A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 6

6.1 Environmental Statement

Chapter 2: The Scheme

Planning Act 2008

Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

26 February 2021

Infrastructure Planning

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A428 Black Cat to Caxton Gibbet improvements

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Chapter 2: The Scheme

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2 The Scheme

2.1 Need for the project

2.1.1 Highways England's strategic road network (SRN) drives local, regional and national economic activity by enabling new housing and business developments to come forward, encouraging trade and attracting investment.

2.1.2 In 2013, the Government announced plans for the biggest ever upgrade of the SRN within *Investing in Britain's Future* (Ref 2-1), which included proposals to significantly increase investment in road projects by 2020/2021. In 2015, the Department for Transport identified the need for improvements to the SRN in the *Road Investment Strategy for the 2015-2020 period* (RIS1) (Ref 2-2).

2.1.3 Within the East of England area, the RIS1 (Ref 2-2) outlines the case for "*improvement of the A428 near St Neots, linking the A421 to Milton Keynes with the existing dual carriageway section of the A428 to Cambridge. The Scheme is expected to include significant improvements to the Black Cat roundabout, where the A1 currently meets the A421*".

2.1.4 A commitment to fund the Scheme within Road Period 2 (covering the financial years 2020/21 to 2024/25) was subsequently made in 2020 by the Department for Transport in its *Road Investment Strategy 2: 2020 – 2025* (Ref 2-3) (RIS2).

Existing problems

2.1.5 The existing A428 between Wyboston interchange and Caxton Gibbet in Cambridgeshire is the only remaining stretch of single carriageway between the two key economic hubs of Milton Keynes and Cambridge. Drivers suffer daily congestion, delays and incidents.

2.1.6 The existing Black Cat roundabout experiences significant queuing on all approaches to the junction. In addition, long traffic queues can form on the existing A428 between St Neots and Caxton Gibbet.

2.1.7 Journey times between the existing Black Cat roundabout and the existing Caxton Gibbet roundabout are significantly longer in peak periods than in off-peak periods. This is a consequence of road sections and intermediate junctions reaching capacity, which results in delays along the existing A428.

2.1.8 Highways England has identified the following key problems associated with the existing A428:

a. There is a lack of viable alternative east-west routes between Cambridge and other economic centres such as Milton Keynes, Northampton and Bedford.

b. There is poor non-motorised user provision along the corridor.

c. A number of junctions along the corridor operate close to, or at capacity.

d. Peak hour speeds along the corridor are significantly lower than the rest of the day.

e. Speeds on the single carriageway sections of the corridor are significantly lower than those that are dualled.

f. There is a high degree of journey time variability along the corridor, making it difficult for users to plan their journey with confidence.

g. Safety and maintenance issues along the corridor.

h. There is low resilience against accidents and incidents.

i. There is a lack of driver information along the corridor.

j. 'Rat-running' on local roads through villages (resulting from drivers seeking alternative routes to avoid the existing A428).

k. The above problems constrain economic growth along the corridor.

2.1.9 Significant traffic growth is predicted on the road network, with potential developments in surrounding areas expected to contribute to an increase in future traffic flows on the existing A428. Without improvement, these developments are likely to exacerbate the current problems of safety, congestion and journey reliability on the route and could inhibit growth in homes and jobs along the St Neots – Cambridge corridor.

2.1.10 Further information regarding the problems on the existing A428 are presented in the Transport Assessment **[TR010044/APP/7.2]**.

2.2 Scheme objectives

Purpose and objectives of the Scheme

2.2.1 The purpose of the Scheme is to address the problems of congestion, poor journey time reliability and poor resilience against incidents between the Black Cat and Caxton Gibbet roundabouts. The Scheme seeks to address these problems through construction of a new 16 kilometre (10 mile) dual 2-lane carriageway from the Black Cat roundabout to Caxton Gibbet roundabout, to be known as the A421 (hereafter referred to as the 'new dual carriageway') and in addition approximately 3 kilometres (1.8 miles) of tie-in works

2.2.2 The objectives of the Scheme have been developed in light of the problems identified above and Highways England's wider environmental and customer satisfaction aspirations. These objectives are set out below.

a. **Connectivity**: Cut congestion and increase capacity and journey time reliability between Milton Keynes and Cambridge, including by providing a free flowing network.

b. **Economic growth**: Enable growth by improving connections between people and jobs and supporting new development projects.

c. **Safety**: Improve safety at junctions, side roads and private accesses by reducing traffic flows on the existing A428. Improve safety on the A1 by removing existing side road junctions and private accesses onto the carriageway.

d. **Environmental improvements**: Maintain existing levels of biodiversity and have a beneficial impact on air quality and noise levels in the surrounding area.

e. **Accessibility**: Ensure the safety of cyclists, walkers and horse riders and those who use public transport by improving the routes and connections between communities.

f. **Resilience**: Improve the reliability of the road network so that it can cope better when accidents occur.

g. **Customer Satisfaction**: Listen to what is important to our customers to deliver a better road for everyone and improve customer satisfaction.

Design principles

2.2.3 The RIS1 (Ref 2-2) includes the government's vision to "*…see the Strategic Road Network working more harmoniously with its surroundings, impacting less on local communities and the environment*".

2.2.4 In response to this, an independent design review panel has been established by Highways England, the role of which is to support and advise on the design quality of road projects delivered through the RIS1 (Ref 2-2). The panel has developed an overarching design vision and a set of good road design principles for road projects, against which the success of individual projects can be assessed during their design-development, implementation and operational stages.

2.2.5 *The Road to Good Design* (Ref 2-4) contains a set of ten principles for good road design, established by the panel in 2018. Centred on the themes of connecting people, places and processes, they encourage better design and provide a basis for road schemes to be objectively reviewed at key stages of their development.

2.2.6 In balancing and co-ordinating the aesthetic, functional and technological considerations of highway design, *The Road to Good Design* (Ref 2-4) states that good roads design:

a. Makes roads safe and useful.

b. Is inclusive.

c. Makes roads understandable.

d. Fits in context.

e. Is restrained.

f. Is environmentally sustainable.

g. Is thorough.

h. Is innovative.

i. Is collaborative.

j. Is long-lasting.

2.2.7 These ten principles have informed the design-development of the Scheme. Further details of how the design of the Scheme has taken account of these principles are presented in Section 2.5.

2.3 Project location

Location

2.3.1 The Scheme would be implemented on land within the administrative areas of the following authorities, located in the east of England:

a. Cambridgeshire County Council.

b. Huntingdonshire District Council.

c. South Cambridgeshire District Council.

d. Bedford Borough Council.

e. Central Bedfordshire Council.

2.3.2 **Figure 1.1** of the Environmental Statement **[TR010044/APP/6.2]** illustrates the geographic location of the Scheme in relation to these administrative areas.

2.4 Baseline scenario

Existing baseline

2.4.1 The existing baseline refers to the conditions that currently exist.

2.4.2 The following sections describe the main features, interests and designations in the area associated with the Scheme and its immediate surroundings, the locations of which are illustrated on **Figure 2.1** of the Environmental Statement **[TR010044/APP/6.2]**.

2.4.3 Details of the existing baseline applicable to the individual environmental topics assessed as part of the environmental impact assessment (EIA) of the Scheme are reported in **Chapters 5 – 14** of the Environmental Statement **[TR010044/APP/6.1]**.

Transportation

Existing road network

2.4.4 The existing A428 connects into the A1 Great North Road at the Wyboston interchange approximately 2 kilometres (1.24 miles) north of the existing Black Cat roundabout and runs in a broadly west to east direction for approximately 17 kilometres (10.56 miles), before connecting into the existing Caxton Gibbet roundabout, south of Papworth Everard.

2.4.5 The existing Black Cat roundabout is located approximately 2.7 kilometres (1.67 miles) south of St Neots. It is a partially signalised at-grade roundabout that connects the A1 with the A421 and Bedford Road. The roundabout comprises of a circulatory carriageway, with the eastern side of the junction having segregated lanes to separate A1 southbound traffic from A421 traffic.

2.4.6 The A421 continues west from the existing Black Cat roundabout through to, and beyond, the south of Renhold, bypassing the settlements of Roxton and Great Barford. The A1 is a dual two-lane carriageway running in a north – south direction, the alignment of which lies broadly parallel with the East Coast Main Line (ECML) railway between St Neots and Biggleswade.

2.4.7 Between its junctions with the A1 north of the existing Black Cat roundabout and the A1198 at the existing Caxton Gibbet roundabout, the existing A428 comprises a single two-lane carriageway road.

2.4.8 From the roundabout junction with Great North Road the road runs eastwards to the south of St Neots, passing through Wyboston Lakes on an elevated embankment and viaduct across the flood plain and the River Great Ouse to a roundabout that links Barford Road and the existing A428.

2.4.9 Continuing eastwards the existing A428 remains a single lane in both directions and passes beneath the ECML railway and the B1046 in cutting.

2.4.10 At this point the existing A428 passes through a predominantly rural setting, passing over Hen Brook and through to a three-arm roundabout that links the B1428 Cambridge Road and the A428 Cambridge Road.

2.4.11 Beyond this, the existing A428 provides access to the local road network, businesses and farms, passing to the north of Croxton and Eltisley. Approximately 2 kilometres (1.24 miles) east of Eltisley, the existing A428 approaches the existing Caxton Gibbet roundabout as a single carriageway from the west.

2.4.12 The existing Caxton Gibbet roundabout comprises an at-grade four-arm roundabout that connects the existing A428 to the A1198 (Ermine Street). The roundabout includes a number of business enterprises in the immediate vicinity including the Caxton Gibbet Services, fuel station and convenience store. East of the roundabout, the existing A428 continues onwards on the recently upgraded and realigned dual carriageway towards Cambridge.

Existing traffic conditions

2.4.13 The existing A428 carries twice the amount of traffic it was originally designed for and has one of the least reliable journey time sections[1] nationally.

2.4.14 People who travel along the existing A428 regularly experience congestion and delays, particularly during weekday peak hours. The existing Black Cat roundabout experiences significant queuing on all approaches to the junction, and long traffic queues can form on the existing A428 between St Neots and Caxton Gibbet.

2.4.15 The existing A428 also has safety issues, and between the Wyboston interchange and the existing Caxton Gibbet roundabout the road has been identified as within the top 25% of roads nationally for casualties per billion vehicle miles.

2.4.16 Further information regarding the existing traffic conditions on the road network are presented in the Transport Assessment **[TR010044/APP/7.2]**.

[1] 'Journey time sections' is the term used to describe the journey times between two junctions.

Public transport

2.4.17 The ECML railway runs between London and Edinburgh, forming a key route on the national railway network which runs broadly parallel to and east of the existing A1 through the St Neots area. St Neots railway station is located on the north east side of the town.

2.4.18 The Stagecoach X5 bus service runs seven days a week between Oxford and Cambridge via Milton Keynes and Bedford. The route of the service passes through the existing Black Cat roundabout via Bedford Road and the A1, through St Neots and to Cambridge via the existing A428.

2.4.19 The existing Black Cat roundabout, existing Caxton Gibbet roundabout, and the existing A428 between Wyboston and Caxton Gibbet, have limited facilities for walkers, cyclists and horse riders (WCH).

National Cycle Network

2.4.20 A section of the Sustrans National Cycle Network (NCN) Route 12 connects the village of Great Barford west of the existing Black Cat roundabout to St Neots, and passes close to the villages of Roxton, Chawston and Wyboston.

2.4.21 This section is part of the wider NCN Route 12 which comprises of 207.4 kilometres (128.87 miles) of cycleways that when complete would run from Enfield Lock in north London to Spalding via Stevenage, St Neots and Peterborough.

Landform, topography and soils

2.4.22 The area surrounding the existing A428 is characterised by varying landform. Local topography at the existing Black Cat roundabout, the A1 and the western extents of the A428 in the Wyboston locality is relatively flat and situated around 20 – 30 metres Above Ordnance Datum (AOD), rising gradually to around 40 metres AOD near Great Barford to the west.

2.4.23 East of St Neots, the profile of the land gradually rises in elevation before reaching 65 metres AOD surrounding the existing Caxton Gibbet roundabout. West of St Neots, the local topography generally lies between 30 – 40 metres AOD. South of the existing A428, the topography of the wider landscape gradually rises to between 50 – 60 metres AOD, west of Abbotsley.

2.4.24 The majority of land along and surrounding the existing A428, and to the north and west of the existing Black Cat roundabout, is mapped on Natural England's *Agricultural Land Classification Map: Eastern Region* (Ref 2-5) as being best and most versatile land, comprising Grade 2 soils. Small pockets of best and most versatile Grade 1 soils are located around the Chawston, Wyboston and Roxton locality. An area of Grade 3 soil is located to the east of the existing Black Cat roundabout, associated with the Little Barford locality.

Settlement and land use

2.4.25 Land use is marked by a contrast of urban development within St Neots, Eynesbury and Eaton Socon on the western extents of the existing A428 against the more open landscapes and smaller settlements and farms along and surrounding the remainder of the existing A428.

2.4.26 The existing A428 predominantly passes through an area characterised by agriculture, comprising a pattern of agricultural fields and pockets of plantation woodland framed by a network of hedgerows and farm access tracks.

2.4.27 Built form associated with the A1 south of Eaton Socon comprises ribbon development within the settlements of Chawston and Wyboston north of the existing Black Cat roundabout, and the settlements of Tempsford and Church End south of the existing Black Cat roundabout. The village of Roxton, located south west of the existing Black Cat roundabout, comprises another area of settlement in proximity to the A1, with the larger village of Great Barford located further to the west along Bedford Road. Cambourne, located east of the existing Caxton Gibbet roundabout, forms a substantial settlement adjacent to the dualled section of the existing A428.

2.4.28 The agricultural landscapes surrounding the existing A428 contain the dispersed villages of Little Barford, Abbotsley, Croxton, Eltisley and Caxton to the south, and the village of Yelling and the settlement of Papworth Everard to the north. Commercial interests including hotels, plant nurseries, garages and local businesses are focused around the existing Black Cat roundabout, along the A1, and around Wyboston interchange. Further commercial interests including supermarkets and fast food outlets are located around the junction of the B1428 Great North Road at Little End, south of Eaton Socon. A number of individual businesses, residential properties and farms front onto the existing A428 to the east of St Neots.

2.4.29 Industrial land uses are characterised by a large electricity generating station situated east of the River Great Ouse (south of the existing B1043/A428 junction) at Little Barford, an industrial estate and depot adjacent to the electricity generating station, and an aggregate quarry (Black Cat Quarry[2]) accessed from the existing Black Cat roundabout.

2.4.30 Recreational and leisure facilities include parkland associated with Roxton Park, Wyboston Leisure Park and Golf Course, driving ranges, and the Abbotsley Hotel, Golf and Country Club.

Hydrology and geology

2.4.31 The River Great Ouse runs parallel to the A1 and the ECML railway and comprises an important habitat and landscape feature due to its extensive floodplain. Parts of the floodplain are subject to mineral extraction operations.

[2] Black Cat Quarry (also known as Breedon's Quarry) comprises an existing mineral extraction site which is currently undergoing restoration, involving the formation of land contours and the implementation of an approved planting scheme. Further details regarding Black Cat Quarry and its restoration are presented in the Case for the Scheme **[TR010044/APP/7.1]**.

2.4.32 Hen Brook and Fox Brook are tributaries to the River Great Ouse and join the river within St Neots. Gallow Brook is another tributary of the River Great Ouse and joins the river to the south east of Little Paxton. Further brooks and tributaries include Wintringham Brook, Wintringham Brook Tributary and West Brook Tributary.

2.4.33 Other watercourses include Rockham Ditch, which flows beneath the existing A421 and Bedford Road west of the existing Black Cat roundabout, and South Brook which crosses the A1 south of Chawston.

2.4.34 The solid geology is characterised by the Oxford Clay Formation, formed of silicate mudstone with sporadic limestone beds. There are superficial deposits and river terrace deposits associated with the River Great Ouse, comprising of sand and gravel, and alluvium deposits comprising of clay, silt, sand and gravel.

Public utilities

Apparatus

2.4.35 Existing utilities apparatus within the Order Limits are associated with the following companies:

a. National Grid Electricity Transmission (NGET).
b. National Grid Gas Transmission (NGGT).
c. Cadent.
d. UK Power Networks (UKPN) (up to 11 kilovolts (kV)).
e. UKPN (above 11kV).
f. CLH Pipeline System.
g. Anglian Water.
h. Cambridge Water.
i. Chawston Irrigation Pipeline.
j. Openreach.
k. Virgin Media.
l. Vodafone.

2.4.36 A number of major services including high pressure gas mains, high voltage overhead power lines and an oil pipeline are located between the existing Black Cat roundabout and the ECML railway.

Underground gas mains

2.4.37 An existing high-pressure gas main is located to the south and west of the existing Black Cat roundabout. This main is operated by NGGT and crosses under the A1, Bedford Road and the A421 dual carriageway. Another high-pressure gas main operated by NGGT is located between the River Great Ouse and Barford Road, which supplies gas to the power station at Little Barford.

2.4.38 A further high-pressure gas main operated by Cadent runs alongside the eastern side of the ECML railway and carries gas primarily for domestic supplies. As described in **Chapter 1, Introduction** of the Environmental Statement **[TR010044/APP/6.1]**, this diversion would give rise to likely significant effects and accordingly satisfies the relevant criteria under s20 of the *Planning Act 2008* (Ref 2-6) to be treated as an Nationally Significant Infrastructure Project in its own right. Details regarding the likely significant effects of this diversion are reported in **Appendix 4.4** of the Environmental Statement **[TR010044/APP/6.3]**. National Policy Statements relevant to this diversion are discussed in **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]**.

Water mains and sewage pipelines

2.4.39 A number of existing water supplies and sewage pipelines that are operated by either Anglian Water or Cambridge Water are present.

2.4.40 Anglian Water has a major water main running south to north through the existing Black Cat roundabout and an underground reservoir located off Potton Road to the south of the B1046, with associated mains supplying water to Eynesbury and St Neots.

2.4.41 Cambridge Water controls the water mains and sewage pipelines to the east of Toseland Road. It has a water main that runs along the existing A428 from the junction with Toseland Road eastwards to the existing Caxton Gibbet roundabout, and a pumped foul water rising main that runs from the junction of the existing A428 with the B1040 to the west of Eltisley, eastwards along the existing A428 and then northwards along the B1040 St Ives Road towards Papworth.

Fuel pipelines

2.4.42 Compañía Logística de Hidrocarburos (CLH) Pipeline System has an oil pipeline that runs north to south. From the Wyboston interchange and the existing Black Cat roundabout, the pipeline is located between the A1 and the River Great Ouse.

Overhead electricity transmission lines

2.4.43 A number of transmission lines are present which provide electricity to individual dwellings and urbanised areas. In addition, there are a number of high voltage overhead powerlines operated by both NGET and UKPN.

2.4.44 NGET has a 400kV transmission line that passes north to south, located between Barford Road and the ECML railway to the east of the existing Black Cat roundabout. Through this area, UKPN also has a 132kV transmission line running from north east to south west and crossing under the NGET transmission line.

2.4.45 UKPN has a 132kV transmission line that passes in an east to west direction and broadly follows the route of the existing A428 from St Neots to the existing Caxton Gibbet roundabout.

Environmental designations

Air quality

2.4.46 An Air Quality Management Area (AQMA) has been designated by Huntingdonshire District Council on St Neots' High Street, approximately 5.4 kilometres (3.35 miles) to the north of the existing Black Cat roundabout.

2.4.47 A second AQMA has been designated by Central Bedfordshire Council along a section of the A1 immediately west of Sandy, approximately 5 kilometres (3.10 miles) south of the existing Black Cat roundabout.

2.4.48 Further information regarding AQMAs is presented in **Chapter 5, Air quality** of the Environmental Statement **[TR010044/APP/6.1]**.

Cultural Heritage

2.4.49 To the south west of the existing A428, a number of scheduled monuments are located within and in proximity to the settlements of Wyboston, Chawston, Tempsford, Roxton, Great Barford, Church End and Eaton Socon. Scheduled monuments are also recorded south of the existing A428 near to the settlements of Croxton and Eltisley, and within Papworth Everard north of the existing Caxton Gibbet roundabout. Further sites are also located to the south of the existing Caxton Gibbet roundabout.

2.4.50 Conservation areas are associated with the towns, settlements and villages of St Neots, Yelling, Eltisley, Croxton, Caxton, Papworth Everard, Tempsford, Church End, Roxton and Great Barford.

2.4.51 Numerous listed buildings of predominantly Grade II listing are located in close proximity to the existing A428, with a concentration of these buildings within Croxton and Eltisley. Groups of Grade II listed buildings are also situated within Chawston and Wyboston, north of the existing Black Cat roundabout, and within Roxton and Great Barford to the south west of the roundabout. A small number of Grade II* listed buildings are also located within the settlements of Roxton, Little Barford, Eaton Socon, Croxton, Eltisley and Caxton.

2.4.52 The settlement of Croxton contains the historic Croxton Park, a Grade II* listed Registered Park and Garden. The Grade I listed Barford Bridge and Causeway is located on the River Great Ouse, south of Great Barford.

2.4.53 Further information regarding designated heritage assets is presented in **Chapter 6, Cultural heritage** of the Environmental Statement **[TR010044/APP/6.1]**.

Landscape

2.4.54 Stands of ancient woodland are located within or near to the settlements of Eltisley (approximately 900 metres south of the existing A428) and Papworth Everard (approximately 2.1 kilometres (1.3 miles) north of the existing Caxton Gibbet roundabout). Further stands of ancient woodland are located approximately 1.7 kilometres (1.05 miles) north east of the existing Caxton Gibbet roundabout, approximately 3.3 kilometres (2.05 miles) east and 2.8 kilometres (1.73 miles) west of the existing Black Cat roundabout.

2.4.55 There are several trees and tree groups that are subject to Tree Preservation Orders (TPO) located within Huntingdonshire and South Cambridgeshire.

2.4.56 Further information regarding designated landscape features is presented in **Chapter 7, Landscape and visual effects** of the Environmental Statement **[TR010044/APP/6.1]**.

Biodiversity

2.4.57 European sites in the area, but outside of the Order Limits, comprise the following:

a. Eversden and Wimpole Woods Special Area of Conservation (SAC) – located approximately 8.10 kilometres (5.03 miles) south of the existing Caxton Gibbet roundabout (designated for bats, particularly barbastelle bat (*Barbastella barbastellus*)).

b. Portholme SAC – located approximately 8.9 kilometres (5.5 miles) north of the settlement of Croxton (designated for its lowland hay meadows).

c. Ouse Washes SAC, Special Protection Area and Ramsar – located approximately 16.01 kilometres (9.45 miles) north-east of the existing Caxton Gibbet junction (designated for Spined Loach (*Cobitis taenia*), and its international significance for wintering and breeding wildfowl and waders, rich aquatic fauna and flora, and areas of unimproved grassland).

2.4.58 Nationally important ecological sites, nearby but outside of the Order Limits, include the following:

a. Papworth Wood Site of Special Scientific Interest (SSSI) – located approximately 2 kilometres (1.24 miles) north of the existing Caxton Gibbet roundabout.

b. Elsworth Wood SSSI – located approximately 1.8 kilometres (1.11 miles) north-east of the existing Caxton Gibbet roundabout.

c. St Neots Common SSSI – located approximately 3 kilometres (1.86 miles) north of Wyboston interchange.

d. Little Paxton Pits SSSI – located approximately 4.8 kilometres (2.98 miles) north of Wyboston interchange.

e. Little Paxton Wood SSSI – located approximately 5.2 kilometres (3.23 miles) north of Wyboston interchange.

2.4.59 Little Paxton Pits Local Nature Reserve comprises two separate areas of land to the east of Little Paxton, approximately 2.5 kilometres (1.55 miles) north of the B1428/A428 junction.

2.4.60 Further information regarding designated biodiversity sites and their associated habitats and species are presented **in Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]**.

Noise

2.4.61 Noise Important Areas (NIA) are located on:

a. The A1 between the existing Black Cat roundabout and Wyboston interchange.

b. The A1 between Wyboston and Little Paxton.

c. In the locality of Church End on the A1 south of the existing Black Cat roundabout.

d. Between Church End and the north of Sandy on the A1.

e. On the existing A428 – the first NIA located approximately 1 kilometre (0.62 miles) east of the existing A428/B1428 Cambridge Road roundabout, the second NIA located approximately 700 metres east of the existing Caxton Gibbet roundabout, and the third NIA located on Bedford Road between Great Barford and Roxton.

2.4.62 Further information regarding NIAs is presented in **Chapter 11, Noise and vibration** of the Environmental Statement **[TR010044/APP/6.1]**.

Future baseline

Changes to the existing baseline

2.4.63 In the absence of the Scheme, changes to the conditions within the existing baseline are likely to occur in the future due to a combination of natural events and human influences.

2.4.64 **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]** explains that a review of these events and influences was undertaken using professional judgement and predictive modelling to identify the extent to which they may change the existing baseline at different points in the future.

2.4.65 The individual topic assessments reported in **Chapters 5 – 14** of the Environmental Statement **[TR010044/APP/6.1]** have considered the extent to which these changes could materially alter the existing baseline and, thereby, potentially alter the nature and significance of the effects reported.

Natural events

2.4.66 In relation to natural events, the review identified that:

a. The local landscape pattern is likely to develop and mature over time, which could potentially result in gradual changes to local landscape character and its perception, the availability and composition of existing views, and the setting of heritage assets.

b. Existing weather patterns are likely to change over time, potentially resulting in changes in the behaviour of ecological species, the conditions of existing habitats, the geomorphology of watercourses, increases in flood risk, and other extreme weather events.

Human influences

2.4.67 In relation to human influences, the review identified that other planned developments, major projects and development allocations are likely to come forward in the future in the area.

2.4.68 Developments identified as having a likelihood of being implemented in the future are identified in **Appendix 15.1** of the Environmental Statement **[TR010044/APP/6.3]**.

2.4.69 The review identified that these developments, projects and allocations could potentially result in the following changes to the baseline:

a. Changes in air quality and greenhouse gas emissions – arising from alterations to traffic volumes and vehicle movements on the road network, and from advances in vehicle emission technology and electric vehicles.

b. Changes in the availability of material and mineral resources, and landfill capacity – arising from construction demands.

c. Changes to land uses – arising from alterations to the current pattern and relationships of different land uses, modifications in agricultural practices, and changes in land ownership.

d. Changes to landscape character – arising from the loss or alteration of existing components within the landscape that combine to form areas of distinctive character.

e. Changes to visual amenity – arising from changes to the availability, quality and composition of views.

f. Changes to heritage assets – arising from the introduction of new built form, infrastructure and other components into the setting of assets and key views, and from the removal of archaeological remains.

g. Changes to geology, soils and hydrology – arising from the remediation of contaminated sites, pollution risk to surface water and groundwater, water quality changes, and the loss of agriculturally viable soil resources.

h. Changes to noise – arising from alterations to traffic volumes and vehicle movements on the road network, and from the introduction of new development-related noise sources.

i. Changes to biodiversity – arising from the severance or loss of land and components within the natural environment that support flora and fauna, and disturbance.

j. Changes relating to population – arising from employment opportunities during construction, and the loss of community land and facilities used by people.

2.4.70 The review also identified that changes in policy arising from the implementation of national and local planning policy objectives may also occur.

2.4.71 Traffic modelling undertaken to forecast the changes that would occur on the road network in the future identified that, in the absence of the Scheme, daily traffic volumes on major routes are expected to rise by between 20% – 30% between the years 2015 – 2040. Additionally, a forecast increase of between 80% – 100% is expected on minor routes running east – west by the year 2040, which is reflective of drivers seeking alternative routes to avoid congestion on major routes.

2.5 Project description

Overview of the Scheme

2.5.1 The Scheme comprises the construction of a new 16 kilometre (10 mile) dual 2-lane carriageway from the existing Black Cat roundabout to the existing Caxton Gibbet roundabout, and in addition approximately 3 kilometres (1.8 miles) of tie-in works.

2.5.2 The Scheme includes the following main components:

a. A new three-level grade separated junction at the existing Black Cat roundabout, with the A1 at the lower level, the new dual carriageway on the upper level and a roundabout between the two at approximately existing ground level. In addition to slip roads a new free flowing link between the A421 eastbound carriageway and the A1 northbound carriageway would also be provided.

b. A new grade separated all movements junction would be constructed to the east of the existing Cambridge Road roundabout to provide access to the new dual carriageway and maintain access to the existing A428.

c. At the existing Caxton Gibbet roundabout, a new grade separated all movements junction would be constructed, incorporating the existing roundabout on the south side of the new dual carriageway and a new roundabout on the north side. The new dual carriageway would then tie-in to the existing A428 dual carriageway to the east of the new Caxton Gibbet junction.

d. In the vicinity of the new Black Cat junction, direct access onto the A1 from some local side roads and private premises would be closed for safety reasons. A new local road would provide an alternative route. The existing Roxton Road bridge would be demolished and replaced with a new structure to the west to accommodate the realigned A421.

e. New crossings would be constructed to enable the new dual carriageway to cross the River Great Ouse, ECML railway, Barford Road, the B1046/Potton Road, Toseland Road and the existing A428 at Eltisley.

f. The existing A428 between St Neots and Caxton Gibbet would be de-trunked and retained for local traffic and public transport with maintenance responsibility transferred to the local highway authorities.

g. An alternative access would be provided to side roads at Chawston, Wyboston and Eltisley.

h. The implementation of safer routes for walkers, cyclists and horse riders.

2.5.3 **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]** illustrates the preliminary design of the Scheme and identifies its main components and features.

Order Limits

2.5.4 The Order Limits define the maximum area of land required temporarily and permanently to construct, operate and maintain the Scheme.

2.5.5 The extents of the Order Limits are illustrated on **Figure 2.1** of the Environmental Statement **[TR010044/APP/6.2]**.

Limits of deviation

2.5.6 Lateral (horizontal) and vertical limits of deviation (LoD) have been incorporated around the main engineering components of the Scheme, around proposed gantries, and around areas where utility diversions would be required.

2.5.7 The purpose of the LoD are to allow minor modifications and refinements to be made to the preliminary design, where necessary, during the detailed design[3] and construction phases. Such modifications could, for example, be required in response to unforeseen ground conditions encountered during construction of the Scheme.

2.5.8 The lateral LoD are illustrated on the Works Plans **[TR010044/APP/2.3]**. Any deviation from the lines, situations or locations shown on those plans would be contained within the extents of the LoD defined around the respective components or works.

2.5.9 The vertical LoD are referenced against the vertical profile levels indicated on the Engineering Section Drawings **[TR010044/APP/2.10]**, which permit deviation of up to a maximum of 1 metre upwards or downwards.

2.5.10 In no case would the Scheme extend beyond the Order Limits.

2.5.11 The EIA of the Scheme has accounted for the potential of minor design flexibility and variation being required within the LoD, the overall approach to which is described in **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]**.

2.5.12 **Chapters 5 – 14** of the Environmental Statement **[TR010044/APP/6.1]** detail how the horizontal and vertical LoD have been considered within the individual topic assessments undertaken.

[3] The detailed design phase would typically commence after the grant of consent and involves the development and refinement of the preliminary design and the approach to construction.

Design principles

2.5.13 The preliminary design of the Scheme has evolved over time through a staged process of optioneering, design-development, consultation and environmental assessment. This process and the main alternatives identified and evaluated are described in **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]**.

2.5.14 In developing the preliminary design and the approach to Scheme construction, consideration has been given to the following principles:

a. Prevailing design standards and good design practice, as set out with relevant sections of the *Design Manual for Roads and Bridges* (DMRB) (Ref 2-7).

b. Principles and guidance contained in the *Manual for Streets* (Ref 2-8) relating to low design speed roads.

c. Aiming to achieve an earthworks balance where possible, in order to minimise the need to import or export earthworks materials. Where this has not been possible, the design has sought to acquire construction materials from borrow pits located within the Order Limits, rather than from off-site sources.

d. Minimising the need for roadside features, for example lighting, to reduce the potential for visual impacts whilst remaining consistent with safety requirements.

e. Construction methods and operations, to ensure that construction can be undertaken in phases as safely as possible, whilst minimising potential disruption to residents, businesses, landowners and users of the public rights of way (PRoW) and road networks.

f. Consideration of future maintenance operations and requirements to improve safety for road users and maintenance operatives during maintenance works, and to minimise disruption.

g. Operational safety, to make the Scheme more understandable for road users, the objective being to improve safety.

2.5.15 Consideration has also been given to meeting the challenges of climate change during the preliminary design stage, in line with the requirements contained in the *National Policy Statement for National Networks* (NPSNN) (Ref 2-9), and where relevant the *Overarching National Policy Statement for Energy (EN-1)* (Ref 2-10), and the *National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)* (Ref 2-11).

2.5.16 This consideration has involved taking account of the projected impacts of climate change when planning the location, design, construction, operation and maintenance of the Scheme, and applying the latest UK climate projections – for example when modelling future flood events. Further details relating to climate predictions and how the requirements of these National Policy Statements (Ref 2-8; Ref 2-10; Ref 2-11) have been met are presented in **Chapter 14, Climate** of the Environmental Statement **[TR010044/APP/6.1]**, and in the Case for the Scheme **[TR010044/APP/7.1]**.

Engineering layout

2.5.17 At the existing Black Cat roundabout, a new junction (Black Cat junction) would be constructed to allow traffic to flow freely along the A1 and the new dual carriageway through the junction. All movements for access between the A1, the existing A421 and the new dual carriageway would be provided via Black Cat junction. Additionally, a segregated left-turn lane would be provided between the A421 eastbound carriageway and the A1 northbound carriageway.

2.5.18 Black Cat junction would be on three levels: the A1 carriageway would be on the lower level passing under the new junction; the new roundabout would be constructed at approximately existing ground level; and the new dual carriageway would pass over the new junction at the higher level. The existing bridge at Roxton Road would be demolished due to:

a. The need to lift the A421, which would reduce the headroom clearance under the existing structure.

b. The impact of accommodating the slip road merge and diverge leading to the Black Cat junction.

2.5.19 To the west of the existing bridge, a new structure (Roxton Road bridge) would be constructed to maintain the link between Roxton Road and Bedford Road.

2.5.20 As a result of the Scheme, and for reasons of safety, direct access onto the A1 from School Lane, Chawston Lane, Nagshead Lane and The Lane would be prevented, and the existing public access to Kelpie Marina and the Great North Road would be closed. The Scheme would provide a new road (the Roxton Road link) linking The Lane, Nagshead Lane and Chawston Lane to Bedford Road via the Roxton Road bridge to provide alternative, safe access. The Scheme would also provide an alternative access to Kelpie Marina (the Kelpie Marina access road). The Scheme would provide a segregated service road from the BP garage (located north of the existing Black Cat roundabout) to the Black Cat junction circulatory. The service road would be adjacent to the southbound carriageway of the A1. Over part of its length, it would also provide access to the Great North Road.

2.5.21 From the Black Cat junction, the Scheme comprises a new dual 2-lane carriageway which would run east across the River Great Ouse and its floodplain, passing under existing overhead high voltage power lines before crossing over the ECML railway.

2.5.22 The new dual carriageway would cross the river and its floodplain on a multi-span viaduct (the River Great Ouse viaduct). At the ECML railway, a new three-span bridge over the railway would be constructed (the ECML underbridge).

2.5.23 After crossing the ECML railway, the route of the new dual carriageway changes to a northerly direction, passing to the west of the Abbotsley Golf Course and crossing the Potton Road and B1046 before turning east again to the south of the existing A428.

2.5.24 A single overbridge would be provided on the B1046 (the new B1046 bridge) to cross over the new dual carriageway. Potton Road would be realigned north from its junction with the Eynesbury Plant Hire Company, up to a new priority junction with the B1046 on the eastern side of the new dual carriageway.

2.5.25 The new dual carriageway would cross the existing A428 to the east of the existing junction with the B1428 Cambridge Road, before continuing in a north easterly direction towards the C182 Toseland Road.

2.5.26 A new grade separated junction would be constructed to the east of the existing Cambridge Road roundabout to provide for all movements and maintain a continuous link for the existing A428. A new overbridge would be constructed on Toseland Road (the Toseland Road Bridge) to maintain this link over the new dual carriageway.

2.5.27 After crossing Toseland Road, the new dual carriageway would dip south east to cross the B1040 St Ives Road, before again crossing over the existing A428 to the east of Eltisley to run along the southern side of the existing road.

2.5.28 To the northeast of Eltisley the existing A428 would be diverted via two new roundabout junctions and a new overbridge to the northern side of the new dual carriageway (the Eltisley Link). From here, the existing A428 would continue east to tie-in to the existing road past North East Farm and Pembroke Farm before connecting into a new grade separated all movements junction at Caxton Gibbet (the Caxton Gibbet junction).

2.5.29 Access to the existing fuel filling station and businesses on the south side of Caxton Gibbet junction would be maintained and the existing A428 would link into the junction on the north side. Caxton Gibbet junction would incorporate the existing Caxton Gibbet roundabout on the south side of the new dual carriageway (the Caxton Gibbet junction south roundabout), and a new roundabout would be constructed on the north side (the Caxton Gibbet junction north roundabout).

2.5.30 At the Caxton Gibbet junction, the new dual carriageway would pass on embankment to the north of the existing Caxton Gibbet roundabout. The new dual carriageway would then tie-in to the existing A428 dual carriageway to the east of Caxton Gibbet junction.

2.5.31 The engineering components of the Scheme are illustrated on **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]**.

Earthworks

2.5.32 The earthworks strategy for the Scheme has sought to balance the materials on site and not dispose of materials off site, where possible.

2.5.33 Earthworks comprise a combination of:

a. Embankments – which would elevate sections of carriageway over existing infrastructure.

b. Cuttings – which would position sections of carriageway below existing ground level, visually contain new road infrastructure, and attenuate road traffic noise.

c. Earth bunds – which would visually screen new and modified sections of carriageway, and attenuate road traffic noise.

2.5.34 Earthwork slopes incorporated into the design of the Scheme vary to accommodate the profile of the new dual carriageway within the local landscape.

2.5.35 The majority of earthwork slopes have been designed to a gradient of 1:3 (defined as being 1 metre vertically for every 3 metres horizontally) to achieve the required earthwork stability, except in locations where softer gradients would be more desirable from a landscape integration perspective.

2.5.36 The location, height and lengths of the cuttings and earth bunds incorporated into the design of the Scheme reflect both engineering and environmental requirements.

2.5.37 The form and extent of earthworks within the Scheme are illustrated on the Works Plans **[TR010044/APP/2.3]**.

Borrow pits

2.5.38 The design of the Scheme includes the formation and use of borrow pits, the purpose of which would be to extract suitable earthworks materials for use during construction of the Scheme.

2.5.39 Four borrow pits would be formed:

a. Two borrow pits located towards the eastern extents of the Scheme, immediately north-west and north-east of the existing Caxton Gibbet roundabout.

b. Two borrow pits located towards the western extents of the Scheme, to the east of the existing Black Cat roundabout and to the west of Roxton Road.

2.5.40 The location and extents of the borrow pits are illustrated on the Works Plans **[TR010044/APP/2.3]**. These locations have been selected due to their proximity to where material would be needed during the construction phase, and to minimise the distance over which material would need to be transported.

2.5.41 Excavations within the borrow pits would be to the following depths:

a. An average depth of 7 metres for the borrow pit located to the east of the existing Black Cat roundabout.

b. An average depth of 3 metres for the borrow pit located to the west of Roxton Road.

c. An average depth of 3 metres for the borrow pit located to the north-west of the existing Caxton Gibbet junction.

d. An average depth of 2 metres for the borrow pit located to the north-east of the existing Caxton Gibbet junction.

2.5.42 Further information regarding the borrow pits is presented in the Borrow Pits Optioneering Report **[TR010044/APP/7.6]**.

Soils

2.5.43 All areas of cut and fill along the new dual carriageway would have the existing topsoil stripped and stored in local storage areas.

2.5.44 A number of temporary sites have been identified and included within the Order Limits for soil storage, the locations of which are illustrated on **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]**.

2.5.45 It is anticipated that all stripped topsoil would be reused during construction of the Scheme, with no requirement to import additional topsoil.

Drainage

Overview of the drainage design

2.5.46 The drainage design has been developed in accordance with design standards contained in the following sections of the DMRB:

a. *LA 113 Road drainage and the water environment (Revision 1)* (Ref 2-12).

b. *CG 501 Design of highway drainage systems (Revision 2)* (Ref 2-13).

2.5.47 Consultation with the Environment Agency has shaped and influenced the drainage design and the assessment of flood risk, with an allowance for the effects of climate change included in the design.

2.5.48 The requirements of National Policy Statements (Ref 2-9; Ref 2-10; Ref 2-11) and, where relevant, the *National Planning Policy Framework* (NPPF) (Ref 2-14) have also been considered in the design process, alongside advice from the competent experts responsible for undertaking water related assessments reported in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]** with regards to minimising the following:

a. Effects on water quality – through the use of natural storage, treatment and discharge solutions where appropriate to manage drainage during the construction and operational phases of the Scheme.

b. Changes to watercourse and ditch alignments – by incorporating solutions into the design of the Scheme that would not result in changes to hydromorphology.

c. Landtake within areas identified as being at risk of flooding – by directing development away from such areas where possible.

d. Where development in areas identified as being at risk of flooding is required, areas of land have been identified within the Order Limits for the purpose of flood compensation.

2.5.49 Full details of the drainage strategy are presented in **Appendix 13.3** of the Environmental Statement **[TR010044/APP/6.3]**.

2.5.50 The locations of drainage infrastructure and measures incorporated into the design of the Scheme described in the following sections are illustrated on **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]**.

Drainage networks

2.5.51 As road drainage for the Scheme would discharge into networks maintained separately by Highways England and the local authorities, the drainage design has accordingly been split into two networks:

a. Local road drainage – which would be adopted by Central Bedfordshire Council, Bedford Borough Council and Cambridgeshire County Council.

b. Road drainage for the SRN (including the new dual carriageway and the Black Cat junction) – which would be operated and maintained by Highways England.

Storage and treatment

2.5.52 Strategies for collecting, separating and treating road runoff have been developed and incorporated into the Scheme to achieve the desired discharge rates, with infrastructure designed and sized to accommodate future increases in flood storage volume associated with climate change.

2.5.53 A combination of underground and above ground solutions has been incorporated into the design to store, treat and discharge surface water runoff, the siting and design of which has been influenced by the relationship of the Scheme with existing environmental constraints and water features.

2.5.54 The approach to surface water collection across the Scheme varies depending upon the location and form of the carriageway. Where sections of carriageway are kerbed, gullies would be installed to capture surface water runoff. Combined kerb drainage systems would be implemented only where a kerb and gully system is not appropriate.

2.5.55 A positive surface water drainage system would be provided along the new dual carriageway to capture road runoff prior to its discharge into attenuation basins and outfall to receiving watercourses.

2.5.56 A new pumping station would be provided to manage both surface water runoff and ground water inflow from the proposed A1 link as it passes through Black Cat junction. The pumping station would be located off the A1 northbound carriageway just to the north of the Black Cat junction Circulatory. It is anticipated that the pumping station would comprise of submersible pumps and associated pipework, valves and control system that would automatically pump water from the pump chamber up to and into the ground level surface water drainage system.

2.5.57 Some existing ditches would be modified or realigned to accommodate the Scheme.

2.5.58 The method of surface water collection would be determined at the detailed design phase of the Scheme.

Culverts

2.5.59 New piped and box culverts would be installed at a number of locations across the Scheme to maintain water flows along existing watercourses. The size and design of which vary in response to:

a. The outcomes of flood risk modelling and assessment.

b. Watercourse flow requirements.

c. Requirements for future maintenance and inspection.

2.5.60 A number of culverts would perform other functions – for example providing pedestrian and mammal access beneath the new dual carriageway and other roads within the Scheme.

2.5.61 Three existing culverts located along the existing A1 (Rockham Ditch, South Brook and Begwary Brook) would require either extending or replacing as a result of the Scheme.

Flood compensation

2.5.62 A number of flood compensation areas of varying size would be constructed as part of the Scheme in the following locations to compensate for the loss of existing floodplain, and to manage flood risk:

a. South-east of Black Cat junction.

b. Rockham Ditch.

c. Begwary Brook.

d. South Brook.

e. Rectory Farm.

f. Hen Brook.

g. Top Farm.

Road pavement and surfacing

2.5.63 New sections of road would be constructed using different types and layers of bituminous materials.

2.5.64 All sections of road within the Scheme extents would be constructed of either fully flexible or flexible composite pavement construction. The depth of the pavement layers on each section of road varies based on the volumes of traffic that are forecast to use the road.

2.5.65 Where existing roads would be modified to connect with new sections of road, or where improvements to accommodate future traffic growth are required, a surface treatment comprising either thin surface course system, hot rolled asphalt or stone mastic asphalt would be implemented.

2.5.66 Further information on the locations where a thin surface course system would be required for the purpose of reducing road traffic noise is presented in **Table 2-1**.

2.5.67 Where existing roads would be modified to accommodate temporary traffic management (TTM) arrangements, localised repairs would be undertaken to reinstate the existing carriageway to its original condition upon completion of the works.

2.5.68 The surface treatments for local roads would be agreed with the relevant highway authorities (these being the local authorities).

Kerbing

2.5.69 Kerbs would be provided at roundabouts and on side roads where a segregated cycleway or footway runs adjacent to the carriageway. At roundabouts and where required on local roads, full battered (splayed) kerbs would generally be provided. Where a footway / cycleway is located behind the kerb, half battered kerbs would be provided.

2.5.70 Where required, combined kerb and drainage systems would be installed to convey surface water on the road to nearby drainage systems.

Vehicle restraint systems

2.5.71 The following types of vehicle restraint systems are incorporated into the Scheme for road safety, in accordance with relevant safety standards:

a. Steel barriers would be used on slip roads, junctions and sections of carriageway where restraint is required.

b. Parapets would be used on new bridge decks as part of the bridge design.

c. Concrete barriers would be installed along the length of the central reserve of the new dual carriageway to separate traffic travelling in opposite directions.

Public transport

2.5.72 Two existing bus stops on the A1 carriageway, north of the existing Black Cat roundabout, would be relocated as part of the Scheme. The bus stop on the northbound carriageway is to be moved north of existing junction with The Lane. The bus stop on the southbound carriageway is to be moved off the A1 and located on the junction of the old Great North Road, north of the existing service area.

Fencing and boundary treatments

2.5.73 Where formal boundaries are permanently required on new and improved sections of road, treatments would include wooden post and rail fencing and hedgerows. Where no formal boundary treatment is required the highway boundary would generally be marked with boundary marker posts located at regular intervals along the route.

2.5.74 Where fencing is installed along existing and new boundary lines to separate the new dual carriageway and its junctions from adjacent land, it would incorporate a narrow strip of land between the fencing and the outer edge of cutting or embankment slopes for maintenance access.

2.5.75 Guide fencing would be used to direct bats, mammals and other animals towards oversized culverts and ledges within underpass structures, in order to reduce the risks of collisions with vehicles and the risks to both animals and drivers. The locations and extents of guide fencing are illustrated on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**.

2.5.76 **Table 2-1** presents further details regarding guide fencing.

Signage, road markings and de-trunking

2.5.77 New road signage and markings would be installed across the Scheme to ensure route legibility for road users travelling on new and improved roads, and to support the Scheme objectives of cutting congestion and improving safety.

2.5.78 As the Scheme would involve modifications to both the SRN and local road network, static road signage would be agreed with the relevant local authorities to ensure continuity is achieved along the following routes:

a. The existing A428.
b. Bedford Road.
c. Roxton Road.
d. Barford Road.
e. B1046.
f. Potton Road.
g. B1428 Cambridge Road.
h. Toseland Road.
i. B1040.
j. A1198.

2.5.79 Where existing signs do not conform to new or modified road layouts within the Scheme, these would be removed and replaced with new signage containing updated information.

2.5.80 New and modified sections of road would be permanently marked using a combination of road markings and road studs.

2.5.81 In relation to the de-trunking of the existing A428, it has been agreed with the relevant local authorities that:

a. The existing A428 between Cambridge Road (St Neots) and Caxton Gibbet would be re-classified as a B class road with number B1428 – a continuation of the number of Cambridge Road.

b. The existing A428 between Wyboston and Cambridge Road (the St Neots bypass) would remain an A-class road because of the volume of traffic forecast near Little Barford roundabout and would be re-numbered as the A1428.

Road lighting

2.5.82 Road lighting incorporated into the design of the Scheme reflects the level of safety required for road users.

2.5.83 Lighting would be installed at the following locations across the Scheme:

a. Roxton Road roundabout.

b. Black Cat junction (including maintaining the existing lighting on the A1 carriageway through the junction).

c. BP Garage service road.

d. Cambridge Road junction.

e. Eltisley link.

f. Caxton Gibbet junction.

2.5.84 The requirements for road lighting at these locations has been determined on the basis of increasing safety for all road users. The lighting design has sought to minimise the potential for adverse effects on the following:

a. Nocturnal species (for example bats).

b. The existing landscape and night time views.

c. The setting of features associated with the historic environment (for example listed buildings).

Technology

2.5.85 The placement of new technology infrastructure has taken into account future maintenance requirements, allowing for off-site access wherever practicable.

2.5.86 Closed Circuit Television (CCTV) coverage would be provided at the Black Cat junction, Cambridge Road junction and Caxton Gibbet junction to monitor these locations.

2.5.87 Emergency telephones would be installed within lay-bys proposed at several locations along the new dual carriageway.

2.5.88 The design of the Scheme makes allowance for the provision of four gantries for variable message signs (VMS) which could be installed at the following locations, shown in **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2],** to provide road users with journey information[4]:

a. On the northbound carriageway of the A1 between Church End and Tempsford.

b. On the eastbound carriageway of the A421, to the east of Roxton and adjacent to Bridleway No. 6.

c. On the southbound carriageway of the A1, immediately north of the Wyboston interchange.

d. On the westbound carriageway of the new dual carriageway, immediately east of the ECML underbridge.

2.5.89 Installation of this technology would require improvements to be made to the existing communications network, for example, through the installation of new cabling.

Structures

2.5.90 A range of structures including overbridges, underbridges, retaining walls, culverts, CCTV masts would be installed as part of the Scheme.

2.5.91 The primary structures along the new dual carriageway would be:

a. Roxton Road bridge.

b. Black Cat junction.

c. River Great Ouse viaduct.

d. Barford Road bridge.

e. ECML underbridge.

f. Top Farm accommodation bridge.

g. New B1046 bridge.

h. Cambridge Road junction.

i. Bridleway 1/18 accommodation bridge.

j. Toseland Road Bridge.

k. Eltisley bridge.

l. Caxton Gibbet junction.

2.5.92 The locations of these primary structures are illustrated on **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]**. Other smaller structures forming part of the Scheme design, for example culverts, are also illustrated.

[4] The potential requirement for gantries and VMS was identified early in the design-development process as a means of providing information to drivers on the approaches to Black Cat junction. Subsequent to their inclusion in the Scheme and their assessment within the EIA, the ongoing development and review of the design has yet to conclude that they would be required to be delivered as part of the Scheme.

Public rights of way and other routes

2.5.93 A number of permanent closures and diversions to footpaths and bridleways within the existing PRoW network, and other existing routes, would be required.

2.5.94 Provisions have been included in the design to replace and, where feasible and appropriate, improve existing routes and facilities within the Order Limits that are used by pedestrians and cyclists. The objective being to ensure continued connectivity is provided for WCH between communities and routes within the wider PRoW network.

2.5.95 Together, **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]** and the Streets, Rights of Way and Access Plans **[TR010044/APP/2.6]** illustrate the locations of:

a. The existing PRoW network within and surrounding the Order Limits.

b. PRoW and other routes that would be permanently closed (referred to as being 'stopped up').

c. New and improved PRoW, cycle tracks and footways that would be delivered as part of the Scheme.

2.5.96 The following diversions to existing PRoW that would be severed by the Scheme have been incorporated into the design:

a. Footpath A10: this is located to the north of the existing A421 (west of Roxton Road), a section of which would be stopped up. A new section of footpath (combined with a realigned farm access track) would be constructed running broadly parallel with the realigned Roxton Road, which would join onto Roxton Road north of the Roxton Road roundabout.

b. Footpath 7: this is located to the north of the existing A421 (east of Roxton Road), a section of which would be stopped up. As the Roxton Road link (south) would sever this PRoW, it would join a new combined cycleway and footpath running east-west along the Roxton Road link (south).

c. Footpath 8: this is located to the north of the existing Black Cat roundabout, a section of which would be stopped up. As the Roxton Road link (south) would sever this PRoW, it would join a new combined cycleway and footpath running east-west along the Roxton Road link (south).

d. Footpath 1/9 (linking to Footpath 194/55): this is located adjacent to Hen Brook, a section of which would be stopped up. As the new dual carriageway would sever this PRoW, a pedestrian underpass beneath the road would be provided alongside Hen Brook to maintain existing movements. The PRoW would also merge with a new combined footpath and maintenance track, running parallel to the south of the new dual carriageway, which would service drainage features in that area.

e. Footpath 1/20: this is located north of Hen Brook, a section of which would be stopped up. As the new dual carriageway would sever this PRoW, the section to the south-east of the road would join with the new combined footpath and maintenance track (described in Footpath 1/9).

f. Footpath 1/19: this is located north of Footpath 1/20, a section of which would be stopped up. As the new dual carriageway would sever this PRoW, the section to the south-east of the road would join with the new combined footpath and maintenance track (described in Footpath 1/9).

g. Footpath 1/17 (linking to Footpath 194/52): this is located adjacent to Wintringham Brook, a section of which would be stopped up. As the new dual carriageway would sever this PRoW, the section to the south-east of the road would join with the new combined footpath and maintenance track (described in Footpath 1/9) and would then be diverted over the new dual carriageway via a new pedestrian footbridge, before re-joining the existing footpath on the opposite side of the carriageway.

h. Footpath 1/16: this is located north of Wintringham Brook, a section of which would be stopped up. As the new dual carriageway would sever this PRoW, the section to the south-east of the road would join with the new combined footpath and maintenance track (described in Footpath 1/17).

i. Bridleway 1/18: this is located between Toseland and Wintringham, a section of which would be stopped up. As the new dual carriageway would sever this PRoW south of Fox Holes, a new combined bridleway and farm access track would divert users and take them over the road. The diversion would also incorporate a dedicated gate / corral system with passing places for horse riders.

j. Footpath 59/1 to 278/7: this is located between Yelling and Croxton, a section of which would be stopped up. As the new dual carriageway would sever this PRoW, a new footpath running parallel to the road would redirect movements over the road via the Toseland Road Bridge to the west, before re-joining the existing footpath.

k. Bridleway 74/6: this is located adjacent to the West Brook tributary, a section of which would be stopped up south of Pillar Plantation. As the new dual carriageway would sever this PRoW, users would be diverted under the road via a new combined bridleway and watercourse underpass.

2.5.97 The following modifications would be made to existing routes within the Order Limits that are not designated as PRoW, but which are used by WCH, in order to maintain connectivity:

a. School Lane: this is located to the east of Roxton, a section of which would be stopped up. The lane would be re-designated as a bridleway for WCH, which would run the length of the lane and merge with the Kelpie Marina access road (comprising a new combined cycleway and footpath).

b. Cycleway / Footway 73/17: this is located immediately north of the existing Caxton Gibbet roundabout and would be lost to the Scheme. This designated cycleway would be re-established between the A1198 Ermine Street and Brockley Road and combined with an agricultural private means of access (PMA) adjacent to the Caxton Gibbet junction eastbound off-slip road.

2.5.98 New footways would be introduced within the verges of the following roads and junctions within the Order Limits to replace those severed or lost by the Scheme, and to improve route connectivity for users:

a. Roxton Road link (north).

b. Roxton Road link (south).

c. BP filling station service road.

d. Kelpie Marina access road.

e. Cambridge Road junction (including sections of the realigned A428).

f. Realigned Toseland Road.

g. Eltisley link (including sections of the realigned A428).

h. Caxton Gibbet junction.

2.5.99 Information regarding the need for, and location of, temporary diversions and closures during construction of the Scheme is presented within the construction methodology in Section 2.6.

Accommodation works and private means of access

2.5.100 The following accommodation works and PMA have been incorporated into the design of the Scheme to allow continued access for landowners and businesses, where existing access arrangements would be severed or lost as a result of the Scheme:

a. A1 Services link located along the eastern edge of the A1, which would provide access to the existing Wyboston Services.

b. Top Farm accommodation bridge located between the ECML railway and Potton Road, which would provide access to agricultural land via a new bridge over the new dual carriageway.

c. An agricultural PMA located between the realigned B1046 and Hen Brook, which would provide access to agricultural land south of the new dual carriageway.

d. Bridleway accommodation bridge located east of the Cambridge Road junction on Bridleway 1/18, which would provide access to agricultural land either side of the new dual carriageway via a new bridge.

e. An agricultural PMA located off the Cambridge Road junction North Roundabout, which would provide access to agricultural land west of the junction and north of the new dual carriageway.

f. An agricultural PMA located adjacent to the Caxton Gibbet junction eastbound on-slip road, which would provide access to agricultural land north-east of the junction.

Speed limits

2.5.101 A speed limit has been allocated to each section of road modified by, and included within, the Scheme. The new dual carriageway would operate under the national speed limit.

2.5.102 All side roads have been designed to retain the speed limits currently in place on the existing road network. For the Roxton Road link a speed limit of 30mph would be adopted on the section north of Chawston Lane, and a speed limit of 40mph would be adopted on the section south of Chawston Lane.

2.5.103 The proposed speed limits are illustrated on the Permanent Speed Limit Plans **[TR010044/APP/2.8]**.

Landtake

2.5.104 Although Highways England is endeavouring to acquire the land required to construct, operate and maintain the Scheme by agreement, rights to compulsorily acquire land are being sought through the DCO application.

2.5.105 The Scheme's temporary and permanent landtake requirements have been identified during the design-development and EIA processes, and through consultation and engagement with affected landowners.

2.5.106 Land would be acquired: permanently to accommodate the engineering, drainage and environmental components of the Scheme; and temporarily for works and operations including utilities diversions, construction compounds, vehicular access, haul routes, construction working areas, materials storage and the implementation of TTM measures.

2.5.107 The land required for the Scheme is illustrated on the Land Plans **[TR010044/APP/2.2]**, the extents of which are contained by the Order Limits.

2.5.108 In addition, permanent rights in land are being sought within the DCO application for future maintenance access by Highways England, statutory undertakers and local authorities.

2.5.109 The Statement of Reasons **[TR010044/APP/4.1]**, which accompanies the Book of Reference **[TR010044/APP/4.3]**, sets out the justification for why each land parcel is to be acquired either permanently or temporarily, and where permanent or temporary rights are being sought.

Demolitions

2.5.110 The Scheme would require the extinguishment and/or demolition of the following businesses, premises, properties and a bridge:

a. Demolition of the Roxton Road bridge located to the west of Black Cat junction.

b. Extinguishment and demolition of the Travelodge hotel – located north-west of the existing Black Cat roundabout.

c. Extinguishment and demolition of the Shell Garage and service area – located north west of the existing Black Cat roundabout.

d. Extinguishment and demolition of the A1 Keen Screens and associated businesses – located just north of the existing Black Cat roundabout.

e. Demolition of Brook Cottages (Grade II listed) – located to the north of the existing Black Cat roundabout and accessed off the A1 northbound carriageway.

f. Extinguishment of a car wash business and demolition of a disused fuel filling garage – located to the west of the existing Caxton Gibbet roundabout, on the north side of the existing A428.

2.5.111 The locations of these businesses, premises, properties and bridge are illustrated on the Demolition Plans **[TR010044/APP/2.12]**.

Traffic flows

2.5.112 Construction and operation of the Scheme is predicted to alter the speed, flow and routing of vehicles using both the local and strategic road networks.

2.5.113 Traffic flows have been generated using computer modelling for scenarios both with and without the Scheme, to predict the changes in traffic flows as a result of the Scheme at different years in the future, accounting for changes on the networks that are likely to occur from planned developments and projects being implemented, population increases and employment growth[5].

2.5.114 Further details of these forecast traffic conditions are presented in the Transport Assessment **[TR010044/APP/7.2]**.

Environmental mitigation and the Environmental Masterplan

Overview

2.5.115 The environmental design of the Scheme has been shaped by the outcomes of the EIA process, design-development and consultation which collectively have sought to mitigate[6] the adverse environmental effects of the Scheme during its construction, operation and (where applicable) maintenance phases through a combination of avoidance, prevention and reduction measures.

[5] The EIA has been undertaken based on an opening year of 2026 for the Scheme, in line with the reasonable worst case scenario construction programme presented in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**. However, traffic modelling undertaken to generate forecasts for the assessments reported in the Environmental Statement **[TR010044/APP/6.1]** has been based on an opening year of 2025; this being the year assumed at the time of modelling when Scheme construction was expected to be completed (see the Transport Assessment **[TR010044/APP/7.2]**), which is aligned to the key project milestones. This difference between the opening years does not invalidate the conclusions of the assessments reported in the Environmental Statement **[TR010044/APP/6.1]** and the Transport Assessment **[TR010044/APP/7.2]** as the forecast flows on the road network in years 2025 and 2040 are considered to be reasonably representative of the traffic flows that would exist on the network in years 2026 and 2041 respectively.

[6] **Chapter 4, Environment assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]** explains the different categories of environmental mitigation that would be delivered as part of the Scheme, and how these would be secured through the DCO.

2.5.116 **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]** summarises the optioneering and design-development of the Scheme, and the key design-based decisions made in relation to avoiding and preventing adverse environmental effects – for example the modification of the horizontal alignment of the new dual carriageway to avoid environmentally sensitive areas and features, and the selection of sites for borrow pits that avoid areas of environmental interest and value.

2.5.117 Where avoidance and prevention have not been possible, design-based features have been identified to reduce the adverse environmental effects of the Scheme during its different phases – for example the development and incorporation of a comprehensive planting strategy to help integrate the new dual carriageway into the landscape, and to provide biodiversity mitigation and enhancements.

2.5.118 The Environmental Masterplan presented on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]** illustrates the form and location of design-based features embedded into the Scheme, the development of which has been primarily driven by the process of landscape design using guidance contained in *LD 117: Landscape Design (Revision 0)* (Ref 2-15).

Landscape design principles

2.5.119 The landscape design for the Scheme commenced with the identification and establishment of the following design principles relevant to the landscape and visual environment:

a. A strategic, green infrastructure approach to design which considers the multiple benefits that the Scheme can deliver.

b. The sensitive design of earthworks, attenuation basins and other drainage features to fit with surrounding landform and land cover patterns.

c. As far as practicable, the sensitive location of signage and gantries to limit visual intrusion.

d. Lighting of new and improved sections of highway within the Scheme has been confined to locations where road safety is a priority, in order to minimise the potential for light spill in night time views across the landscape.

e. Where practicable, the application of recommendations contained within relevant landscape guidelines.

f. The use of a range of plant species to reflect the distinctive local character, protect against the effects of climate change, and reinforce biosecurity.

g. Areas of species rich grassland at locations where conditions are suitable for their establishment, to provide seasonal interest and to provide valuable habitats that increase local biodiversity.

h. The use of different types of native tree and shrub planting on and adjacent to highway earthworks to create woodlands, copses and shelterbelts to fit with the surrounding landscape character patterns, help to break up the scale of the new dual carriageway, and screen structures, traffic and lighting.

i. Retention of views to local landmarks through breaks in proposed planting, to help create a sense of place and interest for road users where possible.

j. Rounding of the crests and toes of embankments and cuttings to achieve better integration with the surrounding landform, where space and materials are available.

k. The use of hedgerows along the highway boundary, where appropriate, to link into existing field boundaries, provide screening and integration into the local pattern, and to connect and extend existing wildlife corridors.

2.5.120 Recommendations contained within relevant landscape guidelines, including Natural England's Statements of Environmental Opportunity (SEO) outlined in its profile for *National Character Area 88*: *Bedfordshire and Cambridgeshire Claylands* (Ref 2-16), were also considered during the development of the landscape design.

2.5.121 The design has responded to published management objectives and SEO including managing, expanding and linking woodlands, hedgerows and other semi-natural habitats (SEO 1) and linking and enhancing existing semi-natural habitats (SEO 3). The focus of these responses relates to the more remote sections of the new dual carriageway where this would cross open countryside away from existing road infrastructure, principally across Alington Hill and towards the existing Cambridge Road roundabout. The design has also sought to address opportunities to protect, conserve and enhance cultural heritage (SEO 4) issues relating to the protection of the setting of the Registered Park and Garden at Croxton Park.

2.5.122 Green corridors alongside PRoW and new links and connections between these PRoW to the east of St Neots have been included in the design, the purpose being to improve the opportunities for biodiversity.

2.5.123 The design has also sought to expand the physical pattern of landscape features surrounding the village of Eltisley to improve the visual connectivity of the historic village enclosures, and the sense of arrival to the village.

Environmental function codes

2.5.124 *LD 117* (Ref 2-15) sets out a range of environmental function codes relevant to the design and management of highway developments.

2.5.125 Design-based features associated with the following codes have been embedded into the design of the Scheme:

a. EFA (Visual screening) – comprising measures that mitigate against adverse visual impacts by screening views of the Scheme and associated infrastructure from properties and public viewpoints, including PRoW and public open spaces.

b. EFB (Landscape integration) – comprising measures that integrate the Scheme into the character of the surrounding landscape by maintaining the matrix of local vegetation patterns, blending with local landform and softening views of the new dual carriageway, its infrastructure and its traffic.

c. EFC (Enhancing the built environment) – comprising measures that enhance the landscape and built elements of the Scheme with surrounding features, to reflect the scale, character and materials of the local townscape or community through which the new dual carriageway passes, and consideration of the needs and amenity of the public living or working in or utilising areas within or adjacent to the Scheme.

d. EFD (Nature conservation and biodiversity) – comprising measures that protect, manage and enhance nature conservation and biodiversity value and integrate the Scheme with habitats and locations containing protected species (or other locally important species or habitats).

e. EFE (Visual amenity) – comprising measures that maintain interest, variety and an acceptable visual appearance for both road users and adjacent public viewers.

f. EFG (Auditory amenity) – comprising measures that reduce the adverse noise impact of road traffic or construction on adjacent properties or publicly accessible areas, by providing measures to reduce noise pollution.

g. EFH (Water quality) – comprising measures that mitigate impacts on areas sensitive to flooding or hydrological changes, local water courses and groundwaters from construction works, road runoff and spillages.

2.5.126 *LD 117* (Ref 2-15) includes a further environmental function code – EFF (Heritage). This code has not been used as design-based features relating to the topic of heritage were not considered necessary to incorporate into the design of the Scheme.

Environmental elements

2.5.127 The following sections provide a summary of the design-based elements within the environmental function codes, the locations of which are illustrated and labelled on the Environmental Masterplan on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**.

Landscape and visual amenity

2.5.128 The design-based elements in this section relate to environmental function codes EFA, EFB, EFC & EFE.

2.5.129 To mitigate effects on the landscape and visual environment through landscape integration and visual screening, the design of the Scheme incorporates the following:

a. Amenity grassland, species-rich (or conservation) grassland, and open grassland.

b. Woodland and woodland edge planting.

c. Shrubs, shrubs with intermittent trees, and linear belts of shrubs and trees.

d. Scrub.

e. Native species hedgerows, and hedgerows with trees.

f. Individual trees.

g. Banks and ditches.

h. Reed beds.

i. Marsh and wet grassland.

Biodiversity

2.5.130 The design-based elements in this section relate to environmental function code EFD.

2.5.131 To mitigate the effects of the Scheme on protected species and other wildlife, and to increase the permeability of the landscape surrounding the Scheme, the design of the Scheme incorporates the following:

a. The incorporation of mammal ledges into culvert structures.

b. The inclusion of mammal tunnels and underpasses, including a bat tunnel structure.

c. The erection of mammal fencing.

d. The creation of artificial badger setts.

e. The erection of bat boxes.

f. The erection of nest boxes and artificial nests for birds.

g. Providing roost opportunities for Barn Owl.

2.5.132 The design also incorporates measures to mitigate the loss of habitats through the provision of the elements described in paragraph 2.5.129 across the Scheme.

2.5.133 In addition to measures required for mitigation, elements that would enhance the quality and connectivity of habitats have been incorporated into the design. These elements are associated with the creation of new habitats, the restoration of in-channel and riparian habitats, and the removal of injurious weeds.

Noise

2.5.134 The design-based elements in this section relate to environmental function code EFG.

2.5.135 To mitigate the effects associated with noise generated by road traffic, the design of the Scheme incorporates the following:

a. The application of a thin surface course system (also referred to as low noise surfacing) on the new dual carriageway and certain junctions within the Scheme to reduce vehicle noise at source.

b. Earth bunds along sections of the new dual carriageway to contain vehicle noise.

Water quality

2.5.136 The design-based elements in this section relate to environmental function code EFH.

2.5.137 To mitigate the effects of the Scheme on the quality of water within watercourses and waterbodies, the design of the Scheme incorporates culverts which have been designed in a way that reduces impacts on watercourses by ensuring the conveyance of flows and provision of naturalised beds.

2.5.138 In addition, enhancement of sections of existing watercourses would be delivered as part of the Scheme. These elements relate to channel form enhancements, improving floodplain connectivity, and improving riparian habitats.

Schedule of embedded mitigation measures

2.5.139 **Table 2-1** presents details of the embedded mitigation measures that have influenced, and/or have been incorporated into, the preliminary design for the purpose of avoiding, preventing and reducing the environmental effects of the Scheme.

2.5.140 The measures contained in **Table 2-1** are a summary of the embedded measures presented in the Schedule of Mitigation **[TR010044/APP/6.9]**, which also presents the essential mitigation measures and environmental enhancements identified through the EIA process.

Table 2-1: Embedded mitigation measures

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Chapter 5: Air quality		
The Scheme has been designed to maintain or increase the distances between properties and traffic, where possible.	To maintain or increase the separation distance between the source of pollutants (traffic) and sensitive receptors (properties).	Effects of road traffic emissions on local air quality.
The Scheme has been designed to maintain traffic flows on the A1 and A421 through Black Cat junction and the surrounding road network.	To maintain air quality at sensitive receptors.	Effects of road traffic emissions on local air quality.
The Scheme has been designed to remove traffic from the existing A428 onto the new dual carriageway.	To increase the separation distance between the source of pollutants (traffic) and sensitive receptors (properties).	Effects of road traffic emissions on local air quality.
Chapter 6: Cultural heritage		
The selection and position of construction compounds and construction areas (e.g. borrow pits) and their design/layout have taken account of known and potential archaeology.	To avoid construction-related disturbance to buried archaeology in locations that have been identified as having high archaeological potential.	Effects on archaeological sites and features of known or potential value.
Archaeological sites and features of acknowledged value identified within construction compounds and construction areas (for example borrow pits) would be fenced off, with notices prohibiting works in those area attached to the fencing.	To protect archaeological remains within those sites from accidental disturbance during construction of the Scheme.	Effects on archaeological sites and features of known or potential value.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
The total area of land within the Order Limits has been limited to that required to construct, operate and maintain the Scheme.	To avoid unnecessary disturbance to buried archaeology.	Effects on archaeological sites and heritage features of value.
Confining road lighting introduced as part of the Scheme to new and improved sections of road where road safety is a priority.	To reduce the potential for light spill intrusion into the setting of heritage assets.	Effects on the setting of heritage assets.
Chapter 7: Landscape and visual effects		
The total area of land within the Order Limits has been limited to that required to construct, operate and maintain the Scheme.	To avoid impacts by retaining, where possible, established vegetation and features that contribute to local landscape character and that provide an existing visual screening function.	Effects on local landscape character and visual amenity.
Modifications made to the horizontal alignment of the new dual carriageway during the design-development process.	To avoid impacts on notable and valued landscape features – for example veteran Elm tree located to the north of Hen Brook, and other veteran trees at Croxton Park registered park and garden.	Effects on components and features that combine to influence local landscape character.
Optimisation of the horizontal and vertical alignment of the new dual carriageway, to minimise impacts associated with crossing valleys and landform within the landscape, and to reduce the visual impact of new junctions (for example Black Cat junction).	To minimise impacts associated with crossing valleys and landforms within the local landscape. To reduce the visual intrusion of new highway components in existing views.	Integration of the Scheme into the local landscape. Effects on visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Positioning of sections of the new dual carriageway below existing ground level within earthwork cuttings.	To visually contain much of the new dual carriageway and its associated infrastructure and traffic movements from existing views.	Effects on visual amenity.
Designing certain earthworks to have slope gradients shallower than 1 in 3.	To soften the appearance of engineering earthworks along sections of the new dual carriageway and achieve good integration with the rural landscape.	Integration of the Scheme into the local landscape.
Confining road lighting introduced as part of the Scheme to new and improved sections of road where road safety is a priority.	To minimise the potential for light spill to intrude into night time views.	Effects on visual amenity.
The outline definition of zones within the main site compounds to accommodate materials storage areas, define areas for temporary works and operations, and the locations for other equipment and infrastructure (for example welfare facilities).	To minimise the temporary impact of the main site compounds in the local landscape, and in available views.	Effects on local landscape character and visual amenity.
Factoring landscape and visual considerations into the form and design of permanent structures (for example footbridges).	To improve the appearance of structures in available views within the local landscape.	Effects on visual amenity.
Minimising the introduction of new gantries and throughout the Scheme.	To reduce the perception of visual clutter across the Scheme.	Effects on visual amenity.
The reinstatement of land used temporarily during construction, where required.	To reinstate land post completion of construction.	Restoration of the landscape to its original character.
Implementation of the following elements of the planting strategy within Chainage 0 – 1000 (A421 tie-in to the Black Cat junction). In this location the new dual carriageway would tie in with the existing A421 at approximately existing ground level. The existing	To integrate the Scheme into the character of LLCA 01: East Renhold Clay Farmland.	Integration of the Scheme into the local landscape.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
noise bunds on the A421 would be reconstructed and planted with a belt of trees and shrubs to replace planting lost during the construction and provide visual screening. This would also help to integrate the new dual carriageway into the surrounding landscape. Native woodland planting and open grassland north of the realigned farm access track and public footpath to reinforce the existing landscape pattern.	To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Effects on local landscape character and visual amenity.
Chainage 1000 – 2450 (Black Cat junction to the River Great Ouse). The embankments of the Roxton Road overbridge and roundabout would be planted with native woodland to replace vegetation lost during the construction and to screen the structure. The Roxton Road bridge would be approximately 8m above the new dual carriageway, and native woodland planting north and south would screen the structure and assist in screening views from properties in Roxton to the south and Chawston to the north. The new Roxton Road link would be constructed to connect Wyboston and Chawston and provide safer access to Bedford Road. Large groups of native woodland along the western section of the Roxton Road link would screen the structure of the Roxton Road link and the Black Cat junction from Chawston to the west. Further north, proposed hedgerows would restore field boundaries lost during the construction and help integrate the Scheme into the local landscape pattern. Through the Black Cat junction, the new dual carriageway would be positioned on embankments approximately 9m above existing ground level. These embankments would be maintained as open grassland and belts of trees and shrubs would be established to	To integrate the Scheme into the character of LLCA 02: Settled Ouse Valley, LLCA 03: Wyboston and Chawston and LLCA 04: Ouse Valley. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
break up the scale and views of the structure and vehicles travelling over it. Tree and shrub planting around the surrounding attenuation basins would help integrate these drainage features into the surrounding land cover. The A1 (ground -1) would be positioned at a maximum depth of 9m, resulting in a reduction in visible traffic on the approaches to the Black Cat junction to the north and south. The Kelpie Marina access road would rise on embankments at approximately 8m high on the approach to its elevated crossing of the A1. Planting west of the track would assist in filtering or screening the tall embankments in views from Roxton to the west and help integrate new road infrastructure into the local area. The flood compensation areas south of the new dual carriageway would be integrated into the Black Cat Quarry restoration landscape. Planting would replace vegetation lost during construction and help to integrate the land with the riparian vegetation along the neighbouring River Great Ouse to the east. Widening of the A1 immediately north of the Black Cat junction would result in the loss of existing, mature vegetation along the road. The linear belt of trees and shrubs proposed along the western side of the A1 would replace vegetation lost during construction and screen views from Chawston.		
Implementation of the following elements of the planting strategy within Chainage 2450 – 3850 (River Great Ouse to the ECML railway). At Chainage 2450 the new dual carriageway would cross the River Great Ouse on a viaduct. Most of the existing vegetation along the riverbanks would be retained, with additional native	To integrate the Scheme into the character of LLCA 05: Biggin Wood Clay Vale and LLCA 04: Ouse Valley. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
woodland planting proposed including woodland edge to diversify the structure and species and aid the creation of new habitats. Between Chainage 2500 – 2900 the new dual carriageway would descend into cutting to a maximum depth of 7m to pass under the Barford Road bridge. On both sides of the new dual carriageway the slopes would be seeded with a mix of species rich and open grassland. A linear belt of trees and shrubs would cover part of the embankments of the realigned Barford Road south of the new dual carriageway to break up the scale of these features. Extensive areas of species rich grassland would be created east of the realigned Barford Road to provide seasonal interest and new habitats. Planting on the embankments of the realigned Barford Road would also help reduce the prominence of the Barford Road bridge within the open landscape. The attenuation basin area proposed to the north-east of the Barford Road bridge would be maintained as open grassland with individual trees to help integrate the drainage infrastructure into the local landscape. Between Chainage 2900 – 3850 the new dual carriageway would gradually rise above the surrounding ground on embankments up to a maximum height of 9m to accommodate the ECML underbridge, the eastern extents of which would be planted with native woodland and open grassland to help integrate this feature into the local landscape.		
Implementation of the following elements of the planting strategy within Chainage 3850 – 7150 (ECML railway to Alington Hill). From Chainage 3850, the embankments of the ECML underbridge would be planted with native woodland and open grassland to assist in integrating the structure into the surrounding landscape	To integrate the Scheme into the character of LLCA 05: Biggin Wood Clay Vale and LLCA 06: Alington Hill Clay Farmland. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
and contribute to the wooded character of the Biggin Wood Clay Vale. The new dual carriageway would be positioned in cutting into Alington Hill between Chainage 4950 – 6250 to a maximum depth of 7.5m. On both sides the slopes would be seeded as open grassland. Large clumps of native woodland would be planted along the tops of the cutting and would cover part of the embankments in places to help integrate them with the local landscape. Hedgerow planting would reinstate field boundaries on the eastern side of the new dual carriageway to restore locally characteristic boundary features. At Chainage 5450 the Top Farm accommodation bridge would cross the new dual carriageway at approximately existing ground level. Large clumps of native woodland planting adjacent to Alington Top Farm would reduce the visual impact of the new dual carriageway and help integrate it with the surrounding landscape. Further north between Chainage 6250 – 6600, the new dual carriageway would be at ground level but contained with earth bunds. Native woodland planting on the earth bunds would screen traffic on the new dual carriageway and help integrate these features into the local landscape. The earth bund on the eastern side of the new dual carriageway would be planted with clumps of native woodland to assist the screening of views from businesses on Potton Road, including Abbotsley Golf Club. Between Chainage 6600 – 7150 the new dual carriageway would descend into a cutting with a maximum depth of 8m beneath the new B1046 bridge, which would cross the new dual carriageway. Native woodland planting would screen traffic and the new B1046 bridge in views.		

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
The new dual carriageway would result in substantial alterations to the existing landform and landscape pattern through extensive earthworks and the loss of existing field boundary vegetation. The earthworks have been designed to assist in integrating the new dual carriageway within Alington Hill by feathering out the tops of cutting slopes. Native woodland and hedgerow planting would integrate the new dual carriageway with the surrounding landscape by restoring the character of scattered woods clothing the slopes up to the plateau and to reduce its prominence.		
Implementation of the following elements of the planting strategy within Chainage 7150 – 9200 (Alington Hill to Wintringham). Between Chainage 7150 – 7500, embankments along the new dual carriageway would be planted with a mix of species rich and open grassland. Small, scattered blocks of native woodland and grassland would help integrate these structures into the local landscape of scattered woods. Hedgerows would replace field boundary vegetation lost during construction and tie in with the remaining hedgerows. The land around the attenuation basin to the east of the new dual carriageway would be seeded with species rich grassland to provide new habitats and seasonal interest. Between Chainage 7500 – 8700 the new dual carriageway would rise and fall on embankments to cross both Hen Brook and Wintringham Brook. These embankments would be seeded with a mix of species rich and open grassland and planted with native woodland. Extensive planting around the interfaces with Hen Brook and Wintringham Brook is proposed to help reconnect and extend existing wildlife corridors along these watercourses. Native woodland adjacent to the new dual carriageway would create further connections with the existing landscape pattern. Extensive	To integrate the Scheme into the character of LLCA 08: Settled Clayland Vale. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
areas of species rich grassland and individual trees would increase biodiversity and provide interest to the users of footpaths. Between Chainage 8700 – 9000 the new dual carriageway would be in cutting to a maximum depth of 4m, which would visually screen traffic within this open section of rural landscape. Native woodland and hedgerow planting would further increase the screening of traffic.		
Implementation of the following elements of the planting strategy within Chainage 9000 – 12250 (Cambridge Road junction, and Wintringham Brook to Gallow Brook). The new dual carriageway would pass beneath the Cambridge Road junction in cutting, reducing the visual impact of traffic. Embankments supporting the Cambridge Road junction dumbbell link road would be planted with belts of trees and shrubs to reduce the perception of the junction and provide visual interest for road users. The Cambridge Road junction North Roundabout and South Roundabout would be seeded with amenity grassland to provide visual interest whilst maintaining visibility splays. A hedgerow north of the Cambridge Road junction North Roundabout would replace field boundary vegetation lost during construction. Attenuation basins on the eastern and western side of the Cambridge Road junction would be integrated into the local landscape using a mixture of species rich and open grassland, individual trees and shrubs. Between Chainage 10150 and 11000 the new dual carriageway would be approximately at existing ground level with hedgerows proposed on both sides of the new dual carriageway, tying in with the existing vegetation to reinforce the local landscape pattern.	To integrate the Scheme into the character of LLCA 11: Wintringham and Weald Clay Farmland. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Between Chainage 11000 to 11050 a Bridleway accommodation overbridge would be constructed, the embankments of which would be planted with native woodland to integrate this structure within the local landscape and the existing woodland to the north and south. Between Chainage 11050 and 12250 the new dual carriageway would be positioned on embankment in places to cross Fox Brook and Gallow Brook. On the southern side of the new dual carriageway, a linear belt of trees and shrubs would screen traffic and help integrate the new road infrastructure into the local landscape pattern of scattered woods. Hedgerows would replace field boundary vegetation lost during construction. On the northern side of the new dual carriageway, open grassland would allow for views out across the rural landscape to provide interest for road users.		
Implementation of the following elements of the planting strategy within Chainage 12250 – 15300 Croxton Park (Gallow Brook and West Brook Tributary). Between Chainage 12250 and 13000, Toseland Road Bridge would be positioned on embankment and planted with native woodland to visually screen the structure. An attenuation basin on the western side of Toseland Road Bridge would be set within an area of open grassland, with individual trees, native woodland and woodland edge proposed to integrate it with the local parkland character. Between Chainage 13000 and14350, the new dual carriageway would be in cutting to a maximum depth of 4.5m, which would reduce its visual impact. On both sides of the new dual carriageway the slopes would be seeded with open grassland to	To integrate the Scheme into the character of LLCA 11: Wintringham and Weald Clay Farmland and the adjacent LLCA 12: Croxton Park. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
provide landscape integration. Hedgerows would connect to existing field boundaries, and scattered individual trees are proposed to reflect the parkland character and wider setting of Croxton Park. Between Chainage 14350 and 15300, the new dual carriageway would be positioned at existing ground level before rising gradually towards its crossing over the West Brook Tributary, the approach to which would be bounded by hedgerows and occasional trees.		
Implementation of the following elements of the planting strategy within Chainage 15300 – 17550 (West Brook Tributary and access track to Pastures Farm). Between Chainage 15300 and 16000 the new dual carriageway would drop in elevation from its crossing over the West Brook Tributary and descend into cutting. On both sides of the new dual carriageway the slopes would be seeded with open grassland to provide landscape integration. The Eltisley link would be positioned on embankment and planted with trees and shrubs to reduce the sense of scale of the junction and help integrate it with the surrounding landscape. Attenuation basins located north-west of the Eltisley link would be set within grassland, with a retained group of existing trees that are protected by TPO. A smaller attenuation basin south-west of the Eltisley link, adjacent to the realigned A428, would be planted with open grassland and clumps of native woodland to the south. The planting would provide substantial screening and tie in with existing woodland planting at the entrance to Eltisley village. Between Chainage 16000 and 17550 open grassland and scattered trees would continue along to the new dual carriageway	To integrate the Scheme into the character of LLCA 14: Western Claylands and partially within LLCA 13: Eltisley. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
to integrate the new road infrastructure and attenuation basins within the local landscape. Linear belts of trees and shrubs would provide visual screening to residents and enhance the existing planting north of the realigned A428. Hedgerows would replace lost field boundary vegetation south of the new dual carriageway.		
Implementation of the following elements of the planting strategy within Chainage 17550 – 19137 (Caxton Gibbet junction). The new dual carriageway would be carried over the Caxton Gibbet junction dumbbell link road on an overbridge, with its embankments planted with native woodland to screen passing traffic and reduce the scale of the junction in views from the surrounding properties and footpaths. Linear belts of trees and shrubs would be provided along the northern boundaries of the realigned A428 and the Caxton Gibbet eastbound off-slip road. Caxton Gibbet Services would be retained, with a combination of existing and new planting screening views from these facilities.	To integrate the Scheme into the character of LLCA 14: Western Claylands. To integrate the Scheme into the existing vegetation pattern and minimise its visual impacts.	Integration of the Scheme into the local landscape. Effects on local landscape character and visual amenity.
Chapter 8: Biodiversity		
The total area of land within the Order Limits has been limited to that required to construct, operate and maintain the Scheme.	To minimise the loss of existing habitats.	Effects on terrestrial and aquatic habitats.
Optimisation of the horizontal alignment of the new dual carriageway during the design-development process.	To avoid impacts on notable and valued features of biodiversity value – for example a veteran Elm tree located to the north of Hen Brook, and veteran trees at Croxton Park registered park and garden.	Effects on terrestrial habitats.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
The retention of existing habitats within the Order Limits of the Scheme, where practicable.	To minimise the loss of existing habitats as a result of the Scheme.	Effects on terrestrial and aquatic habitats.
The planting of woodland and woodland edge species along sections of the new dual carriageway.	To provide foraging and roosting opportunities for bats and birds. To reduce the impact of habitat fragmentation on bats. To provide habitat for Badger. To minimise the risk of mortality to Barn Owl from traffic collisions. To provide habitat for terrestrial invertebrates.	Effects on birds, bats, badger, barn owl and terrestrial invertebrates.
The planting of shrubs and scrub along sections of the new dual carriageway.	To provide replacement foraging, roosting and breeding habitat for birds in the summer months. To provide foraging and roosting habitat for birds in the winter months. To provide cover and protection for Common Lizard and Grass Snake. To reduce the impact of habitat fragmentation on bats and Great Crested Newt. To provide habitat for terrestrial invertebrates.	Effects on breeding and wintering bird assemblages, Common Lizard, Grass Snake, bats, Great Crested Newt and terrestrial invertebrates.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
The planting of hedgerows along sections of the new dual carriageway.	To reconnect existing hedgerows that would be fragmented by the Scheme and those lost to the Scheme. To link existing and new woodland. To provide additional foraging and commuting habitat for bats, and additional habitat for a range of other species.	Effects associated with habitat fragmentation on bats and other species. Effects associated with terrestrial habitat loss.
The creation of grassland habitats on earthwork cutting and embankment slopes, and on road verges.	To replace existing habitats lost to the Scheme. To provide foraging and refuge habitat for birds, reptiles and amphibians. To provide habitats for insects and other invertebrates, and encourage colonisation. To provide cover and protection for Common Lizard and Grass Snake.	Effects on terrestrial invertebrates and habitats, and on birds, reptiles and amphibians. Effects in Common Lizard and Grass Snake.
The creation of new wet ponds within the Order Limits (with associated marginal and wetland planting). Ponds would be profiled to achieve gentle sloping sides to allow native vegetation cover to develop around the pond edge. New ponds would not be stocked with fish which are inimical to amphibians.	To create habitat for Great Crested Newt and aquatic invertebrates.	Effects on aquatic invertebrate habitats and species. Effects on Great Crested Newt.
The installation of mammal ledges within the following structures within the design of the Scheme: a. Begwary Brook Culvert (Roxton Link Road).	To maintain connectivity between habitats used by otter, Great Crested Newt and	Effects on otter, Great Crested Newt and badger.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
b. South Brook Existing (A1). c. South Brook Proposed (Roxton Link Road). d. Alington Top Farm. e. Hen Brook. f. Cambridge Road (east) (Wintringham Brook Tributary). g. Cambridge Road (Wintringham Brook Tributary). h. Gallow Brook. i. Pillar Plantation (West Brook).	Badger that would be severed by the Scheme.	
The installation of bat boxes sited on retained trees within the Order Limits, at locations identified on Figure 2.4 Environmental Masterplan **[TR010044/APP/6.2]**.	To provide alternative roosting opportunities for the local bat population and mitigate for the loss of potential summer and hibernation roosts.	Effects on bats.
The creation of a network of wetland habitats, including ephemeral wetland habitat, reedbeds and wet grassland within the Scheme.	To mitigate for the loss of field ponds to the Scheme, and their associated invertebrate fauna.	Effects on aquatic and wetland habitats.
Confining road lighting introduced as part of the Scheme to new and improved sections of road where road safety is a priority.	To minimise the potential for light spill and disturbance into adjacent habitats, including areas of important foraging and/or commuting habitat used by the local bat population.	Effects on bats and other species.
Provision of planting within the planting strategy of the Scheme at known bat activity hotspots and flyways.	To replace and reinstate navigational cues adjacent to the Scheme.	Effects on bats.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
	To encourage bats towards crossing point structures and away from the new dual carriageway.	
Installation of mammal fencing comprising a 1.5m high metal mesh fence (maximum 50mm mesh gauge) with a lower buried section (0.5 metres vertical and 300mm turned away from the fence in the direction from which badgers and other mammals will approach), with an addition of a mesh overhang at the top of 300mm angled away from the road to prevent Otter from climbing. For the 20m either side of a bat tunnel (underpass) entrance, the height of the fencing would be 2m.	To guide badgers and other mammals under the new dual carriageway once operational. To prevent otter being able to pass through the fence and onto the new dual carriageway once operational. To minimise the risk of deer and other mammals crossing the new dual carriageway once operational. To encourage and guide bats towards crossing point structures and away from the new dual carriageway during the planting establishment period. To minimise the risk of mortality to Barn Owl from traffic collisions.	Effects on mammals (mortality).
The creation of replacement artificial badger setts (comprising main, outlier and subsidiary setts) at confidential locations within the Order Limits.	To replace badger setts lost to the Scheme.	Effects on badger.
The consideration of existing bat flight paths during the development of the preliminary designs of the following structures incorporated into the Scheme: a. Viaduct over the River Great Ouse. b. East Coast Main Line railway underbridge.	To reduce the risk of collision mortality by encouraging safe passage for bats under the new dual carriageway. To minimise the need for bats to alter their flight height or direction.	Effects on bats.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
c. Alington Top Farm. d. Hen Brook. e. Bridleway accommodation bridge (north of Croxton Park). f. Pillar Plantation pedestrian underpass.	To maintain existing bat commuting routes.	
Provision of a dedicated bat tunnel (underpass) within the design of the Scheme which would join Sir John's Wood, Alington Hill and Boys Wood. No permanent lighting would be installed within the underpass, or in proximity to its entrances and adjacent habitat features.	To reduce the risk of collision mortality by encouraging safe passage for bats under the new dual carriageway. To minimise the need for bats to alter their flight height or direction. To maintain existing bat commuting routes.	Effects on bats.
Chapter 9: Geology and soils		
Modifications made to the horizontal alignment of the new dual carriageway during the design-development process.	To minimise the potential for interaction with, and disturbance of, known contaminated land.	Effects on, and from, contaminated land.
The total area of land within the Order Limits has been limited to that required to construct, operate and maintain the Scheme.	To minimise the permanent loss of best and most versatile agricultural soils.	Effects on soils.
Incorporation of drainage solutions and the grading of cut and fill slopes within the design to a maximum of 1 in 3 gradients.	To reduce the susceptibility of earthwork slopes to erosion.	Effects on ground stability and soils.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Chapter 10: Material assets and waste		
Designing the Scheme to facilitate the reuse of acceptable material arisings (for example those associated with earthworks cuttings and other excavations).	To recycle existing materials, and to reduce on-site waste arisings.	Effects relating to the generation of on-site waste and its disposal.
Achieving an earthworks balance (cut and fill material) within the design of the Scheme, where possible.	To minimise the need to import and export material.	Effects relating to the generation of on-site waste and its disposal.
Inclusion of borrow pits within the Order Limits of the Scheme.	To obtain materials local to the Scheme and minimise the need to import and export material.	Effects relating to consumption of materials and products and the generation and disposal of on-site waste.
Inclusion of land within the Order Limits of the Scheme for the temporary on-site storage of soils, excavated materials and other construction materials.	To enable appropriate segregation and storage of materials and waste, reduce wastage and facilitate the reuse of materials on-site.	Effects relating to the generation of on-site waste and its disposal.
Appropriate sizing of the main site compounds, satellite construction compounds and storage areas within the Scheme design.	To enable appropriate segregation and storage of waste, and to facilitate off-site recovery.	Effects relating to the generation of on-site waste and its disposal.
Retention of existing highways infrastructure within the Scheme design where feasible (for example sections of the existing A428 and existing side roads).	To minimise the need for the demolition of components and infrastructure, and to reduce associated on-site waste arisings.	Effects relating to the generation of on-site waste and its disposal.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Reuse of excavated materials and the recycling of demolition and construction materials within the Scheme.	To recycle existing materials, reduce dependency on primary material resources, and to reduce on-site waste arisings.	Effects relating to consumption of materials and products and the generation and disposal of on-site waste.
Optimisation of junction designs (for example Black Cat junction) within the Scheme to reduce the height of retaining walls and pile lengths.	To reduce the associated materials requirements of the Scheme.	Effects relating to consumption of materials and products.
Optimisation of bridge, underpass and culvert designs through the incorporation of precast concrete elements into the design of the Scheme.	To reduce the associated materials requirements of the Scheme, and to reduce on-site waste arisings.	Effects relating to consumption of materials and products and the generation and disposal of on-site waste.
Construction methodology for the Scheme includes for the importation of alternative (recycled and secondary) aggregate materials during construction, where practicable.	To reduce dependency on primary material resources.	Effects relating to consumption of materials and products.
Chapter 11: Noise and vibration		
The positioning of sections of the new dual carriageway below existing ground level within earthwork cuttings.	To contain road traffic noise and reduce effects on noise sensitive receptors in proximity to the earthwork cuttings.	Reduction in noise associated with the movement of road traffic on the new dual carriageway.
Low noise surfacing would be installed on the following roads and junctions within the Scheme: a. Along the entire length of the new dual carriageway, from its tie in with the existing A421 through to the tie in with the	To reduce road traffic noise at source.	The use of a thin surface coarse system would offer up to a 3.5 dB(A) reduction in noise associated with the movement of road traffic on

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
existing A428 dual carriageway east of Caxton Gibbet junction. b. On the A1 (ground -1) through Black Cat junction. c. Black Cat junction. d. Cambridge Road junction. e. Eltisley link. f. Realigned A428. g. Caxton Gibbet junction.		the new dual carriageway, when compared to the use of hot rolled asphalt.
Earth bunds of a maximum 3m height would be formed adjacent to the new dual carriageway at the following locations, as illustrated on Figure 2.4 Environmental Masterplan **[TR010044/APP/6.2]**: a. Along either side of the new dual carriageway between its tie in point with the existing A421 and the Roxton Road bridge (approximately Chainage 1100). b. Along either side of the new dual carriageway from north of the Top Farm accommodation bridge (approximate Chainage 6250) to the new B1046 bridge (approximately Chainage 7000).	To contain road traffic noise and reduce effects on noise sensitive receptors at the following noise sensitive locations: a. Properties at Roxton. b. Parker's Farm, Rectory Farm and other nearby properties.	Reduction in noise associated with the movement of road traffic on the new dual carriageway.
Chapter 10: Population and health		
Earthwork slopes along the new dual carriageway have predominantly been designed to slope gradients of 1 in 3.	To minimise the extent of permanent landtake within agricultural holdings.	Effects on the operation and future viability of agricultural holdings.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Incorporation of severed and/or inaccessible land parcels into the Order Limits, where appropriate and reasonably practicable.	To reduce the effects of the Scheme on existing agricultural operations and ensure fields are of a form and size that enables them to remain viable to farm.	Effects on the operation and future viability of agricultural holdings.
Reinstatement of agricultural field boundaries using fencing and/or hedgerows where components of the Scheme would sever established boundaries.	To demarcate the highway boundary and reinstate the boundaries of agricultural fields severed by the Scheme.	Effects on the operation and future viability of agricultural holdings.
Provision of accommodation works and PMAs within the design for agricultural land holdings and commercial premises affected by the Scheme.	To enable continued access where existing arrangements would be severed or lost as a consequence of the Scheme.	Effects on the operation and future viability of agricultural holdings and businesses.
Inclusion of the following measures into the design of the Scheme: a. Barriers. b. Lay-bys (including emergency telephones). c. CCTV.	To improve safety for WCH travelling on the new dual carriageway.	Effects on WCH and motorised user journeys, amenity, safety and accessibility.
Provision of PRoW to replace and, where feasible, improve the following footpaths and bridleways: a. Footpath A10. b. Footpath 7. c. Footpath 8. d. Footpath 1/9. e. Footpath 1/16. f. Footpath 1/17.	To enable WCH to continue to make journeys on PRoW severed by the Scheme, and ensure continued connectivity is provided for WCH between communities and routes within the wider PRoW network.	Effects on WCH user journeys, amenity and accessibility, and effects associated with community severance.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
g. Footpath 1/20. h. Footpath 59/1 to 278/7. i. Bridleway 1/18. j. Bridleway 74/6.		
Re-designation of School Lane (east of Roxton) to a bridleway.	To maintain connectivity for WCH who currently use School Lane with the Kelpie Marina access road.	Effects on WCH user journeys, amenity and accessibility, and effects associated with community severance.
Provision of new footways within the verges of the following roads and junctions: a. Roxton Road link (north). b. Roxton Road link (south). c. BP filling station service road. d. Kelpie Marina access road. e. Cambridge Road junction (including sections of the realigned A428). f. Realigned Toseland Road. g. Eltisley link (including sections of the realigned A428). h. Caxton Gibbet junction.	To replace footways severed or lost to the Scheme.	Effects on pedestrian and cyclist journeys, amenity and accessibility, and effects associated with community severance.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
Chapter 13: Road drainage and the water environment		
Incorporation of treatment trains into the design of the Scheme (comprising features including, but not limited to, wet ponds, filter drains, swales, new highway ditches and hydrodynamic vortex flow separators) at locations illustrated on the Drainage Layouts within the Engineering Section Drawings **[TR010044/APP/2.10]**.	Pollution control through the collection and treatment of routine road runoff associated with the operational Scheme, prior to its discharge into receiving watercourses.	Effects relating to water quality.
Incorporation of sustainable drainage features into the design of the Scheme, designed to ensure no surcharge for a 1 in 1 year return period and no flooding in a 1 in 5 year return period, and including for a 40% increase in rainfall intensity.	To mimic natural drainage as far as practicable, and to provide a number of other benefits to ecological habitat creation. Flow attenuation. Resilience against future climate change.	Effects relating to drainage and climate change.
Installation of 39 new engineered outfalls for surface water at locations illustrated on the Drainage Layouts within the Engineering Section Drawings **[TR010044/APP/2.10]**. The number of new surface water outfalls has been minimised by using existing outfalls, where possible.	To discharge operational runoff from the strategic and local road networks. To avoid the need to construct new structure and outfalls.	Effects relating to water quality and the discharge of runoff.
Construction of flood compensation areas within the Order Limits of the Scheme at the following locations, as illustrated on Figure 2.4 Environmental Masterplan **[TR010044/APP/6.2]**: a. River Great Ouse: two areas. b. Rockham Ditch: two areas.	To mitigate (compensate) for loss of floodplain storage volume.	Effects relating to flood risk.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
c. Begwary Brook: two areas. d. South Brook: two areas. e. Rectory Farm: one area. f. Hen Brook: one area. g. Top Farm Watercourse: one area.		
Construction of a viaduct over the River Great Ouse and its floodplain, comprising a six-span twin ladder girder, steel-concrete composite viaduct comprising of two decks each carrying the new eastbound and westbound carriageways. Piers and adjoining embankments have been designed and located to avoid the river channel and provide minimal obstruction of floodplain flows. The soffit for the viaduct where it spans the River Great Ouse has been designed to ensure sufficient clearance for navigation, and has taken into account flood levels. Piers have been designed to be set back from the bank edge to minimise the span length required.	To provide minimal obstruction of floodplain and river flows. To allow navigation along the navigable section of the river to continue unobstructed.	Effects associated with flood risk and navigation.
Installation of culverts (box or pipe) at locations illustrated on the Drainage Layouts within the Engineering Section Drawings **[TR010044/APP/2.10]**.	To maintain existing watercourse flows crossed by the Scheme and minimise interruption to existing hydromorphological processes. Flood risk management.	Effects on drainage, flood risk and morphology.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
The diversion, realignment or re-routing of existing watercourses at locations illustrated on the Drainage Layouts within the Engineering Section Drawings **[TR010044/APP/2.10]**.	To maintain a more perpendicular crossing and shortest possible crossing length by the Scheme. To maintain existing watercourse flows crossed by the Scheme and minimise interruption to existing hydromorphological processes. To ensure flood risk is not increased.	Effects on drainage, flood risk and morphology.
Chapter 14: Climate		
The specification and installation of highway equipment capable of withstanding high temperatures (including electrical equipment comprising information and communication systems, bridge joints and paved surfaces).	To increase the resilience of the Scheme to extreme weather conditions.	Effects relating to climate change and/or extreme weather events.
The incorporation of VMS signage and technology into the design of the Scheme.	To provide resilience during severe weather events.	Effects relating to climate change and/or extreme weather events.
Implementation of emergency systems, including the identification of suitable network redundancies and diversion routes.	To respond to severe weather events and increase the resilience of the Scheme to extreme weather conditions.	Effects relating to climate change and/or extreme weather events.
The incorporation of sustainable drainage solutions to handle road runoff and provide resilience against potential future flood events associated with climate change.	To handle road runoff and provide resilience against potential future flood events associated with climate change.	Effects relating to climate change and/or extreme weather events.

Embedded measure	Objective(s) of measure	Effect being avoided, prevented or reduced
The use of energy efficient road lighting.	To reduce energy consumption during operation of the Scheme.	Effects relating to carbon emissions (greenhouse gas).
The reuse of materials arisings generated from construction works within the design of the Scheme, where possible.	To minimise greenhouse gas emissions associated with the transportation of materials, both on- and off-site.	Effects relating to carbon emissions (greenhouse gas).
The inclusion of borrow pits within the Scheme to source suitable construction material for the Scheme.	To reduce the need to import material, and thereby reduce the associated traffic movements that could result in greenhouse gas emissions.	Effects relating to carbon emissions (greenhouse gas).
The planting of trees, shrubs and hedgerows as part of the landscape design for the Scheme.	To offset some of the carbon emissions associated with land use changes introduced by the Scheme, and subsequent loss of carbon sink.	Effects relating to carbon emissions (greenhouse gas).
The retention, where possible, of existing highway infrastructure within the Scheme design.	To reduce greenhouse gas emissions associated with demolition activities and the transportation of associated arisings off-site.	Effects relating to carbon emissions (greenhouse gas).

2.6 Construction, operation and long-term management

Construction overview

2.6.1 The approach to Scheme construction described in the following sections is indicative, the details of which have been developed by Highways England in conjunction with advice from its appointed buildability advisor.

2.6.2 At the preliminary design stage, the construction methodologies, programme and works information are indicative but are considered to be representative of the likely approach to how the Scheme would be implemented. The approach to construction would be further refined and finalised during the detailed design phase, post consent of the DCO application.

2.6.3 To minimise the disruption caused by construction of the Scheme, it is expected that certain works (referred to as advanced and enabling works) would need to be undertaken ahead of the main construction works to allow these works to proceed, and to optimise the overall delivery programme for the Scheme.

a. Advanced works would primarily comprise archaeological investigations and diversions of key statutory undertakers' plant.

b. Enabling works would primarily comprise works associated with the establishment of construction compounds, including construction of accesses. These works would also include preliminary site clearance works, haul road and site access works, ecology works and permanent/temporary works to Public Rights of Way.

2.6.4 The main construction works would follow the advanced and enabling works, with construction works split across the following sections of the Scheme:

a. **Section 1:** Black Cat junction.

b. **Section 2:** River Great Ouse viaduct to ECML railway.

c. **Section 3:** ECML railway to Cambridge Road junction.

d. **Section 4:** Cambridge Road junction.

e. **Section 5:** Cambridge Road junction to Caxton Gibbet junction.

f. **Section 6:** Caxton Gibbet junction.

2.6.5 These sections may be amalgamated during the construction preparation period to streamline the works and achieve efficiencies; however, it is anticipated that the construction sequencing would broadly follow that presented herein.

2.6.6 A phased approach to construction of some sections of the Scheme would be adopted by the Principal Contractor, with phasing likely to be determined by the requirements for TTM on existing routes and the need to minimise disruption to the travelling public.

2.6.7 The construction of the Black Cat junction is anticipated to be the most complex section of the works. Consideration would be given to the phasing of these works to minimise, as far as reasonably practical, impacts on road users and local communities close to the junction.

Construction Programme

2.6.8 Highways England's *Delivery Plan 2020 – 2025* (Ref 2-17) explains how the committed schemes included in the RIS1 (Ref 2-2) will be delivered in the period up to 2025. The Scheme is included in the *Delivery Plan 2020 – 2025* (Ref 2-17) as a development with a construction start date of 2022 – 2023.

2.6.1 The Government has stated its commitment to delivering the Scheme in the RIS2 (Ref 2-2), and has committed to funding the Scheme during the second Road Period (covering the financial years 2020/21 to 2024/25).

2.6.2 Based on these commitments, a delivery programme was developed for the Scheme in 2019 which assumed construction would commence in September 2021, with works being completed and the Scheme being open for traffic in May 2025. These dates represent the key milestone dates for the Scheme.

2.6.3 A traffic model was developed around these key dates to inform the design-development of the Scheme, and to provide information to inform the assessment of the Scheme's likely construction and operational effects. This modelling was informed by Highways England's appointed buildability advisor, who developed an indicative programme and scenarios for the likely phasing and timing of construction works and activities around these milestones, based on:

a. A DCO application submission date of June 2020.

b. The DCO application being consented by the Secretary of State for Transport in November 2021.

c. The Scheme being segregated into six distinct sections for construction purposes.

d. A six month period of advanced works being undertaken prior to consent for the DCO application being granted, commencing in September 2021, which would be secured through separate planning consents and landowner agreements outside of the powers contained in the DCO.

e. The advanced works being undertaken in parallel within all six sections from September 2021.

2.6.4 **Table 2-2** presents these indicative key dates and durations identified in 2019.

Table 2-2: Indicative buildability dates and durations

Key construction programme element	Start date	Completion date
Enabling works	**September 2021**	**February 2022**
DCO consented for the Scheme	**November 2021**	
Main construction works:	**March 2022**	**May 2025**
Section 1 Black Cat junction	March 2022	April 2025
Section 2 River Great Ouse viaduct to East Coast Main Line railway	March 2022	December 2023

Key construction programme element	Start date	Completion date
Section 3 East Coast Main Line railway to Cambridge Road junction	March 2022	May 2024
Section 4 Cambridge Road junction	March 2022	September 2024
Section 5 Cambridge Road junction to Caxton Gibbet junction	March 2022	December 2024
Section 6 Caxton Gibbet junction	March 2022	April 2024
Scheme open for traffic	**May 2025**	

2.6.5 The traffic model was developed using these dates and forecasted future traffic flows in year 2025 (the year that the Scheme would be open for traffic) and year 2040 (fifteen years after opening), both with and without the Scheme in place.

2.6.6 As the programme assumption was that the advanced works would be secured outside of the DCO application, the modelling of future traffic flows on the road network did not account for these works. Further details of how the works presented in **Table 2-2** have been factored into the traffic modelling undertaken for the Scheme are presented in the Transport Assessment **[TR010044/APP/7.2]**.

2.6.7 Subsequent to the adoption of the indicative programme, the design-development and modelling of the Scheme continued into 2020.

2.6.8 In mid-2020, a review of the construction programme and the anticipated phasing and durations of construction works was undertaken by Highways England and its appointed buildability advisor. This was in response to delays to the likely DCO application submission date resulting from further consultation undertaken on proposed modifications to both the Scheme design and the planned approach to its construction.

2.6.9 The review identified that:

a. The six-month period identified for undertaking advanced works would need to be followed by a further six month period of enabling works, and that these would need to be accommodated within the construction programme.

b. Powers would need to be included within the DCO to deliver both the advanced and enabling works, in the event that Highways England is unsuccessful in securing the necessary consents and agreements outside of the DCO application and/or is unable to implement them in the periods assumed in the construction programme.

c. The EIA would need to be undertaken on a reasonable worst case scenario, based on all planned construction activities (i.e. advanced, enabling and main construction works) not commencing until after consent of the DCO application is granted, and accounting for the consequential delays that would result to the Scheme's open for traffic date.

2.6.10 Taking account of these considerations, a revised programme was developed by Highways England and its appointed buildability advisor to identify a reasonable worst case on which the EIA could be based.

2.6.11 **Table 2-3** summarises the reasonable worst case construction programme developed; this represents an extension (delay) of 12 months to the Scheme's open for traffic date presented in the indicative programme in **Table 2-2**.

Table 2-3: Reasonable worst case construction programme

Key construction programme element	Start date	Completion date
DCO for the Scheme consented	**March 2022**	
Advanced works	**March 2022**	**September 2022**
Enabling works	**September 2022**	**March 2023**
Main construction works:	**March 2023**	**May 2026**
Section 1 Black Cat junction	March 2023	March 2026
Section 2 River Great Ouse viaduct to East Coast Main Line railway	March 2023	March 2026
Section 3 East Coast Main Line railway to Cambridge Road junction	March 2023	March 2026
Section 4 Cambridge Road junction	March 2023	October 2025
Section 5 Cambridge Road junction to Caxton Gibbet junction	March 2023	March 2026
Section 6 Caxton Gibbet junction	March 2023	March 2026
Scheme is open for traffic	**May 2026**	

2.6.12 During the two-month period between the anticipated completion of the six sections (March 2026) and the date the Scheme would be open for traffic (May 2026) in **Table 2-3**, activities would include the restoration of land used temporarily during construction and demobilisation of equipment from construction working areas.

2.6.13 To ensure a reasonable worst case for Scheme construction has been assessed, the EIA has accordingly been based on the timeline presented in **Table 2-3**, which reflects all construction works commencing post-consent of the DCO application in March 2022 and the Scheme being open for traffic in May 2026.

2.6.14 Notwithstanding this, the traffic modelling undertaken to generate forecasts for certain assessments reported in the Environmental Statement **[TR010044/APP/6.1**] remains based on a Scheme opening year of 2025; this being the year assumed at the time of modelling when Scheme construction was expected to be completed, and which is aligned to the key project milestones within the indicative timeline presented in **Table 2-2**.

2.6.15 The 12 month difference between the opening year adopted in the traffic modelling and the opening year adopted in the EIA is not considered to invalidate the conclusions of the assessments reported in the Transport Assessment **[TR010044/APP/7.2]** and Environmental Statement **[TR010044/APP/6.1]**, as the forecast flows on the road network in years 2025 and 2040 are considered to be reasonably representative of the traffic flows that would exist on the network in years 2026 and 2041 respectively.

2.6.16 As the traffic modelling information did not account for vehicle movements associated with the advanced works phase of construction, the competent experts undertaking the traffic modelling and Highways England's appointed buildability advisor estimated the number of additional trips (i.e. journeys) that would likely result from these works. As the exercise concluded that works within this phase would have a negligible impact on existing traffic flows, the EIA has not considered these specific flows further within the construction-phase assessments reported in the Environmental Statement **[TR010044/APP/6.1]**.

2.6.17 A quantitative assessment of additional construction traffic associated with the enabling works was undertaken to evaluate the effect that additional trips during this phase could have on the road network. As these works were identified as likely to have an impact on the road network, this information was incorporated into the construction flow data used in the EIA and was accordingly considered within the relevant construction-phase assessments reported in the Environmental Statement **[TR010044/APP/6.1]**.

2.6.18 Further details regarding the construction modelling undertaken and the evaluation of traffic associated with the advanced and enabling works phases are presented in the Transport Assessment **[TR010044/APP/7.2]** and its appendices.

2.6.19 Further information regarding the relationships between the traffic modelling undertaken and the reasonable worst case scenario adopted in the EIA is presented in **Chapter 4, Environmental assessment methodology** of the Environmental Statement **[TR010044/APP/6.1]**.

2.6.20 It remains the intention of Highways England to obtain, where possible, the consents and agreements required to undertake the advanced and enabling works ahead of securing consent for the DCO. In order to bring the delivery of the Scheme back to the key project milestones, planning applications have been submitted to the relevant local authorities seeking permission to undertake the archaeological works required during the advanced works phase of the Scheme.

Advanced and enabling works

2.6.21 Advanced and enabling works would be undertaken ahead of the main construction works. **Table 2-4** summarises the main activities that would be undertaken during these phases of the construction programme.

Table 2-4: Anticipated advanced and enabling works

Works	Phase of implementation		Summary of anticipated activities
	Advanced works	Enabling works	
Archaeological works	✓	✓	Archaeological mitigation works comprising full and detailed excavation, sampling and recording of specific archaeological sites located within the Order Limits. Installation of protection measures (fencing) around archaeological sites, where required.
Utilities works	✓	✓	Undertaking surveys of existing utilities within the Order Limits, and implementing diversions and protection measures where necessary on key apparatus.
Construction compound establishment works		✓	Works to facilitate the establishment of the main construction compounds and, where necessary, satellite construction compounds within the Order Limits.
Vehicle recovery sites		✓	Works to set up vehicle recovery compounds within the Order Limits.
Site clearance works		✓	The clearance of vegetation (trees and hedgerows) within the Order Limits, with works undertaken outside of the bird breeding season where possible to avoid adverse ecological effects.
Haul roads and access works		✓	Works to form construction haul roads and site accesses within the Order Limits.
Ecological works		✓	Undertaking of ecological pre-construction surveys and, where applicable, preliminary ecological works within the Order Limits.
PRoW works		✓	Implementing measures on routes within the Order Limits that coincide with areas where advanced and enabling works activities would be undertaken to: a. Segregate users from the works with temporary fencing. b. Divert users onto new temporary routes. c. Temporarily close routes to users.

Archaeological works

2.6.22 Archaeological works would be required ahead of the main construction phase to undertake the excavation, sampling and recording of buried archaeology.

2.6.23 Although some archaeological works would need to be undertaken during the advanced works phase, specifically those that coincide with utilities diversions to be undertaken in the same phase, the majority of the archaeological works would be carried out during the enabling works phase and into the main construction works.

2.6.24 Highways England is seeking separate consents from the relevant planning authorities for those sites requiring full and detailed excavation during the advanced works stage; however, in the event these consents cannot be secured, these works would be authorised by the DCO and undertaken post-consent of the DCO application.

2.6.25 Where site conditions may prevent archaeological works being undertaken in the enabling works phase, these works would be undertaken during the early stages of the main construction works phase.

2.6.26 Further details of the planned archaeological works and the locations of sites to be excavated and sampled are presented in the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

Utilities works

2.6.27 As overhead and buried utilities would be impacted by the Scheme, works would be required to a number of existing infrastructure assets and services during the advanced works and enabling works phases and, where necessary, in the early stages of the main construction works. The full scope of these works would be developed and agreed with each affected asset operator.

2.6.28 The following types of works would be undertaken as required on existing utilities within the Order Limits:

a. Protection works – using an exclusion zone or a structural solution, for example a bridging slab, to protect an asset during construction.

b. Pre-earthworks diversion – undertaken to allow earthworks and drainage operations to commence.

c. Multiple phase diversion – where services require diversions onto a temporary alignment during construction, with subsequent diversion into the verge of the new highway.

2.6.29 Works relating to the installation of protection slabs would likely involve the removal of topsoil and subsoil to a specified depth, followed by the formation of a reinforced concrete slab positioned on top of compacted fill material.

2.6.30 Works relating to the diversion of assets would likely involve different combinations of the following activities:

a. Excavating trial holes to determine the exact alignment and depth of existing utilities and the desired connection points.

b. Excavating trenches for new service alignments or to install assets using trenchless techniques, for example through the use of pipe jacking or horizontal directional drilling (HDD), including vegetation clearance, soil stripping and dewatering of excavations where necessary.

c. Installation of new assets and connections to existing services.

d. Installation of towers or poles (for overhead equipment).

e. Undertaking surveys of new assets for recording purposes.

f. Testing and commissioning new assets.

g. Decommissioning and removal of redundant equipment.

2.6.31 The following diversions and protections would need to be carried out to existing apparatus during the advanced works phase, to facilitate delivery of the enabling works and main construction works:

a. Cadent high pressure (HP) gas main diversion (works number 51) – located on the east side of the East Coast Main Line railway and requiring diversion to facilitate construction of railway bridge pier.

b. National Grid (NG) 450NB HP gas main lowering (works number 42) – located between the River Great Ouse and Barford Road and requiring lowering to allow the construction of the new dual carriageway.

c. CLH oil pipeline diversion (works number 38) – located on the west side of the River Great Ouse and requiring diversion to facilitate construction of the viaduct over the river.

d. NG 450NB HP gas main protection slab – located under Bedford Road and the existing A421 to the west of Black Cat junction and requiring installation of a concrete slab to facilitate construction of an embankment at Roxton Road.

2.6.32 The locations of the works associated with the Cadent HP diversion, NG 450NB HP lowering and the CLH diversion are illustrated on the Works Plans **[TR010044/APP/2.3]** and are described in further detail in Schedule 1 of the DCO **[TR010044/APP/3.1]**. The works associated with the NG 450NB protection slab have not been assigned a work number as these are covered by the general provisions contained in Schedule 1, subsection k of the DCO **[TR010044/APP/3.1]**.

2.6.33 In relation to the NG 450NB HP gas main lowering, NG has undertaken a conceptual design study which proposes two diversion options comprising both open cut and HDD techniques to achieve required depths. The current preferred option is to undertake the diversion using HDD techniques.

2.6.34 Regarding the Cadent HP gas main diversion, Cadent Gas are in the process of preparing a diversion feasibility study. Their current preferred solution consists of a pipeline diversion some 20 metres to the east of the ECML underbridge abutment and a pipeline protection solution to allow the embankment to be constructed on top of the diverted main.

2.6.35 These advanced works would be undertaken following completion of the archaeological works and would be co-ordinated and agreed with the relevant statutory undertakers, companies and, for the Cadent HP gas main diversion, Network Rail given the proximity of the diversion to the ECML.

2.6.36 In addition to the diversion and protection of assets during the advanced works phase, works would also be required to other existing infrastructure. These activities are described in the following sections and have been provisionally agreed with the relevant utility companies but would be subject to further modification during the detailed design phase of the Scheme.

Anglian Water Services

2.6.37 Anglian Water Services (AWS) require a total of eight diversions of both potable water and foul water apparatus to accommodate the Scheme.

2.6.38 **Table 2-5** details the type of diversion required to AWS's apparatus, the locations of which are illustrated on the Works Plans **[TR010044/APP/2.3]** and are described in further detail in Schedule 1 of the DCO **[TR010044/APP/3.1]**.

Table 2-5: Anglian Water Service diversions

Works number	Utility apparatus	Type
19	Foul Water	Buried Foul Pressurised Water
28	Clean Water	Buried Clean Water
44	Clean Water	Buried Clean Water
60	Clean Water	Buried Clean Water
61	Clean Water	Buried Clean Water
62	Clean Water	Buried Clean Water
66	Clean Water	Buried Clean Water
95	Foul Water	Buried Foul Pressurised Water

Cambridge Water

2.6.39 Cambridge Water (CW) require a total of three potable water diversions to accommodate the Scheme, these being located around Eltisley and Caxton Gibbet.

2.6.40 **Table 2-6** details the type of diversion required to CW's apparatus, the locations of which are illustrated on the Works Plans **[TR010044/APP/2.3]** and are described in further detail in Schedule 1 of the DCO **[TR010044/APP/3.1]**.

Table 2-6: Cambridge Water diversions

Works number	Utility apparatus	Type
100	Clean Water	Buried Clean Water
103	Clean Water	Buried Clean Water
107	Clean Water	Buried Clean Water

UK Power Networks

2.6.41 UK Power Networks (UKPN) is responsible for a range of assets that would be affected by the Scheme, including both 11kV and 33kV overhead and underground assets.

2.6.42 In line with UKPN requirements, where 11kV and 33kV overhead power lines clash with the Scheme, the design accommodates the diversion of these services underground.

2.6.43 **Table 2-7** details the type of diversion required to UKPN's apparatus, the locations of which are illustrated on the Works Plans **[TR010044/APP/2.3]** and are described in further detail in Schedule 1 of the DCO **[TR010044/APP/3.1]**.

Table 2-7: UK Power Networks Service diversions

Works number	Utility apparatus	Type
6	Electricity	Overhead 11 kV Cables
8	Electricity	Overhead 11 kV Cables
27	Electricity	Overhead 11 kV Cables
32	Electricity	Overhead 11 kV Cables
47	Electricity	Overhead 11 kV Cables
49	Electricity	Overhead 33 kV Cables
52	Electricity	Overhead 33 kV Cables
56	Electricity	Overhead 11 kV Cables
58	Electricity	Overhead 33 kV Cables
63	Electricity	Overhead 11 kV Cables
67	Electricity	Overhead 33 kV Cables

Works number	Utility apparatus	Type
69	Electricity	Underground 33 kV Cables
69A	Electricity	Overhead 11 kV Cables
69B	Electricity	Overhead 33 kV Cables
82	Electricity	Underground 11 kV Cables
99	Electricity	Overhead 11 kV Cables
110	Electricity	Overhead 11 kV Cables

2.6.44 As the Scheme would not impact existing 132kV overhead powerlines, no works to this infrastructure would be required.

Communications and telecommunications services

2.6.45 BT/Openreach (BT/OR), Vodafone (VF) and Virgin Media (VM) are providers of cable, wired and fibre optic communication networks to deliver telephone, internet, data and TV services to households and businesses. As all three suppliers' apparatus would be affected by the Scheme, diversions to their buried and overhead services would be necessary.

2.6.46 **Table 2-8** details the type of diversion required to these suppliers' apparatus, the locations of which are illustrated on the Works Plans **[TR010044/APP/2.3]** and are described in further detail in Schedule 1 of the DCO **[TR010044/APP/3.1]**.

Table 2-8: Communications and telecommunications diversions

Works number	Supplier	Utility apparatus	Type
9	Openreach	Communications	Buried Cables
20	Openreach	Communications	Buried Cables
42	Openreach, Vodafone, Virgin Media	Communications	Buried Cables
45	Openreach	Communications	Buried Cables
65	Openreach	Communications	Overhead
81	Openreach, Vodafone, Virgin Media	Communications	Buried Cables
90	Openreach	Communications	Overhead
96	Openreach	Communications	Overhead
97	Openreach, Vodafone, Virgin Media	Communications	Buried Cables

Works number	Supplier	Utility apparatus	Type
104	Openreach, Vodafone	Communications	Overhead & Buried Cables

Chawston Irrigation Board

2.6.47 The Chawston Irrigation Board (CIB) manage a privately owned irrigation system comprised of a buried pipe abstracting water from the River Great Ouse. The water is distributed across farmland in the A1 corridor and onto farmland west of Wyboston.

2.6.48 The CIB has confirmed that this non-potable water supply also feeds a number of properties as well as local hydrants in Wyboston village. As the existing buried pipe would be impacted by the Scheme, a diversion to this pipe would be necessary.

2.6.49 The CIB pipe comprises works number 31, the location of which is illustrated on the Works Plans **[TR010044/APP/2.3]** and is described in further detail in Schedule 1 of the DCO **[TR010044/APP/3.1]**.

Construction compound establishment works

2.6.50 The Scheme would require three main construction compounds to be formed within the Order Limits prior to, and to facilitate, the main construction works.

2.6.51 These main construction compounds would be established at the following locations within the Order Limits, as illustrated on **Figure 2.5** of the Environmental Statement **[TR010044/APP/6.2]**:

a. Main project compound – located at Wintringham.

b. Western compound – located to the south-east of the existing Black Cat roundabout.

c. Eastern compound – located to the north-east of the existing Caxton Gibbet roundabout.

2.6.52 The main construction compounds would include welfare facilities, materials handling and storage, and production facilities.

2.6.53 In addition to the main construction compounds, a number of smaller satellite construction compounds would be established at key locations within the Order Limits, for example where structures are proposed. The locations of these satellite compounds are also illustrated on **Figure 2.5** of the Environmental Statement **[TR010044/APP/6.2]**.

2.6.54 Construction compound establishment works would be undertaken prior to the main construction works, and would likely involve the following activities:

a. Establishment of an access from the existing road network.

b. Establishment of measures (fencing) around features and areas of environmental value within each site that are to be retained and protected, and around the perimeter of each site for security.

c. Clearance of trees, hedgerows and other vegetation that are not being retained within each site.

d. Profiling the land, including the stripping and storage of topsoil and subsoil in bunds with stable slope gradients.

e. Installation of temporary drainage systems, where necessary, to intercept existing land drains and divert water away from working areas.

f. Installation of geo matting and laying of any temporary bituminous material for internal roads, and the laying of hard surfacing for offices and laydown areas.

g. Storage of stripped soils around the peripheries of each site, with subsequent seeding to control dust and provide an elevated bund to contain activities and minimise visual disruption.

h. Installation of lighting within each site and on the site boundaries.

i. Erection of office cabins and welfare facilities centrally within each site, where possible.

2.6.55 Further information regarding construction compound establishment activities is presented in the First Iteration EMP **[TR010044/APP/6.8]**.

2.6.56 Details of the individual functions of the main construction compounds and satellite compounds are presented within the 'Construction compounds' section later in this chapter.

Vehicle recovery areas

2.6.57 Four satellite vehicle recovery areas would be established as part of the Scheme which would be used during the construction phase for the recovery of broken-down vehicles:

a. The first area would be located off the B645 Kimbolton Road at Crosshall, close to the A1 at St Neots.

b. The second area would be located off the A421 lay-by north of Great Barford, adjacent to Footpath No. 3.

c. The third area would be located off Tempsford Road, adjacent to the A1 east of Blunham.

d. The fourth area would be located within the eastern compound at Caxton Gibbet junction.

2.6.58 The location and size of each vehicle recovery area is illustrated on **Figure 2.2** of the Environmental Statement **[TR010044/APP/6.2]**.

Site clearance works

2.6.59 Site clearance activities would need to be undertaken prior to the main construction works commencing, and would involve the removal of existing trees, hedgerows and vegetation from areas where construction works are planned to be undertaken.

2.6.60 To avoid disturbance to nesting birds, site clearance works (including the demolition of buildings and the removal of any woody vegetation and ground flora) would be undertaken outside the bird nesting season. In the event site clearance works would have to take place during the bird nesting season, such works would be preceded by a nesting bird survey conducted by a suitably qualified ecologist.

2.6.61 Site clearance works would be undertaken under the supervision of the ECoW, in accordance with the measures presented in the Biodiversity Management Plan contained within the First iteration EMP **[TR010044/APP/6.8]**.

Ecological surveys, protection measures and mitigation

Pre-construction surveys

2.6.62 Ahead of the main construction works, pre-construction surveys would be undertaken during the enabling works phase to validate and, where necessary, update the baseline survey findings reported in **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]**.

2.6.63 Pre-construction surveys would include, but not be limited to, bats, Badger, Otter, Barn Owl, Red Kite and Hobby. These surveys would also be used to update existing habitat assessments.

2.6.64 The surveys would ensure mitigation requirements during construction of the Scheme are based on the latest information, particularly in relation to obtaining protected species licences from the relevant authorities. Ecological mitigation works for protected species would commence after obtaining the relevant licence, and within the appropriate ecological mitigation calendar periods.

2.6.65 Pre-construction surveys would also be necessary to verify the location of invasive species requiring removal, the findings of which would be used to inform the implementation of measures to prevent their spread.

Haul roads and access works

2.6.66 The linear nature of the construction works means that haul routes would be constructed prior to the main construction works phase.

2.6.67 These routes would be used throughout the main construction works phase to facilitate:

a. The movement of plant and materials along sections of the alignment of the new dual carriageway.

b. The movement of materials to and from the borrow pits located at the western and eastern extents of the Scheme.

c. Connectivity between construction working areas and construction compounds.

2.6.68 The following haul roads and access arrangements would be formed:

a. Borrow pit to Roxton Road – connecting a borrow pit to the Roxton Road Link, to service the Roxton Bridge embankments, the Roxton Link Road, and works within the north-east quadrant of the Black Cat junction.

b. East of Black Cat junction – connecting the Black Cat junction, the western compound, a borrow pit and land to the west of the River Great Ouse, to service embankment construction, construction of the flood compensation areas, and construction of the River Great Ouse viaduct west abutment.

c. River Great Ouse – connecting Barford Road to land to the east of the River Great Ouse, to service construction of the River Great Ouse viaduct east abutment.

d. Barford Road to ECML railway – connecting Barford Road to the western side of the ECML railway, to service construction of the ECML west abutment.

e. ECML railway to Potton Road – connecting the eastern side of the ECML railway to the main construction compound, to service construction of the ECML east abutment, the Alington Top Farm accommodation bridge, the Potton Road bridge, and the new dual carriageway in this section.

f. Potton Road to Cambridge Road junction – connecting the main project compound to the Cambridge Road junction, to service construction of the Cambridge Road junction, Wintringham footbridge, and the new dual carriageway in this section.

g. Cambridge Road junction to Eltisley link – connecting the Cambridge Road junction to the Eltisley link, to service construction of the Toseland Road Bridge, the accommodation bridge at Fox Brook Farm, and the new dual carriageway in this section.

h. Eltisley link – connecting the Eltisley link to the west of Caxton Gibbet junction, to service construction of the new dual carriageway in this section.

i. West of Caxton Gibbet junction – connecting a borrow pit to Caxton Gibbet junction, to service construction of the western embankment of the Caxton Gibbet Junction and the bridge over the Caxton Gibbet junction dumbbell link road.

j. East of Caxton Gibbet junction – connecting the Caxton Gibbet junction to the eastern compound, to service construction of the bridge over the Caxton Gibbet junction dumbbell link road, and the new dual carriageway in this section.

k. Borrow pit to Caxton Gibbet junction – connecting a borrow pit to the east of the Caxton Gibbet junction, to service construction of the eastern embankment of the Caxton Gibbet junction.

2.6.69 Haul roads would be constructed from either site-won processed arisings or imported granular material placed on a geotextile membrane.

2.6.70 The majority of internal site haul roads would be constructed along the length of the alignment of the new dual carriageway, either adjacent to the toe of embankment slopes or on the top of earthwork cuttings. These would be typically 10 metres wide with a bund or windrow alongside them, formed using the excavated material from the haul road.

2.6.71 Haul route crossings for construction traffic would be provided at the following locations:

a. Roxton Road, north of the Bedford Road junction.

b. Barford Road.

c. B1046, near the B1046/Potton Road junction.

d. Toseland Road, north of the existing A428.

e. B1040, north of the existing A428.

2.6.72 In these locations, traffic signals would be installed to control the movement of vehicles across the carriageway. Wheel washing facilities would also be installed to reduce the risk of construction material being taken onto the road network.

2.6.73 Further details on the location of these haul route crossings are presented in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**.

Ecological supervision

2.6.74 Ecological supervision of the archaeological works and utilities diversions would be undertaken by an Ecological Clerk of Works (ECoW) or other suitably qualified person to ensure any retained vegetation, designated sites, protected species and other areas of biodiversity value are appropriately protected from works associated with archaeological clearance and utilities diversions.

Ecological protection measures and mitigation

2.6.75 The ECoW would ensure that mitigation and protection measures, method statements, supervision and monitoring requirements are appropriately implemented during the enabling works phase.

2.6.76 Measures are likely to include, but not be limited to, the following:

a. Localised clearance of existing vegetation, where this coincides with working areas around archaeological sites and utilities diversions and cannot be retained and protected from the works.

b. Installing temporary fencing around existing vegetation in locations adjacent, or in proximity to, areas identified for archaeological investigations and utilities diversions to prevent access to retained important habitat, protect habitat, avoid accidental damage, and avoid species mortality.

c. Deterring birds from nesting in working areas defined around the archaeological works and utilities diversions, where appropriate, through either physical means to prevent establishment of nests (for example prior coppicing or pruning of vegetation) or other legal means of disturbance.

d. Excluding animals from working areas defined around the archaeological works and utilities diversions, to prevent them falling into and becoming trapped in excavations, or being injured or killed.

e. Designing and positioning temporary construction lighting to minimise light spill onto adjacent habitats, including where there are potential bat roosts and important foraging or commuting habitat.

f. Ensuring best practice construction management techniques are implemented, for example when working in proximity to watercourses and waterbodies.

g. Communications to construction workers regarding the requirements for protected species and associated working practices.

2.6.77 Further information regarding ecological measures to be implemented are presented in the Biodiversity Management Plan contained within the First Iteration EMP **[TR010044/APP/6.8]**.

Public rights of way works

2.6.78 There is an extensive PRoW network that crosses land within the Order Limits, and a number of footpaths and bridleways would be impacted by the Scheme.

2.6.79 During the enabling works phase, the following types of measure would be implemented on PRoW that would be affected by construction activities:

a. Segregation of users from the works – in locations where construction works are close to PRoWs, works areas would be fenced off using temporary 'Heras' type panels (or similar) to segregate the site works from users.

b. Diversion of users onto new temporary routes – temporary diversion routes would be provided where practical and feasible, with users diverted around construction works via an adjacent PRoW or locally around the perimeter of the fenced works site, with appropriate signage erected.

c. Closure of routes – where local diversions cannot be provided, temporary closures and appropriate signage would be erected at the extent of the PRoW closure to ensure that the public are informed, with wider communications via methods including the project website, social media and newsletters also provided.

d. Use of temporary marshals – where construction activities do not prohibit use of the routes but the safety of users needs to be maintained.

2.6.80 The following routes are anticipated to require temporary measures:

a. Footpath No. A10.

b. Footpath No. 7.

c. Footpath No. 8.

d. Footpath No. 1/9.

e. Footpath No. 1/20.

f. Footpath No. 1/19.

g. Footpath No. 1/17.

h. Footpath No. 1/16.

i. Bridleway No. 1/18.

j. Footpath 278/7.

k. Bridleway No. 74/6.

l. Cycleway / Footway 73/17.

2.6.81 The Principal Contractor would consult with the relevant local authorities to identify, agree, implement and manage appropriate measures within the Order Limits for PRoW affected by construction works.

Main construction works

2.6.82 Details of the construction activities required to deliver the Scheme are presented in the following sections, along with details of the anticipated construction methods to be used. The descriptions of the main construction works and accompanying plate images[7] relate to the sections of the Scheme defined in paragraph 2.6.4.

2.6.83 The final construction methods would be subject to further refinement and development and would not be finalised until completion of the detailed design phase of the Scheme.

Section 1: Black Cat junction

2.6.84 The works at Black Cat junction would be co-ordinated from the eastern compound located off the eastern side of the existing Black Cat roundabout.

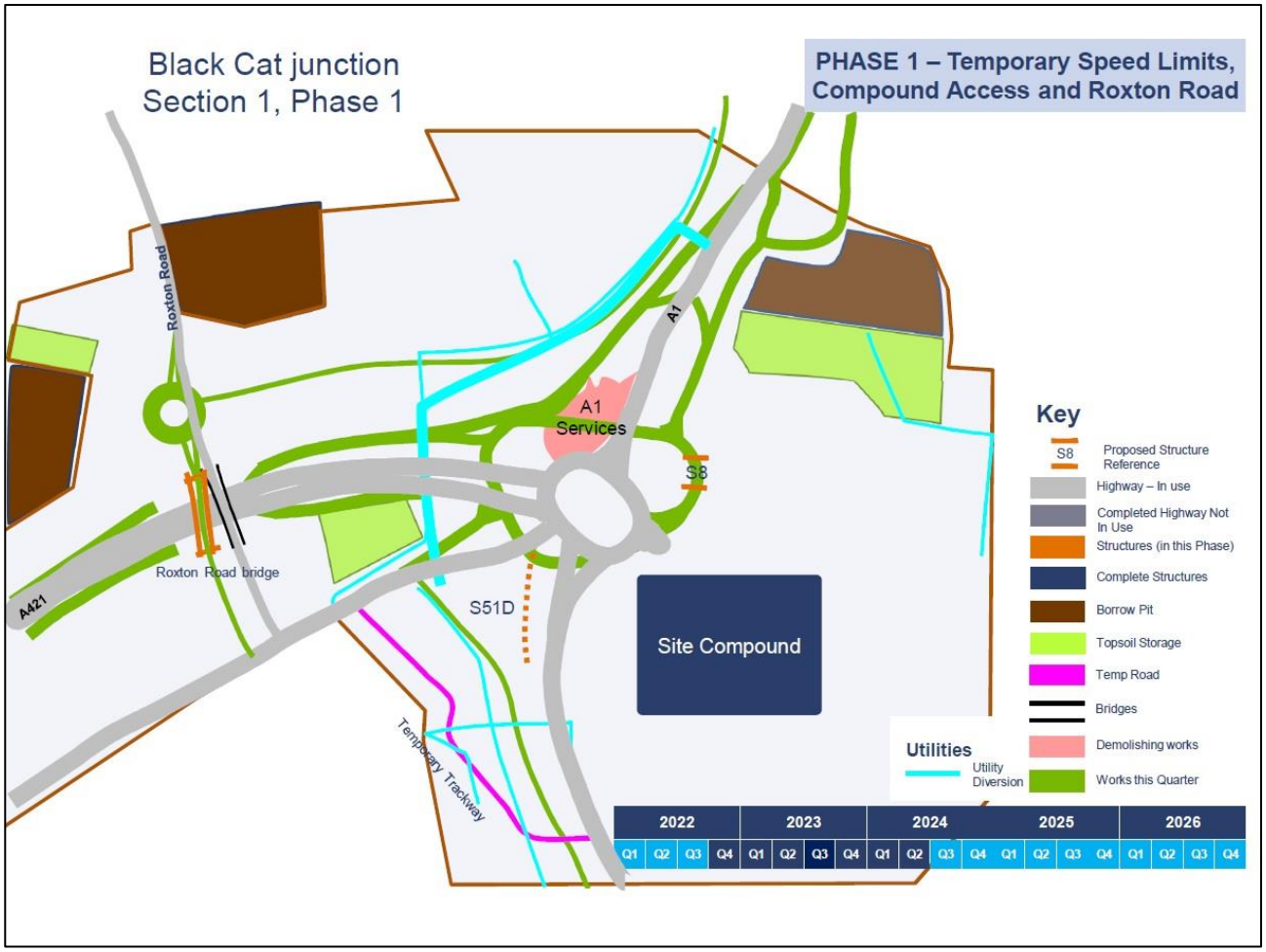
2.6.85 A phased approach would be adopted for the construction of the Black Cat junction. It is anticipated that four phases would be implemented, coordinated to minimise overall disruption to the travelling public and achieve the safe and successful construction of this section of the Scheme.

Phase 1

2.6.86 **Plate 2.1** illustrates Phase 1 of the Black Cat junction.

[7] The structures reference numbers quoted in the plate images (for example S8) are provided for location information only.

Plate 2.1: Black Cat junction Phase 1



2.6.87 During Phase 1, traffic using Black Cat junction would remain on the existing carriageways.

2.6.88 Permanent new roads would be constructed which would include the diverted section of Roxton Road and the Roxton Road link, the permanent slip roads and service roads to and from the A1, the permanent slip roads to and from the A421, and permanent sections of the new Black Cat junction.

2.6.89 The main structural works to be progressed during this phase include:

a. Construction of the new Roxton Road bridge and demolition of the existing Roxton Road bridge.

b. The construction of the Black Cat junction eastern bridge (S8) which would be used to form a temporary access into the central area of the traffic island in subsequent phases.

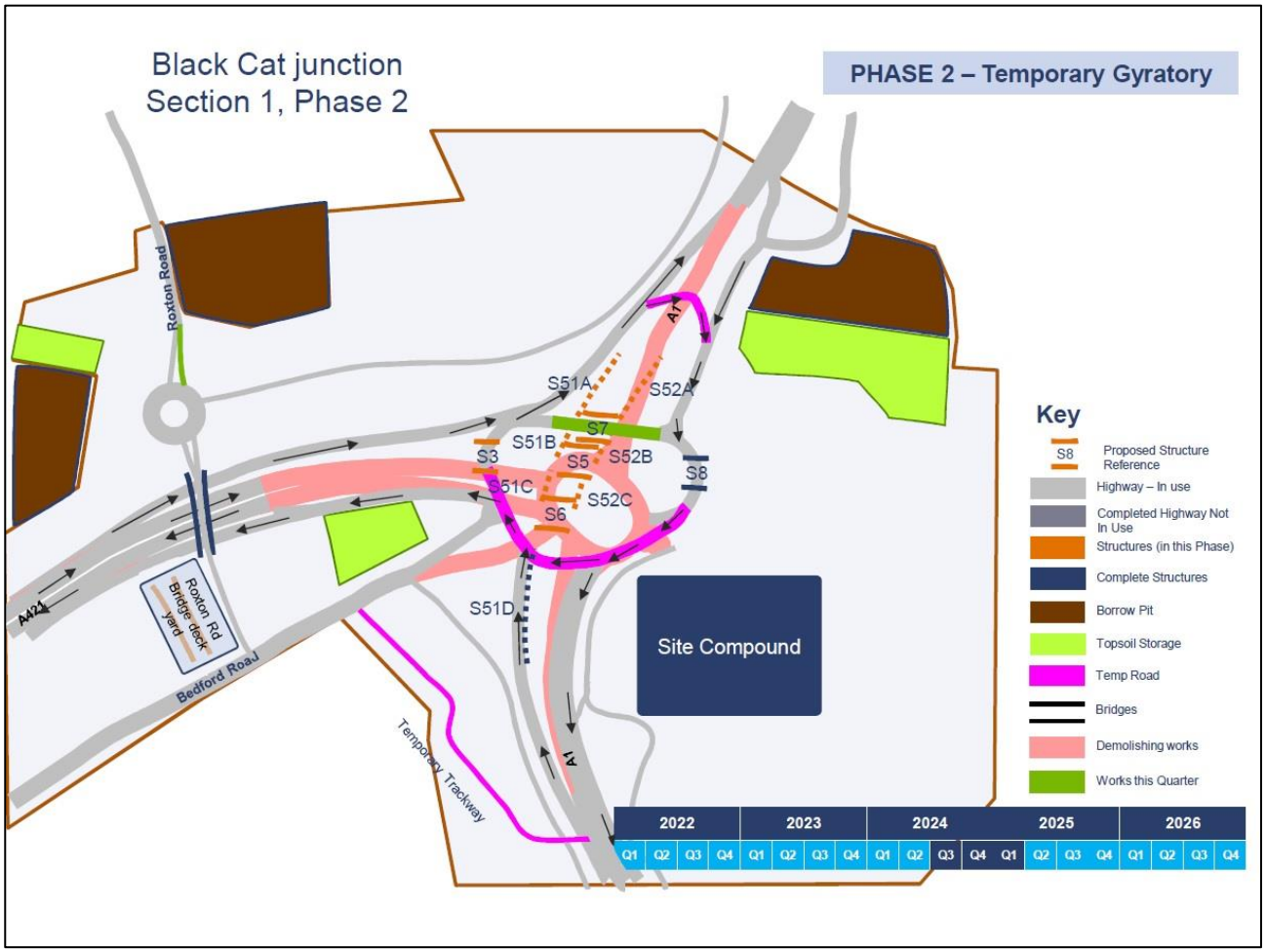
c. The construction of the south west retaining wall structure (S51D), to allow the new A1 northbound off-slip to be constructed.

2.6.90 Traffic would be rerouted onto the on-slips and off-slips constructed during Phase 1 by means of temporary roads.

Phase 2

2.6.91 **Plate 2.2** illustrates Phase 2 of the Black Cat junction.

Plate 2.2: Black Cat junction Phase 2



2.6.92 During Phase 2, traffic would be rerouted onto the new temporary gyratory system leaving the central island site clear for the new junction construction.

2.6.93 Temporary roads would be constructed to facilitate the movement of traffic onto the temporary network in Phase 2 which would form an enlarged temporary gyratory system.

2.6.94 The main activities during this phase would be the demolition and clearance of a number of existing road surfaces and structures, including: the existing A421 west and east bound lanes and the existing north and southbound A1(M) from Black Cat junction; and the existing Black Cat roundabout. In addition, the existing redundant section of Roxton Road and the existing Roxton Road bridge would be demolished, and all traffic moved onto the new alignment.

2.6.95 The main structural works to be progressed during this phase include:

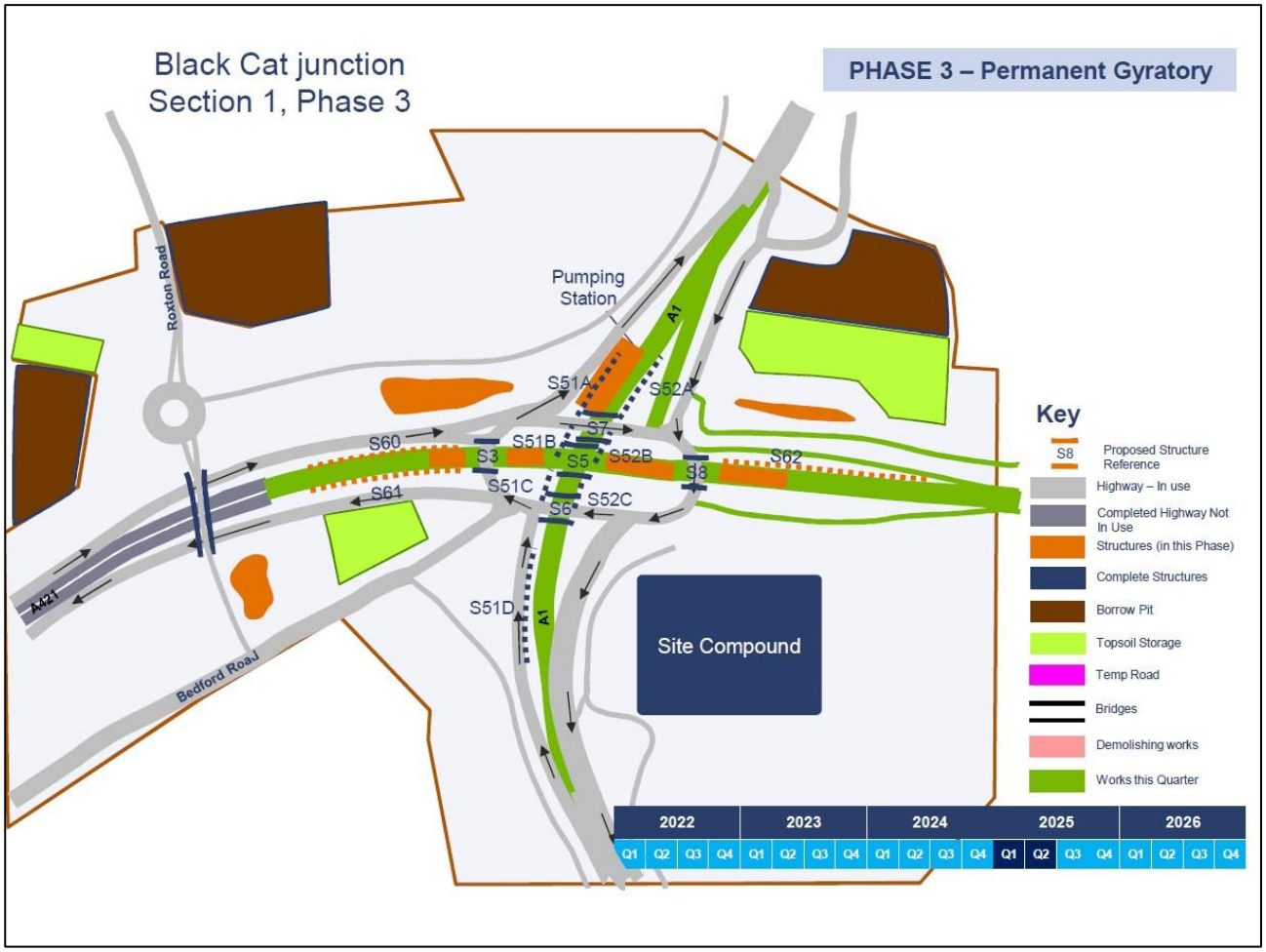
a. The construction of the remaining sections of retaining wall alongside the realigned A1 (S51A, S51B, S51C) and S52A, S52B and S52C.

b. The construction of the Black Cat junction western bridge (S3), the Black Cat junction central bridge (S5), the Black Cat junction southern bridge (S6) and the Black Cat junction northern bridge (S7).

Phase 3

2.6.96 **Plate 2.3** illustrates Phase 3 of the Black Cat junction.

Plate 2.3: Black Cat junction Phase 3



2.6.97 In Phase 3, the completion of structures S3, S6, S7 and S8 would allow the new permanent Black Cat junction Circulatory to be opened to traffic. At this point, the junction Circulatory would be on its permanent alignment.

2.6.98 The opening of the permanent Circulatory would allow the excavation works associated with the underpass of the realigned A1 through the Black Cat junction to be undertaken. These works would open up construction access between the new A1 southern, central and northern sections which would minimise the impact on traffic movements around the Black Cat junction.

2.6.99 Materials generated from the excavation works within the central section of the junction would be transported using bridges S3 and S8 and used locally on the construction of the approach embankments of the new dual carriageway and associated retaining wall structures S60, S61 and S62.

2.6.100 On completion of the earthworks operations, works would continue under the same TTM arrangements on the roadworks construction for the realigned A1 and the new dual carriageway.

2.6.101 The main structural works to be progressed during this phase include:

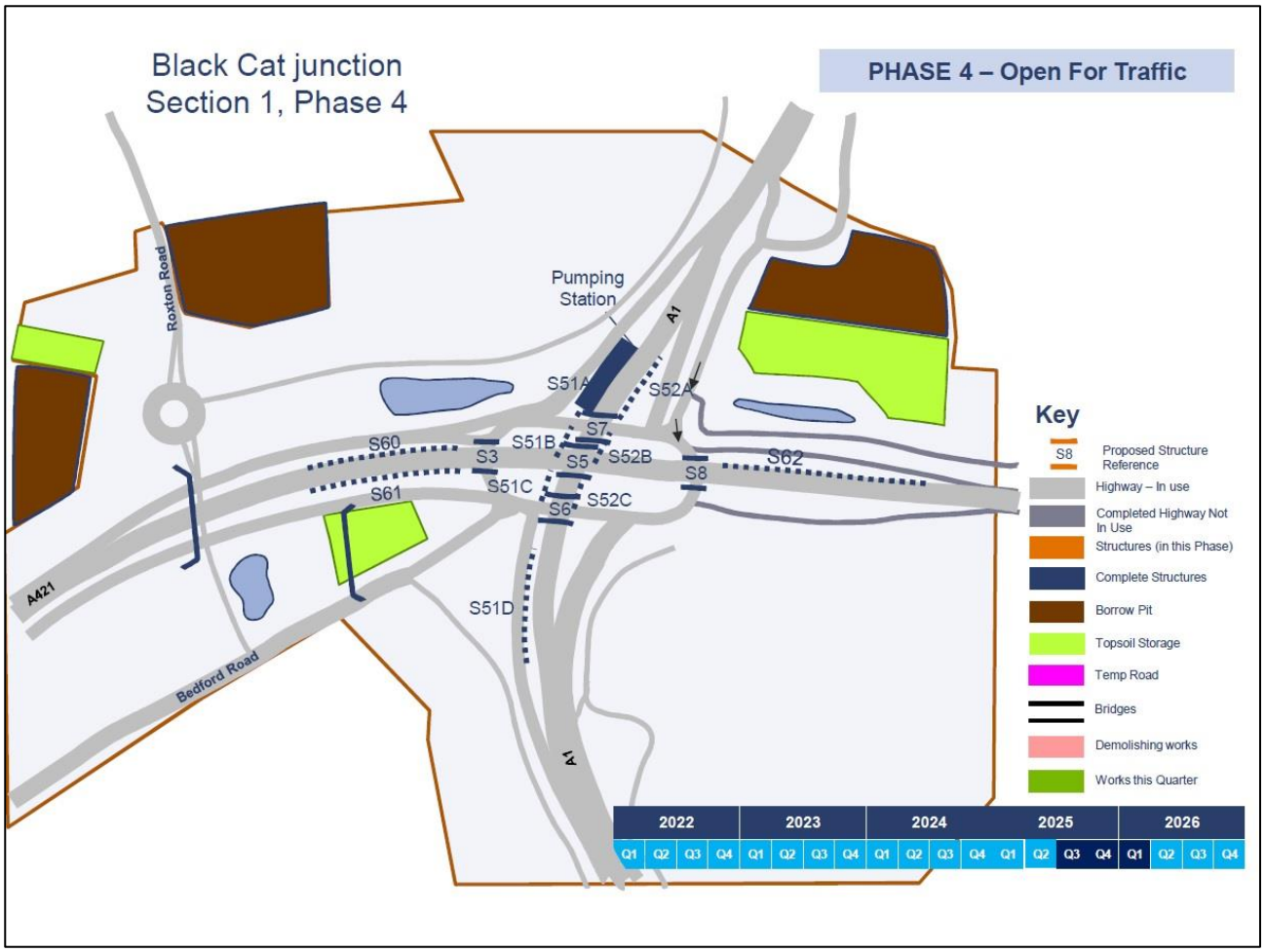
a. The construction of the retaining wall alongside the new dual carriageway (S60, S61 and S62).

b. The new surface water pumping station located off the A1 northbound carriageway to just to the north of the permanent Black Cat junction Circulatory.

Phase 4

2.6.102 **Plate 2.4** illustrates Phase 4 of the Black Cat junction.

Plate 2.4: Black Cat junction Phase 4



2.6.103 In Phase 4, the final tie in works on to the A1 and the new dual carriageway would be undertaken, the TTM measures would be removed, and the junction would become fully operational.

Roxton Road Bridge

2.6.104 The Roxton Road Bridge would comprise a 5 span structure crossing the A421 to provide a key link for local traffic to the north west to the new junction. The existing structure prevents the western approach to the new junction from being constructed, but this cannot be demolished and removed without providing an alternative route for local traffic to cross the A421. The new structure comprises three braced pairs of steel beams per span that carry an in-situ concrete deck with parapet edge beam and metal parapets, and is similar in form to the ECML crossing structure. The general construction methods and sequencing relating to construction of the ECML underbridge described in Section 3: ECML railway to Cambridge Road junction, would be followed.

2.6.105 The north and south abutments together with Pier 1, Pier 2 and Pier 4 would all be clear of the existing A421 carriageways, and access for these elements would be provided from Roxton Road to the north and Bedford Road to the south.

2.6.106 Pier 3 would be constructed within a central reserve island site between the east and westbound carriageways of the A421. The central reserve area is already widened at this location; however, TTM would be used to narrow the lanes, further increase the available working space, and provide access from the A421.

2.6.107 Once the north and south abutments have been constructed to the stage that they are ready to accept the main bridge beams, the new slip road alignments that would pass under the north and south spans would be constructed.

2.6.108 The bridge beams would be delivered to these slip roads and unloaded by a mobile crane sited on a platform adjacent to the completed abutments. The beams would be placed onto temporary supports such that they can be braced together in pairs and permanent soffit formworks and falsework added.

2.6.109 A large mobile crane would be mobilised to complete the main lifts onto the structure. The braced pairs of beams to the north span would be lifted and placed onto the abutment and pier. A full closure of the eastbound A421 would be required to lift and place the centre span beams, with similar closures of the westbound A421 required for the southern span. The number of closures required would be confirmed once the detailed design of the structure is completed, but it is anticipated these works could be undertaken in two weekend closures for each span.

2.6.110 A further weekday off-peak night-time road closure would be required to disconnect and lift down the falsework panels once the deck and parapet works are complete.

Kelpie Marina bridge

2.6.111 The Kelpie Marina access road requires a bridge to be constructed over the northbound A1, south of Black Cat junction, forming a new route between Bedford Road and Kelpie Marina. This would be a single span structure that utilises a single braced pair of steel beams to span between bank-seats located on reinforced earth abutments.

2.6.112 Access to construct the west abutment would be via the route of the new access from Bedford Road to the north. TTM would be implemented on the A1 southbound and northbound carriageways with routes formed to allow site traffic access into the island between the carriageways for the construction of the east abutment.

2.6.113 The construction sites for the works on both abutments would be secured with suitable temporary fencing to segregate the works from the adjacent Kelpie Marina site, and to prevent residents straying into the works areas.

2.6.114 The reinforced earth embankments would be constructed from imported material and the bank-seats would be constructed in-situ from reinforced concrete. Once the embankments and bank seats are complete a crane platform would be constructed adjacent to the west abutment. The main bridge beams would be delivered on articulated trailers via the route from Bedford Road and lifted onto temporary stools. Additional steel work would be added to brace the beams together into a pair. Falsework and permanent soffit formwork may also be fixed to the beams prior to lifting into position.

2.6.115 The completed fabrication of the braced pair of beams would be lifted onto the bank-seat supports by a large mobile crane sited on the west abutment crane platform. It is anticipated that this lift would be completed during a weekend road closure of this section of the A1 northbound carriageway. Contingency weekend closures would be required for this operation to account for adverse weather conditions that might prevent the crane lift from being completed.

2.6.116 Once the bridge beams and soffit formwork are in place, the A1 northbound carriageway would be reopened to traffic and works would continue to construct the deck. A similar closure would be required once the permanent reinforced concrete bridge deck and steel parapet guard rails are in place to allow the falsework to be removed.

2.6.117 Earthworks plant would complete the western approach embankment using material sourced locally or imported from the borrow pit to the north west of Roxton Road bridge. Material required to complete the east embankment would be from the same source and would use the new protected bridge deck to transport the material into the area between the A1 carriageways. Once the earthworks are completed the road construction and drainage would be undertaken.

Ground improvement measures

2.6.118 It is anticipated that some ground improvement measures would be required in the area of the former Black Cat Quarry, located to the east of the Black Cat junction, which is currently under restoration.

2.6.119 The form and extent of these measures would be determined at the detailed design phase of the Scheme, and would be dependent on the nature of the backfill required to the remediated quarry pits.

Section 2: River Great Ouse viaduct to the ECML railway

2.6.120 The works to the east of the Black Cat junction and up to the ECML railway includes the construction of a viaduct over the River Great Ouse and its flood plain. Also included in this section is the construction of the Barford Road bridge and associated side road diversion.

River Great Ouse viaduct

2.6.121 The River Great Ouse viaduct (the viaduct) comprises a 260 metre long multi-span structure which would be constructed to carry the new dual carriageway over the River Great Ouse and its flood plain.

2.6.122 The design of the viaduct is such that it does not require permanent structures to be constructed in the river.

2.6.123 Utility diversions would be undertaken ahead of constructing the viaduct, and construction works would commence from the west of the river, over the watercourse, and to the east of the river.

2.6.124 As the viaduct construction works and the new permanent structure would be located within the flood zone of the River Great Ouse, the preliminary design includes a flood compensation area on the west side of the river, located generally to the south of the new dual carriageway.

2.6.125 The works associated with the viaduct would primarily be co-ordinated from the western compound with localised local welfare facilities established near to the west abutment, and a small satellite construction compound and welfare facilities established to the east of the river (near to the east abutment). Haul routes from the western compound and Barford Road would provide works access.

2.6.126 As the flood plain land includes very soft ground and ponds, platforms would be constructed by tipping imported clean stone (or equivalent) and progressively extending the platform towards the river.

2.6.127 To construct the western part of the viaduct, a temporary works crane and piling platform would be constructed on the west side of the River Great Ouse. To construct the platform, topsoil would be removed and the area levelled to accommodate prefabricated concrete slabs. This would provide a solid surface for the construction works and permanent features to be delivered from. The platform would be approximately 70 metres in width and would incorporate a haul route and crane track to service both sides of the new structure.

2.6.128 At the east abutment located on the east of the River Great Ouse, topsoil would be stripped and removed to a local storage area. At this point a piling or crane platform similar to that formed on the western side of the river would be constructed to lift sections of the new viaduct in to place. Prefabricated and fabricated on-site parts would then be lifted into place in addition to concrete deliveries from the road network.

2.6.129 Cranes would be used to lift larger steelwork and precast deck units directly from the delivery trailers and position them into place to form the viaduct.

2.6.130 Upon completion of the main structural features of the viaduct, the ground level platform would be demobilised and the surface layers of the platform that do not form part of the maintenance and access tracks would be removed, with the area then top-soiled and landscaped.

2.6.131 Back of wall drainage, deck drainage and the viaduct drainage systems would then be installed and connected to drainage provisions at either end of the viaduct.

2.6.132 The carriageway over the full extent of the viaduct would be completed as part of the construction of the new dual carriageway using standard plant and equipment, for example pavers, rollers, compressors and breakers.

2.6.133 To enable the construction of the viaduct, a site precast concrete facility would be established on the north side of the new dual carriageway. This facility would comprise segregated works and vehicle zones, service cranes, casting beds and curing areas. Mobile covers would be installed to allow works to be undertaken in all weather conditions. This facility would also contain storage zones for incoming materials and finished precast items, prior to export for use.

2.6.134 As a number of these construction activities would take place over the River Great Ouse and would not be continuous, a number of closures of the river would be required. The following outline approach would be followed to implement and monitor the closures:

a. Temporary mooring buoys or points would be installed in the river on the approach to the proposed closure.

b. A safety boat would be deployed in the river.

c. When the river is to be closed, strings of buoys would be deployed to clearly mark the closed section of the river. The safety boat would pull these buoys across the full width of the navigation and secure these in place, the extents of which would be at least 50 metres upstream and downstream of the construction working area.

d. The safety boat crew would man the closure at all times and direct the public to a hold station and temporary mooring points, and would keep the public informed of when the navigation is scheduled to reopen.

e. During the river closure, the adjacent river banks would be closed to public access using physical barriers and signs to confirm the closure and warn of potential hazards.

2.6.135 The number and timing of river closures would be developed further during the detailed design phase of the Scheme; however, based on the preliminary design and construction methodology an estimated ten weeks of river closures over a period of up to eight months are envisaged to be required.

2.6.136 During these closures, construction operations would generally be undertaken in weekday shifts, with the works checked and secured at the end of the shift so the river can be reopened outside of the core working hours.

2.6.137 It is estimated that river closures would be for no longer than 24 hours for any one activity to be completed, which would represent the maximum delay to navigable traffic that would pass the construction working area.

2.6.138 In the event that weekend works require river closures, these would be timed to avoid conflicts with key events (for example the Bedford River Festival).

Barford Road bridge

2.6.139 The construction approach for the 3-span Barford Road bridge would be comparable to that adopted for overbridges carrying side roads and accommodation tracks along the new dual carriageway (described in the section titled 'overbridge construction', paragraph 2.6.233), with the following additions required at this location:

a. A site access point would be established on the west side of the existing Barford Road, and a haul road constructed to provide a direct route to the new bridge works area and satellite construction compound.

b. A new farm access on the west side of Barford Road to the south of the new dual carriageway would be constructed to remove the mainline crossing point.

Section 3: ECML railway to Cambridge Road junction

2.6.140 Works in Section 3 include the construction of the new bridge crossing of the ECML railway, the Top Farm accommodation bridge and the Potton Road / B1046 side road diversion.

East Coast Main Line underbridge

2.6.141 A new underbridge would be constructed over the ECML railway, which would require utility diversions ahead of the works.

2.6.142 To enable the utility diversion works to be undertaken, temporary access would be provided from Station Road to the east of the ECML railway and a similar construction access point would be constructed from Barford Road to the west of the ECML railway. These temporary site accesses would only be used until the main haul routes through the site have been established.

2.6.143 A site office, welfare facility and local storage and laydown compound would be established adjacent to, but segregated from, the construction works area.

2.6.144 To construct the bridge, topsoil and subsoil would be stripped and moved to an appropriate storage area.

2.6.145 Given the close proximity of the structure to the ECML railway, a temporary works concrete foundation slab would be constructed on the railway side of the east and west pier pile caps. A scaffold or similar modular protection screen would be constructed off this slab to form a robust barrier between the pier construction works and the adjacent operational railway.

2.6.146 Temporary works piling platforms would be constructed at the east and west pier and abutment locations. These platforms would accommodate the piling rigs and attendant cranes, excavators and associated equipment. Prefabricated pile reinforcement cages required for the foundations to be constructed would be delivered to the works areas via haul routes.

2.6.147 Construction of the bridge foundations, piers and abutments would be progressed behind a protection screen with minimal impact to the operation of the ECML railway. All works carried out adjacent to (and over) the ECML railway would be undertaken in accordance with procedures and method statements, agreed in advance with Network Rail and under Network Rail's supervision as required.

2.6.148 A temporary works crane platform designed to carry a large mobile crane would be constructed on both the east and west sides of the ECML railway to enable placement of the bridge beams.

2.6.149 The bridge beams would be delivered to the site and offloaded at the crane platforms. Bracing and permanent deck soffit formwork would be installed to form braced pairs of beams that can be lifted into position on the bridge as one unit. A series of overnight weekend railway possessions with full isolation of the overhead power lines would be required in order to lift the bridge beams into position.

2.6.150 Once the bridge beams have been installed and the permanent formwork has been infilled and sealed, and all required temporary protection over the railway line has been fitted to the satisfaction of Network Rail, construction of the bridge deck would be progressed.

2.6.151 Following completion of all deck and associated drainage works, the protection screen would be dismantled from either side of the ECML railway and a temporary timber hoarding used to define the boundary between the construction works and the Network Rail land would be removed and replaced with a permanent palisade fence.

2.6.152 Upon completion of the bridge a temporary site traffic haul route would be constructed to allow site vehicles across the structure, which would minimise the need for construction traffic to use the road network.

Top Farm accommodation bridge

2.6.153 The construction approach for the 3-span Top Farm accommodation bridge would be comparable to that adopted for overbridges carrying side roads and accommodation tracks along the new dual carriageway (described in the section titled 'overbridge construction' paragraph 2.6.223), with the following additions required at this location:

a. An overhead 11kV power cable in the south verge of the existing farm track would be diverted ahead of the bridge works, commencing via a new duct route below the alignment of the new dual carriageway.

b. Access to construct the accommodation bridge would be established via a haul route from Potton Road and the main project compound.

c. A temporary hardcore access track would be constructed to the south of the existing farm track to provide farm vehicle access while the accommodation bridge is being constructed.

d. On completion of the accommodation bridge, the structure would be opened for use and the temporary track diversion route to the south excavated and removed, in order to segregate the public from construction works associated with the new dual carriageway.

B1046 bridge / Realigned Potton Road

2.6.154 The construction approach for the 3-span B1046 bridge / Realigned Potton Road would be comparable to that adopted for overbridges carrying side roads and accommodation tracks along the new dual carriageway (described in the section titled 'overbridge construction' paragraph 2.6.223), with the following additions required at this location:

a. Access to this area would be from the main project compound via an access route and the existing Hen Brook culvert. A secondary access would also be constructed from the east side of Potton Road to form a haul route to the works area.

b. A new section of side road and a short temporary tie-in would be constructed on the east side of the new dual carriageway to provide a temporary connection between the B1046 and Potton Road. Ducts and temporary utility diversions would also be installed in the verge and existing utility services rerouted. Once completed, traffic would be diverted onto this road for the duration of the bridge construction works and the short section of the B1046 that crosses the new dual carriageway would be closed and removed.

c. Field accesses would be filled and surfaced as part of the side road construction works, and a temporary access route would be maintained for third party use (except for short durations when tie-ins are being constructed).

Footpath 1/17 pedestrian overbridge

2.6.155 This structure comprises a single span steel box girder bridge that would span between bank-seats located on reinforced earth abutments.

2.6.156 A temporary closure of Footpath 1/17 would be in place for the duration of the works required to construct this crossing.

2.6.157 Access to construct this structure would be established via a haul route from Cambridge Road junction and the main project compound. A satellite construction compound would be set up to provide welfare facilities and a storage and laydown area.

2.6.158 Reinforced earth embankments would be constructed from imported material and the bank-seats would be constructed in-situ from reinforced concrete. Bearings would be installed on the bank-seats in preparation for the installation of the box girder bridge.

2.6.159 The prefabricated steel bridge would be delivered on an articulated type trailer and lifted by a mobile crane into place on the banks seats and secured, prior to the mobile crane being demobilised. Abutment retaining walls would then be constructed and installed using precast units delivered and lifted into position.

2.6.160 General embankment fill material would be delivered via the haul route via dumper trucks, and then placed and compacted by bulldozer and roller.

2.6.161 The full length of the overbridge would be surfaced and permanent signage erected. Topsoil would be delivered to the bridge site from the storage zones, placed by excavator on the verges and batters before the area is seeded and planted to complete the landscaping works.

Section 4: Cambridge Road junction

2.6.162 The Cambridge Road junction would be in the form a dumbbell junction arrangement with a northern and southern roundabout, which would provide both west and east bound access and egress to the new dual carriageway.

2.6.163 The northern roundabout would be constructed on the alignment of the existing A428 and would provide an eastbound off-slip and eastbound on-slip. The roundabout would also provide access to the local road network and to the southern roundabout by means of an overbridge.

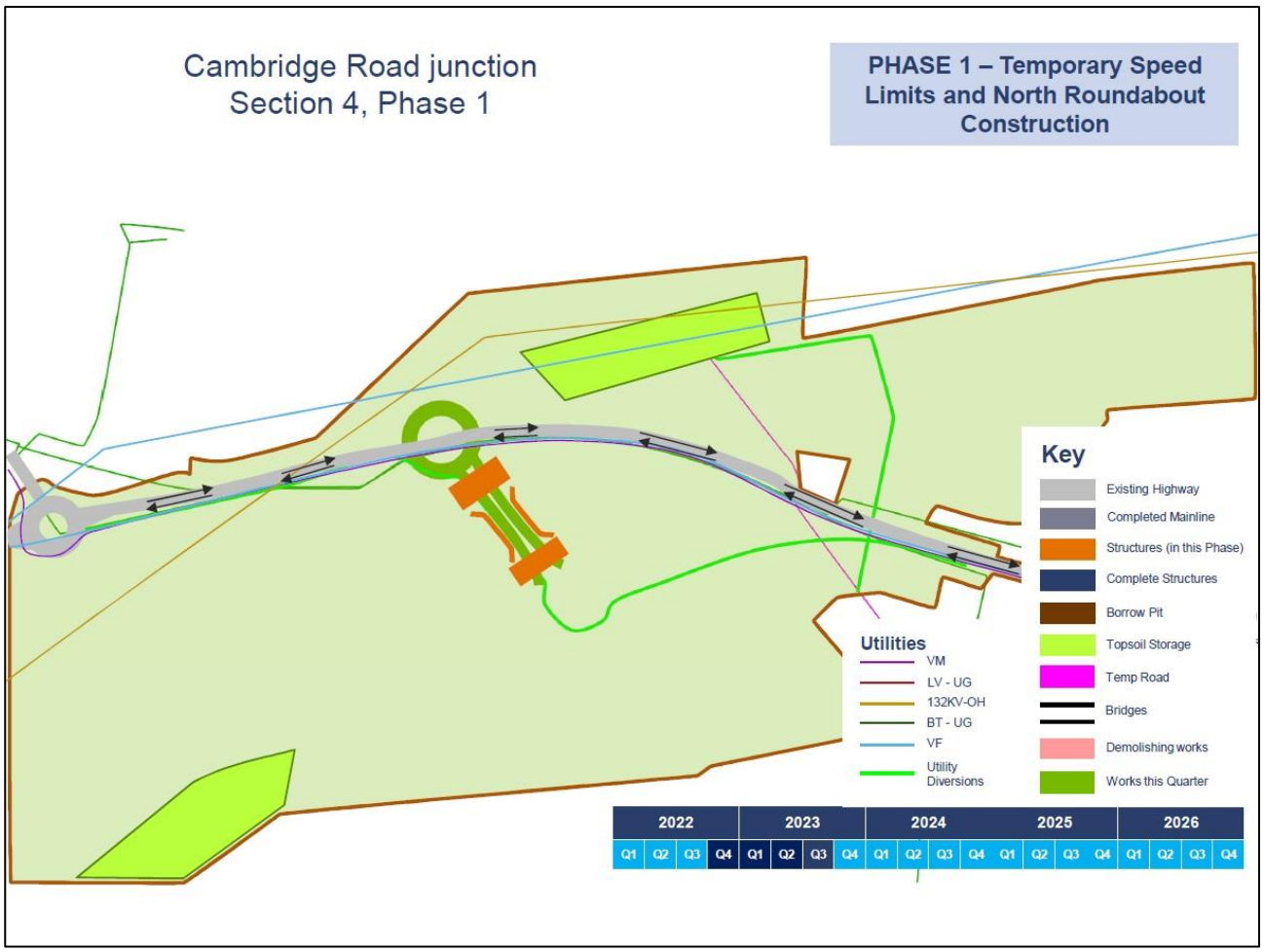
2.6.164 The overbridge structure and southern roundabout would be constructed offline of the existing A428, the latter also providing a westbound off-slip, a westbound on slip and a connection to the existing A428.

2.6.165 The junction and the associated structure would be built in the following phases, with a site compound being established to the west of the new north roundabout with a site office, welfare facility and local storage and laydown area. Deliveries to this bridge construction site would come directly from the existing A428 or via a haul route from the west.

Phase 1

2.6.166 **Plate 2.5** illustrates Phase 1 of the Cambridge Road junction.

Plate 2.5: Cambridge Road junction Phase 1



2.6.167 In Phase 1 of these works, the northern roundabout would be constructed. TTM and local widening of the existing A428 would be undertaken to enable the roundabout carriageways to be constructed on either side of the existing A428.

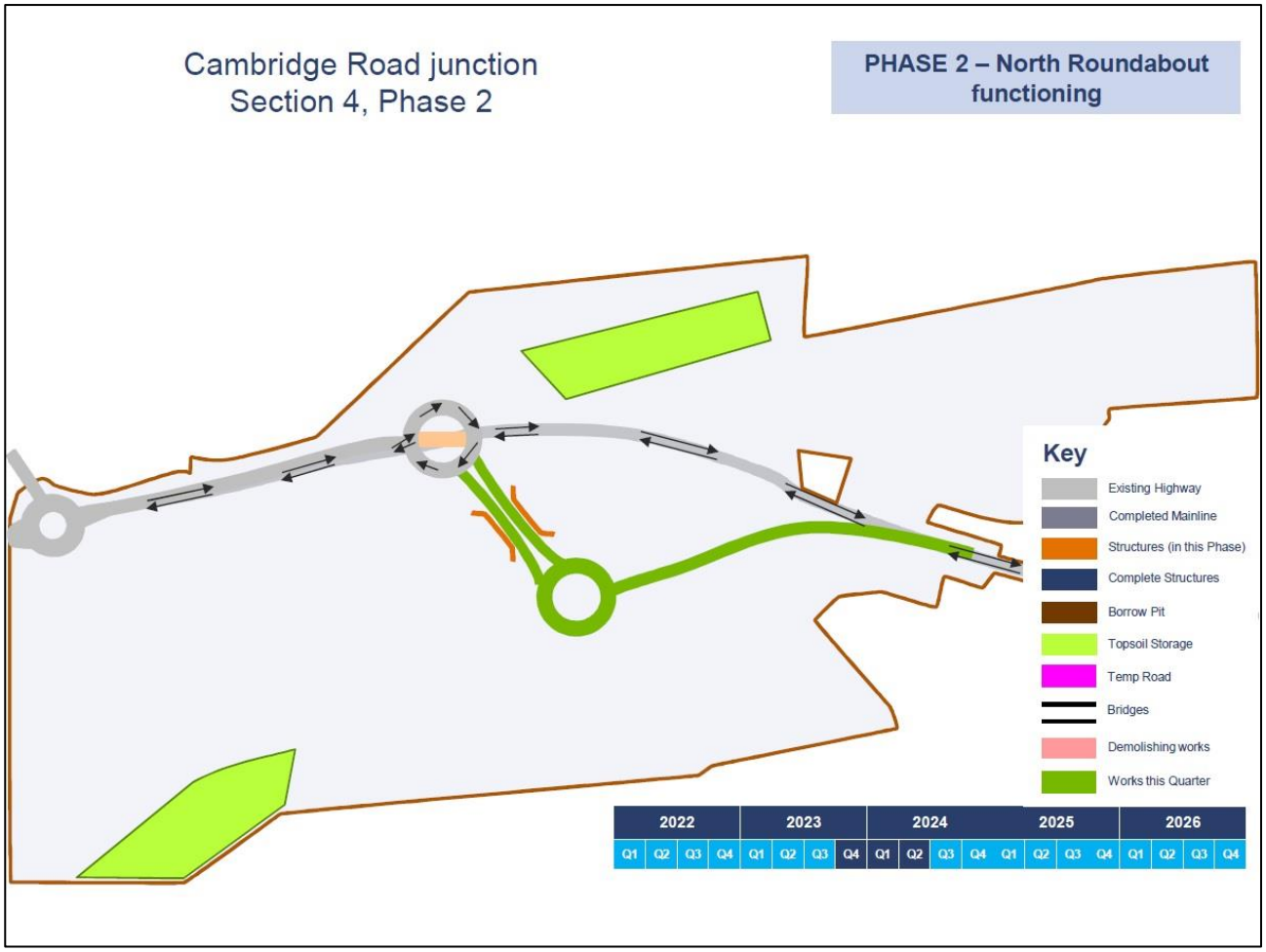
2.6.168 Once the northern roundabout is constructed, traffic would be diverted in order to complete the other sections of the junction. New site access points would be constructed as part of this work to provide access and egress to haul roads.

2.6.169 The Cambridge Road junction bridge structure would pass over the alignment of the new dual carriageway and tie into the southern roundabout that facilities access to the westbound carriageway of the new dual carriageway and eastbound access to the local road network. The structure would be 3-span and constructed from prefabricated beams that would be delivered to the site raised and fixed into place spanning between reinforced concrete cast in-situ piers and abutments.

Phase 2

2.6.170 **Plate 2.6** illustrates Phase 2 of the Cambridge Road junction.

Plate 2.6: Cambridge Road junction Phase 2



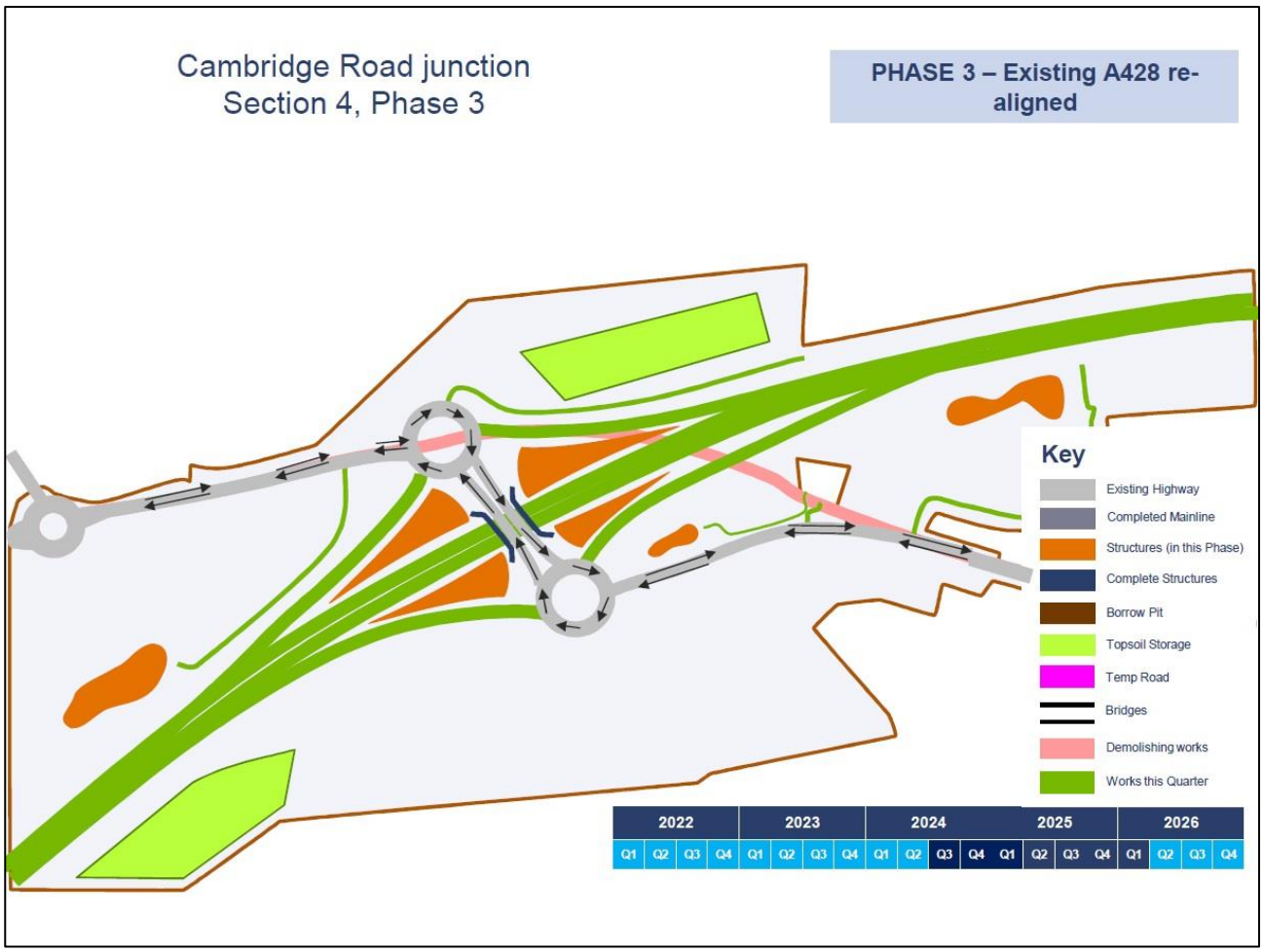
2.6.171 Phase 2 includes the remaining offline parts of the new junction and the overbridge, the construction of which would follow the approach described for the northern roundabout.

2.6.172 The southern roundabout and the link road to the eastern A428 tie in would be constructed in parallel to the bridge works, such that once the bridge structure is complete the approach embankments and highway works to construct the dumbbell link between the roundabouts can be progressed. At this point the final tie-in works would be undertaken.

Phase 3

2.6.173 **Plate 2.7** illustrates Phase 3 of the Cambridge Road junction.

Plate 2.7: Cambridge Road junction Phase 3



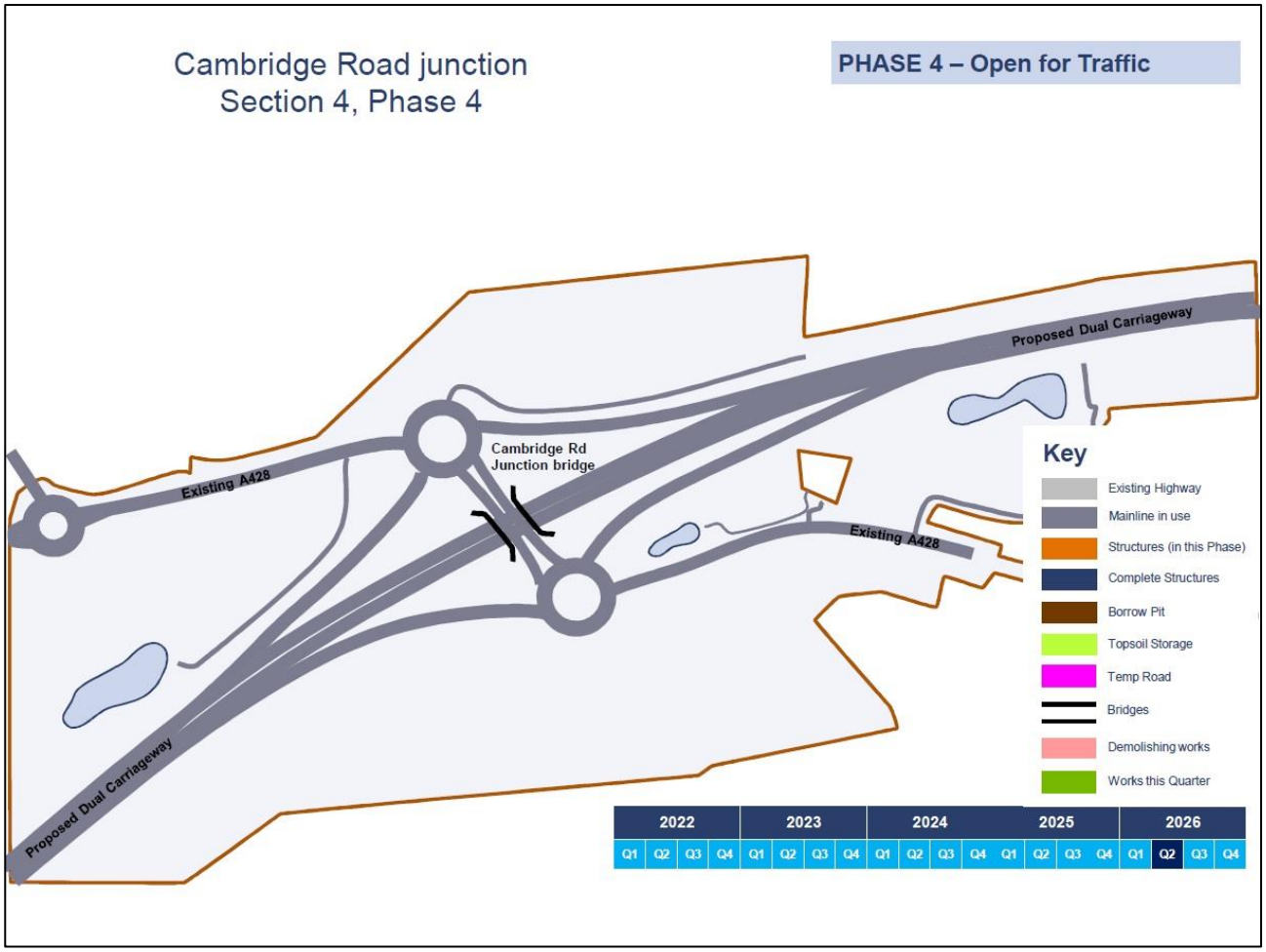
2.6.174 Phase 3 of the works would be progressed once the existing A428 traffic is routed through the new junction, and would include the finalisation of the slip road earthworks and associated drainage networks. During the surfacing and finishing works of the new dual carriageway, the new slip roads would be used to provide controlled site access routes for the construction plant and materials.

2.6.175 The redundant section of the existing A428 would be planed out, with existing drainage and ducts also removed.

Phase 4

2.6.176 **Plate 2.8** illustrates Phase 4 of the Cambridge Road junction.

Plate 2.8: Cambridge Road junction Phase 4



2.6.177 In Phase 4 the final tie-in works to the existing A428 and the new dual carriageway would be undertaken. TTM would be removed, and the new junction would become fully operational.

Section 5: Cambridge Road junction to Caxton Gibbet junction

2.6.178 Section 5 includes the construction of the Bridleway 1/18 accommodation bridge, the Toseland Road Bridge and the Eltisley link.

Bridleway 1/18 accommodation bridge

2.6.179 This accommodation bridge would comprise a single span structure, the purpose of which would be to reconnect a severed local agricultural access track and accommodate Bridleway 1/18. It would be constructed on embankments to achieve the required elevation to cross over the new dual carriageway.

2.6.180 The structure would be constructed offline with the foundation platforms being completed using cast in-situ reinforced concrete abutments and preformed bridge beams. Once the structure is completed, the earthworks to the approach embankments would be constructed.

2.6.181 Access for these works would be via a haul route from the Cambridge Road junction and an access track directly from the existing A428 to the south.

2.6.182 In addition, a satellite construction compound would be established to the south east of the structure including a site office, welfare facilities, and a storage and laydown area.

Toseland Road Bridge

2.6.183 The Toseland Road Bridge would carry Toseland Road over the new dual carriageway, and comprises a 2-span bridge with a central pier and bank-seat abutments at either end.

2.6.184 The construction approach for the bridge would be comparable to that adopted for overbridges carrying side roads and accommodation tracks along the new dual carriageway (described in the section titled 'overbridge construction' paragraph 2.6.223), with the following additions required at this location:

a. Site access points would be constructed off both the east and west side of the existing Toseland Road to the new bridge site and a satellite construction compound, which would include a site office, welfare facilities, and a storage and laydown area.

Eltisley link

2.6.185 The Eltisley link is a large dumbbell junction that would be located to the north of Eltisley village. It comprises of two four-arm roundabouts, the first located to the north of the new dual carriageway and the second to the south. The roundabouts would be joined by an overbridge structure (Eltisley bridge).

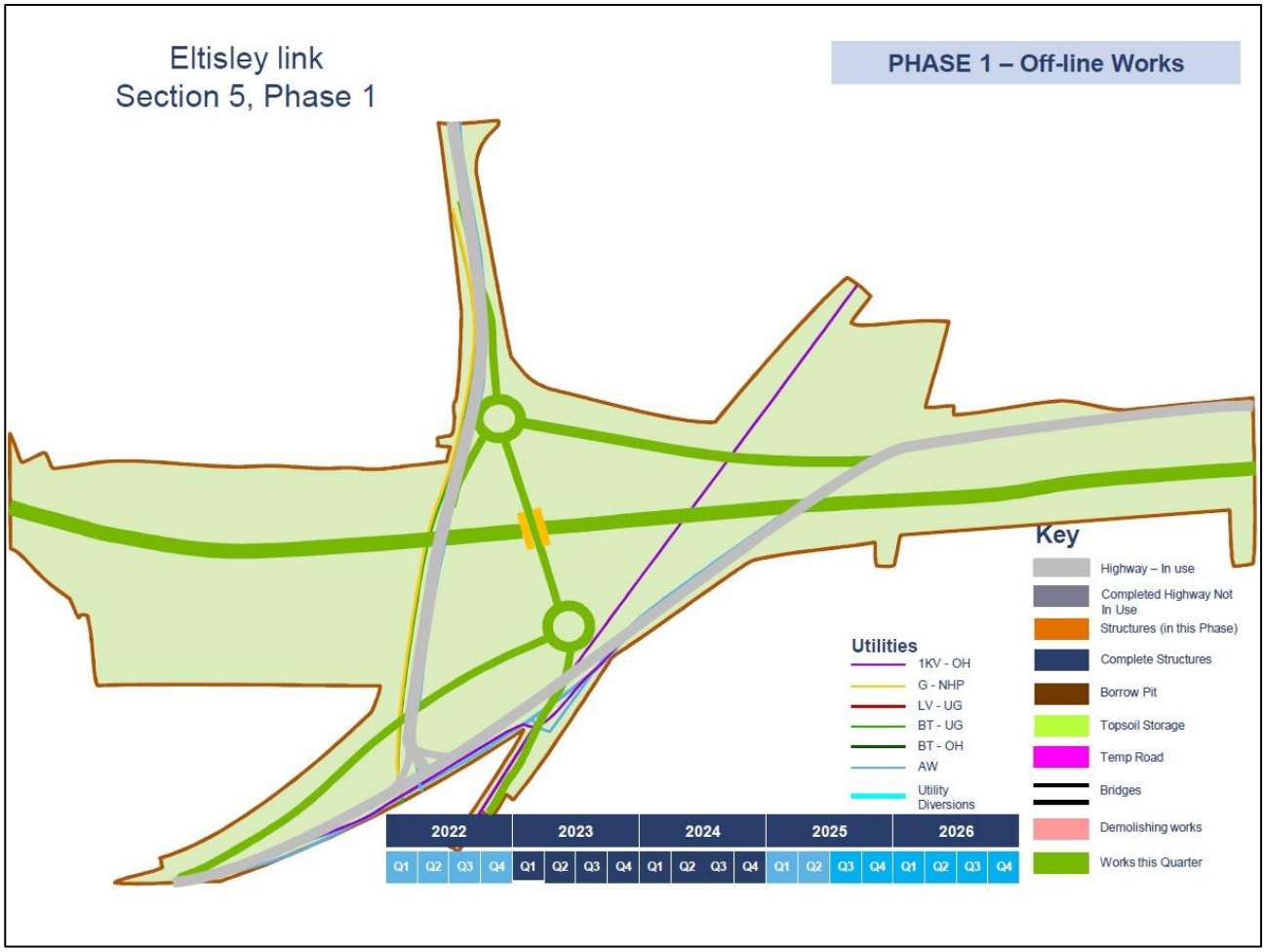
2.6.186 The new arrangement would maintain the connection of the existing A428 through the junction as well as maintain links with the B1040 St Ives Road, access into Eltisley via Cambridge Road, and access for landowners.

2.6.187 No connection to the new dual carriageway would be provided.

Phase 1

2.6.188 **Plate 2.9** illustrates Phase 1 of the Eltisley link.

Plate 2.9: Eltisley link Phase 1



2.6.189 The phasing and works in Phase 1 would be similar to those undertaken during construction of the Cambridge Road junction, whereby the new junction configuration including the Eltisley bridge and northern road to Caxton Gibbet would be constructed offline to allow traffic to continue to use the existing A428 and B1040.

2.6.190 The southern link where the existing B1040 would be crossed would be completed/co-ordinated with the tie-in works.

Eltisley bridge

2.6.191 Eltisley bridge would connect the northern and southern roundabouts of the Eltisley link. Access points would be constructed off both the east and west side of the existing B1040 St Ives Road.

2.6.192 The construction approach for this 3-span bridge would be comparable to that adopted for overbridges carrying side roads and accommodation tracks along the new dual carriageway, with the following additions required at this location:

a. Within the footprint of the junction a site compound would be constructed comprising of a site office, welfare facility and local storage.

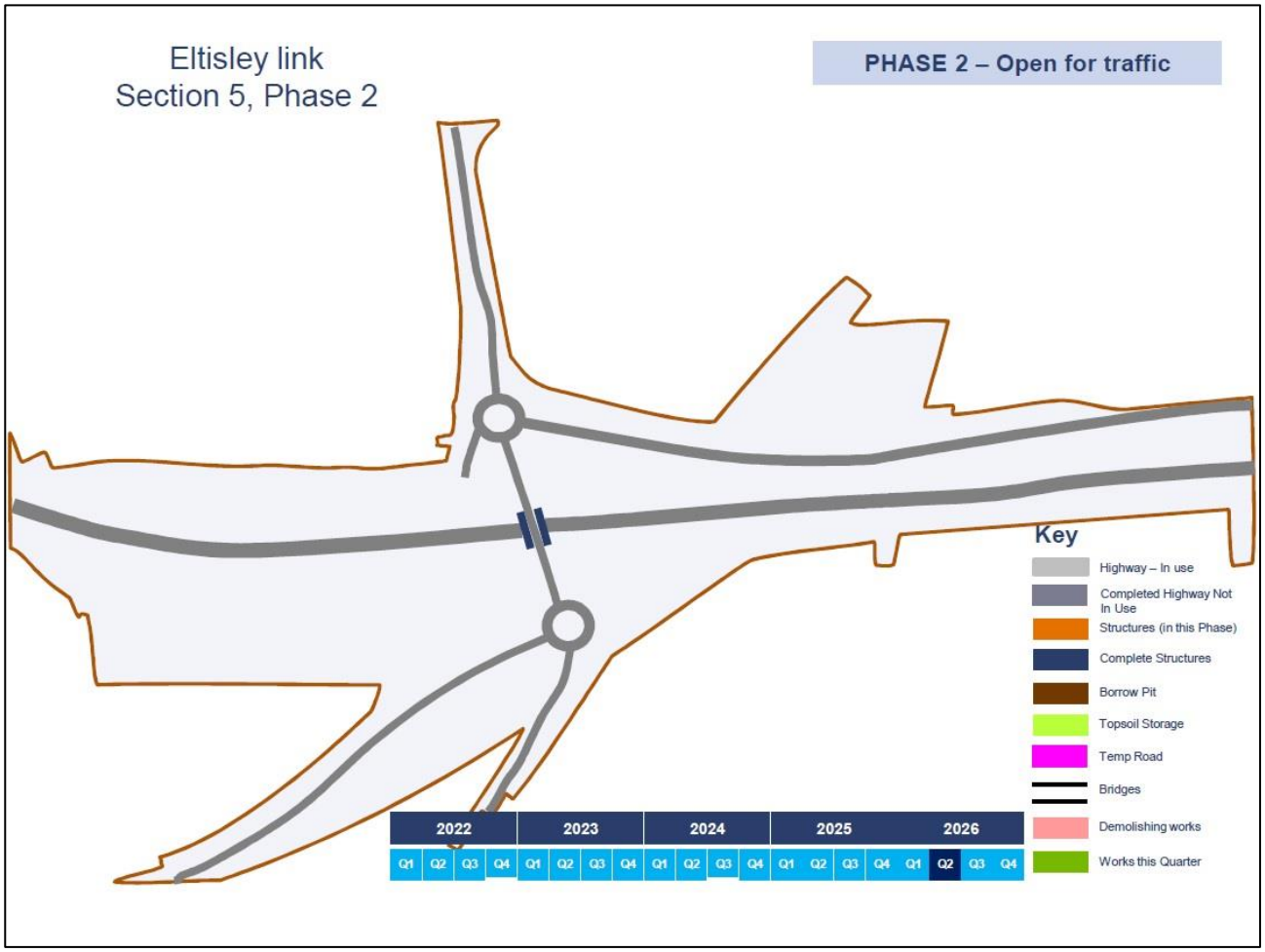
b. The junction configuration would be built offline in parallel to the structure such that when the structure is complete the embankments can be extended up to the back of the abutments and the road construction tied in.

c. When the new offline section is complete, the tie-in to the existing A428 would be progressed during a night or on a weekend closure and the traffic that uses both the existing A428 and the B1040 St Ives Road diverted clear of the alignment.

Phase 2

2.6.193 **Plate 2.10** illustrates Phase 2 of the Eltisley link.

Plate 2.10: Eltisley link Phase 2



2.6.194 Upon completion of the offline works, a number of carriageway tie-ins would be undertaken on the existing A428 and B1040 to divert traffic onto the Eltisley link, and the northern road to Caxton Gibbet.

Section 6: Caxton Gibbet junction

2.6.195 Caxton Gibbet junction is a large dumbbell junction arrangement that the new dual carriageway would pass over. It would comprise of a six-arm roundabout to

the north of the new dual carriageway and a four-arm roundabout located to the south.

2.6.196 The northern roundabout would accommodate an eastbound off-slip and an eastbound on-slip to the new dual carriageway, provisions to the local road network (A1198 Ermine Street), and a PMA.

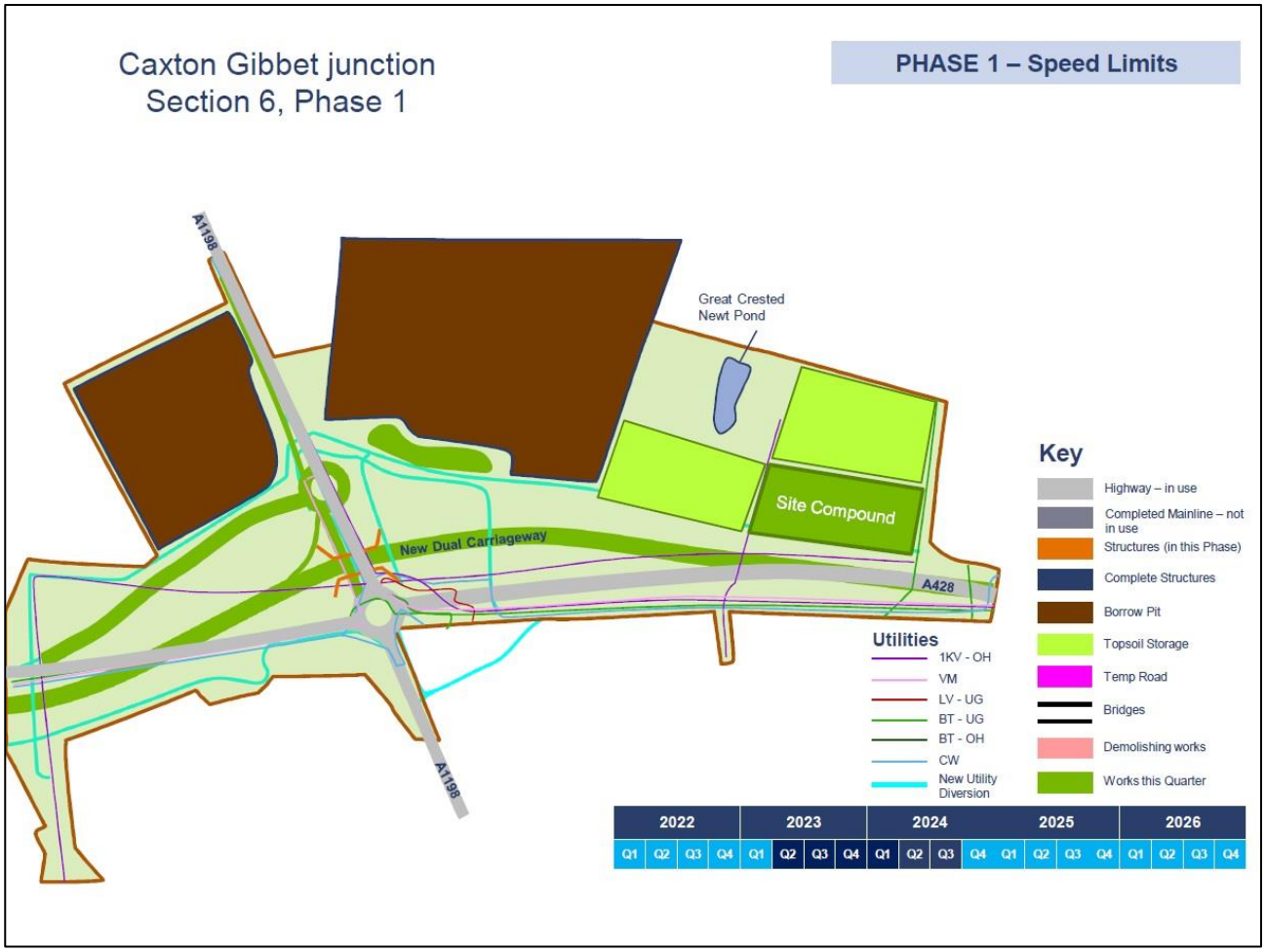
2.6.197 The southern roundabout would accommodate the westbound off-slip from the new dual carriageway, and an access link road which leads to the westbound on-slip to the new dual carriageway in addition to access to the local road network (A1198 Ermine Street). The northern and southern roundabouts would be connected by a dual 2-lane link road that would pass under the new Caxton Gibbet bridge.

2.6.198 The works to construct the Caxton Gibbet junction would be progressed in three phases. Access to the existing services, fuel filling station and businesses would be maintained throughout the construction period, except for short term closures that would be required for activities including bridge beam placement and tie-in works.

Phase 1

2.6.199 **Plate 2.11** illustrates Phase 1 of the Caxton Gibbet junction.

Plate 2.11: Caxton Gibbet junction Phase 1



2.6.200 The works in this phase would include the construction of the northern roundabout on the A1198 and a section of dual carriageway between the north and south roundabouts. The construction of the bridge carrying the new dual carriageway would also be constructed in this phase.

2.6.201 Utilities in both the east and west verge of the existing A1198 would be diverted to new routes in road verges, and would include the installation of temporary protection measures to facilitate construction of the bridge.

2.6.202 TTM would be used during the construction of new site access points on the east and west side of the A1198 Ermine Street, which would include local widening and the tie-ins to the new roundabout.

2.6.203 New culverts for the watercourse crossings would be constructed offline using excavators and mobile cranes to lift and place precast culverts and pipes into position. Headwalls would be either precast units lifted in and stitched / bolted together or cast in-situ using prefabricated formwork and reinforcement.

2.6.204 Once the culverts are complete, the new watercourses and the drainage pond to the north east of the junction would be excavated and the local drainage diverted into this new arrangement.

2.6.205 The northern roundabout would then be opened to 'through traffic', with the central lanes providing single lane access in each direction between the roundabouts creating working space for the bridge construction.

Caxton Gibbet bridge

2.6.206 Caxton Gibbet bridge is a 3-span structure with two piers and bank-seat abutments at either end. The bridge foundations, pier and abutments would be constructed in-situ from reinforced concrete, with the bridge deck constructed from preformed beams and a reinforced cast in-situ deck. The prefabricated bridge deck beams would be lifted into place from both sides of the new dual carriageway during overnight or weekend closures of the A1198 Ermine Street and local diversion of the north south traffic via the B1040.

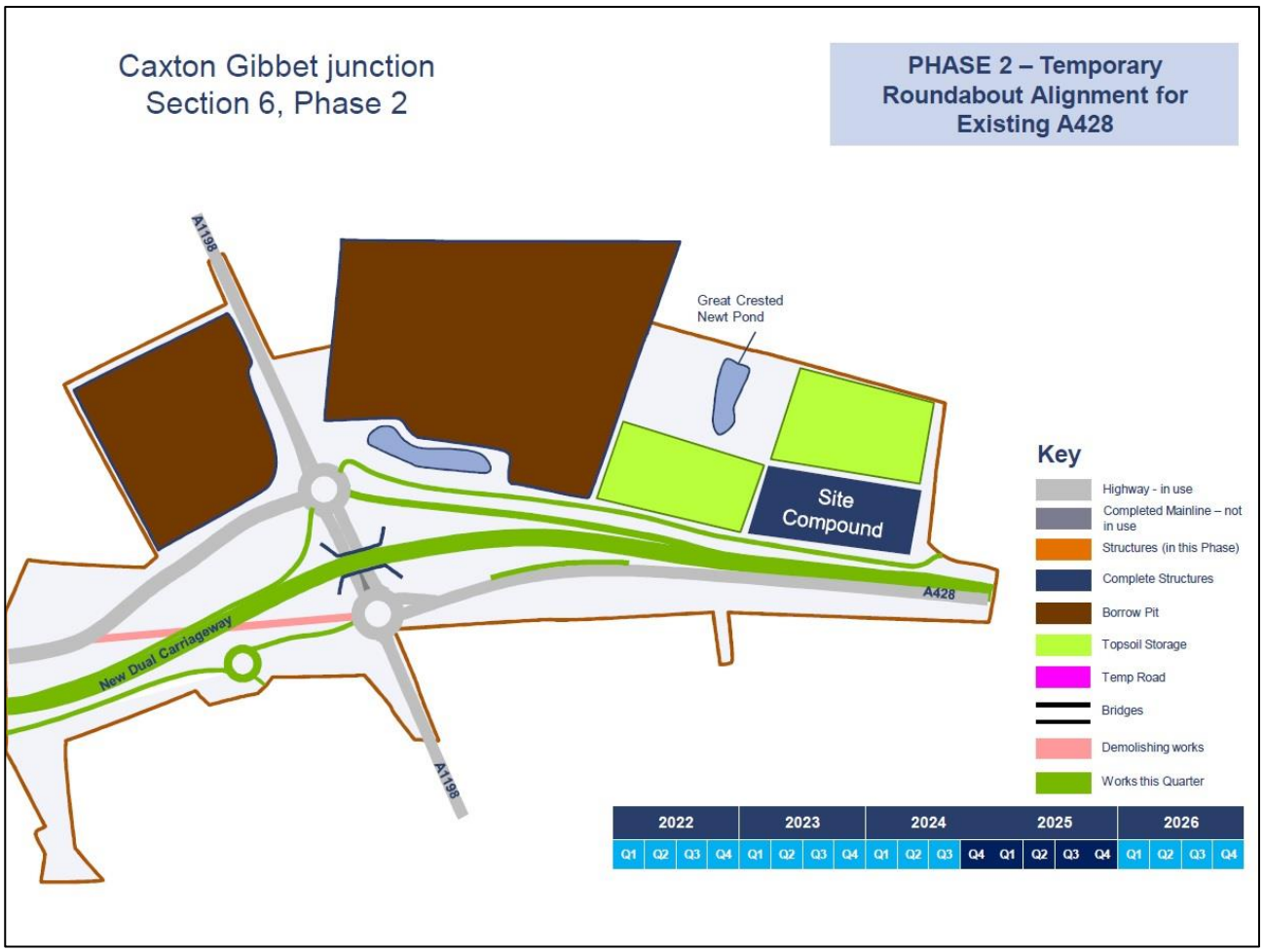
2.6.207 Pre-earthworks ditches would be cut to define the available area of the approach embankments and a drainage layer would be installed where required by the design. General embankment fill material would be placed directly from the borrow pits and moved to the accessible parts of the eastern and western approach embankments.

2.6.208 Following completion of the bulk earthworks to the north of the existing A428, the new local link road between the tie-in with the existing carriageway and the A1198 northern roundabout would be constructed. This would include tie-in works during weekend closures of the A428 and local diversion of the east-west traffic via the B1040 and A1198 Papworth Everard bypass.

Phase 2

2.6.209 **Plate 2.12** illustrates Phase 2 of the Caxton Gibbet junction.

Plate 2.12: Caxton Gibbet junction Phase 2



2.6.210 Phase 2 would involve the completion of the new dual carriageway, the Caxton Gibbet junction slip roads, the new service/link road roundabout and remodelling of the existing Caxton Gibbet roundabout.

2.6.211 The utilities located in the verges of the existing A428 west of the Caxton Gibbet roundabout would be diverted to follow the new local access road verges, the verges of the A1198 Ermine Street, or via ducts previously installed under the embankments of the new dual carriageway.

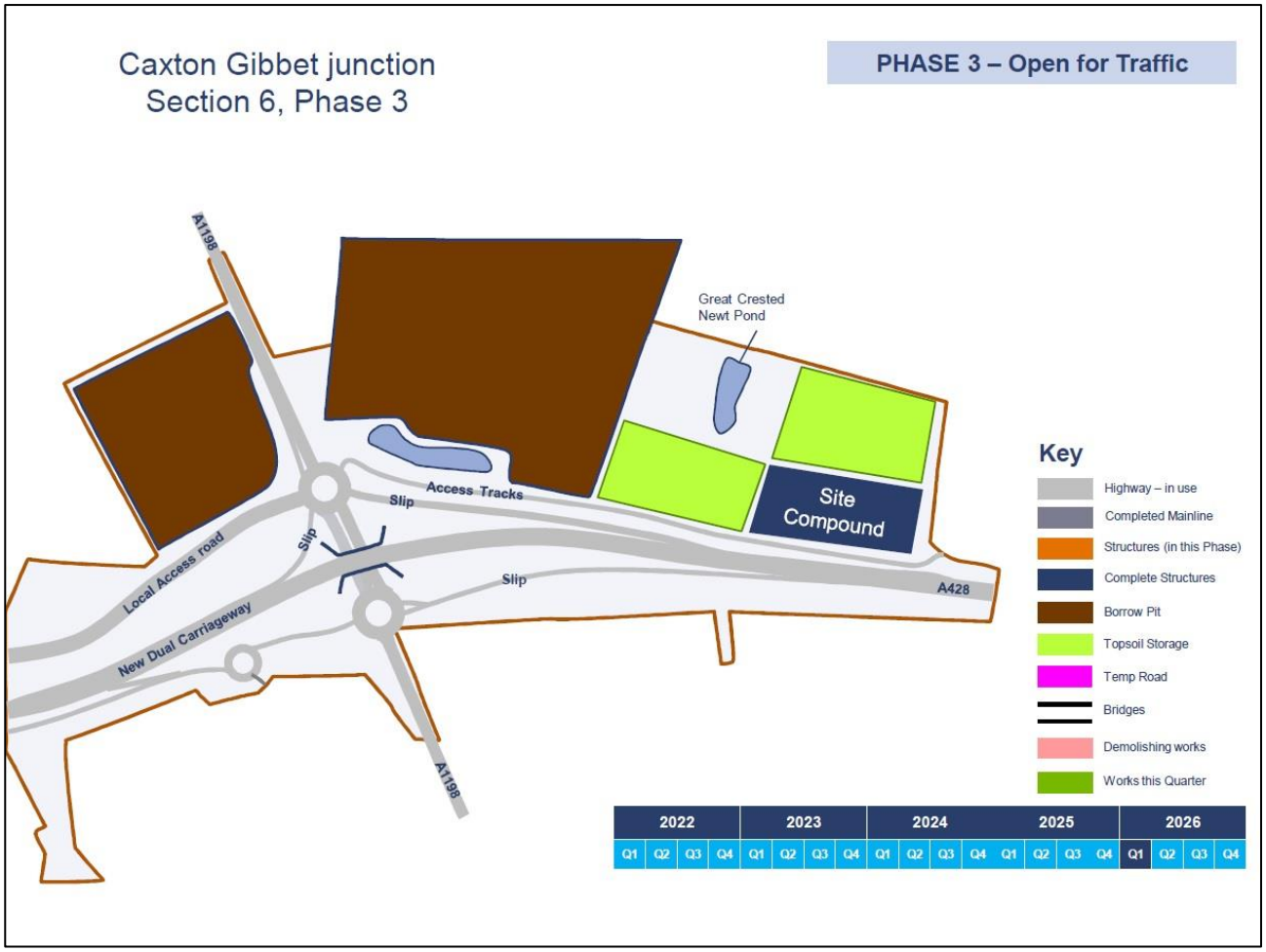
2.6.212 The redundant section of the existing A428 would then be planed out with drainage and ducts also removed.

2.6.213 The opening of the Caxton Gibbet bridge and the diversion of the A428 traffic onto the northern link road would allow a haul route for earthworks plant to be formed, allowing the transportation of excavated materials to be used as part of embankment construction and the return of any unsuitable material generated along the new road to the borrow pits.

Phase 3

2.6.214 **Plate 2.13** illustrates Phase 3 of the Caxton Gibbet junction.

Plate 2.13: Caxton Gibbet junction Phase 3



2.6.215 In Phase 3 the final tie-in works for the existing A428 and the new dual carriageway would be undertaken. In this phase, all TTM would be removed and Caxton Gibbet junction would become fully operational.

Overbridge construction

2.6.216 The following overbridges associated with side roads and accommodation tracks would be built using a comparable construction approach:

a. Barford Road bridge.

b. Top Farm accommodation bridge.

c. B1046 bridge.

d. Toseland Road Bridge.

e. Eltisley bridge.

2.6.217 These structures would be constructed using the following methods and techniques:

a. Topsoil and subsoil would be stripped by an excavator and moved to a local storage area, and piling platforms would be established on either side of the structure's crossing point.

b. Where required, piling equipment would be delivered via the access haul routes and established on the platform, in addition to any required cranes, excavators and other associated piling equipment. As piles are completed for a particular part of the structure the piling rig would be demobilised and moved to the next adjacent element until all piled foundations are complete.

c. Reinforcement, formwork panels and falsework equipment would be delivered to the site by lorry and then unloaded by an attendant site mobile crane. Some elements would be prefabricated on the site in laydown areas before they are lifted and fixed. Temporary bearings required for the installation of the bridge beams would be cast into the piers and abutments. Concrete would be delivered to the site by road lorries and placed using an attendant concrete pump.

d. Once the bridge abutments and piers have been constructed the bridge beams would be delivered to the site, lifted and fixed into position by a mobile crane. Following installation of the bridge beams the structural deck would be constructed including installation of waterproofing, bridge deck drainage and prefabricated vehicle parapets.

e. Approach embankments would be constructed to follow the alignment of the new carriageway and tied-in to the new structure. On completion of the earthworks, the new road would be installed and with the exception of the tie-ins, the new road would be surfaced in one operation.

f. Once works on the new offline road are complete, a short closure of the road would be implemented to plane out the tie-in zones and then construct the tie-ins, including the highway finishes before opening to traffic.

g. The existing and now redundant side road would be planed out or excavated, and any suitable materials loaded and transported to a site processing area for reuse in haul routes, access tracks and temporary works.

Culvert construction

2.6.218 As part of the Scheme, a number of culverts would need to be installed where the new dual carriageway and side roads interface with existing watercourses.

2.6.219 Culverts would generally be constructed offline from existing watercourses, whereby the route of a culvert would be constructed in an open cut formation with benched sides and the base blinded. A system of local sumps and suction pumps would be used to keep the excavation dry, with water discharged via a silt sock either back into the ground or into a local pre earthworks ditch.

2.6.220 Where it would be necessary to construct a culvert online, a system of over pumps would be set up and would include contingency measures such as a standby pump or flume pipe and a detailed maintenance procedure. Once the

pumping system is in place, the watercourse would be blocked and the pumps made operational leaving a dry section for the culvert construction.

2.6.221 A lifting platform would be constructed setback from the culvert and an excavator or crane would be mobilised to the platform. Precast culvert units or pipes would be delivered on a flatbed lorry and lifted in and placed into position. A system of chain-blocks or similar would be used to pull the units together, with the joints then sealed. The full extent of the buried elements of the culvert would be waterproofed prior to reinstatement, and the culvert backfilled with suitable compacted material.

2.6.222 Once the surround is complete, general fill would be placed and compacted as part of the general embankment construction. The backfill at each end of the culvert would be stepped back to allow for the construction of the headwalls.

2.6.223 Dependent upon the size and complexity of the headwall detail, either precast or in-situ head walls would be constructed. The headwall and wingwall locations would be excavated and blinded. Where precast wingwalls are used, the sections would be lifted into position and the stitch details between units cast. Where an in-situ detail is required, preformed formwork and prefabricated steel reinforcement would be utilised to form the new headwall arrangement.

2.6.224 Once the headwalls are complete the scour protection measure required both upstream and downstream of the new culvert would be installed. These would be formed from rock blankets or gabion baskets which would be made up in-situ and filled with imported stone.

2.6.225 When the new culvert structure is complete, the approach section of the new drainage route would be excavated and tied back into the watercourse and the water diverted to the new route. The original route would then be sealed off, any soft spots dug out before the original route is backfilled and reinstated. Where over-pumping has been used the upstream dam would be removed and the pumping system demobilised.

Construction traffic flows and traffic management

2.6.226 Estimates of the likely number and type of construction traffic have been generated based on the planned approach to, and phasing of, construction of the Scheme. Details of these estimated vehicle movements are presented in the Transport Assessment **[TR010044/APP/7.2]**.

2.6.227 During construction, TTM would be put in place to ensure that traffic flows on both the strategic and local road networks are maintained, whilst allowing safe working at the interface between the existing road network and the Scheme.

2.6.228 The main objectives of the TTM are:

a. To protect the construction workforce against the risks to health and safety associated with working on or adjacent to live carriageways.

b. To ensure the safety of road users (including WCH) as they approach, and travel through, routes affected by roadworks.

c. To minimise the health and safety risks to the local community resulting from construction operations, including the impacts of (intended and unintended) traffic diversions onto the side road network.

d. Minimise disruption to road users, local businesses and communities during construction works.

2.6.229 TTM would include, but not be limited to, the following types of measure:

a. The application of temporary speed limits.

b. Carriageway and slip road closures.

c. The segregation of routes.

d. The use of signage and clear road marking systems.

e. Formation of safe access and egress points.

f. Communication of measures to stakeholders.

2.6.230 Further details of the TTM to be implemented during the construction of the Scheme are presented in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**.

2.6.231 It is envisaged that multiple phases of traffic management would be required throughout construction of the Scheme, particularly at existing junctions to ensure these can be kept in use and running at an appropriate capacity.

Construction plant, equipment and machinery

2.6.232 Construction activities undertaken across the Scheme would involve the use of a range of plant, equipment and machinery depending on the location and nature of the works.

2.6.233 Tracked excavators, dozers, breakers, dumper trucks, planers, piling rigs, concrete pumps and rollers would be used to dig, move, lay and compact material as part of the earthworks and foundation operations.

2.6.234 Road wagons, tipper wagons, telehandlers, low loaders and cranes would be used to transport materials and equipment to and from construction working areas.

2.6.235 Hand tools including hammer drills, vibrators, saws, plate compactors and sprays would be used for specific activities and where access does not permit the use of larger equipment.

2.6.236 Petrol and diesel powered generators would be used in working areas to provide a power source for some plant and equipment. Solar powered equipment such as lighting towers would be utilised where applicable.

2.6.237 Ancillary equipment such as pumps would be installed during construction to dewater the excavations and working areas, and lighting towers would be erected to provide illumination for safe working outside of daylight hours.

2.6.238 Equipment comprising office and canteen cabin units, drying rooms, stores, changing rooms, showers and a sewage treatment plant would be set up within the main construction compounds and in some satellite construction compounds for staff welfare. A mobile welfare unit would be used during the works in areas more remote from these compounds.

2.6.239 Minibuses, pick up vehicles, road sweepers, recovery trucks and lorry mounted cranes would be used across all working areas to support other construction activities, and for the transportation of people and vehicles from the main site compound.

2.6.240 Communications masts and signal boosters would be used to facilitate effective construction techniques through the adoption of digital technology. The masts would be of a form comparable to a lighting column and would be installed temporarily at locations with signal blackspots.

Construction workforce

2.6.241 The construction workforce would vary throughout the advanced works, enabling works and main construction works phases.

2.6.242 The maximum monthly workforce has been assumed to be 900 staff with the following roles and responsibilities:

a. Highways England staff – individuals within the overseeing organisation responsible for construction project management.

b. Technical assurance staff – individuals who would function as site supervisors.

c. Delivery integration partner – individuals who would undertake managerial, engineering and administrative roles relating to health and safety, quality and commercial management, site inspections, works planning and operations co-ordination, foremen and environmental management.

d. Contractors – individuals who would undertake works and roles such as driving vehicles, environmental supervision, traffic marshalling and management, drainage installation, earthworks, concrete formwork, bridge fabrication and general logistical support.

2.6.243 Further information regarding the roles and responsibilities of key construction staff are summarised in the First Iteration EMP **[TR010044/APP/6.8]**.

Construction working hours

2.6.244 Core construction working hours would be from 07:00 to 18:00 on weekdays and from 07:00 to 13:00 on Saturdays.

2.6.245 The Principal Contractor would adhere to these core working hours as far as is reasonably practicable. Except in the case of the exceptions described below, and in the case of emergencies, any work required to be undertaken outside of core hours (not including repairs or maintenance) would be agreed with the relevant local authority prior to undertaking the works under Section 61 of the *Control of Pollution Act 1974* (Ref 2-18).

2.6.246 Exceptions to these hours may be required to accommodate the following elements, operations and activities:

a. Online sections of the Scheme would require night time working to facilitate traffic management, the installation of bridge beams, the installation of signs and technology, and surface tie-ins.

b. Construction of the ECML underbridge railway would require working in proximity to the railway line. To ensure the safety of construction personnel and railway operations, certain activities would be required to be undertaken during closures (referred to as possessions) of the ECML railway. The timings of the possessions would be dictated by Network Rail's 'Rules of the Route' requirements, these being the rules agreed with train operators under which speed restrictions or temporary line closures can be imposed. Where practicable, railway possessions would be used to install safety systems (for example protection decks and railway protection barriers) to enable a greater amount of the construction activities to be undertaken during core hours.

c. Certain operations such as earthworks are season and weather dependent. In these instances, the Principal Contractor would seek to extend the core working hours and/or days for such operations to take advantage of daylight hours, following consultation with the relevant local authority.

d. Certain other specific construction activities would require extended working hours for reasons of engineering practicability. These activities include, but are not limited to, major concrete pours and piling/diaphragm wall works.

e. Environmental and engineering surveys may need to be carried out outside of core working hours.

2.6.247 Any site specific variations to the core hours and/or additional hours likely to be required would be included within the Principal Contractor's Second Iteration EMP, following consultation with the relevant local authority.

2.6.248 In the case of work required in response to an emergency or which if not completed would be unsafe or harmful to the works, staff, public or local environment, the relevant local authority would be informed as soon as reasonably practicable of the reasons for, and likely duration of, the works. Examples include where pouring concrete takes longer than planned due to equipment failure, or where unexpectedly poor ground conditions are encountered whilst excavating, they require immediate stabilisation.

2.6.249 The intention would be to avoid working on any online sections of roads during bank holidays to minimise potential disruption to road users.

Construction materials

2.6.250 Estimates of the types and quantities of materials required to construct the Scheme, and those generated by construction, have been developed by Highways England's appointed buildability contractor.

2.6.251 Details of the main types and estimated quantities of construction materials required for the delivery of the Scheme are provided in **Chapter 10, Material assets and waste** of the Environmental Statement **[TR010044/APP/6.1]**.

2.6.252 Notwithstanding the use of borrow pits to source construction material, it would be necessary to import some engineering earthworks materials, for example imported backfill material behind structures and, where required, imported materials in a starter layer or drainage layer under embankments.

2.6.253 Where possible, materials would be recycled and used in the works. This includes materials such as crushed concrete from the demolition of the existing Roxton Road bridge and road planings from resurfacing works or redundant sections of carriageway.

2.6.254 It is planned that unsuitable materials generated from earthworks operations would be used within the works and placed in earth bunds or landscaping areas, or used to backfill the excavated borrow pits.

2.6.255 Surplus material would be transported to a suitable deposition location via haul roads where possible. Where this is not possible, road wagons would be used to transport the material via defined site access points and routes on the road network.

Construction compounds

Main construction compounds

2.6.256 The three main construction compounds would be manned on a 24 hour basis and would be in place throughout the entire duration of construction. Although construction of the Scheme would primarily be undertaken during core working hours, a number of functions associated with the works would need to operate 24 hours per day. These functions include:

a. Site security.

b. Vehicle recovery.

c. Traffic management.

d. Water management.

e. Deliveries of large components and/or plant which are moved during off-peak traffic hours, to minimise disruption to road users.

2.6.257 Lighting both within the three main construction compounds and on their boundaries would be managed to reduce light spill as far as practicable, and where possible cabins and welfare facilities would be single story and positioned centrally within the compounds to minimise impacts on receptors in close proximity to the site boundaries.

2.6.258 The location and details of each compound are presented below.

Main project compound

2.6.259 The main project compound located at Wintringham would function as the head office for the Scheme and would accommodate the site management and delivery teams responsible for works in Section 3 and Section 4 of the Scheme.

2.6.260 The compound would be located centrally between the B1046 and the existing A428 Hen Brook underbridge, approximately 275 metres to the east of the ECML railway. The total area of this compound would be approximately 170,000m^2.

2.6.261 Access to the compound would be via a new roundabout on the A428, which would be constructed as part of the compound establishment works.

2.6.262 The compound would be fenced with a 2.4 metre high chain-link fence or similar to prevent unauthorised access, with security barriers to provide access to the site. The dual access point off the existing A428 (one for site personnel, one for visitors and deliveries) would be set back to prevent queuing of site vehicles entering the compound.

2.6.263 An indicative layout and arrangement for this compound is illustrated on **Figure 2.5** of the Environmental Statement **[TR010044/APP/6.2]**. In summary, the compound would include the following features:

a. A modular office of 2000m^2 together with canteen and welfare facilities.

b. Site stores compound, including subcontractor material storage yards and plant yards and laydown areas.

c. Materials testing laboratory facilities.

d. Concrete batching plant.

e. Asphalt batching plant.

f. CCTV traffic control facility.

g. Vehicle free recovery unit and storage, with customer care centre.

h. Waste management and segregation areas.

2.6.264 The site batching plants would be located in the areas close to the compound entrance link road in the north-east quadrant of the site, in order to reduce the interface with other activities on the site.

2.6.265 The compound would accommodate parking provision for:

a. Up to 600 vehicles for staff, subcontractors, labour and visitors traveling to the site daily.

b. 220 vehicle spaces for site-based vehicles including pickups, vans, minibuses, crew cabs etc. and suitable parking for LGVs, HGVs and plant.

2.6.266 It is planned to use the existing Hen Brook Culvert, which is located close to the eastern end of the compound and currently provides a farm access, to provide a segregated access directly from the compound to haul roads and working areas.

Western compound

2.6.267 The western compound located to the south-east of the existing Black Cat roundabout would provide facilities for the construction of Section 1 and Section 2 of the Scheme, including works associated with the borrow pits.

2.6.268 This compound would have an area of 55,000m^2 and would accommodate the site management and construction functions for Sections 1 and 2, which include the majority of the new structures and the most complex construction elements of the Scheme. This compound would be manned on a 24-hour basis.

2.6.269 Access into this compound would initially be off the existing Black Cat roundabout using any existing access that has been used for accessing the Black Cat Quarry and ultimately via the permanent access off the Black Cat junction Circulatory.

2.6.270 The compound would be fenced with a 2.4m high chain-link fence or similar to prevent unauthorised access with security barriers to provide access to the site. The dual access point (one for site personnel, one for visitors and deliveries) would be set back from the existing Black Cat roundabout to prevent queuing of site vehicles entering the compound.

2.6.271 An indicative layout and arrangement for this compound is illustrated on **Figure 2.5** of the Environmental Statement **[TR010044/APP/6.2]**. In summary, the compound would include the following features:

a. A modular office of up to 1500m2 in size including welfare facilities.

b. Site storage areas, including subcontractor material storage yards and plant yards with fuel storage facility.

c. Concrete batching plant.

d. Precast concrete manufacturing yard, with crane platform and service crane(s).

e. Bulk material processing plant.

f. CCTV traffic control facility

g. Vehicle recovery unit and storage.

h. Waste management and segregation areas

2.6.272 The compound would accommodate parking provision for:

a. Up to 400 vehicles for staff, subcontractors, labour and visitors traveling to the site daily.

b. 100 vehicle spaces for site-based vehicles including pickups, vans, minibuses, crew cabs etc. and suitable parking for LGVs, HGVs and plant.

Eastern compound

2.6.273 The eastern compound located to the north-east of the existing Caxton Gibbet roundabout would accommodate the management and delivery team responsible for works in Section 5 and Section 6 of the Scheme, including works associated with the borrow pits.

2.6.274 This compound would be approximately 30,000m^2 in size and located to the north of the existing A428 and east of the A1198 Ermine Street.

2.6.275 Initially the compound would be accessed from Brockley Road; however, when the Caxton Gibbet junction north roundabout has been constructed an existing farm access bell mouth and track would be widened to form an access to the compound directly from the roundabout.

2.6.276 The compound would be fenced with a 2.4 metre high chain-link fence or similar to prevent unauthorised access with security barriers to control access to the site. The barriers would be set back from the new north roundabout to prevent the queuing of site vehicles onto the public highway.

2.6.277 An indicative layout and arrangement for this compound is illustrated on **Figure 2.5** of the Environmental Statement **[TR010044/APP/6.2]**. In summary, the compound would include the following features:

a. A modular office of up to 800m^2 including welfare facilities.

b. Site storage areas, including subcontractor material storage yards and plant yards with fuel storage facility.

c. Bulk material processing plant.

d. Waste management and segregation.

e. A vehicle recovery area for the eastern end of the Scheme.

2.6.278 The compound would accommodate parking provision for:

a. Up to 200 vehicles for staff, subcontractors, labour and visitors traveling to the site daily; and

b. A further 50 vehicle spaces for site-based vehicles including pickups, vans, minibuses, crew cabs etc. and suitable parking for LGVs, HGVs and plant.

Satellite construction compounds

2.6.279 In addition to the main construction compounds, a number of satellite construction compounds would be formed to facilitate the construction of the Scheme.

2.6.280 These smaller compounds would generally be located adjacent to bridge structures and be in operation for a limited duration whilst undertaking these works. Works within the compounds would normally only be undertaken during core hours; however, during periods of overnight works such as bridge beam installation, road tie-ins and other critical works, these compounds would need to operate outside of these hours.

2.6.281 The perimeter to these compounds would be fenced to prevent unauthorised access. The fence type and construction would be appropriate to the level of security required, but this is likely to be ‘Heras’ type fencing.

2.6.282 Lighting columns would be installed to reduce light spill and cabins where possible would be single storey to reduce any impact on receptors in close proximity to the perimeter.

2.6.283 The compounds would typically include the following features:

a. Parking Spaces for a small number of site vehicles such as pickups, vans and minibuses.

b. An office of 72m^2 required for up to 10 staff, together with mess room and welfare facilities.

c. A diesel generator to provide a source of power to the facilities (where practicable solar panels and batteries would be used in place of, or in combination with, a generator).

d. Site storage areas including subcontractor material storage yards and plant parking.

2.6.284 The locations of each satellite construction compound are illustrated on **Figure 2.5** of the Environmental Statement **[TR010044/APP/6.2]**, the details and access arrangements of which are described in **Table 2-9**.

Table 2-9: Satellite construction compounds

Satellite compound name	Reference	Details
Roxton Road compound	Satellite Compound A	This compound would use an area that was previously a compound for the construction of the A421. Access would be from Bedford Road via the existing access junction and road located to the west. TTM and temporary signing would be provided to enable the safe operation of this junction.
Kelpie Marina (School Lane) compound	Satellite Compound B	Access to this compound would be via an access track from Bedford Road. A temporary priority junction off Bedford Road would be provided initially until the permanent junction and access is provide. TTM and temporary signing would be provided to enable the safe operation of this junction.
River Great Ouse crossing (west side) compound	Satellite Compound C	Access would be via an access track from the western compound.
River Great Ouse Crossing (east side) compound	Satellite Compound D	Access would be from the existing Barford Road via a temporary priority junction off Barford Road. TTM and temporary signing would be provided to enable the safe operation of this junction.
East Coast Main Line underbridge (west and east sides) compound	Satellite Compound E	Access to the west side compound would be from Barford Road, via a haul route along the alignment of the new dual carriageway through Rectory Farm. Prior to the construction of the east side compound, this parcel of land would be used to facilitate the Cadent HP gas main diversion undertaken during the advanced works phase. To enable these

Satellite compound name	Reference	Details
		advance works to be undertaken, temporary access would be provided from Station Road. The main access route to the east side compound would be via the main haul routes through the construction works site.
Top Farm accommodation bridge compound	Satellite Compound F	Access would be from Potton Road for a limited period via the existing junction and then from the main project compound via haul road. TTM and temporary signing would be provided to enable the safe operation of the existing junction with Potton Road when this is in use.
B1046 bridge compound	Satellite Compound G	Access would be via a temporary priority junction off Potton Road for a limited period and then from the main project compound via haul road. TTM and temporary signing would be provided to enable the safe operation of the temporary junction with Potton Road when this is in use.
Footpath 1/17 pedestrian overbridge compound	Satellite Compound H	Access would be from the main project compound via haul road.
Cambridge Road junction compound	Satellite Compound I	Access would be from a lay-by off the existing A428 via a temporary site access and from the main project compound via haul road. TTM and temporary signing would be provided to enable the safe operation of the temporary access off the existing A428 when this is in use.
Bridleway 1/18 accommodation bridge compound	Satellite Compound J	Access would be via a temporary priority junction off the existing A428. TTM and temporary signing would be provided to enable the safe operation of this temporary junction while it is in use.
Toseland Road Bridge compound	Satellite Compound K	Access would be via a temporary priority junction off Toseland Road. TTM and temporary signing would be provided to enable the safe operation of this temporary junction while it is in use.
Eltisley bridge compound	Satellite Compound L	Access would be via a temporary priority junction off the B1040 St Ives Road. TTM and temporary signing would be provided to enable the safe operation of this temporary junction while it is in use.

Restoration

2.6.285 Upon completion of the main construction works phase, areas of land identified for return to landowners would be restored to an appropriate condition, or to a condition agreed with landowners, prior to their handback.

2.6.286 Areas of land within the Order Limits that would be subject to restoration are:

a. The main construction compounds.

b. The satellite construction compounds.

c. The borrow pits.

d. Areas of land used temporarily during construction.

e. Temporary materials storage areas.

2.6.287 Within the main and satellite construction compounds, each compound would be demobilised with all plant, equipment, welfare facilities, accesses and other materials removed off-site. Temporary compound fencing would also be removed, and the land regraded through the spreading and grading of subsoil and topsoil stripped and stored during the initial establishment of the compounds.

2.6.288 Similar regrading operations would be undertaken on areas of land used temporarily during construction, and on areas of land used for temporary materials storage.

2.6.289 The proposals for restoration of the borrow pits would be completed at the detailed design phase; however, it is envisaged that progressive restoration of the borrow pits would be undertaken during the main construction works phase to enable parts of each site to be used for material extraction in parallel to other parts being restored. The deeper borrow pits would be restored through backfilling with material unsuitable for construction, and would likely involve the following activities:

a. Surplus material would be delivered back to the borrow pits by articulated dumper trucks.

b. A blade with towed roller would push out and progressively compact layers of material up to the base of the subsoil level.

c. Subsoil and top-soil would be replaced with the intention of returning the borrow pits to agricultural standards.

2.6.290 The shallower borrow pits would not be brought back to original ground levels; rather these would have their levels remodelled and subsoil and topsoil would be reinstated with the intention of returning the borrow pits to agricultural standards.

2.6.291 The final choice of the long-term use for the borrow pit sites post restoration would also be defined and specified at the detailed design phase.

2.6.292 The general commitments relating to the implementation of construction management and mitigation measures set out in the First Iteration EMP **[TR010044/APP/6.8]** would apply during site demobilisation and restoration activities.

Landscape aftercare

2.6.293 The Principal Contractor would be responsible for undertaking landscape management within the five-year contract period, after which the longer maintenance and management responsibilities would transfer to Highways England.

2.6.294 Maintenance of planting would be more intensive during the first three to five years after the Scheme is open for traffic; this would be necessary to ensure the successful establishment of the planting.

2.6.295 The Principal Contractor would also be responsible for the preparation of the Third Iteration EMP during the five-year contract period, the purpose of which would be to provide information relating to existing and future environmental commitments and monitoring that would need to be delivered by those responsible for the future operation and management of the Scheme.

2.6.296 The Third Iteration EMP would also include specific requirements concerning the long term maintenance and management of all landscaping incorporated into the Scheme.

Maintenance of the Scheme

2.6.297 The Scheme has been designed in a way that minimises the frequency of future interventions through the incorporation of low maintenance equipment and features that reduce the number of repairs required.

2.6.298 Examples include the use of cast-in road studs over other stick-on alternatives, and the co-location of equipment to facilitate access for routine inspections. Accordingly, no significant maintenance activities are likely to be required within the first five years of the Scheme being operational.

2.6.299 The maintenance responsibilities for the new carriageway and associated slip roads as shown in the Classification of Roads Plans **[TR010044/APP/2.9]** and Schedule 3 of the DCO **[TR010044/APP/3.1]** would rest with Highways England.

2.6.300 The maintenance responsibility for the new local road network and any other unclassified roads as shown in the Classification of Roads Plans **[TR010044/APP/2.9]** and Schedule 3 of the DCO **[TR010044/APP/3.1]** would rest with the applicable and relevant local highway authority.

2.6.301 Short term maintenance and repair activities are likely to comprise inspections on the new works and installed assets, and any unplanned, emergency repair works due to damage following events such as road traffic incidents.

2.6.302 The assets within the Scheme presented in **Table 2-10** would be subject to routine maintenance operations, similar to those being undertaken elsewhere on the existing strategic and local road networks. These maintenance activities would, wherever feasible, be programmed in a way that enables their combination with other planned operations to reduce disruption to road users associated with land closures and diversions.

2.6.303 TTM deployed during maintenance operations would comprise a combination of temporary speed restrictions, lane closures and reduced running lane widths to enable continued access for traffic.

Table 2-10: Routine asset maintenance operations

Asset	Operation type and frequency
Highway verge equipment	Assets that would be located within the highway verge comprise safety barriers, parapets, drainage infrastructure, structures, technology, lighting, and environmental barriers. Repair works to safety barriers and parapets would generally be undertaken following events such as road traffic accidents, and drainage infrastructure comprising features such as attenuation tanks, pumps, oil separators, gullies, filter drains and chambers would be subject to periodic inspection and cleaning to ensure their continued operation. Structures comprising overbridges, underbridges and accommodation bridges would be inspected during scheduled maintenance events. Gantries would require minor maintenance (painting) after 12 years and major maintenance after 20 years, with minor inspections undertaken when required. Periodic inspections of lighting, environmental barriers and signage would also be undertaken after the first five years of operation.
Central reserve	Equipment located within central reserves would be inspected and managed in a similar way to the equipment located within the highway verge.
Overhead mounted equipment	Equipment attached to overhead gantries such as signage, cabling and other ancillary apparatus would require maintenance and replacement should such equipment become faulty. The structural condition of much of the overhead equipment fitted to the gantries would be inspected every two years, with digital enforcement cameras maintained every three to six months.
Planting	Planting would be inspected and maintained in accordance with the measures set out in the Third Iteration EMP, which would provide a framework for the long term management of the soft estate. Management operations would typically be undertaken in a three to six month cycle after the five-year contract period.
Drainage features	The maintenance regime associated with the sustainable drainage features incorporated into the Scheme would typically comprise the following: a. Swales would be inspected bi-annually to check for erosion, build-up of silt deposits and waterlogging. Areas of poor vegetation growth and bare patches would be reseeded. Grassed swales would be mown regularly during the growing season. Compaction of the ground in the base of the swale would be avoided, in order to maintain infiltration. b. Attenuation basins would be inspected bi-annually and any eroded or damaged areas repaired. Inlet and outlet zones would be cleared of debris or built up material. Sediment build up would be removed when necessary typically every five to ten years. The maintenance requirements of landscaping, grassland and other ground cover would be dependent on the type of vegetation. c. Reed beds would be inspected on an annual basis. Inlet and outlet zones would be cleared of debris or built up material and checked for clogging roots. Reeds would be cut back annually after the second years growth to promote new growth.

Asset	Operation type and frequency
Carriageway maintenance	Maintenance and renewal of the road surfacing, markings, road studs and buried technology would be undertaken when they reach the end of their design life.

2.7 Decommissioning

2.7.1 It is highly unlikely that the Scheme would be demolished as the improvements would have become an integral part of the strategic and local road networks.

2.7.2 In the unlikely event of the Scheme needing to be demolished, this would conform to the statutory process in place at that time, including any requirements for EIA as appropriate.

2.7.3 Demolition of the Scheme has therefore not been considered further in this Environmental Statement; however, appropriate consideration has been given, where relevant, to future maintenance of the Scheme in relation to activities such as periodic inspections and the renewal of components once they reach the end of their design life, where significant effects are likely to occur.

2.8 References

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