air from exhaust. Guidance from the Institute of Air Quality Management (IAQM) notes that effects from onsite exhaust emission are unlikely to be significant.

Given the local and temporary nature of site plant, plant emissions are considered to have a negligible impact on local air quality, relative to the surrounding road traffic contribution on the local road networks. Construction plant emissions will not be assessed further within the EIA. However, mitigation measures to reduce the effect of the site on local air quality will be considered in the EIA.

Construction traffic flows could affect human health receptors and ecologically designated sites within 200 metres of haulage routes. Where changes in Heavy Goods Vehicles (HGVs) is

greater than 200 movements per day, for a period of two years or more, as per the requirements set out within the Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality, the effect on local air quality will be considered. At this stage, detailed information is not available to confirm if construction traffic flows are below this threshold and therefore this will be reviewed as part of the EIA.

6.6.2 Operation

Potential effects during the operational phase will include:

- Changes in emissions associated with changes in traffic flows (including composition and speed) on the local road network
- Changes in road layout which may bring road traffic emission sources closer to, or farther away from, sensitive receptors

The key pollutants for consideration within the assessment of operational phase local air quality effects are:

- Nitrogen oxides (NOx), including nitrogen dioxide (NO_2)
- Particulate matter (PM_{10}) defined as those less than 10 microns in diameter
- Particulate matter ($PM_{2.5}$) defined as those less than 2.5 microns in diameter

No assessment is considered necessary for emissions of any pollutants other than those identified above, as no significant emission sources of these pollutants are introduced or affected by the CSET Scheme or because concentrations are expected to be well below air quality objectives within the study area.

6.7 Proposed Scope of Assessment

6.7.1 Scoped In

The following impacts on air quality will be considered in the ES:

- Impacts associated with construction dust
- Changes in air quality resulting from changes in traffic flows (during construction and operation phases)

6.7.2 Scoped Out

As a result of the information collected in the preparation of this Scoping Report it is proposed that the following impacts will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess:

- Impacts associated with non-traffic related emissions during operation will not be considered in the ES
- Changes in air quality associated with construction plant

Supporting Documents

The air quality assessment will rely on traffic information produced as part of the Transport Assessment and local authority Review and Assessment air quality documents.

Where relevant, mitigation measures will be described in the CEMP and cross-referenced in the ES.

7 Biodiversity

7.1 Introduction

This chapter presents relevant legislation, describes the proposed approach for the assessment of Biodiversity, determines what the potential impacts on biodiversity are and describes the scope of the assessment.

7.2 Legislation and Policy

The following legislation, policy and local Biodiversity Action Plans (BAPs) are considered relevant for this assessment. Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union.

7.2.1 National Legislation and Policy

The key legislation relating to ecology and the environment is The Conservation of Habitats and Species Regulations 2017 and Wildlife and Countryside Act (WCA) 1981 (as amended) Together, these form the framework for species and habitat protection in England. Badgers are protected under the Protection of Badgers Act 1992.

Identified within the National Planning Policy Framework[16] (NPPF), the UK Government has committed to promoting sustainable development by ensuring that biological diversity is conserved and enhanced as an integral part of any development. It clearly states that a development should seek to minimise impacts on biodiversity, provide net gains in biodiversity and establish coherent ecological networks that are more resilient to current and future pressures.

Section 15, paragraph 175 states that: “When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles: if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused”. It also states that: “planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of ancient or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss and a suitable compensation strategy exists”.

The National Policy Statement for National Networks (NPSNN), sets out the need for, and Government’s policies to deliver and develop nationally significant infrastructure projects (NSIPs) on the national road and rail networks in England. It provides the basis for the examination by the Examining Authority and decisions by the Secretary of State.

Where the project is subject to Environmental Impact Assessment (EIA), the applicant should ensure that the Environmental Statement (ES) clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other

[16] Communities and Local Government (2012) National Planning Policy Framework [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems. The NPS states that as a general principle development should avoid significant harm to biodiversity, including through mitigation and consideration of reasonable alternatives. The potential use of biodiversity offsetting to counteract any impacts on biodiversity which cannot be avoided or mitigated is also sanctioned in the NPS.

Although CSET is not a NSIP being considered under the Planning Act 2008 the policy framework can be considered in the process of determining the TWAO application.

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. Under this act a list of habitats and species that are of principal importance for the conservation of biodiversity in England are published under Section 41 (S41). These include those former UK Biodiversity Action Plan (UK BAP) priority habitats and species that occur in England. The Cambridgeshire and Peterborough Biodiversity Group provide Biodiversity Action Plans (BAPs)[17] for the habitats and species within Cambridgeshire. At the time of preparing this Scoping Opinion the Environment Bill is expected to return to Parliament for consideration in the Autumn. Until the Environment Bill receives Royal Assent its provisions may be changed and so the preparation of the ES will have regard to the stage reached by the Environment Bill/Act (if Royal Assent has been received) prior to completion of the ES and address requirements that may be applicable to the CSET Scheme.

7.2.2 Local Plans

A number of policies are relevant to biodiversity within the Cambridge Local Plan (2018) as detailed below:

Policy 69: Protection of sites of biodiversity and geodiversity importance - In determining any planning application affecting a site of biodiversity or geodiversity importance, development will be permitted if it will not have an adverse impact on, or lead to the loss of, part or all of a site. Where development is permitted, proposals must include measures to minimise harm; to secure achievable mitigation and/or compensatory measures; and where possible enhance the nature conservation value of the site affected through habitat creation, linkage and management.

Policy 70: Protection of priority species and habitats - Development will be permitted which protects priority species and habitats and enhances habitats and populations of priority species. Proposals that harm or disturb populations and habitats should minimise any ecological harm; and secure achievable mitigation and/or compensatory measures, resulting in either no net loss or a net gain of priority habitat and local populations of priority species.

Policy 71: Trees - Development will not be permitted which involves felling, significant surgery (either now or in the foreseeable future) and potential root damage to trees of amenity or other value, unless there are demonstrable public benefits accruing from the proposal which clearly outweigh the current and future amenity value of the trees. Development proposals should preserve, protect and enhance existing trees and hedges that have amenity value as perceived from the public realm, provide appropriate replacement planting, where felling is proved necessary; and provide sufficient space for trees and other vegetation to mature.

[17] Cambridgeshire and Peterborough Biodiversity Group (2019) Habitat Action Plans available at: http://www.cpbiodiversity.org.uk/biodiversity-action-plans

The Cambridgeshire Green Infrastructure Strategy[18] has been produced to assist in shaping and coordinating the delivery of green infrastructure in the county. The first of the four main strategies relates to biodiversity: “Reversing the decline in biodiversity. The objective of this strategy is to conserve and enhancing biodiversity, through the protection and enhancement of habitats (terrestrial and aquatic) and wildlife sites and linkage of key habitats”.

Furthermore, the South Cambridgeshire Local Plan (2018) detailed the following policies which are relevant to biodiversity:

- Policy NH/4: Biodiversity;
- Policy NH/5: Sites of Biodiversity or Geological Importance.
- Policy NH/6: Green Infrastructure; and.
- Policy NH/7: Ancient Woodlands and Veteran Trees.

These policies detail that development proposals where the primary objective is to conserve or enhance biodiversity will be permitted and new developments must aim to maintain, enhance, restore or add to biodiversity.

Through implementation of these policies, a biodiversity offsetting metric will be applied to the proposed CSET Scheme with the commitment to achieve net gain.

South Cambridgeshire have also produced the South Cambridgeshire Biodiversity Supplementary Planning Document (2009)[19], which provides additional details on how policies will be implemented to ensure that biodiversity is adequately protected and enhanced throughout the development process. It seeks to ensure that biodiversity and appropriate landscaping are fully integrated to new developments in order to create accessible green spaces for wildlife and people, to contribute to a high quality natural and built environment, and to contribute to a better quality of life.

To further support these policies, Natural Cambridgeshire Local Nature Partnership (LNP)[20] has developed a toolkit which identifies how developments can contribute to the policy of achieving a net gain in biodiversity.

7.3 Study Area

The CSET Scheme was reviewed to identify the spatial scale at which ecological features could be affected as a result of the Scheme and associated activities. This is defined as the Ecological ZoI. The current guidance on ecological assessments (CIEEM, 2018[21]) recommends that all ecological features that occur within an EZoI for a Scheme are investigated. Areas within the EZoI may include**:**

- Areas directly within the land take for the proposed Scheme and access.
- Areas beyond the proposed Scheme boundary from which the impacts described above are likely.

The EZoI will vary for different ecological features depending on their sensitivity to an environmental change. The geographical area for obtaining ecological data through desk and

[18] https://www.cambridge.gov.uk/media/2557/green-infrastructure-strategy.pdf

[19] https://www.scambs.gov.uk/media/6675/adopted-biodiversity-spd.pdf

[20] https://naturalcambridgeshire.org.uk/projects/developing-with-nature-toolkit/

[21] Chartered Institute of Ecology and Environmental Management, 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. [online] Chartered Institute of Ecology and Environmental Management.

field-based surveys is based on the potential impacts of the proposed Scheme on ecological features and accepted best practice field survey guidance.

The EZoI is also used to determine the geographical area for assessing the impacts (both positive and negative) of the proposed Scheme on ecological features based on all the available information. Table 7.1 below details the extent of land required to inform this assessment:

Table 7.1: Zone of Influence for This Assessment

Ecological Feature	Relevant Survey Guidance	Zone of Influence/ Area Surveyed
Designated Sites	CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal.*	2.0km surrounding the CSET Scheme
Designated Sites for Bats	Design Manual for Roads and Bridges (DMRB) (2009) *Environmental Assessment: Assessment of Implications on European Sites*. Volume 11, Section 4 [HD 44/09].	30.0km surrounding the CSET Scheme
Protected Species / Habitat Surveys		
Phase 1 habitat	Joint Nature Conservation Committee (2010) Phase 1 Habitat Survey Handbook	250m surrounding the CSET Scheme
Hedgerows	Department for Environment Food and Rural Affairs (2007) Hedgerow Survey Handbook (2nd edition)	Those directly impacted by the CSET Scheme
Botany	NVC Survey Handbook, JNCC 2006	250m surrounding the CSET Scheme
Breeding Birds	Common Bird Census (1983) British Trust for Ornithology.	250m surrounding the CSET Scheme
Wintering Birds	Bibby *et al.,* (2000) Bird Census Techniques (2nd Edition)	250m surrounding the CSET Scheme
Barn Owl	Shawyer (2011) Barn Owl *Tyta alba* Survey Methodology and Techniques for use in Ecological Assessment. The Barn Owl Trust. Survey Techniques, Leaflet no. 8. Gilbert *et al.,* (1998) Bird Monitoring Methods. A Manual of techniques for Key UK Species.	5km desk study and 1.5km beyond the CSET Scheme
Badger	Harris *et al.*, (1989) Surveying Badgers	250m surrounding CSET Scheme Affected main setts
Badger bait marking	Delahay et al 2000 Mammal Review	
Water Vole and Otter	Strachen & Moorhouse (2006) Water Vole Conservation Handbook Dean, et al., (2016). The Water Vole Mitigation Handbook Chanin, P. (2003). Monitoring the Otter *Lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.	250m surrounding the CSET Scheme
Bats	Bat Conservation Trust (2016). Good Practice Guidelines: Bat Surveys for Professional Ecologists	100m surrounding the CSET Scheme
Reptiles	Froglife (1999) Advice Sheet 9: Reptile Survey	250m surrounding the CSET Scheme
Great crested newts	English Nature (2001) Great crested newt mitigation guidelines	500m surrounding the CSET Scheme

Ecological Feature	Relevant Survey Guidance	Zone of Influence/ Area Surveyed
Invertebrates	Drake et al., (2007) Surveying terrestrial and freshwater invertebrates for conservation evaluation	50m surrounding the CSET Scheme
White clawed crayfish	Peay S (2003). Monitoring the White-clawed Crayfish *Austropotamobius pallipes*. Conserving Natura 2000 Rivers Monitoring Series No. 1. English Nature, Peterborough.	500m upstream/downstream of the CSET Scheme crossing point on the River Granta (2 locations)
River Corridor Surveys	River Corridor Surveys: Methods and Procedures (Conservation Technical Handbook)	500m section of watercourse centred on the CSET Scheme route

7.4 Assessment Methodology

7.4.1 Surveys

The following surveys have been carried out during the optioneering process to identify a preferred route for the CSET Scheme.

- Winter Bird Survey Report (WYG, 2020);
- Badger Report (WYG, 2020);
- Hedgerow Report (WYG, 2020);
- Otter Report (WYG, 2020);
- Additional Phase 1 Report (WYG, 2019);
- Constraints Report (WYG, 2019);
- Bat Activity Report (WYG, 2019);
- Phase 1 Habitat Survey (Plowman Craven, 2018)

Ecological surveys will be discussed with the CCCs Ecology Officer to ensure they cover the required survey area, and to review the validity of surveys which have already been completed in terms of informing the EIA.

BS 42020:20131[22] para 6.2.1 stipulates ecological surveys are valid if they are:

- Undertaken:
  - at the right time of year;
  - over a sufficient period of time'
  - over an appropriate area; and,
- not normally more than 2 to 3 years old unless there are exceptional reasons that demonstrate conditions have remained the same since the original surveys were completed.

Similarly, the "shelf life" of surveys will be less than 2 to 3 years if the surveys were undertaken under exceptional circumstances (particularly related to the weather), or conditions have changed in the area of the surveys such that the species/habitats may have been affected. Finally, if best practice guidance specific to a species requires more frequent surveys than 2 to 3 years then this will be the requirement specific to that species.

Where survey data is between 2 to 3 years old, factors such as mobility of species, whether there have been significant changes to the habitats present and if the local distribution of a

[22] BS 42020:2013 Biodiversity: Code of Practice for Planning and Development

species in the wider area around the site has changed, are all considered when determining if survey data remains valid.

Table 7.2 below identifies the ecological surveys that have been completed to date and what are still planned (to be discussed with the County Ecology Officer).

Table 7.2: Ecological Survey Summary

Ecological Survey	Completed Surveys		Planned Surveys (generally valid for 2 to 3 years)
	Date of Survey	Valid until (worst case)	
Phase 1 habitat survey	November 2018	November 2020	Not required as surveys remain valid
Extended Phase 1 habitat survey – gap fill missing Phase 2 areas	September 2019	September 2021	Any remaining areas with no access to be completed in May / June 2020
Hedgerow Regulations Survey	September 2019	September 2021	Hedgerows survey on areas with no previous access to be completed in June 2020
Bats – Transect and static surveys	August to October 2019 for transects 1-7	October 2021	Transects 1-7 May to July 2020 required (no access prior to August 2019). April surveys not completed due to Covid-19 restrictions. This is not anticipated to be a constraint as surveys are being undertaken during optimal months of May to August. Transect 5 and 6 August to October 2020 (due to previous access restrictions). Transects 1-3 to be undertaken in August 2020 (access restrictions during August 2019 surveys).
Bats – Roost potential surveys of scattered trees	October 2019	October 2021	Not required as surveys remain valid
Bats – Roost potential of woodland blocks	October 2019	October 2021	Not required as surveys remain valid
Bat ground tree level assessment of trees within woodland block			Completed May 2020
Bats – Tree emergence / re-entry			May to September 2020
GCN (HSI)	November 2019	November 2021	GCN (HSI) x12 ponds with no previous access to be completed May to June 2020
GCN eDNA			May to June 2020
Otter	February 2020	February 2022	Not required as surveys remain valid
Barn Owl			May to mid- July 2020
Kingfisher			May to July 2020
Breeding Birds			Spring/Summer 2020
Wintering birds	December 2019, January, February 2020	February 2022	Not required as surveys remain valid
Water vole			May to September 2020
Terrestrial Invertebrates			May to August 2020

Badger walkover	November 2019	November 2021	Areas with no access to be completed in September 2020
Badger Bait marking			September / October 2020
Reptiles			May completed / September 2020
White clawed crayfish			July 2020
NVC Woodland			Completed May 2020
NVC Grassland			June to July 2020
River Corridor			July 2020

Source: Mott MacDonald, 2020

7.4.2 Assessment Approach

The impact assessment on biodiversity will be undertaken in accordance with the following guidance:

- Design Manual for Roads and Bridges (DMRB) LA 108 Biodiversity;
- Chartered Institute of Ecology and Environmental Management (CIEEM 2018) Guidelines for Ecological Impact Assessment in the UK; and,
- CIEEM Sources of Survey Methods

The assessment of the potential impacts takes into account both impacts within the CSET Scheme boundary and those that occur beyond the CSET Scheme boundary. The assessment will consider mitigation measures required and assess the significance of effects of residual impacts. CIEEM Guidance (2018) will be used to help evaluate sites, habitats and species and to assess the effects on ecological integrity to help apply the DMRB method.

Following the completion of further surveys and the assessment of impacts, mitigation measures to reduce and avoid any adverse effects will be identified and developed, and any residual significant effects evaluated.

7.4.3 Significance Criteria

The value (sensitivity) of ecological features and nature conservation resources will be assessed using the criteria outlined in Table 7.3. Following this, the characterisation of ecological impacts will be undertaken and will include consideration of the value, integrity and conservation status of the resource affected, and a characterisation of the impact, which will consider:

- Positive or negative (e.g. adverse/beneficial);
- Duration (e.g. permanent/temporary);
- Reversibility (e.g. irreversible/reversible)
- Extent/magnitude;

  Frequency and timing.

Table 7.3: Biodiversity Resource Importance

International or European Importance	
Designated Sites	Sites including: 1) European sites: a) Sites of Community Importance (SCIs); b) Special Protection Areas (SPAs); c) potential SPAs (pSPAs);

	d) Special Areas of Conservation (SACs); e) Candidate or possible SACs (cSACs or pSACs); f) Wetlands of International Importance (Ramsar sites). 2) Biogenetic Reserves, World Heritage Sites (where recognised specifically for their biodiversity value) and Biosphere Reserves. 3) Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.
Habitats	N/A
Species	Resident, or regularly occurring, populations of species which can be considered at an international or European level where: 1) the loss of these populations would adversely affect the conservation status or distribution of the species at an international or European scale; or 2) the population forms a critical part of a wider population at this scale; or 3) the species is at a critical phase of its life cycle at an international or European scale.
UK or National Importance	
Sites	Sites including: 1) Sites of Special Scientific Interest (SSSIs) or Areas of Special Scientific Interest (ASSIs); 2) National Nature Reserves (NNRs); 3) National Parks; 4) Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); or 5) areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such.
Habitats	Habitats including: 1) areas of UK BAP priority habitats; 2) habitats included in the relevant statutory list of priority species and habitats; and 3) areas of irreplaceable habitats including: a) ancient woodland; b) ancient or veteran trees; c) blanket bog; d) limestone pavement; e) sand dunes; f) salt marsh; g) lowland fen. 4) areas of habitat which meet the definition for habitats listed above but which are not themselves designated or listed as such.
Species	Resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: 1) the loss of these populations would adversely affect the conservation status or distribution of the species at a UK or national scale; or 2) the population forms a critical part of a wider population at this scale; or 3) the species is at a critical phase of its life cycle at a UK or national scale.
Regional Importance	
Sites	Designated sites (non-statutory) including heritage coasts.
Habitats	Areas of habitats identified (including for restoration) in regional plans or strategies (where applicable).
Species	Species including: 1) resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: a) the loss of these populations would adversely affect the conservation status or distribution of the species at a regional scale; or b) the population forms a critical part of a wider regional population; or c) the species is at a critical phase of its life cycle;

	2) Species identified in regional plans or strategies.
County or equivalent authority importance	
Sites	Wildlife / nature conservation sites designated at a county (or equivalent) level including: 1) Local Wildlife Sites (LWS); 2) Local Nature Conservation Sites (LNCS); 3) Local Nature Reserves (LNRs); 4) Sites of Importance for Nature Conservation (SINCs); 5) Sites of Nature Conservation Importance (SNCIs); 6) County Wildlife Sites (CWSs);
Habitats	Areas of habitats identified in county or equivalent authority plans or strategies (where applicable).
Species	Species including: 1) resident, or regularly occurring, populations of species which can be considered at an international, European, UK or national level where: a) the loss of these populations would adversely affect the conservation status or distribution of the species at a county or unitary authority scale; or b) the population forms a critical part of a wider county or equivalent authority area population, e.g. metapopulations; or c) the species is at a critical phase of its life cycle. 2) Species identified in a county or equivalent authority area plans or strategies.
Local Importance	
Sites	Wildlife / nature conservation sites designated at a local level including: 1) Local Wildlife Sites (LWS); 2) Local Nature Conservation Sites (LNCS); 3) Local Nature Reserves (LNRs); 4) Sites of Importance for Nature Conservation (SINCs); 5) Sites of Nature Conservation Importance (SNCIs); 6) Sites of Local Nature Conservation Importance (SLNCIs).
Habitats	Areas of habitat considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal, or genetic exchange.
Species	Populations / communities of species considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange.

Source: DMRB LA108 Biodiversity

The importance of the resource (identified in Table 7.3) and level of impact (identified in Table 7.4) shall be used to determine the significance of effect on the ecological features (Table 7.5). For the purposes of this assessment, effects of Moderate Adverse or Moderate Beneficial and above are considered to be significant. Impacts are unlikely to be significant where features of low importance or sensitivity are subject to small or short-term impacts. However, where there are a number of small scale impacts that are not significant alone, the assessor may determine that, cumulatively, these may result in an overall significant impact.

CIEEM (2018) defines a significant impact as one “that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general”. For designated sites, impacts shall be considered significant when the CSET Scheme and associated activities affect the integrity of the designated site in terms of the coherence of its ecological structure and function or the impact on the designated site is likely to be significant in terms of its ecological objectives

For ecosystems, impacts shall be considered significant when the CSET Scheme and associated activities result in a change in ecosystem structure and function, that reduces its ability to sustain the habitat, complex of habitats and/or the population levels of species of interest.

Table 7.4: Level of Impact and Typical Description

Level of Impact (Change)		Typical Description
Major	Adverse	1) Permanent/irreversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Moderate	Adverse	1)Temporary/ reversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	1)Temporary addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Minor	Adverse	1) Permanent/irreversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	1)Permanent addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible	Adverse	1)Temporary/ reversible damage to a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	1)Temporary addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
No change		No observable impact, either positive or negative

Source: DMRB LA108 Biodiversity

Table 7.5: Significance Matrix

Resource Importance	Level of Impact					
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
	International or European importance	Neutral	Slight	Moderate or large	Large or very large	large
	UK or national importance	Neutral	slight	Slight or moderate	Moderate or large	Large or very large
	Regional importance	neutral	Neutral or slight	Slight	Moderate	Moderate or large
	County or equivalent authority importance	neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Local importance	neutral	neutral	Neutral or slight	Neutral or slight	Slight

Source: DMRB LA108 Biodiversity

7.5 Baseline

The surveys completed to date and surveys still to be undertaken (see 7.4.1 and Table 7.2) as well as data collected from the following data sources will be used in developing a thorough understanding of the biodiversity baseline:

- Desk based data search (information collated using Multi-Agency Geographic Information for the Countryside, Joint Nature Conservation Committee[23], Cambridgeshire and Peterborough Biodiversity Group[24] and Natural England National Character Area Profile 88 Bedfordshire and Cambridgeshire Claylands);
- Previous reports by Plowman Craven and WYG as detailed in section 7.4.1.

7.5.1 Designated Sites

7.5.2 Statutory Sites for Nature Conservation

There are six statutory designated sites[25] within 2km of the CSET Scheme. These include:

- Gog Magog Golf Course Site of Special Scientific Interest (SSSI) located 1.2km to the west of the alignment, north of Shelford Bottom
- Denford Fen SSSI located 1.2km to the south of the alignment, south of Stapleford;
- Roman Road SSSI located 1.6km to the north of the aliment (at its closest point) near Worsted Lodge;
- Sawston Hall Meadows SSSI located 1.05km to the south-west on the outskirts of Sawston;
- Nine Wells Local Nature Reserve (LNR) located 80m to the east of the centre line of the alignment just south of the CBC;
- The Beechwoods LNR located 1.57km to the north-east of the alignment, north of Stapleford.

The Eversden and Wimpole Woods Special Area of Conservation (SAC) is located approximately 10.5km to the west of the route alignment. There are no other internationally designated sites for bats located within 30km of the CSET Scheme.

7.5.3 Non-Statutory Sites for Nature Conservation

There are nine non-statutory sites for nature conservation within 2km of the CSET Scheme.

- River Granta County Wildlife Site (CWS), is located within the scheme footprint in two locations, south of Babraham and east of Stapleford footprint; and;
- Shelford – Haverhill Disused railway (Pampisford) CWS, located 35m to the south-west of the alignment, south of Babraham:
- Red Cross Lane Drain City Wildlife Site (CiWS) located 461m to the east of alignment, just south of the CBC;
- Hedgerow West of Babraham Road CiWS located 490m to the east of the alignment, just south of the CBC.
- Wort's Causeway Road Site Verge CWS / Protected Road Verge is located 1.86km to the north-west of route alignment and north of Shelford Bottom;

[23] Joint Nature Conservation Committee (JNCC) and Department for Environment, Food and Rural Affairs (DEFRA) (on behalf of the Four Countries' Biodiversity Group) (2012) UK Post-2010 Biodiversity Framework [online] available at: http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf

[24] Cambridgeshire and Peterborough Biodiversity Group (2019) Habitat Action Plans (Accessed Online: http://www.cpbiodiversity.org.uk/biodiversity-action-plans)

[25] Cambridge and Peterborough Environmental Records Centre (CPERC) 2017 https://www.cperc.org.uk/

- Wandlebury CWS located 1.47km to the north-east of the alignment, just north of Stapleford;
- Grantchester Road Plantations CiWS located 1.8km to the north-west of the alignment in Trumpington;
- Trumpington Road Woodland CiWS located 1.7km to the north-west of the alignment, just to the north of Trumpington; and
- Long Road Plantation located 1.08km to the north of the alignment, north east of Trumpington.

7.5.4 Habitats and Flora

The dominant habitats across the CSET Scheme are arable fields, semi improved neutral grassland, tall ruderal vegetation, dense/continuous scrub, improved grassland, parkland and scattered trees, unimproved neutral grassland and improved pasture.

Habitats of greater ecological importance in the study area include broad-leaved lowland deciduous woodland (including plantation woodland), traditional orchards, calcareous grassland, hedgerows, wet and dry ditches, waterbodies and a River (River Granta).

The details of botanical surveys are detailed below:

Hedgerows

Thirty four species-rich hedges were identified for survey based on the Phase 1 habitat survey undertaken by Plowman Craven (2018). These hedgerows were surveyed in September 2019 (WYG) to assess if the hedgerows qualify as important under the Hedgerow Regulations 1997. Of the 34 hedgerows surveyed, eight were assessed as being important.

Further surveys are required to assess six hedgerows within the Chieveley Park Estate as at the time of the survey no access was granted. These surveys will be undertaken during the optimum period of June to July 2020.

Woodland National Vegetation Classification (NVC)

There are 32 woodland blocks which stretch across the CSET Scheme from the CBC via Great Shelford, Stapleford and Sawston to the A11/A1307/A505 that will be subject to a woodland NVC survey, during the optimum survey period in May 2020.

Grassland NVC

A number of interesting grasslands have been identified within the across the CSET Scheme from CBC to the A11/A1307/A505, notably semi-improved calcareous grassland. These grasslands will be subject to a grassland NVC survey during the optimum survey period in June to July 2020.

River Corridor Survey (RCS)

The survey will cover a minimum 500m section of the River Granta centred on the proposed route. A river corridor survey comprises mapping and characterising the habitats, flow types and physical features of a watercourse. Any evidence of protected species is recorded, as well as the presence of invasive species[26]. This survey will be undertaken during the optimum survey period in August 2020.

[26] River Corridor Survey, National Rivers Authority 1992

7.5.5 Protected and Notable Species

The results of the desk study and field surveys (including the Preliminary Ecological Appraisal) undertaken for protected[27] and notable[28] species to date are detailed below.

Bats

Biological records obtained in 2018 (Plowman Craven) returned a large number of records for bats within a 5km radius of the CSET Scheme. Species included barbastelle *Barbastella barbastellus*, serotine *Eptesicus serotinus*, noctule *Nyctalus noctula,* Daubenton's bat *Myotis daubentonii*, brown long eared bat *Plecotus auritus* and soprano pipistrelle *Pipistrellus pygmaeus.* The closest known roost of an unidentified bat species was returned from a residential dwelling in Sawston, approximately 0.85km south west of the survey area in 2009. The most recent record, was of a mixed brown long eared bat and pipistrelle roost recorded approximately 1.5km north east of the survey area at Wandlebury CWS in 2015

It is noted that the barbastelle bat is cited as a key feature of Eversden and Wimpole Woods SAC, located approximately 10.5km to the west of the survey area. Third party data has identified barbastelle activity close to Great Shelford, Stapleford, Sawston and Babraham. These bats could potentially be associated with the SAC but to date, no clear link has been established. Habitats such as hedgerows and woodlands within the CSET Scheme extents provide suitable foraging and commuting habitat for this species.

The CSET Scheme would not result in direct habitat loss of the SAC. However, the CSET Scheme may require the removal of habitats which could sever commuting and foraging routes potentially used by barbastelles associated with the SAC population. Independently of the EIA process, a Habitats Regulation Assessment (HRA) will be undertaken to determine whether the CSET Scheme is likely to have a significant effect on the interest features of any European Site either alone or in combination with other plans/projects. If it is not possible to exclude the possibility that such an effect may arise then an appropriate assessment will be undertaken to determine whether the CSET Scheme could have implication on the conservation objectives of any European Site. If it can be ascertained that the proposal would not adversely affect the integrity of any European Site, then the Secretary of State can proceed to determination of the TWAO application. If there is uncertainty then it will be necessary for there to be an assessment of alternatives, of any imperative reasons of overriding public interest and then for a decision to be made as to whether the TWAO may be made. Although the HRA process is independent of the process of EIA, it is proposed that the draft HRA Report will be submitted as an appendix to the ES as it will contain information that informs the EIA process.

A Stage 1 bat inspection survey was undertaken in October 2019 (WYG) on trees and woodland blocks within the survey area. Of the trees surveyed five were considered to contain potential roost features suitable for roosting bats and 11 woodland blocks were considered to have trees suitable for roosting bats. A further Stage 1 bat inspection survey of trees within the woodland blocks will be undertaken during 2020 to identify if any trees contain potential roost features.

Within the wider survey area, most of the habitat area comprises arable land and therefore of limited benefit to bats. However, it was recognised that there were habitats within the survey area considered to provide a range of features suitable to support roosting sites, foraging area and commuting routes for bats.

[27] Species protected under current environmental legislation such the Conservation of Habitats and Species Regulations (2017), Wildlife and Countryside Act (WCA) (1981, as amended) and the Badger Act (1992).

[28] Those species listed under S41 of the NERC Act (2006).

Mature trees containing features suitable for roosting bats are present. In addition, the mature trees, hedgerows, linear tree planting, tall ruderal, waterbodies and semi-improved grassland habitat provided good foraging opportunities for bats and the network of hedgerows and linear features provided suitable commuting routes for bats.

Stage 2 bat activity surveys (transect, static and listening point) were undertaken in late 2019 by WYG. The listening point and transect surveys identified at least seven species of bat including common pipistrelle, soprano pipistrelle, noctule, brown long-eared, *Myotis* species, serotine and barbastelle. The most frequently recorded species was common pipistrelle.

The static surveys recorded eight species of bat including common pipistrelle, soprano, barbastelle, noctule, *Plecotus* species, *Myotis* species, serotine and Nathusius' pipistrelle. The most frequently recorded species was common pipistrelle, followed by soprano pipistrelle. Barbastelle was recorded within each transect during September 2020.

Further stage 2 bat activity surveys (emergence/re-entry, transect and static) are due to be undertaken during 2020 for the trees containing suitable roost features and the networks of hedgerows, line of trees, woodland edges and field boundaries as they could be important foraging/and or commuting routes for bats. These surveys will identify if barbastelle bats identified within the survey area are linked to the SAC.

Badger *Meles*

Surveys undertaken in 2020 have identified a number of active main, annex, subsidiary and outlier setts within 250m of the CSET Scheme. At the time of the surveys there was no access to Cheveley Park Estate, a walkover over of Cheveley Park will be undertaken in 2020 to ensure no setts have been missed.

Third party data (WYG 2020) identified that one main sett will be directly impacted by the scheme and one is in close proximity. Badger bait marking surveys will be undertaken during the optimum period of September to October 2020 to:

- Identify territorial boundaries of different badger groups in an area affected by the project;
- Consider if there are alternative setts used by the same badger group nearby which badgers could move to if a sett is destroyed; and,
- Identify the best location for a replacement artificial sett, if needed.

As part of the design refinement during the EIA the route will be reassessed to see if it can be realigned to avoid impacts to the main badger setts.

Breeding Birds

Biological records obtained in 2018 (Plowman Craven) returned large numbers of records for a wide range of farmland bird species within a 5km radius of the CSET Scheme. These included records of turtledove *Streptopelia turtur*, tree sparrow *Passer montanus*, grey partridge *Perdix*[29], skylark *Alauda arvensis*[30] and corn bunting *Emberiza calandra*. All of these species are red-listed Birds of Conservation Concern (BoCC) (Eaton et al, 2015) and Species of Principal Importance.

[29] A scarce resident, population much declined and fairly local (some releases). A resident, sedentary species. Major concentration is in the southern chalk areas (Cambridge Bird Atlas (2007-2011) – Louise Bacon, Alison Cooper, Hugh Venables).

[30] A common but much declined, resident, very common passage migrant and winter visitor. Occur widely through the county in the breeding season, avoiding urban areas (Cambridge Bird Atlas (2007-2011) – Louise Bacon, Alison Cooper, Hugh Venables).

During the Phase 1 habitat survey (Plowman Craven 2018) at least one singing male corn bunting was observed at two locations within arable habitat close to Addenbrooke's Hospital during the survey. Skylarks were seen and heard singing in the same area.

The undulating arable landscape with contiguous areas of scrub, grassland, woodland and hedgerows all provide suitable habitat for these species and many others. The arable land also provides opportunities for ground nesting birds such as skylark.

The data search also returned a large number of records for bird species commonly found in gardens and suburban areas that have also suffered drastic recent declines, such as house sparrow *Passer domesticus*, song thrush *Turdus philomelos* and dunnock *Prunella modularis*. House sparrow and song thrush are red-listed BoCC, while dunnock is amber-listed. All of these birds are also Species of Principal Importance[31].

Breeding bird surveys will be undertaken during the optimum survey period of April, May and June 2020.

Barn Owl *Tyto alba*

A desk based review undertaken in May 2020 identified the presence of barn owl, a Schedule 1 species within the CSET Scheme footprint. Two potential nest sites, along with one active roost site and two occupied breeding sites have been identified.

Although much of the CSET Scheme is arable farmland, which is considered a sub-optimal habitat for barn owls, there is suitable foraging habitat such as grassland and field margins.

Further surveys are to be undertaken during the optimum survey period of May to mid-July 2020.

Kingfisher

Kingfishes have been sighted at the River Granta CWS at Babraham, Stapleford and Great Abington, as well as similar sightings further downstream of the stretch of Hobson's Brook that encompasses the survey area between 2012 and 2013. There were no recent records of breeding kingfisher.

The stretches of River Granta CWS and Hobson's Brook within the survey area are highly likely to support kingfishers, supporting an abundance of fish and suitable perches. The stretches of these water courses within the survey area had naturalised banks of suitable profile which are likely to provide nesting opportunities for kingfisher[32]

Further surveys are being undertaken in during the optimum survey period in July 2020.

Wintering Birds

A total of 55 bird species were recorded during the winter bird surveys undertaken in between December 2019 and February 2020. Of these six species (Brambling *Fringilla montifringilla,* Fieldfare *Turdus pilaris*, greylag goose *Anser*, green sandpiper *Tringa ochropus*, red kite *Milvus* and redwing *Turdus iliacus* [33]*)* were identified and are given specific legal protection under Schedule 1 of the Wildlife and Countryside Act (1981).

[31] Plowman and Craven Preliminary Ecological Appraisal, November 2018

[32] Plowman and Craven Preliminary Ecological Appraisal, November 2018

[33] Fieldfare and redwing are listed on Schedule 1 by virtue of having small UK breeding populations that are confined to Northern Scotland. In winter they are common and widespread in lowland England including Cambridgeshire (Baker et al, 2013)

Eleven species recorded are listed as Species of Principle Importance (SPI) for the conservation of biodiversity in England listed under Section 41 of the Natural Environment and Rural Communities Act 2006, which comprise, corn bunting*.* dunnock, grey partridge, herring gull *Larus argentatus*, house sparrow**,** linnet *Linaria cannabina*, marsh tit *Poecile palustris*, skylark, song thrush, starling a *Sturnus vulgaris* and yellowhammer *Emberiza citrinella*.

Species listed as Birds of Conservation Concern[34] (BoCC) recorded within the survey area comprised:

- Fourteen Red List Birds of Conservation Concern: corn bunting, fieldfare, grey partridge, herring gull, house sparrow, linnet, mash tit, redwing, skylark, song thrush, starling, yellow hammer, mistle thrush *Turdus viscivorus* and woodcock *Scolopax rusticola.*
- Ten Amber List Birds of Conservation Concern: Barnacle goose *Branta leucopsis*, great black headed gull *Larus marinu,* lesser black-backed gull *Larus fuscus*, black headed gull *Chroicocephalus ridibundus*, dunnock, green sandpiper, greylag goose, kestrel *Falco tinnunculus*, mallard *Anas platyrhynchos* and meadow pipet *Anthus pratensis*.

The areas particularly important to the wintering bird assemblage include:

- Nine Wells LNR located immediately south of the CBC;
- The lake towards located south of Babraham and adjacent to the A11;
- Large open fields, which are present across the CSET Scheme from CBC to Babraham;
- The networks of hedgerows present throughout the CSET Scheme from CBC to Babraham; and;
- The mosaic of fields, scrub, network of hedgerows and grassland adjacent to River Granta.

The nearest Special Protection Area (SPA) is Ouse Washes located approximately 20km north of the CSET Scheme. This SPA is designated for a range of over-wintering birds none of which have been identified within the survey area.

Surveys were completed in February 2020 and are considered to remain valid for the EIA. Therefore, no further surveys are considered necessary for wintering birds.

Great Crested Newt *Triturus cristatus*

The data search returned a large number of records for GCN within a 5km radius of the CSET Scheme. The closest record was returned from a pond in Great Shelford, located approximately 0.75km south-west of the CSET Scheme in 2016 (Plowman Craven, 2018).

There are 55 waterbodies within 500m of CSET Scheme. Of these 22 were dry, three were scoped out due to significant barriers and 12 did not have access at the time of the survey.

Eighteen waterbodies were subject to a Habitat Suitability Assessment (HSI) which have all been assessed as poor to excellent and will be subject to further eDNA surveys during the optimum survey period of May to June 2020. Further HSI / eDNA surveys will be also undertaken during this time for the 12 ponds with no previous access in 2020.

Full traditional survey methods (population surveys) will not be undertaken for any of the ponds, due to the restrictions of COVID-19 and being unable to achieve the survey requirements of 2 (3 if GCN present) surveys between mid-April to mid-May. However, it is considered that eDNA surveys are enough to inform the ES. Traditional survey methods will be undertaken at a later

[34] Eaton et al. 2015, Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man, December 2015

date to inform the European Protected Species Mitigation Licence, if ponds return a positive result for GCN.

Reptiles

Biological records obtained returned a large number of records for all four widespread species of reptile within 5km of the CSET Scheme. This included a record of a single grass snake *Natrix helvetica* from the River Granta CWS in Babraham from 2013, as well as a record of a single common lizard *Zootoca vivipara* approximately 0.5km south west of the CSET Scheme, near Sawston in 2015 (Plowman Craven, 2018).

Areas of habitat suitable for reptiles were noted throughout the CSET Scheme, including:

- Three areas located immediately south of the CBC;
- Narrows strips of vegetation in the centre of the Scheme, west of Stapleford;
- A large area of habitat on the edge of Sawston which is, in part, beyond the boundary of the Scheme;
- An area of suitable habitat surrounding a large lake to the south of Babraham and adjacent the A11.

Further reptile surveys will be undertaken during the optimum survey periods of May and September 2020 within suitable habitat.

Terrestrial Invertebrates

During a site visit undertaken by WYG (2019) several small heath *Coenonympha pamphilus* butterflies (a species of principle importance) were recorded towards the centre of the CSET Scheme, close to Stapleford.

Although the majority of the CSET Scheme comprises arable fields there is suitable habitat for terrestrial invertebrates as follows:

- Areas of grassland with bare ground and tall ruderal, located to the south east of the Scheme, adjacent the A11: and
- An area of grassland north of the Scheme close to Great Shelford[35].

Further surveys of these areas are being undertaken during the survey period of May to July 2020. April was missed due to COVID-19 and therefore some of the early emerging species may have been missed.

Water Vole

A large number of records was returned from the biological records (Plowman and Craven 2018) for water vole within 5km radius of the Scheme. This included records of two water vole sightings and field evidence within a ditch to the south of the CBC in 2017.

Water voles are considered to be located in the River Granta, based on data records and from third party communications with local game keepers. One ditch located just to the south of the CBC was identified as having suitability to support water vole. Water vole feeding remains were noted in this ditch in 2018 (Plowman Craven, 2018).

Further surveys for water vole will be undertake in suitable habitat during the optimum survey period May to September 2020.

Otter

[35] WYG Constraints Report, March 2020

Biological records of otter spraints from the River Granta CWS in Babraham and Great Abington were returned, as well as similar records further downstream of the stretch of Hobson's Brook (Plowman Craven, 2018).

Otters are considered to be located in the River Granta, based on data records and from third party communications with local game keepers.

An otter survey was undertaken by Plowman Craven (2018) no field signs were recorded in the survey area within the boundary. The survey however did identify field signs outside the survey boundary, south east following the River Granta towards Linton.

Surveys were also undertaken by WYG in 2020 which identified otter evidence within the CSET Scheme boundary as follows:

- One spraint and potential otter couch were identified 65m to the east of the CSET Scheme along the River Granta;
- One potential couch located to the east of the large lake south of Babraham and adjacent the A11;
- Seven otter spraints located under the bridge for the A11 along the northern and southern riverbanks;
- Two otter spraints and two slides are located on the southern bank of the River Granta under the bridge for the A11.
- Two potential resting places were also identified under the A11.

Surveys were completed in September 2020 and are considered to remain valid for the EIA. Therefore, no further surveys are considered necessary for otters.

White Clawed Crayfish

Four records of white clawed crayfish *Austropotamobius pallipes* were returned from the biological records centre within a stretch of the River Granta CWS close to Granta Park within the survey area between 2011 and 2014. No recent records of signal crayfish have been identified which increases the likelihood that this species still present within the survey area[36].

White clawed crayfish surveys will be undertaken within suitable aquatic habitat such as the River Granta during the optimal survey period of July to October 2020.

Other Species

A number of incidental brown hare observation were made during the winter bird surveys undertaken by WYG in 2020. They were identified in a large arable field located between the CBC and Granham's Road.

There may be habitat loss impacts to other SPIs, including hedgehog *Erinaceus europaeus* and toad *Bufo bufo*, for which species-specific surveys are not considered necessary but their potential presence (based on the suitability of habitats present within the CSET Scheme) are of consideration. An outline CEMP will identify parts of the CSET Scheme where these ecological features may occur, or are present, and will identify measures to control likely effects.

[36] Plowman and Craven Preliminary Ecological Appraisal, November 2018

7.6 Potential Impacts

The construction and operation of the CSET Scheme has potential to affect ecological features. The assessment of the likely impacts of the CSET Scheme takes into account both on-site effects and those that may occur outside of the Order limits to more distant ecological features.

7.6.1 Construction

The potential impacts of construction on biodiversity are:

- Construction activities may disturb or damage habitats and species, causing direct mortality.
- Removal of habitats would result in habitat loss, fragmentations and severance.
- Construction vehicle movements increase the risk of direct mortality of some species.
- Lighting for security or operational working areas may result in the displacement sensitive species.

7.6.2 Operation

The potential impacts of operation on biodiversity are:

- Increased traffic, lighting of retained habitats within and adjacent to the CSET Scheme, disturbance and severance of wildlife corridors may all impact the biodiversity on site.
- The damage and deterioration of retained habitats from polluted spray or maintenance activities may also impact the biodiversity.

7.7 Proposed Scope of Assessment

7.7.1 Scoped In

Table 7.6 outlines activities, impacts and ecological features potentially affected during construction and operation of the CSET Scheme. As the design for the CSET Scheme evolves and further field survey data is collected this list will be developed.

Table 7.6: Likely Impacts Requiring Assessment

Activity	Impacts	Justification	Ecological features most likely affected (if unmitigated)
Construction			
Construction activities	Disturbance or damage to habitats/ species. Direct mortality	Protected or important habitats/species could be damaged or disturbed as a result of an increase in noise, vibration, light and other activities associated with construction (excavation / removal of suitable refuge / release of pollutants); Impacts may arise on non-statutory designated sites where vegetation may be sensitive to elevated levels of airborne dust from the works. Construction activities in proximity to watercourses may result in the accidental release of potential pollutants.	Important hedgerows would be directly impacted by the CSET Scheme. Adjacent designated sites/habitats to the CSET Scheme could be disturbed as a result of an increase in noise, vibration, light, dust and other activities associated with construction. Increased disturbance to badger, bats (if present), great crested newts (if present), wintering birds, breeding birds, barn owl (if present), kingfisher (if present), reptiles (if present), invertebrates (if present), white clawed

			crayfish (if present), otters and water vole (if present).
Habitat Removal	Fragmentation and severance, by removal of habitats or wildlife corridors	Change in land use would result in the removal of existing habitats; loss of drainage ditch; loss of hedgerow. Less mobile species, or animals that are young or hibernating, are likely to be those most vulnerable to direct mortality during construction Given the predominantly arable landscape, the severance (including temporary severance during construction) of existing wildlife corridors along the CSET Scheme (such as field margins, hedgerows) could have significant impacts on species in the area. Resulting in loss of resources critical throughout a given species' life-history such as those for breeding and rearing, shelter and resting, foraging, dispersal and migration.	Habitat loss may affect badger, bats (if present), great crested newts (if present), wintering birds, breeding birds, barn owl (if present), kingfisher (if present), reptiles (if present) and invertebrates (if present).
Vehicle movements	Direct mortality	Increased movements from construction vehicles.	Mortality of badger, bats (if present), great crested newts (if present), wintering birds, breeding birds, barn owl (if present), kingfisher (if present), reptiles (if present) and invertebrates (if present).
Use of lighting for security purposes or to illuminate operational working areas	Displacement of species	Sensitive species may actively avoid sources of light disturbance and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.	Displacement of badger, bats (if present), great crested newts (if present), wintering birds, breeding birds, barn owl (if present), kingfisher (if present), reptiles (if present) and invertebrates (if present).
Operation			
Traffic movement	Disturbance: noise and light	Increased traffic, lighting of retained habitats within and adjacent to the CST Scheme; disturbance and severance of wildlife corridors; abandonment of refuge by light sensitive species.	The CSET Scheme would result in the permeant loss of important hedgerows. Increased traffic movements will result in greater levels of disturbance to adjacent habitats as a result of increase in noise, vibration, light and other activities associated with operation. Increased disturbance to badger, bats (if present), great crested newts (if present), wintering birds, breeding birds, barn owl (if present), kingfisher (if present), reptiles (if present), invertebrates (if present), white clawed crayfish (if present), otters and water vole (if present).
	Damage/deterioration of retained habitats	Impacts on vegetation from polluted spray from road traffic. Maintenance activities may result in the accidental release of pollutants.	Reduced/deteriorated habitat availability to badger, bats (if present), great crested newts (if present), wintering birds, breeding birds, barn owl (if present), kingfisher (if present), reptiles (if present), invertebrates (if present), white clawed

			crayfish (if present), otters and water vole (if present).
	Recreational pressure	Impacts from making designated sites more accessible to humans.	Deterioration of designated sites and habitats, increased disturbance to protected species.
River crossings	Damage/deterioration of riparian and aquatic habitats	Increased shading of marginal and aquatic plant species due to bridge structure over the River Granta. May result in deterioration of habitats and associated negative effects on species which utilise them	Reduced/deteriorated habitat of the CWS and habitats for species including kingfisher (if present), white clawed crayfish (if present), otters and water vole (if present).

Source: Mott MacDonald, 2020

7.7.2 Scoped Out

Habitats such as hedgerows and broad-leaved woodland across the survey area have the potential to support nesting and foraging dormice, however no records were returned within 5km of the CSET Scheme. They are only known to be present in small numbers in one woodland located 31km north west from the CSET Scheme, following a reintroduction programme (Cambridgeshire Mammal Group, 2016) and have therefore been scoped out of further assessment.

All ecological features listed in Table 7.6 will be considered during the EIA as the baseline surveys continue. For the final assessment, all ecological features considered to be of local or negligible importance only will be scoped out as any impacts upon them would not be considered ‘significant’ (as described in Section 7.5.4 and 7.5.5.

8 Climate Change

8.1 Introduction

It has now been established that as a result of rising concentrations of carbon dioxide (CO_2), and other greenhouse gases in the atmosphere, a degree of climate change is inevitable and is expected to have significant implications for infrastructure assets in future, particularly those with long operational lifetimes. This makes them sensitive, not only to the existing climate at the time of their construction, but also to climate variations over the decades of their use. In addition, stringent targets have been set by the UK to reduce our national emissions to zero by 2050.

This chapter presents the outcomes of the scoping assessment for the climate change related environmental factor divided into two separate aspects:

- Effects on climate – effects of greenhouse gas (GHG)[37] emission on climate change arising from the CSET Scheme.
- Vulnerability of the CSET Scheme to climate change – the resilience of the CSET Scheme to climate change and impacts relevant to adaption.

The potential requirement for further assessment will be identified within this chapter. Design, mitigation and enhancement measures undertaken throughout the design of the Scheme will also be explored as part of the ES. Where necessary, further assessment will be presented within the ES.

8.2 Legislation and Policy

Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union.

8.2.1 European Union

8.2.1.1 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.[38]

Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union

[37] 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.

[38] 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)

8.2.2 National Legislation

8.2.2.1 National Policy Statement for National Networks

The National Policy Statement for National Networks (NPSNN)[39] 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.

8.2.2.2 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 baseline[40], supporting the Paris Agreement which provides a framework to keep global warming well below 2°C, pursuing efforts to limit the temperature increase to 1.5°C[41]. 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[42].

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 5-year period, as set out in Table 8.1.

Table 8.1: 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 6 years, on the risks to the UK of climate change, and to publish a programme setting out how these will be addressed. This

[39] 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).

[40] 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)

[41] Department for Business, Energy & Industrial Strategy (BEIS) 2016 [online] available at: https://www.gov.uk/government/news/uk-ratifies-the-paris-agreement (last accessed May 2020)

[42] DECC (2012) Climate Change Act 2008

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.

8.2.2.3 Environmental Impact Assessment Regulations

The requirements of the 2014 amended EU EIA Directive were transposed into UK law and applied to the TWAO process by the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulation 2017, came into force on 5 December 2017.

The regulations amended the Application Rules so as to add climate change as a new topic on which information should be presented by an Applicant in an Environmental statement. As a consequence, the Application Rules now require that the ES for the CSET Scheme present information on the effects that the project is predicted to have on climate change alongside an assessment of the vulnerability of the CSET Scheme itself to climate change.

8.2.3 National Policy

8.2.3.1 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 CO_2 emissions. However, all emissions from the motorways sector have been removed and are not factored into the annual CO_2 emissions.

8.2.3.2 Infrastructure Carbon Review

The Infrastructure Carbon Review[43] sets out carbon reduction actions required by infrastructure organisations. In terms of the CSET Scheme, this means that emission reduction actions should be taken into account when developing Scheme specific mitigation measures, where relevant.

8.2.3.3 PAS2080:2016

PAS2080[44] 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.

8.2.4 Local Policy

8.2.4.1 Net Zero Declarations

The City Council declared a Climate Emergency in January 2019. This is in addition to the Climate Change Strategy (2016-2021) and a supporting Carbon Management Plan (2016-2021) that has already been put in place. The climate change strategy identifies five key themes to tackle, including measures to:

[43] 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)

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

- Reduce emissions from the City Council estate and operations
- Reduce emissions from transport by promoting sustainable transport, reducing car travel and traffic congestion, and encouraging behaviour change
- Reduce energy consumption and promoting sustainable construction, use of renewable energy sources and behavioural change
- Reduce consumption of resources

SCDC has committed to deliver Net Zero Carbon by 2050 and declared a "Climate Emergency" in December 2018. The commitment is that the next local plan (to be a combined local plan with City Council) will "*look at ways South Cambridgeshire District Council can press for a carbon-free area through the design of homes and other buildings, land use including open space, transport links, energy supplies and waste and recycling services"*. The current local plan is focused on buildings and energy reduction, the new local plan will have to take a broader view on all new developments and how to reduce carbon (embedded and operational emissions).

8.2.4.2 Cambridge Local Plan 2018

Cambridgeshire County Council (CCC) adopted their Cambridge Local Plan[45] 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.*"

8.2.4.3 South Cambridgeshire Local Plan 2018

SCDC adopted their Local Plan in 2018[46]. GHG policies within the Local Plan include Policy CC/1: 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.

8.3 Study Area for Impacts on Climate

8.3.1 Construction

The study area for the construction assessment includes construction-related activities that occur within the CSET Scheme limits, such as development of the new highway.

Emissions would also include those associated with some activities supporting construction which occur outside the physical CSET Scheme limits, for example GHG emissions from construction related transport (including workers and materials).

Similarly, the quantification of indirect emissions resulting from construction activities would include emissions associated with production, manufacture and refining of construction materials, regardless of the location where these activities occur – this is known as embodied carbon.

[45] 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)

[46] 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)

8.3.2 Operation

The study area to be considered for operation includes the Affected Road Network (ARN) for road user carbon (vehicle emissions) and the carbon associated with the maintenance and refurbishment of the CSET Scheme assets (this comprises embodied carbon, emissions from construction activities and associated transport). Road user carbon would be calculated in line with HA207/07 and WebTAG Unit A3 Chapter 4.

8.4 Study Area for Resilience of the CSET Scheme to Climate Change

Spatial scope

The study area will include all areas of permanent land take and will consider the constructed elements of the CSET Scheme design being implemented within the permeant land take area.

8.4.1 Construction

Impacts of climate change on the construction phase are scoped out of this assessment due to the short timescales of the construction phase (construction is proposed to take place from 2023 until 2025). Given the short timescales of the construction period, the climate is not expected to vary significantly from present-day climate. The focus of the assessment will be on the resilience of the operational infrastructure to climate change.

8.4.2 Operation

The climate change risk assessment will consider the 2090s (between 2070-2089) as the timeline for analysis. This choice is informed by the long lifespan of the key structures within the CSET Scheme, with the bridges having a lifespan of 100 years. The UK Climate Projections 2018 (UKCP18)[47] are used to set the future baseline, and the furthest projections available are for the 2080s time period. Where structures have a shorter lifespan (e.g. street lighting) this will be taken into account in the assessment.

8.5 Assessment Methodology

8.5.1 Surveys

No surveys are required to be undertaken for this assessment.

8.5.2 Assessment Approach

Impacts on climate

The assessment of the impacts of the CSET Scheme on climate will include:

- Assessment of the GHGs emitted during construction (including production of the materials used to construct the CSET Scheme), and operation over the lifecycle of the CSET Scheme of both potential guidance options.
- GHG assessment using recognised calculation methodologies and tools:
  - the Mott MacDonald Carbon Portal, which is PAS 2080 compliant will be used for assessment of construction emissions;
  - an appraisal of GHGs for the CSET Scheme opening year and design year to derive the change in emissions will be assessed in accordance with WebTAG Unit A3.

[47] Met Office, UKCP 18: Regional (12km) and Local (2.2km) Projections, 2019 Available online at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/high-res-projections (last accessed May 2020)

- Opportunities for mitigation in the CSET Scheme design.

Resilience of the CSET Scheme to climate change

Assessing the resilience of the CSET Scheme to climate change is fundamentally different to the remainder of the EIA assessment, as it assesses the impact of an external event (climate change) on the Scheme, where the receptors are the elements of the Scheme.

A qualitative methodology for assessing the resilience of the CSET Scheme assets to climate change will be produced in line with DMRB LA 114 Climate and the IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation 2015[48].

In combination climate impacts

A qualitative assessment of the in-combination climate impacts will be carried out in line with the IEMA Environmental Impact Assessment Guide to Climate Change Adaption and Resilience (2015). The assessment will be based on professional judgement of the information available where published quantifiable methods are not available. The assessment will include:

- Impacts due to the project on the current baseline (the assessments carried out by topics);
- How the environmental receptors will be affected by the future climate baseline; and
- The impacts of climate change on the impacts of the project directly and/or through climate change impacting on the mitigation measures for the project.

8.5.3 Significance Criteria

Impacts on climate

An assessment of significance will be conducted in line with the National Policy Statement for National Networks (NPSNN) by comparing estimated GHG emissions arising from the CSET Scheme with UK carbon budgets, and the associated reduction targets. Appendix B to this scoping report sets out a more detailed discussion on how significance will be assessed, highlighting the complexity of doing such an assessment.

CSET is not itself a road project in the sense envisaged in the NPSNN, it's purpose is to reduce road use by providing improved public transport, so it should help reduce carbon emissions that should help the overall carbon reduction commitment. The NPSNN is applicable to a public transport Scheme as the Scheme users will be using private vehicles on the national network first in order to reach the park & ride.

Value engineering and carbon mitigation will be prioritised to reduce the Scheme's emissions as far as possible as required by the IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

Resilience of the CSET Scheme to climate change

The evaluation of the significance of the effects are as follows:

- The potential impacts (hazards and opportunities) for each receptor (CSET Scheme assets) will be identified using available climate projections data. In the UK these are the UKCP18 projections, produced by the Met Office Hadley Centre. The resilience of the project to both weather and climate impact-related scenarios throughout the project lifecycle, will be identified and reported.

[48] IEMA (2015). IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation. November 2015. Available online at: https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20(1).pdf (last accessed May 2020)

- Once the climate change impacts (hazards and opportunities) have been identified, a risk assessment of those impacts on the project shall be undertaken using likelihood categories and consequence of impact.
- The outputs of the risk assessment will be used to report on the significance of effects.

8.6 Baseline

Impacts on climate

The baseline considers existing carbon emissions from a variety of sources in the area, including those from transport infrastructure.

In 2018, UK net carbon dioxide (CO_2) emissions were estimated at 366 million tonnes, a decrease of 2% in comparison to 2017 levels. In 2018 the transport sector accounted for 28% of UK GHG emissions; this is a 1% decrease in total emissions in comparison to 2017[49]. Within Cambridge District Council, the carbon emissions specifically from all roads in 2017 was 105.8 $ktCO_2$, which represents a 6% decrease since 2005[50].

There were 38.7 million vehicles licensed for use on roads in the UK at the end of 2018. During 2019, registration of ultra-low emission vehicles increased by 26% when compared to 2018, making up 2.7% of all new registrations. There has been a sharp decline in the number of diesel cars being registered for the first time in 2019, down 18% compared to 2018[51].

The UK construction industry is the largest consumer of natural resources with an average of over 400 million tonnes of material consumed every year. This is estimated to account for approximately 10% of the total UK carbon emissions[52].

Resilience of the CSET Scheme to climate change

The baseline for this assessment is the historic weather observed in the area.

The Met Office holds historical regional climate information, in which South Cambridgeshire is included in the East of England region[53]. High-level climate observations for the East of England over a 30-year averaging period between 1981-2010 are presented in Table 8.2.

Table 8.2: Historic Climate Baseline for the East of England (1981-2010)

Climatic conditions	Climate observations
Temperature	Mean daily minimum temperatures ranged from 0°C to 2°C in winter, whilst summer daily maximum temperatures were in the region of 21°C.
Rainfall	Atlantic depressions or convection are the source of the majority of rain in the east, particularly in autumn and winter where Atlantic Lows are more vigorous. Annual rainfall in the east averages at 700mm. Monthly rainfall is variable but is highest in the winter months. The number of days with rainfall totals greater than 1mm are 30 days in winter, dropping to an average of 25 days in summer.

[49] Department for Business, Energy and Industrial Strategy (2020): 2018 UK Greenhouse Gas Emissions, Final Figures [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/863325/2018-final-emissions-statistics-summary.pdf (last accessed May 2020).

[50] 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 May 2020).

[51] Department for Transport (2019): Vehicle licensing statistics: Annual 2019 [online] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882196/vehicle-licensing-statistics-2019.pdf (last accessed May 2020).

[52] Institute of Civil Engineers (ICE) (2014): Energy Briefing Sheet: Embodied Energy and Carbon [online] available at: https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/Disciplines%20and%20Resources/Briefing%20Sheet/Embodied_Energy_and_Carbon.pdf (last accessed May 2020).

[53] The Met Office (2016) East England: Climate available at: https://www.metoffice.gov.uk/climate/uk/regional-climates/ee (last accessed May 2020)

Wind	Eastern England is one of the more sheltered parts of the UK. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year when mean speeds are approximately 8 knots and mean wind gusts at 55 knots. Eastern England has the greatest frequency of tornadoes in the UK.
Sunshine	Average annual sunshine totals were between 1500 and 1700 hours. Industrial pollution can reduce sunshine amounts however, since a decline in heavy industry.
Air Frost	The average number of days with air frost varies from 30 to 55 days per year.

Source: Met Office Regional Climate Data

8.7 Future Baseline

Impacts on climate

The transport sector is a key driver in the trend of projected UK emissions. The projections from the Department for Business, Energy & Industrial Strategy (referred to as the BEIS projections) show a decline to 2035 (emissions are projected to fall by 15% from 2016 levels). In 2016, 97% of final energy consumption in transport was from oil-based fossil fuels, however by 2035 this is projected to fall to 92% due to the uptake of electric vehicles and increased use of biofuels[54]. The government has brought forward the year where sales of new fossil fuel vehicles will be banned to 2035. However, there will still be a large second-hand market for fossil fuel vehicles therefore a conservative approach has been taken using the latest government projections at this time. With government's recent commitments to introduce legally binding targets, the UK aims to reduce its carbon emissions to zero by 2050[55].

Resilience of the CSET Scheme to climate change

The UK Climate Projections developed by the Met Office Hadley Centre include regional climate projection data, for which Cambridge is included in the East of England region. The East of England is projected (under a range of emissions scenarios modelled in UKCP18) to experience hotter and drier summers, and warmer and wetter winters (See Table 8.3).

For the EIA, climate projections data for the 2090s (2080-2099) under Representative Concentration Pathway (RCP) 8.5[56] (the highest scenario available in UKCP18) have been selected.

Projected changes in key climate variables under the RCP 8.5 emissions scenario, for the 2080s, are summarised in Table 8.3.

Table 8.3: Future Climate Projections for the 2090s (RCP 8.5 scenario)

Climatic conditions	Climate observations
Temperature	The average summer temperature is projected to increase by 5.3°C under the central estimate, which represents "as likely as not" probability of change (50th percentile), and average winter temperature is estimated to increase by 3.6°C (50th percentile).
Rainfall	The average summer rainfall rate is estimated to decrease by 37%, whereas the average winter rainfall rate is estimated to increase by 22% (in the 50th percentile or central estimate for both)

[54] Department for Business, Energy & Industrial Strategy (2018): Updated energy and emissions projections 2017 [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/671187/Updated_energy_and_emissions_projections_2017.pdf (last accessed May 2020)

[55] UK Government (2019): PM Theresa May: we will end UK contribution to climate change by 2050 [online] available at: https://www.gov.uk/government/news/pm-theresa-may-we-will-end-uk-contribution-to-climate-change-by-2050 (last accessed May 2020)

[56] RCP: Representative Concentration Pathways. RCPs are the new scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) and used by the UKCP18 climate projections. RCPs are based on the projected concentration of greenhouse gases in the atmosphere in 2100, e.g. RCP 8.5 is a radiative forcing of 8.5 in 2100. These replace the previous Low, Medium and High scenarios. There are 4 RCPs in UKCP18 (2.6, 4.5, 6.0 and 8.5). These do not directly map onto the Low, Medium, High scenarios used previously.

Wind	Climate projections for wind are more uncertain than those for temperature and precipitation, due to inherent difficulty in modelling future wind conditions. However, overall an increase in extreme weather, including wind, is projected.

Source: UKCP18 Climate Projections[57]

8.8 Potential Impacts

8.8.1 Construction

Impacts on climate

The proposed duration of the construction works for the CSET Scheme would be about two years. Through this period, embodied GHG emissions from the use of construction materials are the main contributor to climate change, with additional GHG emissions arising from the use of plant and transport of materials.

The construction impact assessment will include the impacts arising from the cut and fill operations. This will include works related to topsoil strip and the mass movement of soil and subsoil within the CSET Scheme, including any import or export of soil and subsoil to/from the Scheme.

Resilience of the CSET Scheme to climate change

During the construction period climate change is not expected to change the risk of severe weather.

8.8.2 Operation

Impacts on climate

The lifetime of the CSET Scheme is anticipated to be 60 years, with the Scheme opening in 2025. Over this time, the operation of the CSET Scheme has the potential to result in changing local GHG emissions by supporting modal shift in vehicle use and improving average speeds of traffic generally.

The proposed use of solar panels is included in the Travel Hub final design, this will be addressed in the Climate chapter of the ES and in the Sustainability Statement.

Resilience of the CSET Scheme to climate change

During the CSET Scheme's 60-year appraisal period, changes in climate as outlined in 8.7 Future Baseline are likely to be experienced in the study area. This has the potential to pose a risk to the CSET Scheme assets such as deformation and deterioration of asphalt surfacing associated with extreme temperatures and changes in precipitation affecting the foundation strength and deterioration of the road surface, with the potential to lead to an increased flood risk.

Changes in climate also have the potential to pose risks to the environmental receptors detailed throughout this report. For example, increased frequency and quantity of rainfall can affect the resilience of species included in landscape planting designs.

[57] Met Office (2018): UKCP18 Climate Projections: Key results [online] available at: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Key-results.xlsx (last accessed February 2020)

8.9 Proposed Scope of Assessment

8.9.1 Scoped In

Impacts on climate

The assessment will consider the GHG emission potential throughout the lifecycle of the CSET Scheme for both construction (in accordance with PAS 2080) and operation (in accordance with TAG Unit A3 Environmental Impact Appraisal). Both forms of guidance (physical and non-physical) will be assessed, to create a potential range of emissions based on the guidance type.

The effect of the PAS 2080 lifecycles scoped into the assessment on climate and their study areas are explored in Table 8.4 below.

Table 8.4: Lifecycle Stages within Scope of Assessment

Lifecycle scope	Study area	Emissions scope
A1-3 Products and materials	Permanent construction materials within the construction site boundary and the supply chains associated with these will be included.	Primary raw material extraction, manufacturing, and transportation within the supply chain of all materials required for the permanent assets.
A4 Transport to works site	Transport of permanent construction materials to site using RICS assumptions if Scheme specific data is not available.	Emissions associated with use of vehicles transporting materials to site.
A5 Construction plant	Construction plant will consider the same plant quantities, sizes and operating hours.	Direct plant emissions, where plant specification data is available. If direct fuel consumption data is available, the emissions scope will consider fuel use emissions.
B2 Maintenance	Permanent construction materials, plant and transport for known maintenance activities within the Scheme boundary.	Emissions scope from A1-3, A4 and A5
B4 Repair	Permanent construction materials, plant and transport for known repair activities within the Scheme boundary.	Emissions scope from A1-3, A4 and A5
B6 Operational energy use	Lighting columns within the footprint of the Scheme.	Energy consumption from the lighting columns within the footprint of the Scheme.
B9 User utilisation of infrastructure	Emissions from traffic use of the Scheme.	Emissions associated with vehicles using the Scheme.

Resilience of the CSET Scheme to climate change

Spatial scope

The assessment will be limited to only consider climate impacts on CSET Scheme assets such as pavements, drainage and geotechnical receptors in addition to the in-combination impacts of climate change on the environmental receptors. In this assessment, the ability to replace and upgrade assets will be taken into account. It will be vital to ensure any assets that will be built once, and which could be impacted by changes in climate, are designed to take into account these future potential vulnerabilities.

Temporal scope

The operational impacts on the CSET Scheme as a result of climate change will be considered. This will be informed by the lifespan of key elements within the CSET Scheme design and availability of UK Climate Projections.

In combination climate impacts (ICCI)

The impacts of the CSET Scheme in combination with climate change will be assessed for the biodiversity, and landscape and visual topics.

8.9.2 Scoped Out

Impact during construction phase

As the construction phase is only two years long it is not likely to be affected by or have any impact on climate change.

Impacts on climate

Land use change will be scoped out as it is likely to be *de Minimis* due to the relatively small size of the proposed Scheme, furthermore the route uses existing roads and / or runs parallel to existing roads resulting in minimal land use change and limited loss of areas with higher soil carbon content such as forested areas.

Resilience of the CSET Scheme to climate change

The resilience of the CSET Scheme to climate during the construction stage is being scoped out, due to the short construction period not being affected by the changing climate which occurs over longer periods of time.

In combination climate impacts (ICCI)

The assessment of In Combination Climate Impacts for the following topics; air quality, community and human health, historic environment, noise and vibration, resources, soils, geology and land contamination, traffic and transport have been scoped out as they are considered not to have significant interaction with climate, leading to in combination climate impacts. The surface water and flooding topic assessment will include an assessment of climate impacts built into the topic in Chapter 15, and therefore does not require further assessment within this section.

9 Community and Human Health

9.1 Introduction

This chapter considers the likely impacts on community and health receptors during the construction and operation of the CSET scheme. It provides an overview of the community and health baseline within the study area and details the likely significant community and health effects. It sets out the proposed methodology for assessing the impact of the CSET scheme on community and health and identifies those impacts which can be scoped out of the ES.

9.2 Legislation and Policy

9.2.1 National Legislation and Policy

The community and human health assessment is guided by EIA regulations, national legislation the Government's planning policy and guidance. These are outlined below.

9.2.1.1 Legislation

Countryside and Rights of Way Act (2000)

This is the principal legislation governing the registration and protection of public footpaths, bridleways, byways open to all traffic and restricted byways, and gives a right of access on foot for the purposes of open-air conservation. There first three parts of the Act are relevant:

- Part 1 Access - this section of the Act recognises the right of access to mountain, moor, heath, down and registered common land. It also recognises the needs of landowners and managers.
- Part 2 Rights of Way – this section of the Act requires local authorities to review and publish plans for improving rights of way in their areas, taking into account the needs of the public including disabled people. This section also outlines the mechanism to temporarily and permanently divert PRoW.
- Part 3 Nature Conservation – this purpose of this section of the Act is to Improves the procedures associated with the notification, protection and management of SSSI and other biodiversity conservation measures.

9.2.1.2 Planning Policy

National Planning Policy Framework (2019)

The NPPF sets out the Government's economic, environmental and social planning policies for England. These policies outline the Government's vision of sustainable development, and "a framework within which locally-prepared plans for housing and other development can be produced"

Chapter 8 of the NPPF outlines how planning policy *"should aim to achieve healthy, inclusive and safe places"*. Much of this guidance is relevant to the community and health assessment, including the need for local authorities to:

- "Plan positively for the provision and use of shared spaces, community facilities (such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship) and other local services ";

- "Ensure an integrated approach to considering the location of housing, economic uses and community facilities and services"; and
- *"Planning policies and decisions should protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails".*

National Planning Policy Statement for National Networks (2014)

The NPSNN sets the national context for transport network development, highlighting the need for national networks to join up communities and connect people to public services, employment and each other. The NPSNN includes guidance on how development and planning decisions should take health into account, specifically in paragraphs 4.79 to 4.82:

- Paragraph 4.79: *'National road …networks… have the potential to affect the health, well-being and quality of life of the population. They can have direct impacts on health because of traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust, odour, polluting water, hazardous waste and pests.'*
- Paragraph 4.80: *'New or enhanced national network infrastructure may have indirect health impacts; for example if they affect access to key public services, local transport, opportunities for cycling and walking or the use of open space for recreation and physical activity.'*
- Paragraph 4.81: *'...where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant adverse health impacts.'*
- Paragraph 4.82: *'The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health.'*

The NPSNN also highlights that effects arising from air quality (paragraph 5.3), noise (paragraph 5.186), waste management (paragraph 5.39) discharges to water (paragraph 5.219) and land instability (paragraph 5.116) can affect health.

The NSPNN provides guidance on assessment for land use including open space, green infrastructure and Green Belt. The following paragraphs are of use to the community and health assessment:

- Paragraph 5.162: '*Access to high quality open spaces and the countryside and opportunities for sport and recreation can be a means of providing necessary mitigation and/or compensation requirements.'*
- Paragraph 5.165: *'The applicant should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing…'*
- Paragraph 5.166: '*Existing open space, sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location.'*
- Paragraph 5,174: '*The Secretary of State should not grant consent for development on existing open space, sports and recreational buildings and land, including playing fields, unless an assessment has been undertaken either by the local authority or independently…'*
- Paragraph 5.184: '*Applicants are expected to take appropriate mitigation measures to address adverse effects on coastal access, National Trails, other public rights of way and*

open access land and, where appropriate, to consider what opportunities there may be to improve access.'

9.2.1.3 Guidance

The community and health assessment is also guided by the Highways England Design Manual for Roads and Bridges (DMRB) LA 112 guidance on population and human health assessments. This is considered the most up-to-date and relevant piece of guidance for a linear transport scheme. However, professional judgement is also used to guide the assessment where appropriate.

9.2.2 Local Legislation and Policy

At a local level, the main policy documents relevant to this project are:

- South Cambridgeshire Local Plan 2018:
  - **Policy S/2** 'Objectives of the Local Plan' sets out strategic objectives for South Cambridgeshire, including promoting economic growth, strong communities, healthy lifestyles, and sustainable modes of transport.
  - **Policy SC/2** 'Health impact assessment' states that "New development will have a positive impact on the health and wellbeing of new and existing residents" and that the Plan should "provide for development in a way that supports and encourages active and healthy lifestyles."[58]
- Cambridge Local Plan 2018:
  - The Plan sets out 15 strategic objectives for Cambridge, including promoting economic development, sustainable transport and the ambition to "promote a safe and healthy environment, minimising the impacts of development and ensuring quality of life and place."

9.3 Study Area

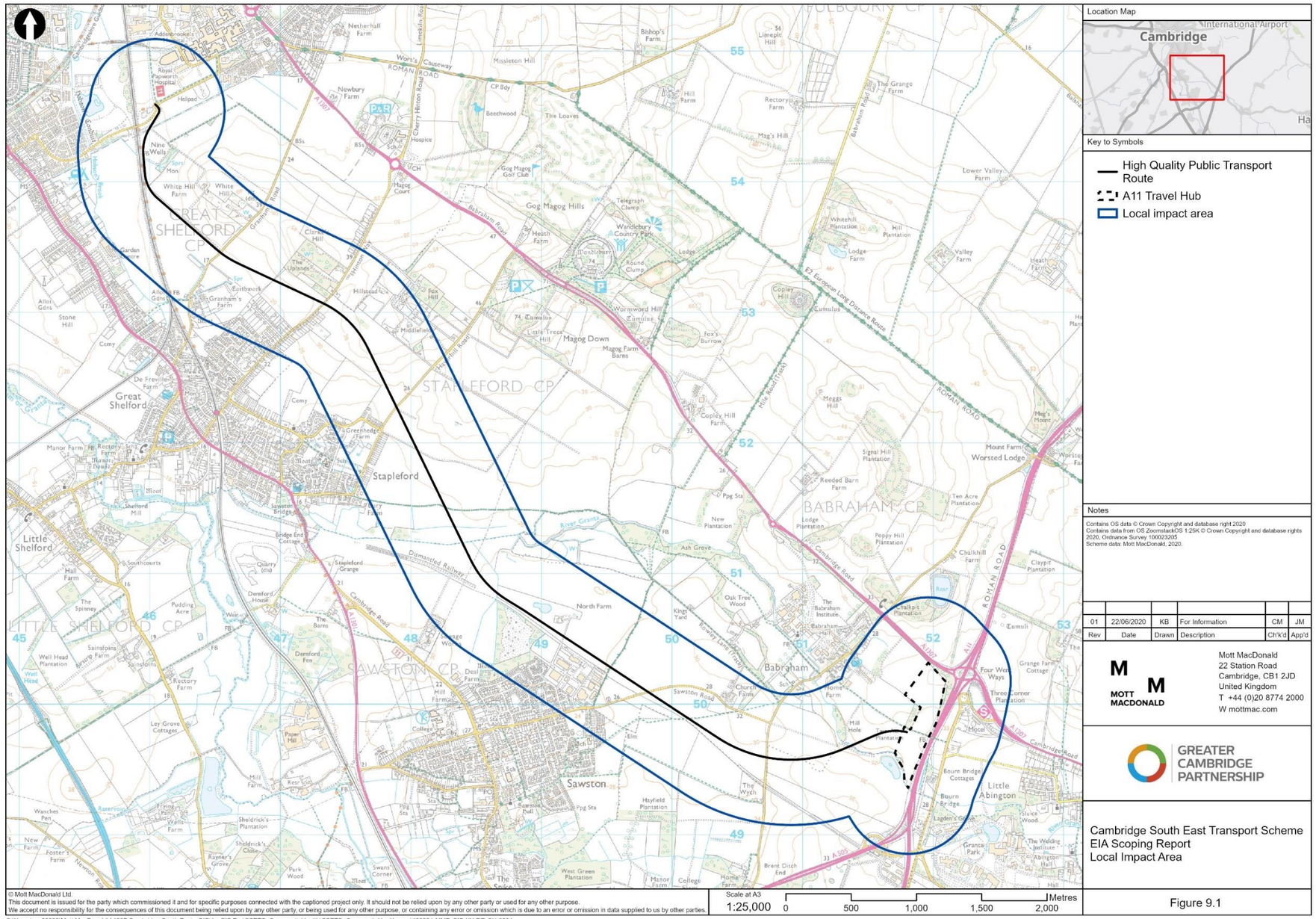
Baseline data has been calculated for a Local Impact Area (LIA) and Wider Impact Area (WIA). The LIA and WIA have been created based on guidance and professional judgement[59] and are defined as follows:

- **LIA:** The area located within a 500m distance from the CSET Scheme boundary. This is the primary study area for this topic and is designed to capture most potential community and health effects of the CSET Scheme. This is shown in Figure 9.1.
- **WIA:** The area covered by the local authorities of Cambridge City and South Cambridgeshire councils forms the WIA due to the CSET Scheme being located on the boundary between these two authorities. The WIA includes the extent of the area that may be affected by the operation of the CSET Scheme and related GCP schemes and is used for the consideration of community and health effects in a broader area. This is shown in Figure 9.2.

[58] The consideration of health in the context of EIA is regarded as an appropriate mechanism to consider health impacts, without the need for a separate Health Impact Assessment

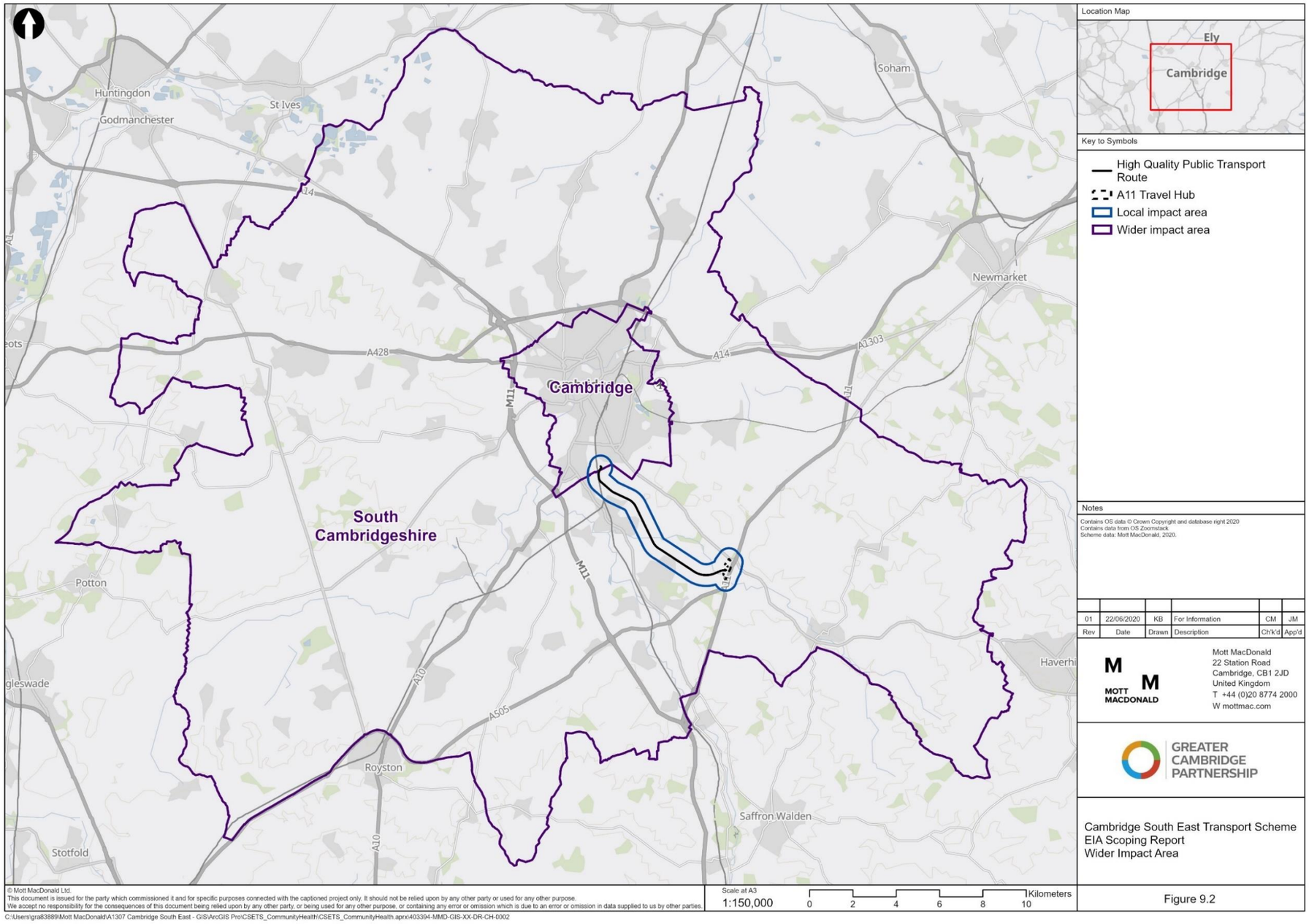
[59] DMRB LA112 Population and Human Health has been used as relevant guidance, with professional judgement used where there is no standard definition of the study area for some effects like employment.

Figure 9.1: Local Impact Area



Source: Mott MacDonald

Figure 9.2: Wider Impact Area



Source: Mott MacDonald

9.4 Assessment Methodology

9.4.1 Surveys

A range of publicly available datasets will be used to form the baseline and inform the assessment. This includes Office for National Statistics datasets including the 2011 Census, Population Estimates, and the Annual Population Survey as well as Ordnance Survey Address Base, English Indices of Multiple Deprivation and data from Public Health England 'Fingertips'. Information on Public Rights of Way (PRoWs) and other walking and cycling routes has been obtained using data from CCC.

Surveys relevant to determinants of human health such as noise or air quality will be undertaken by the relevant environmental topic assessments.

Surveys of agricultural land use will be undertaken and reported within Chapter 12 Land use and land take although the community and health assessment will report on impacts on the function of farm businesses as part of the community assessment. No other specific surveys are assessed as necessary for community impacts.

9.4.2 Assessment Approach

The construction and operational phases of the CSET Scheme have the potential to result in significant effects on community and health within the study area. The assessment on community and health will consider both direct and indirect effects arising as a result of the construction and operation of the CSET Scheme. Where appropriate this will follow guidance on community and health impact assessment including DMRB LA 112.

The assessment of the impact on private property and housing, community land and assets and development land and businesses and cyclists, pedestrians and equestrians will be completed in accordance with DMRB LA 112.

The approach to assessing impacts on agricultural land holdings, health impacts and employment are described below.

9.4.2.1 Agricultural Land

As mentioned above interviews with agricultural land-owners and tenants will be undertaken to ascertain the following:

- The type, location and number of agricultural land holdings at risk of demolition (currently assessed as zero) or from which land will be required/access affected by a project;
- The level of existing severance/accessibility restrictions to agricultural land holdings within the study area; and
- The frequency of use and nature of use of the agricultural holdings/assets within the study area.

The methodology for undertaking interviews with agricultural land-owners will be reviewed closer to the time to ensure it is consistent with latest Government Guidance in relation to social distancing requirements due to Covid19. For example, social distancing is likely to be required on site when discussing with land-owners the potential impact on their land. Where the land-owner is a vulnerable person, with no representatives available to meet on site, alternative communication methods will be required to be used.

9.4.2.2 Health Impacts

There is no formal guidance on considering health within the context of EIA. The institute of Environmental Management and Assessment (IEMA) have published 'Health in Environmental Impact Assessment; A Primer for a Proportionate Approach'.[60]

The assessment of human health will be undertaken utilising this guidance as a basis. The key aspects of the approach to assessing health effects are:

- Health pathways
- Receptors
- Assessment
- Evaluation of significance.

Establishing credible health pathways will determine the relationship between project activities and potential health impacts on the population and will therefore help to establish the scope of the assessment.

A number of other EIA topics are relevant to the determinants of health and will therefore provide inputs to the potential effects requiring assessment. These are:

- Air quality and odour;
- Landscape and visual amenity;
- Noise and vibration; and
- Traffic and transport.

The assessment of each health effect will draw on quantitative and qualitative analysis and stakeholder engagement. The assessment will be based on professional judgements with appropriate reference to supporting evidence.

9.4.2.3 Employment Impacts

The CSET Scheme will deliver a range of direct and wider economic benefits, through the creation of employment and the provision of sustainable public transport. An assessment of employment and economic output that would be generated by the CSET Scheme will be undertaken as part of the EIA. Such outputs include data about the working age population, employment and unemployment levels and the economically active population. This analysis will be used to inform the significance of effect rating presented in this chapter. Land-use impacts on existing businesses and development land are considered separately.

A separate OBC sets out the economic and financial aspects of the CSET Scheme. Where appropriate this will be used to inform the assessment of direct and wider economic benefits outlined above.

9.4.3 Significance Criteria

The assessment will focus on those impacts that are likely to have significant effects on community and health conditions. Significance is determined by considering the sensitivity of the receptor, as well as the magnitude of the impact on those receptors.

Table 9.1 below sets out broad criteria that will be used to describe and assess the sensitivity of community and healthy receptors apart from the assessment on agricultural land. Table 9.2 provides criteria specifically for defining the sensitivity of agricultural land.

[60] IEMA, Health in Environmental Impact Assessment; A Primer for a Proportionate Approach, 2017.

Table 9.1: Sensitivity of Receptors

Sensitivity	Sensitivity criteria
High	• An already vulnerable receptor with very little capacity and means to absorb changes. • No alternative resources, access arrangements or opportunities are available within an easily accessible distance. • A highly or frequently accessed resource
Medium	• A non-vulnerable receptor with limited capacity and means to absorb changes. • A limited range of alternative resources, access arrangements or opportunities are available within and easily accessible distance. • A moderately, or semi-frequently accessed resource.
Low	• A non-vulnerable receptor with sufficient capacity and means to absorb changes. • A wide range of alternative resources, access arrangements or opportunities are available within an easily accessible distance. • An infrequently accessed resource.

Table 9.2: Sensitivity of Agricultural Receptors

Sensitivity	Sensitivity criteria
High	• Areas of land in which the function is dependent on the spatial relationship to key agricultural infrastructure; and • Access between land and key agricultural infrastructure is required on a frequent basis (daily or weekly)
Medium	• Areas of land in which the function is partially dependent on the spatial relationship to key agricultural infrastructure; and • Access between land and key agricultural infrastructure is required on a frequent basis (monthly)
Low	• Areas of land in which the function is partially dependent on the spatial relationship to key agricultural infrastructure; and • Access between land and key agricultural infrastructure is required on a frequent basis (monthly or less frequent)

The magnitude of impacts will be assessed following the principles below. Table 9.3 below sets out broad criteria that will be used to describe and assess the impact on community and health receptors. Table 9.4 provides impact magnitude criteria specifically for agricultural land.

Table 9.3: Impact Magnitude Criteria for Receptors

Magnitude	Criteria
Major	• Affects receptors within the LIA and potentially beyond • Affects many receptors • A substantial change (positive or negative) from the baseline position • A large widening or narrowing of inequalities • Majority of communities affected have high levels of deprivation • The impact is permanent or long-term (e.g. more than a year) • Requires considerable intervention to return to the baseline
Moderate	• Affects receptors beyond the application site into the LIA • Affects a moderate number of receptors • A notable change (positive or negative) from the baseline position • A widening or narrowing or inequalities • Majority of communities affected have average or above average levels of deprivation • The duration over which the impact is experienced is medium-term (e.g. between six months and a year) • May require some intervention to return to the baseline
Minor	• Affects receptors in the LIA only, and mostly within the application site • Affects a small number of receptors • A slight change (positive or negative) from the baseline position with evidence available to demonstrate change

	• A slight widening or narrowing of inequalities with evidence available to demonstrate change • Few people in a community affected (positively or negatively) • The duration over which the impact is experienced is short-term (e.g. between three and six months) • Baseline returns without intervention or with only limited intervention
Negligible	• Affects receptors within the site boundary only • Baseline remains consistent/no discernible change (positive or negative) from the baseline position • Majority of communities affected are not deprived • Impact is very short-term (e.g. less than three months) • Affects the well-being of very few receptors

Table 9.4: Impact Magnitude Criteria for Agricultural Land

Magnitude	Criteria
Major	• loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. e.g. direct acquisition and demolition of buildings and direct development of land to accommodate highway assets; and/or • introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision.
Moderate	• partial loss of/damage to key characteristics, features or elements, e.g. partial removal or substantial amendment to access or acquisition of land compromising function of property, businesses, community assets or agricultural holdings; and/or • introduction (adverse) or removal (beneficial) of severe severance with limited / moderate accessibility provision
Minor	• a discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements, e.g., amendment to access or acquisition of land resulting in changes to operating conditions that do not compromise overall function of property, businesses, community assets or agricultural holdings; and/or • introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.
Negligible	• very minor loss or detrimental alteration to one or more characteristics, features or elements e.g. acquisition of non-operational land or buildings not directly affecting the viability of agricultural land holdings; and/or • very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision.

It is important to note that a health effect does not need to meet all of the sensitivity / magnitude characteristics to be assigned to a specific category. Effects are evaluated by combining the assessments of magnitude and sensitivity as above to determine the significance of effect (as negligible, minor, moderate or major), as explained in Chapter 4 ‘Environmental Impact Assessment Methodology’. Effects can be neutral, beneficial or adverse and temporary or permanent. Only effects that are moderate or major are considered significant.

9.5 Baseline

A range of publicly available data sources have been used to determine the community and health baseline. These include statistics on population and employment from the Office for National Statistics (ONS) and data from local authorities.

9.5.1 Population, Residential Property and Economic Activity

The total population of the LIA as of 2018 is 2,024. The total population of the WIA is 283,277. (125,758 in Cambridge and 157,519 in South Cambridgeshire). The table below shows the population and age baseline in the LIA and WIA.

Table 9.5: Population Baseline Data

Area	Total population	Age		
		Under 16	16-64	65+
LIA	2,024	20%	58%	22%
WIA	283,277	19%	65%	16%
Cambridge	125,758	17%	70%	13%
South Cambs.	157,519	20%	60%	19%
East of England	6,201,214	19%	61%	20%
England	55,977,178	19 %	63%	18%

Source: ONS Population Estimates 2018.

The population of the LIA has a slightly higher proportion of older people compared to the WIA as a whole and nationally. Conversely, the proportion of those ages 16-64 is lower when compared to both the WIA and England. The proportion of children is consistent with both the WIA and national figures.

There are approximately 900 residential properties within the LIA. This includes properties in the settlements of Babraham, Sawston, Stapleford and Great Shelford. The properties closest to the CSET Scheme are mainly along the High Street between Babraham and the A505, the Sawston Road between Babraham and Sawston, Gog Magog Way in Stapleford and Hinton Way in Great Shelford.

Key communities in the LIA and WIA include Babraham, Great Abington, Sawston, Stapleford, Great Shelford, Little Shelford, Whittlesford and Cambridge. Of these Cambridge is the largest with a population of approximately 125,758 people.

9.5.2 Employment and Economic Activity

Information presented here is from 2018 and 2019 and therefore does not reflect any changes to the economy and employment associated with the Covid-19 pandemic in 2020. As comparable information becomes available for the 2020 period, the baseline will be updated.

The following table shows the economic baseline for the WIA. Employment is relatively high and unemployment is relatively low in the WIA authorities compared to the national average. The proportion of working age population (age 16-64) claiming jobseekers' allowance is also lower in the WIA when compared to the national and regional averages.

Table 9.6: Economic Activity and Employment Baseline Data

Area	Economically active (16-64)	Employment rate (16-64)	Unemployed (16-64)	Jobseekers Allowance Claimants[61]	Total Jobs (2018)
WIA	83%	82%	2.1%	1%	195,000
Cambridge	82%	81%	1.4%	1.3%	109,000
South Cambs.	85%	82%	2.6%	0.8%	87,000
East of England	81%	78%	3.3%	2%	2,781,000
England	79%	76%	4.0%	2.7%	26,842,000

[61] Calculated as percentage of the working age population, 2018.

Source: ONS Population Estimates 2018; ONS Annual Population Survey, 12 months to December 2019; ONS Model-Based Estimates of Unemployment, 12 months to June 2019; Business Register and Employment Survey, 2018; Jobseekers Allowance 2019 average.

While the settlements of Babraham, Great Abington, Sawston, Stapleford and Great Shelford contain local-level services and businesses, the main employment centre in the WIA is Cambridge city. This is the main centre for study and regional-level services in the WIA, containing major universities as well as a major shopping and office centre. Major industries of employment in the WIA are shown in the table below. The largest industry groups in the WIA are high-skills industries such as professional, scientific and technical industries (20%), education (16%) and health (13%). Professional, scientific and technical industries are also the largest industry group in the LIA at 17%. Such employment sites are likely to be located in South Cambridge Business Park in Sawston, CBC, Babraham Research Campus and Granta Park Business Park in Great Abington. All other industries make up 5% or less of total employment in the LIA.

Table 9.7: Industries of Employment

Industry	LIA	WIA	Cambridge	South Cambs.	England
Agriculture, mining, utilities (A, B, D, E)	0%	2%	1%	3%	3%
Manufacturing (C)	5%	6%	2%	12%	8%
Construction (F)	5%	4%	1%	6%	5%
Wholesale, retail and motor trades (G)	5%	10%	9%	10%	15%
Transport & storage (including postal) (H)	1%	2%	2%	2%	5%
Accommodation & food services (I)	1%	8%	9%	5%	8%
Finance, ICT and Property (J, K, L)	4%	10%	10%	9%	10%
Professional, scientific & technical (M)	17%	20%	16%	25%	9%
Business administration & support services (N)	7%	6%	5%	6%	9%
Public administration & defence (O)	0%	2%	2%	1%	4%
Education (P)	2%	16%	23%	7%	9%
Health (Q)	5%	13%	15%	10%	13%
Arts, entertainment, recreation & other services (R, S, T and U)	2%	4%	5%	3%	5%

Source: Business Register and Employment Survey, 2018

9.5.3 Deprivation

The English Indices of Multiple Deprivation (IMD) 2019 are commonly used for the measurement and comparison of relative levels of deprivation (poverty). Most LIA residents (87%) live in the 20% least deprived neighbourhoods in the country. This is higher than the WIA and national averages.

Table 9.8: Population by Deprivation Quintiles

Location	Most deprived	Second most deprived	Third most deprived	Fourth most deprived	Least deprived
LIA	0%	0%	12%	21%	66%
WIA	2%	5%	19%	32%	43%
Cambridge	4%	10%	31%	31%	25%
South Cambs.	0%	1%	10%	33%	56%

Location	Most deprived	Second most deprived	Third most deprived	Fourth most deprived	Least deprived
England[62]	20%	21%	20%	20%	19%

Source: Indices of Multiple Deprivation, 2019

9.5.4 Health

The table below present key health indicators, with data provided for the WIA where this is publicly available. The WIA is largely in line with health indicators showing general health, long-term health problem or disability and life expectancy. Both Cambridge and South Cambridgeshire generally perform better than the national average on public health indicators, including for conditions sensitive to environmental factors such as respiratory diseases.

Table 9.9: Public Health Baseline Data

Measure	WIA	Cambridge	South Cambs.	East of England	England
General health, self-reported (bad/very bad, 2011)	3%	4%	3%	5%	5%
Long-term health problem or disability (2011)	15%	13%	14%	17%	18%
Life expectancy at birth (male, 2015-17)	81.9	80.8	82.3	80.4	79.6
Life expectancy at birth (female, 2015-17)	84.6	83.5	85.4	83.7	83.1
Under-75 mortality rate, respiratory diseases (per 100,000, 2016-18)	n/a	26.8	17.7	29.8	34.7
Under-75 mortality rate, cardiovascular diseases (per 100,000, 2016-18)	n/a	63.6	43.4	63.4	71.7
Mortality rate, chronic obstructive pulmonary disease (COPD) (per 100,000, 2016-18)	n/a	41.9	28.7	46.4	51.7
Physically active adults (%, 2017/18)	n/a	80.1	68.3	65.4	66.3

Source: Census 2011; Public Health England, Fingertips, 2020

In addition, areas and communities sensitive to changes in environmental health determinants as a result of the CSET Scheme such as air quality management areas, areas of landscape amenity or areas sensitive to noise will be identified by the relevant environmental assessments and used to inform the human health assessment.

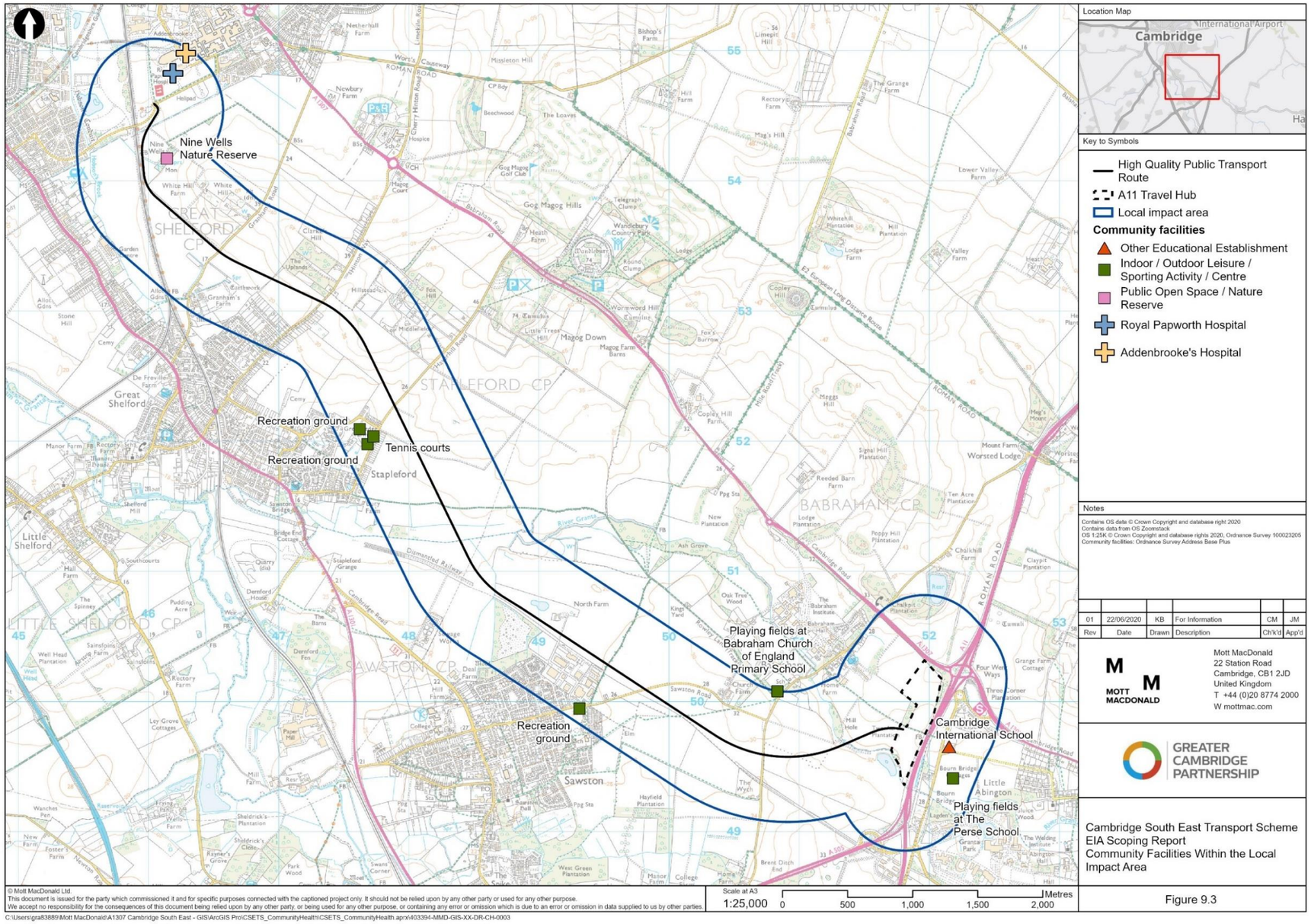
9.5.5 Community Resources

There are several community resources located in the LIA, as shown in Figure 9.3. These include Cambridge International School and The Perse School to the east of the Travel Hub and The Babraham Church of England Primary Schools' playing fields and Lynton Way Park, in the village of Sawston. Stapleford Pavilion (a publicly accessible open space with children's play

[62] IMD measures relative deprivation of Lower Super Output Areas (LSOAs), ranking all English LSOAs from most to least deprived. Population change since LSOAs were created in 2011 means the population is slightly higher in the second most deprived quintile.

area and outdoor gym equipment), Stapleford Tennis Club and Nine Wells (a nature reserve, woodland, scrub and water) are also located in the LIA. Lastly, the Royal Papworth Hospital and Addenbrooke's Hospital are located to the south of Cambridge city centre within the LIA.

Figure 9.3: Community Resources



Source: Mott MacDonald

9.5.6 Non-Motorised Users, PRoWs and Public Transport

As shown in Figure 9.4 below, several PRoWs are located within the LIA:

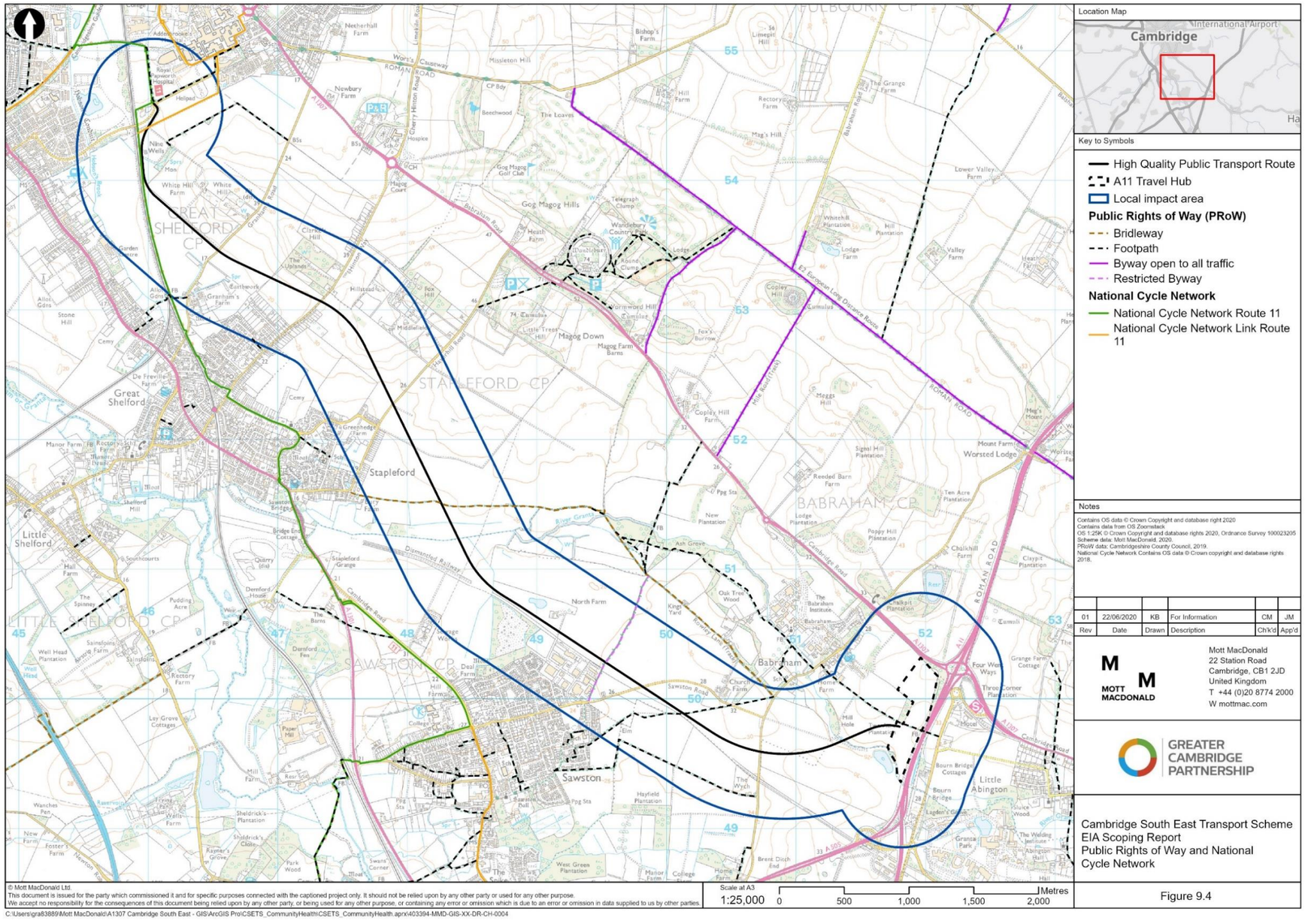
- Footpath 12/4 in Babraham (crosses the Travel Hub site)
- Footpath 179/1 to the east of Sawston (crosses the route of the CSET Scheme)
- Footpath 179/2 to the east of Sawston
- Restricted byway 12/10 to the east of Sawston (crosses the route of the CSET Scheme
- Bridleway 212/2 to the east of Stapleford (crosses the route of the CSET Scheme)
- Footpath 198/2 to the east of the A1301
- Footpath 39/47 to the east of the A1301

Several other PRoWs are located just outside of the LIA. In conjunction with the PRoW located within the LIA, these provide a network of routes for walkers, cyclists and pedestrians to the west of Babraham, ensuring connectivity between Babraham, Sawston and Stapleford. Public footpaths are also located along Haverhill Road and Hinton Way, and there is a segregated walking and cycling route on Sawston Road, all of which are crossed by the CSET Scheme.

The National Cycle Network (NCN) link route (just south of Royal Papworth Hospital and Addenbrooke's Hospital) is located within the LIA and is crossed by the route of the CSET Scheme. NCN route 11 is also located within the LIA, just west of the route of the proposed CSET Scheme.

Existing public transport includes a direct bus from the Hospital Bus Station in south east Cambridge to Babraham with approximately 3 buses per hour at 20 minute intervals.

Figure 9.4: Public Rights of Way and National Cycle Network



Source: Mott MacDonald

9.5.7 Development Land, Businesses and Agriculture

Business properties are primarily located close to the boundary of the LIA in sites such as South Cambridge Business Park in Sawston, CBC and Granta Park Business Park in Great Abington. There are also individual businesses located outside of these locations, within the LIA.

Most land outside of settlements within the LIA is within agricultural use. Agricultural businesses in the LIA include a range of farm types and sizes.

The following land within the LIA is allocated in local plans for development:

- Dales Manor Business Park, Sawston (South Cambridge Local Plan reference: H/1:a) – 10.7 ha. Accolated for 200 dwellings
- Land north of Babraham Road, Sawston (South Cambridge Local Plan reference: H/1:b) – 3.64 ha. Allocated for 80 dwellings
- Land south of Babraham Road, Sawston (South Cambridge Local Plan reference: H/1:c) – 11.64 ha. Allocated for 260 dwellings
- Policy support for an extension of the CBC Extension (South Cambridge Local Plan reference E/2)

None of the above developments are crossed by the route of the CSET Scheme.

9.6 Potential Impacts

The CSET Scheme will see the construction and operation of a public transport route between the A11 / A1307 junction (near Babraham) and Cambridge, an adjacent segregated walking and cycling route and a Travel Hub.

9.6.1 Construction

The CSET Scheme requires temporary and permanent land taken within the LIA. This permanent land take is not anticipated to affect residential property or community land. However, construction of the CSET Scheme will require both permanent and temporary use of agricultural land along the route, potentially impacting the functioning of agricultural businesses.

Temporary changes to access and increases in traffic from construction activities could also impact the entrances to residential properties, community resources and businesses in the LIA. This is particularly likely to impact residents of dwellings along the High Street between Babraham and the A505, the Sawston Road between Babraham and Sawston and Hinton Way in Great Shelford.

The construction of the CSET Scheme is likely to impact existing walking, cycling and equestrian routes within the LIA, requiring both temporary and permanent diversions where they cross the route of the CSET Scheme. These routes NMU routes include:

- Footpath 12/4 in Babraham
- Footpath 179/1 to the east of Sawston
- Restricted byway 12/10 to the east of Sawston
- Bridleway 212/2 to the east of Stapleford
- Public footpath located along Haverhill Road
- Public footpath located along Hinton Way
- Segregated NMU route on Sawston Road
- The National Cycle Network (NCN) link route

These potential temporary diversions or closures to these footpaths, cycle paths and bridleways could result in temporary disruption to users from increased journey lengths. Changing or disrupting these routes can also create severance, by restricting the ability for users to travel between communities to access community facilities and good and services.

The CSET Scheme is anticipated to result in temporary changes to the local environment which may affect the amenity and/or health of communities. Potential adverse impacts could include result from noise and air quality impacts during construction impacting amenity and/or health of communities.

The CSET Scheme requires a construction workforce to deliver it, which would likely result in direct beneficial, indirect and induced indirect effects from temporary employment in the WIA.

9.6.2 Operation

The CSET Scheme is not expected to impact direct access from the existing road network to residential or business properties. Public transport access to community resources, such as Royal Papworth and Addenbrooke's hospitals are likely to be improved by the Scheme.

Based on the preferred system design (optical guidance), during operation of the CSET Scheme a 3 metre wide shared use path for equestrians, pedestrians and cyclists would be built alongside the new public transport route and separated by a grass verge. Concept designs suggest that the route would be wide enough to accommodate shared use in both directions, therefore reducing congestion but the final design will be based on projected demand, health and safety considerations and stakeholder feedback.

The Travel Hub will also provide facilities such as cycle storage. Such interventions are likely to increase to attractiveness of active travel to users. The new walking and cycling provision along the CSET Scheme may also encourage people to use active travel modes, bringing potential health benefits to the population. This could result in beneficial changes in air quality and noise that could improve the environment and subsequently have beneficial impacts on human health.

There are no intended closures of existing PRoWs during operation of the CSET Scheme but there could be some diversions necessary at crossing points, and through the Travel Hub.

The Scheme would improve connectivity between existing PRoW through the new shared use path along the route.

Currently, the A11 has a small footbridge connecting Babraham and surrounds with Granta Park, Little Abington and Great Abington. The footbridge is stepped on either side making it inaccessible for pedestrians with mobility issues, parents with pushchairs and other NMU's such as cyclists and equestrians. An improved walking and cycling route as part of the Travel Hub design will alleviate severance issues for all users.

Whilst changes to PRoWs may increase journey lengths in some parts of the LIA these are not considered likely to be significant.

The CSET Scheme may result in permanent changes to the local environment which may affect the amenity and/or health of communities. Potential adverse impacts could include result from noise and air quality impacts during operation impacting amenity and/or health of communities.

The CSET Scheme may result in beneficial impacts for future users of planned development land under the South Cambridge Local Plan. Three sites allocated for housing to the east of Sawston are likely to increase the population in this area, potentially resulting in demand for use of the CSET Scheme and the presence of the CSET making the area attractive to new residents

(commuters). There is also policy support for an extension of the CBC, located at the most northern point of the CSET Scheme. Employees of this campus may therefore benefit from the Scheme.

The CSET Scheme may also create additional permanent employment throughout operation. It would also deliver wider economic benefits to the economy of the WIA through delivering improved public transport and supporting greater productivity and investment.

9.7 Proposed Scope of Assessment

9.7.1 Scoped In

- The CSET Scheme requires temporary and permanent land within the LIA which will require the use of agricultural land along the route. Therefore, impacts on the function of agricultural businesses as a result of temporary and permanent land take will be assessed in the EIA.
- Potential impacts on businesses and community resources are anticipated to arise in relation to disruption to access during construction of the Scheme.
- Impacts on pedestrians, cyclists and equestrians are anticipated to arise in relation to their ability to access and use PRoW and non-designated public routes, changes to the accessibility and usability of routes, changes to journey lengths, and journey amenity (during both construction and operation).
- The CSET Scheme could potentially impact on human health during construction through temporary environmental impacts such as severance, noise or air quality impacts. During operation by the provision of public transport, infrastructure that encourages active travel modes, potential reduction in pollutants and access to employment have the potential for positive health impacts.
- The provision of public and active transport modes between Babraham and Cambridge is also likely to enhance access to employment sites and key facilities in both locations and benefit journeys. This will be further assessed in the EIA.
- Potential impacts on development land within the LIA will be considered during both construction and operation as there is land within the LIA is allocated in local plans for major development.
- Impacts on the local economy and employment are anticipated to arise in relation to job creation, the supply chain, and employment opportunities for the local population during both construction and operation.

9.7.2 Scoped Out

As a result of the information collected in the preparation of this Scoping Report it is proposed that the following impacts will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess:

- There is not expected to be any loss of residential or community land as a result of the CSET Scheme, and this is proposed to be scoped out during both construction and operation.
- Access to residential and business properties is not expected to be impacted during operation of the Scheme. This is proposed to be scoped out for the operational period.

10 Historic Environment

10.1 Introduction

This chapter presents relevant legislation, describes the proposed approach for the assessment of the historic environment, determines what the potential impacts on the historic environment are and describes the scope of the assessment.

10.2 Legislation and Policy

10.2.1 National Legislation and Policy

10.2.1.1 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 the Planning (Listed Buildings and Conservation Areas) Act 1990.

10.2.1.2 National Policy

National planning policy is set out in the National Planning Policy Framework (NPPF) (2019). The NPPF addresses the conservation and enhancement of the historic 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. Although this Scheme will not be subject to the local authority planning process these policies represent best practice when dealing with the cultural heritage resource.

The National Planning Statement on National Networks (NPSNN)[63] includes guidance which will be considered at the design stage of this CSET Scheme. The guidance covers historic environment assessment of heritage assets, both above and below ground, relevant to Environment Impact Assessments (EIA) and should enable decision makers to understand the level of harm to the historic environment a development may cause. The assessment should also take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials, use and landscaping (for example, screening by planting).

10.2.2 Local Policy

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

The relevant policies for South Cambridgeshire are detailed below:

[63] 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 July 2020)

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:
   a. Designated heritage assets, i.e. listed buildings, conservation areas, scheduled monuments, registered parks and gardens;
   b. Non-designated heritage assets including those identified in conservation area appraisals, through the development process and through further supplementary planning documents;
   c. The wider historic landscape of South Cambridgeshire including landscape and settlement patterns;
   d. Designed and other landscapes including historic parks and gardens, churchyards, village greens and public parks;
   e. Historic places;
   f. 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:

3. 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;
4. retain buildings and spaces, the loss of which would cause harm to the character or appearance of the conservation area;
5. 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;
6. 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
7. 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.

10.3 Study Area

A study area of 1km from the centre of the CSET Scheme for both designated and non-designated historic environment assets will be used to develop the baseline for the EIA. Where appropriate, assets of high value outside of this study area will also be considered.

10.4 Assessment Methodology

10.4.1 Assessment Approach and Significance Criteria

The assessment value of impacts and significance of effects from the CSET Scheme on the historic environment will follow the guidance set out below:

- Chartered Institute for Archaeologists (CIfA) (2017) Standards and Guidance for historic desk-based assessment;
- Highways Agency (2019) Design Manual for Roads and Bridges (DMRB), Volume 10, Section 5, LA 116 Cultural heritage asset management plans;
- Highways Agency (2019) Design Manual for Roads and Bridges (DMRB), Volume 11, Section 2, LA 104 Environmental assessment and monitoring;
- Highways Agency (2019) Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, LA 106 Cultural heritage assessment;
- Historic England (2008) Conservation Principles, Policies and Guidance;
- Historic England (2015) Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking; and
- Historic England (2017) Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets.

Consultation will be undertaken with relevant stakeholders to the CSET Scheme. Sources which will be consulted as part of the assessment include:

- A search of the National Heritage List for England, which is maintained by Historic England. For details on nationally designated heritage assets including information on listed buildings, scheduled monuments and registered parks and gardens;
- City Council and SCDC websites for conservation area maps and appraisals;
- The CHER for records pertaining to all non-designated heritage assets (both below and above ground), previous archaeological events, secondary sources;
- The online Archaeology Data Service (ADS) (via Archaeologydataservice.ac.uk) has been searched for relevant archaeological fieldwork grey literature reports and publications;
- A search on relevant planning applications (which contained historic environment information) held by the City of Cambridge Council and SCDC;
- A search of relevant records, publications historic maps and journals held by the CCC Archives and the University of Cambridge Library;
- The results of the geophysical survey undertaken over the CSET Scheme areas during 2020;
- The results of the aerial photographical survey over the stage 3 Travel Hub option locations; and

- In addition, intrusive archaeological trial trenching will be undertaken post-harvest in 2020, along the route of the CSET Scheme. This will be undertaken to further inform the historic environment baseline and impact assessment; aiming to identify the presence and nature of archaeological remains within the CSET Scheme footprint. The scope of the intrusive archaeological works will be agreed with the Cambridgeshire Historic Environment Team.

10.5 Baseline

Baseline data has been collected from a range of sources to provide an outline assessment of the potential impacts on both designated and non-designated historic environment assets, and landscapes, to inform the assessment scope.

10.5.1 Built Heritage

The following designated built heritage assets have been identified as being located close to the CSET Scheme or to have the potential to be affected by the Scheme.

Grade I Listed, Parish Church of St Peter South West of Babraham Hall (NHLE 1331111)

This asset is located 950m north east of the CSET Scheme within the Babraham Hall grounds. Topographically it is situated within the lower chalk valley on the foot of the rising chalk downlands to the north. The church is within the context of Babraham historic core, although it is notably set away to the north west of the main village setting, and is instead situated next to Babraham Hall, enclosed within the hall's parkland. The church at this location originates from the medieval period, prior to Babraham Hall, although the extent of Babraham has changed little over the centuries; with its boundaries being the River Granta to the south and west, along with ancient trackways to the north and east.

The setting of the church is local within the context of Babraham village to the south east and the Babraham park within which is it located and enclosed. The asset is of high heritage value on account of its evidential value, with evidence of the building dating back to the 13th century, as well as many of the internal ecclesiastical features which remain.

Grade II* Listed, Church of St Andrew (NHLE 1165349)

This asset is located 750m west of the CSET Scheme within the context of Stapleford village. The village is located topographically on the lower chalk plains at the foot of the rising chalk downlands to the north. The church is situated to the north of the village along Mingle Lane, possibly a reference to the Minglands; the strip of intercommunal land which separated Stapleford with nearby Great Shelford. The village has since largely submerged into Greater Shelford and is no longer surrounded on all sides by open arable land; character which points to the economic activity of the historic settlement.

The setting of the church is local within the context of the historic Stapleford settlement. There are no long views to or from the church, partly due to the topographic situation of the church, but also because of modern development of residential houses around the church. There is a small northerly angle of open view to the north across remaining arable fields, towards to the CSET Scheme, however this view is limited due to the early 20th century development and enclosure of Fox Hill as private housing within woodland. The asset is of high heritage value on account of its evidential value, with evidence of the building dating back to the 12th century, although the exterior has been extensively restored. There are internal features such as fragments of a Saxon cross and Norman grave cover which provide historic interest.

Grade II* Listed, The Almshouses, The School House (NHLE 1127746)

Located 600m east of the CSET Scheme this 18th century building was designed as a central schoolhouse flanked by two wings of three almshouses. The construction was complete in 1732 and funded by the Bennet and Bush families, with ongoing endowment provided by the late Judith Bennet of Babraham Hall for support of the local children and spinsters. The building has been converted into three private residential dwellings. It is situated in the centre of the historic village, along a short lane, with woodland surround from north west to north east. There are no views out of the village from this asset. The asset is of high heritage value on account of its historic and architectural interest as part of village life in 18th century Babraham.

Grade II* Listed, Middlefield and Garden Wall (NHLE 1317370)

This asset is located 320m north east of the CSET Scheme within the context of Fox Hill, which at the beginning of the 20th century was developed into a private wooded plantation with 4 mansion houses. The house was designed by Edwin Lutyens and constructed in 1908. The house was later named 'Mount Blow', during which time it was lent to the military as use as a Red Cross Hospital during the First World War, before being renamed Middlefield House again. The house is situated on the southern side of Fox Hill, one of the Magog Hills of the chalk downlands north of Great Shelford and Stapleford, within designed grounds that has a vista to the south east over the surrounding arable land towards the River Granta, 1.5km away. A section of shaped (zig-zag) garden wall to the east of the property is included in the listing description also.

The setting of the house is within the context of its private grounds, within the wider context of private residential homes within Fox Hill plantation. However, the visible rural landscape to the south east, within the property's designed vista to the south east also contributes to the asset's setting. The asset is of high heritage value on account of the property's architectural interest.

There are 33 Grade II listed buildings within the study area for the CSET Scheme. These are listed below, however three have been identified as having potential to be affected by the Scheme:

Grade II Listed, Nine Wells Monument (NHLE 1127825)

This 19th century asset is considered in more detail here due to its proximity of being 130m from the CSET Scheme. The monument is a tribute to Thomas Hobson who paid for the construction of the conduit, bearing his name, that provided fresh water to the population of Cambridge from the spring at Nine Wells. The asset is situated next to the spring within the wooded plantation, surrounded by agricultural land at the north western foot of the chalk downlands slope of White Hill. The setting of the asset is adjacent to the spring within the wooded reserve. The asset is of medium heritage value on account of its historic and social interest.

Grade II Listed, Church Farmhouse (NHLE 1331134)

This 19th century farmhouse is considered in more detail here due to its proximity of being 270m from the CSET Scheme. The house is thought to be built by Jonas Webb, a renowned stock breeder, noted for breeding Babraham Southdown sheep which achieved an international reputation. The asset is situated at southern extent of Babraham estate, along Sawston Road, and historically was likely an associated estate farm. The setting of the asset is next to Babraham estate, surrounded by agricultural farmland, but within a small enclosed holding. The former railway between Sawston and Haverhill once truncated the wider rural landscape, however, has since been removed and therefore this wider setting has been reinstated. The asset is of medium heritage value on account of its historic interest.

Grade II Listed, Babraham Hall, The Institute of Animal Physiology (NHLE 1127745)

This 19th century asset is considered in more detail here due to potential for impact to the views south west of the Hall. The building is located 900m north east of the CSET Scheme within the context of the Babraham Hall grounds, which is the site of the Babraham Research Campus. The grounds of Babraham Hall were laid out in the 19th century according to a 16th century plan. The first edition OS map (1887) details a vista laid to the south west of the Hall. This view completes at the top of a slightly rise, within the grounds, along an avenue of trees adjacent to Church Farm. The building has undergone various alterations since construction and is presently the offices of the Babraham Institute

The setting of the asset is contained within its own grounds, which have been heavily developed with modern research campus associated buildings. This has negatively impacted the overall historic setting of the asset however views to the north east and to the south west, from the Hall's principal elevations, remain with open without development. The asset is of medium heritage value on account of its historic interest as a country house within its grounds and the context of the nearby village with which it shares its name.

The remaining Grade II listed buildings within the study area are:

- The White House (NHLE 1127823);
- De Freville Farmhouse (NHLE 1127898);
- Four Mile House (NHLE 1163891);
- Barn and Granary to West of The George Public House (NHLE 1127749);
- Farm building Range to Rear of Farmhouse at De Freville Farm (NHLE 1096004);
- Maris Farmhouse (NHLE 1127899);
- Spanyards (NHLE 1317838);
- 16, High Green (NHLE 1317876);
- Stapleford Hall (NHLE 1331071);
- The George Public House (NHLE 1331113);
- Chalk Farmhouse (NHLE 1331114);
- Walls and Plaques to Former Sluice on River Granta West of Parish Church of St Mary (NHLE 1127654);
- Home Farmhouse (NHLE 1127709);
- Brick Row (NHLE 1127748);
- Dormer Cottage (NHLE 1127818);
- 2 and 4, Church Street (NHLE 1127819);
- 21, High Green (NHLE 1127897);
- Barn at De Freville Farm (NHLE 1164190);
- Dove Cottage (NHLE 1165205);
- The Icehouse (NHLE 1331110);
- The Old Post Office (NHLE 1127747);
- 39 and 41, High Street (NHLE 1127750);
- Nine Wells Monument (NHLE 1127825);
- 7, Bar Lane (NHLE 1317424);
- The Slaughter House (NHLE 1317428);
- 32-38, Granham's Road (NHLE 1317912);

- Wall to Rear of Number 18 and Side of Number 16 (NHLE 1331030);
- Dovecote at Granhams Farm (NHLE 1331068);
- Statue of Jonas Webb Opposite Chalk Farmhouse (NHLE 1331112);
- Church Farmhouse (NHLE 1331134); and
- Temple Cafe and Restaurant (NHLE 1331149);
- Galewood, Pinewood, The Towers (NHLE 1127822);

The following conservation areas are located close to the CSET Scheme.

- Great Shelford Conservation Area, 920m west of the Scheme;
- Stapleford Conservation Area, 500m west of the Scheme;
- Babraham Conservation Area, 450m east of the Scheme; and
- Great and Little Abington Conservation Area, 870m south east of the Scheme.

10.5.2 Historic Landscape

10.5.2.1 Designated Landscapes

There is a designated historic landscape located near to the CSET Scheme. This is the Grade II* Registered (Park and Garden) Pampisford Hall (NHLE 1000321), 800m south of the Scheme on the other side of the A505 from the Scheme.

10.5.2.2 Non-Designated Landscapes

There are two non-designated historic landscape assets located near to the CSET Scheme:

- Hobson's Conduit / Hobson's River / Cambridge New River, a major landscape feature of high historical importance, partly within the Scheme area; and
- Parkland at Babraham, associated with Babraham Hall, c. 500m north of the Scheme.

A historic landscape characterisation has currently not been undertaken for Cambridgeshire. However, there are some broad non-designated historic landscape areas that are definable, along the route of the CSET Scheme.

- Between Addenbrooke's Road roundabout, at the northern extent of the Scheme, and the Schemes' crossing of the River Granta the Scheme skirts between the lower chalk plains to the west and the rising hills of Cambridgeshire's southern chalk downlands to the east. This northern area is the locale of Nine Wells spring which is historically significant as a permanent inland water source some 2.5km distant from the nearest river system. Nine Wells spring is also the head of the 17th century Hobson's Conduit which was built across the landscape, south of Cambridge, to provide clean water to the city. The wider area, likely as a result of this natural spring and the topographic situation at the foot of the chalk downlands, is littered by an extensive cropmark network of field systems, many of which continue up the initial slope of White Hill. The clearest and most extensive cropmark complex of this character area within the Schemes' vicinity is the first to fourth AD settlement site, to the west of the railway line. The historic character of the area is defined as open arable land marking the border between lower chalk plains to the west and rising chalk downland hills of the Gog Magog Hills to the east;
- Between the River Granta and the southern extent of the Scheme (the Travel Hub) the Scheme follows the route of the former Haverhill railway, once again across the lower chalk plains of Cambridgeshire's southern chalk downlands, within vicinity of the River Granta river valley. The local landscape is studded with historic country estates, with the Scheme running

to the south east of Babraham Hall and grounds (The Babraham Institute), north east of Pampisford Hall and grounds, and west of Abington Hall and former grounds. The historic character of the area is defined as open arable land across the lower chalk plains, bordered to the south by the former railway, with the meandering water course of the River Granta-cum-Babraham water meadows to the north.

As inferred above, the nature of the local surrounding landscape is marked by the spatial relationship between the lower chalk plains, with its relatively flat landscape and river systems to the west, and the rising chalk downland hills to the east. The Scheme is located between the two, as the route begins in the plains and works its way south, passing along the foothills and flanks of the rising hills. However, the wider landscape within which the Scheme sits shows an important narrative of prehistoric activity which informs archaeological understanding.

The river valleys of the Cam and Granta are locations of interspersed prehistoric settlement sites which are known to have existed along its banks. The New Archaeologies of the Cambridge Region (2) publication, 'Riversides' covers the narrative of this riverside landscape in detail, whilst focusing much around Trumpington Meadows and the Addenbrookes Hospital development sites (to the west and north, respectively). Part of the attraction of the river valley locale would have been the readily available water supply[64]. By contrast, further up from and away from the valley, the lower chalk plains would have been largely devoid of this resource[65]. However, a naturally occurring spring, tapping into the chalk aquifers, such as the Nine Wells spring was significant and an important site located away from the river valleys, on the foothills of the downlands[66&67]. Nine Wells therefore marks an important location for prehistoric settlement and activity. Dense settlement and general occupation across all periods is a theme of this landscape, covered in detail by the New Archaeologies of the Cambridge Region (1) publication, 'Borderlands'. Moving topographically further up again from the chalk plains, the rising chalk hills of the downlands mark important and prominent locations within the landscape on which earthworks were constructed. The landscape is one of many monuments, with seemingly interrelationship and linkage between contemporary sites situated on the top of the chalk downland hills and those situated next to the river[68].

During the Neolithic period much of the landscape within region was wooded, with clearance of the woodland generally took place during later in the period with the emergence of agricultural practices[69]. However, it wasn't until the Bronze Age that the area was likely to be thought of as open and managed with large scale field systems[70]. The Iron Age and Roman periods saw the continuation of this practice, along with more complex settlement sites and open managed arable land. Communication routes were constructed or improved which led to the movement of goods and people, and with it importing and exporting of resources and practices. The continued construction of large earthworks such as hillforts across the landscape once again

[64] Evans, C. Lucy, S. and Patten, R. (2018) *Riversides: Neolithic Barrows, a Beaker Grave, Iron Age and Anglo-Saxon Burials and Settlement at Trumpington, Cambridge* (CAU Landscape Archives/New Archaeologies of the Cambridge Region 2.) Cambridge: Cambridge Archaeological Unit, p 4

[65] *Ibid*, p 4

[66] *Ibid*, p 14

[67] Evans, C. Lucy, S. and Patten, R. (2018) *Borderlands: The Archaeology of the Addenbrooke's Environs, South Cambridgeshire* (CAU Landscape Archives/New Archaeologies of the Cambridge Region 1.) Cambridge: Cambridge Archaeological Unit, p 14

[68] Evans, C. Lucy, S. and Patten, R. (2018) *Riversides: Neolithic Barrows, a Beaker Grave, Iron Age and Anglo-Saxon Burials and Settlement at Trumpington, Cambridge* (CAU Landscape Archives/New Archaeologies of the Cambridge Region 2.) Cambridge: Cambridge Archaeological Unit, p 402

[69] *Ibid*, p 397

[70] *Ibid*, p 397

points to the importance of this location as a destination as well as place of significant presence and purpose[71].

The continuation of agricultural practices, the establishment of settlements, villages and local trackways/road systems evolved during the Saxon and later medieval periods, with many of the current villages originating from the medieval period proper. The environmental possibilities of the landscape, with its water supply and rivers, may likely have determined much of the cultural activity and subsequent geographies[72]. This landscape seems to have formed a northerly border for various cultures as a result, with Anglo-Saxon being one where dense continuation and occupation is observed in the archaeological record. Probable plough headland banks and/or boundary banks are visible across the chalk downland hills and lower chalk plains at this location. These long low earth banks likely date from the early medieval and show former land divisions. Following enclosure of fields during the late post medieval, and later still large field amalgamations during the modern period the landscape took on the form, which is experienced today, along with the expansion of settlement cores and the introduction of road and rail infrastructure.

10.5.3 Buried Archaeology

10.5.3.1 Designated Assets

There are two designated archaeological sites located near to the CSET Scheme that have the potential to be affected by the Scheme.

Site revealed by aerial photography west of White Hill Farm, Great Shelford - South Cambridgeshire (NHLE 1006891)

Located 20m west of the CSET Scheme this scheduled monument marks the location of an elaborate cropmark of a probable villa complex from the Roman period. The remains are situated on the lower chalk plains, close to the Nine Wells natural spring, at the western foot of White Hill - part of the rising chalk downlands to the east. As detailed above, (see section 10.5.2) the historic framing of the landscape identifies this area as a potential significant location in the period, with dense settlement and domestic land-use. This villa complex connects further across the local area via evidence of a road/track oriented south east as it passes through an area of surrounding ditched enclosures of associated settlement layout.

The current setting of the cropmark complex is within open arable fields to the east of Cambridge Road, between Great Shelford and Trumpington, and to the west of the Cambridge to London railway. The asset is of high heritage value on account of the potential archaeological evidence within the buried remains.

Causewayed enclosure and bowl barrow at Little Trees Hill (NHLE 1011717)

This asset is located 1,030m north east of the CSET Scheme, therefore slightly beyond the 1km study area buffer. However, this asset is considered to have potential to be affected by the Scheme given its topographical location and level of importance within the local historic landscape. The asset dates to the Neolithic period, and is, as a causeway enclosure, one of the earliest recorded type of monuments in the UK. Little Trees Hill enclosure was constructed in a clearing within surrounding woodland and is likely to have had prominence within the local landscape. Later use of the site during the Bronze Age, with the construction of a bowl barrow, shows the significance of this feature within the landscape also.

[71] *Ibid*, p 400
[72] *Ibid*, p 14

The current setting of the asset is on the top of Little Trees Hill, one of the Gog Magog chalk downlands hills at this location. It is situated within a rural landscape, largely as part of Magog Down parkland and conservation area, but also within a wider agricultural landscape. The asset is of high heritage value on account of the potential archaeological evidence within the buried remains.

10.5.3.2 Non-Designated Assets

The Cambridgeshire Historic Environment Record (HER), along with the results of a recent geophysical survey and aerial photographic survey, carried out as part of the Scheme, identifies the following key buried non-designated archaeological remains within or near the footprint of the Scheme. These will be summarised through the defining of eight specific areas along with schemes length:

Addenbrooke's Road roundabout to Granham's Road

Cambridge Historic Environment Record (CHER) hold a number of records relating to previous widescale evaluations, particularly relating to the Addenbrooke's science park site to the north, but also aerial photographic survey analysis projects. The Scheme area connects with the Addenbrooke's Road roundabout in an area close to where late Iron Age / Roman activity has been recorded (CHER: MCB17973), identifying cropmarks of a double ditched enclosure complex. Iron Age finds were found during fieldwalking, which lends dating evidence to the site, however given the regularity in layout of the enclosures it is possible that the site is of Roman use. Also at the northern extent of the Scheme area is a second area of recorded late Iron Age / Roman activity (CHER: 08339), identified through excavation, which discovered a number of ditches (forming enclosures and droveways) and pits. Finds from the area lend an interpretation of late Iron Age / Roman activity for the keeping and herding of animals.

Further along the CSET Scheme, readings from the geophysical survey adjacent to the Cambridge Line railway (CHER: MCB24402), unsurprisingly, show a great deal if magnetic disturbance and very little that can aid interpretation. This is also the area that the Hobson's Conduit, originating at Nine Wells spring, crosses the Scheme area near to where it is culverted beneath the railway line. This asset is of high historical importance as a 17th century 'New River' that sought to supply fresh water to the city of Cambridge, to flush sewage from the city's watercourses which was resulting in the spread of plague and pestilence (CHER: 04529a). The conduit is well preserved along the majority of its route from Nine Wells spring through to the centre of the city by a combination of piped and open channels.

As the CSET Scheme crosses open field towards Granham's Road, geophysical survey results provide insight into the archaeological baseline conditions; namely through identification of two converging trackways, abutted by enclosures. These are attributed Iron Age to Roman dates, which fits with the broader landscape framing of the area as densely occupied during these periods. It seems likely, given proximity, nature and contemporaneous dating, that these features connect with the known cropmark villa complex and surrounding trackways and settlement site to the west, although the narrow corridor of the geophysical survey provides limited opportunity to verify this. The trackways also follow a trajectory which may lead to a potential Roman period settlement, recorded at or near to Granhams Farm (CHER: CB15538). The 1st edition Ordnance Survey map (1886) denotes Granhams Farm as being the site of a Roman Camp, however, whilst there is evidence of Roman activity nearby, as stated, the earthworks at Granham's Farm are considered post-Roman. It is most likely that the site and earthworks are from a possible Saxon burh, or later medieval moat (CHER: 01002a). The northern extent of this likely moat feature is located 170m south of the CSET Scheme.

In 1968 a Neolithic polished flint axe (CHER: 04886) was found in the field close to the Scheme footprint. No other details are known about record.

Granham's Road to Hinton Way

Evaluation in 1999 across this series of fields (ECB1197) identified a number of Neolithic flint finds and pits (CHER: 04893 & CB15541). Further evaluation in 2002 (CHER: ECB999) identified Bronze Age activity close to the Scheme, recorded as usage of natural hollows, with finds of pottery, flint and animal bone. There are a number of CHER records also which record likely prehistoric activity, however which are undatable. These include a cluster of worked flint (CHET: MCB16140) and a ring ditch feature (CHER: 04894). The geophysical survey identifies only agricultural activity through ridge and furrow remains in the field south of Granham's Road, which a likely of post medieval to modern providence.

Hinton Way to Haverhill Road

The CSET Scheme passes across open field flanking the southern face of Fox Hill. Geophysical survey results identify natural linear features crossing the Scheme corridor, north-south. Lidar imagery adds more detail across a wider view where these features are likely to be plough headland / boundary bank earthworks. These possibly date from the early medieval to medieval periods and show a former field system across the landscape. Evidence of the General Head Quarters (GHQ) anti-tank defence line that crosses the region is identified within the Scheme area. This ditch, along with possible ancillary features, is shown through geophysical survey results as well as through aerial survey analysis.

Haverhill Road to River Granta

The CSET Scheme has dropped down the southern face of the chalk downland hills and enters the lower chalk pains and further into the river valley towards the River Granta. The Scheme passes through an area of previous combined geophysical survey and aerial photography evaluation (CHER: ECB4602) where a number of anomalies were recorded. These include a double rectilinear enclosure along with annex, a semi-circular feature (possible barrow) and the outline of a rectangular structure within internal pits (CHER: MCB10013, 20541 & 20542), recorded 100m to the east. Dating has not taken place in the record due to lack of intrusive evaluation. These features may be connected with the results of the recent geophysical survey carried out as part of the Scheme in this area which a rectangular three-sided enclosure with possible internal pit features have been identified. A possible ring ditch feature has also been interpreted from the geophysical results close to Haverhill Road. These above features likely point to a continuation of Bronze Age through Roman period presence and dense occupation of this landscape, with activity close to the banks of the river with accessibility and proximity to the rising chalk downland hills to the north.

River Granta to Sawston Road

As the CSET Scheme heads south from the River Granta towards the route of the former Sawston to Haverhill railway (CHER: 06326) it passes through an area of cropmarks of enclosures identified by aerial photographic assessment (CHER: ECB6135). No other information is available on these features, however, once again point to the wider historic framing of this landscape. On land to the north of West Way, near to the Scheme corridor, archaeological evaluation (CHER: ECB4278) identified a number of features which are likely to show further Roman period activity, such as boundary ditches, enclosures and trackways in this area, along with pits, postholes and a well (CHER: MCB20412). The record further states that a juvenile inhumation was discovered accompanied by a small Greyware beaker, and a miniature coarseware jar dated to the 3rd century.

The route of the CSET Scheme runs parallel and adjacent to the former Sawston to Haverhill railway for a 2km section, which resulted in heavy magnetic disturbance in the geophysical survey data all along the converged route. Elsewhere within the geophysical survey corridor only modern agricultural activity was identified.

Immediately south of the CSET Scheme, to the west of Sawston Road, is the site of a previous archaeological evaluation (CHER: ECB5863) which identified an east–west trackway or possible 'hollow-way', with associated pottery dating between Late Bronze Age–Early Iron Age. This is likely to indicate occupation in the vicinity. The eastern trajectory of the trackway would continue across the Scheme corridor, however no evidence for this was picked up by the geophysical results.

Sawston Road to High Street

The baseline for this section of the CSET Scheme is limited from the CHER and geophysical survey. Lidar imagery indicates plough headland / boundary bank earthworks crossing the width of the Scheme corridor north-south. These possibly date from the early medieval to medieval periods and show a former field system across the landscape. They are not picked up by geophysical survey with only modern agricultural activity identified.

High Street to A11 Travel Hub

The CSET Scheme crosses an open field through an area of cropmarks recorded both by previous aerial photography (CHER: ECB6030) and by recent aerial photography and geophysical survey, carried out as part of the Scheme. These cropmarks show a group of rectilinear enclosures, characteristic of a double-ditched enclosure system with a series of additional enclosures. Whilst no date can be determined due to lack of excavation at this stage, the regularity in layout of the enclosures may suggest a Roman date, which fits with the broader landscape framing of the area as densely occupied during this period. Further along the Scheme, 500m to the north east, two substantial ditched rectilinear enclosures, one nested inside the other, are identified through recent aerial photography survey. Given the aforementioned proximity of similar recorded archaeological remains, it is possible that these enclosures are contemporaneous, perhaps to the Iron Age or Romano-British features within the wider landscape.

The CSET Scheme crosses the former Babraham water catchment meadows, constructed by the Bennet family (of Babraham Hall) during the 17th century (CHER: MCB15995). The former leat which ran across the Scheme area at this location has been filled in and is visible now as cropmark and through LIDAR imagery.

Travel Hub

Geophysical survey data from the within the majority of the Travel Hub site shows largely natural anomalies, with little of archaeological interest. The CHER has little recorded for the area except for to the southern extent where there is a record of Saxon period finds, including a brooch and potential human bone and pottery sherds (CHER: MCB17799). Immediately to the south west of the Travel Hub archaeological excavation was undertaken prior to quarrying activity (CHER: ECB296 & 1395). This identified a number of prehistoric artefacts, the earliest of which was a hand-axe dating to the Palaeolithic period (CHER: 11317B). A quantity of Late Mesolithic, Neolithic, and Bronze Age lithics where found, which is posited in the record to be signs of a possible Neolithic settlement site (CHER: 11317). Further finds associated with Bronze Age activity were discovered including pottery, and interestingly a ring-ditch monument that was dated to the mid-2nd millennium BC (CHER: 11317A). Excavation of the ring-ditch revealed part of a system of large sub rectangular fields with Late pre-Roman Iron Age or very early Roman origins (CHER: 11317C). The record for these further states that the large size of

the fields, their low-lying location and the absence of evidence for manuring suggests they were used for pasture (CHER: 11317D).

The site also revealed later occupation during the Saxon period, which is known to have spread into the Travel Hub. The excavation site immediately south west of the CSET Scheme identified remains of a small 5th to 7th century colonisation settlement (CHER: 13044)). Evidence of activity indicated a mixed economy of cereal cultivation and livestock, supplemented by some hunting. The main complex, on a high gravel terrace, comprised six Grubenhauser along with numerous pits and hollows. A seventh structure was found on the floodplain to the NW.

Within the wider landscape surrounding the Travel Hub site, to the east of the A11, the remains of a Neolithic causewayed enclosure was identified through aerial photography survey (CHER: 09356a), along with a Bronze Age barrow cemetery at Four Wentways. The former A11 - Newmarket Road – is the probable route of a Roman Road, which runs parallel to the eastern boarder of the Scheme.

Adjacent and to the east of the Scheme Travel Hub is the line of the former 19th century Chesterford to Newmarket railway (CHER: 06327). The dualling of the A11 highway now forms the eastern border of the Travel Hub at this location.

10.6 Potential Impacts

10.6.1 Construction

The historic environment assets identified below, may be potentially impacted by the CSET Scheme.

10.6.1.1 Built Heritage

The construction of the CSET Scheme may have an impact on the setting of a number of assets within the study area of the Scheme.

Of particular note for further consideration, are:

- Grade II* listed Church of St Andrew, Stapleford, an asset of high value. There is potential for impacting the only remaining open view to the north across arable land;
- Grade II* listed Middlefield and Garden Wall, an asset of high value. There is potential for impacting the long views towards the river within the designed vista to the south east;
- Grade II listed Nine Wells Monument, an asset of moderate value. The setting is unlikely to be impacted, however due to proximity to the Scheme will be considered;
- Grade II listed Church Farmhouse, an asset of moderate value. There is potential for impact the periphery surrounding open arable context of this estate farm; and
- Babraham Conservation Area, an asset of moderate value. There is potential for impacting the surrounding open arable context of the historic village core.

A full assessment will be carried out during the ES stage which will consider potential construction impacts on the remaining built heritage assets within the study area of the Scheme.

10.6.1.2 Historic Landscapes

The construction of the CSET Scheme may have an impact on a number of historic landscapes / landscape features within the study area of the CSET Scheme.

Of particular note for further consideration, are:

- Hobson's Conduit, a non-designated landscape feature of high historic importance. A 17th century asset which stretches north from Nine Wells spring into the centre of the City of Cambridge; and
- The historic landscape character of the lower chalk plain and rising downland hills within the northern section the Scheme, due to the Scheme interrupting the open arable land which marks the foothills of these two distinct topographic areas. The Scheme will skirt between the two, visibly truncating this relationship of historic foothill interconnectivity.

A full assessment will be carried out during the ES stage which will consider potential construction impacts on the remaining historic landscapes and landscape features within the study area of the Scheme.

10.6.1.3 Buried Archaeology

The corridor of the CSET Scheme passes through multiple areas of known archaeological remains along the length of the Scheme. These remains have been identified through previous survey and investigations, as well as through recent geophysical survey and aerial photography assessment carried out as part of the Scheme. Therefore, construction will have impact on these remains. The construction of the Scheme may also have an adverse impact on previously unidentified archaeological remains. Archaeological intrusive evaluation will be undertaken, to further understand the potential impacts of the Scheme on the buried archaeological remains.

There is no impact to the scheduled causewayed enclosure and bowl barrow at Little Trees Hill, due to it being outside of the corridor of the CSET Scheme and the setting of the monument remaining within a rural landscape, largely as part of Magog Down parkland and conservation area, but also within the agricultural fields.

There is no impact to the scheduled site revealed by aerial photography west of White Hill Farm, Great Shelford, due to it being outside the corridor of the Scheme and the setting of the monument remaining within open agricultural fields to the west of Nine Wells Spring. However, there is potential for further remains associated with the site to continue south and east into the CSET Scheme corridor.

There is no impact to the early medieval burh / medieval moated at Granham's Farm, due to being outside the corridor of the Scheme and the setting of the remains within rural field context to the north of Granham's Farm. This asset, whilst non-designated, is likely to be of schedulable quality and therefore is considered to be of high heritage value.

A full assessment will be carried out during the ES stage which will consider potential construction impacts on the remaining buried archaeological remains within the study area of the CSET Scheme.

10.6.2 Operation

The operation of the CSET Scheme particularly the movement of public transport vehicles may have a potential impact on the following assets:

- Grade II* Church of St Andrew, Stapleford
- Grade II* Middlefield and Garden Wall
- Grade II Nine Wells Monument
- Grade II Church Farmhouse
- Babraham Conservation Area

Below ground archaeological remains will not be impacted by the operation of the CSET Scheme.

10.7 Proposed Scope of Assessment

10.7.1 Scoped In

Due to the presence within and proximity of historic environment assets to the CSET Scheme, and the potential impacts of the Scheme on these historic environment assets, the effects on the historic environment from the majority of the route will be scoped in as part of the ES.

10.7.2 Scoped Out

Assets outside of the 1km study area, excluding those considered above, are proposed to be scoped out of the ES on the basis that there would be no likely significant effects on them.

11 Landscape and Visual

11.1 Introduction

This chapter sets out the proposed scope for the assessment of the potential effects of the CSET Scheme on landscape character and visual amenity. The landscape and visual impact assessment (LVIA) will address two separate but related issues:

- effects on landscape as a resource in its own right; and
- effects on people's views and visual amenity.

The assessment of landscape effects is also linked to the following environmental topics: historic environment, ecology, socio-economy, noise and traffic.

11.2 Legislation and Policy

The following provides details of planning policy that is relevant to the LVIA.

11.2.1 National Networks National Policy Statement 2014

The National Networks National Policy Statement sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. Although the CSET Scheme is not a major trunk road some of the policy is relevant to the LVIA and are set out below.

Paragraph 5.143 - this states that the landscape and visual effects of all proposed projects will vary on a case by case basis according to the type of development, its location and the landscape setting of the proposed development.

Paragraph 5.144 – this states that where the development is subject to EIA the applicant should undertake an assessment of any likely significant landscape and visual impacts and describe these in the environmental assessment. Guidance has been produced to assist in addressing landscape issues[73]. The landscape and visual assessment should include reference to any landscape character assessment and associated studies, as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England.

Paragraph 5.156 – this states that outside nationally designated areas, local landscapes may be highly valued locally and protected by local designation. Where a local development document in England has policies based on landscape character assessment, these should be given particular consideration. However, local landscape designations should not be used in themselves as reasons to refuse consent, as this may unduly restrict acceptable development.

Paragraph 5.157 – this states that in taking decisions, the Secretary of State should consider whether the project has been designed carefully, taking account of environmental effects on the landscape and siting, operational and other relevant constraints, to avoid adverse effects on landscape or to minimise harm to the landscape, including by reasonable mitigation.

[73] Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, April 2013. Natural England publishes profiles for National Character Areas.

Paragraph 5.158 – this states that the Secretary of State will have to judge whether the visual effects on sensitive receptors, such as local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the development.

Paragraph 5.160 states that adverse landscape and visual effects may be minimised through appropriate siting of infrastructure, design (including choice of materials), and landscaping schemes, depending on the size and type of proposed project. Materials and designs for infrastructure should always be given careful consideration.

Paragraph 5.161 states that it may be appropriate to undertake landscaping off site, although if such landscaping were proposed, it would have to be included within the order limits for that application. For example, filling in gaps in existing tree and hedge lines would mitigate the impact when viewed from a more distant vista.

11.2.2 National Planning Policy Framework 2019

The National Planning Policy Framework attaches importance to landscape and visual issues, 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 Project 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 – emphasizes the purposes of the Green Belt which include: controlling 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 GCP to describe the significance of any heritage assets affected, including any contribution made by their setting.

11.2.3 Cambridge Local Plan 2018

Policy 4: The Cambridge Green Belt - the Green Belt preserves the unique setting and special character of the city and includes green corridors that penetrate deep into the urban and historic heart of Cambridge. It is a key component in providing for active and passive sport and recreation, for amenity and biodiversity. A significant proportion of the Cambridge Green Belt within the city's boundaries is in agricultural use. The Green Belt is one of the key elements that contribute to the symbiotic relationship between high quality of life, place and economic success of Cambridge.

Policy 8: Setting of the City - development on the urban edge, within green infrastructure corridors and the Cambridge Green Belt will only be supported where it responds to, conserves

and enhances the setting, and special character of the city, in accordance with the Cambridge Landscape Character Assessment 2003, Green Belt assessments and the Cambridgeshire Green Infrastructure Strategy, promotes access to the surrounding countryside/open space, where appropriate, safeguards the best agricultural land and includes landscape improvement proposals that strengthen or re-create the well-defined and vegetated urban edge, improve visual amenity and enhance biodiversity.

Policy 59: Designing landscape and the public realm - development will be supported where the existing features including trees, natural habitats and boundary treatment positively contribute to the character of an area are retained and protected, materials are of a high quality and respond to context to help create local distinctiveness and the design adopts the principles of inclusive design.

Policy 71: Trees - development will not be permitted which involves felling, significant surgery (now or in the foreseeable future) and potential root damage to trees of amenity or other value, unless there are demonstrable public benefits accruing from the proposal which clearly outweigh the current and future amenity value of the trees.

11.2.4 South Cambridgeshire District Council 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 – proposals should aim to conserve and enhance existing green infrastructure (GI), link new and existing GI and create new GI and enhance public enjoyment of it. Proposals will be supported that deliver the strategic green infrastructure network and priorities set out in the Cambridgeshire Green Infrastructure Strategy and which deliver local green infrastructure. All new developments will be required to contribute towards the enhancement of the green infrastructure network.

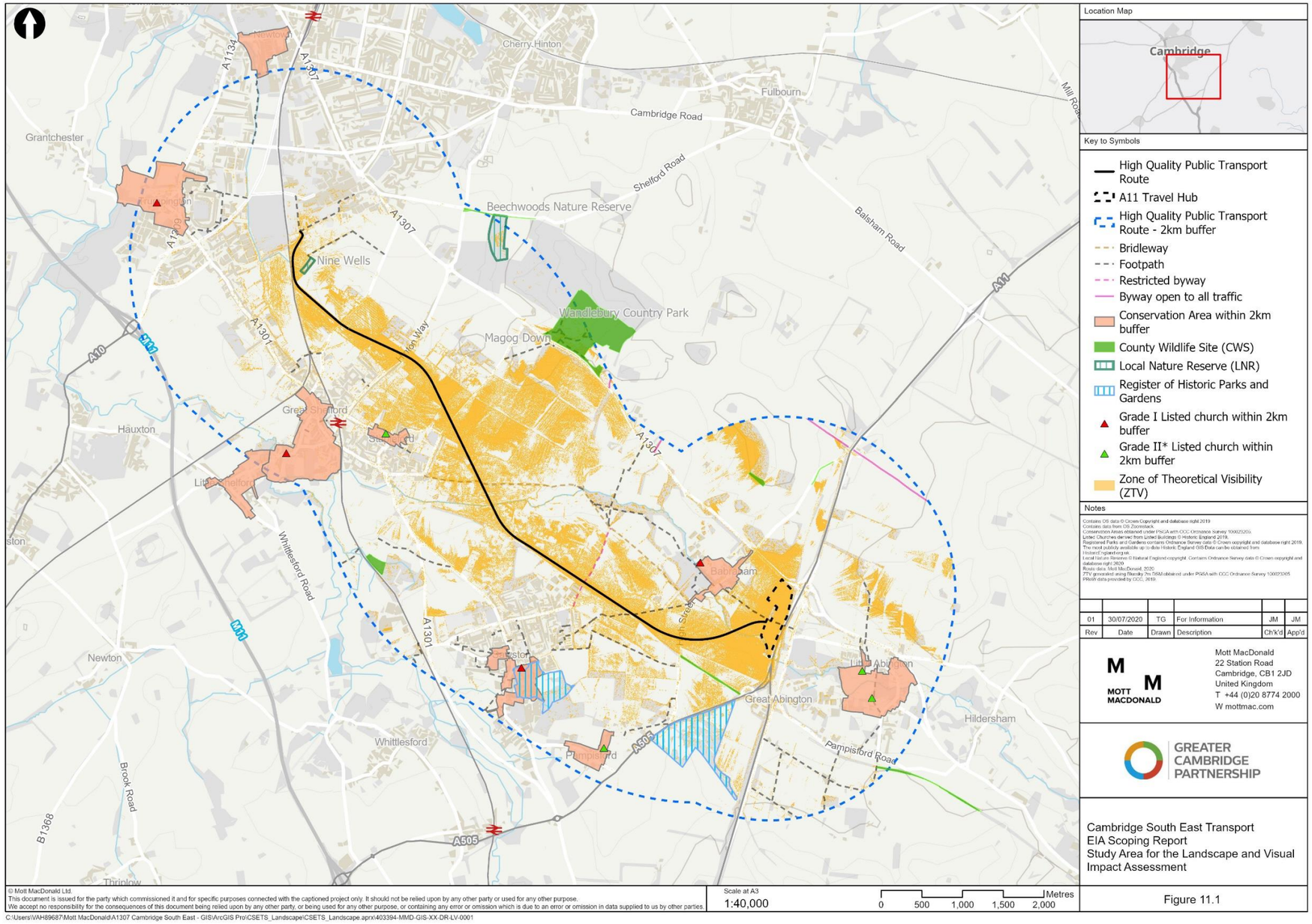
Policy NH/7: Ancient Woodlands and Veteran Trees – development should avoid loss or damage to veteran trees or ancient woodland. If this is unavoidable, adverse impacts will be mitigated and developers will contribute to the woodland's or veteran tree's management and further enhancement.

Policy NH/8: Mitigating the Impact of Development in and adjoining the Green Belt – developments must not have detrimental impact on rural character and openness of the Green Belt. Development on the edges of settlements surrounded by the Green Belt must include careful landscape design measures of a high quality.

11.3 Study Area

The study area will comprise an area within 2km of the centre line of the CSET Scheme. This is based on a study of mapping and aerial photography and site survey. The zone of theoretical visibility (ZTV) of the CSET Scheme has been modelled to illustrate the area from which the development will theoretically be visible to a person with a viewer height of 1.6m above ground level (see Figure 11.1). An updated Digital Surface Model (DSM) data will be used to create the ZTV model which will be verified and refined during the site survey to inform the ES.

Figure 11.1: Study Area for the Landscape and Visual Impact Assessment



Source: Mott MacDonald

11.4 Assessment Methodology

11.4.1 Surveys

A desk-based review of policy, guidance and published landscape character assessments and initial fieldwork has been undertaken to gain an understanding of the existing landscape and visual environment. This has informed an assessment of how the landscape might be affected by the CSET Scheme and to establish the study area. Further site survey will be carried out for the landscape and visual baseline assessment and to take photographs in summer and winter to illustrate existing views. A 35mm format camera with full sensor size 36 X 24mm with a minimum resolution of 21MP will be used to take photographs.

11.4.2 Assessment Approach

The methodology for the assessment will be undertaken in accordance with the following guidance:

- 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 LVIA will identify and report on:

- the likely nature, extent and scale of the project to determine effects of change and development;
- the likely nature and scale of landscape effects (adverse, neutral or beneficial) during the construction and operation of the project; and
- the likelihood of the project to affect the aesthetic and perceptual aspects of the landscape, its distinctive character and its elements.

Key sources of information will include OS mapping, aerial photography, published landscape character assessments and historic landscape characterisation documents.

11.4.3 Significance Criteria

11.4.3.1 Baseline Criteria

Landscape baseline criteria

As part of the route optioneering and business case development the landscape baseline has been considered based on the constituent elements, features and other factors that contribute to existing landscape character within the study area including:

- the physical influences on the landscape resource - including topography, geology, soils, microclimate, water bodies and water courses;
- the influence of human activity – including land use, open space, transport routes, public rights of way, land management, the character of settlement and buildings, the night-time environment, and the pattern and type of fields and enclosure;
- the aesthetic and perceptual aspects of the landscape – including scale, complexity, openness, tranquillity, and wildness; and

- habitats and heritage features – including nature reserves, sites of special scientific interest, conservation areas, listed buildings, registered parks and gardens and other elements contributing to historic landscape character.

For the LVIA, local landscape character areas (broadly homogeneous units of distinct features and elements) within the study area will be identified. The areas will be established using published landscape character assessment, desk study and site survey. The value of each landscape character area will be evaluated in accordance with the criteria set out in the table below.

Table 11.1: Level of Landscape Value

LCA Value	Criteria for assessing landscape value
High	Designated landscape (such as National Park, AONB). Landscape of high scenic quality with a distinctive combination of features, elements and characteristics, outstanding views and a strong sense of place. A scarce or fragile landscape with cultural, historic or ecological elements which make a major contribution to landscape character. No or very few landscape detractors. Has components which are difficult to replace (such as mature trees). A tranquil landscape in good condition, largely intact, with an unspoilt character.
Medium	Landscape locally designated (such as conservation area, regional park) or locally valued (for its recreational facilities and footpath networks for instance). Some scenic quality and a moderate sense of place. A landscape with some distinctive features, elements and characteristics. Some cultural, historic or ecological elements which contribute to landscape character. Some high use areas, but overall medium tranquillity. Few landscape detractors.
Low	Undesignated landscape, not valued for its scenic quality, with a disparate combination of features, elements and characteristics and a weak sense of place. Mainly common features and few or no cultural, historic or ecological elements that contribute to landscape character. Many landscape detractors. A landscape of low tranquillity, in poor condition.

Criteria based on guidance in paragraph 5.19, GLVIA 3rd edition (LI and IEMA, 2013)

Visual baseline criteria

The visual amenity baseline study will identify the people in the area and important, designated or protected views potentially affected by the development. Viewpoints will be selected to represent the visual receptor types in the study area including residential, recreational, hotel, healthcare, educational, transport, active sports and employment receptors. The selection of representative viewpoints will take into account:

- the accessibility of the viewpoint;
- the number of receptors likely to be affected;
- the viewing direction and distance from the site of the CSET Scheme;
- the nature of the viewing experience; and
- cumulative views, in conjunction with other projects.

Viewpoints will also be selected to represent specific views valued for their scenic quality or cultural associations or to demonstrate a specific issue. The selection of viewpoints will be based on the extent of the ZTV, the findings of the site survey, a review of planning policy documents and discussion with SCDC and City Council.

The value of the view will be determined based on indicators including:

- the value attached to a view in relation to a heritage asset, through planning designation and by visitors to the area; and/or
- views described in guidebooks, shown on maps and/or referred to in literature or art.

Photographs will be taken during winter and summer to represent the character of the landscape and existing views. A 35mm format camera with full sensor size 36X24mm with a minimum resolution of 21MP will be used to take the photographs.

11.4.3.2 Assessment Criteria

The assessment will identify the effects likely to arise from the CSET Scheme, taking into account mitigation measures and changes over time. The significance of effects will be assessed by considering the sensitivity of the receptor and the predicted magnitude of change in relation to the baseline conditions. Effects will be assessed in construction and in years 1and 15 of operation. The year 15 assessment will take into account the mitigating effects of maturing vegetation planted as part of the CSET Scheme design.

Landscape assessment criteria

The sensitivity of the landscape will be evaluated by considering the existing value of the landscape and its susceptibility to the type of change arising from the CSET Scheme using the criteria set out in the table below.

Table 11.2: Landscape Sensitivity

Landscape sensitivity	Typical description
Very high.	Landscape of very high international/national importance, rarity and value with no or very limited ability to accommodate change without substantial loss/gain (i.e. national parks, internationally acclaimed landscapes - UNESCO World Heritage Sites). A very high susceptibility to change due to the type of development proposed.
High	Landscape of high national importance, rarity and value with distinctive features/elements with limited ability to accommodate change without incurring substantial loss/gain (i.e. designated areas, registered parks and gardens, country parks and strong sense of place). A high susceptibility to change due to the type of development proposed.
Medium	Landscape of medium value and local or regional recognition of importance, able to accommodate some change (i.e. with features worthy of conservation, some sense of place or value through use of perception). A medium susceptibility to change due to the type of development proposed.
Low	Undesignated landscape of low value, low to medium importance able to accommodate change (i.e. non-designated or designated areas of local recognition or areas with little sense of place). A low susceptibility to change due to the type of development proposed.
Negligible	Landscapes of very low importance and rarity, able to accommodate change. A very low susceptibility to change due to the type of development proposed.

Source: Criteria based on guidance in LA107 Landscape and visual effects Rev 0 (2019) and GLVIA 3rd edition (LI and IEMA, 2013)

The magnitude of change to landscape character in construction and in year 1 (opening year) and year 15 of operation will be determined by considering:

- the nature of an impact - whether the introduction of a proposed development will be of benefit or detriment to the existing landscape character;
- the scale of the change - extent of the loss of landscape elements, the degree to which aesthetic features or perceptual aspects of the landscape are altered (by the removal of hedgerows or introduction of new structures for example) and whether a key characteristic of the landscape is altered;
- the geographical extent of the area affected; and
- the duration of the change and its reversibility.

The evaluation of the magnitude of change will be based on the criteria set out in the table below.

Table 11.3: Magnitude and Nature of Effect on the Landscape

Magnitude of effect (change)		Typical description
Major	Adverse	Total loss or large scale damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, conspicuous features or elements (i.e. road infrastructure). Changes that alter a substantial proportion of the LCA. Introduction of long-term and/or irreversible changes to an LCA or its setting.
	Beneficial	Large scale improvement of landscape character to features and elements; and/or addition of new distinctive features or elements, or removal of conspicuous road infrastructure elements Changes that alter a substantial proportion of the LCA.
Moderate	Adverse	Partial or noticeable damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, noticeable features or elements (i.e. road infrastructure), but which do not necessarily conflict with key characteristics of the existing landscape
	Beneficial	Partial or noticeable improvement of landscape character by restoration of existing features or elements; or addition of new characteristic features or elements or removal of noticeable features or elements.
Minor	Adverse	Slight loss or damage to existing landscape character of one (maybe more) key features and elements; and/or addition of new uncharacteristic features and elements. Changes that will alter a small to a small proportion of the LCA and its immediate setting.
	Beneficial	Slight improvement of landscape character by the restoration of one (maybe more) key existing features and elements; and/or the addition of new characteristic features. Changes that will alter a small to a small proportion of the LCA and its immediate setting.
Negligible	Adverse	Very minor loss, damage or alteration to existing landscape character of one or more features and elements.
	Beneficial	Very minor noticeable improvement of character by the restoration of one or more existing features and elements
No change		No noticeable alteration or improvement, temporary or permanent, of landscape character of existing features and elements.

Source: LA 107 Landscape and visual effects Rev 0 (2019)

Visual amenity assessment criteria

The sensitivity of visual receptors will be evaluated by considering the value attached to specific views and the susceptibility of individual visual receptors to changes to views and visual amenity. The value attached to a view could derive from a planning designation or an association with a heritage asset. The susceptibility to change depends on the occupation or activity of the receptor and the extent to which their attention is focused on the view and visual amenity.

The evaluation of the sensitivity of visual receptors will be based on the criteria set out in the table below.

Table 11.4: Visual Receptor Sensitivity

Sensitivity	Receptor
Very high	Static views from and of major tourist attractions. Views from and of very important national/international landscapes, cultural/historical sites (e.g. National Parks, UNESCO World Heritage sites). Receptors engaged in specific activities for enjoyment of dark skies
High	Views by users of nationally important PRoW / recreational trails (e.g. national trails, long distance footpaths).

	Views by users of public open spaces for enjoyment of the countryside (e.g. country parks. Static views from dense residential areas, longer transient views from designated public open space, recreational areas. Views from and of rare designated landscapes of national importance.
Moderate	Static views from less populated residential areas, schools and other institutional buildings and their outdoor areas. Views by outdoor workers. Transient views from local/regional areas such as public open space, scenic roads, railways or waterways, users of local/regional designated tourist routes of moderate importance. Views from and of landscapes of regional importance
Low	Views by users of main roads or passengers in public transport on main arterial routes. Views by indoor workers. Views by users of recreational/formal sports facilities where the landscape is secondary to enjoyment of the sport. Views by users of local public open spaces with limited variety or distinctiveness.
Negligible	Quick transient views such as from fast moving vehicles. Views from industrial area, land awaiting re-development Views from landscapes of no importance with no variety or distinctiveness

Source: LA107 Landscape and visual effects Rev 0 (2019)

The magnitude of change to views in construction and in year 1 (opening year) and year 15 of operation will be determined by considering the scale, nature and duration of the change, the distance of the change from the visual receptor, the receptor's direction of view, the extent of screening and filtering of the view and whether the receptor is static or moving.

Approximate distances between the representative viewpoint and the CSET Scheme will be classified as follows:

- Close – up to 500m from the proposed development;
- Mid-distance – between 500m and 1000m from the proposed development; and
- Distant – More than 1000m from the proposed development.

The evaluation of the magnitude of change will be based on the criteria set out in the table below.

Table 11.5: Magnitude of Change to Views

Magnitude	Criteria
Major	Total loss or substantial alteration to key characteristics of the view. Addition of new features or components that become the dominant feature or focal point of the view.
Moderate	Addition of new features or components that are noticeable features of the view, clearly visible to the receptor. Substantial change partially filtered by intervening vegetation and/or built form, or viewed obliquely.
Minor	The Proposed Scheme or part of it would be perceptible but not alter the overall balance of features and elements that comprise the existing view. Changes largely filtered by intervening vegetation and/or built form, or viewed obliquely.
Negligible	Only a small part of the Proposed Scheme would be discernible or changes in the background of the view, would be seen as an inconspicuous element within the wider panorama. Change almost entirely obscured by intervening vegetation and/or built form.
No Change	No part of the Proposed Scheme would be discernible.

Source: Criteria based on guidance in LA107 Landscape and visual effects Rev 0 (2019) and GLVIA 3rd edition (LI and IEMA, 2013)

Significance of effects

Professional judgement will be used to determine the overall level of significance of effects on landscape and visual receptors by weighing the sensitivity of the receptors against the magnitude of change. The evaluation of the significance of effects will be guided by the matrix in the table below.

Table 11.6: Significance of Effects

Sensitivity	Magnitude of impact				
	Major	**Moderate**	**Minor**	**Negligible**	**No Change**
Very high	Very Large	Large/Very Large	Moderate/Large	Slight	Neutral
High	Large/Very Large	Moderate/Large	Slight/moderate	Slight	Neutral
Moderate	Moderate/Large	Moderate	Slight	Neutral/Slight	Neutral
Low	Slight/Moderate	Slight	Neutral/Slight	Neutral/Slight	Neutral
Negligible	Slight	Neutral/Slight	Neutral/Slight	Neutral	Neutral

Source: Table 3.8.1 LA104 Environmental assessment and monitoring Revision 1 (2019)

11.4.4 Photomontages

To support the assessment a number of photomontage visualisations will be prepared. These will show the Proposed Scheme in both year 1 and year 15 to give an impression of the immediate impact of the Scheme post construction and how the Scheme will appear in 15 years' time once mitigation has matured. Figure 11.2 shows the proposed locations for photomontages.

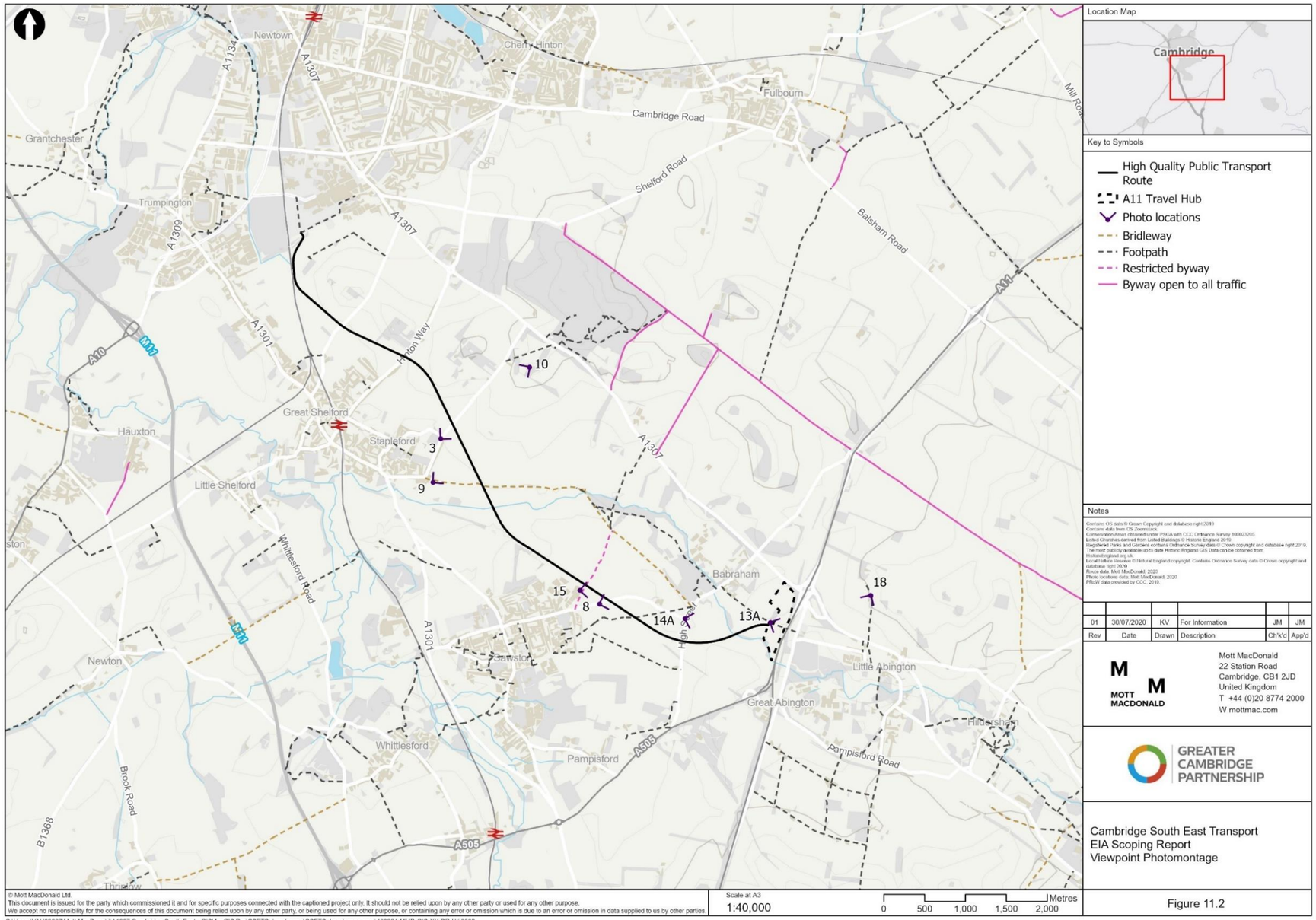
Photomontage methodology

The camera is mounted on a tripod 1.6m above the ground and high quality architectural photographic practice is used to capture the view in two-point perspective. For panoramic images the camera is placed on a rotating mount and a sequence of images sharing the same point of perspective and orientation with respect to the horizon are captured using a fixed 35mm lens. Images are captured in RAW format and a photograph is taken of the camera in its location. AutoCAD, 3DS Max and Photoshop are used to model the proposed scheme to generate perspective overlays for each photograph.

Photomontages are produced by placing a computer-generated camera at the surveyed camera position within the 3D model. The photograph taken from the actual camera position is used as a backdrop to the 3D model. A view of the 3D model within the photographic context is rendered.

Photoshop is used to merge the perspective taken from the 3D model and the photograph to illustrate the visual appearance of the proposals.

Figure 11.2: Photomontage Locations



Source: Mott MacDonald

11.5 Baseline

11.5.1 Landscape

National Character Area Assessments

The study area lies predominantly within National Character Area 87: East Anglian Chalk. The key characteristics of NCA 87 include:

- Underlying chalk bedrock gives the area nutrient-poor and shallow soils;
- River Rhee and River Granta (chalk rivers) flow in gentle river valleys north-west across the NCA;
- Rolling downland, mostly in arable production, sparse tree cover but distinctive beech belts along long, straight roads. High points have small beech copses, characteristic features in the open landscape;
- Remnant chalk grassland, including road verges, supporting chalkland flora and vestigial populations of invertebrates such as the chalk hill blue butterfly;
- Neolithic long barrows and bronze-age tumuli along the Icknield Way, iron-age hill forts at Wandlebury and dykes crossing the chalk; Anglo-Saxon linear earthworks;
- Settlement in valleys - small towns and villages; and
- Roads and lanes crossing the downs perpendicularly and following historic grazing routes. Major roads and railways are prominent.

A small part of the study area is located within the northeast of the National Character Area 88: Bedfordshire and Cambridgeshire Claylands. The key characteristics of NCA 88 include:

- Gently undulating lowland plateau dissected by shallow river valleys;
- Underlying geology of Jurassic and Cretaceous clays overlain with boulder clay and sand and gravel on the river valleys;
- Lime-rich, loamy and clayey soils;
- Variable woodland cover comprises woodland belts, plantations, copses, secondary woodland, pollarded willows and poplar along river valleys and clusters of ancient woodland.
- Open arable farmland landscape of planned and regular fields bound by open ditches and trimmed, often species poor hedgerows;
- Major transport routes, including the M11 cross the area; and larger settlements cluster along major road and rail corridor and smaller settlements often nucleated around a church or village green.

Local Landscape Character Assessment

The Cambridge Inner Green Belt Study[74] and Cambridge Inner Green Belt Study Supplement[75] provide the most recent local landscape character assessment of the part of the study area within the Cambridge Green Belt. The route runs through the Green Belt, crossing two of the landscape character areas (LCA) identified in the study: the Granta Valley LCA and the Gog Magog Chalk Hills LCA. The Cambridge Inner Green Belt Study is not a statutory planning document, but it was an important background document that formed the evidence base of the current SCDC and City Council Local Plans.

[74] Cambridge Inner Green Belt Study, LDA Design, 2015

[75] Cambridge Inner Green Belt Study Supplement, LDA Design, 2016

The South Cambridgeshire District Design Guide Supplementary Planning Document[76] provides a further landscape assessment and locates study area in Area B – Chalklands LCA. The Cambridgeshire Landscape Guidelines[77], a much earlier assessment, places it in the Chalklands LCA. In all assessments, the key characteristics relevant to the study area are:

- The chalk hills, part of the East Anglian Heights, gently rounded and rolling, reaching 74m above ordnance datum at Wandlebury;
- Springs occurring at the junction of the chalk and clay, such as at Nine Wells. The dry valleys of the chalk are also important landscape features;
- Large-scale arable landscape with fields enclosed by closely maintained low thorn hedges and few hedgerow trees. Shelter belts, often of beech, and hilltop copses are common;
- The roads, which tend to be straight and run across the contours, thus commanding panoramic views of Cambridge and its environs. Addenbrookes Hospital, on the edge of Cambridge, dominates views towards the city;
- An area rich in archaeological elements, with the Roman Road, Wandlebury Ring, burial mounds and chalk pits; and
- Wandlebury Country Park, Magog Down and the Beech Woods Local Nature Reserve (LNR) are important recreational and ecological sites close to Cambridge.

Green Belt

The CSET Scheme is wholly within the Green Belt. The study area includes land at the northern and southern ends of the route which is outside the Green Belt.

Landscape Character Areas

During the optioneering appraisal, it was felt that the LCA identified in the published landscape character assessments should be further broken down to reflect the varied landscape characters of the study area east of the urban edge of Cambridge.

The CSET Scheme study area will therefore include the following LCA:

- Cambridge Southern Fringe LCA;
- River Granta Valley Farmland LCA;
- River Granta Valley Villages LCA;
- Gog Magog Chalk Hills LCA;
- Babraham and Great Abington Research Parks LCA; and
- Gog Magog Hills Recreational LCA.

Registered Parks and Gardens

There are two Registered Parks and Gardens of Special Historic Interest in England in the study area:

- Sawston Hall (Grade II); and
- Pampisford Hall (Grade II*).

Conservation Areas

The study area includes the following conservation areas:

[76] District Design Guide Supplementary Planning Document, South Cambridgeshire District Council, 2010

[77] Cambridgeshire Landscape Guidelines -a Manual for Management and Change in the Rural Landscape, Cambridgeshire County Council, 1991

- Great and Little Shelford;
- Stapleford;
- Sawston;
- Pampisford;
- Babraham Village and Hall; and
- Great and Little Abington.

Important landscape features

- Wandlebury Country Park: Iron Age hill fort, historic gardens, woodland and path network;
- Magog Down: woodland, wildflower meadows and expansive views over the River Granta Valley;
- The Beechwoods Local Nature Reserve: beech woodland planted in 1840s, path network, and white helleborine orchids in spring; and
- Nine Wells Local Nature Reserve: springs issue form the base of the chalk hills and feed the 17th century watercourse, Hobson's Conduit, which runs through the centre of Cambridge.

11.5.2 Visual

Visual receptors

Visual receptors potentially affected by the CSET Scheme include:

- People in residential properties;
- Walkers and visitors using PRoW, permissive paths and in recreational areas;
- Visitors to heritage assets; and
- People working at or visiting Addenbrookes Hospital.

The following visual receptors may experience views of the Scheme:

- Residents in Cambridge on Southwell Drive, Granham's Road and Babraham Road – filtered views of the Scheme;
- Staff working on the biomedical campus at Addenbrookes Hospital – clear/partially screened views of the Scheme;
- Residents on the north-eastern edge of Great Shelford and Stapleford - clear/filtered views of the Scheme;
- Residents on or near Hinton Way and Haverhill Road;
- Residents on the southern and eastern edges of Babraham - clear/filtered views of the Scheme;
- Visitors to Magog Down and Nine Wells - clear views of the Scheme;
- Residents on the northern edge of Sawston - clear/filtered views of the Scheme;

- Users of the cycleways parallel to the West Anglia mainline, along Sawston Road and along footpath 12/4;
- Users of Footpath 39/47 - clear/filtered views of the Scheme;
- Users of Footpath 198/2 - clear/filtered views of the Scheme;
- Users of Footpath 198/1 - clear/filtered views of the Scheme;
- Users of Footpath 212/3 - clear/filtered views of the Scheme;
- Users of Bridleway 212/2 - clear/filtered views of the Scheme;
- Users of Restricted Byway 12/10 - clear/filtered views of the Scheme;
- Users of Bridleway 12/12 - clear/filtered views of the Scheme;
- Users of Footpath 12/9 - clear/filtered views of the Scheme;
- Users of Footpath 179/2 - clear/filtered views of the Scheme; and
- Users of Footpath 4/3 - clear/filtered views of the Scheme.

Views of the Cambridge Skyline

Appendix F: Tall Buildings and The Skyline of the Cambridge Local Plan[78] aims 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. Three strategic viewpoints lie in the study area:

- Little Trees Hill, Magog Down (Viewpoint 7);
- Limekiln Road lay-by (Viewpoint 8); and
- Wort's Causeway/Shelford Road (Viewpoint 9)

Of these viewpoints only the view from Little Trees Hill, Magog Down (Viewpoint 7) would be affected by the CSET Scheme. This viewpoint takes in a wide panorama looking north/north-west and includes part of the study area, whereas the other viewpoints are focused upon views towards the city and would not include the proposed Scheme.

The purpose of the guidance is to assess the potential impact of tall buildings upon the skyline of Cambridge and since this Scheme comprises a ground level HQPT route with vehicles moving through the landscape, it would be unlikely to have any impact upon the Cambridge skyline.

11.6 Potential Impacts

Landscape and visual effects would be largely contained by the screening provided by the undulating topography, built form and woodland to a fairly narrow corridor of land within approximately 1500m of the Scheme.

11.6.1 Construction

The most apparent changes to landscape and views would result from the temporary presence of construction plant and the construction compound, the removal of existing trees and hedgerow and the construction of the CSET Scheme public transport route, non-motorised user route and Travel Hub.

The potential impacts on landscape character and visual amenity during construction include:

[78] Cambridge Local Plan, Cambridge City Council, 2018

- Presence of construction traffic, construction plant and equipment;
- Construction activity, generating noise and movement;
- Earthworks, changes in landform and storage of soils and materials;
- Presence of a construction compounds, temporary security fencing and hoardings;
- Vehicle movements including private vehicles belonging to site staff;
- Removal of existing vegetation which will open up views of the construction works; and
- Use of lighting, if night-time works are required and security lighting.

Environmental impacts would be avoided or reduced through an iterative design process to minimise the footprint of the Scheme and the loss of existing vegetation and farmland. Construction would be carried out using in accordance with the Code of Construction Practice.

Landscape

There would be direct impacts on the following LCA:

- River Granta Valley Farmland LCA; and
- Gog Magog Chalk Hills LCA (small proportion);

The Cambridge Southern Fringe LCA, Babraham and Great Abington Research Parks LCA, River Granta Valley Villages LCA and Gog Magog Hills Recreational LCA would be affected indirectly by the presence of construction traffic and activity, construction lighting in the winter months and a reduction in tranquillity. The scale of these effects, and of the impacts from construction on the River Granta Valley Farmland LCA and on the remaining LCA in the study area will be assessed during the EIA.

Visual

Views of construction of the route and Travel Hub would be possible from residential areas on the edge of Cambridge, Great Shelford, Stapleford, Sawston, Babraham and properties on or near Hinton Way and Haverhill Road, but most views would be largely filtered through intervening vegetation. Views would also be possible from the PRoW in the area, Magog Down (Little Tree Hill), Nine Wells and the biomedical campus at Addenbrooke's Hospital.

The potentially for adverse effects on residents on the northern and eastern boundaries of Great Shelford, Stapleford, Sawston and Babraham and in properties on or near Hinton Way and Haverhill Road would be assessed in the EIA. The assessment will also include visual impacts on users of the PRoW in the study area.

11.6.2 Operation

The guided public transport route and adjacent non-motorised user route would form a new, linear infrastructure feature in the area, visible from elevated locations and PRoW close to, or crossing the route. Moving HQPT vehicles would be apparent in much of the area, introducing transport infrastructure into a farmed landscape. Mitigation planting would be incorporated into the proposals to strengthen the existing landscape structure and provide some screening.

The potential impacts on landscape character and visual amenity during operation will include:

- Loss of hedgerow and trees from the along the route band within the footprint of the Travel Hub;
- Presence of a Travel Hub on former farmland;
- Presence of a linear paved route and vehicles passing through farmland and urban areas;

- Presence of stops and lighting in the Travel Hub and at stops and road junctions in the rural landscape and on the edge of settlements.

Photomontages

Photomontages will be provided from the following locations to illustrate the appearance of the scheme in operation:

- Bridleway 212/2, on the southeast edge of Stapleford (547743, 251551), looking northeast;
- Haverhill Road, at the junction with Gog Magog Way, Stapleford (547782, 252103), looking northeast;
- Magog Down (548799, 252946), looking south:
- Restricted Byway 12/10, on the northeast edge of Sawston (549501,250219), looking east;
- Footway along Sawston Road (549571, 250019), looking west towards Sawston;
- Junction of Sawston Road and High Street, Babraham (550760, 249855), looking east;
- Footpath 12/4, to the east of Babraham (551837, 249807), looking east; and
- Footpath 4/2, south of Grange Farm Cottage, Abington (553007, 250134), looking southwest.

Landscape

The guided public transport route would cut across the existing landscape pattern, severing fields and changing field boundaries. It would also cross minor roads, footpaths and bridleways, and the River Granta valley and would result in a loss of farmland and short lengths of hedgerow. The most apparent changes to landscape character would result from the introduction of a paved guided public transport route, non-motorised user route, Travel Hub, stops, lighting and moving vehicles into a predominantly rural landscape.

There would be direct impacts on the following LCA:

- River Granta Valley Farmland LCA; and
- Gog Magog Chalk Hills LCA (small proportion).

The scale of the indirect impacts on the Cambridge Southern Fringe LCA, Babraham and Great Abington Research Parks LCA, River Granta Valley Villages LCA and Gog Magog Hills Recreational LCA from vehicle movements along the route and in the Travel Hub would be assessed in the EIA.

Visual

The landscape between Addenbrooke's Road and Babraham is open and there would be long views of the CSET Scheme across the open farmland from Magog Down, Hinton Way, the PRoW network, the A1307, High Street Babraham and Sawston Road. Woodland belts, at Nine Wells, near Hinton Way, at Wandlebury and south-east of Sawston, garden vegetation and the rolling landform would screen most views of the Scheme from residential properties in the area and much of the PRoW network. There would be filtered and partly screened views from the edges of the Addenbrooke's Hospital biomedical campus, Great Shelford and Stapleford. Residential and recreational receptors close to the Scheme route would be affected by views of the guided route and HQPT vehicles passing through farmland, adjacent to rural roads and close to residential areas. These impacts will be assessed during the EIA.

11.7 Proposed Scope of Assessment

11.7.1 Scoped In

The CSET Scheme has the potential to result in likely significant effects to landscape character and visual amenity during construction and operation. It is therefore considered necessary to undertake a landscape and visual impact assessment to understand the potential impacts of the CSET Scheme.

The impacts of the CSET Scheme on the openness of the Cambridge Green Belt would be included in the LVIA.

11.7.2 Scoped Out

It is not proposed that any elements of landscape and visual impact would be scoped out of the ES.

12 Noise and Vibration

12.1 Introduction

This chapter presents the applicable legislation, policies and assessment methodology, including significance criteria, that are proposed following scoping assessment of the CSET Scheme.

12.2 Legislation and Policy

12.2.1 National Legislation and Policy

12.2.1.1 The Control of Pollution Act 1974

Whilst receptors that live nearby to construction activities may accept that there would be some disturbance caused to those living nearby, the Control of Pollution Act 1974[79] offers further protection.

Section 60 of the Act enables a local authority to serve a notice specifying its noise control requirements covering plant or machinery (which is or is not being used), hours of working, and levels of noise that can be emitted. Section 61 relates to prior consent in which the contractor consults with the local authority and provides an application prior to construction works commencing to obtain approval for the methods to be used and the steps proposed to minimise noise resulting from the works.

If the local authority considers that the application contains sufficient information and that "*best practicable means*" (BPM) of noise control are being implemented, and; if the works are being carried out in accordance with the application, it would not serve a notice under Section 60.

BPM are defined in Section 72 of the Act as "*reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications*".

12.2.1.2 The Land Compensation Act 1973 Part 1

The Land Compensation Act 1973 Part 1[80] includes provision for compensation for loss in property value resulting from physical factors, including noise and vibration, resulting from the use of public works, such as new or improved roads.

12.2.1.3 The Noise Insulation Regulations 1975 (amended 1988)

The Noise Insulation Regulations 1975 (amended 1988)[81] 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.

[79] Her Majesty's Stationary Office, The Control of Pollution Act, 1974
[80] Her Majesty's Stationary Office, Land Compensation Act, 1973.
[81] Her Majesty's Stationary Office, Noise Insulation Regulations. Building and Buildings, 1975.

12.2.1.4 The Environmental Noise (England) Regulations 2006 (amended 2018)

The Environmental Noise (England) Regulations[82] 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)[83]" was published, which identified 'Important Areas' for future mitigation.

12.2.1.5 The Noise Policy Statement for England 2010

The Noise Policy Statement for England (NPSE)[84] was issued by 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 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.

12.2.1.6 The National Planning Policy Framework 2019

The National Planning Policy Framework (NPPF)[85] 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, 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:

[82] Her Majesty's Stationary Office, Environmental Noise Regulations, 2006 (Amended 2018).

[83] Noise Action Plan: Roads (Including Major Roads) Environmental Noise (England) Regulations 2006 (Amended 2018).

[84] Department for Environment Food and Rural Affairs. The Noise Policy Statement for England, 2010.

[85] Ministry of Housing, Communities and Local Government, Planning Practice Guidance, 2019

- 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.

12.2.1.7 National Policy Statement National Networks 2014

The National Policy Statement for National Networks (NPSNN) sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It promotes good health and good quality of life through effective noise management and notes that Government policy is set out in the Noise Policy Statement for England (see above).

It states that noise should be assessed using the principles of the relevant British Standards and other guidance and that prediction of road traffic noise should be based on the method described in the Calculation of Road Traffic Noise (see below). Whilst CSET is not a nationally important road the policy guidance in the NPS NN will be considered when undertaking the noise assessment.

12.2.1.8 Planning Practice Guidance

Planning Practice Guidance (PPG)[86] 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.*

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 12.1.

Table 12.1: PPG Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not present	No Effect	No Observed Effect	No specific measures required

[86] Department for Communities and Local Government, Planning Practice Guidance, 2019.

Present 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		
Present 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		
Present 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
Present 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

12.2.2 Local Policy

The current local planning policy and guidance relevant to noise and vibration 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 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. b. Has an unacceptable adverse impact on countryside areas of tranquillity which are important for wildlife and countryside recreation;
    c. 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 an 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**
  1. 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).

The Greater Cambridge Sustainable Design and Construction Supplementary Planning Document was adopted in 2020 by South Cambridgeshire and City Councils and provides additional guidance for the consideration and assessment of noise and vibration due to noise generating development. Section 3.6 which relates to noise and vibration provides advice on effect level threshold values and the Agent of Change principle. The document also describes good acoustic design for noise generating developments within the context of planning policy aims and sustainable development.

12.2.3 Guidance

12.2.3.1 BS5228-1&2:2009+A1:2014, Noise and Vibration

British Standard 5228-1:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites’ Part 1: Noise[87] provides a methodology for calculating noise levels generated by fixed and mobile plant used for a range of typical construction operations.

BS 5228-1 provides guidance for the determination of significance of noise effects due to construction activities which combine both an exceedance of noise level thresholds and time period of works. The Guidance also recommends mitigation and measures that can be applied to minimise noise impacts from construction works.

British Standard 5228-2:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites’ Part 2: Vibration[88] details that even when it is of a very low magnitude, vibration generated as the result of the construction or operation of a development can be perceptible to people living or working close by. Nuisance associated with vibration is frequently associated with the assumption that, if vibrations can be felt, then damage is

[87] British Standards Institution, BS 5228-2:2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites” Part 1: Noise, 2014.

[88] British Standards Institution, BS 5228-2:2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites” Part 2: Vibration, 2014.

inevitable. However considerably greater levels of vibration over the perceptible threshold are required before damage to buildings at either a cosmetic or structural level will occur.

12.2.3.2 DMRB LA111 Noise and Vibration 2020

The Design Manual for Roads and Bridges (DMRB) LA111 'Noise and Vibration'[89] describes a methodology for the assessment of highways projects in the UK and best reflects EIA methodology as applied to highways. It includes a method of the classification of magnitude of impact, assessment of both long and short-term effects and determination of significance.

12.2.3.3 WHO Environmental Noise Guidelines for the European Region 2018

The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region[90] 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 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.*"

12.2.3.4 WHO Night Noise Guidelines for Europe

The WHO Night Noise Guidelines for Europe (NNG)[91] 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.

[89] Highways England, Design Manual for Roads and Bridges, LA111 Noise and Vibration (Revision 2), 2020.
[90] World Health Organisation, Environmental Noise Guidelines for the European Region, 2018.
[91] World Health Organization, Night Noise Guidelines for Europe, 2009.

12.2.3.5 British Standard 8233:2014

BS 8233:2014[92]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 recognized 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 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.”

12.2.3.6 Calculation of Road Traffic Noise 1988

Calculation of Road Traffic Noise (CRTN)[93] 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.

12.2.3.7 Noise Advisory Council 1978

Noise Advisory Council (NAC) guidance[94] 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.

12.3 Study Area

12.3.1 Construction

The study area proposed for construction will be the same as that defined for assessment of operational noise effects (see below), although this may be extended to assess the effects from construction traffic on the existing road network, from potential diversion routes and any construction compounds. Within the study area the extent of the assessment will be limited to areas where construction noise has the potential to exceed baseline noise levels.

12.3.2 Operation

For operational noise, LA111 states that the study area should include the following:

“1) noise sensitive receptors that are potentially affected by operational noise changes generated by the project, either on the route of the project or other roads not physically changed by the project;

2) noise sensitive receptors in areas where there is a reasonable stakeholder expectation that noise assessment is undertaken.”

LA111 methodology recommends that calculations are undertaken for receptors within 600m of the physical works associated with the Scheme and 50m of roads which are likely to experience a change of 1dB $L_{A10,18hr}$ upon Scheme opening. This approach to define the study area will be

[92] British Standards Institution, BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings”, 2014.

[93] Department of Transport, Calculation of Road Traffic Noise, 1988

[94] The Noise Advisory Council, A Guide to Measurement and Prediction of the Equivalent Continuous Sound Level Leq, 1978.

adopted for assessment of operational noise effects. Consequently, the spatial extents of the assessment may extend beyond the physical works associated with the CSET Scheme.

12.4 Assessment Methodology

12.4.1 Surveys

At the time of writing baseline noise surveys have not been undertaken. Baseline noise surveys will be undertaken for the purposes of establishing baseline noise levels for assessment of construction noise and to assist in validating baseline noise modelling results in accordance with LA111. Measurements will be undertaken at locations representative of receptors or receptor groups which have the potential to be affected by changes in noise level from construction or operation of the CSET Scheme.

Consultation will be undertaken with local authorities prior to surveys to agree the methodology and noise measurement locations. Desktop studies indicate that baseline noise levels at many receptor locations are dominated by road traffic noise sources. In the instance that ambient noise levels are not representative due to Covid-19 restrictions guidance issued by the relevant professional bodies (including the Institute of Acoustics) will be followed to establish baseline noise levels, including using modelled methods if necessary, for the purposes of the Scheme assessment.

The Baseline Noise Survey Report will be an appendix to the ES.

12.4.2 Assessment Approach

The assessment will broadly follow the guidance in LA111 and will comply with requirements of the National Planning Policy Framework's requirement 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. Significance will be considered on the basis of magnitude of impact and with respect to the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) values which are concepts that were introduced by the Noise Policy Statement for England.

Assessments of significance of effect will be based on magnitude of impact and on exceedance of threshold levels in accordance with EIA regulations, local policy guidance and national planning policy guidance.

12.4.2.1 Construction

Assessment of construction noise and vibration will be in accordance with BS 5228 "Code of Practice for noise and vibration control on construction and open sites".

For construction noise the assessment will follow BS5228-1 Example method 2 (the 5dB method) and for construction vibration it will follow BS5228-2.

Following assessment mitigation measures will be suggested as appropriate. These will include those outlined in BS5228.

12.4.2.2 Operation

There is no single methodology for assessment of the different operational elements of the CSET Scheme so more than one approach is envisaged.

The DMRB LA111 provides a methodology for assessment of traffic noise associated with alterations to the existing road network and for changes in traffic flow or composition on the wider network. LA111 uses the prediction methodology of Calculation of Road Traffic Noise (CRTN) to calculate noise levels at receptor locations based on forecast traffic parameters for Annual Average Weekday Traffic (AAWT traffic volume), %HGV and traffic speed.

Calculations will be undertaken using the available 2026 and 2036 traffic modelling. It is noted that the Opening Year is 2025 and DMRB LA111 guidance indicates a Future Year of +15 years from the Opening Year. The source information for the forecasted traffic is the Cambridge Sub Regional Model (CSRM2), which is a complex demand model with forecasts based on defined vision for developments and economic growth within Cambridgeshire. Based on the detailed assumptions embedded within these forecasts, it is considered proportionate to undertake calculations based on the available information for 2026 as a proxy for an Opening Year (2025) and 2036 for the Forecast Year (+10 Years).

This minor departure from DMRB LA111 guidance is considered proportionate as only relatively small increases in traffic flow would be expected between 2025 and 2026 in the absence of the Scheme. Similarly, in the case of the Future Year, the development assumptions within this scenario are defined by CCC and present a representation of a defined potential future for Cambridgeshire. Developing a further independent forecast which includes an additional 5 years growth would be a departure from this defined scenario. It would be considered disproportionate to generate an interpolated 2041 from a 2046, due to the influence of major developments beyond 2041 and the omission of demand model responses.

It is noted short term predictions represent a marginally worse case assessment where 2026 Opening Year scenarios account for slightly higher traffic volumes compared to 2025. Greater weight is given to short term impacts in the application of significance criteria as described in the following section. Effects due to the variance described above will therefore be minimised.

Calculations will be undertaken using a 3D noise model of the CSET Scheme to account for distance, topography, screening and reflections from buildings or structures and ground effects in accordance with CRTN.

For assessment of noise from discrete events within the site and for assessment of noise from public transport using the dedicated links from the site, an assessment based upon the Noise Advisory Council (NAC) prediction methodology (based on a sound exposure approach) or applying conventional acoustic propagation models of noise source terms is proposed. The method selection will be subject to the quality and availability of data relating to the vehicle types intended to be used on the routes.

To assess the classification of impacts and determine change in road traffic noise the following comparisons are made between forecast scenarios in accordance with LA111 guidance:

- Do-Minimum scenario in the opening year against Do-Something in the opening year (short-term change with the CSET Scheme)
- Do-Minimum scenario in the opening year against Do-Something in the future year (long-term change with the CSET Scheme)
- Do-Minimum scenario in the opening year against Do-Minimum in the future year (long-term change without the CSET Scheme)

These comparisons will be assessed for the CSET Scheme and are reported for the number of noise sensitive receptors within the study area that are subject to no change or negligible, minor, moderate or major changes that may be either increases or decreases. Noise sensitive

receptors will be considered including residential dwellings and other noise sensitive receptors (e.g. hospitals, schools, community facilities, designated areas).

Following assessment, mitigation measure will be suggested as appropriate.

12.4.3 Significance Criteria

12.4.3.1 Construction

An adverse effect arises when total noise (baseline plus construction noise) exceeds the baseline by 5dB or more and LOAEL (see Section 12.2.1.5) is exceeded. A significant adverse effect arises when total noise exceeds the baseline by 5dB or more and where SOAEL (see Section 12.2.1.5) is exceeded for a period of 10 or more days in 15 days or for 40 days in any consecutive six months. The values of LOAEL and SOAEL for construction noise and vibration will all be based on BS5228 and will be:

- LOAEL for the daytime and Saturday mornings is 65dB $L_{Aeq, T}$, for night-time is 45dB $L_{Aeq, T}$ (in both cases the lower cut-off value in example method 2);
- SOAEL for the daytime and Saturday mornings is 72dB $L_{Aeq, T}$, for night-time is 55dB $L_{Aeq, T}$ (in both cases the trigger for noise insulation with 75dB façade converted to 72dB free-field);
- LOAEL for vibration is a Peak Particle Velocity (PPV) of 0.3mm/s; and
- SOAEL for vibration is a PPV of 1mm/s.

12.4.3.2 Operation

The assessment will consider the potential significance of any changes using criteria based on the classification of impact and noise levels with respect to the LOAEL and SOAEL as follows:

- A potentially significant adverse effect arises for moderate or major impacts (i.e. an increase of 3dB or more in the short-term) where noise levels are above LOAEL; or for minor, moderate or major impacts (i.e. an increase of 1dB or more in the short-term) where noise levels are above SOAEL.
- In all cases where a potentially adverse effect is indicated, professional judgement is used to determine if a significant adverse effect arises that includes consideration of the sources of noise, the causes of the change in noise levels, the magnitude of the impact and noise levels relative to LOAEL and SOAEL.
- LOAEL for the daytime is 50dB $L_{Aeq, T}$ (free-field) based on BS8233 and LOAEL for night-time is 40dB $L_{night, outside}$ (free-field $L_{Aeq, T}$) defined as LOAEL in the WHO night noise guidelines.
- SOAEL for the daytime is 68dB $L_{A10,18h}$ (façade) based on the Noise Insulation Regulations and SOAEL for the night-time is 55dB $L_{night, outside}$ (free-field) based on level above which cardiovascular effects become a major public health concern in the WHO night noise guidelines.
- As stated in LA111 guidance, the LOAEL and SOAEL values can be modified where it is proportionate and merited by local circumstances. This includes but is not limited to non-residential receptors and noise sensitive receptors that have an increased or reduced sensitivity to noise or vibration.

12.5 Baseline

At the time of writing baseline noise surveys have not been undertaken due to restrictions on field work, but importantly due to the lack of normal traffic levels on the national road network due to the Covid-19 pandemic.

Existing baseline conditions have therefore been reviewed through desktop study using the Extrium (available online at: http://extrium.co.uk/) noise map. Existing ambient noise levels at noise sensitive receptors 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, within Great Shelford and CBC are likely higher and typically between 55-60dB $L_{Aeq,16hr}$.

Baseline noise levels in the immediate vicinity of the CSET Scheme area are characterised by a combination of sources including railway noise and road traffic using the A1307, A11, A505 and surrounding road network. As distance increases from these road traffic and rail noise sources other environmental and anthropogenic sources are anticipated will become dominant (e.g. agricultural/commercial/industrial noise, birdsong, residential activities).

There are no noise important areas (NIA) located within 600m of the Travel Hub or CSET Scheme route. NIAs are viewable online at: http://extrium.co.uk/noiseviewer.html

The surrounding areas from the CSET Scheme route include noise sensitive receptors in communities along the Scheme route including Babraham, Sawston, Stapleford, Great Shelford, Trumpington and Cambridge. The majority of these noise sensitive receptors within these areas comprise residential properties although non-residential receptors include Addenbrooke's Hospital, CBC facilities, Babraham Research Campus, schools and community facilities.

12.6 Potential Impacts

12.6.1 Construction

During construction the CSET Scheme has the potential to increase noise and vibration levels at sensitive receptors within approximately 300m of construction works for a temporary period. Construction work areas are likely to include the main scheme route, new Travel Hub site and any construction compounds. Potentially affected areas include Sawston, Stapleford, Great Shelford and the CBC.

Additional noise from diversion routes also has the potential to increase noise levels and result in adverse effects at receptors.

12.6.2 Operation

During operation there is the potential for traffic using the new CSET Scheme route, within the Travel Hub site and access roads, and changes to traffic flows on the existing road network, to result in noise level changes at sensitive receptors. Potential adverse impacts are anticipated for off-line sections of the route due to the introduction of a new noise source.

In order to attain an increase of 1dB, in broad terms, an increase of 25% of traffic volume using existing roads would be necessary. Similarly, in order to achieve an increase of 3dB, existing traffic flows would have to be doubled. Alternatively, noise changes could also occur as a result of significant changes in flow parameters such as speed and percentage HGV etc.

The CSET Scheme is not expected to result in substantial changes to traffic flows on the existing road network, however, potential impacts are anticipated to be localised to areas around the Scheme route and particularly for offline section where baseline noise levels are typically lower. These areas include receptors near Sawston, Stapleford and Great Shelford. These receptors are described in Section 12.5.

12.7 Proposed Scope of Assessment

12.7.1 Scoped In

The following impacts have been scoped in:

- Construction noise and vibration from the site;
- Construction noise and vibration from movement of vehicles on the existing road network;
- Construction noise and vibration from the compound (depending on the location of the compound, vibration may be subsequently scoped out);
- Operational noise.

12.7.2 Scoped Out

Operational vibration has been scoped out. DMRB LA111 advises maintained road surfaces will be free from irregularities which avoids the potential for significant adverse vibration effects.

13 Land Use and Land Take

13.1 Introduction

Land and property would be acquired or used for the CSET Scheme in a number of different ways, including:

- Temporary use of land.
- Permanent acquisition of land.
- The safeguarding and survey of land.
- Permanent acquisition of rights and restrictive covenants over land.

Temporary use of land is required where it is needed for construction purposes, but not for the future operation of the CSET Scheme. Permanent acquisition of land is required for both the siting of the permanent structures, equipment and its operation and maintenance, it is also required for landscaping and mitigation measures, for example for drainage, environmental mitigation and parcels of land severed by the route which would no longer be viable for their current purpose in the future (termed severance).

The land required to accommodate the CSET Scheme is proposed the following:

- Land that is required for the construction of the CSET Scheme, for the construction of works to be carried out, together with all construction work sites and working areas.
- Land which will need to be acquired for the permanent structures and equipment associated with the CSET Scheme, or land over which rights will be required to maintain, operate and safeguard its operation.

The Applicant would seek to minimise land take, whilst ensuring that the extent is sufficient for the purposes of the construction and operation of the CSET Scheme, including working areas and work sites. As the development of the CSET Scheme progresses the amount of land required will further be defined and further assessment work will be required to inform its land requirements.

All interests in the land within the Order limits will be identified as part of the land referencing process and any further or newly identified interests in land will be incorporated within the existing stakeholder engagement and land interest negotiations.

13.2 Assessment Methodology

The ES will include a chapter to describe the potential impact arising from land use and land take associated with the CSET Scheme. It will assess the impact of the CSET Scheme in terms of temporary land take during construction, and permanent land take during its operation, as well as changes to the pattern of land use during the operational phase of the CSET Scheme, including any interaction with committed developments.

There is no specific guidance available that relates to the assessment of land use and land take, but best practice techniques will be adopted to assess the impacts of the CSET Scheme both in quantitative and qualitative terms.

13.3 Legislation and Policy

The assessment will be undertaken having regard to the requirements of the Application Rules. As with all aspects of the approach to ES, it will be carried in accordance with best practice. In particular, it will identify the short and long term impacts on the pattern of land use during the construction and operational phases of the CSET Scheme, and aspects of the environment likely to be significantly affected by the proposal.

The National Policy Statement for National Networks (NPSNN)[95] includes useful guidance on developing particular land uses including open space[96], green infrastructure and Green Belt. Whilst the Scheme is not a strategic road project, these will still be reviewed and taken into account. The NPSNN states that the applicant should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Existing open space should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quality and quantity in a suitable location. However, it notes access to high quality open spaces and the countryside can be a means of providing necessary mitigation and/or compensation requirements for development in these areas.

Where significant development of agricultural land is demonstrated to be necessary, applicants should seek to use areas of poorer quality land in preference to that of a higher quality. Applicants should also identify any effects and seek to minimise impacts on soil quality and should safeguard any mineral resources on the proposed site as far as possible.

For development within Green Belt land, applicants must consider if the development is inappropriate development within the meaning of Green Belt policy, and if so, demonstrate very special circumstances to justify planning consent. The guidance acknowledges that linear infrastructure linking an area near a Green Belt with other locations will often have to pass through Green Belt land. The liner infrastructure will need to, as far as possible, contribute to the achievement of objectives for the use of land in Green Belt.

13.4 Study Area

The study area for the CSET Scheme will be identified taking into account land currently considered necessary for both construction and operation, to also include all land in respect of which there may be direct or indirect likely significant effects. The assessment will consider all locations where physical works and ground disturbance will take place (i.e. temporary and permanent land take areas). These are the areas which could experience direct impacts of likely significant effect.

The assessment will also look more widely to neighbouring and surrounding land where there could be indirect likely significant effects arising during both construction and operation.

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[95] 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).

[96] The planning portal (https://www.planningni.gov.uk/index/policy/planning_statements/pps08/pps08_annexes/pps08_annex_a.htm) defines he broad range of open spaces that are of public value to include:

parks and gardens – including urban parks, country parks, forest parks and formal gardens; outdoor sports areas; amenity green space (most commonly, but not exclusively in housing areas); spaces specifically providing facilities for outdoor activities by children and teenagers; green corridors – including river and canal banks, amenity footpaths and cycleways; natural and semi-natural urban green spaces; allotments and community gardens; cemeteries and churchyards; and civic spaces, including civic and market squares and other hard surface areas designed for pedestrians.

13.5 Assessment Methodology

The ES will include a chapter to describe the potential impact arising from land use and land take associated with the CSET Scheme. It will assess the impact of the CSET Scheme in terms of temporary land take during construction, and permanent land take during its operation, as well as changes to the pattern of land use during the operational phase of the CSET Scheme, including any interaction with committed developments.

There is no specific guidance available that relates to the assessment of land use and land take, but best practice techniques will be adopted to assess the impacts of the CSET Scheme both in quantitative and qualitative terms.

13.5.1 Surveys

The assessment will be carried out based on a detailed desk based review and site visit of the CSET Scheme route, including:

- South Cambridgeshire Local Plan (September 2018);
- Cambridge Local Plan (October 2018);
- Relevant evidence base documents including the Strategic Housing Land Availability Assessment (2013) and Employment Land Review update (2013) for Cambridge City Council, and the Strategic Housing Land Availability Assessment (2013) and Employment Land Review Update (2012) for SCDC;
- Planning History Records; and
- Site walkover.

It is not intended to carry out soil sampling to identify soil types, this information will be collected (if required) to inform a soil management plan to be produced by the appointed contractor for construction (if the Scheme is approved to be constructed). The soil sampling would therefore form part of pre-construction works and would be identified as part of the mitigation plan reported in the ES and documented in the CEMP.

13.5.2 Significance Criteria

The impacts of the CSET Scheme on land use and land take will be evaluated for both the construction and operational phases. Impacts will be categorised having regard to whether they would be direct or indirect, temporary or permanent, and whether they would result in a beneficial, adverse or neutral impact.

Effects will be predicted by setting the degree of change due to the project against the type and importance of each land use and extent of land take. The significance of the effects will be categorised as either ‘severe’ (national or regional importance), ‘major’ (local or district scale), ‘moderate’ (a number of effects of local scale that individually are minor, but in combination might amount to moderate effects), ‘minor’ (local scale), or no effect. ‘Severe’, ‘major’ and ‘moderate’ effects are regarded as ‘significant’ in EIA terms.

13.6 Baseline

Baseline conditions will be established through desk based research and a site visit to identify areas affected by land use and land take associated with the CSET Scheme. Planned and committed developments will be identified through a review of existing or proposed land use allocations, discussions with CCC planning officers, as well as City Council and SCDC planning officers and reviewing the Council’s published planning records. This will include the time limits imposed on planning permissions to identify extant consents (committed developments).

Land uses adjacent to the CSET Scheme are typical of a rural environment, except the western end of the route at Cambridge, and are characterised by agriculture with some residential area, open space and industrial uses. New land take is required along the majority of the route, largely from agricultural land.

13.7 Potential Impacts

Potential impacts on land use and land take during the construction and operational phases are summarised in Table 13.1 and Table 13.2 respectively.

13.7.1 Construction

Table 13.1: Potential Construction Impacts

Aspect of CSET Scheme Construction Works	Construction Impact
Establishment of site compounds	Temporary change in use of land, disruption to movement in and out of buildings, disruption to the road network
Severance of land parcels used for agricultural production	Permanent change to land access for farmers fields – affecting agricultural viability
Soil strip for construction	Permanent change in land use, loss in agricultural productivity.
Closure of roads for construction activities	Temporary change in use of land, disruption to movement in and out of buildings, disruption to the road network
Closure and diversions to PRoWs	Temporary change in use of land, disruption to PRoW network

Temporary road closures and PROW closures/diversions will be identified and discussed with the relevant local county officers to identify mitigation measures to include in the ES. These will also be documented in the Code of Construction Practice (or another appropriate document).

Impacts on land use due to construction compounds, haul roads and from severance resulting in potential impacts on agricultural viability will be assessed through engagement with affected landowners. This will include identifying temporary or permanent changes to field access and temporary or permanent changes to farmers use of fields.

As part of this engagement information relating to soil type and drainage in the fields will also be collected. This ES chapter will document the potential impacts on farm viability and of the impact of any topsoil strip. It will identify mitigation and assess the significance of effects based on professional judgement and best practice.

13.7.2 Operation

Table 13.2: Potential Operational Impacts

Aspect of CSET Scheme Operation	Operational Impact
Operation of the HQPT Service	Permanent changes in land use (including land and properties acquired and/or demolished to accommodate the route alignment)
Shared use pathway, environmental mitigation (e.g. landscaping and habitat creation), drainage system for the CSET Scheme, electrical sub stations, stops along the route, etc	Permanent changes in land use (including land and properties acquired and/or demolished to accommodate ancillary development)

13.8 Proposed Scope of Assessment

13.8.1 Scoped In

The Land Use and Land Take chapter of the ES will consider the potential impacts on current and future land use (including farm viability) arising from the construction and operation of the CSET Scheme. It will have regard to existing land uses and development proposals promoted through the planning system. The nature and significance of each impact will be identified.

The chapter will also report on the impacts on agricultural land from the Scheme taking into account the quality of the land affected.

13.8.2 Scoped Out

As a result of the information collected in the preparation of this Scoping Report it is proposed that the following impacts will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess:

- soil surveys for classifying agricultural land quality – it is proposed these are recommended for completion as part of pre-construction works to inform the detailed soil management plan that will be required to be completed by the appointed construction contractor.

14 Soils, Geology and Land Contamination

14.1 Introduction

This chapter sets out the potential effects of the CSET Scheme on soils, geology and any existing land contamination. It is proposed to scope out production of a Geology and Soils chapter from the ES and this chapter sets out the reasons why this is proposed. This chapter indicates how some elements related to soils will be included in the ES.

14.2 Legislation and Policy

Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union.

14.2.1 European Legislation

14.2.1.1 The Water Framework Directive (EU Directive 2000/60/EC) and associated national implementation regulations

This Directive aims to protect inland and coastal waters and prevent deterioration of aquatic ecosystems, including groundwaters. A key aim of the Water Framework Directive (WFD) is to achieve 'good' ecological status for all waterbodies by 2015, with a secondary aim to gradually reduce the release of pollutants which may pose significant risks to the aquatic ecosystems. The environmental objectives for the WFD are implemented through actions described in the River Basin Management Plans (RBMPs).

This legislation does not directly affect soil and geology, and the implications of soils and geology on water bodies identified under the WFD are discussed in Chapter 15.

14.2.1.2 The Groundwater Daughter Directive (2006/118/EC) transposed into law in England & Wales through the Groundwater Regulations 2009

This Directive establishes specific measures in order to prevent and control groundwater pollution including: criteria for assessing the chemical status of groundwater; criteria for identifying significant and sustained upward trends in groundwater pollution levels, and for defining starting points for reversing these trends; and preventing and limiting indirect discharges (after percolation through soil or subsoil) of pollutants into groundwater. The Groundwater Daughter Directive (GDD) clarifies certain objectives of the WFD relating to prevention and control of groundwater pollution and establishes groundwater quality standards.

This legislation does not directly affect soil and geology, and the implications of soils and geology on water bodies identified under the WFD are discussed in Chapter 15.

14.2.2 National Legislation and Policy

14.2.2.1 Part IIA of the Environmental Protection Act 1990

The Environmental Protection Act, 1990 (EPA) principally applies to sites where individual historical contamination linkages present a Significant Possibility of Significant Harm (SPOSH) or a Significant Possibility of Significant Pollution to Controlled Waters (SPOSPCoW) representing an unacceptable level of contamination risk for each linkage.

The Part IIA clean-up is the minimum which can be done on a cost basis to make and keep the site in a just safe condition for an existing use.

14.2.2.2 The Contaminated Land (England) Regulations 2006 (as amended)

The Contaminated Land (England) Regulations set out provisions relating to the identification and remediation of contaminated land under Part IIA of the EPA. The Regulations make provision for an additional description of contaminated land that is required to be designated as a special site where the Environment Agency is to be the enforcing authority.

14.2.2.3 Wildlife and Countryside Act 1981 (as amended)

Geological and geomorphological features considered to be of national importance are designated as Sites of Special Scientific Interest (SSSI). The importance of nature conservation, including areas with geological features, is emphasised.

14.2.2.4 Environmental Permitting (England and Wales) Regulations 2016

The prevention of pollution is regulated by several pieces of legislation including the Environmental Permitting Regulations, which regulate pollution control by requiring permits for emissions to, for example, the land and water.

14.2.2.5 Waste Legislation (various)

There are a number of waste-related regulations which serve to protect soils from contamination by waste management, such as the Hazardous Waste (England and Wales) Regulations 2005 (as amended), Environmental Protection (Duty of care) Regulations 1991, Waste Management Licensing Regulations 1994 (as amended), Landfill Directive 1999, Landfill Tax (Contaminated land) Order 1996, Landfill (England and Wales) Regulations 2002 (as amended), and the Waste (England and Wales) Regulations 2011 (as amended).

14.2.2.6 Other Regulations (various)

Under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) and the Construction Design and Management (CDM) Regulations 2015, where a developer knows or suspects the presence of contaminated soil, provision would be made to ensure that risks to the public and site workers are minimised.

14.2.2.7 National Planning Policy Framework 2019

Section 15, paragraph 170 requires planning policies and decisions to contribute and enhance the natural and local environment by protecting and enhancing sites of geological value and, more generally, soils. These protections afforded should be proportionate to their statutory status or their quality identified in local development plans

Paragraph 170 also requires new or existing development to avoid contributing to, or being affected by, pollution from a variety of sources. These sources include any soil or geological sources.

14.2.3 Local Plans and Policy

14.2.3.1 South Cambridgeshire Local Plan 2018

Policy NH/3 (Protecting Agricultural Land) sets out the requirement for development affecting grade 1, 2 or 3 agricultural land to demonstrate that there is no sustainability alternative to the

land take required for the proposed development. Paragraph 6.13 goes on to state that development impacts on soil and the need to protect soil need to be taken into account.

Policy CC/6 (Construction Methods) requires developers to manage materials already on-site or brought to the site (including soils) to reduce the amount of waste produced and maximise the reuse or recycling of materials either onsite or locally.

14.2.3.2 Cambridge City Local Plan 2018

Policy 8 (Setting of the city), paragraph 2.78 requires developers to take account of potential impacts on soil during construction and operation and to work to protect soils.

Policy 33 (Contaminated Land) requires an assessment of contaminated land risk if there is any indication historic or current land use practices could have caused soils to be contaminated. A remediation strategy is required to demonstrate that no residual impact on people or the environment from any contamination on a site is likely, before approval can be granted.

14.2.3.3 Cambridgeshire and Peterborough Minerals and Waste Core Strategy 2019

The Cambridgeshire and Peterborough Minerals and Waste Core Strategy and Proposals Map C: Mineral Safeguarding Areas[97] were adopted by CCC and Peterborough City Council on 19 July 2011. They are valid until 2026. The maps covering the CSET Scheme route show there are no Mineral Safeguarding Areas within the project footprint.

The adopted Waste maps[98] show there are no waste sites identified within the footprint of the Scheme (either existing or proposed).

14.3 Study Area

The CSET Scheme will only be likely to directly impact soils and geology within the proposed footprint of the Scheme (including land required for temporary access and construction compounds). This is limited to a width of around 20m from the centre line. However, for the purposes of this Scoping Report the study area for soils and geology has been extended to:

- 250m from the centre line of the CSET Scheme
- 250m from the proposed outer limits of the travel hub.

The additional area is to account for the potential for pollution to migrate from contaminated sites by a variety of means, for example for contamination from a site to leach into groundwater that then flowed towards the project area.

14.4 Assessment Methodology

14.4.1 Surveys

No field surveys have been undertaken on soil or geology. Data has been collected from publicly available published sources.

There are no proposed soil surveys for the EIA.

[97] https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Proposals_Map_C_MSA_Maps_017.pdf
[98] https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Waste_adopted.pdf

14.4.2 Significance Criteria

Criteria used to define the value of soils and geology and the scale of potential impact in this assessment are based on those defined in DMRB LA109, Rev 0 “Soils and Geology”.[99]

14.5 Baseline

14.5.1 Soils

Baseline information on soils has been obtained from the Government MAGIC website. The Agricultural Land Classification maps on MAGIC are divided into two data sets. A national dataset that is pre-1988 and a post 1988 data set that is more accurate and detailed, but which does not cover the whole of the UK. In the study area there is no information available from the post 1988 data set of use for the EIA.

Soil along the route has been assessed in the pre-1988 data set against the Agricultural Land Classification (ALC) system, which classifies land into five grades. These grades classify soil types on the land (along with physical or chemical characteristics) that affect agricultural use. The grades are numbered 1 to 5, with Grade 3 divided into two Subgrades (3a and 3b).

The majority of the Scheme is underlain by Grade 2 agricultural soils, which is classed as Very Good Agricultural Land capable of providing high yields from crops grown on it.

There is 900m of the route where it crosses Hinton Way that is on Grade 3 agricultural land – but available mapping does not differentiate if this is Grade 3a or 3b.

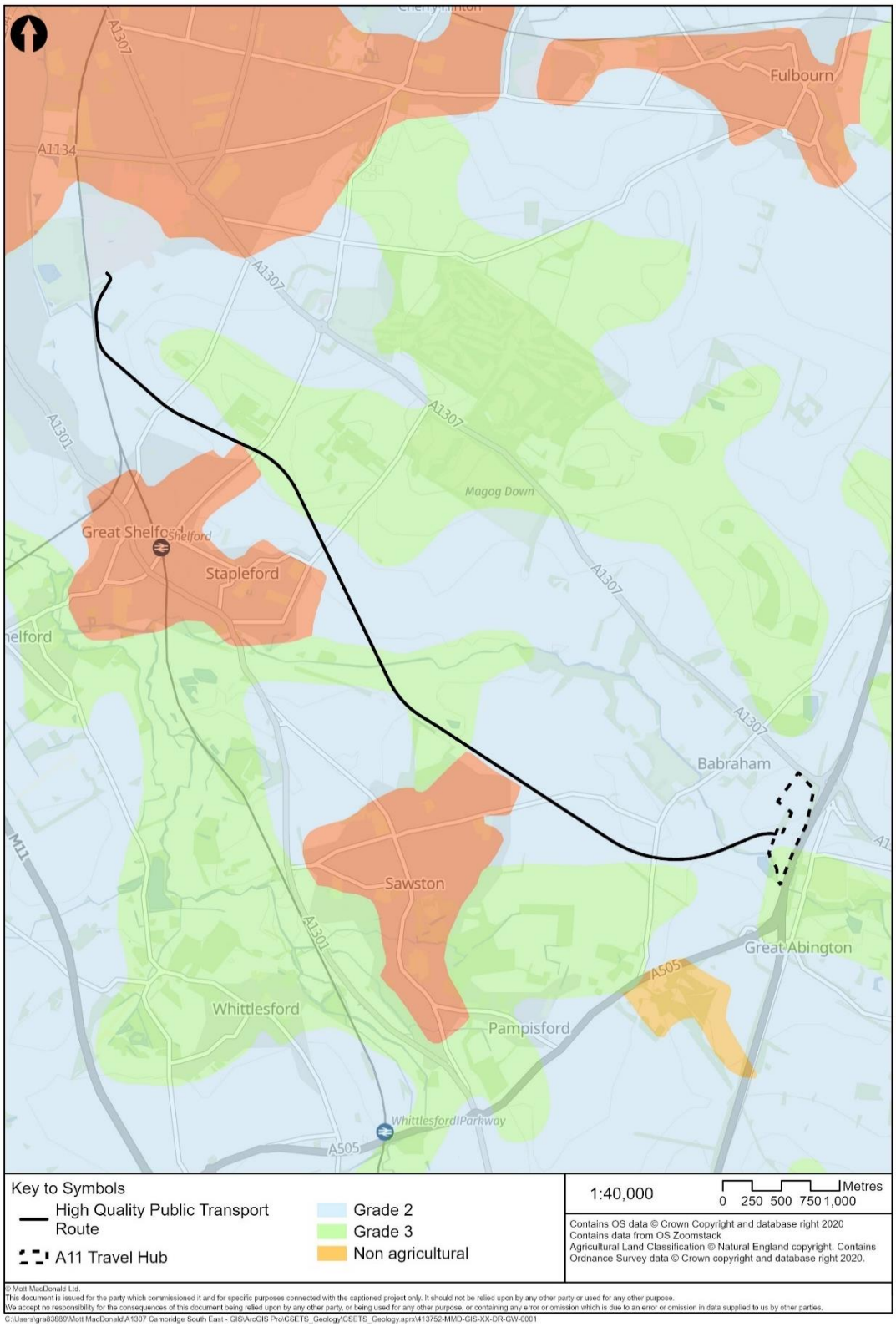
There is another section of the route where it crosses the River Granta at Stapleford which is also Grade 3 agricultural land. This section is about 1.2kms long and stops at Home Farm just north of Stapleford. It too is not differentiated in available mapping between Grade 3a or 3b.

Grade 3 land is classified as good to moderate agricultural land and provide slightly lower yields or more variable yields than Grade 2 land. The soils in the Study Area as shown in Figure 14.1.

The impact of the loss of soils will be covered in the Land Use and Land Take chapter of the ES (see Section 14.5.1).

[99] DMRB Volume 11, LA109 Rev 0, Soils and Geology. http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/LA%20109%20Geology%20and%20soils-web.pdf

Figure 14.1: Agricultural Soils in Study Area



Source: Mott MacDonald

14.5.2 Superficial Deposits

The route is largely on outcropping bedrock except where it crosses the River Granta valley, where there are superficial River Terrace Gravels and Alluvium associated with the River Granta valley.

The Travel Hub may have some areas of River Terrace Gravels around the western edge (Babraham side) and southern edge of the site where it drops down towards the River Granta. These are shown in Figure 14.2 below.

14.5.3 Bedrock Formations

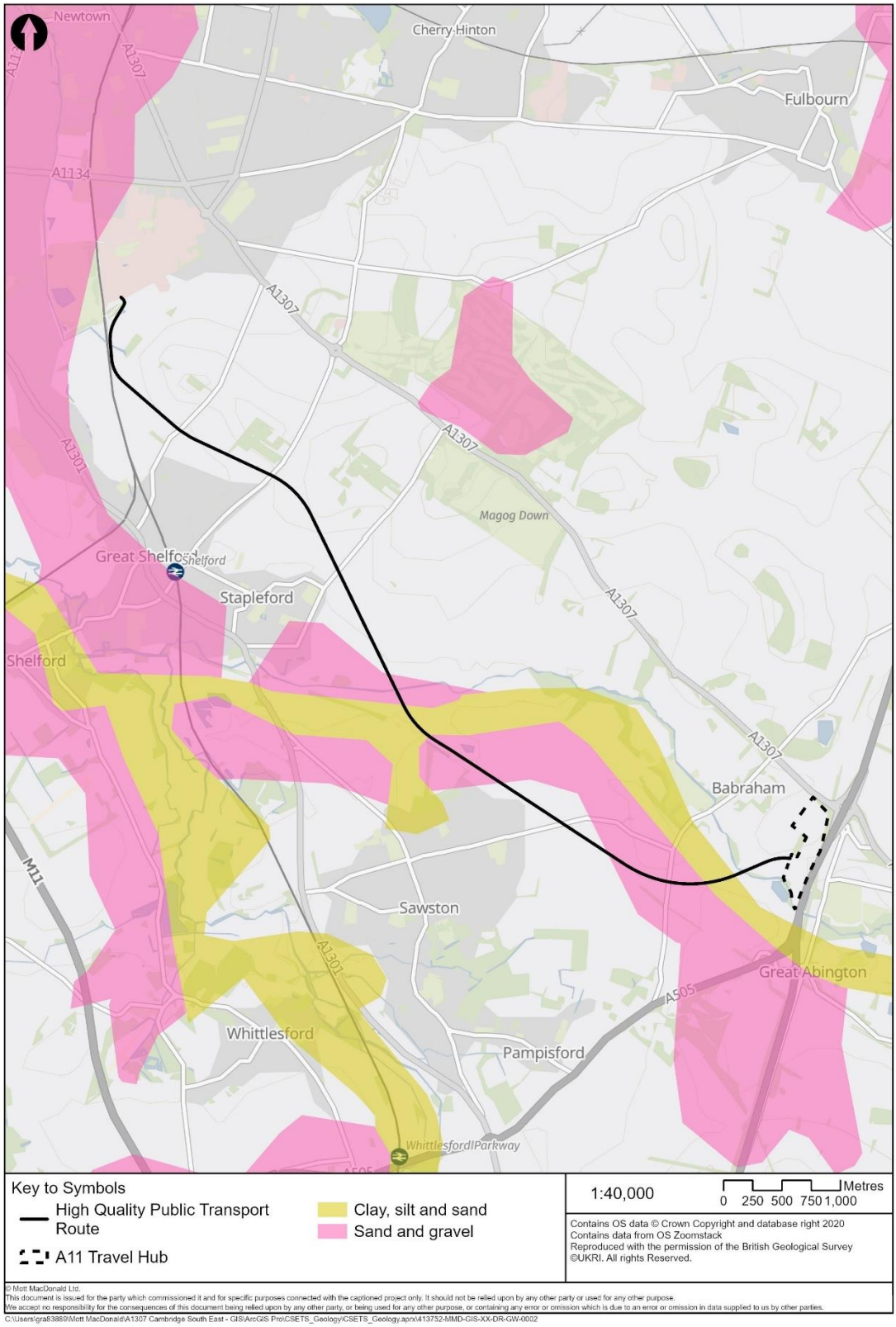
The CSET Scheme is entirely underlain by chalk bedrock. From CBC to Sawston the route is on Grey Chalk Sub-Group formations made up of the West Melbury Marly Chalk Formation and the Zig Zag Chalk Formation. From Sawston to the Travel Hub the area is underlain by White Chalk Sub-Group, mainly the Holywell Nodular Chalk Formation. These all outcrop under the Scheme area and represent the northern limits of the chalk in this area, so the thickness of the chalk below the northern part of the route thins towards CBC.

The Holywell Nodular Chalk Formation occupies the flanks of the Gog Magog hills and then the outcrop boundary curves south westerly across the River Granta and becomes the surface bedrock formation from near Sawston Road southwards.

All these formations are generally dipping in a south/south easterly direction.

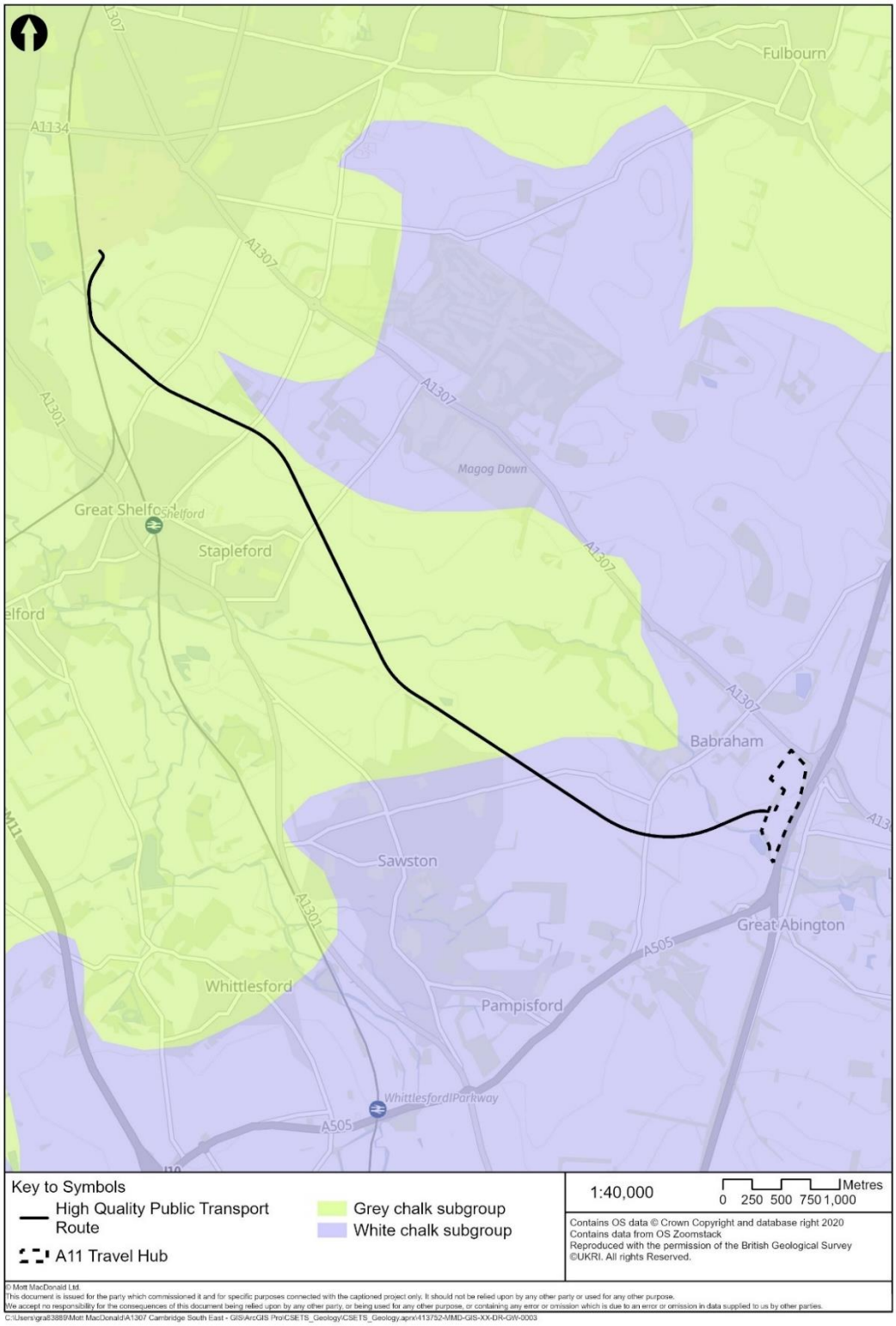
The Travel Hub is largely on outcropping chalk but may have some areas of River Terrace Gravels around the edge of the site. The bedrock geology is shown in Figure 14.3.

Figure 14.2: Superficial Deposits in the Study Area



Source: Mott MacDonald

Figure 14.3: Bedrock Geology in the Study Area



Source: Mott MacDonald

14.5.4 Waste Management / Landfill Sites

There are no active waste management or landfill sites within the Scheme study area.

There is one historic landfill site in Sawston, located on the land on the northern edge of Sawston between the village and the disused railway line. This is recorded as the Sindalls Historic Landfill site.

There is another record of an historic landfill site on the alignment of the disused railway line between Sawston Road and the High Street south of Babraham.

The Scheme will not have any direct impact on either of these areas, although the route would pass close to the disused railway line south of Sawston Road.

14.5.5 Historic Land Use

The land use in the Scheme study area has largely been agricultural and there are no known brownfield sites along the route as a result.

There is a disused railway line which runs parallel and adjacent for much of the route from near the River Granta south of Stapleford to the High Street south of Babraham. The proposed route does not intersect this old railway line.

14.5.6 Local Geological Site

There is one important geological site in the study area, the Nine Wells Local Geological Site (LGS) is recognised for its local geological diversity and earth heritage value. The Nine Wells LGS was designated to protect its unique blend of geology, geomorphology, hydrology, ecology, history and education value. The springs are located along the boundary between the zig Zag Chalk Formation and the West Melbury Marly Chalk Formation and are primarily fed by groundwater flowing northwards in the Totternhoe Stone.

The LGS is also a Local Nature Reserve (LNR) managed by the City Council. The springs are the main source of water for Hobson's Conduit which flows northwards into the centre of Cambridge. There is a memorial to Thomas Hobson, the founder of the conduit, and to the College Masters and City Councillors who worked together to create this water supply to the city. Details related to this site are available on the Cambridgeshire Geological Societies website.[100]

The route would not impact this site as it is located at least 60m from the boundary of the Nine Wells Nature Reserve which is the boundary of the LGS.

14.6 Potential Impacts

14.6.1 Construction

There would be no impact on the LGS at Nine Wells.

Construction impacts on soils and geology result in physical disturbance to soils and geology below the Scheme. Soil would be stripped and stored for re-use or removed from the site. The objective of the Scheme design will be to minimise the removal of soils from site. Soil that is not

[100] http://www.cambsgeology.org/565-2-2

able to be used in the Scheme design would be spread on surrounding fields with local landowner approval.

The superficial and bedrock formation will be excavated in places where:

- The superficial deposits do not provide a suitable substrate for the Scheme, or
- Where the land topography requires land to be profiled to meet the needs of the horizontal and vertical alignment of the Scheme.

Some excavated materials will be reused on site for:

- Creation of landscape bunding to provide various levels of screening along the Scheme
- Where suitable it will be used to fill any areas where the route vertical alignment requires the land surface to be raised.
- Sub-base and / or backfill at the two River Granta river crossings.

During construction the implementation of the industry standard measures outlined in the CoCP will ensure that risks of increasing pollution to soils and geology will be controlled and will not be significant. The CoCP will be included as an appendix to the EIA.

The CSET Scheme's cut and fill balance is still to be evaluated. It is not yet known if there will be a need to export materials from site or import of material to provide suitable sub-grade to the roadway and Travel Hub infrastructure. No major earthworks or excavations are, however, anticipated. The potential impacts of the cut and fill operation will be evaluated as part of the Carbon Assessment of Construction as this is the largest environmental effect arising from cut and fill operations. The impact on land use will be covered in the Land Use and Land Take chapter. The potential impacts on traffic from vehicle movements will be covered in the Traffic and Transport chapter.

It is considered to be unlikely that there will be a need to import topsoil for the CSET Scheme. Until the detailed design is completed the nett balance of topsoil will not be fully known, but the handling and management of topsoil will be set out in the CoCP and will be in accordance with:

- DEFRAs Code of Practice on the sustainable use of soils, 'Code of practice for the sustainable use of soils on construction sites'.
- CL:AIRE. ISBN 978-1-905046-23-2, 'Definition of Waste Code of Practice.'

There is a small risk that hotspots of contamination from the historical land use could be encountered, but if these are encountered the risk, they posed to receptors would be assessed as to whether they should be isolated and removed for appropriate disposal or can be left in-situ. This could lead to a positive impact on the soils in the area.

The geological assets that would be impacted have a low value as they are not designated (nationally or regionally) and have no exposures or outcrops of local interest. The scale of any impact is considered to be low – this is based on there being a measurable but minor physical loss of the surface layers of the outcropping superficial or bedrock formations. The loss is minor due to the scale of the impact compared to the overall exposures of these formations. The overall impact on geology is therefore considered negligible (i.e. not significant). For this reason it is proposed to scope out geology from the EIA.

The majority of the agricultural soils that will be removed and reused are classified in DMRB as either of Very High and High to Moderate Value due to their ALC classification as Grade 2 or 3 soils. The removal of soil is regarded as being a Major impact. In terms of mitigating the impact there is nothing practical that can be included in the design, other than minimising the land take

for the CSET Scheme. This will be addressed in the Land Use and Land Take chapter of the ES, and so there would be no specific chapter on soils in the ES.

14.6.2 Operation

During operation any impact on soil and geology would be restricted to the immediate footprint of the Scheme. The main potential impact that could arise would be in relation to pollution from the Scheme. It is considered unlikely that the Scheme would to result in significant risks of pollution to soils and geology.

The route used by public transport vehicles will have low levels of traffic and the vehicles would not contain or carry hazardous materials that would have any significant effect in the event of a traffic accident. The Travel Hub would have very low travel speeds of vehicles and a drainage network that will contain and prevent the release of polluting substances in the event of a spill. Chapter 15 documents the assessment of the drainage network and concludes it will prevent any significant risk of contamination to the environment.

For these reasons it is proposed to scope out any assessment of the operation of the Scheme on soils and geology.

14.7 Proposed Scope of Assessment

14.7.1 Scoped In

Assessment of the impact of the final cut and fill balance will contribute to the following:

- Transport Assessment – in relation to the number of construction vehicle movements likely and the transport routes for such traffic
- Community Effects chapter of the ES – in relation to the impacts from construction traffic on communities
- Climate Change chapter of the ES – in relation to the impacts on construction carbon due to construction traffic movements.
- Sustainability Assessment – in relation to use of materials on the project.
- Assessment of the impact on agricultural soils will be carried out in Land Use and Land Take chapter of the EIA (see Section 13.7.1).

14.7.2 Scoped Out

As a result of the information collected in the preparation of this Scoping Report it is proposed that the following impacts will be scoped out of further consideration in the ES because there will be no likely significant environmental effects to assess:

- Any impacts on geological resources.
- Any other impacts on soil and geology are scoped out as not being significant at a local or regional scale.

15 Water Resources and Flood Risk

15.1 Introduction

This chapter discusses the water resources (surface water and groundwater) present in the study area which could be affected by the CSET Scheme. The conclusion presented here is that surface water and groundwater resources are not present as significant features and will therefore not be assessed in the ES. However, risks of flooding that could be changed (positively or negatively) by the CSET Scheme are assessed and the approach to be taken in the EIA is set out here.

This section presents the applicable legislation, the methodology, study area and existing baseline and includes an initial assessment of the potential impacts on water resources and flood risk from the CSET Scheme.

15.2 Legislation and Policy Context

Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union.

15.2.1 European Legislation

15.2.1.1 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 of, 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.

15.2.1.2 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.

15.2.2 National Legislation

15.2.2.1 Environmental Permitting (England and Wales) Regulations 2016

The Environmental Permitting (England and Wales) Regulations 2016 (EPR) aim to protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances. The EPR 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).

15.2.2.2 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). 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 (SuDS) can be found within these guides.

15.2.2.3 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.

15.2.3 National Policy

15.2.3.1 National Planning Policy Framework 2019

The NPPF applies to this Scheme under Chapter 15 ("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 may be required for the preferred option because the total area of the preferred Scheme is larger than 1 hectare in size.

15.2.3.2 National Policy Statement for National Networks 2014

The NPSNN sets out requirements for managing flood risk and protecting water resources.

In relation to flood risk, approval can only be granted if the Secretary of State is satisfied that flood risk will not be increased elsewhere and only consider development appropriate in areas at risk of flooding where (informed by an appropriate flood risk), it can be demonstrated that flood risk has been properly accounted for in the design to avoid placing assets in areas vulnerable to flooding unless there are overriding reasons for certain elements of the design to be in a specific location; and that the development is resilient to flooding in the event it occurs; and that priority has been given to the use of sustainable drainage systems (SuDS). The Secretary of State should also be satisfied that the most appropriate body has been identified with responsibility for maintaining any SuDS, taking into account the nature and security of the infrastructure on the proposed site. The responsible body could include, for example, the applicant, the landowner or the relevant local authority.

The NPSNN sets out the requirements to ensure the prevention of unacceptable impacts on water resources quality and quantity, particularly in relation to existing EU legislation which is not likely to be relevant at the time of the application. However, the NPS sets out a useful summary on the requirements for the Secretary of State to consider proposals put forward to mitigate adverse effects on the water environment and whether appropriate requirements

should be attached to any development consent and/or planning obligations. If the Environment Agency continues to have concerns and objects to the grant of development consent on the grounds of impacts on water quality/resources, the Secretary of State can grant consent, but will need to be satisfied before deciding whether or not to do so that all reasonable steps have been taken by the applicant and the Environment Agency to try to resolve the concerns, and that the Environment Agency is satisfied with the outcome.

The NPSNN also makes clear the expectation to include SuDS in designs to manage drainage impacts, and to adhere to pollution prevention guidance in the design of a development.

15.2.4 Local Policy

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

The South Cambridgeshire Local Plan 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 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 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 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.

15.3 Study Area

The study area covers the surface water and groundwater resources in an area up to 1km either side of the centre line of the route alignment (which is less than 20m wide in most locations) and the boundaries of the A11 Travel Hub site. The route has been described in Chapter 2.

15.4 Assessment Methodology

15.4.1 Surveys

No specific water resources site surveys have been carried out. A desk study and site visit has been carried out during the options appraisal process as part of the preferred Scheme optioneering.

Flood model information is being provided by the Environment Agency for use by the project to assess the design implications of flooding around the River Granta flood plain.

15.4.2 Assessment Methods

The risks to groundwater have been assessed in this scoping report using several tools including:

- Design Manual for Roads and Bridges LA113 which references the Highways England Excel tool that models impacts on water resources, this is the HEWRAT;
- CIRIA C753 “The SuDS Manual” which includes tools to assess the hazards and the potential for drainage to minimise hazards from roads and car parking areas;
- Government MAGIC website to identify flood zones and groundwater protection zones around public water supply sources.

15.5 Baseline

15.5.1 Surface Water Features

The CSET Scheme crosses 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.

The Scheme would pass downgradient from the springs in Nine Wells LNR where alignment goes no closer than 60m from the boundary of the LDR. Therefore, the route in this area would 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 and which would be crossed by the Scheme. The Scheme crossing of the conduit would be designed to accommodate the potential flows without hindering these flows, and in consultation with stakeholders such as the Hobson’s Conduit Trust to preserve the heritage value as much as possible.

The major water features in the area the River Granta which flows through the Scheme study area south of Stapleford and would be crossed twice by the Scheme. The River Granta is designated as a County Wildlife Site.

Between Stapleford and Sawston the route crosses about 220m of the River Granta Flood Zone 2 and 3. The route then crosses 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 there is one licensed abstraction point from the Granta near Babraham which would be within the Scheme footprint although at this point the Scheme would be on a bridge over the River Granta. This will be investigated with the landowner as part of the EIA.

Recreational access could be increased along the River Granta from the Scheme’s shared use path and through improvements to local PRoW and permissive paths.

There are no still water ponds directly in the footprint of the Scheme and the Scheme drainage design will not discharge into those ponds which are close to the Scheme. Therefore, there is not likely to be any impact on biodiversity or aesthetics of ponds in the area.

15.5.2 Hydrogeology

Section 14.5 describes the geology of the study area. The CSET Scheme is on outcropping chalk except where it crosses the River Granta, where there are superficial River Terrace Gravels and Alluvium associated with the River Granta valley.

CBC to Sawston the route is on Grey Chalk Sub-Group formations, and from Sawston to the Travel Hub site the area is underlain by White Chalk Sub-Group formations.

The Travel Hub Site is largely on outcropping chalk but may have some areas of River Terrace Gravels around the edge of the site.

There are springs emerging from the Totternhoe Stone at the base of the Zig Zag Formation in the Nine Wells LNR. There are no other identified springs within the Scheme study area, the area is typical of a chalk catchment.

15.5.3 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[101] 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[102]. 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.

15.5.4 Public Water Supplies and Source Protection Zones

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

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. Strong controls on development in this area.
- SPZ2 – outer source protection zone indicating travel time of 400 days to 50 days to the point of abstraction. Controls on certain high pollution risk activities in this zone but otherwise standard best practice sufficient for normal development activities.

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

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

- SPZ3 – total catchment zone indicating the whole groundwater catchment likely to be supplying the abstraction. General best practice to manage pollution risks required, but no special controls generally needed.

There are three abstractions and associated SPZ1 within 400m of the route between Sawston and Babraham. There are other SPZ1 (abstractions) further south but these are hydraulically upgradient of the Scheme. The route crosses the SPZ2 and SPZ3 associated with the two public abstractions near Babraham and one abstraction in Sawston.

A map showing the Source Protection Zones is shown in Figure 15.1 below.

15.6 Potential Impacts

15.6.1 Construction

During construction there are not likely to be significant below ground works except in the vicinity of the main structural elements at the River Granta crossings. At the River Granta crossings it is likely foundations would be based in the underlying chalk formation.

For these structures some form of below ground piling for foundations may be required. Piling creates an opportunity for pollutants (mainly turbidity associated with piling and grout installed in the pilling) to move more rapidly to any groundwater encountered by the piling. However, with properly controlled piling operations the movement of turbid materials should be minimised so effects are limited and localised. With properly designed piles it would be feasible to prevent rapid pathways for contaminants at the surface to reach groundwater being created. Controls to achieve this would be set in the CoCP. As such the impact from piling operations is considered to be negligible and not likely to be significant.

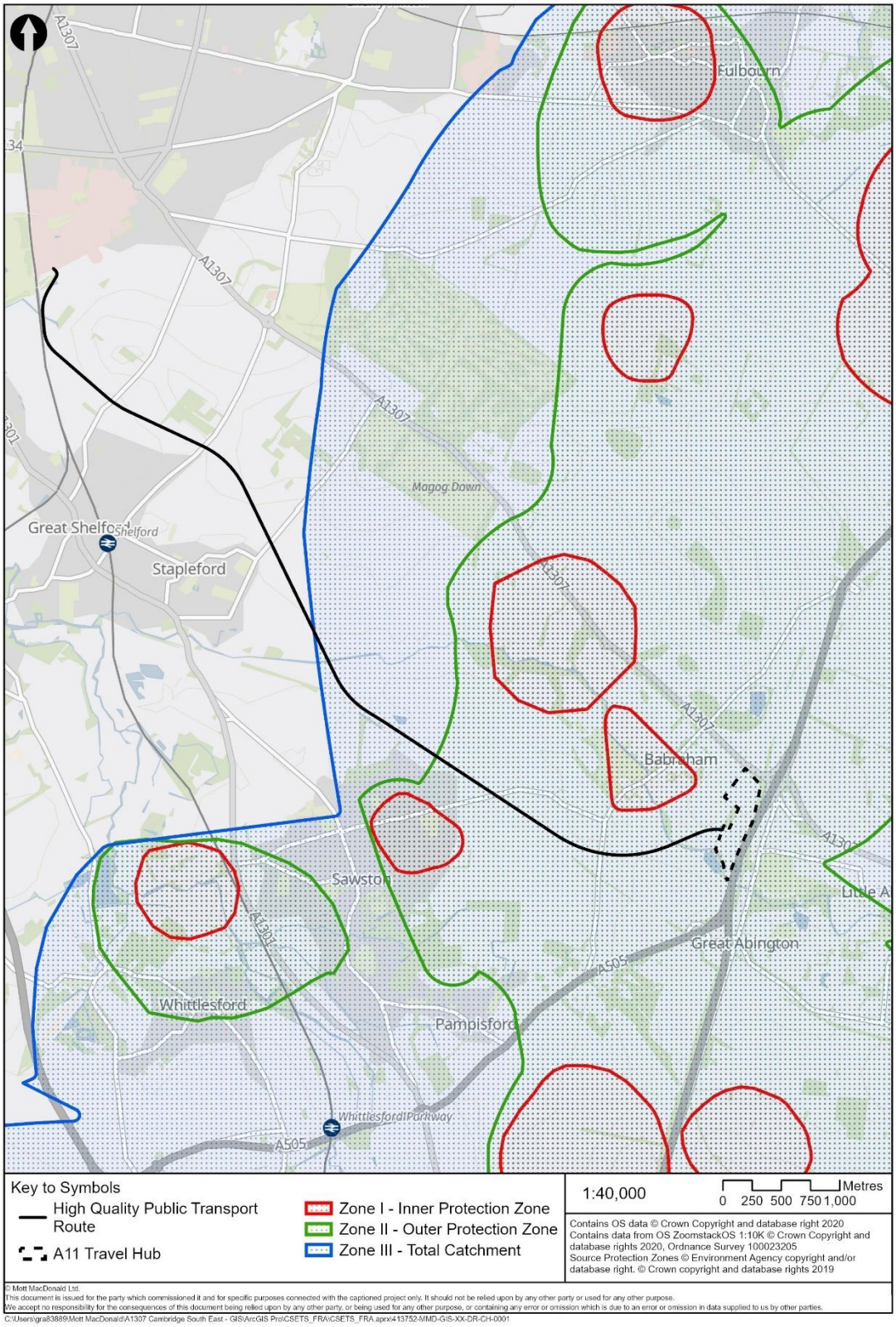
There will be construction of a drainage network which will include various drainage facilities including ponds or drains, which will either permit drainage to infiltrate to ground, or connect into existing surface water features.

Pollution of groundwater and surface water is possible from any construction site from:

- Leaks and spills of chemicals and other potentially polluting substances used or stored on the site (e.g. fuel, cement).
- Suspended materials from working areas running off in rainfall and causing high turbidity water to enter existing surface water features.

Adherence to standard pollution control measures that will be set out in the CEMP and CoCP will ensure risks to water resources from construction are controlled and limited. As there would be no direct discharge to surface water bodies from the site and there would be strict controls on substances that could impact groundwater on site it is concluded that any incidents on site would not be likely to result in significant effects on water resources from these sources of pollution.

Figure 15.1: Source Protection Zones in Study Area



Source: Mott MacDonald

15.6.2 Operation

The drainage strategy for this CSET Scheme is currently being developed taking into account the flood risks and the potential impacts of flooding from a variety of sources within the study area. The design and flood risk assessment will continue to be developed iteratively during the preparation of the ES. The ES will include the final drainage design in the form of a drainage strategy, this will be part of the Flood Risk Assessment reported in the ES.

The potential impacts from operations on the water environment will arise from:

- Contaminants arising from the CSET Scheme entering groundwater or surface water;
- Change in recharge to groundwater;
- Changes in flow of groundwater;
- Changes to flow of surface water (either increased or reduced);
- Changes to the geomorphology of surface water bodies; and
- Impacts on water dependant ecosystems.

These are considered briefly below.

15.6.2.1 Contaminants arising from the CSET Scheme entering groundwater or surface water

There are two means to assess the potential for contaminants from the CSET Scheme entering surface or groundwater. One is to follow the guidance published by Highways England[103] and the other is the CIRIA SuDS Manual[104] which includes a tool for carrying out an assessment of the potential for controlling runoff quality with a SuDS scheme.

DMRB Assessment

LA113 references the Highways England Excel tool that models impacts on water resources, this is the HEWRAT tool that enables an assessment of the risk to groundwater and assesses the potential quality of discharges into the surface water environment.

During operations the public transport vehicles using the CSET Scheme would be a relatively small number – generally around 250 to 300 a day. In order to maintain environmental standards vehicles would need to be well maintained. This number of vehicles (albeit they are all large vehicles) is not likely to generate sufficient contaminant load from any leakages of hydraulic and brake fluids and fuel, or particles from wear and tear of brakes and tyres to create a risk of contamination from road runoff to surface water and groundwater.

Using Highways England's HEWRAT tool to assess groundwater risk, assuming there is infiltration through swales and ditches to ground then the risk to groundwater is identified as Moderate assuming a reasonably shallow depth to groundwater. The tool assigns a Moderate value to scores between 150 and 250, which for CSET is likely to be below 200 (see the table below which scores 190 using reasonable assumptions for typical drainage arrangements to ground on the Scheme).

However, this is based on the lowest possible AADT (annual average daily traffic) value that the tool considers of "<50,000". The guidance manual for HEWRAT notes that the model is not likely to be reliable for AADT values much below 11,000 and is likely to be overly conservative.

[103] LA113 Rev 0. *Road Drainage and the water environment*, Highways England, August 2019. file:///C:/Users/mon11362/OneDrive%20-%20Mott%20MacDonald/_information/DMRB%20&%20Webtag%20&%20Highways%20Act/V11%20EIA%20Process/Section%203/LA%20113%20Road%20drainage%20and%20the%20water%20environment-web%202019.pdf

[104] CIRIA C753 The SuDS Manual. https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS

If AADT is much below 11,000 the assumption is that risks of pollution to surface water are low and could be managed by standard drainage design practice. As discussed, the number of vehicles using the route will be two orders of magnitudes lower than the AADT required to enable reliable use of the HEWRAT model.

Use of HEWRAT is not likely to benefit this Scheme as it would over-estimate the potential impacts, therefore the conclusion is that risks to groundwater should be very low.

It is therefore proposed that no further assessment of groundwater risk is required for the CSET Scheme.

Table 15.1: HEWRAT Groundwater Risk Assessment

Component Number		Weighting Factor	Property or Parameter	Risk Score	Component score	Weighted component score
1	SOURCE	10	Traffic flow	<=50,000 AADT	1	10
2		10	Rainfall depth (annual averages)	<=740 mm rainfall	1	10
3		10	Drainage area ratio	>50 to <150	2	20
4	PATHWAY	15	Infiltration method	"Continuous", shallow linear (e.g. unlined ditch, swale, grassed channel)	1	15
5		20	Unsaturated zone	Depth to water table <=5 m	3	60
6		20	Flow type (Incorporates flow type an effective grain size)	Mixed fracture and intergranular flow (e.g. consolidated deposits or unconsolidated deposits of medium – coarse sand)	2	40
7		5	Unsaturated Zone Clay Content	<=1% clay minerals	3	15
8		5	Organic Carbon	<=1% SOM	3	15
9		5	Unsaturated zone soil pH	pH >=8	1	5
				TOTAL SCORE		190
				RISK SCREENING LEVEL		Medium

Source: Mott MacDonald

SuDS Manual Assessment

The SuDS Manual[105] was used to carry out an assessment of the potential risks to water resources using the simple assessment tool that is part of the SuDS manual. The tool consider the risks associated with a proposed SuDS design and was used to assess the pollutant risks from the two main Scheme components as set out below.

- Segregated route for public transport vehicles: If the route is identified as a road (which is conservative as this category excludes low traffic roads which the route is more similar to) then the route would be identified as presenting a medium hazard from suspended solids, metals and hydrocarbons. The proposed drainage design elements (e.g. Vegetated swales, filter strips and filter drains) reduced the hazard risk to “acceptable” for hydrocarbons and metals and to just below acceptable for suspended solids. Where suspended solids could enter water courses then additional treatment in the form of stop traps would reduce the hazard risks to “acceptable”. The final drainage strategy will present more detailed information on the risks to water quality to confirm the hazards are not likely to have any impact on water resources from this low traffic route.
- Travel Hub: The land use type assigned to the assessment was a “Non-residential car parking with frequent change (e.g. hospitals, retail)” which presents a medium hazard from suspended solids, metals and hydrocarbons.[106] Assuming permeable paving under the car parking (as proposed for the Cambridge South West Travel Hub currently the subject of a planning application to CCC), swales and vegetated ditches and a detention pond and

[105] CIRIA, The SuDS Manual, CIRIA C753, 2015.

[106] The tool does not permit a well-used non-residential car park to be selected, but this is a category identified in the CIRIA SuDS Manual (Table 26.2) which allocates the same risk indices as the road category chosen in the simple assessment tool used for this assessment.

wetland/pond prior to discharge the hazard risks are reduced to acceptable levels. Even if the wetland/pond was not included the overall hazard risk is still acceptable.

It is therefore concluded that potential impacts on surface water from the CSET Scheme would not be significant and do not warrant inclusion in the EIA.

15.6.2.2 Change in recharge to groundwater

As described above the CSET Scheme is largely routed over high permeability formations. The area of the CSET Scheme is very small in comparison with the catchments of the formations crossed by the CSET Scheme. As there will be swales and other infiltration measures (e.g. filter drains) along the CSET Scheme some recharge will occur close to where it would have occurred. The overall effect of the CSET Scheme on groundwater recharge is therefore unlikely to be any significant reduction in recharge.

15.6.2.3 Changes in groundwater flow

Groundwater flow is affected if a scheme introduces structures that can block groundwater flow or can divert groundwater flow. The CSET Scheme is almost entirely constructed on existing ground level, and there are not likely to be any significant below ground structures that could interfere with groundwater flow.

15.6.2.4 Changes to flow in surface water

The CSET Scheme creates a significant increase in hard surface which will be drained by a positive drainage system. Opportunities for infiltration through the route drainage will be included in the design where possible but it is anticipated that the CSET Scheme's drainage system will discharge to the local surface water network.

However, without appropriate design the CSET Scheme has the potential to increase the rate of flow from the hard surfaced areas to the final point of discharge where these discharge to the River Granta, increasing flows in this river.

However, the design will have to meet the local lead flood authority (LLFA - CCC) requirements to ensure no increase in flood risk arises from the CSET Scheme – taking appropriate account of climate change increases. Discharges will be at rates agreed with the LLFA and are likely to be similar to existing green field runoff rates plus climate change allowance. It is therefore concluded that the potential for the CSET Scheme to increase flows in surface water is considered to be insignificant.

15.6.2.5 Changes to the geomorphology of surface water bodies

The CSET Scheme would cross the River Granta twice, but the design for each crossing would be of a single span structure that does not impact the river channel as the river is not particularly wide at the points of crossing.

Any drainage feature that discharges directly into a receiving water course will have to be designed to minimise scour and prevent changes to the geomorphology of the receiving river or stream.

It is therefore concluded that there is unlikely to be any significant impact on the geomorphology of any perennial streams or rivers in the area.

15.6.2.6 Water dependant ecosystems

Nine Wells LNR is reliant on the springs discharge from the chalk in the reserve. These springs are draining a large area of chalk to the south/south east of Nine Wells the CSET Scheme would not impact the flow to these springs.

The River Granta is a County Wildlife Reserve and as such is an important water dependant ecosystem. However, the Scheme design is unlikely to have any significant impact on the quality or quantity of the flow in the river.

15.6.2.7 Impact on Public Water Supplies

As the Scheme traverses the Source Protection Zones for several public water supplies around Babraham and Sawston the potential for impacts on these supplies has been assessed. The works proposed pose limited risk of any impact on groundwater quality as identified in the previous sections. Therefore, it is recommended that no additional assessment of the risk to groundwater quality is required in the EIA.

Similarly, the Scheme would have no impact on groundwater flow paths as it the design would not require significant below groundwater works. Therefore, there is no risk to groundwater flow supplying the public abstractions and the EIA will not address this issue.

15.7 Proposed Scope of Assessment

15.7.1 Scoped In

As the CSET Scheme will increase the area of hardstanding along the route and the route crosses the River Granta flood zone, a full flood risk assessment (Level 2 with Modelling) will be carried out to inform the drainage design of the CSET Scheme so that it meets the requirements of the local lead flood authority. This will be carried out as part of the EIA and included as an appendix to the ES.

The drainage strategy for the Scheme (with associated design layouts and calculations) will be included in the ES as an appendix. The drainage design and strategy will include a section that assesses potential pollution hazard risks to receiving surface waters.

The flood risk assessment will be informed by information provided by the Environment Agency on the flood modelling of the River Granta Catchment. This will cover not only the River Granta itself but also the surface water system around CBC. The flood risk assessment will also cover groundwater flooding risks and pluvial flood risk associated with the Scheme design.

In completing the Flood Risk Assessment following the following climate change factors will be included in the assessment.

River flow climate change allowances will be:

- +25% up to 2039
- +35% up to 2069
- +65% up to 2115

These figures are defined for the Anglian River Basin in Table 1 in https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Rainfall climate change allowances will be:

- +10% up to 2039

- +20% up to 2069
- +40% up to 2115

These are the upper end allowances set out in Anglian River Basin in Table 2 in https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

15.7.2 Scoped Out

As the potential impacts on groundwater and surface water from the CSET Scheme design are considered highly unlikely to be significant the EIA will not include a detailed evaluation of these impacts.

However, the CoCP and CEMP will include measures to be complied with that will control the impacts during construction on water resources. These documents will be included as part of the ES.

16 Major Accidents and Hazards

16.1 Introduction

The potential for any scheme to affect the environment by increasing the risk of major accidents occurring or being affected by a major accident is a requirement for EIA. The risk of major accidents is associated with the presence of hazards that create the opportunity for a major accident to occur. This chapter seeks to define what constitutes a major accident and sets out if this Scheme could create opportunity for a major accident to occur due to the CSET Scheme, or whether the CSET Scheme could be affected by a major accident, or a natural hazard (such as extreme weather events). General safety requirements of the Scheme will be assessed through an independent Road Safety Audit.

16.2 Legislation and Policy

16.2.1 National Legislation

The main legislation relating to major accidents are the COMAH (Control of Major Accidents and Hazard Regulations 2015). The operation of the CSET Scheme would not fall within the scope of the COMAH regulations, but the regulations do provide some guidance as to how a Major Accident is defined. From the HSE guidance on COMAH[107] a Major Accident is defined as follows:

"major accident" means an occurrence such as a major emission, fire, or explosion resulting from uncontrolled developments in the course of the operation of any establishment to which these Regulations apply, and leading to serious danger to human health or the environment (whether immediate or delayed) inside or outside the establishment, and involving one or more dangerous substances;

As can be seen in this context Major Accident refers to major incidents creating serious danger to human health of the environment involving dangerous substances. The regulations go on to stipulate the nature and volume of dangerous substances that could result in a major accident. It is highly unlikely that the operation of a public transport scheme of this nature would involve any substances in the volumes specified in the regulations, which is clear indication that this Scheme is highly unlikely to present any risk of a major accident of the kind which COMAH is intended to prevent occurring.

We have also considered the approach suggested in the IEMA article[108] to evaluate the exposure and vulnerability of CSET to each of the hazards on the list in the article and identify the potential major accidents or disasters associated with each, and assess the risk of likely significant environmental effects that would be caused

There is no other specific legislation on major accidents and hazards, although there is a range of pollution prevention legislation related to specific activities that are not relevant to the CSET Scheme (e.g. they cover the management of potentially polluting sites, waste management activities and oil storage).

[107] HSE, The Control of Major Accident Hazards Regulations 2015, Guidance on Regulations

[108] https://transform.iema.net/article/disasters-eia#:~:text=The%20EIA%20process%20should%20evaluate,effects%20that%20would%20be%20caused

16.2.1.1 National Planning Policy Framework 2019

The National Planning Policy Framework 2019 also makes no specific reference to major accidents in relation to transport infrastructure.

16.2.1.2 National Policy Statement (NPS) for National Networks

The NPS for National Networks 2014 sets out the road safety requirements of new highways developments. Such road safety requirements are not specifically aimed at major accidents as defined above, but the safer the new infrastructure the less risk a major accident could arise. So, although the CSET Scheme is not a new highways development, the NPS for National Networks does offer guidance on safety aspects that should be considered at the design stage. The following guidance is applicable to the CSET Scheme:

- The applicant should undertake an objective assessment of the impact of the proposed development on safety including the impact of any mitigation measures.
- They should also put in place arrangements for undertaking the road safety audit process, which will be undertaken before the scheme design is finalised for the TWAO application.
- Applicants should show that they have taken all steps that are reasonably required to:
  - Minimise the risk of death and injury arising from their development;
  - Contribute to an overall reduction in road casualties;
  - Contribute to an overall reduction in the number of unplanned incidents;
  - Contribute to improvements in road safety for walkers and cyclists.
- Applicant should also to demonstrate that:
  - They have considered the safety implications of their project from the outset; and
  - They are putting in place rigorous processes for monitoring and evaluating safety.

16.2.2 Local Plans and Policy

There are no specific local policy relating to major accidents and natural hazards in the SCDC Local Plan 2018 or the City Council Local Plan 2018.

16.3 Study Area

The study area considered is the route of the proposed Scheme and the surrounding environment, extending to 1km either side of the centre line of the route alignment and the boundary of the Travel Hub.

There are no industrial areas along the route that are likely to present a major hazard to the environment or human health. There are small commercial operations on the outskirts of Stapleford and Sawston.

CBC includes two large hospitals, Addenbrookes Hospital and the Royal Papworth Hospital as well as other company research and development centres.

All other activities along the route relate to agricultural activities, and there are numerous private residential properties along the route as well.

None of these present a major opportunity for major hazards to be present in the immediate vicinity of the Scheme.

Based on the Landmark Envirocheck report prepared for the Scheme, no COMAH sites or Planning Hazardous Substances Consents/Enforcements are recorded within 1000m from the route.

16.4 Assessment Methodology

16.4.1 Surveys

No specific surveys have been carried out in relation to major accidents and hazards.

16.4.2 Assessment Approach

The EIA Directive requires an assessment of 'the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters which are relevant to the project concerned'.

The scope of the assessment carried out for this scoping report covers:

- The vulnerability of the CSET Scheme to risks of major accidents and / or disasters.
- Any consequential changes in the predicted effects of the CSET Scheme on environmental factors.

The objective is to determine if there is a need to include Major Accidents and Hazards as a part of the EIA process. This has been done by examining the nature of the works and operational activities associated with the CSET Scheme and whether these present any increased hazards that could result in major accidents. In addition, the likelihood of an increased frequency of extreme weather events impacting on the CSET Scheme operation, thereby causing a major accident, has been taken into consideration.

The following definitions related to the assessment of major accidents and disasters (major events) have been identified, based on professional judgement:

- Major accident: An event or situation caused by humans that threatens immediate or delayed serious and far-reaching harm to human health, welfare and / or the environment. A major accident is interpreted to be one that would result in greater harm and damage than the level of accident one which would normally be anticipate in the environment that the CSET Scheme is located in.
- Natural disaster: A naturally occurring phenomenon such as an extreme weather event or ground-related hazard events with the potential to cause an event or situation that threatens immediate or delayed serious and far-reaching harm to human health, welfare and / or the environment.

16.5 Potential Impacts

16.5.1 Construction

The nature of construction for the CSET Scheme is of routine civil engineering works involving earthmoving and construction of road infrastructure as set out in Chapter 2.

Some hazardous substances will be used in the construction works (e.g. fuel, asphalt, cement and associated additives) but the storage and handling of these will be governed by standard health and safety procedures.

Whilst the materials are hazardous and present a potential hazard to the environment if released in an uncontrolled manner, it is considered unlikely the volume and nature of the materials would be sufficient to risk the occurrence of a major accident as defined above.

During construction the most likely natural hazard of concern would be extreme rainfall causing flooding. Excessive heat or wind may cause some local damage but it is not likely that any effects would be exacerbated through interaction with the construction of the CSET Scheme.

In the circumstances of extreme rainfall the erosion of topsoil and other materials could cause environmental harm if it was released into, say, the local water courses. During such an event it is likely that the runoff from land would include significant suspended sediment from surrounding land as well.

The Applicant would ensure that a robust CoCP and CEMP was in place during construction that would ensure all earthworks included means to control runoff to minimise risks arising from natural events. Therefore, the risk would be reduced to not significantly worse than would occur in such an extreme event naturally.

16.5.2 Operation

During operation there would be no activities on the CSET Scheme that would be likely to cause a major accident as defined above.

Extreme weather events could arise which may result in hazardous conditions along the route. In the worst case the route could be closed and vehicles stopped from using the CSET Scheme. The most likely kind of extreme natural event that could cause this type of disruption is considered to be a storm with high wind or very high rainfall or other form of precipitation.

Extremely hot weather may affect the road surface itself and could affect the comfort and health of users of the CSET Scheme, but this is not an effect considered to be a significant impact from the CSET Scheme itself.

Extreme wind could result in trees being blown over which may block the route but the damage or harm would be very localised.

Extreme rainfall will cause flooding which could be worsened by the CSET Scheme increasing runoff from hard surfacing. The drainage design would be completed to ensure flood risk from extreme rainfall (including climate change allowances – see Section 15.7.1 was acceptable to the local lead flood authority (CCC).

It is therefore concluded that even if a natural event occurred which might compromise the operations it is unlikely to result in a major accident or to harm to the natural environment from the CSET Scheme itself.

The ES will consider the longer term effects of climate change on the future environment, and the in-combination impacts of the CSET Scheme and climate change. This will be carried out in the individual technical topics as appropriate.

16.6 Proposed Scope of Assessment

On the basis of this scoping assessment it is concluded that as no likely significant effects have been identified in respect of Major Accidents and Hazards, it is proposed to scope this topic out of assessment in the ES.

17 Traffic and Transport

17.1 Introduction

This chapter of the Scoping Report presents the methodology and scope for assessing the impacts and associated effect of the construction and operational phases of proposed CSET Scheme. It provides a summary of transport legislation and policy that is relevant to the CSET Scheme and the wider study area for the purposes of the ES. It details the proposed methodology for assessing the transport impacts initially through a Transport Assessment and identifies those impacts which can be scoped out of the EIA.

17.2 Legislation and Policy

The methodology and significance criteria to be used in the ES will be based upon the following guidance and best practice in accordance with industry standards, with particular reference to:

- Guideline for the Environmental Assessment of Road Traffic 1993 – Institute of Environmental Assessment (IEA);
- LA 104 'Environmental assessment and monitoring' of the of the "Design Manual for Roads and Bridges" (DMRB) "Sustainability & Environment Appraisal" 2020; and,
- LA 112 'Population and human health' of the of the "Design Manual for Roads and Bridges" (DMRB) "Sustainability & Environment Appraisal" 2020;
- National Policy Statement (NPS) for National Networks 2014

The ES will also consider the following planning policy guidance documents in accordance with national and regional transport policies:

- National Planning Policy Framework 2019
- National Planning Practice Guidance 2014; and
- National Policy Statement (NPS) for National Networks 2014
- Cambridgeshire County Council Transport Assessment Guidance 2019.

The Traffic and Transport ES chapter will set out the existing and future baseline conditions based on the local transport network associated with the Scheme. It will then provide an overview of the proposed Travel Hub and public transport route and how these, together with local committed developments and growth in the corridor, are expected to impact on the surrounding highway network, compared to the 'without' CSET Scheme future baseline. This assessment will be drawn from the Transport Assessment which will be submitted as part of the application documents.

A TA Scoping Note will be submitted to CCC and Highways England to inform the scope of the TA and the associated methodology through pre-application discussions.

The scope of the TA will, subject to confirming the scope as noted previously, likely include the following:

- Baseline transport data will be reviewed including transport provision in the study area across all modes and consideration of committed development and transport infrastructure improvements;
- 5-year accident data to be reviewed for the study area identifying any accident patterns on the network in the (to be agreed) study area;

- Identify the trip generation and distribution for trips to and from the proposed Travel Hub and any associated with the proposed public transport route and active travel infrastructure through both a first principles approach, and demand-led, through Cambridge Sub Regional Model (CSRM) model runs and other mechanisms to be agreed with the relevant authorities which will inform the proposed local VISSIM model inputs and traffic flows;
- Identify the impact of the public transport route, including passenger demand and effects on the highway network due to matters such as mode-switching, through CSRM runs and other mechanisms to be agreed with CCC and Highways England.
- Details of the new access points onto the highway network to serve the proposed Travel Hub site, and the proposed junctions to accommodate the proposed public transport route to cross or interact with the existing highway network; and
- Identification of the impact of the CSET Scheme on the local and strategic highway network in terms of capacity and highway safety, and identification of potential mitigation measures as appropriate.

The ES will consider the outcomes of the Transport Assessment utilising the methodology set out below.

17.3 Study Area

The study area will be determined in accordance with the Institute of Environmental Management & Assessment (IEMA) document “Guidelines for the Environmental Assessment of Road Traffic (Guidance Note 1)” (GEART). The GEART document recommends the following rules-of-thumb should be applied to determine the scale and extent of the assessment:

- Rule 1: include highways links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%)
- Rule 2: include any other sensitive areas where traffic flows have increased by 10% or more.

The 30% threshold provides a level for development flows to be assessed against to establish whether additional assessment is needed to establish the significance of the impact. Development flows above the 30% level do not automatically indicate the impacts as significant, therefore professional judgement will also be applied.

Traffic flow changes that are less than 10% are generally accepted as being similar in magnitude to daily variation in traffic flows and therefore are considered to have no discernible environmental impact.

Once the traffic flow changes and Travel Hub demand are known have been identified through the TA process the study area for the purpose of the ES will be appropriately defined. If the changes in flow resulting from the proposals do not meet the thresholds detailed above during construction or operation, the study area for the impacts related to traffic and transport will be defined based on professional judgement and through discussion and agreement with the relevant local highway authorities.

17.4 Assessment Methodology

17.4.1 Growth Scenarios

Traffic modelling is required to produce the changes in the key highway traffic volumes between the “with” and “without” scheme scenarios, which forms the basis of the Air Quality, Noise and Greenhouse Gas assessments.

The statistics required from the transport modelling include:

8. Average Annual Daily Traffic (AADT)
9. Average Annual Weekday Traffic (AAWT)
10. %HGV
11. Peak Hour Traffic - AM (08:00-09:00), PM (17:00-18:00) & Average Inter-peak (IP) hour (10:00-16:00)
12. Peak Hour Average Speeds (kph) (as above).

The source for the traffic data will be the Cambridge Sub Regional Model (CSRM) demand model with a supporting SATURN highway assignment model. The traffic data for the environmental assessments will be extracted from an updated SATURN highway model.

The following scenarios will be included in this assessment:

- Base Year (2015)
- Do-Minimum (DM) “without” (Core Minus) (2026 & 2036)
- Do-Something (DS) “with” (Core Minus) (2026 & 2036)

The underlying assumptions regarding the sources of traffic demand growth, such as future developments (residential and employment) have been specified by CCC and summarised within the development Uncertainty Log, which will be referenced within this assessment.

The reference to Core Minus is associated with the exclusion of developments which are classified as “scheme dependent” and are therefore only included in scenarios with that scheme.

In addition to the demand, the CSRM model includes a consideration of improvement to the transport system supply through committed multi-modal transport interventions. These schemes have been added to the Base Year network to generate a representative future year transport network from which the impact of the proposed Scheme can be assessed in the Do-Something (DS).

In addition to the individual Scheme assessments as previously outlined, the environmental assessment will consider the impact of the cumulative impact of the proposed GCP transport strategy, which is referred to as a “Do-All”.

Traffic related assessments and cumulative assessment are discussed in Section 4.6.2.

17.4.2 Surveys

A review has been undertaken of the traffic survey data available for the purposes of the Transport Assessment, which is considered to be suitable to inform the base year demand at each junction for VISSIM and other (if required) model inputs. The surveys that will be used for the assessment will be documented in the TA.

Additionally, pedestrian and cycle movements will be observed during future site visits, through cycle movements as part of traffic surveys, and historic data from other data sources, including CCC data if available. It is not proposed to carry out any specific NMU surveys. Any comments on pedestrian and cycle usage will be extracted and used to present NMU flows.

It is anticipated that no further surveys will be required for the purposes of Traffic and Transport chapter of the ES.

17.4.3 Significance Criteria

IEMA guidance lists the following environmental impacts relevant to transportation that should be considered as part of an assessment, and therefore the following will be considered as potential impacts in both the construction and operational phases of the proposed development:

- Driver severance;
- Driver delay;
- Pedestrian severance;
- Pedestrian delay;
- Pedestrian amenity;
- Fear and intimidation;
- Accidents and safety; and
- Hazardous loads.

The traffic and transport assessment will consider the impact of the proposed Scheme on highway users in terms of changes in traffic levels and their associated effects on driver severance and driver delay. This assessment will also consider pedestrian amenity. Pedestrian severance and pedestrian 'increase or decrease in journey length' (including walking, cycling and horse riding described above as 'delay') will be considered in the Community and Health Chapter.

The significance level attributed to each effect will be assessed based on the magnitude of change due the proposed site and the sensitivity of the affected receptor/ receiving environmental to change. For walkers, cyclists and horse riders, as detailed in Chapter 3 of LA104 in the DMRB[109] guidelines.

Magnitude of Change and the sensitivity of the affected receptor/ receiving environment are both assessed on a scale of high, medium, low and negligible (as detailed in DMRB guidelines).

In each case, the receptor is identified as highway users (i.e. pedestrians, cyclists, motorists etc.). On this basis, and given that the receptor is people, it is considered that the receptor will be sensitive to changes in traffic flow as a result of the CSET Scheme. The receptor is therefore deemed to be of high sensitivity for the purposes of this assessment.

The significance of changes in traffic flow volume on receptors for each of the environmental effects listed previously has been considered in relation to the significance matrix summarized in Table 17.1 below.

Table 17.1: Environmental Value

		Sensitivity of Receptor/ Receiving Environment to change/ effect			
Magnitude of change	High	Medium	Low	Negligible	
	High	Major	Moderate to major	Minor to moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Low	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Source: DMRB LA104, table 3.8.1

The IEMA guidance details potential receptors that are expected to be sensitive to changes in traffic conditions. As identified above the receptor is identified as highways users (i.e. pedestrians, cyclists, motorists). This receptor is considered as highly sensitive and will be classed as such through the assessment.

[109] DMRB Volume LA 112 Section 3, Table 3.11 and 3.12

The significance of changes in traffic flow volume on receptors for each of the environmental effects will be considered in relation to the significance matrix from DMRB LA 104, Section 3, Table 3.8.1. The effect of the proposed development on the sensitive receptors will be evaluated by combining the assessment of impact magnitude and receptor sensitivity. The effects will be classified as beneficial or adverse and temporary or permanent. Mitigation measures will additionally be proposed accordingly.

17.4.4 Design and Mitigation

The traffic and transport assessment and CSET Scheme will, where appropriate, be designed so as to minimise the need for further mitigation measures. This assessment will follow the mitigation hierarchy outlined in the DMRB guidance LA 112, Section 3, paragraph 3.33 and DMRB LA 104 Section 3 paragraph 3.23, and shall be implemented during design and assessment:

- avoidance and prevention: design and mitigation measures to prevent the effect
  - identify alternative design/route options that avoid introducing or worsening severance and avoid reducing walking, cycling and horse riding provision/increasing journey times.
- reduction: where avoidance is not possible, then mitigation is used to lessen the magnitude or significance of effects
  - by altering alignment to minimise severance to communities and disruption to pedestrian, cyclist, and horse rider provision.
- remediation: where it is not possible to avoid or reduce a significant adverse effect, there are measures to offset the effect.

These principles are also broadly in line with paragraph 5.6 of chapter 5 of the Guidelines for the Environmental Assessment of Road Traffic.

In line with DMRB LA104 Chapter 3 paragraph 3.24, the ES shall report on the following categories of mitigation:

13. embedded mitigation: project design principles adopted to avoid or prevent adverse environmental effects; and
14. essential mitigation: measures required to reduce and if possible offset likely significant adverse environmental effects, in support of the reported significance of effects in the environmental assessment.

Additional detail on mitigation is set out in Section 4.2 of this Scoping Report.

17.5 Baseline

The A1307 is a secondary class A road between the A14 at Junction 31 in Cambridge and Haverhill, Suffolk. The corridor is a key radial route to the centre of Cambridge and serves several rural villages. Outside of the centre of Cambridge, the route is predominately rural and consists of a mixture of single lane and dual lane carriageways with varying speed limits throughout. The extent of the CSET Scheme stretches from the A11/A1307/A505 junction, north west to the CBC at Francis Crick Avenue.

The CSET Scheme will provide long term sustainable transport improvements within the wider A1307 corridor.

The corridor already experiences high levels of demand and is prone to delays and congestion at peak times. The proposal may attract some additional traffic to the area which has the potential to impact on the local highway network during both pre and post construction phases.

However, there will likely be traffic reductions on other parts of the network due to car trips being intercepted and mode-switching. The local highway network is known to already experience congestion and delay during peak periods, and therefore assessment of the associated traffic impacts of the development will be an important consideration in the Environment Statement. However, it should be noted that one of the aims of providing the Travel Hub Site and new dedicated public transport route and active travel infrastructure will be to encourage a transfer of trips to sustainable modes from A11/A1307/A505 junction and the CBC which is expected to have a positive impact on traffic levels overall as a result.

17.6 Potential Impacts

This section sets out the potential transport and traffic impacts as a result of the proposed CSET Scheme in its construction phase and operational phase.

17.6.1 Construction

- Temporary increase in traffic flows associated with the construction works – this is likely to include an increase in HGV movements, which are likely to access the Travel Hub site from the A11/A1307/A505 junction and are likely to increase during the construction of the public transport route and active travel infrastructure. Given the existing capacity issues on the surrounding road network, it is considered that this has the potential to impact on driver delay and accident rates. These are expected to be moderate to major, but this will need to be reviewed during the assessment process.
- There will also be construction vehicle movements associated with the Public Transport Route. As with the hub and given the existing capacity issues on the surrounding road network, it is considered that this would also have the potential to impact on driver delay and accident rates. These are expected to be moderate to major, but this will also need to be reviewed during the assessment process
- Temporary disruption to pedestrians, cyclists and road vehicle users arising from the construction works for the temporary Travel Hub site access, on site works which are likely to impact on amenity and journey times and construction of the public transport route and active travel infrastructure. These disruptions could be a low effect, but this will need to be reviewed during the assessment process.

17.6.2 Operation

- Effects of completed and operational development traffic increase upon the local road network and associated effects on driver journey times through key junctions, which has the potential to impact on driver delay and accident rates. These could be moderate to major in some locations with positive impacts due to traffic being intercepted in other locations.
- Effects of operational traffic on the local road infrastructure – the proposed Travel Hub will provide a new junction on to the A1307. The proposed public transport route and active travel infrastructure will intersect a number of local access roads, this has the potential to impact on driver delay. These effects are expected to be moderate to major.
- Effects of the completed and operational works on public transport including rerouting and introduction of additional services. These are expected to be low to moderate, with potentially positive benefits to some services
- Effects of the completed and operational development upon pedestrians and cycle facilities through creation of a new active travel infrastructure along the length of the route. The Travel Hub has the potential to provide new pedestrian and cycle links through the site and onward journeys, potentially reducing fear and intimidation, as well as improving amenity and delay.

Similarly, the public transport route will also be accompanied by facilities for Non-Motorised Users in the form of active travel infrastructure. These effects are expected to be low to moderate, and positive due to the new proposed provision.

17.7 Proposed Scope of Assessment

17.7.1 Scoped In

Assessment of the traffic level increases during the construction and operational period will be considered based on highway users (including pedestrians, cyclists, motorists, public transport users, and equestrians) being the affected receptor.

17.7.2 Scoped Out

The proposed development would not result in the need for any hazardous loads to be transported and so this will be scoped out of the Traffic and Transport ES chapter.

Ecological effects should also be scoped out of the Traffic and Transport chapter as IEMA sets out this would only be likely to have a significant impact due to chemical spillage (not applicable for this site) and loss of habitat or hedgerow, which will be assessed in the Biodiversity section of the EIA.

18 Material Resources and Waste

18.1 Introduction

This chapter considers the potential impacts of the proposed CSET Scheme on material resources (or material assets) and the generation and management of waste. It provides a high level assessment of the potential impact of the CSET Scheme to determine the scope of the EIA on this topic.

The ES process provides an opportunity to assess and manage the effects associated with the use of resources and disposal / recovery of waste of any scheme. The management of impacts is largely achieved by encouraging sustainable design to:

- Reduce overall material use;
- Prevent and / or reduce the generation of waste; and
- Identify appropriate management measures to control waste.

For the purposes of this report resources / material assets are defined as comprising the provision and use of material resources, including primary, secondary, recycled and manufactured materials.

18.2 Legislation and Policy

The principal legislative and planning context for the assessment of the environmental effects of the CSET Scheme on material assets is presented below. Whilst this Scoping Report acknowledges relevant European Union legislation, the ES will present the legislation and standards that apply at the time of submission of the TWAO application, which will no longer include legislation of the European Union.

18.2.1 European Legislation

18.2.1.1 The Waste Framework Directive 2008

The revised Waste Framework Directive[110] sets out a 5-step waste hierarchy for waste management as an important requirement which applies to anyone who produces or manages waste. The waste hierarchy ensures that waste is dealt with in the following order or priority:

1. Prevention
2. Preparing for re-use
3. Recycling
4. Other recovery (for example energy recovery)
5. Disposal as a last resort

The following considerations must be taken into account:

- The general environmental protection principles of precaution and sustainability;
- Technical feasibility and economic viability;
- Protection of resources; and

[110] European Union (2008) Waste Framework Directive 2008/98/EC

- The overall environmental, human health, economic and social impacts.

18.2.1.2 Landfill Directive (1999/31/EC)

The Landfill Directive aims to prevent, or reduce as far as possible, negative effects on the environment from the landfilling of waste and was implemented by Member States in 2001.

18.2.1.3 Hazardous Waste Directive (91/689/EEC)

The Hazardous Waste Directive (lays down strict controls and requirements for controlling hazardous wastes. Hazardous waste is any waste with hazardous properties that may make it harmful to human health and the environment and is defined by the European Waste Catalogue.

18.2.2 National Legislation

18.2.2.1 Environmental Protection Act 1990

The Environmental Protection Act[111] defines the fundamental structure and authority for waste management and control of emissions into the environment. It outlines:

- the definition of controlled waste
- the requirements of the duty of care in respect of waste and transferral of waste
- the requirements for permits and authorisations
- waste collection and waste disposal authorities and their roles

18.2.2.2 The Waste (England and Wales) Regulations 2011, as amended

The Waste (England and Wales) Regulations 2011[112], implement parts of the revised Waste Framework Directive 2008, particularly the principles of Waste Hierarchy.

Site Waste Management Plans (SWMPs)[113] are no longer mandatory for projects commencing after 1 December 2013. They are, however, recommended, and the principles behind the Regulations remain best practice.

18.2.2.3 Hazardous Waste (England and Wales) Regulations 2005 as amended[114]

The Hazardous Waste (England and Wales) Regulations 2005 as amended aim to track and control hazardous waste movements. A consignment note is required prior to the removal of any hazardous waste. Hazardous wastes are wastes that exhibit certain properties (for example, they are potentially flammable, toxic or carcinogenic) such that they are or may (at or above certain concentrations) be detrimental to human health or the environment. Strict regulatory controls have been placed over the handling, storage, transportation, and disposal of hazardous wastes on account of the considerable risks they pose to human health and the environment.

18.2.2.4 Environmental Permitting (England and Wales) Regulations 2016[115]

The Environmental Permitting (England and Wales) Regulations 2016 replace the Environmental Permitting (England and Wales) Regulations 2010. These regulations introduce

[111] The Environment Protection Act 1990 http://www.legislation.gov.uk/ukpga/1990/43/contents

[112] Statutory Instrument (2011) The Waste (England and Wales) Regulations. No.988 http://www.legislation.gov.uk/uksi/2011/988/contents

[113] Department for Transport (2004) Guidance for Construction Contractors and Climate Voluntary Code of Practice 6 Chapter 43 - http://www.legislation.gov.uk/ukpga/1990/43/introduction accessed 08/09/2016

[114] The Hazardous Waste (England and Wales) Regulations 2005 No. 894 http://www.legislation.gov.uk/uksi/2005/894/contents/made

[115] The Environmental Permitting (England and Wales) Regulations 2016 No. 1154 http://www.legislation.gov.uk/uksi/2016/1154/contents

a streamlined system of environmental permitting in England and Wales for certain installations, waste operations and mobile plants. They transpose provisions of fifteen EU Directives which impose obligations requiring delivery through permits or which are capable of being delivered through permits.

18.2.3 National Policy

18.2.3.1 National Planning Policy Framework 2019

The NPPF sets out policies for development and how these should be implemented but makes specific reference to the Government's policy for waste which should be read in conjunction with the NPPF.

18.2.3.2 National Policy Statement (NPS) for National Networks 2014

The NPS for National Networks[116] sets out policies for how waste should be managed on large infrastructure schemes and Nationally Significant Infrastructure Project (NSIPS) on the national road and rail networks. It outlines the decision-making criteria for approval of an application by the Secretary of State. The NPS for National Networks makes direct reference to the requirements of the Environment Agency's environmental permitting regime which should be adhered to if the Scheme requires certain environmental permits.

The NPS for National Networks states that the arrangements that are proposed for managing any waste produced should be set out clearly in the application and should include any information on the proposed waste recovery and disposal system for all waste generated by the development. The policy has a clear focus on seeking to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome.

18.2.3.3 National Planning Policy for Waste 2014

The National Planning Policy for Waste[117] replaces Planning Policy Statement 10: Planning for Sustainable Waste Management (PPS 10) and sets out detailed waste planning policies.

The updated policy maintains the core principles of the 'plan led' approach with a continued focus of moving waste up the waste hierarchy.

The document sets out detailed waste planning policies to facilitate a more sustainable and efficient approach to resource use and management. When determining planning applications for non-waste development, the policy requires that local planning authorities should, to the extent appropriate to their responsibilities, ensure that:

- The likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities.
- New, non-waste development makes sufficient provision for waste management and promotes good design to secure the integration of waste management facilities with the rest of the development and, in less developed areas, with the local landscape.

[116] Department for Transport (2014). National Policy Statement for National Networks. Available online at:

[117] Department for Communities and Local Government (2014) National Planning Policy for Waste. Available at: https://www.gov.uk/government/publications/national-planning-policy-for-waste

- The handling of waste arising from the operation of developments maximises re-use/recovery opportunities and minimises off-site disposal.

18.2.3.4 Government's 25 Year Environment Plan

The Government's 25 Year Environment Plan sets out government action to help the natural world regain and retain good health. The proposals aim to tackle a number of growing problems including waste. It will champion sustainable development, lead in environmental science, innovate to achieve clean growth and increase resource efficiency to provide benefits to both our environment and economy. In doing so, the Government's 25 Year Environment Plan has identified six key areas to focus action on. The policy area relevant to the assessment of waste and material resource is set out in Chapter 4 on increasing resource efficiency and reducing pollution and waste.

A number of goals and targets are set out in the strategy, of relevance are those on minimising waste. These include the aim to minimise waste, reuse materials as much as possible and manage materials at the end of their life to minimise the impact on the environment.

This is intended to be done by:

- Working towards the ambition of zero avoidable waste by 2050.
- Working to a target of eliminating avoidable plastic waste by end of 2042.
- Meeting all existing waste targets – including those on landfill, reuse and recycling – and developing ambitious new future targets and milestones.
- Seeking to eliminate waste crime and illegal waste sites over the lifetime of the plan, prioritising those of highest risk. Delivering a substantial reduction in litter and littering behaviour.
- Substantially reducing and where possible preventing all kinds of marine plastic pollution – in particular material that came originally from land.

18.2.3.5 Our Waste, Our Resources: A Strategy for England

The Strategy complements and helps deliver the 25 Year Plan, the Clean Growth Strategy, the Industrial Strategy, and the Litter Strategy. It is guided by two overarching objectives:

15. To maximise the value of resource use, and;
16. To minimise waste and its impact on the environment.

The Strategy features the government's approach to sustainable production, consumer participation, recovering resources and managing waste, waste crime, food waste, international leadership, research and innovation, and monitoring and evaluation of the Strategy.

The Strategy will be delivered through policies, actions and commitments, and it will contribute to the delivery of the following strategic ambitions:

17. Work towards all plastic packaging placed on the market being recyclable, reusable or compostable by 2025;
18. To work towards eliminating food waste to landfill by 2030;
19. Zero avoidable plastic waste by 2042;
20. Doubling of resource productivity by 2050; and
21. Zero avoidable waste by 2050.

18.2.3.6 The Waste Management Plan for England, 2013

DEFRA published the National Waste Management Plan for England in July 2013[118]. The plan outlines the waste hierarchy as a guide to sustainable waste management and sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management. Positive planning plays a pivotal role in delivering England's waste ambitions through ensuring the re-use, recovery or disposal of waste is undertaken without endangering human health or harming the environment and delivering sustainable development and resource efficiency through all schemes.

18.2.4 Local Policy

18.2.4.1 The Cambridgeshire and Peterborough Minerals and Waste Plan[119]

The Cambridgeshire and Peterborough Minerals and Waste Core Strategy and Proposals Map C: Mineral Safeguarding Areas were adopted by Cambridgeshire County Council and Peterborough City Council on 19 July 2011.

The Minerals and Waste Core Strategy sets the framework for all minerals and waste developments until 2026. It sets out policies to guide mineral and waste management development and will:

- ensure a steady supply of minerals (construction materials e.g. sand and gravel)
- ensure sufficient new, modern waste management facilities are provided for, and
- ensure the management of waste is carried out in a much better way than landfill

The Core Strategy makes strategic allocations for long-term mineral and waste management development, none of which are in the area of the CSET Scheme.

Mineral Safeguarding Areas are designated through Proposal Map C, again the designated areas are not within the areas affected by the CSET Scheme.

The Site-Specific Proposals Plan set out the council's allocations for site specific proposals for future development and management of minerals and waste within Cambridgeshire and Peterborough. It also includes supporting site-specific policies.

The Proposals Maps for Minerals and Transport Zones and Waste Management set out the location of Mineral and Waste Management Allocations, Mineral and Waste Consultation Areas Transport Zones and Transport Safeguarding Areas and Waste Water Treatment Works and their Safeguarding Areas. These maps identify the boundary and number of Inset Maps which can be found in the Site-Specific Proposals Plan.

18.2.4.2 South Cambridgeshire Local Plan, 2018

The plan references the Cambridgeshire and Peterborough Minerals and Waste Local Development Framework – Core Strategy and Proposals Map C 2011, Site Specific Proposals Plan and Proposals Map A and B 2012 as forming an integral part of the South Cambridgeshire development plan.

[118] Department for Food and Rural Affairs (2013) National Waste Management Plan for England (2013) available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265810/pb14100-waste-management-plan-20131213.pdf

[119] The Cambridgeshire and Peterborough Minerals and Waste Core Strategy available at : https://www.cambridgeshire.gov.uk/business/planning-and-development/planning-policy/adopted-minerals-and-waste-plan

The policy on mitigating climate change (CC/1) references the need for development proposals to demonstrate waste reduction during construction and operation which is specifically set out in Policy CC/6 which covers construction methods.

Policy CC/7 requires proposals to demonstrate adequate wastewater collection, management and treatment systems are included in the proposal designs.

Policy HQ/1 sets out Design Principles including the need to include provision for facilities for waste management, recycling and collection in a manner that is appropriately integrated within the overall development.

18.2.4.3 Cambridge City Local Plan, 2018

The plan references the Cambridgeshire and Peterborough Minerals and Waste Local Development Framework – Core Strategy (July 2011); and Site-Specific Proposals Plan (February 2012) as forming an integral part of the South Cambridgeshire development plan.

Any development proposals will need to be assessed against the above minerals and waste policies and will need to prove they are compatible to ensure the existing safeguarded aggregates railhead and waste operations can continue without conflict. The CSET Scheme is not located in any safeguarded areas so will not impact on these or waste sites listed in the Waste Local Development Framework.

Policy 28 requires developers to demonstrate within a Sustainability Appraisal how site waste management and materials use will be carried out.

18.3 Study Area

The DMRB provides definitions for two geographically different study areas to examine and assess the use of material assets (and resource use) and waste generation.

The first study area is the area within the construction footprint (or boundary), as this constitutes the area within which construction materials would be consumed (used, reused and recycled) and within which waste would be generated.

The second study area needs to be sufficient to identify the suitable waste management infrastructure likely to accept the waste volumes and types generated by the proposed Scheme, and their location and capacity to accept waste (considering the proximity principle). It also takes into consideration the feasible sources and availability of construction materials required for the proposed development. The second study area for the receiving waste management facilities has been selected based on the waste management capacity of facilities in Cambridge for inert, hazardous and non-hazardous waste. Therefore, for the purposes of the waste assessment, this second study area is the county of Cambridge.

18.4 Assessment Methodology

18.4.1 Surveys

No surveys were carried out for scoping and no surveys are planned.

18.4.2 Assessment Approach

The assessment will follow the approach set out in DMRB LA110, August 2019. This guidance identifies that the construction and maintenance of motorway and trunk roads can have environmental effects associated with the consumption and use of material assets, and the

disposal / recovery of waste. For the purposes of CSET Scheme it is assumed that the scheme will result in the construction and operation of infrastructure of a similar nature and scale as a trunk road scheme in terms of the resources and waste it could require/generate.

Where the need for further assessment has been established, the assessment will describe the current and likely future requirements including information on availability, types and quantities of key construction materials. For the assessment of material resource use, an assessment against the UK national demand will also be undertaken. The assessment for waste will be based on the availability of suitable waste management infrastructure and capacity in Cambridge.

Scheme specific information for the ES will be obtained from the design team to identify the nature of the materials and quantities required for construction of the CSET Scheme.

18.4.3 Significance Criteria

The DMRB LA110 document provides an approach to determining the significance of the potential effects that may arise from the use of material resources and the generation of waste.

Materials required for the construction of the CSET Scheme are likely to be procured from a range of different sources (which are not likely to be known during the EIA process), all of which will have their own specific environmental effects, which may or may not have been subject to an environmental assessment. Therefore, there are no obvious environmental receptors or resources for materials in the way that there are for other topic areas. Consequently, this precludes the application of a methodology to derive a measure of significance of the use and consumption of materials based on the value or sensitivity of a resource or receptor and the magnitude of an identified effect.

Therefore, the significance of effect will be assigned in accordance with the criteria outlined below.

Table 18.1: Effect Categories and Typical Descriptors

Effect Category	Description
Neutral	**Material assets** project achieves >99% overall material recovery / recycling (by weight) of non-hazardous Construction Demolition Waste (CDW) to substitute use of primary materials; and aggregates required to be imported to site comprise >99% re-used / recycled content **Waste** no reduction or alteration in the capacity of waste infrastructure within the region.
Slight	**Material assets** project achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional percentage target. **Waste** <1% reduction or alteration in the regional capacity of landfill. and. Waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region
Moderate	**Material assets**

Effect Category	Description
	project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target. **Waste** >1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; and 1-50% of project waste requires disposal outside of the region
Large	**Material assets** project achieves <70% overall material recovery / recycling (by weight) of non-hazardous Construction and Demolition Waste (CDW) to substitute use of primary materials; and aggregates required to be imported to site comprise <1% re-used / recycled content; and project sterilises >1 mineral safeguarding site and/or peat resource. **Waste** >1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; and >50% of project waste requires disposal outside of the region
Very Large	**Material assets** No criteria: as criteria for Large category above. **Waste** >1% reduction or alteration in national capacity of waste infrastructure as a result of accommodating waste from a project. The project would require new (permanent) waste infrastructure to be constructed to accommodate waste
Notes:	'Region' means Cambridgeshire and Peterborough. 'Primary materials' describes materials that are from a non-renewable source.

Source: Design Manual for Roads and Bridges LA110
https://standardsforhighways.co.uk/dmrb/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT

Table 18.2: Significant Criteria for Material Assets and Waste Generation

Significance	Description
Not significant	Material assets: Category description met for Neutral or Slight effect Waste generation: Category met for Neutral or Slight effect
Significant	Material assets: Category description met for Moderate or Large effect Waste generation: Category met for Moderate, Large or Very Large effect
Notes	See Table 18.1 for definitions of scale of effect.

Source: Design Manual for Roads and Bridges LA110
https://standardsforhighways.co.uk/dmrb/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT

18.5 Baseline

The baseline conditions will be centred on the demand for key construction materials and the national and local generation of waste, within Cambridge, the East of England and the UK. The baseline will also outline the capacity/availability of waste management infrastructure within the vicinity of the proposed Scheme. It will be established to ensure the most up to date information

is reported. This information will be determined through a desk-based study, using a range of readily available resources.

18.6 Potential Impacts

18.6.1 Construction

18.6.1.1 Material Resources

The CSET Scheme would be likely to require large quantities of material resources for construction, and would, therefore, have the potential for permanent direct adverse effects on the environment, through a reduction in the availability of material resources and potentially the depletion of natural resources. It will be outside of the scope of any assessment to assess the environmental effects associated with raw material extraction, and processing and manufacturing of products, as these are likely to be subject to separate environmental assessments. The use of material resources would also have the potential to generate adverse environmental effects through the transportation of materials (for use on-site), such as detrimental impacts to air quality and increase in local noise levels, however, the effects of these are more logically dealt with within other Chapters including Air Quality and Noise and Vibration.

As part of the EIA the materials required will be identified in more detail and the potential for supplying these resources from primary or secondary sources (i.e. recycling or re-use) will be set out. Primary resources will be mapped against local, regional or national availability. Any particularly scarce resources will be identified and the designer will be challenged as to whether these resources cannot be substituted by more sustainable material.

The construction phase could generate resources during the initial excavations and levelling works for the site. A cut/fill balance calculation will be carried out for the CSET Scheme and opportunities for re-use of any surplus material not required on the project will be identified during the EIA process. A key objective of the project is to minimise the need to import or dispose of materials for construction.

Further details on specific project activities that have the potential to generate significant effects from the use of materials is summarised in Table 18.2 below.

Table 18.2: Potential Material Use

Project Activity	Material use and potential to generate significant effects
Site remediation/ preparation/ earthworks	Potential direct effects associated with the import and use of primary aggregates and/or fill material, which may result in the depletion of non-renewable resources.
Demolition	Any demolition would be unlikely to require the use of any materials.
Site construction	Construction of the CSET Scheme and associated new structures (such as potentially the provision of a facilities building), along with signage, lighting, safety barriers, drainage, communications infrastructure, pavement, and landscaping works, would require large amounts of materials. Although quantities of materials are not known at present, the type of materials that are likely to be required may include (and not limited to): Steel Aggregate Cement Concrete Bitumen Wood Plastic Other metal

Project Activity	Material use and potential to generate significant effects
Operation	Operation in this case includes maintenance activities. No significant effects relating to the operation of the new Scheme and Travel Hub are anticipated on material assets as maintenance would be infrequent and unlikely to require large volumes of materials, therefore, it is proposed that this element is scoped out of further assessment.

18.6.1.2 Waste

The construction phase will generate some waste materials in the form of packaging and unwanted resources (e.g. offcuts of timber or steel) – Table 18.3. There are two historical landfill sites within 500km of the CSET Scheme, outlined in the baseline report. The CoCP will set out standard procedures to minimise this waste and will set out requirements for managing and recycling waste on site and for ultimate disposal. The CoCP will have to be adopted by the appointed contractor and incorporated into their CEMP as appropriate.

An outline Site Waste Management Plan shall be drafted as part of the ES which will require the eventual appointed contractor to develop into a detailed Site Waste Management Plan for the CSET Scheme.

Table 18.3: Potential Waste Generation

Project Activity	Waste arisings and potential to generate significant effects
Site remediation/ preparation/ earthworks	Potential direct effects associated with the off-site disposal of waste, which may result from: The production of waste from site clearance, e.g. green waste, contaminated soils, inert waste. Exceeding the cut and fill balance, therefore, generating excess cut material as waste.
Demolition	If demolition of structures or properties is required, there may be direct effects associated with the generation of waste, in particular bricks, concrete and timber. This may cause indirect effects if disposal in landfill is required, which will result in a permanent reduction in landfill void capacity.
Site construction	It is likely that the majority of waste would be generated in the site preparation and demolition phases. However, the construction phase of the proposed Scheme may result in the following waste arisings: Materials brought to site that are not used for their intended purpose, e.g. damage items, offcuts, and surplus materials. Excavated materials such as soil which may be contaminated, unsuitable or surplus to requirements.
Operation	Waste may also be generated during the operation of the proposed Scheme. Waste would be likely to arise from the following activities during operation: • domestic type waste from the potential facility building • maintenance, including road sweepings and gully clearings, replacement signage and lighting, road and parking area resurfacing and landscape maintenance • road debris and litter from users of the CSET Scheme.

18.6.2 Operation

18.6.2.1 Resources

Materials would be required for the maintenance of the CSET Scheme, once operational. This would likely include localised repairs and resurfacing. Significant effects from the use of material resources are considered unlikely during the operation of the proposed Scheme options, as maintenance activities would be infrequent and would likely require minimal quantities of material resources. There will be very minor quantities for consumables at the Travel Hub site, but these are not considered to be in significant quantities.

18.6.2.2 Waste

It is unlikely that significant effects would result from the generation of waste due to maintenance of the proposed Scheme, as maintenance activities would be infrequent and the waste hierarchy would be implemented to reduce waste generation. Additionally, domestic type waste generated by the potential users of the Scheme would be unlikely to be significant, particularly if recycling facilities are provided. Waste from passengers, NMU users and staff will be collected and disposed of by the operator through standard recycling and waste disposal collection services.

18.7 Design, Mitigation and Enhancement Measures

18.7.1 Construction

Mitigation measures to reduce the effects of material resource use and waste generated by the CSET Scheme during construction would be implemented throughout the iterative design process. These mitigation measures will be included in the Scheme description, where possible.

Measures to reduce the effects of material resource use throughout the design process involves the reduction in the use of virgin materials and aggregates, which may be achieved through reducing the material requirements in the design itself, the use of site-won or recycled materials and the use of materials with a high proportion of recycled content. Embodied carbon emissions of the material resources required for the proposed Scheme options will be calculated as the proposed Scheme design progresses, to inform a low carbon design, which would subsequently aid in reducing material requirements.

The waste hierarchy would be applied to minimise generation (i.e. through the undertaking of a Design out Waste workshop) and maximise reuse and recycling. For example, through the reuse of excavated soils and green waste onsite for landscaping, and through the recycling of inert material by crushing, blending and subsequent reuse e.g. as an aggregate.

The following mitigation measures may need to be monitored throughout construction to determine their effectiveness. In the ES, the assessment will first be presented without the following mitigation measures in place. The measures below will then be outlined and the likely significant effects of the CSET Scheme will be reassessed with the proposed mitigation in place.

When considering the requirement for the supply of materials for use on site, local suppliers should be identified, where possible, to reduce fuel requirements and cost of delivery to reduce greenhouse gas emissions resulting from transportation.

Where waste cannot be re-used or recycled onsite, opportunities would be sought for the reuse of material on other nearby schemes, where possible, or in other uses with clear benefits to the environment, e.g. in the remodelling of agricultural land, or in the restoration of nearby quarries or other excavation sites. By reusing and recycling as much waste as possible, this would reduce the amount of waste going to landfill.

Where waste must be taken to recycling/disposal facilities, these facilities must have the appropriate permits to ensure environmental risks are reduced. The recycling/disposal facilities should be located as close to the works as possible to minimise transport, thereby reducing greenhouse gas emissions resulting from transportation. The closest and relevant treatment and disposal sites will be identified by the appointed contractor.

The appointed contractor would produce a CEMP. This would detail mitigation measures to be adhered to onsite to reduce potential impacts from material resource use and waste generation during the construction of the CSET Scheme.

Attention will be given to the need for a Site Waste Management Plan (SWMP), which would be produced for the preferred option by the appointed contractor. This would consider the sourcing, transport and use, and disposal of waste and material resources, in a sustainable manner. It would also take account of, and capture, design changes as the proposed Scheme option design evolves and would ensure that unavoidable construction waste is identified, and able to be managed in accordance with the waste hierarchy and other relevant legislative requirements. The SWMP would be used to derive the management options that would achieve the highest practicable performance levels within the hierarchy.

Consideration of the need for a Materials Management Plan (MMP), under the CL:AiRE Definition of Waste Code of Practice (DoW CoP), should also be given. Where appropriate, the contractor may be required to produce an MMP prior to starting works. This would enable the any site-won materials (or identified, imported waste materials) to be used on site, providing justification and certainty of use and ensuring that the materials comply with an earthworks specification.

18.8 Proposed Scope of Assessment

18.8.1 Scoped In

Material Resources

Due to the size and scale of the CSET Scheme, there is potential for large volumes of material resources to be required for the construction phase. Therefore, there is potential for significant adverse effects on the environment, through a reduction in the availability of material resources and potentially the depletion of natural resources. However, mitigation measures such as reducing the material requirements of the CSET Scheme through design and utilising as much site-won materials as possible would be implemented to reduce the effects, which would be included within a CEMP for the proposed scheme. Therefore, further assessment, which will benefit from material quantification, a cut/fill balance calculation and further design information, is required to confirm these conclusions.

Waste

The CSET Scheme would be likely to generate waste during construction which could result in the temporary occupation of waste management facility space (from treatment of waste) and the permanent reduction to landfill capacity (from disposal of waste). However, a SWMP is recommended to be produced by the appointed contractor, which would implement the principles of the waste hierarchy to reduce the amount of waste produced and maximise the re-use of any waste on-site. A baseline study will be undertaken to confirm sufficient capacity of waste infrastructure, within 10km of the CSET Scheme to deal with any waste generated that requires treatment or disposal. Therefore, it is unlikely that significant environmental effects would result from the generation of waste during the construction. However, at this stage there is limited design information for the CSET Scheme, and a lack of information on the quantities of material resources required and waste arisings, on which to base the assessment. Therefore, further assessment is required to confirm these conclusions.

18.8.2 Scoped Out

Once operational, the CSET Scheme would be unlikely to require large volumes of material resources as maintenance activities would likely be infrequent. Additionally, it is unlikely that large volumes of waste would be generated through maintenance and by users of the Scheme, including litter, during operation. Therefore, no further assessment is required for the effects of

material resource use and waste generation from the CSET Scheme during operation, as no significant direct or indirect effects are anticipated.

It is proposed to scope operational material resources and waste management out of the EIA.

19 Summary to ES Scoping

19.1 Summary

This report sets out the proposals for the Cambridge South East Transport Scheme, known as the CSET Scheme. It has been prepared to support a request to the Secretary of State to provide a scoping opinion on the information to be included in the ES for the CSET Scheme.

A summary of the proposed technical scope of the ES outlined in the preceding chapters is provided in Table 19.1.

Table 19.1: Summary of Impacts Scoped In for Further Assessment

Topic	Construction	Operation	Comment
Air Quality	Yes but not from construction plant	Yes but only related to emissions from traffic related to the Scheme	Section 6
Biodiversity	Yes	Yes	Section 7 Excludes dormice surveys
Climate Change	No	Yes	Section 8 Excludes land use change impact on climate change as are in combination climate impacts
Community and Human Health	Yes	Yes	Section 9 Excludes impact assessment on residential and community facilities during construction and operational phases. Excludes assessment on access to businesses and residences during operation.
Historic Environment	Yes	Yes	Section 10 Any assets beyond 1km of the Scheme are scoped out.
Landscape and Visual	Yes	Yes	Section 11
Noise and Vibration	Yes	Yes	Section 12 Operational vibration has been scoped out.
Land use and Land take	Yes	Yes	Section 13 Soil surveys are scoped out.
Policies and Plans	Yes	Yes	Section 5
Soils, Geology and Contaminated Land	No	No	Section 14 Impact on final mass balance to be assessed in relation to Carbon in the Climate Change Construction impact and in terms of traffic on local roads in the Traffic and Transport chapter. Impact on agriculture to be assessed in Land Use and Land Take chapter.

Topic	Construction	Operation	Comment
Water Resources and Flood Risk	No	Yes	Section 15 Only carrying out flood risk assessment for operations. No significant effects on groundwater or surface water anticipated so no EIA on these receptors.
Major Accidents and Hazards	No	No	Section 16
Traffic and Transport	Yes	Yes	Section 17
Resources and Waste	Yes	No	Section 18
Decommissioning Stage	N/A	No	Future decommissioning is not likely for many decades and so assessing impacts of decommissioning would be impractical.

A. Scheme Drawings

Notes

1. Dimensions are in metres unless stated otherwise.
2. Do not scale from the drawing.
3. Drawing to be printed in colour.
4. Preliminary route options shown are based on the highway design principles set out in the Design Manual for Roads and Bridges (DMRB). These drawings are subject to further detailed design.
5. All works are subject to the approval of the local highway authority (Cambridgeshire County Council) and further stakeholder engagement.
6. Drawings are based on LiDAR information and will require amendments subject to receipt of topographical surveys.
7. Location and detail of existing utilities to be determined at the next stage of design.
8. Based on the underlying geology, side slopes of 1 in 4 have been provided along the route.
9. The design speed is 100kph for the route with a reduction to 40kph in restricted areas (however 50kph has been used as the minimum design speed in line with the DMRB).
10. OS mapping licence no. © Crown copyright and database rights 2020 OS 100023205
11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed cycleway
- Proposed footway
- Proposed Public Transport Route (PTR)
- Proposed Traffic Route
- Proposed bus stop
- Kerbline
- Proposed Traffic Signal
- Road marking of pedestrian crossings
- Zebra crossing
- Proposed tactile paving
- Corduroy paving

Reference drawings

403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
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403394-MMD-HWA-00-DR-HW-0318 CSET Preferred Option GA Sheet 17 of 19
403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Francis Crick Avenue Layout 1
Sheet 1 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number

403394-MMD-HWA-00-DR-HW-0302

1:1000 0 50m 100m

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KLE90251

Notes

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2. Do not scale from the drawing.
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8. Based on the underlying geology, side slopes of 1 in 4 have been provided along the route.
9. The design speed is 100kph for the route with a reduction to 40kph in restricted areas (however 50kph has been used as the minimum design speed in line with the DMRB).
10. OS mapping licence no. © Crown copyright and database rights 2020 OS 100023205
11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed cycleway
- Proposed footway
- Proposed Public Transport Route (PTR)
- Proposed Traffic Route
- Proposed bus stop
- Kerbline
- Embankment/Cutting
- Zebra crossings
- Proposed tactile paving
- Public Right of Way

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
403394-MMD-HWA-00-DR-HW-0307 CSET Preferred Option GA Sheet 6 of 19
403394-MMD-HWA-00-DR-HW-0308 CSET Preferred Option GA Sheet 7 of 19
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403394-MMD-HWA-00-DR-HW-0311 CSET Preferred Option GA Sheet 10 of 19
403394-MMD-HWA-00-DR-HW-0312 CSET Preferred Option GA Sheet 11 of 19
403394-MMD-HWA-00-DR-HW-0313 CSET Preferred Option GA Sheet 12 of 19
403394-MMD-HWA-00-DR-HW-0314 CSET Preferred Option GA Sheet 13 of 19
403394-MMD-HWA-00-DR-HW-0315 CSET Preferred Option GA Sheet 14 of 19
403394-MMD-HWA-00-DR-HW-0316 CSET Preferred Option GA Sheet 15 of 19
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403394-MMD-HWA-00-DR-HW-0318 CSET Preferred Option GA Sheet 17 of 19
403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Francis Crick Avenue Layout 1
Sheet 2 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0303

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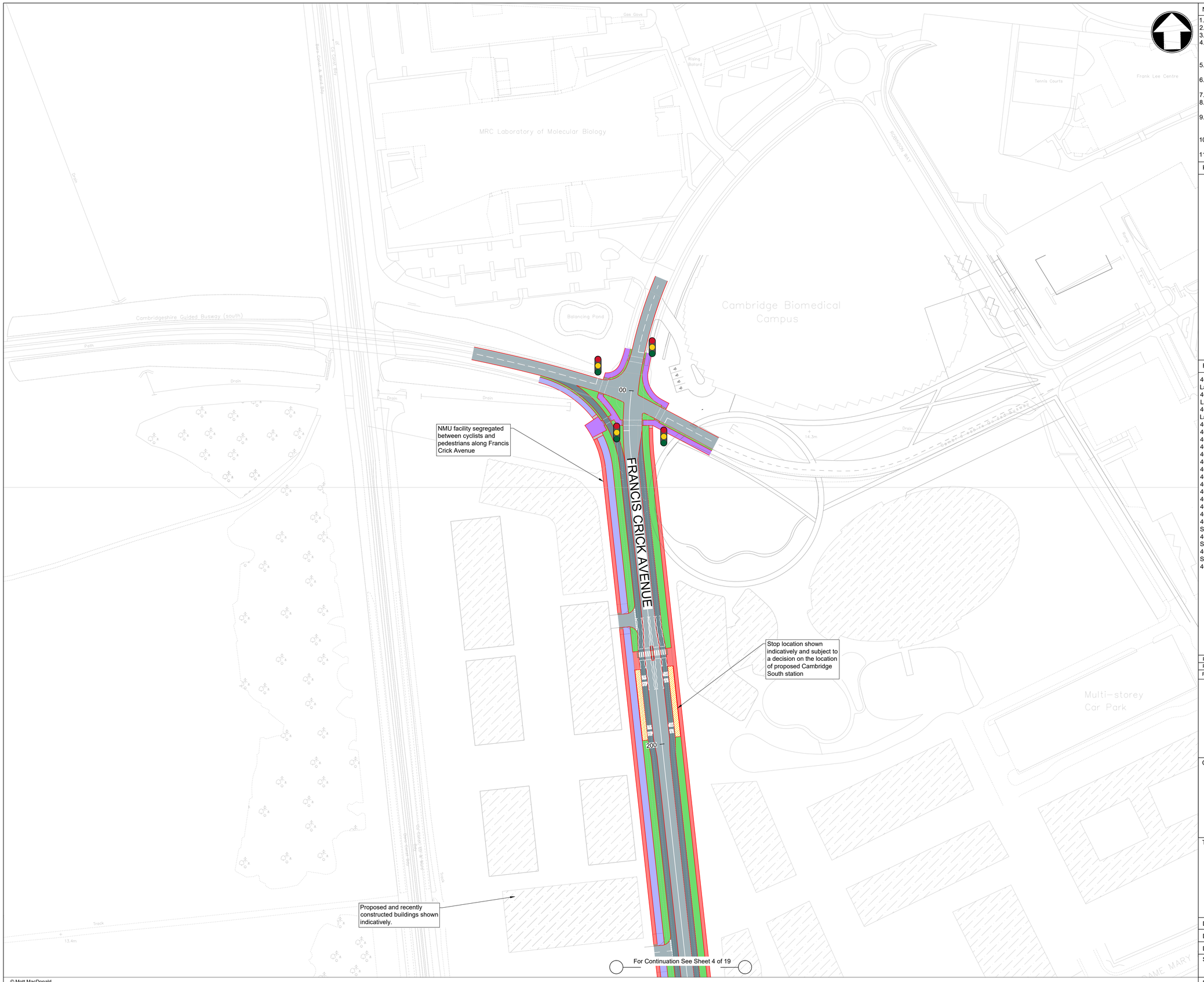
KLE90251



Notes

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8. Based on the underlying geology, side slopes of 1 in 4 have been provided along the route.
9. The design speed is 100kph for the route with a reduction to 40kph in restricted areas (however 50kph has been used as the minimum design speed in line with the DMRB).
10. OS mapping licence no. © Crown copyright and database rights 2020 OS 100023205
11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed cycleway
- Proposed footway
- Proposed Public Transport Route (PTR)
- Proposed Traffic Route
- Proposed bus stop
- Kerbline
- Proposed Traffic Signal
- Road marking of pedestrian crossings
- Zebra crossing
- Proposed tactile paving
- Corduroy paving

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
403394-MMD-HWA-00-DR-HW-0307 CSET Preferred Option GA Sheet 6 of 19
403394-MMD-HWA-00-DR-HW-0308 CSET Preferred Option GA Sheet 7 of 19
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403394-MMD-HWA-00-DR-HW-0313 CSET Preferred Option GA Sheet 12 of 19
403394-MMD-HWA-00-DR-HW-0314 CSET Preferred Option GA Sheet 13 of 19
403394-MMD-HWA-00-DR-HW-0315 CSET Preferred Option GA Sheet 14 of 19
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403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Francis Crick Avenue Layout 4
Sheet 3 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0304

1:1000 0 50m 100m

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KLE90251

Notes

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10. OS mapping licence no. © Crown copyright and database rights 2020 OS 100023205
11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed cycleway
- Proposed footway
- Proposed Public Transport Route (PTR)
- Proposed Traffic Route
- Proposed bus stop
- Kerbline
- Embankment/Cutting
- Zebra crossings
- Proposed tactile paving
- Public Right of Way

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
403394-MMD-HWA-00-DR-HW-0307 CSET Preferred Option GA Sheet 6 of 19
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403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Francis Crick Avenue Layout 4 Sheet 4 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0305

1:1000 0 50m 100m

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Notes

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Hardstanding
- Existing non motorised user (NMU) facility
- Kerbline
- Embankment/Cutting

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
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403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 5 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0306

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EBE85276

1:1000 0 50m 100m

Notes

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Proposed tactile paving (red)
- Existing carriageway
- Kerbline
- Road marking of pedestrian crossings
- Embankment/Cutting
- Proposed Traffic Signal

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
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403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 6 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0307

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Notes

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Proposed tactile paving (red)
- Existing carriageway
- Kerbline
- Road marking of pedestrian crossings
- Embankment/Cutting
- Proposed Traffic Signal

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
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403394-MMD-HWA-00-DR-HW-0317 CSET Preferred Option GA Sheet 16 of 19
403394-MMD-HWA-00-DR-HW-0318 CSET Preferred Option GA Sheet 17 of 19
403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 7 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0308

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KLE90251

1:1000 0 50m 100m

Notes

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2. Do not scale from the drawing.
3. Drawing to be printed in colour.
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9. The design speed is 100kph for the route with a reduction to 40kph in restricted areas (however 50kph has been used as the minimum design speed in line with the DMRB).
10. OS mapping licence no. © Crown copyright and database rights 2020 OS 100023205
11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Landscaping
- Proposed Bus Stop
- Proposed footway
- Existing carriageway
- Existing cycle/footpath
- Disabled parking bay
- Proposed tactile paving (red)
- Proposed tactile paving (buff)
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Kerbline
- Road marking of pedestrian crossings
- Sheffield Stands
- Cycle lockers
- Embankment/Cutting
- Proposed Traffic Signal

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
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403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 8 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number

403394-MMD-HWA-00-DR-HW-0309

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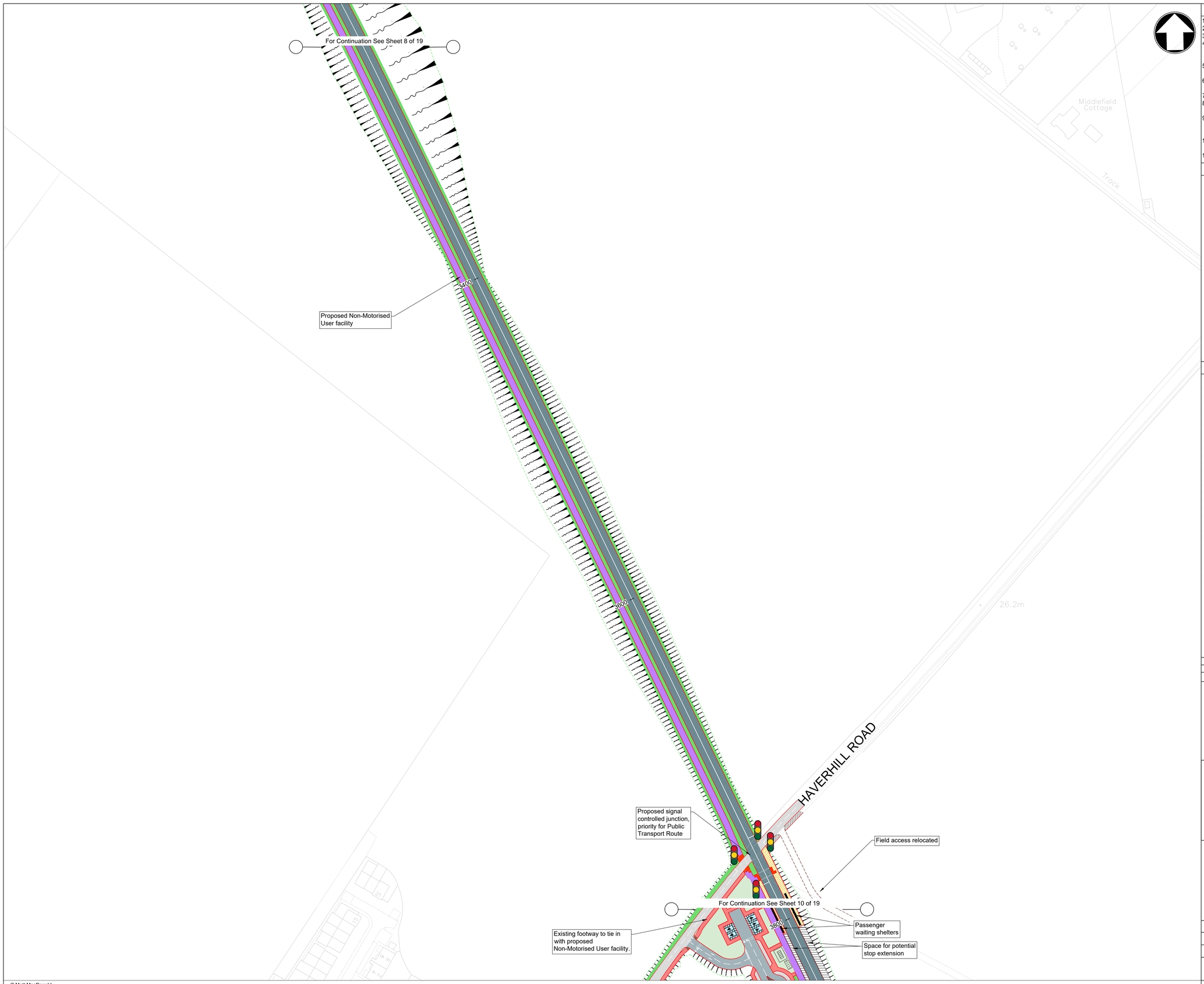

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Key to Symbols

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- Landscaping
- Hardstanding
- Proposed Bus Stop
- Proposed footway
- Existing carriageway
- Existing cycle/footpath
- Disabled parking bay
- Proposed tactile paving (red)
- Proposed tactile paving (buff)
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Kerbline
- Road marking of pedestrian crossings
- Sheffield Stands
- Cycle lockers
- Embankment/Cutting
- Proposed Traffic Signal
- Proposed Access Track

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
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403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 9 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number

403394-MMD-HWA-00-DR-HW-0310

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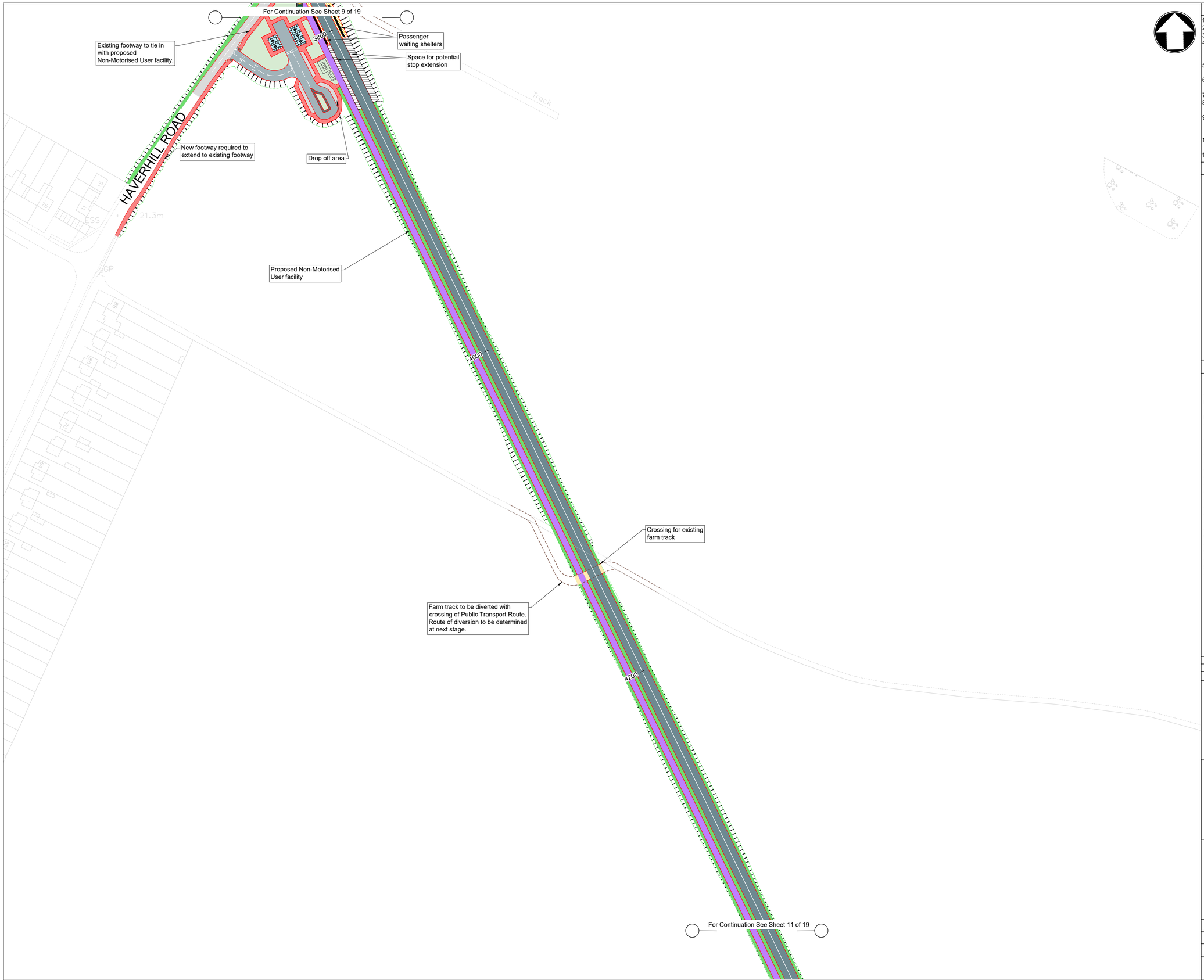

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Key to Symbols

- Proposed verge
- Landscaping
- Hardstanding
- Proposed Bus Stop
- Proposed footway
- Existing carriageway
- Existing cycle/footpath
- Disabled parking bay
- Proposed tactile paving (red)
- Proposed tactile paving (buff)
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Kerbline
- Road marking of pedestrian crossings
- Sheffield Stands
- Cycle lockers
- Embankment/Cutting
- Proposed Traffic Signal
- Proposed Access Track

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
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403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 10 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
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KLE90251

Notes

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Hardstanding
- Kerbline
- Embankment/Cutting
- Public Right of Way

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
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403394-MMD-HWA-XX-M2-HW-0001 OS Map

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 11 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number

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Notes

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Kerbline
- Embankment/Cutting

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 12 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P1	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0313

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KLE90251

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Hardstanding
- Kerbline
- Embankment/Cutting

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
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403394-MMD-HWA-00-DR-HW-0309 CSET Preferred Option GA Sheet 8 of 19
403394-MMD-HWA-00-DR-HW-0310 CSET Preferred Option GA Sheet 9 of 19
403394-MMD-HWA-00-DR-HW-0311 CSET Preferred Option GA Sheet 10 of 19
403394-MMD-HWA-00-DR-HW-0312 CSET Preferred Option GA Sheet 11 of 19
403394-MMD-HWA-00-DR-HW-0313 CSET Preferred Option GA Sheet 12 of 19
403394-MMD-HWA-00-DR-HW-0315 CSET Preferred Option GA Sheet 14 of 19
403394-MMD-HWA-00-DR-HW-0316 CSET Preferred Option GA Sheet 15 of 19
403394-MMD-HWA-00-DR-HW-0317 CSET Preferred Option GA Sheet 16 of 19
403394-MMD-HWA-00-DR-HW-0318 CSET Preferred Option GA Sheet 17 of 19
403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 13 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0314

1:1000 0 50m 100m

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KLE90251

Notes

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11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Landscaping
- Hardstanding
- Proposed footway
- Existing carriageway
- Existing cycle/footpath
- Disabled parking bay
- Proposed tactile paving (red)
- Proposed tactile paving (buff)
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Proposed Bus Stop
- Road marking of pedestrian crossings
- Sheffield Stands
- Cycle lockers
- Embankment/Cutting
- Proposed Traffic Signal
- Public Right of Way
- Kerbline
- Existing non motorised user (NMU) facility

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
403394-MMD-HWA-00-DR-HW-0305 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 4 of 19
403394-MMD-HWA-00-DR-HW-0306 CSET Preferred Option GA Sheet 5 of 19
403394-MMD-HWA-00-DR-HW-0307 CSET Preferred Option GA Sheet 6 of 19
403394-MMD-HWA-00-DR-HW-0308 CSET Preferred Option GA Sheet 7 of 19
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403394-MMD-HWA-00-DR-HW-0316 CSET Preferred Option GA Sheet 15 of 19
403394-MMD-HWA-00-DR-HW-0317 CSET Preferred Option GA Sheet 16 of 19
403394-MMD-HWA-00-DR-HW-0318 CSET Preferred Option GA Sheet 17 of 19
403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 14 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0315

1:1000 0 50m 100m

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EBE85276

Notes

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11. No landscaping, planting or other environmental mitigation is shown on these plans.

Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Hardstanding
- Kerbline
- Embankment/Cutting
- Public Right of Way

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
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403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 15 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0316

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KLE90251

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Key to Symbols

- Proposed verge
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Proposed tactile paving (red)
- Existing carriageway
- Kerbline
- Road marking of pedestrian crossings
- Embankment/Cutting
- Proposed Traffic Signal

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
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403394-MMD-HWA-00-DR-HW-0319 CSET Preferred Option GA Travel Hub Sheet 18 of 19
403394-MMD-HWA-00-DR-HW-0320 CSET Preferred Option GA Travel Hub Sheet 19 of 19
403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 16 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0317

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EBE85276

Notes

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Key to Symbols

- Proposed verge
- Landscaping
- Hardstanding
- Proposed footway
- Travel Hub Access Road
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Kerbline
- Zebra crossings
- Road marking of pedestrian crossings
- Proposed tactile paving (buff)
- Embankment/Cutting
- Gas main
- Gas main easements
- Public Right of Way

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
403394-MMD-HWA-00-DR-HW-0304 CSET Preferred Option GA Francis Crick Avenue Layout 4 Sheet 3 of 19
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403394-MMD-HWA-00-DR-HW-0334 CSET Preferred Option Highways Typical Cross Section
403394-MMD-HWA-XX-M2-HW-0001 OS Map

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
P1	13/03/2020	PZ	First issue	LC	MP

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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Sheet 17 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0318

1:1000 0 50m 100m

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KLE90251

1:1000 0 50m 100m

Notes

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Key to Symbols

- Proposed verge
- Landscaping
- Hardstanding
- Proposed footway
- Travel Hub Access Road
- Disabled parking bay
- Proposed non motorised user (NMU) facility
- Proposed Public Transport Route (PTR)
- Kerbline
- Zebra crossings
- Road marking of pedestrian crossings
- Proposed tactile paving (buff)
- Embankment/Cutting
- Gas main
- Gas main easements
- Public Right of Way
- Sheffield Stands
- Cycle lockers

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
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Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	27/03/2020	PZ	Second issue	LC	JS
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Client

GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Travel Hub
Sheet 18 of 19

Designed	P.Zajac	PZ	Eng check	L.Chojnacki	LC
Drawn	P.Zajac	PZ	Coordination	E.Karim	EK
Dwg check	L.Chojnacki	LC	Approved	J.Saldanha	JS

Scale at A1	Status	Rev	Security
1:1000	PRE	P2	STD

Drawing Number
403394-MMD-HWA-00-DR-HW-0319

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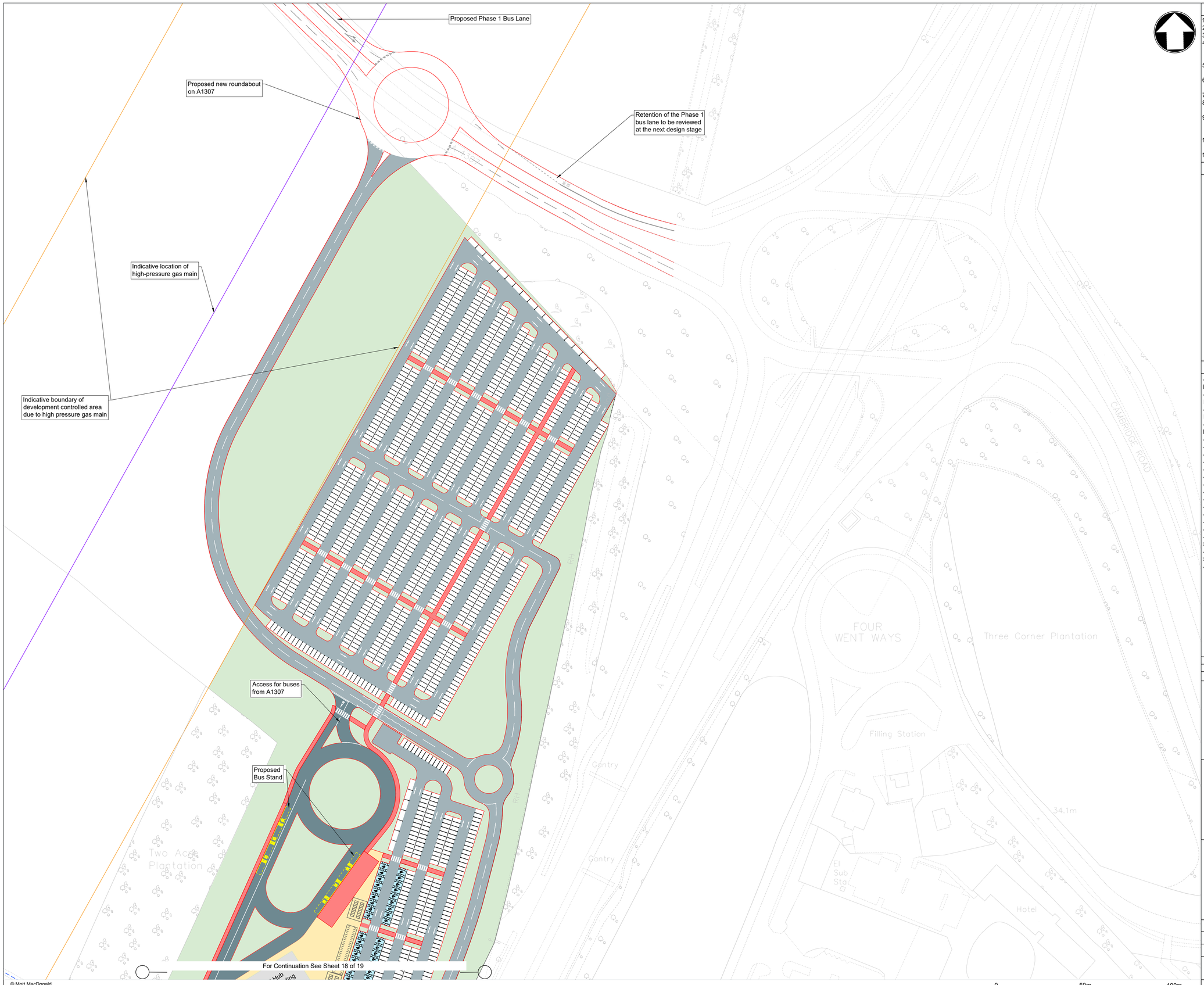

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- Proposed Public Transport Route (PTR)
- Kerbline
- Zebra crossings
- Sheffield Stands
- Cycle lockers
- Gas main
- Gas main easements

Reference drawings

403394-MMD-HWA-00-DR-HW-0302 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 1 of 19
403394-MMD-HWA-00-DR-HW-0303 CSET Preferred Option GA Francis Crick Avenue Layout 1 Sheet 2 of 19
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GREATER CAMBRIDGE PARTNERSHIP

Title

CSET Phase 2
Preferred Option
Travel Hub
Sheet 19 of 19

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B. Assessing Significance of Carbon

Technical Note

Project:	Cambridge South East Transport Scheme (CSET)		
Prepared by:	Alicia Winter	Date:	14.08.2020
Approved by:	James Montgomery	Checked by:	Mark Crouch
Subject:	Carbon approach to significance and carbon budget comparison		

An application is to be made under the Transport and Works Act Order for development known as the Cambridge South East Transport Scheme (CSET). As part of the application for CSET the Applicant will provide information on Greenhouse Gas (GHG) emissions in the Environmental Statement (ES), reflecting Net Zero legislation and Climate Emergency declarations. The GHG assessments to be undertaken as part of the assessment of likely significant environmental effects of CSET are being informed by legislation and guidance, but it is recognised that there are different guidance documents containing alternative approaches for assessing significance and for contextualising the scale of calculated GHG emissions. The purpose of this Technical Note is to set out and justify the approach proposed to take in preparing the ES for CSET. The note compares alternatives approaches and identifies recommendations on the approach for any other future assessments.

Assessment of Significance

Significance in EIA in general
The procedure for TWAO applications is described in The TWA (Applications and Objections Procedure) (England and Wales) Rules 2006 (the Application Rules). The Application Rules, as amended by the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017, provide that (unless the Secretary has made a direction under rule 7(3)), an application for a TWAO shall be accompanied by an ES. The principal purpose of the Environmental Statement is to identify and assess the likely significant effects of the scheme on the environment.

It is recognised that in the process of EIA there is subjectivity involved in the assessment of significance, and that different subject matter experts may come to different conclusions. Emphasis is placed on practitioners to set out a methodology for assessing significance that is appropriate for the project being assessed, so that the assessment finding can be justified.

Assessing significance of GHG emissions
There is currently no nationally accepted threshold of GHG emissions which, if exceeded, can be defined as significant from an EIA perspective. There are various forms of guidance and industry standards available, yet as demonstrated in the examples below, some of the approaches set out in the guidance can be contradictory.

The most broadly recognised UK guidance on evaluating significance of GHG, which is relevant regardless of sector, is that published by The Institute of Environmental Management and Assessment (IEMA). The guidance advises that all GHG emissions should be considered significant, regardless of the scale of the emissions (IEMA, 2017).

Highways England have published their own guidance within the Design Manual for Roads and Bridges (DMRB). LA 114 – Climate states that "*projects shall only report significant effects where increases in GHG emissions will have a material impact on the ability of Government to meet its carbon reduction targets*". It also 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*" and that in this context "*it is considered unlikely that projects will in isolation conclude significant effects on climate*".

These two examples highlight how different evaluations of significance could be performed depending on which guidance was being followed. In addition to this GHG specific published guidance, it is common practice during EIA to have a scoring system or matrix for deciding significance that will be common to all environmental topics.

Despite this contrast in advising on the threshold for significance, the IEMA, DMRB and other industry accepted guidance documents have much else in common. The guidance recognises that the approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. The guidance also focuses on mitigation efforts, regardless of the assessment of significance.

Assessing significance of GHG of the Greater Cambridge Partnership schemes

The National Policy Statement for National Networks (NPS NN) advises (paragraph 5.17) that for road projects applicants should provide evidence of the carbon impact of the project and an assessment against the Government's carbon budget, although it notes that it is very unlikely that the impact of a road project will, in insolation, affect the ability of Government to make its carbon reduction planned targets. CSET is not itself a road project in the sense envisaged in the NPS NN, it's purpose is to reduce road use by providing improved public transport, so it should help reduce carbon emissions that should help the overall carbon reduction commitment. Nevertheless there will be a significant embedded carbon footprint as the scheme will require new construction.

In the absence of clear alternative guidance, the Scoping Report has presented information to assist the Secretary of State in reaching an opinion as to whether or not an assessment of the carbon impact of the project should be made against the Government's carbon budget.

The Scoping Report proposes that the assessment of significance is conducted in line with the NPS NN and DMRB by comparing estimated GHG emissions arising from the scheme with UK carbon budgets, and the associated reduction targets.

Carbon reduction targets and carbon budgets

UK Government Carbon reduction targets and budgets in EIA

The UK Government has legislated economy wide GHG reduction targets. These include a Net Zero target for 2050, with supporting 5-year carbon budgets, some of which have been defined and legislated (Climate Change Act).

The DMRB guidance recommends comparison of the GHG emissions from the project being assessed against UK carbon targets and budgets. The guidance recommends that this comparison is used to inform the significance assessment, as previously described.

The IEMA guidance also recommends comparison with national carbon targets and budgets. However, unlike the DMRB guidance it does not recommend that the comparison is used in the significance assessment. In the IEMA guidance the comparison is used to provide context and the guidance also recognises that the contribution of any individual project in isolation is likely to be very small as a proportion of national targets and budgets.

Within the IEMA guidance, it is also recommended to contextualise the project's carbon footprint using local or sector-based budgets where possible. To date, sector or regional carbon budgets have not often been available, although this situation is beginning to change. An increasing number of local and regional authorities are developing budgets in response to national Net Zero legislation and Climate Emergency declarations. This is also the case for many industry bodies and organisations who are beginning to develop sector-based Net Zero route maps. Therefore, it should become more feasible on a larger range of EIA projects to make a meaningful comparison against a local or regional carbon budget, and/or sector-based route maps.

When local budgets do not exist, it is not appropriate or in line with industry guidance for the assessor to independently attempt to formulate their own local carbon budget, for example by proportioning the national budget according to the local population. The industry recommended approaches to setting local authority budgets are complex and need to be developed in partnership with local authorities as currently developed by the Tyndall Centre .

Other simplistic attempts to make comparisons, for example proportioning the national budgets to the number of users of a scheme, are fraught with complexity and will not usually result in a meaningful comparison. The boundaries and assumptions used to estimate the GHG effect of a scheme will often not align with such a simple comparison. Such complications include:

- The spatial boundary and definition of "number of users". For example, for many transport schemes the approach used to calculate emissions will use an area-based traffic model looking at a wider transport system, with a greater number of users. So, for example it would not be appropriate to assign the total carbon budget for the a scheme such as CSET to the users of the travel hub itself as many other transport users will benefit from the scheme than just those users of the travel hub.
- The temporal scope of an assessment. Schemes are normally assessed on a whole life basis (commonly >60 years), so it is not appropriate to assign the whole life carbon emissions against a single budget period.
- The scope of the emissions included in the carbon assessment. Schemes are normally assessed against carbon associated with construction and operation emissions, including Scope 1, 2 and 3 emissions. Scope 3 materials included in construction may also include imported materials, not currently included in national budgets.
- Assumptions for future decarbonisation included in the assessment. In line with EIA principles, these are normally worst-case, or conservative assumptions. The rate of future decarbonisation, for example the switch to low/zero emission vehicles, will be forecast using carbon factors published by Government departments. However, the rates of decarbonisation in these published carbon factors often do not (yet) support the national carbon budgets and trajectory of the Net Zero targets.

Comparing against budgets and targets on GCP schemes

The GHG emissions are being estimated over the project lifetime for the GCP schemes, which extends over multiple carbon budget periods. The GHG emissions of a scheme are assigned to each carbon budget according to the year of forecast emissions, so that a percentage of the relevant carbon budget period can be calculated. This approach has been used to compare against national, economy-wide carbon budgets and is in line with that recommended by the both the IEMA guidance and the DMRB guidance.

This comparison enables scheme emissions to be contextualised against national budgets, which will then be utilised to inform the significance assessment in-line with the DMRB guidance.

An appropriate local or regional carbon budget for Cambridge County is not currently available. There are also no appropriate sectoral budgets or roadmaps to compare against. Therefore, on GCP schemes the comparison will only be made against national budgets, rather than regional or sector based.

Mitigation

The DMRB and the IEMA guidance both place strong emphasis on the importance of minimising or reducing GHG emissions through mitigation measures. The guidance recommends mitigation measures be included regardless of the approach adopted to significance assessment.

The NPS NN advises on the assessment of carbon emissions in paragraphs 5.16 – 5.19. Paragraph 5.17 advises on the applicant's assessment of carbon emissions as part of the EIA process. Paragraph 5.18 refers to the overarching national carbon reduction strategy as set out in the Carbon Plan (2011) and advises that an increase in carbon emissions is not a reason to refuse consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets. The policy statement advises that evidence of appropriate mitigation measures in both the design and construction should be presented. The Secretary of State will consider the effectiveness of such mitigation measures in order to ensure that the carbon footprint is not unnecessarily high.

The proposed approach to mitigation on CSET is in line with PAS 2080: Carbon Management in Infrastructure . This includes carbon specialists working with the design teams to explore opportunities of carbon reduction throughout the design process.

The whole life carbon should be understood to evaluate whether the embodied carbon from the construction phase is offset by operational savings over the project's lifetime. For the CSET scheme, operational savings may come from modal shift and the ability to support electric buses in the future. Should electric public transport not be able to be committed to by GCP the EIA assessment will assume standard internal combustion vehicles, which are classed as Heavy Goods Vehicles. This would provide a worst case assessment of significance as future vehicles powered by electricity (or other renewable source) would have a lower operational carbon. It is proposed such an assessment will be included as a sensitivity test to highlight the benefits of the scheme. This assessment would also calculate the avoided carbon emissions by users shortening their journeys to use the electric buses.

A large proportion of the future decarbonisation of the schemes will be realised not by scheme specific "mitigation" measures, but from wider decarbonisation across the transport sector. The levels of transport sector decarbonisation required to meet the economy wide Net Zero targets has not yet been accounted for in the assessment of GCP schemes. The Government's document Decarbonising Transport: Setting the Challenge of March 2020 sets out the ambition to ensure that transport delivers its contribution to meeting the economy wide Net Zero target. This will have significant impacts on the emissions mix of the future vehicle fleet and the way that transport infrastructure is provided to facilitate these aims. It is expected that relevant government departments will in due course publish more ambitious projections that can be used in future assessments but these may not be available to support the Environmental Statement for CSET.The assessments conducted to date for the Greater Cambridge Partnership are conservative. Once the Government's decarbonising factors are available it is highly likely a revised assessment of the operational phases would result in lower operational carbon footprints for the scheme.

Conclusions and recommendations

If the Secretary of State forms the opinion that the ES should include a carbon assessment against the Government's carbon budget then the approach to GHG assessment for CSET would be as follows:

Assessment theme	Current approach	Recommendations
Significance	Significance is assessed by considering the forecast emissions from the scheme against national carbon budgets. Where the scheme emissions are not sufficiently large to materially impact the ability of the UK to meet carbon budgets, then the effect of the scheme is categorised as not significant. This is in-line with DMRB guidance.	Continue to use the same (i.e. DMRB) approach to assess significance, however, in the reporting clearly acknowledge that: • Alternative guidance (e.g. IEMA) would lead to different outcome. • DMRB guidance is not mandatory • Mitigation should be focussed on regardless
Carbon budget comparison	Compare scheme GHG emissions as a proportion of national (UK) carbon budgets, as used in assessment of significant.	Continue to compare scheme GHG emissions against national carbon budgets. Continue to monitor availability of regional/local carbon targets and budgets, along with sector-based route maps. These should be used for comparisons, alongside national budgets, where available. Do not attempt to back calculate local carbon targets or proportional national targets according to scheme users or local population.
Mitigation	Emphasis on mitigation and value engineering, according to PAS2080 principles, regardless of the outcome of the significance assessment or comparison against national carbon budgets.	Continue to focus on mitigation. Also: • Ensure that the EIA reporting contains sufficient clarity, and highlights that ambitious mitigation is essential, regardless of the significance assessment findings. • Undertake and record low-carbon optioneering, such as workshops, early in the design process.

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