A12 Chelmsford to A120 widening scheme TR010060

6.4 ENVIRONMENTAL STATEMENT NON-TECHNICAL SUMMARY

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A12 Chelmsford to A120 widening scheme

Development Consent Order 202[ ]

ENVIRONMENTAL STATEMENT
NON-TECHNICAL SUMMARY

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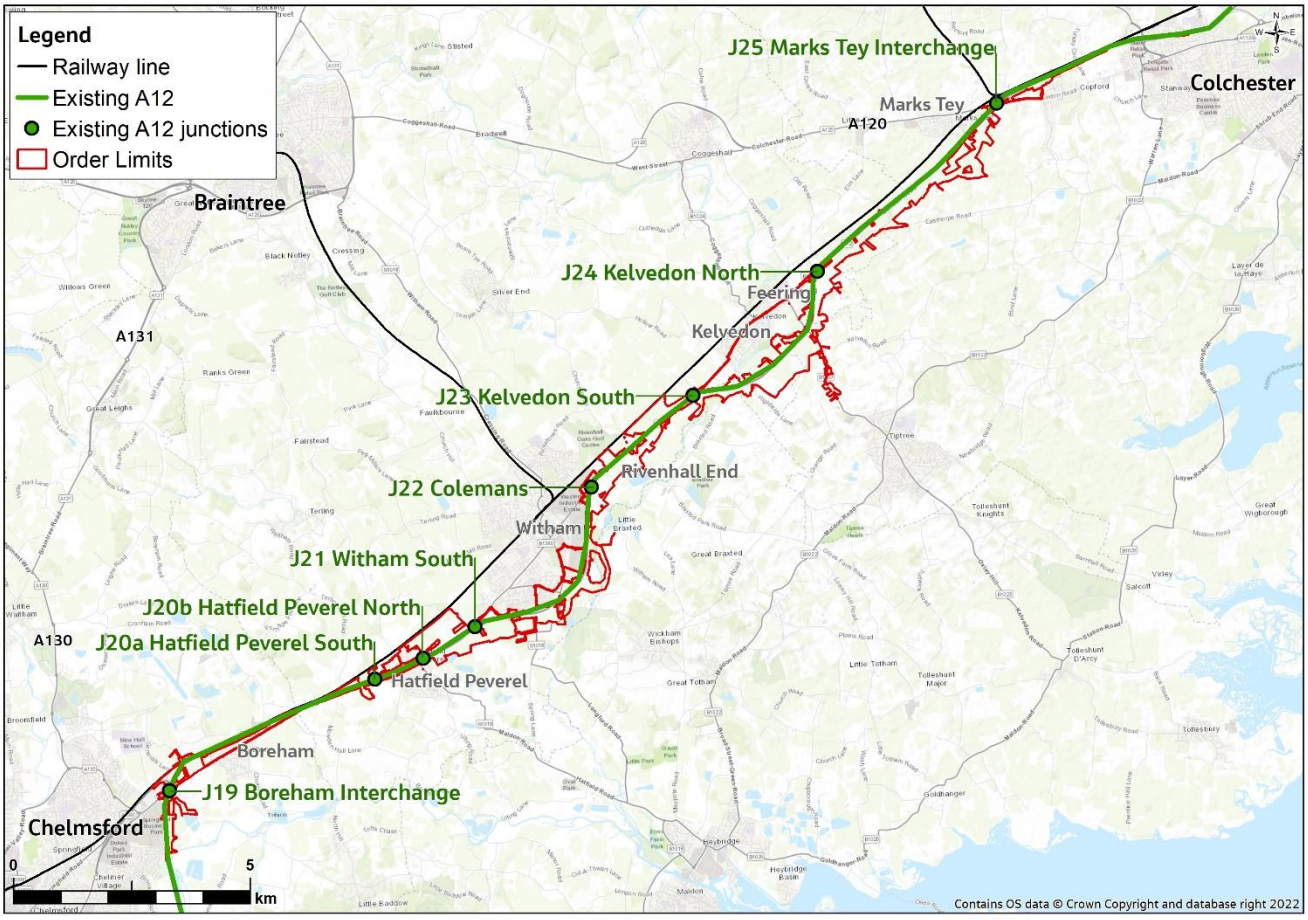
1 Introduction

1.1 Proposed scheme overview

1.1.1 This Non-Technical Summary has been prepared for the A12 Chelmsford to A120 widening scheme (the proposed scheme). The proposed scheme comprises improvements to the A12 between junction 19 (Boreham interchange) and junction 25 (Marks Tey interchange), a distance of approximately 24km, or 15 miles (see Plate 1.1 below).

1.1.2 The proposed scheme involves widening the A12 to three lanes throughout (where it is not already three lanes) with a bypass between junctions 22 and 23 and a second bypass between junctions 24 and 25. It also includes safety improvements, including closing off existing private and local direct accesses onto the main carriageway, and providing alternative provision for walkers, cyclists and horse riders to existing routes along the A12, which would be removed. The total area of land required to deliver these improvements is contained within the Order Limits (the spatial boundaries of the proposed scheme, as shown in red on the plan below).

Plate 1.1 Proposed scheme location plan



1.2 Development Consent Order

1.2.1 The proposed scheme is classed as a Nationally Significant Infrastructure Project under the Planning Act 2008, which is why we are applying for a Development Consent Order (DCO). The Planning Inspectorate, as the Examining Authority, will examine the DCO application and will make a recommendation to the Secretary of State for Transport on whether development consent for the proposed scheme should be granted or refused.

1.2.2 The Environmental Statement is part of a series of documents that makes up the DCO application. The Environmental Statement is taken into consideration by the Planning Inspectorate during the examination of the DCO application.

1.3 Environmental Impact Assessment

1.3.1 As the proposed scheme is a project for which the Environmental Impact Assessment (EIA) process is required, an Environmental Statement has been prepared by competent experts to provide information so that the Examining Authority, the Secretary of State and all stakeholders can understand the likely significant environmental effects of the proposed scheme.

1.3.2 The Environmental Statement is a detailed, technical document that presents a description of the proposed scheme, the methods used for the environmental assessment, details of where the design has been changed or modified as part of the design development, and the likely significant effects of the proposed scheme on the environment, communities and people that could be affected. It also includes measures that would be put in place to reduce or remove those effects, known as mitigation. Where possible, any opportunities for additional improvements, known as enhancement, are identified but not included in the Environmental Statement assessment, so that the likely significant effects of the proposed scheme are identified.

1.3.3 This Non-Technical Summary provides a summary of the Environmental Statement using non-technical language.

2 The proposed scheme

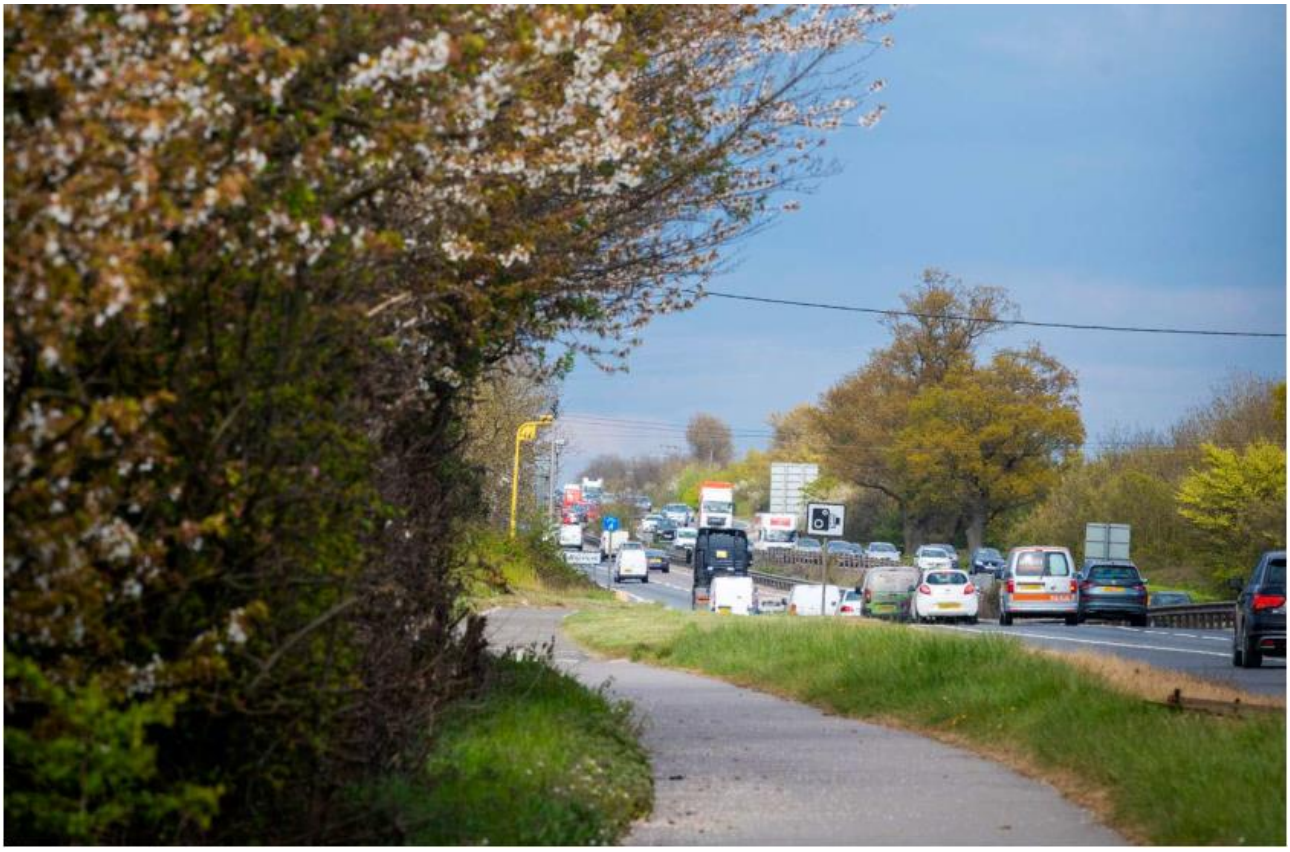
2.1 Need for the proposed scheme

2.1.1 The A12 is an important economic link in Essex and across the east of England. It provides the main south-west/north-east route through Essex and Suffolk, connecting Ipswich to London and to the M25. The section between Chelmsford and Colchester carries high volumes of traffic, with up to 90,000 vehicles every day. Many heavy goods vehicles travel on this section due to its important freight connection, especially to Felixstowe and Harwich ports. This section of the A12 is also an important commuter route between Chelmsford and Colchester, and acts as a link, via the A120, to London Stansted Airport.

2.1.2 This section of the A12 currently experiences congestion, which causes delays. This means that, during the morning commute, a driver's average speed can be particularly slow for an A-road, in either direction. There is substantial housing and employment growth planned in this area over the coming decades. As

such, an increase in overall traffic volume during peak periods is expected on the A12.

Plate 2.1 Traffic on the A12



2.1.3 Our proposed changes to this stretch of the A12 road would achieve the following:

- Improve safety for road users, especially at the junctions and slip roads through better design, as well as by removing the current direct private accesses onto the A12
- Reduce traffic congestion by increasing the capacity of the road, making journey times more reliable
- Take long-distance traffic off the local roads and put it back onto the A12 where it belongs, so that local roads are not used as ‘rat runs’
- Ensure that the road can cope with the predicted increase in traffic from more jobs and homes in the area
- Make improvements for walkers, cyclists and horse riders, and public transport users, to give them better connections and safer, more enjoyable journeys

2.2 Environmental input to the design process

2.2.1 The proposed scheme includes a range of measures that have been developed to avoid, prevent, reduce or offset likely significant adverse environmental effects. This includes measures such as changing the road's height and layout, reducing the temporary and permanent areas of the proposed scheme, and altering construction methods.

2.2.2 Environmental considerations have been a key factor in developing the proposed scheme, and we have developed environmental design principles which include, but are not limited to, the following:

- Limit the amount of land needed for the proposed scheme, including minimising land required within the floodplain.
- Retain as much existing vegetation as feasible. Where vegetation has to be removed, replace and extend areas of proposed planting into the landscape to provide visual screening where feasible.
- Maximise the biodiversity value of habitat and improve wildlife connections by including hedgerows and lines of trees that link to retained woodland and hedgerows where feasible.
- Plant native tree, shrub and hedge species typically found within the surrounding local landscape.
- Provide interesting views for local residents, and users of the public rights of way and public open spaces, including planting trees and vegetation to improve views out from the road for drivers using the A12.
- Careful design of the proposed scheme, including major junctions, structures and earthworks, to filter, screen and contain views and integrate them into the surrounding landscape with native planting.
- Improve the quality and capacity of existing walking, cycling and horse riding routes, and seek opportunities to create new routes.

2.2.3 Further control measures are contained within the first iteration Environmental Management Plan, which is part of the DCO application. The Environmental Management Plan details all the mitigation measures for the proposed scheme which will be implemented by National Highways and the Principal Contractor before, during and after construction.

2.3 Proposed scheme development and alternatives

2.3.1 There have been many different options identified and assessed during a number of stages of the proposed scheme. This started with a long list of 23 options that could meet the overall objective of improving the A12, and ended with a short-list of four options that we took forward to the public consultation in 2017. These options were as follows:

- Option 1 – widening the existing A12 throughout and provision of a local access road to provide alternative access to existing single tier junctions

- Option 2 – widening the existing A12 with two new sections of three-lane dual carriageway between junctions 22 and 23 and between junctions 24 and 25
- Option 3 – widening the existing A12 with a new section of three-lane dual carriageway between junctions 22 and 23
- Option 4 – widening the existing A12 with a new section of three-lane dual carriageway between junctions 24 and 25

2.3.2 The preferred route for the proposed scheme was selected based on several factors, including environmental impacts, journey times, complexity of build, affordability, feedback from the public and advice given by the Planning Inspectorate on the joint Local Plan for the area. The most popular option with the public was Option 2. Following feedback from the consultation and further technical, economic and environmental assessments, our preferred route option has been based on Option 2. For more information on the consultation results and the Preferred Route Announcement, please visit our webpage at https://nationalhighways.co.uk/our-work/east/a12-chelmsford-to-a120-widening-scheme/.

2.3.3 The iterative process of identifying and assessing likely significant effects has influenced the route options selection and design development. Examples of where we have altered the proposed scheme design to avoid or reduce environmental effects include, but are not limited to, the following:

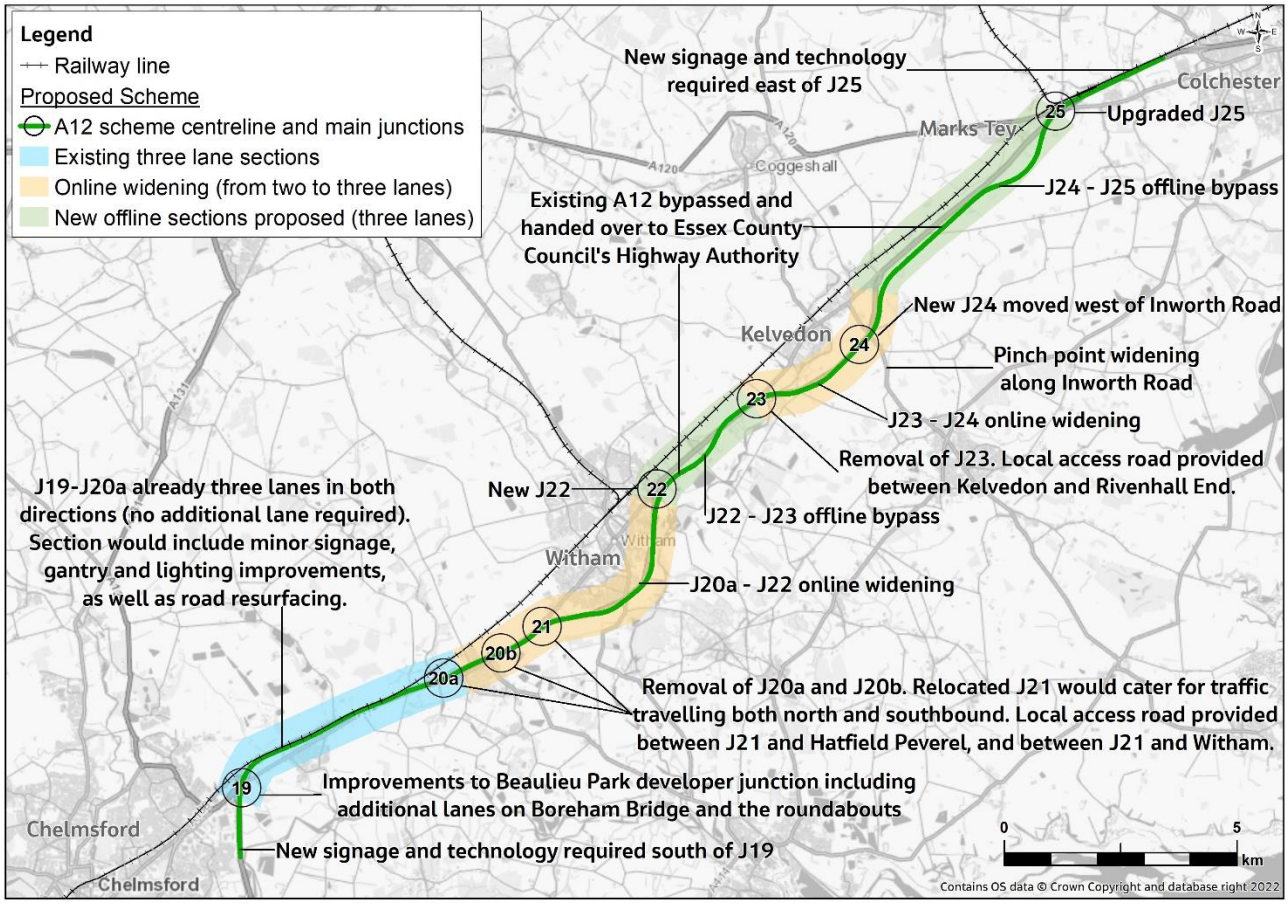
- Using Wellington Bridge to connect Hatfield Peverel to the new junction 21 (Witham South interchange), instead of a new link road south of the A12, to avoid noise increases along the B1137/The Street
- Shortening the length of the new section of three-lane dual carriageway between junctions 22 (Colemans interchange) and 23 (Kelvedon South interchange) to avoid impacting a scheduled monument and to reduce the size of the proposed scheme in the River Blackwater floodplain
- Working with the owner of Colemans Farm Quarry to design the proposed junction 22 to reduce impacts on the operational quarry and to prevent unnecessary sterilisation of mineral resources
- Revising the position of the new junction 24 to reduce impacts on the grade II listed Prested Hall
- Closing Easthorpe Road to general traffic travelling to and from the A12, benefiting the community of Easthorpe
- Changing the layout of the new section of three-lane dual carriageway between junctions 24 (Kelvedon North interchange) and 25 (Marks Tey interchange) to avoid having to cut down a veteran tree located near Easthorpe Road
- Discounting proposed borrow pit and construction compound locations due to likely disruption to local communities

- Use of road surfacing with better noise reducing properties than conventional low noise road surfacing in some areas to reduce noise levels

2.4 Key features of the proposed scheme

2.4.1 An overview of the proposed scheme is provided in Plate 2.2. Further detail is shown on the General Arrangement Plans submitted with the DCO application. A simplified visualisation of the General Arrangement Plans is included at the end of this Non-Technical Summary.

Plate 2.2 Proposed scheme design overview



2.4.2 At the southern end of the proposed scheme, at junction 19 (Boreham interchange) we would improve the junction by introducing additional lanes on Boreham Bridge as well as additional lanes to various roundabouts (including their approaches and exit roads). We will also add a new signal-controlled crossing and construct a new bridge to allow walkers, cyclists and horse riders to cross safely. This will add to proposed improvements already planned by the developers of the adjacent Beaulieu Park. As we move north towards Hatfield Peverel, the existing A12 already widens to three lanes in each direction, so our changes would be focused on improving signs, overhead gantries and the road surface of the southbound carriageway.

2.4.3 We would widen the road to three lanes in each direction at Hatfield Peverel. The current junctions 20a and 20b would be closed and replaced by a new

junction 21 (Witham South interchange). The new junction 21 would provide access to the A12 both northbound and southbound and would take traffic from all directions between Hatfield Peverel and Witham.

2.4.4 We would build a new junction 22 (Colemans interchange) just to the east of its current location. It would provide access to the A12 both northbound and southbound, taking traffic from Rivenhall End, Kelvedon, Witham and Little Braxted onto the A12. North of the new junction 22, we would build a new section of dual carriageway around Rivenhall End with three lanes in each direction. The new section of carriageway would re-join the existing A12 just to the west of Cranes Bridge, to the west of Kelvedon.

2.4.5 The current junction 23 (Kelvedon South interchange) would be removed, although parts would be retained to provide local access, including Cranes Bridge.

2.4.6 Between the current junction 23 and the proposed junction 24, we would widen the A12 to three lanes in both directions. The new junction 24 would provide access to the A12 both northbound and southbound. It would take traffic from Kelvedon, Inworth and Tiptree onto the A12.

2.4.7 North of the new junction 24, a new three-lane section of road would take traffic to and from Marks Tey. It would connect into the upgraded junction 25 (Marks Tey interchange). It would take traffic from Marks Tey, Copford and the A120, and provide a connection to the existing A12 which would be kept for use by local traffic.

2.4.8 The proposed scheme would include side road upgrades to connect to the A12; a number of new or replacement bridges and structures; provision for walkers, cyclists and horse riders; new or improved drainage; new signs and technology; and resurfacing the A12 carriageway in some areas.

2.4.9 Our proposals have been developed in discussion with walking, cycling and horse riding stakeholders, and aim to better link to other paths or communities. There would be six new bridges for walkers, cyclists and horse riders and approximately 9 miles (15km) of new or improved walking and cycling paths across the proposed scheme. Highlights of the facilities proposed are as follows:

- New controlled crossings at junction 19 which would allow both walkers and cyclists to cross safely.
- A new bridge link on the north side of junction 19 (new Paynes Lane Bridge) for use by walkers, cyclists and horse riders.
- Shared use cycle tracks provided across the north and south sides of the new junction 21, connecting Hatfield Peverel to Witham.
- A new bridge (Gershwin Boulevard Bridge) would be provided for walkers across the proposed scheme south of Witham.
- A new bridge (Little Braxted Bridge) would be provided for walkers and cyclists across the proposed scheme south of junction 22, and would provide a connection to National Cycle Network Route 16.

- A new bridge for walkers and cyclists (Sniveller's Lane Bridge) would be provided between Rivenhall End and junction 23.
- Bus stops on a new road linking Rivenhall End to Kelvedon, connecting the Essex County Fire and Rescue Service Headquarters to public transport links via the new Sniveller's Lane Bridge.
- Potts Green Bridge (south of Doggetts Lane) would be a new bridge for walkers. This would connect to a new shared use cycle track south of the new A12, providing connections with the new junction 25 roundabout at Hall Chase, and the public right of way network north of Easthorpe.
- The existing Marks Tey footbridge would be demolished and rebuilt as a bridge for walkers and cyclists across the proposed scheme through junction 25.

2.4.10 An existing high pressure gas main would need to be diverted as part of the proposed scheme. The diversion would run from the west of Maldon Road. It would cross the River Blackwater to avoid Whetmead Local Nature Reserve and an area of potentially contaminated land to re-join the existing gas main south-west of Little Braxted. Other utilities such as water mains, sewers, gas, electricity and telecoms would also need to be diverted.

2.5 Construction

Construction programme

2.5.1 We expect construction to start in 2024 and take approximately four years, and for the proposed scheme to open for traffic towards the end of 2027. Some works may take place before the main construction works, subject to permission from the local authorities and landowners. These are called advanced works and would mainly be archaeological work, moving utility pipes and cables, environmental protection work, and some site preparation. The majority of site preparation works, such as initial site clearance, fencing and footpath diversions, would start in 2024 ahead of the main works but after the proposed scheme has been given development consent.

Environmental management

2.5.2 All construction work would be done with appropriate environmental controls in place, in line with an Environmental Management Plan. This would include specific controls for the construction phase such as the following:

- Control of noise, dust and other emissions
- Temporary drainage and treatment facilities to protect watercourses from potential pollution
- Restricting construction work to standard daytime hours, avoiding night-time working unless required for certain construction works to avoid major disruption on the A12 during the daytime
- Controlling lights used in construction compounds and working areas

- Managing borrow pits and construction site compounds to minimise impacts on sensitive environmental features and residential areas
- Establishing buffers and work-free zones to protect environmental features

Site compounds

2.5.3 There would be two main construction site compounds – one at junction 20b and one at junction 22. We have selected these locations to be close to the current A12 to limit the need for construction traffic to use local roads, and to be as far away from residential properties as feasible.

2.5.4 In addition to the proposed main site compounds, there would be three satellite compounds. These would be located at junction 19, Easthorpe Road and junction 25 and would reduce the need for large numbers of vehicles and plant to access construction areas on a daily basis.

2.5.5 Temporary laydown areas would be needed throughout the length of the proposed scheme to allow for parking, staff welfare, materials storage and some pre-construction activities.

2.5.6 Soil removed to construct the proposed scheme would be stored locally along the route.

Construction noise and working hours

2.5.7 During major construction work, there are many sources of noise. These can include the movement and operation of construction vehicles, and the operation of heavy machinery.

2.5.8 To reduce the impact on residents, most construction work would be during normal daytime working hours. These hours would be between 07:30 and 19:00 Monday to Friday, and between 07:30 and 18:00 on Saturday. During the summer months, the working hours would extend to 07:00 to 21:00 to make use of the longer daylight hours. In addition, there would be an hour before and after these times for site set up and close down.

2.5.9 There would be certain instances where night-time or weekend working would be required, such as for safety reasons when we are constructing or demolishing bridges. This work may also require overnight and weekend closures of the A12. In these instances, a diversion route would be set up. We will notify local communities of night-time working and road closures before works start.

Reducing construction traffic on local roads and traffic management

2.5.10 To reduce the amount of construction traffic on the existing roads, construction traffic would use temporary roads where possible (known as haul roads). Where feasible, these would be run alongside the existing A12.

2.5.11 By locating our site compounds near the existing A12 and using temporary roads, we will aim to limit the number of site vehicles using local roads. We intend for the construction team to travel by minibuses and car sharing from main compound areas to work fronts and local compounds to reduce the volume of construction traffic.

2.5.12 Where local roads and footpaths would be subject to construction plant crossings, traffic lights would be set up during work hours and measures would be implemented to control potential mud on the road surface.

2.5.13 Where the existing A12 is to be widened, we would keep the road open but have roadworks that make the existing lanes on the A12 narrower and implement lower speed limits.

2.5.14 Where construction activities, such as bridge demolition, prohibit safe road operation, road closures would be required at nights and weekends to minimise disruption to road users. Overnight and weekend closures may also be required from time to time to allow access to verge work areas or to complete works such as surfacing. Advance notice regarding any road closures would be given to local communities and a suitable diversion would be put in place.

Borrow pits

2.5.15 To construct the proposed scheme, we would use borrow pits. Borrow pits are areas where soil, gravel or sand would be dug out for use in construction at another location, to build banks or for landscaping. We have selected borrow pit locations based on their closeness to our site compounds and main construction work and the suitability of the fill materials they contain.

2.5.16 Environmental constraints have been considered when siting and designing the proposed borrow pits. This includes siting the borrow pits to avoid densely populated areas and specifying exclusion zones around sensitive environmental features such as hedgerows and trees.

2.5.17 Borrow pits are proposed at the following locations:

- Between the existing junction 20b and junction 21 between the A12 and the railway
- To the east of junction 21 on the south side of the A12, south of Witham
- To the east of Rivenhall End and west of junction 23, between the A12 and the railway
- On the southbound side of the A12, with Inworth Road to the east and Highfields Lane to the west

2.5.18 Once suitable materials have been extracted from the borrow pits, they would be restored. Restoration cannot be finalised at this stage as this would be subject to detailed design and site conditions. However, restoration principles include landscaping the restored borrow pits and planting trees, woodland and hedgerows, to integrate them into the surrounding landscape.

3 Environmental Impact Assessment

Environmental scoping

3.1.1 We submitted an Environmental Scoping Report to the Planning Inspectorate on 28 October 2020, which can be viewed by following the link:

https://infrastructure.planninginspectorate.gov.uk/A12/ScopingReport

3.1.2 The Environmental Scoping Report was produced to document the proposed scope of the Environmental Statement.

3.1.3 The Planning Inspectorate reviewed and consulted on the Environmental Scoping Report and published a Scoping Opinion on 7 December 2020. It was republished with a list of corrected errors on 15 March 2021, which can be viewed by following the link:

https://infrastructure.planninginspectorate.gov.uk/A12/ScopingOpinion

Statutory consultation

3.1.4 We held a statutory consultation which ran for eight weeks from 22 June to 16 August 2021. This was open to statutory consultees such as Natural England, the Environment Agency, Historic England and relevant planning authorities as well as local communities and the wider public.

3.1.5 We wrote a Preliminary Environmental Information Report (PEIR) to support the statutory consultation. Its purpose was to help members of the public, consultees and other stakeholders to develop an informed view of the proposed scheme. The PEIR represented a ‘snapshot in time’ of the ongoing environmental assessment process.

3.1.6 Details of the public consultation, including the PEIR, can be viewed by following the link:

https://highwaysengland.citizenspace.com/he/a12chelmsford-to-a120-widening-consultation-june21/

3.1.7 As a result of feedback from the public consultation and further design work, we held a further supplementary consultation between 9 November and 19 December 2021. This was to provide further information on design modifications, construction logistics and the need to divert the gas main.

3.1.8 A Consultation Report has been produced and submitted as part of the DCO application.

Environmental Statement

3.1.9 The Environmental Statement has been carried out according to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and the National Networks National Policy Statement. The purpose of the Environmental Statement is to provide information on the likely significant environmental effects of the proposed scheme, to inform the Secretary of State in their decision as to whether the proposed scheme should go ahead.

3.1.10 The assessment presented within the Environmental Statement has used the methodology presented within the Design Manual for Roads and Bridges and, where relevant, more topic-specific guidance.

3.1.11 To inform the Environmental Statement, we needed to establish the current situation or 'baseline' for the area. We completed this by doing a desk-based study of existing environmental documents, maps, records and data. We also undertook site visits and surveys to find out more detail. This included the following:

- Ecology surveys, including for habitats, otters, water vole, badgers, dormice, bats, birds including barn owls, reptiles, amphibians such as great crested newts, and aquatic species such as freshwater crayfish.
- Landscape winter and summer walkovers. A 'walkover' is an inspection of the site and its surrounding area.
- Arboriculture (tree) surveys (see photo from tree survey in Plate 3.1).
- Air quality and noise monitoring.
- Ground investigations, including groundwater monitoring and testing for contaminated soils.
- Geophysical surveys and trial trenching surveys for below-ground archaeology.
- Agricultural Land Classification soil surveys.

3.1.12 In addition to surveys, other techniques have been used, such as air quality, noise and flood risk modelling (that is, computer generated simulations).

Plate 3.1 Surveying trees in the willow plantation west of Little Braxted

Environmental aspects

3.1.13 The Environmental Statement covers the following environmental aspects (topics): air quality, cultural heritage (including archaeology and built heritage), landscape and visual, biodiversity, geology and soils, material assets and waste, noise and vibration, population and human health, road drainage and the water environment, climate, and cumulative effects.

3.1.14 Each of these aspects makes a prediction or assessment as to whether 'significant effects' would be likely. In the Environmental Statement assessment, effects are assessed in terms of their significance to give decision makers a measure of the importance, or gravity, of the environmental effect. Significant effects can be either adverse or beneficial and assume that any proposed mitigation would be in place. The conclusions from the assessment of these aspects are summarised in the following sections of this Non-Technical Summary.

3.1.15 In line with regulatory requirements, the Environmental Statement also considered heat and radiation and transboundary effects (effects which could potentially affect another European Economic Area state). The assessments of these aspects have identified that the proposed scheme is unlikely to result in any significant environmental effects, so they were not assessed further.

3.1.16 There is also a requirement to consider the risks due to major accidents and disasters. We undertook a risk assessment which concluded that the only likely risk is due to inland flooding. This risk is mainly covered within the road drainage and the water environment aspect and partly within the climate aspect.

4 Air quality

4.1 Baseline

4.1.1 We have carried out an air quality assessment to assess likely increases in air quality pollutants, including dust, as a result of the proposed scheme. In line with recognised guidance, the assessment has focused on the air quality limits for nitrogen dioxide and particulates. Nitrogen dioxide is a pollutant from vehicle exhausts which is harmful to human health and the environment.

4.1.2 Traffic modelling has calculated an 'affected road network'. Sensitive features, such as residential properties, within 200m of the affected road network have then been assessed for potential air quality impacts and the risk of exceeding nitrogen dioxide limits.

4.1.3 Baseline information, including local air quality monitoring data, was obtained from four key local authorities. We also undertook supplementary monitoring between 2017 and 2018 close to the A12.

4.1.4 The following features that are sensitive to changes in air quality near the affected road network have been considered in the air quality assessment:

- Air quality management areas. These are sensitive locations identified by local authorities. There is one air quality management area, Lucy Lane North, within 200m of the affected road network.

- Residential properties, and buildings used by the vulnerable such as schools and hospitals.
- Designated ecological sites that could be affected by air pollution.

4.2 Construction

4.2.1 We would use well established mitigation measures to control dust emissions during construction, such as dampening down of surfaces, careful siting of dusty activities as far from human and ecological features as possible, and erecting screens or barriers around the dust-causing activities. With these measures in place, it is unlikely there would be significant effects resulting from dust.

4.2.2 Air quality modelling showed that two residential properties (one within the Lucy Lane North air quality management area and one located off Halstead Road close to the A12) are predicted to exceed the nitrogen dioxide air quality limit due to an increase in construction traffic flows. In both locations, the change would be imperceptible. Particulate levels were also modelled but were found to be below the air quality limit for these pollutants.

4.2.3 Overall, the assessment has concluded that air quality effects at residential properties and other sensitive buildings during construction are **not likely to be significant**.

4.2.4 Calculations for ecological sites found that six veteran trees would have nitrogen levels that could affect them. The biodiversity assessment has looked at this impact and found the resulting effect on the veteran trees to be **not significant**.

4.3 Operation

4.3.1 During operation, there could be impacts on air quality as a result of changes in vehicle flows along the alignment of the proposed scheme and wider road network. Air quality impacts have been assessed at identified properties and other sensitive buildings near the proposed scheme.

4.3.2 The air quality assessment shows that nitrogen dioxide air quality limits are likely to be exceeded at three residential properties as a result of the proposed scheme. Of these, only at one house would the levels increase by a ‘medium’ amount; at the others the increase would be only by a ‘small’ amount. These values are below the number of properties considered to be a likely significant effect. Therefore, air quality effects at properties are **not likely to be significant**.

4.3.3 The modelling predicts that the air quality limit for particulates would not be exceeded.

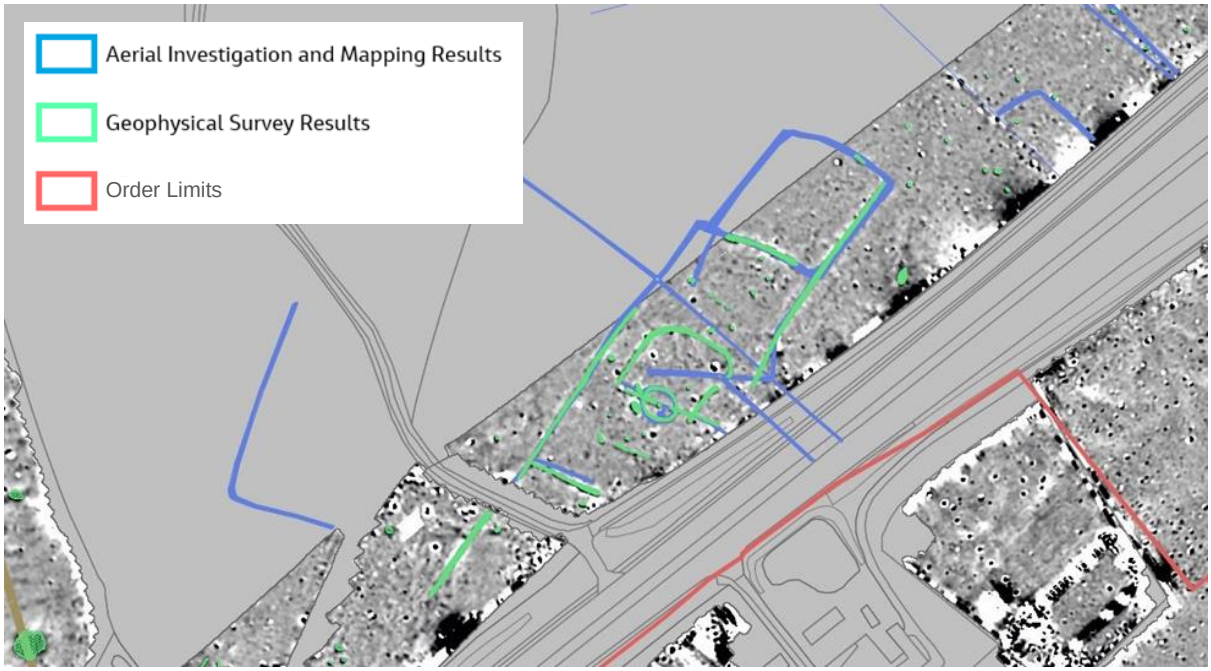
4.3.4 Calculations for ecological locations showed that there could be significant effects at eight ecological sites and 23 veteran trees. The biodiversity assessment has looked at these impacts and found the resulting effect on one site (Perry’s Wood Local Wildlife Site (LWS) and ancient woodland) to be a **likely significant adverse effect**.

5 Cultural heritage

5.1 Baseline

5.1.1 Cultural heritage includes archaeological remains, historic buildings and structures, and the historic landscape including parks and gardens. We have carried out an extensive desk-based study combined with geophysical survey and aerial investigation and mapping (see example in Plate 5.1). We have also completed a comprehensive programme of archaeological trial trenching. A total of 2,117 archaeological evaluation trenches have been excavated across the proposed scheme to inform the assessment and the archaeological mitigation. A schedule of hedgerows important for archaeology and history has also been compiled.

Plate 5.1 Results from a geophysical survey north of the A12, east of Sniveller's Lane near Hole Farm (Rivenhall), indicating a ring ditch and internal features interpreted as a possible Bronze Age burial mound



5.1.2 There are eight scheduled monuments and 465 historic buildings, including 10 grade I, 40 grade II* and 375 grade II listed buildings, within 1km of the proposed scheme. There is also one grade II* and three grade II registered parks and gardens.

5.1.3 Many of the listed buildings are located within Boreham, Witham, Kelvedon and Feering, which have designated conservation areas (these are areas of special architectural or historic interest), or within Braxted Park grade II* registered park and garden.

5.1.4 In addition, there are 462 known archaeological remains within 300m of the proposed scheme.

5.2 Construction

5.2.1 There would be changes to the settings of historic buildings or structures during construction. These temporary impacts could affect views to or from the building or remove part of a related piece of their setting which could harm its overall value. There could also be effects from increased noise, vibration, dust or visual intrusion.

5.2.2 The assessment has identified that construction would result in **likely significant adverse effects** on 13 historic buildings or structures**.** These consist of the grade I listed Boreham House and grade I listed Parish Church of All Saints, two grade II* and nine grade II listed buildings. There would be a **likely significant adverse effect** on a historic landscape at Boreham House.

5.2.3 There would be partial or total removal of archaeological remains during construction. There could also be impacts due to compression from machinery or stockpiles, removal of features during construction and changes to groundwater levels affecting the preservation of buried archaeological remains.

5.2.4 This would lead to **likely significant adverse effects** on 31 archaeological remains.

5.2.5 As significant adverse archaeological effects remain during the construction phase, a comprehensive archaeological mitigation strategy would be implemented by the Principal Contractor to mitigate the effects prior to construction of the proposed scheme.

5.3 Operation

5.3.1 During operation, cultural heritage impacts would be restricted to those associated with the setting of heritage assets. Impacts would mainly be from new permanent infrastructure, changes in lighting and signage, and traffic noise levels from vehicles using the road. Mitigation would include tree planting to screen views, and use of low noise road surfacing and acoustic barriers to reduce noise levels.

5.3.2 There are **likely significant adverse effects** on the settings of six historic buildings. These include one grade II* and five grade II listed buildings. There would be no significant adverse effects on archaeological remains or the historic landscape.

6 Landscape and visual

6.1 Baseline

6.1.1 To inform the baseline we have carried out visual surveys, taking photos along the route of the proposed scheme to capture both winter and summer views. We then created photomontages to show how the proposed scheme would fit into the landscape. We have also carried out surveys of the trees, including those that may be ancient, veteran or notable. A desk-based study was carried out to establish the landscape character.

6.1.2 The landscape surrounding the proposed scheme is largely arable farmland but also includes the existing A12 and urban areas, including Chelmsford, Witham and Marks Tey. There are trees and shrubs along the A12. Small woodland blocks and copses are scattered throughout the wider surrounding landscape, along hedgerow field boundaries and along watercourses. The network of ditches, streams and rivers (including the River Blackwater, River Ter and Domsey Brook) are key distinctive features within a generally flat and low-lying landscape. Sixteen local landscape character areas have been identified along the proposed scheme.

6.1.3 The key baseline features relevant to landscape include:

- The Green Wedge local 'distinctive' landscape designation to the east of Chelmsford and west of the A12
- Open greenspace such as parks, allotments, churchyards, golf courses and other areas open to the public
- Ancient woodland (none within the proposed scheme footprint), trees protected by tree preservation orders and a small number of veteran, ancient and notable trees (see photo of a potential veteran tree in Plate 6.1)
- Blackwater Rail Trail, which is a Country Park (see photo in Plate 6.2) that runs south from Witham, passing beneath the A12
- A network of public rights of way which run close to and cross the A12
- Cultural heritage features

Plate 6.1 Potential veteran oak tree noted in the tree surveys

6.1.4 Potential visual receptors include residents of houses on the edges of settlements close to the A12 and scattered throughout the rural landscape, users of public rights of way, cycle paths and open space, people at places of work, and users of the road network. We have selected 41 viewpoints across the proposed scheme which are representative of views in the area (including five longer distance views), and which have been used as the basis of our visual assessment.

Plate 6.2 View of the Blackwater Rail Trail

6.2 Construction

6.2.1 The proposed scheme has been designed to reduce the impacts on the landscape by careful positioning of junctions, borrow pits, water and flood infrastructure, and construction compounds. In addition, temporary soil stockpiles and fencing would be located to restrict views of construction compounds and materials where feasible. Temporary lighting would be kept to a minimum and would have controllable operation to reduce the amount of light emitted. The proposed construction methods and scheme design have also been altered throughout where practicable, to reduce the impacts on protected trees, landscape character and views.

6.2.2 However, construction activities and use of construction compounds and haul roads, construction lighting, removal of vegetation, excavation and earthworks, diversion of utilities, construction of stockpiles, attenuation ponds, flood compensation areas and borrow pits would impact the local area.

6.2.3 No ancient woodland or ancient trees would be affected by the proposed scheme during construction. However, five potential veteran trees identified during our survey would need to be removed. In addition, part of a group of trees protected by a tree preservation order (TPO) and one additional TPO tree would be removed. Trees would also be at risk of removal within the Chelmer and Blackwater Navigation Conservation Area, although detailed design may reduce the number lost here.

6.2.4 There would be significant adverse effects for visual receptors at 29 of the viewpoints assessed. Eight local landscape character areas would also be significantly affected. There would therefore be **likely significant adverse landscape and visual effects** throughout the construction period.

6.3 Operation

6.3.1 During operation, adverse landscape and visual effects would be caused by the presence of the proposed scheme. This would include new bridges, newly lit junctions, borrow pits and in particular the new sections of three-lane dual carriageway between junctions 22 and 23, and junctions 24 and 25. The proposed scheme would be viewed within the context of the existing A12, but vegetation loss would open up views of the new and existing highway infrastructure. There would be day and night-time landscape and visual effects from lighting and vehicle headlights, signage and traffic flows. Restored borrow pit sites, drainage ponds and access tracks, would also affect the landscape and views.

6.3.2 The proposed scheme includes mitigation planting, including native hedgerows, shrubs and trees to integrate the proposed scheme into the landscape and screen views. This would grow over time to reduce the effects seen at the opening of the proposed scheme.

6.3.3 The standard timescale used for long-term landscape and visual impact assessment following completion of construction is 15 years to allow for landscape planting to mature. Even after this period, the presence of the new highway infrastructure would intrude on the surrounding landscape. There would be **likely significant adverse effects** within seven local landscape character areas that would be directly affected by new junctions and the new sections of three-lane dual carriageway. There would also be **likely significant adverse effects** on 11 of the viewpoints assessed. These are generally very close to the proposed scheme, and where the presence of new bridges or borrow pits would remain a prominent feature of the view, or significantly change the character of the view, despite established mitigation planting.

7 Biodiversity

7.1 Baseline

7.1.1 Biodiversity is the study of living organisms and their relationship with each other and their environment. There are three main areas of study: designated (protected) sites; priority (important) habitats; and protected and notable species of plants and animals. We have carried out extensive surveys and desk studies to inform the baseline.

7.1.2 There are five European designated sites that have a water connection to the proposed scheme and 15 that have important bird species that may fly to or over the proposed scheme. There are two sites of special scientific interest that either have a water connection to the proposed site or are within 200m of roads potentially affected by the proposed scheme.

7.1.3 Whetmead Local Nature Reserve (LNR) and Brockwell Meadows LNR are located partially within and next to the Order Limits respectively. A further three LNRs are within 200m of roads potentially affected by the proposed scheme. There are 37 LWSs within 1km of the proposed scheme. The closest of these are Riverview Meadows LWS, Perry's Wood LWS, Whetmead LWS and River Chelmer LWS which are all partially within or next to the Order Limits. There are also ancient woodlands, veteran trees and hedgerows close to or within the Order Limits, and ponds and watercourses within the study area.

7.1.4 We found signs of bats, badgers (see photo in Plate 7.1), otters, brown hare, hedgehogs, barn owls, breeding and wintering birds, common reptiles, great crested newts, fish and other water-living animals and plants during the multiple specialist field surveys that we undertook. We found habitat suitable for dormice in the area of the gas main diversion, east of the River Blackwater. We also observed some notable plants, such as the nationally scarce lesser calamint (see photo in Plate 7.2).

Plate 7.1 Badger hole identified within the Order Limits

Plate 7.2 Lesser calamint, a nationally scarce plant, noted in a roadside verge

7.2 Construction

7.2.1 Construction can impact biodiversity by direct removal of vegetation, disturbance of species – for example, from noise – and by changes in air quality and dust deposition.

7.2.2 There would be **no likely significant adverse effects** on designated sites or priority habitats from the proposed scheme during construction. Although there would be a loss of habitats in general across the proposed scheme, we would replace habitats as shown in our Environmental Masterplan. This would include, for example, the creation of 57 new wildlife ponds, approximately 42km of replacement hedgerows and approximately 104ha of woodland.

7.2.3 There would be no significant effects on ancient woodland either directly or from changes in air quality or dust deposition. However, five potential veteran trees would be felled. This is not considered to be significant in the wider context, although it is recognised that this is a permanent impact on an irreplaceable feature. There would also be temporary effects on one veteran, four potential veteran and one potentially ancient tree due to air pollution. This is **not likely to be significant** as the temporary effect would not adversely impact the integrity or key characteristics of the individual trees (see the discussion of air quality in Section 4 of this Non-Technical Summary).

7.2.4 Protected species across the site would be affected by the temporary loss of habitat and disturbance during construction. However, due to measures to reduce these impacts, there would be no likely significant adverse effects for protected species. In fact, there are **likely significant beneficial effects** for water voles due to the creation of more suitable habitat south of junction 19 and south of the River Brain.

7.3 Operation

7.3.1 Operation of the proposed scheme would lead to **likely significant adverse effects** from changes to air quality due to nitrogen deposition. The location affected would be the ancient woodland at Perry's Wood LWS. An area of woodland habitat would be created to offset the significant effect on Perry's Wood.

7.3.2 There would be **no likely significant adverse effects** on protected species from the operation of the proposed scheme due to mitigation proposed within our Environmental Masterplan. However, wildlife could be hit by moving vehicles when attempting to cross the A12. We would limit this risk by providing features such as mammal ledges within culverts underneath the A12, badger and otter proof fencing, and other potential crossing options which are currently being investigated. Landscape planting would also provide 'hop-overs' for species such as bats. Hop-overs are where tall vegetation planted on either side of the road with overhanging branches creates a continuous 'bridge' over the gap created by the road.

7.3.3 Operation of the proposed scheme could also disturb wildlife. However, we would reduce this disturbance through sensitive design of the lighting, providing noise bunds and fencing where appropriate, and screening through landscape planting.

8 Geology and soils

8.1 Baseline

8.1.1 Geology and soils includes the assessment of underlying geology including geological designations, soil resources and land contamination including risks to human health and waterbodies. To support this assessment, we have carried out an Agricultural Land Classification survey. We have also carried out ground investigations across the proposed scheme (see photo in Plate 8.1), including the borrow pit locations.

Plate 8.1 Borehole drilling during the ground investigations

8.1.2 One geological site of special scientific interest (Marks Tey Brickpit) has been identified within the study area.

8.1.3 The soil survey found that the soils were mainly of good or moderate quality with occasional areas of very good quality. As well as being agricultural land, some of these soils are important as they underly designated ecological sites and non-designated priority habitats.

8.1.4 There are records of six historical landfills in the area. In addition, there are some historic mineral extraction sites, some of which have been infilled with waste materials. These are potential sources of contamination. Further potentially contaminated land uses include decommissioned railway infrastructure, sewage works, rifle ranges, a malthouse and gasometer, current and former industrial areas and fuel stations.

8.1.5 We have collected groundwater samples across the proposed scheme, including from the borrow pit locations. The results indicate that there are various contaminants in groundwater beneath the study area. There is potential for these contaminants to move into local surface water and groundwater if disturbed.

8.2 Construction

8.2.1 There would be no significant impacts on the geological site of special scientific interest as this lies 115m outside the footprint of the proposed scheme.

8.2.2 Soils would be affected in two ways during construction, via:

- Physical removal or permanent sealing of agricultural land
- Degradation during stripping, handling and storage, through mechanisms such as soil compaction

8.2.3 Approximately 460ha of agricultural land would be lost or permanently sealed by the proposed scheme, including over 332ha of land classed as the best and most versatile. In addition, 85ha of agricultural land would be temporarily acquired for construction. To reduce this effect, best practice for using soils onsite would be followed. This includes stripping topsoil and subsoil from all areas disturbed by construction, followed by sustainable reuse within the proposed scheme or elsewhere, wherever we can. However, due to the predicted loss of very good to moderate quality agricultural land, this has been assessed as **a likely significant adverse effect**. There would also be a **likely significant adverse effect** on the soils that support Whetmead LNR/LWS due to displacement of soils.

8.2.4 The results of the ground investigation indicate that there would be **no likely significant effect** on human health from the proposed scheme.

8.2.5 Construction works could open up pathways between contaminated land and surface water and groundwater. We would apply pollution prevention measures to prevent the mobilisation of contaminants. With these mitigation measures in place, there would be **no likely significant effects** on groundwater or surface water from contaminants onsite.

8.3 Operation

8.3.1 The permanent loss of agricultural land occurring during construction would persist during operation but is not considered as an additional effect. Any contamination deemed by risk assessment to have posed a significant risk during construction, would have been removed or remediated during the construction phase. The operational impacts on geology and soils have therefore not been assessed further on the basis that there would be **no likely significant effects**.

9 Material assets and waste

9.1 Baseline

9.1.1 We have carried out a desk-based study for the material assets and waste assessment. Regional data show that there is likely to be a good supply of both primary (new materials rather than recycled) and recycled aggregates (minerals which are used for construction including soft sand, sand and gravel, and crushed rock) within the East of England. There is also likely to be available waste management capacity within the region to dispose of the majority of waste likely to be produced during construction. There may, however, be no local capacity for the disposal of hazardous waste.

9.1.2 A large proportion of the proposed scheme is located within two Mineral Safeguarding Areas. These areas are protected from development that does not use the minerals within them. The proposed scheme footprint also crosses a number of local authority consultation areas for existing and future mineral and waste sites.

9.2 Construction

9.2.1 Construction of the proposed scheme would need materials and would generate waste that would need to be managed.

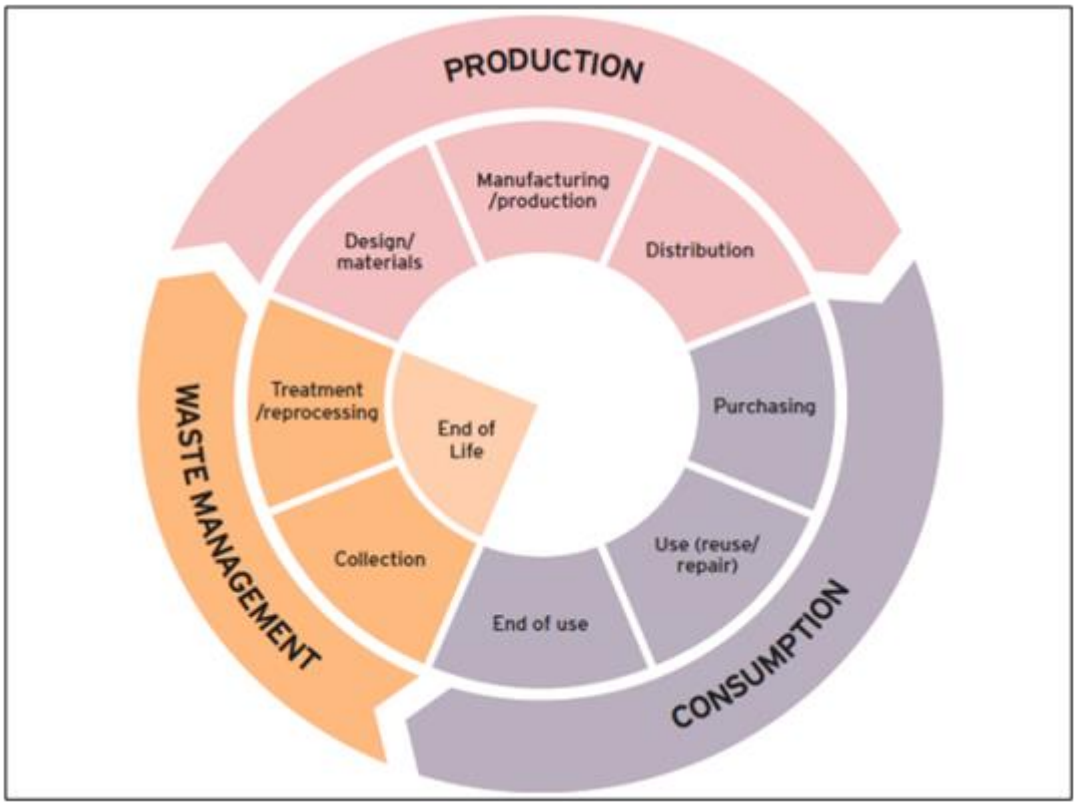
9.2.2 The use of primary materials leads to direct impacts on the environment through use of limited natural resources. Disposal of waste to landfill leads to direct impacts on the environment through the permanent use of landfill space and the loss of material that could potentially be recycled.

9.2.3 To construct the proposed scheme, we would need to permanently take 411ha of land inside the Mineral Safeguarding Areas. This could constrain or prevent existing and potential future use of these sites. The proposed scheme goes directly through the active Colemans Farm Quarry site. We expect that the minerals would be extracted from the affected area and backfilled before construction. Relocation of some quarry infrastructure would also be required. With these measures, there would be no significant effects on the quarry and minerals allocations.

9.2.4 We would action mitigation measures throughout the design and construction of the proposed scheme to reduce the use of primary materials and disposal of waste to landfill. We plan to reuse, recycle or otherwise recover on or offsite any surplus materials and wastes. Maximising reuse and diverting waste away from landfill would reduce the environmental impacts associated with materials production, thereby supporting a circular economy (see visual representation of a circular economy in Plate 9.1).

9.2.5 A circular economy is an alternative to a traditional approach (of make, use, dispose) in which resources are kept in use for as long as possible.

Plate 9.1 A circular economy (Defra 2018)



Source - https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england

9.2.6 By following good practice during construction, partly by diverting material from excavation back into construction, the proposed scheme has the potential to use about 60% recycled aggregate. Even with this good practice, the proposed scheme has the potential to generate about 1.5 million tonnes of construction and demolition waste. About 94% of this waste could be recoverable and therefore diverted away from landfill. This would be equivalent to a small (less than 1%) reduction in landfill capacity for inert and non-hazardous waste in the East of England.

9.2.7 There would be the potential need to dispose of about 20,000 tonnes of hazardous waste to landfills outside the East of England region (due to a lack of capacity).

9.2.8 The assessment has concluded that that there would be **no likely significant effects** on material assets and waste of constructing the proposed scheme.

9.3 Operation

9.3.1 No significant maintenance activities would occur during the opening year, and therefore no significant materials consumption or waste generation is expected. Operational impacts on material assets and waste have therefore been scoped out of the assessment on the basis that there would be **no likely significant effects**.

10 Noise and vibration

10.1 Baseline

10.1.1 The existing noise climate near the proposed scheme is dominated by road traffic noise, predominantly from the A12. Other noise sources include local roads, the railway, and urban and rural activities. There are 21 Noise Important Areas between junctions 19 and 25 or on roads near to the proposed scheme. These are areas that have been identified as currently experiencing particularly high noise levels and are generally those close to the A12.

10.1.2 There are many locations sensitive to noise and vibration in the area. This includes the large areas of existing and planned housing in the major settlements (e.g. Boreham, Hatfield Peverel), smaller communities (e.g. Rivenhall End) and isolated properties along the route of the A12.

10.1.3 To understand the existing noise levels better, we carried out a series of noise surveys in May 2021 at 17 locations along the route (Plate 10.1). We have also undertaken noise modelling and assessment to determine what likely future noise and vibration levels would be both with and without the proposed scheme in place.

Plate 10.1 Typical noise monitoring equipment

10.2 Construction

10.2.1 The main construction activities that would take place during the construction phase are site clearance, earthworks (including borrow pits excavation), regrading land for infrastructure such as new bridges and junctions, piling activities and ultimately road construction. These construction activities have the potential to result in temporary noise impacts at the receptors closest to the works. We have calculated noise levels from construction at selected locations that are thought to represent noise levels in that area.

10.2.2 Well established measures to reduce the noise from construction activities have been included in the first iteration of our Environmental Management Plan and would be used during the construction phase. These would include placing noisy equipment away from residential areas where feasible, building some structures offsite, and using temporary noise barriers and bunds for the noisiest activities.

10.2.3 However, **likely significant adverse effects** are expected at a number of locations, including those near junction 19 (night-time), Hatfield Peverel (day and night-time), the Witham Bypass including the new junction 22 (night-time), Rivenhall End (daytime), Easthorpe Green, Wishingwell Farm, and Doggetts (daytime), London Road at Marks Tey (night-time) and at Latneys Kennels (daytime).

10.2.4 We have identified potential adverse effects from vibration at 56 sensitive receptors near to where retaining walls, earthworks and structures would be built. This is due to the use of vibratory piling and vibratory compaction. These activities would likely only last approximately one week at a time in any one location, meaning that generally the effects are not likely be significant. However, vibration from the use of vibratory compaction for structures backfilling is an activity that may take place for longer than 10 days in one location and therefore could cause a **likely significant adverse effect** at dwellings nearby to these works. Where potential exists for vibration effects, we would explore measures to minimise vibration effects during construction.

10.2.5 During construction there would be the need to temporarily close the A12 and put in a diversion route. We estimate that this could occur for 500 nights over the four year construction period. This would cause **likely significant adverse effects** at 266 houses within 25m of the planned diversion routes. As the construction programme is developed, we would look at reducing the number of A12 closures where feasible.

10.3 Operation

10.3.1 Online widening would bring traffic closer to some houses which may be particularly sensitive to noise. The two new sections of three-lane dual carriageway would take traffic away from noise sensitive properties currently experiencing traffic noise from the A12. Along some sections, this may result in the main noise source being moved from one side of a property to another. This could potentially impact residents who have become accustomed to spending most of their time on one side of a property, for example, in a garden.

10.3.2 Noise reducing measures have been included in the proposed scheme, including the use of a road surface on some parts of the A12 which lowers the road noise more than conventional low noise surfacing. Noise barriers and bunds have been included where feasible to do so to reduce noise levels.

10.3.1 Across the proposed scheme, noise modelling has predicted that there would be 806 dwellings and 18 other sensitive receptors experiencing a **significant beneficial effect**. Modelling has predicted 123 **significant adverse effects** at properties and four other sensitive receptors. Of these, 28 properties are along Main Road, Boreham, and a further 71 properties are along Kelvedon Road, through Messing and then Harborough Road. These are both due to an increase in traffic flow on these roads.

10.3.2 Of the 21 Noise Important Areas along or near to the proposed scheme, we have calculated that there would be an increase in noise levels within two Noise Important Areas; at Boreham east and between Boreham and Hatfield Peverel. Noise levels would decrease at 13 Noise Important Areas. The remaining areas would remain the same as the current situation, except at Marks Tey, where some properties would have increased noise and some would have reduced noise.

11 Population and human health

11.1 Baseline

11.1.1 The main settlements along and around the A12 corridor are Chelmsford, Boreham, Hatfield Peverel, Witham, Rivenhall End, Kelvedon, Tiptree, Feering, Marks Tey and Copford. The larger settlements provide places of employment, various community facilities and attract commuters.

11.1.2 There are several areas allocated for housing and approved planning applications for development near the proposed scheme. The projected housing growth is above the national average in the local authority areas of Chelmsford, Maldon and Colchester.

11.1.3 Outside of the main settlements, land is mainly used for arable agricultural farm holdings, combined with some other land uses, such as fishing lakes, golf and country clubs, allotments, wedding venues and nature reserves.

11.1.4 There is a network of public rights of way that cross or are close to the existing A12. Some public rights of way have been severed by the previous dualling of the A12. Walkers, cyclists and horse riders are likely to be put off from using many existing routes which cross or are alongside the A12 due to the closeness of high volumes of high-speed traffic.

11.1.5 We have undertaken an assessment of the interrelated aspects of population and human health. This includes an assessment of the likely significant physical impacts of the proposed scheme on land use and accessibility, followed by an assessment of the potential effects on population health.

11.2 Construction

Land use and accessibility

11.2.1 The route of the proposed scheme has been selected to avoid as many impacts on houses, property and community facilities as practicable. However, there would still be significant effects from permanent and temporary land-take. The proposed scheme would result in the following **likely significant adverse effects** on private property and housing:

- Permanent acquisition of five residential properties in Hatfield Peverel, temporary acquisition of one property and temporary land-take on a further four, to accommodate Bury Lane Bridge and Station Road Bridge replacement proposals. Disruption and inconvenience of access to over 400 properties during the proposed Station Road Bridge replacement.
- Demolition of two houses, direct land-take from a further ten properties, including permanent land take from eight properties resulting in partial loss of garden areas in the communities of Witham and Rivenhall End.

11.2.2 The proposed scheme would result in the following **likely significant adverse effects** on community land:

- Temporary reduced access to the railway station at Hatfield Peverel due to Station Road Bridge replacement
- Temporary loss of car park for the Church Latter-day Saints and loss of access to Whetmead Nature Reserve
- Disruption and inconvenience of access to community facilities in Marks Tey due to proposed works associated with the junction 25 improvements

11.2.3 There would be impacts on businesses in Witham, Rivenhall End, Kelvedon and Marks Tey which would lead to **likely significant adverse effects**.

11.2.4 About 395ha of arable farmland would be permanently lost as a result of constructing the proposed scheme. Given the importance of agricultural production as a resource, this is a **likely significant adverse effect**.

11.2.5 During construction, many public rights of way and other routes used by walkers, cyclists and horse riders would be disrupted, particularly for people who cross Station Road Bridge in Hatfield Peverel to access the train station or schools. Footways would be disrupted alongside the A12 where road widening occurs, and public rights of way would be disrupted where construction of new sections of road occur. National Cycle Network Route 16 would also be impacted by works at junction 22. Disruption is likely to be temporary or short-term, depending on the scale of works in those areas. We would provide safe and segregated diversions where practicable for routes affected by the construction works. However, given the scale of disruption and the duration of construction works, there would be **likely significant adverse effects** on walkers, cyclists and horse riders during construction.

Human health

11.2.6 During construction, there would be some inconvenience and disruption to some residents as a result of construction activities, particularly from noise. The most likely health effects would be negative impacts on mental wellbeing and sleep disturbance. Those particularly susceptible would be shift workers and residents who live close to key locations of construction activity and may be at home a lot, for example, retired elderly people or those with long-term health conditions or disabilities. Given the scale of potential exposure, particularly to increased night-time noise, the effect on wellbeing and sleep disturbance is assessed as a **likely significant adverse effect**.

11.2.7 It is likely that there would be a temporary negative effect on the levels of active travel in the area due to disruption of walking and cycling routes. Given that the construction period would last for approximately four years, it is anticipated that some individuals would be discouraged from active travel for a prolonged period. This could contribute to weight gain and reduced mental wellbeing. This would be a **likely significant adverse effect.**

11.2.8 We would engage with communities before and during construction, to allow residents to raise any concerns and for them to be addressed where possible.

11.3 Operation

Land use and accessibility

11.3.1 The main impacts of land-take and changes to access would occur during construction, so **no likely significant adverse effects** during operation have been identified for housing, community and business land use. However, the permanent loss of agricultural land would be a **likely significant adverse effect**.

11.3.2 The proposed scheme would improve connectivity for walkers, cyclists and horse riders. Separate links for these groups would be provided to help cyclists to bypass junctions and slip roads, including National Cycle Network Route 16 which crosses the A12 at junction 22. The design of the proposed scheme would also address some issues of past severance of public rights of way. There would be **likely significant beneficial effects** for the following communities:

- Boreham, due to a new Payne's Lane Bridge (suitable for walkers, cyclists and horse riders) which would re-connect bridleways north and south of the A12 allowing access to other public rights of way
- Kelvedon, Feering and Inworth, due to a new Sniveller's Lane Bridge (for walkers and cyclists), enhanced shared use walking/cycling route along the B1024, and other improvements to public rights of way, improving overall access
- Marks Tey, Copford and Easthorpe, due to linking proposed new shared use walking/cycling routes to existing public rights of way, improving connectivity, and improvements to existing pedestrian crossings in Marks Tey to accommodate cyclists

Human health

11.3.3 Noise can cause sleep disturbance and annoyance, and there is a growing body of evidence for links between long-term exposure to high levels of traffic noise and cardiovascular conditions, including heart attacks. Our health assessment has identified that there would be an increase in households exposed to noise levels sufficient to disturb sleep and cause annoyance, but that there would be a decrease in households exposed to traffic noise at the high levels linked to heart attacks. For those homes with increased noise levels, there could be a **likely significant adverse effect** on sleep due to traffic noise disturbance.

11.3.4 The reconnection of previously severed public rights of way would improve physical access to greenspace and outdoor recreation opportunities. However, changes in road and junction layouts could make it harder for people within settlements and on some public rights of way to see vegetation and greenspace. There would therefore be both **likely significant beneficial and adverse effects** on feelings of wellbeing.

12 Road drainage and water environment

12.1 Baseline

12.1.1 Road drainage and the water environment includes surface water (i.e. water quality, water resources and hydromorphology – the form of rivers), groundwater, drainage and flood risk. It also considers the proposed scheme's compliance with the Water Framework Directive (a legal framework for improving the water quality of water bodies).

12.1.2 We have carried out a desk-based assessment, drainage surveys, aquatic surveys, ground investigation and flood risk modelling to understand the existing water environment.

12.1.3 The proposed scheme crosses seven main rivers: Boreham Brook, River Ter, River Brain (see photograph in Plate 12.1), Rivenhall Brook, River Blackwater, Domsey Brook and the Roman River. There are also 36 ordinary watercourses and numerous tributaries, drains, ditches and ponds.

Plate 12.1 River Brain close to the Witham Bypass

12.1.4 Water quality within the study area is generally poor, with all of the waterbodies currently 'failing' due to chemical pollution.

12.1.5 The proposed scheme passes over a drinking water aquifer with 45 licenced groundwater abstractions within 2km of the proposed scheme.

12.1.6 There are several nature conservation sites which are dependent on surface water or groundwater.

12.1.7 A flood risk assessment has been carried out and is presented as an appendix to the Environmental Statement. This covers flooding from rivers, surface water runoff, groundwater and other types of flooding. Climate change has been taken into account following national planning requirements.

12.2 Construction

12.2.1 The likely impacts during construction of the proposed scheme are sediment and other polluting substances in runoff from temporary working areas reaching watercourses. However, with the mitigation measures in our Environmental Management Plan, including measures to tackle emergency spillages and measures to control the storage, handling and disposal of potentially polluting substances, there are **no likely significant effects** on surface water features.

12.2.2 There is likely to be some impact on groundwater due to the need to pump it out from excavations (known as de-watering). This may affect nearby watercourses and nature sites. To reduce this effect, water would be carefully controlled onsite following a water management plan and obtaining abstraction licences where appropriate. There are therefore **no likely significant effects** on groundwater, or water resources and nature sites dependent on that groundwater.

12.2.3 We would control the risk of flooding during construction by following good construction practice, such as locating construction activities outside of areas at risk of flooding where feasible, use of sustainable drainage systems and adopting the Environment Agency's flood early warning system. There are therefore **no likely significant effects** on flood risk during construction.

12.3 Operation

12.3.1 The proposed scheme would require realignment of the Rivenhall Brook, Domsey Brook, and Roman River. We would use sensitive working methods and design features. This would include meandering river routes and use of natural materials and vegetation so that there would be **no likely significant effects** on these watercourses.

12.3.2 The overall water management strategy for the proposed scheme is to attenuate and treat highway runoff using wet ponds, filter drains, swales, new highway ditches and other sustainable drainage systems where applicable. As such, there would be **no likely significant effects** on surface or groundwater quality from the proposed scheme. The inclusion of features which would provide water quality treatment where currently there are none would lead to a betterment compared to the existing situation.

12.3.3 The road has been designed to minimise the risk of it flooding or causing flooding elsewhere by incorporating current design standards and future climate change allowances to improve its resilience, and through the use of measures to control and manage runoff. No significant adverse effects have been identified in relation to flooding during operation of the proposed scheme. Flood risk mitigation would result in three **likely significant beneficial effects** due to a reduced risk of flooding on the A12, local roads and residential receptors compared to the existing situation. These are at Ordinary Watercourse 21 (south of Kelvedon), Ordinary Watercourse 26 (south-west of Marks Tey), and Inworth Road.

13 Climate

13.1 Baseline

13.1.1 The climate assessment looks at the potential impact of the proposed scheme on climate by estimating changes in greenhouse gas (GHG) emissions. This includes 'embodied' carbon within the materials used, carbon used in transport during construction and operation, and changes in land use affecting the storage of carbon.

13.1.2 We have compared the estimated GHG emissions against the UK carbon budgets. Each carbon budget provides a five-year, statutory cap on total UK GHG emissions. This cap should not be exceeded if the UK is to achieve its commitments to reduce emissions.

13.1.3 We have also assessed the potential vulnerability of the proposed scheme to future changes in climate, such as from flooding. Features that are potentially vulnerable to climate change include the proposed scheme itself (e.g. pavements, structures, earthworks, drainage and technology) but also

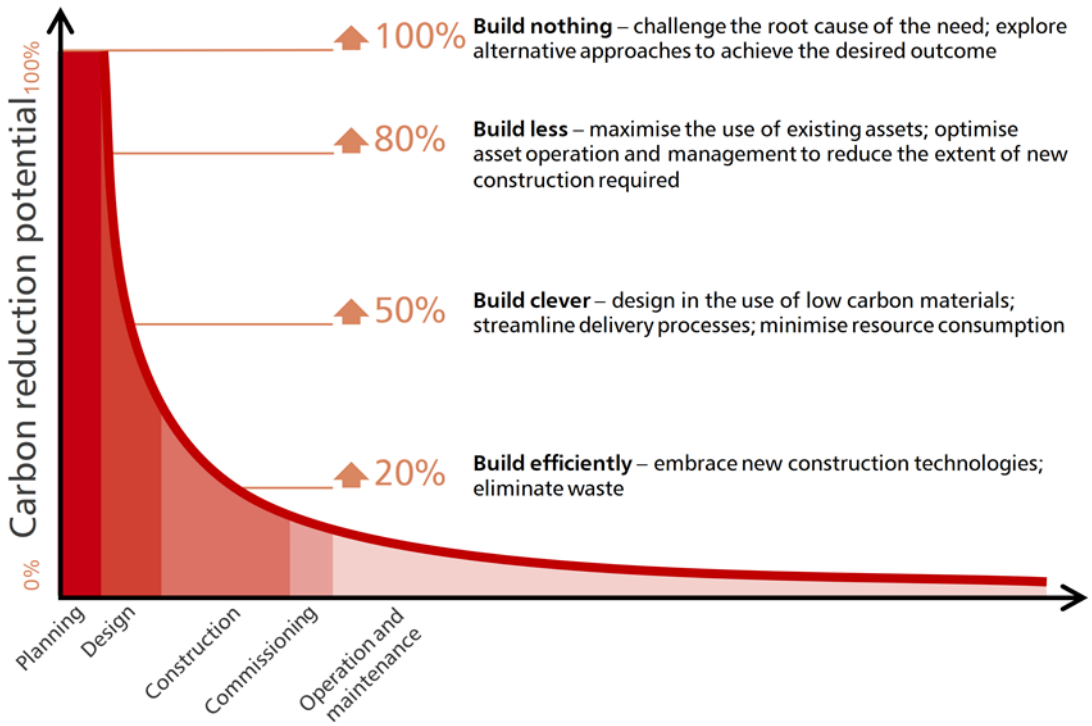
operational road users, including the public and commercial operators, who may be affected by disruption.

13.2 Construction

13.2.1 The largest proportion of construction phase GHG emissions would be from the production of materials used in construction. This is predicted to be about 55% of the total GHGs for the construction stage. Other sources of construction emissions include the transport of materials to site, the transport and treatment of waste, employee transport, construction and installation processes, and changes in land use and forestry during the construction phase.

13.2.2 To reduce these impacts, we have modified the proposed scheme throughout its design, and will continue to do so throughout the construction phase. The carbon reduction curve in Plate 13.1 shows how measures at different stages of design can have more impact than others.

Plate 13.1 Carbon reduction curve



Source: https://www.gov.uk/government/publications/infrastructure-carbon-review

13.2.3 It is unlikely that climate change would substantially disrupt construction of the proposed scheme. We would follow standard mitigation measures to reduce the proposed scheme's vulnerability. This would include suitable management of site drainage and using weather forecasts to plan onsite activities to limit the impacts of heavy rainfall.

13.2.4 **No significant effects** with regards to changes in greenhouse gas emissions or the vulnerability of the proposed scheme to climate change are predicted during the construction phase.

13.3 Operation

13.3.1 Operational phase GHG emissions would mainly be from vehicles using the road. We have calculated that although there would be an increase in GHGs, these changes in emissions are negligible in comparison to the relevant UK carbon budgets. Therefore, GHG emissions are **not likely to have a significant effect** on the ability of the UK Government to meet its carbon reduction targets by 2050.

13.3.2 In 2021 we published our own Net Zero Highways Plan. This includes commitments to ensure that our corporate GHG emissions become net zero by 2030, our maintenance and construction activities will become net zero by 2040 and road user GHG emissions on the strategic road network will become net zero by 2050. We estimate that due to carbon reduction measures across the UK (such as use of electric cars), emissions from road users would reduce over the lifetime of the proposed scheme.

13.3.3 The proposed scheme could be vulnerable to several climate hazards over its 60-year design life, including hazards related to:

- Increased rainfall and extreme rainfall events in winter
- Decreased rainfall and more dry spells
- Increased summer temperatures and heatwaves/hot spells

13.3.4 We will choose materials that comply with relevant highways design standards, guidance and good engineering practice. Additionally, the design has included embedded mitigations for climate change (e.g. in relation to the sizing and capacity of the drainage systems). We will also choose drought tolerant plants in our landscaping.

13.3.5 We have proposed mitigation measures, together with appropriate maintenance during operation, including monitoring and inspections, to address the potential hazards of climate change. As a result, climate change would **not result in a significant effect** during the operation of the proposed scheme.

14 Cumulative effects

14.1.1 Although an individual development may not itself have significant environmental effects, when combined with other development(s) nearby, the impacts could potentially combine to result in a significant cumulative effect.

14.1.2 Forty-seven developments have been identified which could interact with the proposed scheme to increase effects on the environment. The assessment has found that there are likely significant cumulative effects on:

- The setting of listed buildings and a historic park and garden around junction 19 due to the proposed scheme and housing development at Beaulieu Park.
- The landscape character of the Blackwater River Valley, due to the proposed scheme and multiple housing and commercial developments, including the active quarry at Colemans Farm.

- The landscape character between Chelmsford and Hatfield Peverel, due to the proposed scheme, multiple housing developments, a solar farm, and the Chelmsford North East Bypass.
- Views from Little Braxted Lane overlooking the proposed scheme and active quarry at Colemans Farm.
- An increase in the loss of agricultural land due to the proposed scheme, large housing development at Beaulieu Park, a solar farm and the Chelmsford North East Bypass.
- Temporary disruption to access to some public rights of way, footways and businesses during construction of the proposed scheme and various other developments. However, there would be a long-term beneficial effect on rights of way from the proposed scheme and Beaulieu Park development.
- Incremental development from the proposed scheme and other development resulting in loss of greenspace for residents in north-east Witham and Kelvedon (including users of the surrounding public right of way network), which could have a negative effect on the health and wellbeing of local communities.

14.1.3 We have identified no additional mitigation for cumulative effects over and above mitigation proposed for individual schemes.

15 Summary of likely significant effects

15.1.1 The table below provides a summary of the likely residual significant environmental effects associated with the proposed scheme's construction and operation. We have developed mitigation measures, found in the first iteration of our Environmental Management Plan, to avoid or reduce environmental effects where possible. We have considered these mitigation measures when determining the significance of effects.

Table 15.1 Summary of likely residual significant effects

Aspect	Summary of likely significant environmental effects	
	Construction	**Operation**
Air quality	No significant effects identified.	No significant effects on human health features. Likely significant adverse effects on one biodiversity site (Perry's Wood LWS and ancient woodland) from nitrogen deposition.
Cultural heritage	Likely significant adverse effects on 13 historic buildings and structures, one historic landscape and 31 archaeological remains.	Likely significant adverse effects on the setting of six listed buildings.

Aspect	Summary of likely significant environmental effects	
	Construction	**Operation**
Landscape and visual	Likely significant adverse effects on eight landscape character areas and 29 locations with views of construction activities (e.g. movement of construction machinery, excavation and earthworks; the presence of compounds, temporary roads, and stockpiled soil and materials; and loss of vegetation).	Likely significant adverse effects at year 15 on seven landscape character areas that would be directly affected by new junctions and the new sections of three-lane dual carriageway, and for 11 viewpoints that are very close to the proposed scheme, and where the presence of major new infrastructure would significantly change the character of the view. Planting would grow over time to reduce these effects but they would still remain significant.
Biodiversity	No significant adverse effects identified. There are likely significant beneficial effects for water voles from habitat creation.	Likely significant adverse effect from changes in air quality at Perry's Wood LWS and ancient woodland.
Geology and soils	Likely significant adverse effects on soils due to loss of approximately 460ha of agricultural land, of which 332ha comprises best and most versatile agricultural land. Additional likely significant adverse effect due to displacement of soils from within the Whetmead LNR.	No significant effects identified.
Material assets and waste	No significant effects identified.	No significant effects identified.
Noise and vibration	There would be likely significant adverse effects from raised noise levels both during the day and at night during construction. There would be likely significant adverse effects for dwellings close to vibratory compaction for structures backfilling. There would also be significant noise effects when the A12 is closed to 266 houses that would be within 25m of the diversion routes. No significant effects from vibration identified.	The proposed scheme would move traffic closer to some properties and further away for others. There would be likely significant adverse effects for 123 properties (plus four other sensitive receptors) and likely significant beneficial effects for 806 properties (plus 18 other sensitive receptors).

Aspect	Summary of likely significant environmental effects	
	Construction	**Operation**
Population and health	There would be likely significant adverse effects due to the permanent and temporary loss of property, community land, business land and agricultural land due to the proposed scheme. There would be likely significant adverse effects on walkers, cyclists and horse riders due to disruption to public rights of way. There would be likely significant adverse effects on mental wellbeing and sleep disturbance from construction noise. There would be likely significant adverse effects on physical activity and mental wellbeing due to the disruption of walking and cycling routes.	There would be a likely significant adverse effect from the permanent loss of agricultural land. There would be likely significant beneficial effects for walkers, cyclists and horse riders in Boreham, and for walkers and cyclists in the communities of Kelvedon, Feering and Inworth, and Marks Tey, Copford and Easthorpe. There would be likely significant adverse effects on sleep disturbance for properties experiencing significant noise increases. There would be both beneficial and adverse effects on access to greenspace, resulting in an uncertain overall effect. This uncertainty is judged to be significant in terms of decision-making.
Road drainage and the water environment	No significant effects identified.	No significant adverse effects identified. There would be likely significant beneficial effects reducing the risk of flooding at two ordinary watercourses and along Inworth Road.
Climate	No significant effects identified.	No significant effects identified.
Cumulative effects assessment	Likely significant cumulative effects on heritage assets, landscape character and views, loss of agricultural land, access to public rights of way and businesses, and health and wellbeing from loss of greenspace.	

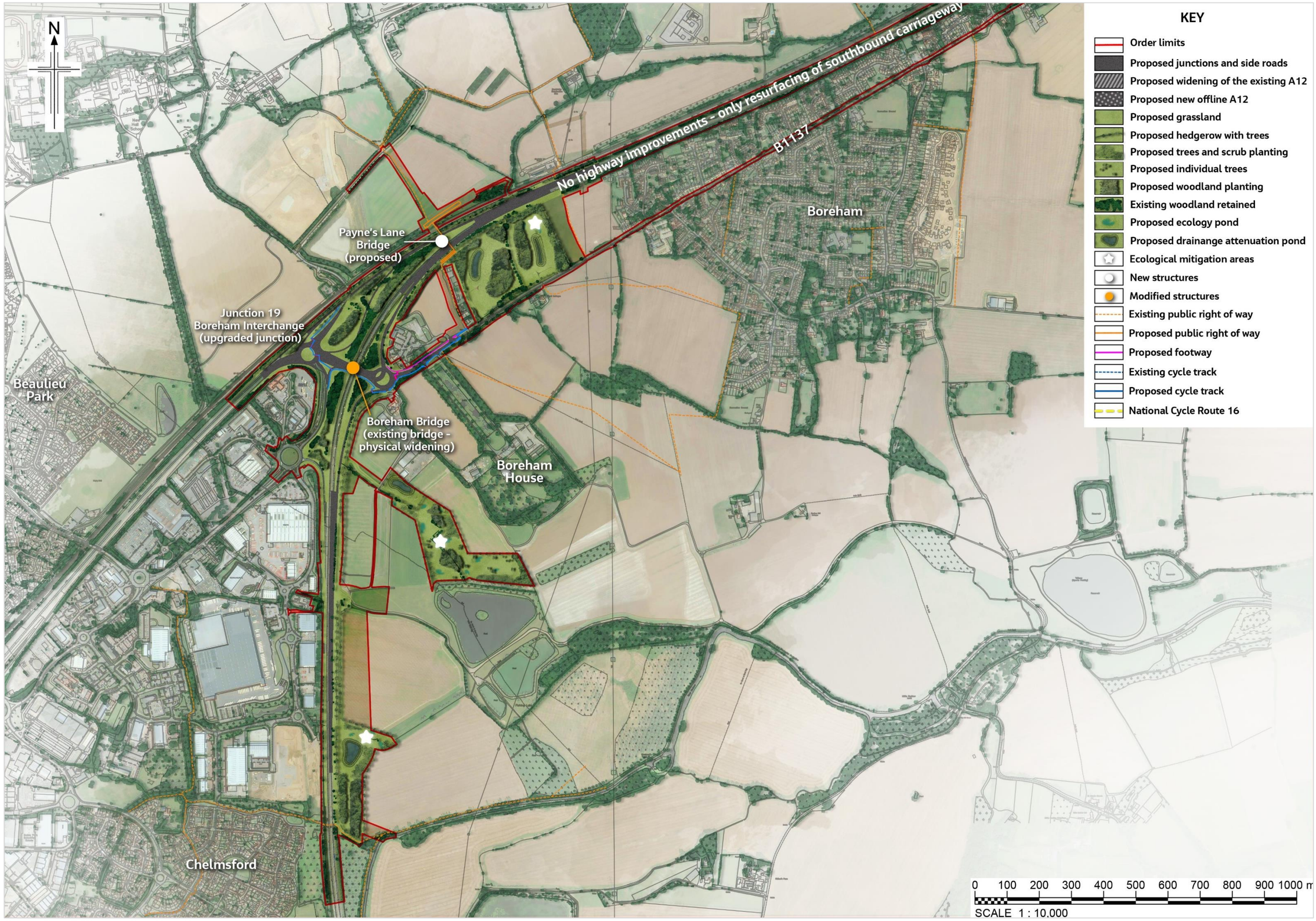
16 Next steps

16.1.1 The Environmental Statement forms part of our application for development consent to the Secretary of State for Transport. The Planning Inspectorate (acting on behalf of the Secretary of State) will examine the application and may hold some public hearings. Once the hearings have ended, a recommendation will be made to the Secretary of State, who will decide on whether or not the proposed scheme will go ahead. Should the proposed scheme gain consent, construction work is expected to start in 2024.

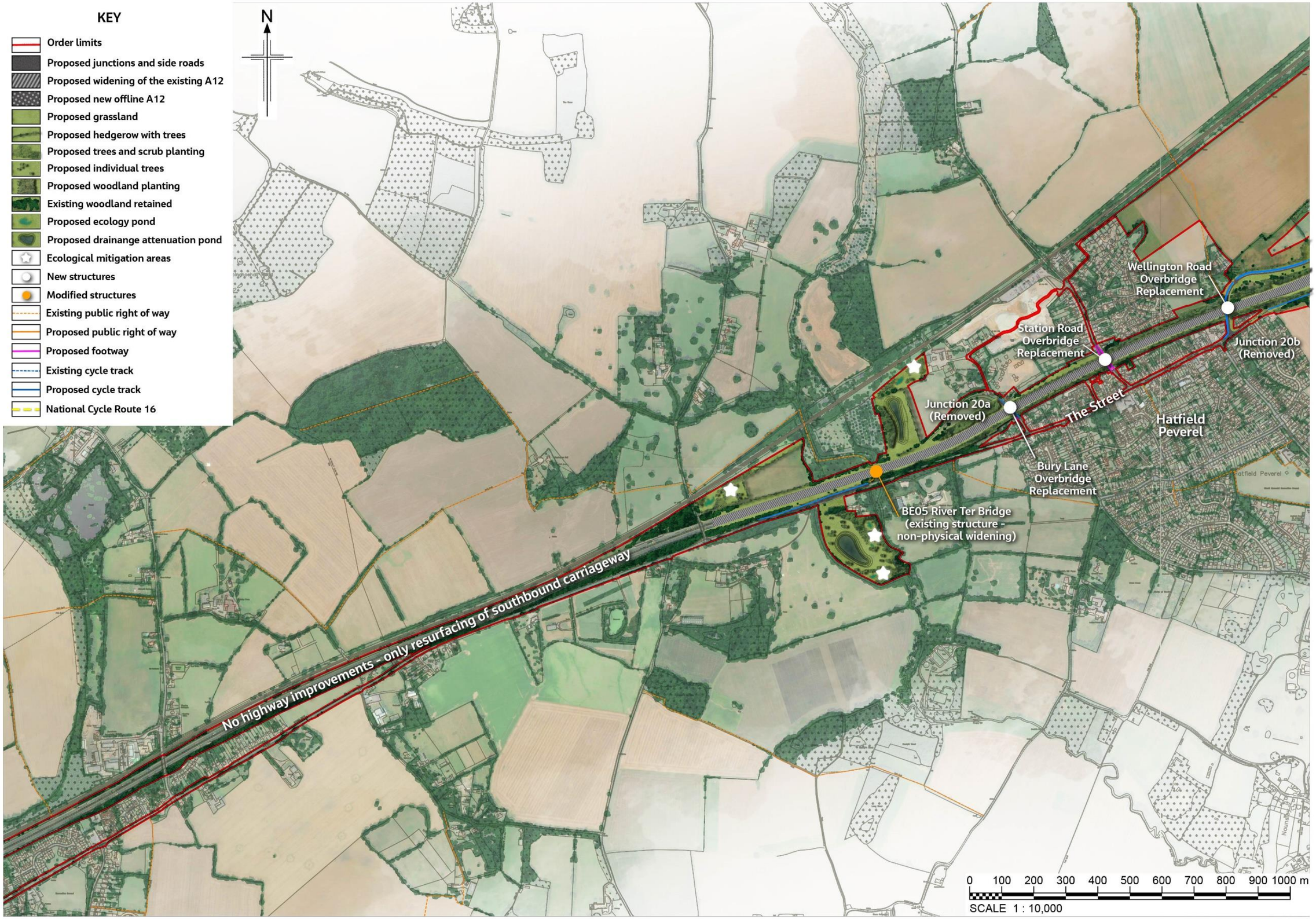
17 Non-Technical Summary figure

17.1.1 The below figure is a simplified visualisation of the proposed scheme General Arrangement Plans. A more detailed representation of the proposed scheme is shown on the General Arrangement Plans, which are included in Volume 2 of the DCO application.

17.1.2 An Environmental Masterplan has also been produced to support the Environmental Statement. This shows the proposed scheme design, along with additional notes to explain the proposed mitigation measures. The Environmental Masterplan is Figure 2.1 of the Environmental Statement.



Source for aerial imagery: OpenStreetMap



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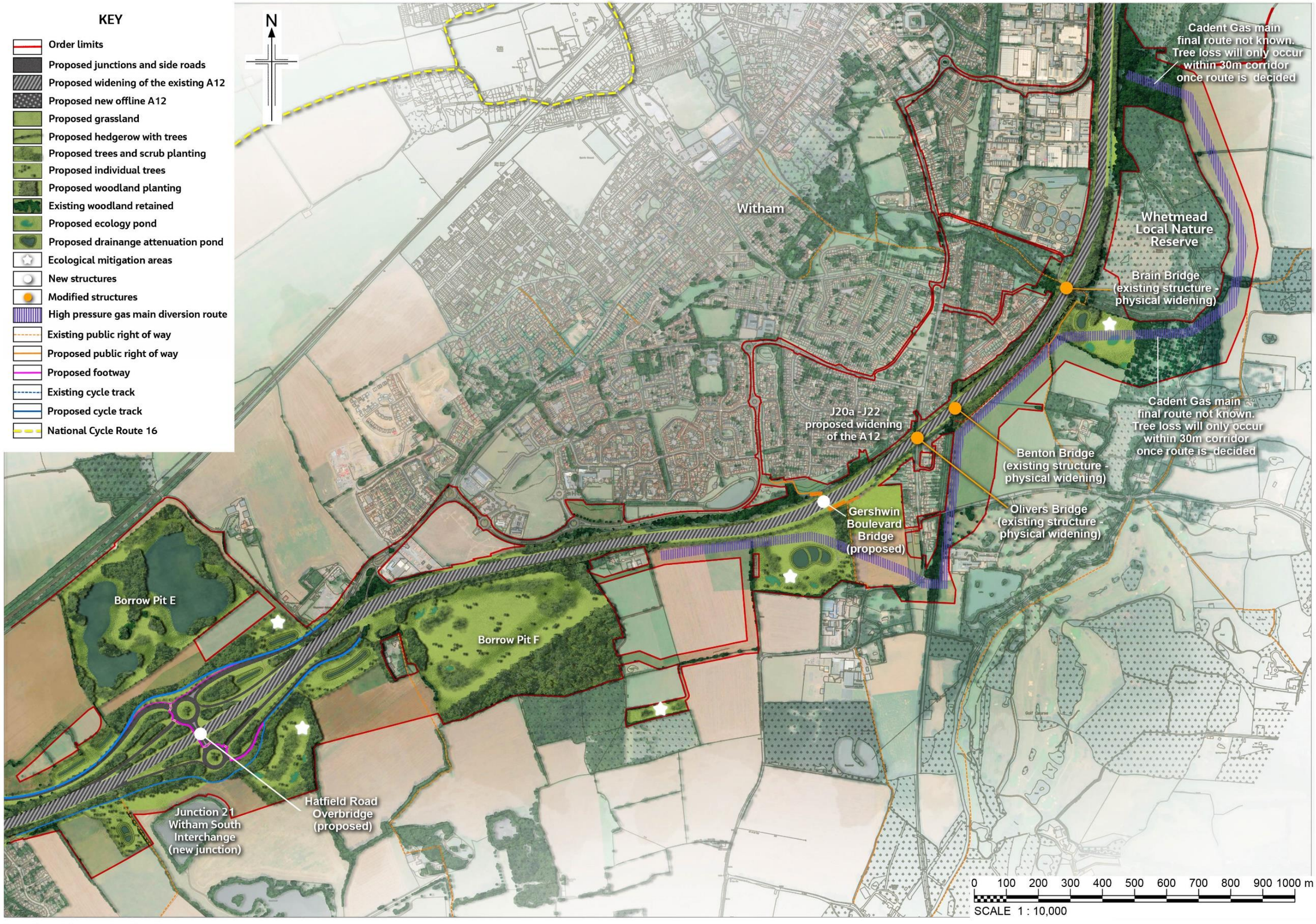

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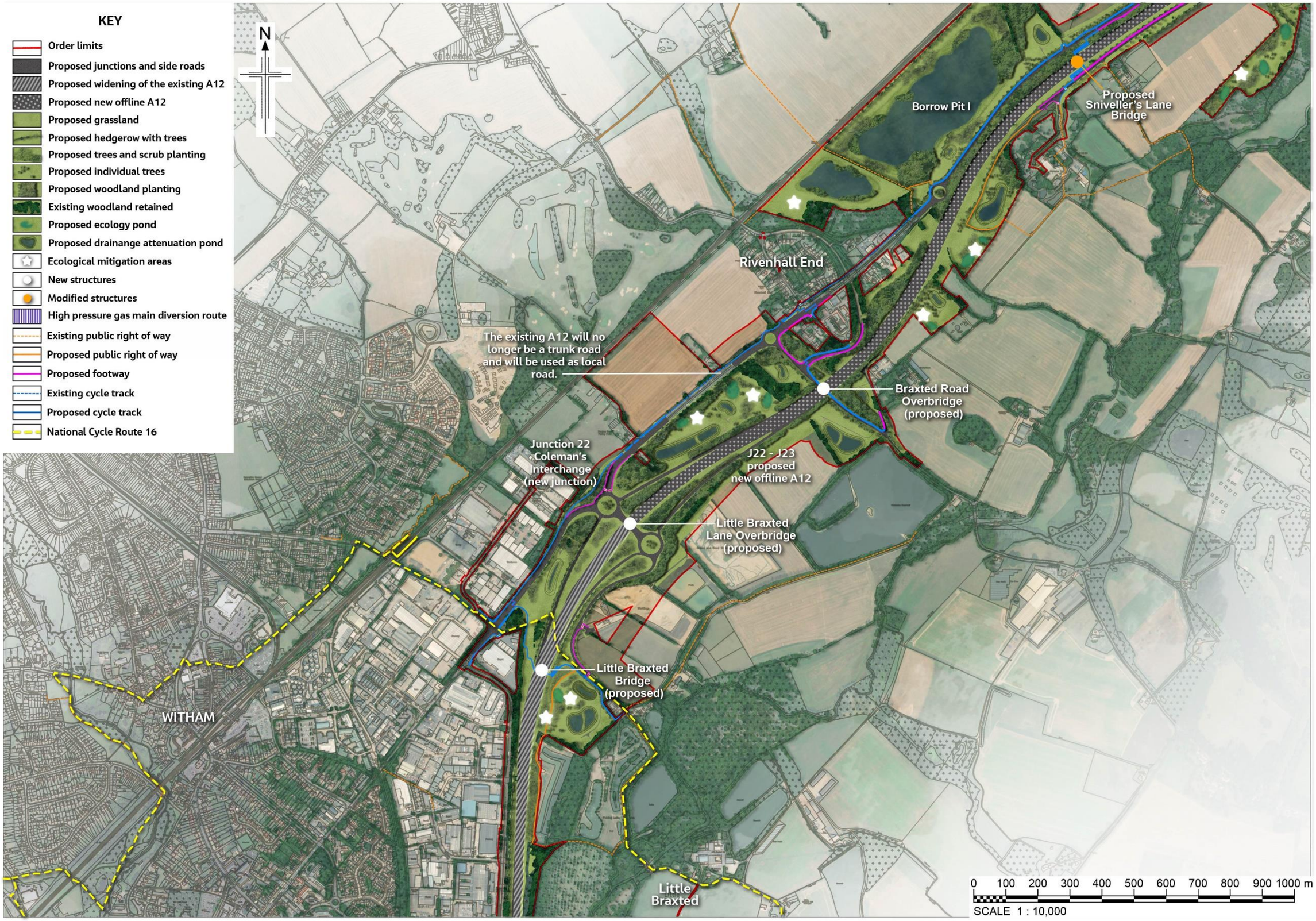

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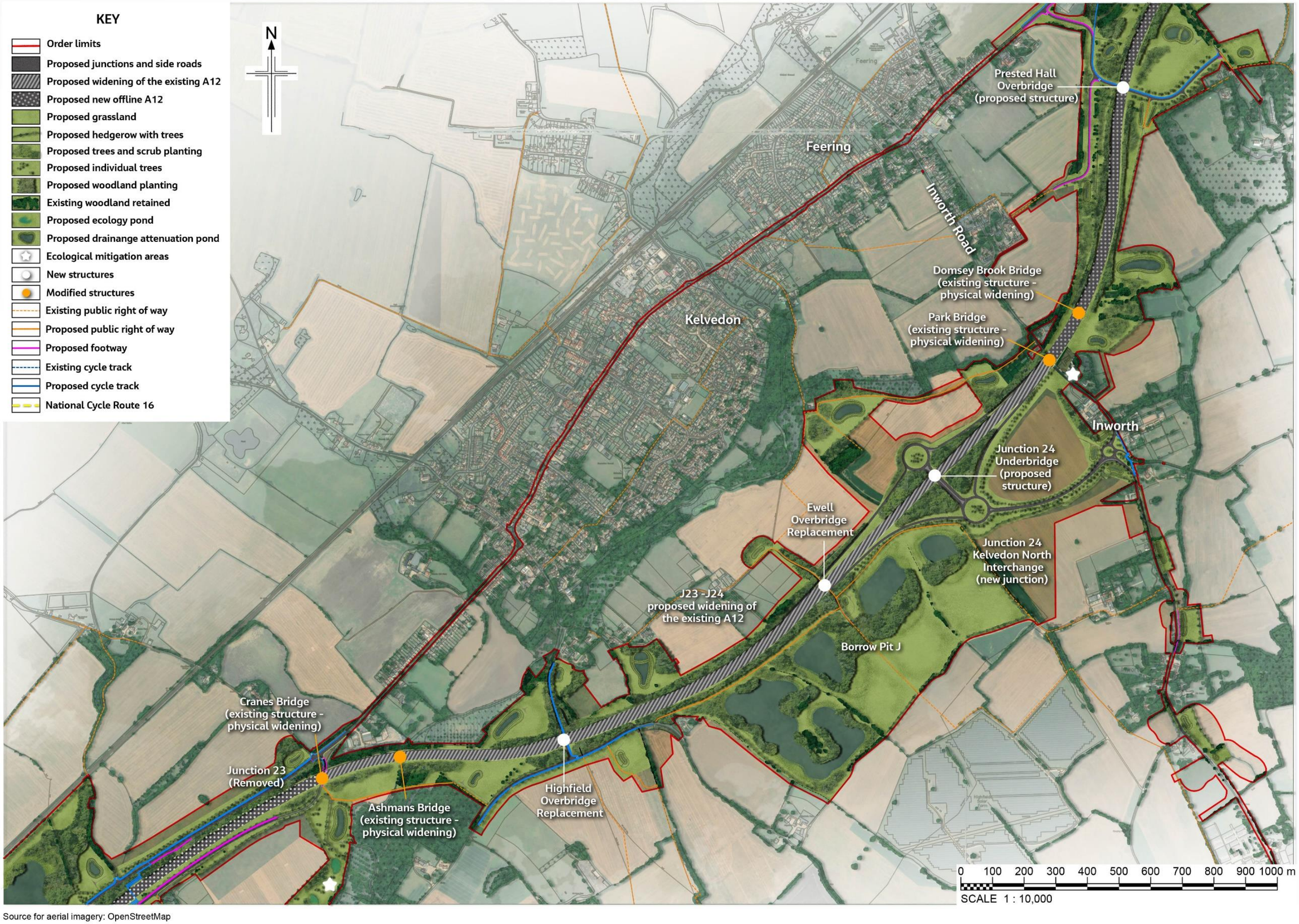

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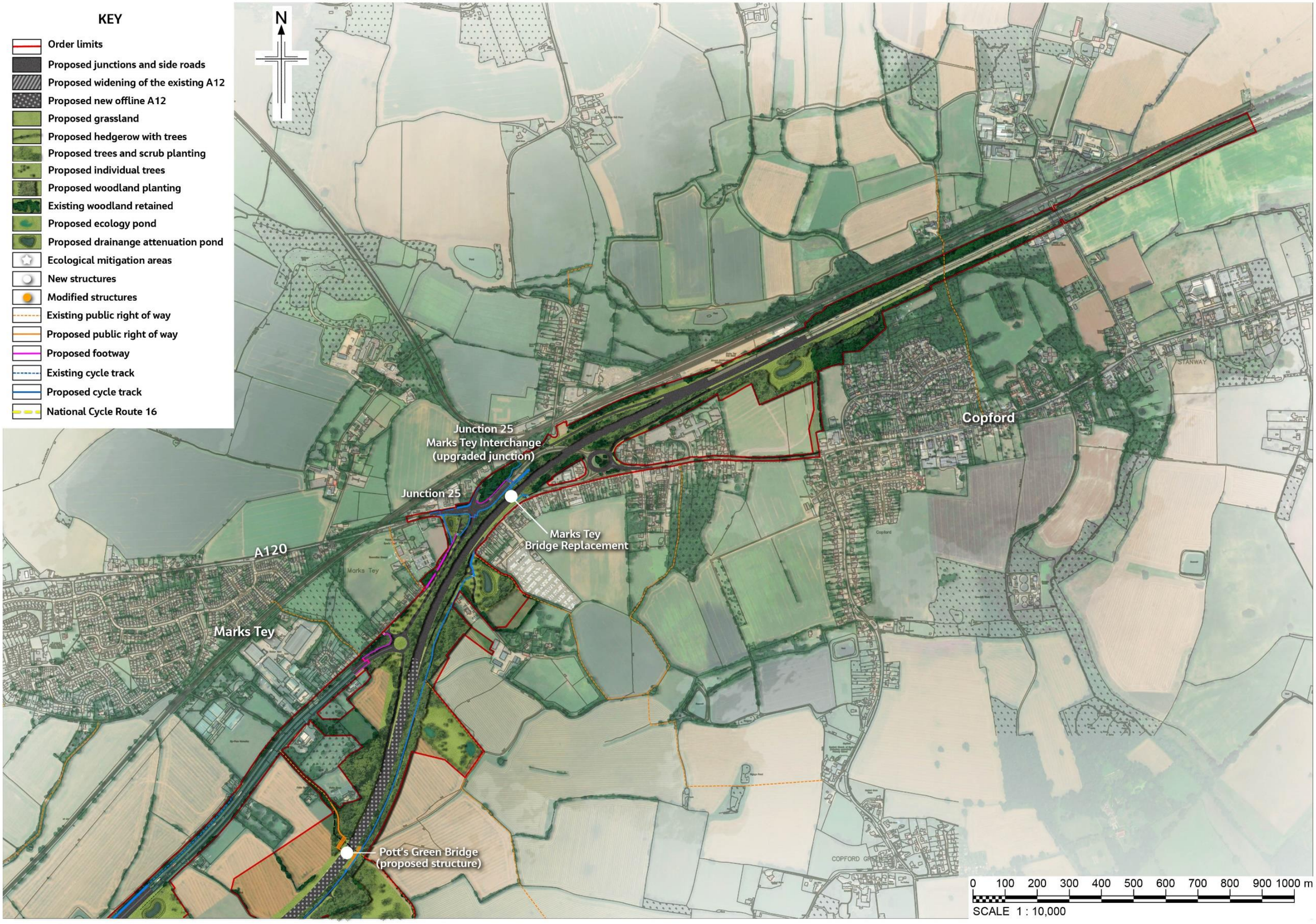

Source for aerial imagery: OpenStreetMap