The Cambridge South East Transport Order

Transport And Works Act 1992

Transport And Works (Applications And Objections Procedure) (England And Wales) Rules 2006

Volume 1: Non-Technical Summary

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1.0 INTRODUCTION

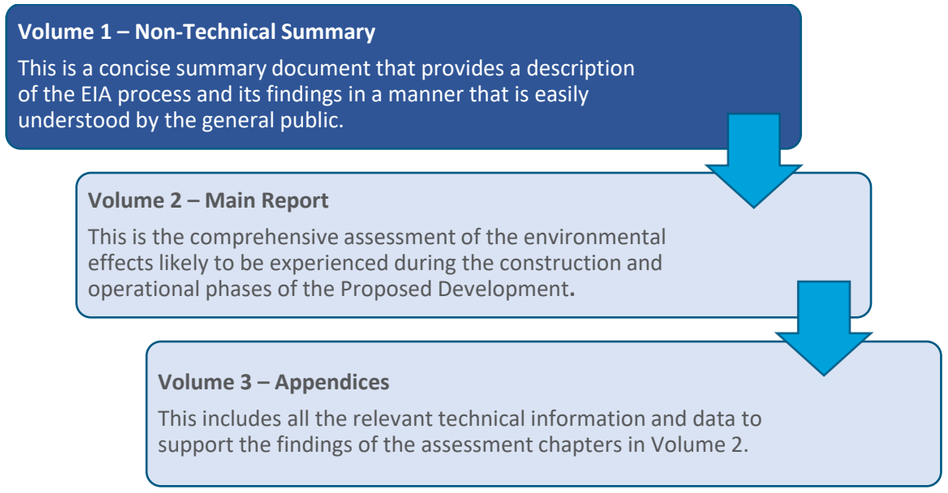
1.1 Understanding the Environmental Statement

The Environmental Statement is a document, or set of documents, that is required to be provided by the applicant as part of the process of Environmental Impact Assessment (EIA) to provide information on the likely significant environmental effects of a proposed development. EIAs are undertaken on development projects where there is a potential for causing significant environmental effects. The EIA process is informed by inputs from various organisations including local authorities, statutory consultees such as the Environment Agency, Natural England, and others, and members of the public through consultation events.

The Environmental Statement is required by law to accompany certain development applications such as planning applications, or in the case of this Proposed Development, a Transport and Works Act Order application and direction for deemed planning consent.

The Environmental Statement contains information on the existing environment and how this will be affected by the Proposed Development, so that the decision maker can take this into account when deciding whether to make the TWAO and planning direction. Crucially, the decision maker needs to take into account any effects to the environment that could be 'significant'. The information contained within the ES has been specified by the Secretary of State in the Scoping Opinion.

This Environmental Statement comprises three volumes. This document is Volume 1, the Non-Technical Summary (which is also available as a stand alone document). A brief description of each of the three volumes, and how they relate, is provided below to help you determine which document is the most useful for you to find the information you require.



Environmental Statement volumes

The Non-Technical Summary provides an overview of the environment as it is now. It is also required to include the following:

- A description of the Proposed Development
- The likely significant effects on the environment
- How the scheme has been designed to minimise adverse effects on the environment and the mitigation measures included to prevent, reduce, and offset likely impacts
- A description of the reasonable alternatives that were considered and the main reasons for the option chosen (taking into account the effects of the project on the environment)

1.2 Background

The problem

Cambridge is a fast growing city but also a constrained one due to the surrounding greenbelt. This has resulted in a shortage of affordable housing meaning that many people that work in Cambridge live outside the city and commute to their places of work.

Many of these commuter journeys are undertaken by car due to a lack of suitable public transport options and this causes congestion in the crowded city centre. This leads to other problems, such as reduced air quality, increased noise, conflicts with other road users such as cyclists, and a general reduction of amenity value.

The solution

The Greater Cambridge Partnership (GCP) is the local delivery body for a City Deal signed by central Government to bring powers and investment to the region, including improvements to critical infrastructure. The GCP comprises five partners:

- Cambridge City Council
- Cambridgeshire County Council
- South Cambridgeshire District Council
- University of Cambridge
- Local Enterprise Partnership

Through the City Deal, funding has been secured to develop a series of transport infrastructure improvements to address the problems of congestion. One of the projects being put forward is the Cambridge South East Transport Phase 2 (CSET2) project, herein referred to as the Proposed Development.

The Proposed Development is a mostly new, segregated, guided bus route, travel hub, and active travel path located to the south east of the city, as shown in the Site location plan below and more detailed plan in Section 2. The Site comprises all of the land within the red line boundary which coincides with the proposed Order Limits as defined in the draft TWAO accompanying the application.

Starting at the Cambridge Biomedical Campus, where it ties into the existing Francis Crick Avenue, the route then crosses open countryside towards the proposed new travel hub at the A11 / A1307 road junction at Babraham.

Objectives

There are five objectives of the Proposed Development as follows:

- Objective 1: Improve connectivity to employment sites in south east Cambridge and central Cambridge
- Objective 2: Support the continued growth of Cambridge and south Cambridge's economy
- Objective 3: Improve road safety for all users of the A1307 corridor
- Objective 4: Relieve congestion and improve air quality in south east Cambridge
- Objective 5: Improve active travel infrastructure and public transport provision in south east Cambridge

1.3 Alternatives to the Proposed Development

Throughout the design phase, various alternative options have been considered and assessed to ensure that the Proposed Development is the best possible option to deliver the scheme objectives.

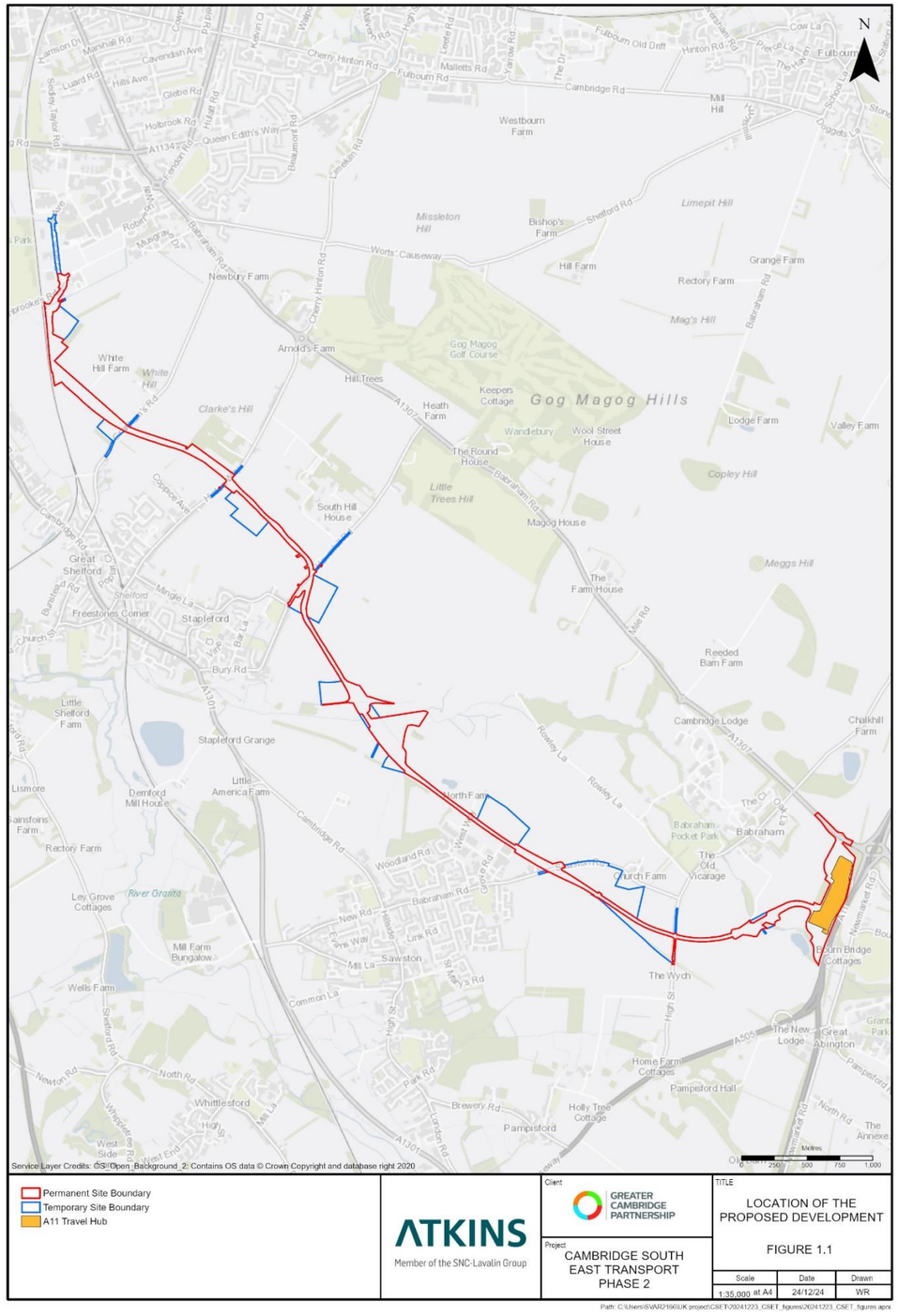
At the outset, the following three strategic options were identified with Strategy 1 ultimately being the preferred option as it performed best against the objectives stated above despite having the greatest environmental impact:

- Strategy 1 – Busway via Sawston with A11 Park and Ride
- Strategy 2 – On highway bus lanes with A11 Park and Ride plus bus only link to Cambridge Biomedical Campus
- Strategy 3 – On highway bus lanes with A11 Park and Ride

Once Strategy 1 had been determined to be the preferred strategy, a long list of 90 possible route alignments was developed and reduced to a shortlist of seven route alignment options. These were assessed against a range of performance criteria, including environmental effects, to decide on the preferred option. This was then further refined to minimise environmental impacts and costs, and to address points raised throughout the consultation process.

At each stage of the process the public and statutory stakeholders were consulted to identify their concerns and to ensure the design addressed these where possible.

As the design developed, a number of small amendments were made to address specific areas of concern raised by stakeholders and consultees and to improve the performance of the Proposed Development.



Location of the Proposed Development

2.0 THE PROPOSED DEVELOPMENT

2.1 Overview

The Proposed Development comprises the construction and operation of a sensor guided busway, an emergency and maintenance accesstrack that also serves as a multipurpose active travel path (Service Track), a new Travel Hub, three new bus stops, associated infrastructure including drainage and lighting, and landscaping.

2.2 The Proposed Development design

Route alignment

The Proposed Development overview, opposite, shows the proposed route alignment. The proposed alignment was decided through a rigorous process that identified a long list of possible options that was reduced to a short list and a final preferred option that became the Proposed Development. The environment was a key consideration in this option selection process, and the proposed alignment has been developed to avoid or minimise environmental impacts.

The northern end of the Proposed Development starts at Francis Crick Avenue where buses will run on the existing highway. Some modifications to the pedestrian footway and a new bus stop will be required.

The offline busway commences at the southern end of Francis Crick Avenue, where the route crosses through the centre of the roundabout. The route then travels through multiple agricultural fields, crossing Granham's Road, Hinton Way, Haverhill Road, Sawston Road and High Street before finishing at the proposed new Travel Hub.

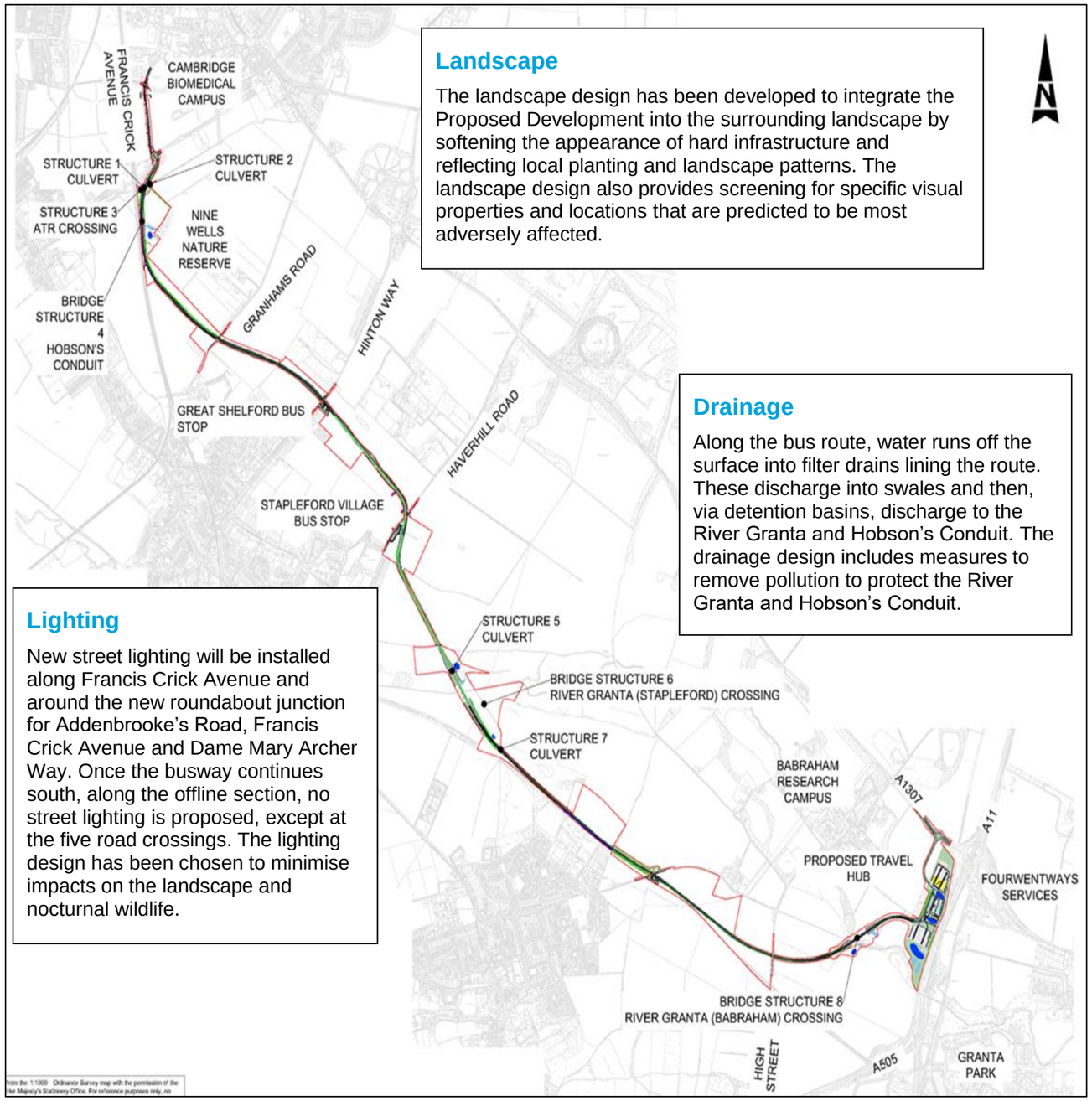
As it passes through the countryside, the busway will cross Hobson's Brook and the River Granta twice.

The busway passes north east of three villages, Great Shelford, Stapleford, and Sawston.

Guidance technology

The proposed guidance technology is an advanced automated system which will control the bus alignment by the use of sensors. The bus driver will still control the speed of the bus. The busway design also enables a kerb guided system to be installed using metal guide rails.

The guidance system will control the bus alignment at stops to enable precise alignment, allowing for easy access and egress for passengers to and from the bus stop platforms. Buses will revert back to normal driver operation when travelling on the public highway or private roads and approaching junctions throughout the route. The guidance system will be in situ and in use for the majority of the new busway that is sought to be authorised.



Landscape

The landscape design has been developed to integrate the Proposed Development into the surrounding landscape by softening the appearance of hard infrastructure and reflecting local planting and landscape patterns. The landscape design also provides screening for specific visual properties and locations that are predicted to be most adversely affected.

Drainage

Along the bus route, water runs off the surface into filter drains lining the route. These discharge into swales and then, via detention basins, discharge to the River Granta and Hobson's Conduit. The drainage design includes measures to remove pollution to protect the River Granta and Hobson's Conduit.

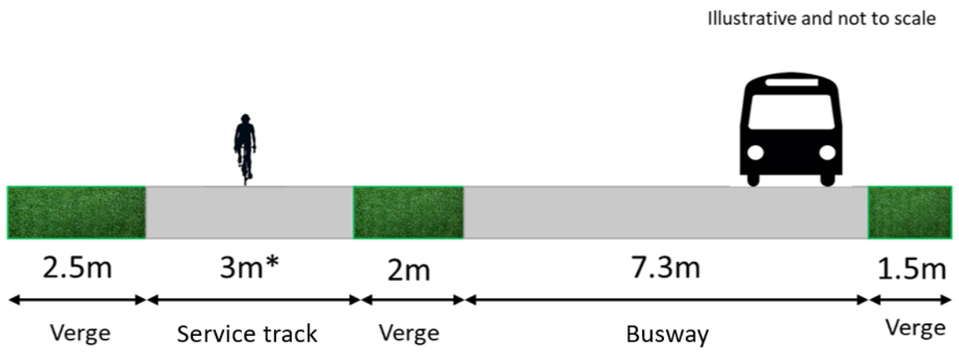
Lighting

New street lighting will be installed along Francis Crick Avenue and around the new roundabout junction for Addenbrooke's Road, Francis Crick Avenue and Dame Mary Archer Way. Once the busway continues south, along the offline section, no street lighting is proposed, except at the five road crossings. The lighting design has been chosen to minimise impacts on the landscape and nocturnal wildlife.

Proposed Development overview

Busway

The busway will be 7.3 m wide and will be constructed from concrete with an asphalt surface. The busway will mostly follow the level of the existing ground but there will be some short sections where ground levels will need to be raised or lowered to account for local depressions and rises.



*Note the width of the service track varies in width upon the bridge decks and where replacing the existing DNA path

Typical cross-section of the busway

Service track

Adjacent to the busway will be the Service Track, providing access along the entire length of the busway for any required maintenance activities and also acting as an emergency refuge for passengers and staff in the event of an incident.

The Service Track will also be able to provide a new segregated route for walkers, cyclists, and for most of the route, horse riders. It is intended to be a public bridleway for the route between the Cambridge Biomedical Campus and the A11 Travel Hub, but created expressly subject to the authority for vehicles connected with the maintenance and safety of the busway to drive on the Service Track.

For the majority of the route, the Service Track will be a new facility, but it will merge with and replace the existing DNA Cycle Path (a public cycletrack) where it joins the new busway route from just south of Nine Wells Local Nature Reserve (LNR) and re-joins the existing DNA path at the end of Addenbrooke's Road overbridge.

Structures

The busway crosses the River Granta twice, once at Stapleford and again at Babraham. The bridge at Stapleford spans the River Granta and associated river flood zone and is 118 m in length. At the Brabraham crossing the bridge is approximately 130 m in length and also spans the River Granta. Hobson's Conduit Bridge will be a single span bridge, approximately 14.4 m in width.

The below visualisation shows how the River Granta bridge at Stapleford will look, 15 years after opening, once the landscaping has established.

There will also be three culverts and a pedestrian footbridge to allow the busway and Service Track to cross drainage ditches.

River Granta crossing at Stapleford

Travel hub

The Travel Hub is split into three areas, a northern car park, a central car park and a southern car park.

There are separate tree-lined pedestrian routes through the Travel Hub, between the parking areas and the waiting area. A public footpath linking Babraham and Great Abington, via an existing footbridge over the A11, passes through the centre of the Travel Hub. This will be retained and incorporated into the design. The Travel Hub includes the following:

- 1,250 car parking spaces
- 10 coach bays
- 63 blue badge holder parking bays
- 29 bays for drop off parking
- Motorcycle parking

In the northern car park, approximately 150 bays will be covered by solar panels to power the Travel Hub. It is planned that there will be car charging facilities provided in line within the current regulations. A small building in the central area will provide a covered waiting area for all passengers, toilets and maintenance facilities. Access into the Travel Hub will be from a new roundabout junction on the A1307 and a short, connecting, access road.

The Travel Hub includes extensive landscaping to break up the large areas of car parking and integrate the facility into the surrounding landscape as far as possible. At the southern end of the Travel Hub, next to the River Granta, will be a series of ponds which will provide habitat for Water Vole and other species of wildlife.

Bus stops

There are three intermediate bus stops along the route at Great Shelford, Stapleford and Sawston. The locations of these stops have been chosen at locations where the busway crosses existing roads and that are as close as possible to communities along the route to maximise their use.

Each of the stops will include:

- 40 cycle stands
- Five parking bays for disabled parking
- Shelters for waiting passengers on each side of the busway. The shelters will also include real time message boards and lighting appropriate to the setting and to promote the security and safety of the busway users.
- Drop-off loop
- Landscaped areas

Sawston Stop Visualisation

The Sawston Stop visualisation shows the proposed layout of the bus stop at Sawston, but the other two bus stops will have a similar appearance.

Drainage

The drainage system adopts Sustainable Drainage System (SUDS) principles to reduce surface water runoff rates and provide some treatment to minimise pollution. SUDS measures include the use of swales, filter drains, and storage ponds.

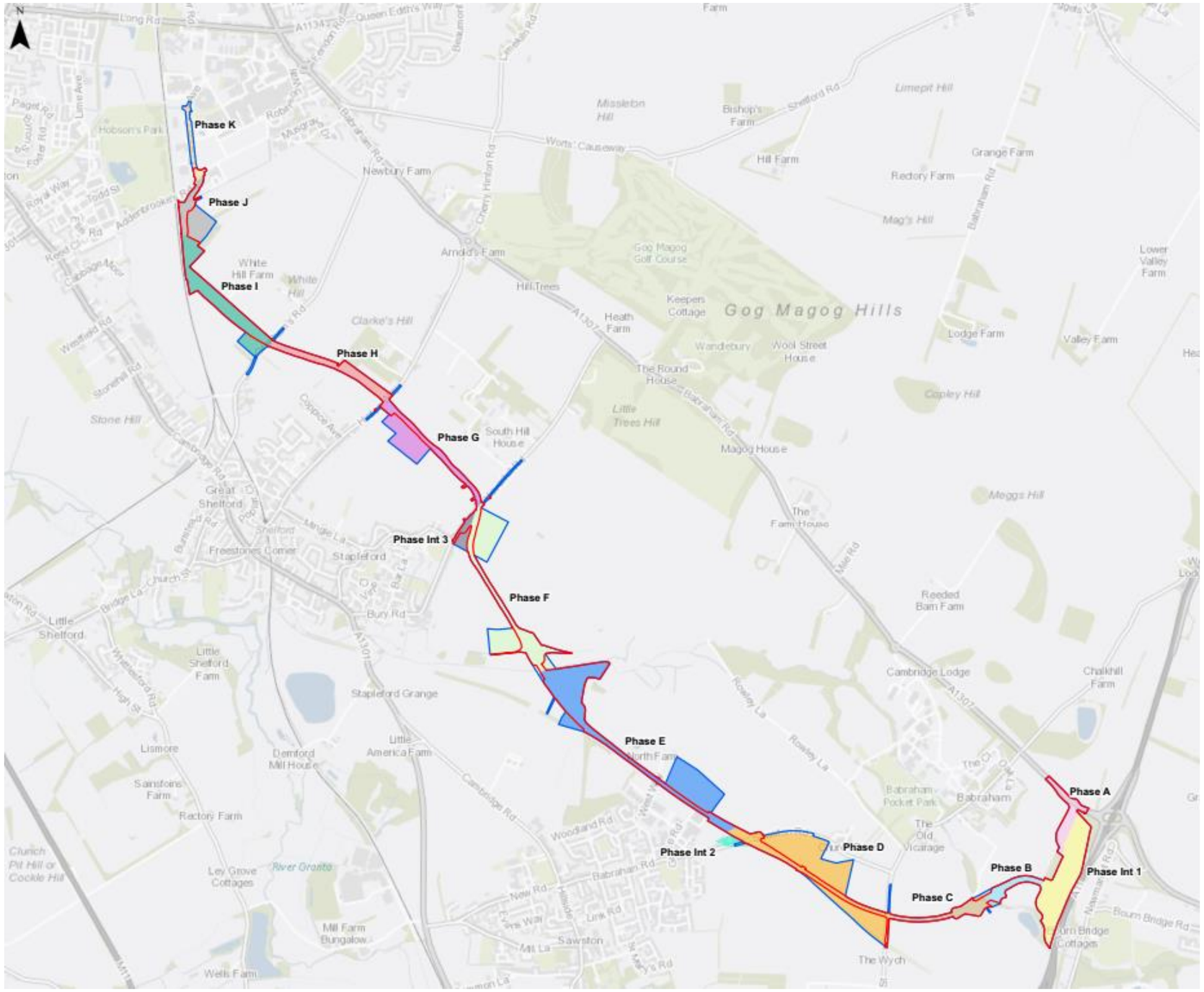
Landscaping

The landscape design includes mitigation to minimise or compensate for predicted adverse effects to landscape, visual, and ecological receptors. The landscape proposals include nature rich habitats including new woodlands, hedgerows, extensive species rich grassland and wildflower meadows, and eight new ecological ponds. This will increase the amount of habitat available for native wildlife and help to blend the appearance of the Proposed Development into the surrounding landscape.

The route alignment has been chosen to minimise the impact on land owners as far as possible, but the busway will sever some fields leaving some small and irregular shaped land parcels. These will not be suitable for farming and cannot be used by the current land owners. These parcels of land have been incorporated into the design and provide opportunities for additional planting to provide further new habitats for wildlife in the area. They will also help to further integrate the Proposed Development into the landscape.

Lighting

New street lighting columns will be installed along Francis Crick Avenue, to replace the existing street lighting, the junctions where the busway crosses existing roads, and at the Travel Hub and bus stops. Most of the busway will be unlit. Low powered solar studs will be installed along the Service Track.



Propose Development construction overview

2.3 Constructing the Proposed Development

Pending gaining the necessary consents and permissions, construction of the Proposed Development is due to start in 2026 (at the earliest).

The construction of the busway has been divided up into eleven phases, lettered A-L, based on the location along the route. The Figure to the left shows the location of each phase. Broadly, the scheme would be constructed in a south to north direction.

Site compounds work area and haul road

There will be seven site compounds located along the length of the Proposed Development, connected by a haul road that will allow for the transport of vehicles, plant, materials, and personnel. There will also be numerous materials storage areas where bulk materials delivered to the Proposed Development and waste material waiting to leave will be stored. The main site compound will be the largest compound and will be located within the area that will become the Travel Hub. The six other compounds will have site welfare facilities and offices, parking, security, small tools and Control of Substances Hazardous to Health (COSHH) secure storage areas, delivery reception area and wheel wash facilities.

The Proposed Development construction overview shows the red line boundary which defines the permanent land take required for the operation and maintenance of the Proposed Development, and the blue line boundary shows additional land that will be required temporarily to construct the Proposed Development. Land taken temporarily will be handed back to the land owner after construction is complete.

Programme

The Proposed Development will be constructed over a 26 month period as shown on the indicative programme on the next page.

Phase	Works	Duration	Month
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
A	Access road and r/a on A1307	6 months	
B	Route from Travel Hub to River Granta crossing (Bridge Structure 3)	23 months	
C	River Granta to High Street	7 months	
D	High Street to Sawston Road and Sawston Stop	9 months	
E	Sawston Road to River Granta (Stapleford) – bridge structure 2	14 months	
F	River Granta (Stapleford) to Haverhill Road and Stapleford Stop	10 months	
G	Haverhill Road to Hinton Way and Gt Shelford Stop	11 months	
H	Hinton Way to Granham's Road	10 months	
I	Granham's Road to Hobson's Brook and bridge (Structure 1)	9 months	
J	Hobsons Brook to entrance onto Francis Crick Avenue	5 months	
K	Francis Crick Avenue	17 months	
	Great Shelford Stop (Interchange 1)	4 months	
	Stapleford Stop (Interchange 2)	4 months	
	Sawston Stop (Interchange 3)	4 months	
	Travel Hub	17 months	
	Hobsons Brook Bridge (Structure 1)	11 months	
	River Granta Bridge at Stapleford (Structure 2)	17 months	
	River Granta Bridge at Babraham (Structure 3)	18 months	
	Carriageway and ATP surfacing and tie in to existing roads	3 months	
	Road marking and signs	2 months	
	Street lighting and signals	6 months	
	Completion and handover	3 months	
	Demobilisation and snagging	2 months	

Indicative construction programme

Construction traffic

All construction traffic will travel to and from the construction site along pre-defined routes that will be agreed with the Local Authority. These routes will avoid sensitive areas such as residential areas and schools. It is estimated that the following number of trips will be generated to and from the construction site across the whole 26 month construction programme:

- 54,318 heavy goods vehicles (lorries and heavy construction equipment)
- 18,106 light duty vehicles (vans and other similar sized vehicles)
- 36,212 cars

Construction activities

A detailed construction plan has not yet been developed, but it is expected that the main construction activities will be the following:

- Enabling works
- Ground engineering works
- Construction of the segregated busway
- Alterations to Francis Crick Avenue
- Construction of the Service Track
- Construction of the structures
- Construction of the Travel Hub and bus stops
- Landscaping
- Demobilisation, testing, commissioning, and handover to the project owner

Construction plant and equipment

Construction vehicles, plant and equipment will likely include:

- Excavators

- Road saws
- Ground breakers
- Dumpers
- Lorries
- Rollers
- Mobile crane
- Piling rig
- Planers

Construction materials and waste

The main categories and estimated quantities of construction materials that will be used for the Proposed Development are:

- 752,856 tonnes of aggregates (sand, gravel etc.)
- 61,769 tonnes of asphalt
- 35,888 tonnes of concrete
- 2,016 tonnes of steel

Approximately 153,600 m^3 of inert waste has been estimated to be produced during construction. This will mainly consist of surplus topsoil, sub-soil and weather rock.

Diversions

The following utilities will need to be diverted to prevent damage to them during construction:

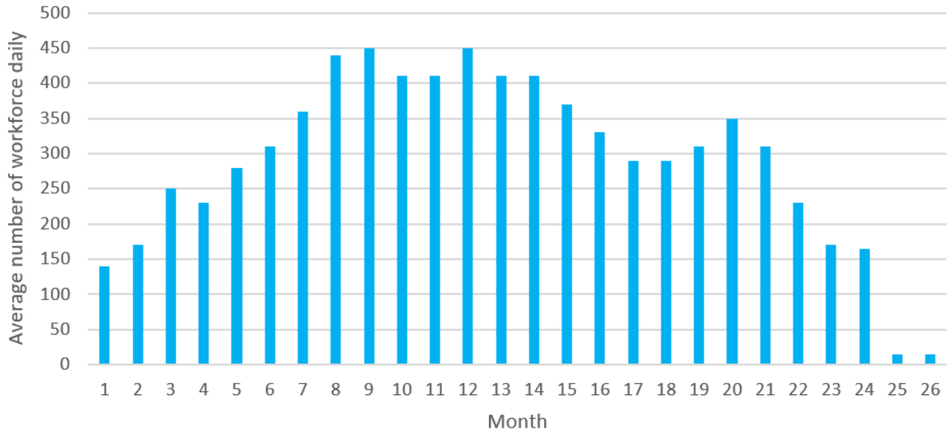
- Water pipes: 5 pipes require diverting, 4 require protection and 2 require new ducts to be installed.
- Gas pipes: 6 pipes require diversion and 1 requires protection
- Electricity cables: 10 electricity cables to be diverted
- Telecommunications: 11 telecommunication cables to be diverted

The following public rights of way will either be temporarily closed or diverted:

- Bridleway 212/2 between Stapleford and Babraham
- Restricted Byway 12/10 between Sawston and Bridleway 212/2
- Footpath 12/9 between Sawston and Babraham
- Footpath 12/4 between Babraham and the Abingdons

Workforce

The average number of daily workforce bar chart, below, shows the estimated amount of people that will be working on site throughout the construction phase.



Average number of daily workforce

Construction management and environmental protection

The construction company awarded the contract to build the Proposed Development will need to have a management system in place which will include a Code of Construction Practice and a Construction Environmental Management Plan. These documents will set out and govern the mitigation measures that will need to be implemented during construction to minimise environmental impact. The Environmental Statement includes outline versions of both the Code of Construction Practice and the Construction Environmental Management Plan.

2.4 Operating the Proposed Development

Bus services

It is anticipated that there will be six buses an hour in each direction (twelve per hour in total). Out of the six buses, two of these buses will terminate at the Travel Hub, two will carry on to Linton and Haverhill and two will go to Granta Park. It is expected that a service from Saffron Walden and the Hinxton Genome Campus development will join the busway at Sawston via the Babraham Road / Sawston Road crossing. The hours of operation are expected to be c. 06:00 to 00:00 Mondays to Sundays. However, this is subject to the final arrangements for public transport services between the Applicant, the Cambridgeshire and Peterborough Combined Authority (CPCA) and bus operator(s).

Buses

The buses are expected to be a single deck bus which is approximately 12 metres in length and can accommodate around 40 seated passengers. The buses will have hybrid engines, which will operate on Euro VI diesel engines whilst travelling along the Proposed Development busway and switch to electric propulsion when entering the Cambridge Biomedical Campus.

Along most of the route, buses will travel at the design speed of 60 mph. This will decrease at road crossings, farm access track crossings, PRoW crossings, and when approaching the stops. Buses will be self guided along the busway using sensors to control the steering. The driver will still control the speed of the vehicle and will have full control when operating on public highways.

3.0 THE SITE AND SURROUNDING ENVIRONMENT

3.1 Description of the Site

The Site mostly consists of open farmland used to grow arable crops including fields, field margins, and hedgerows. The Site crosses the River Granta twice, at Babraham and Stapleford also crossing the river floodplain in these locations.

At the northern end, the Site includes Francis Crick Avenue, part of the Cambridge Biomedical Campus. There are five other existing roads crossed by the Proposed Development that are included in the Site. These are Granham's Road, Hinton Way, Haverhill Road, and Babraham / Sawston Road, and Babraham High Street. All five roads cross the Site at more or less right angles, so that only short sections of these roads are included in the Site.

Between Francis Crick Avenue and Granham's Road is the DNA cycle path, part of the National Cycle Route 11. Part of the DNA cycle path is within the Site and will be incorporated into the Proposed Development to maintain its use as a cycle path.

Northern end of Francis Crick Avenue showing the signalised crossroad junction with the existing guided busway.

Babraham High Street looking north from the point at which the Site crosses the road

3.2 The surrounding area

The northern end of the Site is within the Cambridge Biomedical Campus with its large institutional, laboratory, and hospital buildings providing an urban setting.

South of the Cambridge Biomedical Campus, the Proposed Development passes through a largely rural corridor bound by the A1307 to the north east, the A11 to the south east, and the A1301 to the south west. The south western part is more developed than the rest of this corridor with the three villages of Great Shelford, Stapleford, and Sawston clustered along the A1301. The east is more rural, characterised by rolling agricultural hills including those of White Hill, Clarke's Hill, Fox Hill and Magog Down. The small historic village of Babraham is located in the south eastern corner of the corridor, with the Babraham Research Campus, a biotechnology business park, close by.

Adjacent to the northern part of the Site is the West Anglia Main Line owned and operated by Network Rail.

Meandering through the corridor is the River Granta and its associated flood plain. Around Stapleford, the River Granta passes through open fields but becomes tree lined and more enclosed near Babraham.

3.3 Environmental sensitivities within the area

The Environmental Constraints Plan on the following page shows the location of the key environmental sensitivities within the Site and the surrounding area. Broadly, these can be divided into four categories including the physical environment, wildlife and habitats, local communities, and cultural aspects.

Physical environment

The area surrounding the Proposed Development is all underlain by chalk bedrock which is also a Principal Aquifer from which the local population gets most of its potable water. This bedrock is close to the surface and helps to create the fertile soils in this productive agricultural landscape. Within the Site itself, most of the soils are considered Best and Most Versatile and are considered a valuable resource.

As mentioned above, the River Granta meanders across the Site in two locations, at Stapleford and Babraham, and the associated flood plain has deposited layers of sand and gravel on top of the chalk.

Hobson's Conduit also runs across the Site, originating in the Nine Wells Local Nature Reserve (LNR) and passes under the West Anglia Main Line, heading towards the River Cam in Cambridge city centre. The name Nine Wells refers to the multiple chalk springs within the LNR, as shown in the photo below. Nine Wells LNR is also designated as a Local Geological Site.

In addition to the River Granta and Hobson's Brook, there are numerous field drains, ditches and ponds within the surrounding area and across the Site.

N

Hobson's Brook

Nine Wells (LNR)

Nine Wells Monument (Listed Building)

Site revealed by aerial photography West of White Hill Farm (SAM)

DNA Cycle Path

The Beechwoods (LNR)

Gog Magog Golf Course (SSSI)

Hill Trees (Historic Landfill)

Wandlebury Camp (SAM)

Wandlebury (Country Park)

Stapleford

Great Shelford

River Granta

Babraham

Dernford Fen (SSSI)

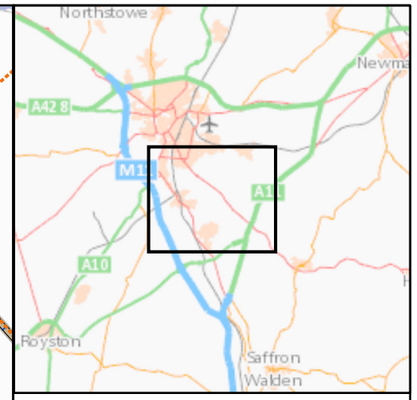
Sawston Hall Meadows (SSSI)

250m Buffer

1km Buffer

Great And Little Abington

Hoffer Brook



- Permanent Site Boundary
- Temporary Site Boundary
- 250m Site Buffer
- 1Km Site Buffer
- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Public rights of way
- National Cycle Network
- Surface Water Courses
- Country Parks
- Historical Landfill
- Open green space
- Registered parks and gardens
- Conservation Area
- Sites of Special Scientific Interest
- Flood zone 2
- Flood zone 3
- Local Nature Reserve
- Noise Important Areas
- Priority habitats
- Scheduled monuments

Metres

0 500 1,000

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GREATER CAMBRIDGE PARTNERSHIP

Project

CAMBRIDGE SOUTH EAST TRANSPORT PHASE 2

Title

ENVIRONMENTAL CONSTRAINTS MAP

Sheet Size	Original Scale	Designed / Drawn	Checked	Authorised
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Chalk spring within Nine Wells Local Nature Reserve

As a predominantly greenfield site, no ground contamination has been found, however there are three disused, historical landfill sites within 50 m of the Site boundary, one of which is within the Site, and another adjacent to the Site boundary. These historical landfill sites received inert waste which has not resulted in contamination.

As a largely rural area, air quality is good, falling well below the limits (Air Quality Objectives) where air quality could cause health problems through long term exposure. Noise levels throughout the area vary, with the main source of noise being road traffic from the A11, A1307, and smaller local roads.

Wildlife and habitats

Most of the Site and surrounding landscape is arable fields and urban development which is of relatively low ecological value, with few species of plants and animals living there. There are areas which are more ecologically valuable both within the Site and the surrounding area. These include blocks of woodland, hedgerows, ponds, rivers, ditches, and field margins. These habitats create a network across the landscape which support a wide variety of protected and important wildlife including, bats, badgers, amphibians (including great crested newts), reptiles, water vole, otter, and a wide variety of bird species.

Within the study area, there are a number of protected ecological sites that could be affected by the Proposed Development. These are:

- Eversden and Wimpole Woods Special Area of Conservation 11 km west of the Site
- Nine Wells Local Nature Reserve adjacent to the Site
- River Granta County Wildlife Site which crosses the Site at Babraham and Stapleford
- Shelford – Haverhill disused railway (Pampisford) County Wildlife Site, approximately 155 m to the south west of the Site
- Hobson's Brook South City Wildlife Site, approximately 575 m west of the Site, and Hobson's Brook Mid City Wildlife Site, approximately 605 m west of the Site.

There are a further four Sites of Special Scientific Interest, two Local Nature Reserves, eleven County Wildlife Sites, and seven City Wildlife Sites within the study area, but these have not been included in the impact assessment as there is no potential for them to be affected by the Proposed Development.

Local communities

Closest to the Site are the villages of Great Shelford, Stapleford, Sawston, and Babraham. These are the communities that will be most affected by the Proposed Development. Further afield are the communities living in Little Abington and Great Abington, separated from the Proposed Development by the A11, and to the north Trumpington and Red Cross which are the southernmost conurbations of Cambridge. Scattered across the rural landscape are other individual houses and farms.

Across the Site and surrounding area, are numerous public rights of way including the DNA cycle path (a public cycletrack) which is part of the National Cycle Route 11, footpaths, bridleways, and a byway. These are in addition to the local highway network and provide access to the countryside for local communities and visitors.

Key employment sites in the area include the Cambridge Biomedical Campus, Babraham Research Campus, Granta Park, Dales Manor Business Park, and the commercial centres of the local villages. As a rural area, there are also farms and agricultural businesses. The Site will acquire land from seven different farm businesses and landowners.

Other community facilities within the local area include:

- Two schools:
  - The Icknield Primary School in Sawston approximately 500 m west of the Site
  - Cambridge Academy for Science & Technology in Cambridge approximately 270 m north of the Site
- Open spaces including sports leisure facilities
  - Nine Wells Local Nature Reserve adjacent to the Site
  - Hobson's Park approximately 140 m to west of the Site
  - Stapleford Pavilion adjacent to the Site
  - Lynton Way Park approximately 400 m west of the Site
  - Frank Lee Leisure & Fitness Centre approximately 280 m east of the Site
- Health and social care services including:
  - Rangeford Retirement Village (yet to be constructed at the time of assessment, but planning permission has been approved) adjacent to the Site
  - Addenbrooke's Hospital approximately 285 m east of the Site
  - Royal Papworth Hospital approximately 85 m east of the Site

Cultural aspects

Landscape character for the Site and surrounding area can be summarised as following:

- Gently rounded and rolling chalk hills
- Springs located at the junction of the chalk and clay geology (such as at Nine Wells)
- Large-scale arable landscape with fields enclosed by hedges and trees

- Land rich in archaeological elements, including the Roman Road, Wandlebury Ring, burial mounds, and chalk pits
- Local Nature Reserves (LNRs) that are important recreational and ecological sites within the area, such as Nine Wells.

The farmed landscape is mostly in arable cultivation with large fields and there are pockets of woodland on the higher ground and woodland belts lining the River Granta. Villages which line the river corridor include the Shelfords, Stapleford, Sawston and Babraham.

There are numerous places throughout the landscape with views across the Site that people can access. These include views from local residents' homes, and views from the public rights of way network. A total of 33 viewpoints have been identified which represent the places with accessible views.

The landscape surrounding the Site is steeped in history. Archaeological surveys have identified 29 separate archaeological sites dating from the bronze age to the modern era, that underlie the Site.

Surrounding the Site are three Conservation Areas (Stapleford Conservation Area, Babraham Conservation Area, and Great and Little Abington Conservation Area), three Grade I listed buildings, eight Grade II* listed buildings, thirteen Grade II listed buildings, and two Scheduled Monuments. There is also the Pampisford Hall Grade II* and Sawston Hall Grade II Registered Park and Gardens within 1.5 km of the Site.

4.0 THE ENVIRONMENTAL EFFECTS OF THE PROPOSED DEVELOPMENT

4.1 Approach to the EIA process

The EIA process seeks to understand what changes to the environment will occur as a result of the construction and operation of the Proposed Development. To do this, a detailed understanding of the existing environment is obtained through a combination of site visits, detailed specific surveys, and desk based research. This allows for the identification of the existing properties and environmental features that could be affected by the Proposed Development.

Impacts from the construction and operation of the Proposed Development are identified through a combination of modelling, desk based research, professional judgement and experience from other similar projects, and discussions with various stakeholders. The likely significant impacts are characterised and an analysis is undertaken to determine what effect the impacts will have on the identified environmental receptors and whether any of the effects are significant.

Throughout this process, mitigation is identified to minimise harm to the environment. This could be in the form of changes to the design or in the way that construction will be undertaken, or it could be through additional management or mitigation measures. Where these mitigation measures are known to be effective and will be secured they are taken into account when assessing the likely significant environmental effects.

4.2 Impacts from the Proposed Development

The ES identifies impacts from the Proposed Development at two distinct phases, during construction, when the Proposed Development will be built, and during operation when construction is complete and the bus services along the busway and into Cambridge will be running. These are assessed separately because the types of impact are different and required mitigation is different for each phase. Owing to the lifespan of the Proposed Development, maintenance throughout its operational life and uncertainties as to decommissioning options in decades to come, the Scoping Opinion approved the approach set out in the ES Scoping Report that the ES does not assess the decommissioning phase.

Construction phase impacts

The main impacts that will occur during construction are:

- Vegetation clearance – loss of habitats and screening vegetation from the Site
- Groundworks – removal of topsoil, excavations for the foundations and services, construction of the bridge abutments and Site levels
- Construction traffic – movements of heavy goods vehicles transporting construction materials and equipment to and from the Site, transporting waste away from the Site, and the daily commute of construction workers to and from the Site
- Pollution – dust and emissions to air from the engines of construction equipment, vehicles, surface water drainage which could be contaminated with soils and chemicals, leaks and spills from construction equipment and chemical storage
- Visual impacts – from the presence of construction equipment and activities, large material stockpiles, site hoardings and the presence of new structures and activities within the landscape
- Noise – from construction traffic, construction equipment, handling of aggregates and other construction materials, and from vehicle alarms
- Carbon emissions – including embedded carbon emissions in the construction materials, carbon emissions from the engines of construction equipment on Site and vehicles travelling to and from Site, and from the removal of vegetation across the Site.

Operational phase impacts

Once the Proposed Development is operational and bus services are running, this will result in the following:

- Changes in traffic flows on the surrounding road network as people change their journey patterns to use the new bus services
- Movement of buses along the new busway and the surrounding highway network, including the existing guided busway, to Cambridge Station resulting in noise and traffic emissions and impact on views
- The presence of new infrastructure within the landscape including new light sources
- Increased surface water runoff which could include pollutants from buses
- Improved connectivity for walkers, cyclists, and horse riders who are able to use the new service track for journeys
- The establishment of new habitats for important and protected wildlife in the landscaped areas, which will result in biodiversity net gains.

4.3 Mitigation measures

Throughout the design process, the potential environmental effects of the Proposed Development have been considered. There are many aspects of the design which have sought to avoid impacts altogether or minimise their environmental effects where impacts are unavoidable. During construction, most mitigation will be in the form of construction site management and good working practices. The delivery of these measures will be secured through the TWAO and the deemed planning permission, and will be managed on site through the series of control documents, an outline of which accompany the applications for the TWAO and deemed planning permission. Following the grant of a TWAO and deemed planning permission the outline documents will be developed into detailed requirements for the contractor to follow to avoid or minimise significant environmental effects prior to approval in accordance with the deemed planning permission. These documents are:

- Code of Construction Practice
- Construction Environmental Management Plan
- Spoils Management Strategy
- Construction Lighting Plan

Most mitigation for the operational phase has been integrated into the design of the infrastructure. The landscape design has been developed to integrate the Proposed Development into the landscape and screen sensitive viewpoints as far as possible. Impacts to wildlife from the loss of existing habitat have also been mitigated through the landscape design which includes new and replacement habitats for wildlife. The landscape design will be monitored and managed for the benefit of the wider landscape and wildlife through a Landscape and Ecological Management Plan.

The lighting design has been developed to minimise light spill and ensure that only the parts of the Proposed Development that require lighting are lit. Careful consideration has been given to minimise the impacts of light on local residents, nocturnal wildlife, and the wider landscape.

The drainage strategy adopts the principles of Sustainable Urban Drainage Systems which seeks to manage surface water flows across the Site to minimise possible downstream flooding and ensure that any discharges are free from pollutants.

Where the busway is located close to homes, noise bunds and fences will be constructed to minimise the noise from buses using the busway.

4.4 Predicted significant environmental effects

The identified mitigation will avoid or minimise significant environmental effects as far as possible, but some adverse environmental effects which are still considered significant will remain. This is normal for a large infrastructure project at the scale of the Proposed Development, even with comprehensive mitigation and control measures in place. There will also be significant environmental benefits from the Proposed Development. The significant adverse effects and significant benefits of the Proposed Development are summarised in the below tables for both the construction and operational phases.

Summary of the significant adverse and beneficial environmental effects from the Proposed Development during construction

	Significant environmental effects during the construction phase	Proposed mitigation
Noise	Significant adverse noise from construction satellite compounds will be experienced by people living in houses closest to construction compounds, along Hinton Way, Haverhill Road, and Sawston Road / Babraham Road. The effect will last for most of the construction phase, whilst the satellite compounds are in use. The assessment assumed that all works are happening on the boundary of the compound. If noisy works, such as lorry movements, tele-handlers and the wheel wash are limited to being 20 m or more from the site boundary, the noise from the compound would not be significant.	Mitigation measures, including monitoring, to minimise noise have been identified and will be specified in the Construction Environmental Management Plan.
Soils	There will be a permanent loss of 53 hectares of agricultural land with Best and Most Versatile soils.	It is not possible to mitigate this loss.
Waste	The disposal of 153,600 m^3 of waste would result in a significant reduction in landfill capacity if alternative uses cannot be found. Most of this waste is inert and likely to be reusable for landscaping, or land restoration schemes but it will not be known if such schemes are available and willing or able to take the waste generated by the Proposed Development, until the detailed design stage. This would be further investigated at detailed design.	Find alternative uses for waste materials to avoid disposal at landfill.
Landscape	The presence of the construction site within the River Granta Valley Landscape Character Area would significantly reduce its quality. This would be a temporary effect, lasting for the duration of the construction phase. The Construction Environmental Management Plan would seek to minimise the effect as far as possible but the scale of the construction site in a quiet rural location would still result in a significant effect. This will be a temporary effect, lasting for the duration of the construction works.	Limited ability to mitigate, but the Construction Environmental Management Plan specifies general measures to minimise visual intrusion.

	Significant environmental effects during the construction phase	Proposed mitigation
Visual impact	The construction site would introduce uncharacteristic new landscape features to views that would be out of keeping with existing views. Views at the following locations would be temporarily significantly impacted for the duration of the construction phase: • VP4 Users of National Cycle Route 11/DNA Cycle Path (PPA/0155) looking South • VP6 Visitors to Nine Wells Nature Reserve and users of Footpath 198/2 looking west • VP7 Users of National Cycle Network Route 11/DNA Cycle Path (PPA/0155) looking north • VP8 Residents at White Hill Farm, Nine Wells House and White Hill House, and users of the permissive bridleway looking south-west • VP14 Residents on Hinton Way and Coppice Avenue looking north-east • VP15 Residents on Mingle Lane, Duke's Meadow and the western end of Gog Magog Way and visitors to St Andrew's Church and Stapleford Cemetery looking north-east • VP16 Residents on Haverhill Road, Chalk Hill and at the eastern end of Gog Magog Way looking north-east • VP17 Residents of Middlefield Cottage, South Hill House, the House on the Hill and other residences on Fox Hill and users of Haverhill Road looking south and south-west • VP19 Users of Bridleway 212/2 and residents on Haverhill Road looking east • VP20 Users of Bridleway 212/2 looking west • VP22 Users of Restricted Byway 12/10 and residents of North Farm looking south-west • VP24 Residents on Sawston Road / Babraham Road, Lynton Way and Stanley Webb Close looking east and south-east • VP25 Users of Footpaths 179/1, 179/2, 196/12 and 196/14 looking north-east • VP26 Users of Sawston Road and the cycleway looking west • VP27 Users of Footpath 12/8 and 12/9 and residents in properties north of Sawston Road looking south • VP28 Users of Sawston Road and High Street looking east • VP30 Users of Footpath 12/4 looking south and south-east and Footpath 4/3 looking west	Limited ability to mitigate, but the Construction Environmental Management Plan specifies general measures to minimise visual intrusion.
Archaeology	Sixteen separate archaeological remains have been identified within the Site. These are likely to be lost or damaged during any ground breaking tasks, such as topsoil stripping and any excavations, resulting in a significant adverse effect.	Mitigation will be agreed with the County Archaeologist and is likely to include the recording of all remains prior to construction.
Traffic	The only potential significant adverse effect predicted during construction is additional driver delay on Francis Crick Avenue due to temporary traffic management arrangements that could affect ambulances accessing Addenbrookes Hospital.	A construction traffic management plan would identify measures to keep disturbance to a minimum.
Population and human health	Commercial businesses will benefit from the stimulation to the local economy during construction from the use of local supply chains for construction materials and services such as accommodation and food and drink which will be required by construction workers. This will be a temporary benefit, lasting for the duration of the construction works.	None required as this would be a benefit of the Proposed Development.

	Significant environmental effects during the construction phase	Proposed mitigation
Cumulative effects	Significant adverse in-combination effects to staff and workers at the Cambridge Biomedical Campus due to the combined effects of construction noise, visual impact, and additional traffic congestion from the Proposed Development. This will be temporary, lasting for the duration of construction works along Francis Crick Avenue, and reversible. The following significant adverse effects would arise, when considering the cumulative effects of the Proposed Development with other proposed or consented developments: • Permanent loss of 84.3 ha of best and most versatile agricultural land when the Proposed Development is considered in combination with the Genome Campus (Planning Reference S/4329/18/OL) • A temporary cumulative change in character of the Granta Valley landscape character area is predicted when the Proposed Development is considered in combination with the South West Travel Hub, the Land at Newbury Farm (Planning Reference 19/1168/OUT), and the East West Rail Connection Stage 3 developments • A permanent cumulative loss or truncation of the 08339 Cropmark Complex at Addenbrooke's (known archaeological remains, that are partially underlying the Proposed Development) due to the construction works for both the Proposed Development and the Cambridge South Station • Temporary, cumulative, adverse effects caused by disruption to traffic along Francis Crick Avenue from the construction of both the Proposed Development and the ongoing construction of the Cambridge Biomedical Campus • Temporary, cumulative adverse effects caused by disruption to traffic along Granham's Road from the construction traffic accessing both construction compound 6 of the Proposed Development, and the adjacent construction compound for the East West Rail Connection Stage 3 development.	Coordination with the East West Rail Connection Stage 3 project to try and plan construction phases to avoid if possible, and minimise if not, any overlap of construction programmes.

Summary of the significant adverse and beneficial environmental effects from the Proposed Development during operation

	Significant environmental effects during the operational phase	Mitigation
Noise	Significant adverse noise effects would occur at houses along Hills Road, Long Road, Regent Street, and Park Terrace. These noise effects would be caused by the operation of the Proposed Development bus services on the existing highway network and existing guided busway. At these locations buses would be operating under electric power and the main noise source would be the interaction between the road surface and bus tyres.	The noise effects would occur outside of the Site on the existing highway network, and it is not possible to mitigate further. Thresholds for compensating residents would not be met. It is proposed to monitor the situation using National Highways Post Opening Project Evaluation approach.
Landscape	The presence of the Proposed Development within open countryside would alter the character of the River Granta Valley Landscape Character Area by introducing uncharacteristic new features into the landscape, resulting in a significant adverse effect. The landscape design has been developed to integrate the busway and other hard elements of the Proposed Development such as car parking, structures, and the Service Track, into the landscape, as far as possible, by softening their appearance and screening them through the use of hedgerows and tree planting. Significant adverse effects would be worse at the opening year, before landscape planting has established, and would lessen overtime as the vegetation grows.	The landscape design mitigates landscape impacts as far as possible, and no further mitigation is proposed. The Landscape and Ecological Management Plan sets out the monitoring requirements.

	Significant environmental effects during the operational phase	Mitigation
Visual impact	Changes in views from 14 viewpoints will result in significant adverse effects at the opening year, before landscape planting has established. After 15 years, landscape planting will have established and grown, providing a screening effect that will reduce the harm to views. Significant adverse effects will still occur at the following seven viewpoints after 15 years: • VP4 Users of National Cycle Route 11/DNA Cycle Path (PPA/0155) looking south • VP16 Residents on Haverhill Road, Chalk Hill and at the eastern end of Gog Magog Way looking north-east • VP20 Users of Bridleway 212/2 looking west • VP22 Users of Restricted Byway 12/10 and residents of North Farm looking south-west • VP24 Residents on Babraham Road, Lynton Way and Stanley Webb Close looking east and south-east • VP26 Users of Sawston Road and the cycleway looking west • VP30 Users of Footpath 12/4 looking south and south-east and Footpath 4/3 looking west The following seven viewpoints would receive significant environmental effects at the opening year only and would not be significant after 15 years, once vegetation screening has established: • VP7 Users of National Cycle Network Route 11/DNA Cycle Path (PPA/0155) looking north • VP8 Residents at White Hill Farm, Nine Wells House and White Hill House, and users of the permissive bridleway looking south-west • VP14 Residents on Hinton Way and Coppice Avenue looking north-east • VP15 Residents on Mingle Lane, Duke's Meadow and the western end of Gog Magog Way and visitors to St Andrew's Church and Stapleford Cemetery looking north-eastVP17 Residents of Middlefield Cottage, South Hill House, the House on the Hill and other residences on Fox Hill and users of Haverhill Road looking south and south-west • VP19 Users of Bridleway 212/2 and residents on Haverhill Road looking east • VP25 Users of Footpaths 179/1, 179/2, 196/12 and 196/14 looking north-east	The landscape design mitigates landscape impacts as far as possible, and no further mitigation is proposed. The Landscape and Ecological Management Plan sets out the monitoring requirements.
Population and human health	Walkers, cyclists, and horse riders will benefit from a new segregated route along the length of the Proposed Development through the use of the Service Track as an active travel path. This will be a significant benefit of the Proposed Development. Commercial businesses and local residents will benefit from improved journey reliability and reduced journey times across the local transport network. This will be a significant benefit of the Proposed Development	Significant effects are beneficial, so no mitigation is required.
Cumulative effects	A significant cumulative beneficial effect is predicted to occur due to an increase in Broadleaved semi-natural woodland that would occur from both the Proposed Development and the Cambridge South Station.	Significant effects are beneficial, so no mitigation is required.

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