A12 Chelmsford to A120 widening scheme TR010060

6.1 ENVIRONMENTAL STATEMENT CHAPTER 2 THE PROPOSED SCHEME

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A12 Chelmsford to A120 widening scheme

Development Consent Order 202[ ]

ENVIRONMENTAL STATEMENT
CHAPTER 2 THE PROPOSED SCHEME

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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.

2.1.2 The section of the A12 between Chelmsford and Colchester (junction 19 Boreham interchange to junction 25 Marks Tey interchange) carries high volumes of traffic, with up to 90,000 vehicles every day. Heavy goods vehicles (HGVs) account for between 9% and 12% of the traffic on this section due to its importance as a 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. The resulting congestion leads to delays and means that, during the morning commute, a driver's average speed can be particularly slow for an A-road, in either direction.

2.1.3 Previous studies, including the East of England Route Strategy (Highways England, 2015), the A12/A120 Route Based Strategy (Highways Agency, 2013) and the Essex Local Transport Plan (Essex County Council, 2011), indicate several problems between junction 19 and junction 25 of the A12. The key problems and issues from these studies are documented in the A12 Chelmsford to A120 Widening Options Assessment Report (Highways England, 2016, pages 44–47) and summarised in Table 2.1.

Table 2.1 Current issues along the A12

Strategic issue	Locations
Traffic flows and congestion	Congestion is experienced routinely on all links along the length of the A12. The busiest link is between J20b and J21 and is linked to the commuter route between Braintree and Maldon. These routes put pressure on traffic through Witham at J21 and affect the performance of the A12 between Boreham and Marks Tey.
Consistency in standard	The A12 has been improved in a piecemeal way which has resulted in a route with little consistency in terms of provision. It varies between dual two-lane and dual three-lane all-purpose carriageways and has numerous variations of junction types, surfacing, geometry, access, asset condition, lighting and lay-by provision. There is also limited roadside technology along the whole route.
Resilience	There are limited suitable diversion routes for the A12, which can lead to significant disruption when incidents occur. The lack of diversion routes also makes it more difficult to undertake maintenance to the route.

Strategic issue	Locations
Safety	There were approximately 141 collisions in the section of A12 between J19 and J25 between 2017 and 2019[1]. Motorcyclists, cyclists, horse riders and walkers are identified as 'vulnerable' road user groups. There are elements of the existing A12 with substandard design, including slip roads with inadequate length, and poor visibility at junctions and bends. There are also several direct accesses onto the A12 from residential, commercial and agricultural properties, particularly on the section between J24 and J25.
Walkers, cyclists and horse riders (WCH) and public transport provision	As the A12 becomes busier, there is an aspiration to move WCH provision and bus stops onto safer alternative routes. There are also issues regarding existing rights of way that were severed during the construction of the current A12 alignment.

[1] This is more recent collision data from National Highways compared to what is reported within the Options Assessment Report, which was produced in 2016 (Highways England, 2016).

2.1.4 The A12 Chelmsford to A120 widening scheme was included within the first Road Investment Strategy (RIS) as one of the projects to be delivered in Road Period 1 between 2015 and 2020. RIS1 (Department for Transport (DfT), 2015a) identified a phased approach to major improvement works to the A12 corridor. The scheme was identified as phase 1 of a programme of major upgrades to the A12. It was described as '*widening the A12 to three lanes between junction 19 (north of Chelmsford) and junction 25 (A120 interchange)*' and was allocated funding within RIS1.

2.1.5 In 2017, following the initial consultation on four route options, National Highways was asked to consider alternative options that sought to avoid the proposed Colchester Braintree Borders Garden Community (CBBGC) between junctions 24 (Kelvedon North interchange) and 25 (Marks Tey interchange). CBBGC[1] was one of three garden communities being proposed within Essex, included in the North Essex Authorities'[2] draft Local Plan submitted in Autumn 2017. There was a commitment to 2,500 homes within the local plan period (as part of an overall total of between 15,000 and 24,000 homes). Alternative alignments for the proposed scheme were considered between junctions 24 and 25 to account for the potential footprint of this development, and a further consultation was held in October 2019. Although the CBBGC was removed from the adopted Section 1 Local Plan[3], following feedback from the Planning Inspectorate in May 2020 (see Chapter 3: Assessment of alternatives, of the Environmental Statement [TR010060/APP/6.1], for more details), the extended options stage means that the proposed scheme would begin construction within

[1] The CBBGC is also known as the Marks Tey Garden Community.

[2] The North Essex Authorities consist of the Braintree, Colchester and Tendring local authorities.

[3] The Local Plan 2013-2033 North Essex Authorities' Shared Strategic Section 1 Plan, which has been adopted by Braintree District Council, Colchester Borough Council, and Tendring District Council.

Road Period 2 between 2020 and 2025 rather than Road Period 1. The proposed scheme is therefore now a committed scheme in RIS2: 2020-2025 (DfT, 2020a).

2.1.6 Even without the CBBGC, there is substantial housing and employment growth planned in this area over the coming decades (National Trip End Model, version 7.2, which is the government forecast of traffic growth). In addition, the investment in the Haven Ports is likely to increase the number of HGVs along the route. As such, an increase in overall traffic volume during peak periods is expected on the A12.

2.2 Proposed scheme objectives

2.2.1 The overall aim of the proposed scheme is to alleviate strategic traffic problems and congestion, and associated safety issues, along the strategic road network (SRN) between junctions 19 (Boreham interchange) and 25 (Marks Tey interchange).

2.2.2 Scheme-specific objectives have been used to develop the proposed scheme design (Table 2.2). The environmental objectives were developed based on the commitments within the Highways England Licence (DfT, 2015b) to reduce the environmental impacts of operating, maintaining and improving its network; protecting and enhancing the environment to achieve the best practicable environmental outcomes across its activities; and seeking to improve the wellbeing of road users and communities affected by the network.

Table 2.2 Proposed scheme-specific objectives

Objective	How it aligns with DfT strategic objectives	How it aligns with RIS2 strategic outcomes
Proposed scheme supports the growth identified in Local Plans by reducing congestion related delay, improving journey time reliability and increasing the overall transport capacity of the A12	Grow and level up the economy	Providing fast and reliable journeys (supporting economic growth)
Improved safety design: private accesses to the strategic road network closed off and alternative access to local roads provided by the proposed scheme	Improve transport for the user	Improving safety for all
Proposed scheme improves road user safety		
Proposed scheme improves road worker safety during maintenance and operation		
Proposed scheme reduces current and forecast congestion related delays and therefore increases journey time reliability	Improve transport for the user	Providing fast and reliable journeys
Proposed scheme understands the impacts of other schemes and recognises other RIS schemes		

Objective	How it aligns with DfT strategic objectives	How it aligns with RIS2 strategic outcomes
Reduce the visual, air and noise quality impacts of the proposed scheme on affected communities on the route	Reduced environmental Impacts	Delivering better environmental outcomes
Reduce the capital carbon and biodiversity impact of the proposed scheme		
Proposed scheme reduces the impact of severance of communities along the route	Improve transport for the user	Meeting the needs of all users
Proposed scheme improves accessibility for walkers, cyclists, horse riders, and public transport users		
Improve customer satisfaction, and reduce customer impact during construction		

2.2.3 The RIS2, published by the DfT in 2020, has an ambition to develop a greener network, specifically envisaging the following:

- '*The majority of all vehicles using the SRN, including almost all cars and vans, are zero emission at the tailpipe, transforming the impact of the SRN on air quality and carbon emissions.*
- *The SRN makes extensive and effective use of environmentally and visually sensitive 'green infrastructure', modern materials and careful planting, including trees. Together, these minimise and mitigate the air, light, noise, visual, and water quality impacts of the SRN on those living or working near to it, and sustain habitats and enhance biodiversity.*
- *Enhancements to the network create roads that fit with their surroundings and which keep negative consequences to a minimum. In particular they have employed high standards of design, responding to place-specific issues and in keeping with the natural, built and historic environment*.' (DfT, 2020a, pages 19–20)

2.2.4 The design has accounted for National Highways' 10 principles of good design published in The Road to Good Design (Highways England, 2018) to support its aspirations for a network that responds better to both people and places through improved design processes. These principles promote environmentally sustainable design that fits in context, while making roads safe, useful and understandable. The Design Principles, provided in Volume 7 of the Development Consent Order (DCO) application [TR010060/APP/7.10], sets out specific design principles for the proposed scheme based on the following themes from The Road to Good Design and specific design elements of the proposed scheme:

- Connecting people
- Connecting places

- Connecting processes
- Structures
- Lighting, signage and technology
- Landscape (including veteran trees)
- Borrow pit restoration

2.2.5 The following scheme-specific design principles have been identified in relation to the landscape design. These have been applied to the preliminary design (including the landscape mitigation embedded into the design) and will also be carried forward into the detailed design:

- Retain as much existing vegetation as possible where it provides an important visual screening function and/or forms part of the landscape structure. Where vegetation loss is unavoidable, replace and extend areas of proposed planting into the landscape to provide screening and to contribute towards the surrounding framework of vegetation.
- Maximise the biodiversity value of habitat throughout the proposed scheme extent and improve wildlife connectivity by incorporating linear habitats such as hedgerows and lines of trees, linking with retained woodland and hedgerows where practicable.
- Reinforce the landscape character and biodiversity by planting native species typically found within the surrounding landscape.
- Provide visual interest for local residents, users of public rights of way (PRoW) and public open space; including incorporating intermittent planting to allow views out from the road for drivers using the A12.
- Filter, screen and contain views of major junctions and integrate into the surrounding landscape framework of native planting.
- Aim to limit the overall extent of the proposed scheme as much as possible when considering the design and location of drainage ponds and floodplain compensation areas.
- Integrate drainage and earthworks sensitively into the surrounding landscape in terms of earth modelling and planting, and carefully consider structure design over watercourses, aiming to minimise visual intrusiveness, connectivity for wildlife and maintain the character of the landscape and views along valley floors.
- Within areas of floodplain, keep land take and vegetation loss to an absolute minimum to retain the locally distinctive willow plantations. Ensure proposed planting contributes to the pattern and character of existing vegetation.
- Alignment of the proposed scheme and location of junctions and borrow pits have been designed to reduce landscape and visual effects.

- Careful design of major structures, signage and gantries to limit visual intrusion and to help integrate these into the wider landscape.
- Refinement of the design of earthworks to create natural gradients and slopes that achieve better integration with the surrounding landform, where space and material are available.
- Sensitive design of borrow pit restoration and attenuation ponds, to integrate these features into the landscape and reduce visual intrusion.
- Planting of native hedgerows, shrubs and trees would reduce adverse landscape and visual effects. Consideration of the species, pattern and distribution of proposed hedgerows, shrubs and trees along the proposed scheme would reflect the distinctive local character of vegetation within the adjacent landscape and provide screening for visual receptors.
- Dense native tree and shrub planting on and adjacent to highway earthworks would create woodlands, copses and shelterbelts in order to break up the scale of the road, screen structures, traffic and lighting, and help integrate the proposed scheme into the existing landscape pattern.
- Support green infrastructure objectives through use of planting to link into existing field boundary vegetation to provide screening and integration into the local pattern and character, as well as connection of existing wildlife corridors.
- Use of locally indigenous native and non-native plants as appropriate to reflect the distinctive local character, such as the replication of willow plantation on valley floors.
- Consideration of balance between screening the proposed scheme, and retention of views out from the highway through breaks in the planting to help create a sense of place and stimulating visual experience for vehicle travellers where practicable.
- Where the loss of ancient or veteran trees is unavoidable, the hulk of the ancient or veteran tree would be left as close as practicable to its original location to benefit invertebrates and fungi. If that is not practicable, they would be moved near other ancient and veteran trees in the area.
- Loss of ancient or veteran trees would be compensated for by planting young trees of the same species near to the trees they are replacing. Over planting of young trees would be implemented where practicable to ensure a good survival rate.

2.2.6 Further information is included in the Design Principles document [TR010060/APP/7.10].

2.3 Proposed scheme location

2.3.1 The location and Order Limits of the proposed scheme are illustrated on Figure 1.1 of the Environmental Statement [TR010060/APP/6.2].

2.3.2 The proposed scheme lies within Essex, mainly passing through the administrative areas of Braintree District Council and Colchester Borough Council, as well as parts of the administrative areas of Chelmsford City Council and Maldon Borough Council. Chelmsford is located to the south-west of the proposed scheme and Colchester to the north-east. The settlements of Boreham, Hatfield Peverel, Witham, Little Braxted, Rivenhall End, Kelvedon, Feering, Inworth, Messing, Easthorpe and Marks Tey are along the route. There are also individual business and residential properties which front directly onto the A12.

2.3.3 The A12 runs in parallel and to the south of the Great Eastern Main Line (GEML) railway for most of its length between junctions 19 and 25. Major connecting roads include the A130 which joins the A12 at junction 19 and the A120 which joins the A12 at junction 25. The B1018 and the B1019 link Maldon to Witham and Hatfield Peverel respectively. The B1023 links Kelvedon and Tiptree.

2.4 Baseline scenario

Existing baseline

2.4.1 The existing conditions within the proposed scheme Order Limits and surrounding area, applicable to each of the aspect chapters, is reported in Chapters 6 to 15 of the Environmental Statement [TR010060/APP/6.1]. Key environmental constraints are shown on the figures produced to support each environmental aspect [TR010060/APP/6.2]. A summary of the existing baseline is provided below.

2.4.2 Land use outside of built-up areas is generally broadacre arable cropping with pockets of other farming types. There are a number of large commercial plots (over 100ha in size) along the route. Soils are generally classed as ‘good’ (grade 3a) or ‘moderate’ (grade 3b), with localised areas of ‘very good’ (grade 2), under the Agricultural Land Classification system.

2.4.3 The A12 crosses seven Main Rivers between junctions 19 and 25. These are Boreham Brook, River Ter, River Brain, Rivenhall Brook, River Blackwater, Domsey Brook and Roman River.

2.4.4 Existing vegetation includes highway vegetation, the pattern of small woodland blocks and copses scattered throughout the wider surrounding landscape, hedgerow boundaries, watercourses lined with trees, and the woodland and locally distinctive willow plantations along the River Blackwater.

2.4.5 The network of ditches and streams, water bodies and rivers are key distinctive features of this flat and low-lying landscape. The winding routes of the rivers and smaller waterways influence field pattern, providing a strong sense of place and offering continuity throughout the landscape.

2.4.6 Key environmental designations and features along the route include Whetmead LNR to the east of the A12 at Witham; Boreham House and New Hall Boreham Registered Parks and Gardens at junction 19; Rivenhall Long Mortuary Enclosure Scheduled Monument, located south of the A12 to the east of Rivenhall End; a geological Site of Special Scientific Interest to the north of junction 25; and listed buildings, trees with Tree Preservation Orders, and veteran trees along the route.

2.4.7 Habitat capable of supporting various protected and notable species is located along the route of the proposed scheme. These include bats, badgers, great crested newt, breeding birds, barn owl, reptiles, water vole, otters and aquatic species.

2.4.8 There is one air quality management area located close to roads affected by the proposed scheme (known as the affected road network, which is defined in Chapter 6: Air quality, of the Environmental Statement [TR010060/APP/6.1]). This is the Lucy Lane North air quality management area located in Colchester near junction 26 of the A12.

2.4.9 There are several noise important areas along the route, including at Boreham, Hatfield Peverel, Witham, Rivenhall End, junction 24 (Kelvedon North interchange) and Marks Tey.

2.4.10 Most of the study area is classed as a Mineral Safeguarding Area due to the underlying sand and gravel resources in the region. A Mineral Safeguarding Area designation denotes where mineral capable of being an economic resource is considered to be present, and where prior extraction should take place if practicable to avoid its sterilisation by non-mineral development. There is also an active quarry at Colemans Farm, near Rivenhall End.

Future baseline

2.4.11 How the existing baseline conditions would change and evolve without the implementation of the proposed scheme has been assessed as part of the Environmental Impact Assessment (EIA) and is referred to as the future baseline. Changes to the existing baseline conditions may occur due to a combination of natural influences (e.g. climate change) and human influences (e.g. new developments and changes in land use).

2.4.12 The future baseline conditions, applicable to each of the aspect chapters, are reported in Chapters 6 to 15 of the Environmental Statement [TR010060/APP/6.1]. A summary of the future baseline is provided below.

2.4.13 There are several development proposals within the study area that have been considered during the proposed scheme's development. A full list of committed developments has been produced for the cumulative effects assessment, as set out in Chapter 16: Cumulative effects assessment, of the Environmental Statement [TR010060/APP/6.1]. Key strategic developments include the following:

- Beaulieu Park development – this is a large development with planning permission to the north of junction 19. It includes 3,000 new homes, a 45,000m^2 office business park, a secondary school, two primary schools, four nurseries and a neighbourhood centre. It is currently being constructed

and includes proposals to improve junction 19. National Highways has worked with the developer to understand how the developer's proposals tie in with the proposed scheme. There is also planning permission for construction of a new railway station to serve the proposed Beaulieu Park development.

- Chelmsford Garden Community – Strategic Growth Site 6 of the Adopted Chelmsford Local Plan (Chelmsford City Council, 2020), located north of the Beaulieu Park development. A masterplan is due to be approved in 2022, including 3,000 new homes, with planning applications expected in the second half of 2022.

- Chelmsford North East Bypass – this is a new road scheme that Essex County Council is promoting. The route links with junction 19 (Boreham interchange) via a radial distributor road (part of the Beaulieu Park development) and is orientated north to join the A131 at Deres Bridge. The Chelmsford North East Bypass scheme will be delivered in phases and has secured funding from the Government's Housing Infrastructure Fund, as well as the South East Local Enterprise Partnership. A planning application for Phase 1 was approved in March 2022, with construction due to start in 2023 and finish in 2024.

- Longfield Solar Farm – construction, operation and decommissioning of a solar photovoltaic electricity generating and storage facility with a capacity of up to 500 megawatts, on land approximately 6km north-east of Chelmsford. The DCO application for this development was submitted in February 2022. It is anticipated that construction of the solar farm will coincide with the construction phase of the proposed scheme. The Interrelationship Document [TRO10060/APP/7.6] sets out the construction interfaces between the two schemes.

- A120 Scheme between Braintree and the A12 – in 2020 the Government announced the inclusion of the A120 Scheme within the RIS3 pipeline (a group of schemes being considered for potential inclusion in the RIS3 programme for delivery in 2025–2030). Work is progressing to validate all the previous work that has been done by Essex County Council which would include a link to the A12. The two project teams are working together to reduce customer impact where practicable should the A120 be included within a future RIS period.

- Crown Estate land at Feering – the emerging Section 2 Local Plan for Braintree allocates land south of Feering as a strategic growth location for up to 750 houses and business areas. The Crown Estate currently has an approved planning application (19/01222/REM) for 165 homes, which are currently under construction. Planning applications for the main growth site are expected in 2023. The Order Limits for the proposed scheme interact with the boundary of the strategic growth allocation. National Highways has worked with The Crown Estate to ensure the alignment of the proposed scheme is compatible with the strategic growth site.

2.4.14 Other committed developments included in the proposed scheme traffic model are shown in Appendix C of the Combined Modelling and Appraisal Report [TR010060/APP/7.3].

2.4.15 During the options selection stage of the proposed scheme, the CBBGC was considered as a major future development along the A12 corridor, and options were developed to accommodate this (see Chapter 3: Assessment of alternatives [TR010060/APP/6.1]). As the CBBGC was not taken forward in the North Essex Authorities' Local Plan, it is no longer a committed development and is therefore no longer being considered as a future development for the purposes of cumulative assessment.

2.4.16 Wider environmental changes are also predicted to occur over time as a consequence of factors such as climate change, which could increase the risk and intensity of flood events affecting the road network. The future baseline for climate is based on 2018 UK Climate Projections, and is described in more detail in Chapter 15: Climate, of the Environmental Statement [TR010060/APP/6.1].

2.5 Proposed scheme description

Main alignment and junction works

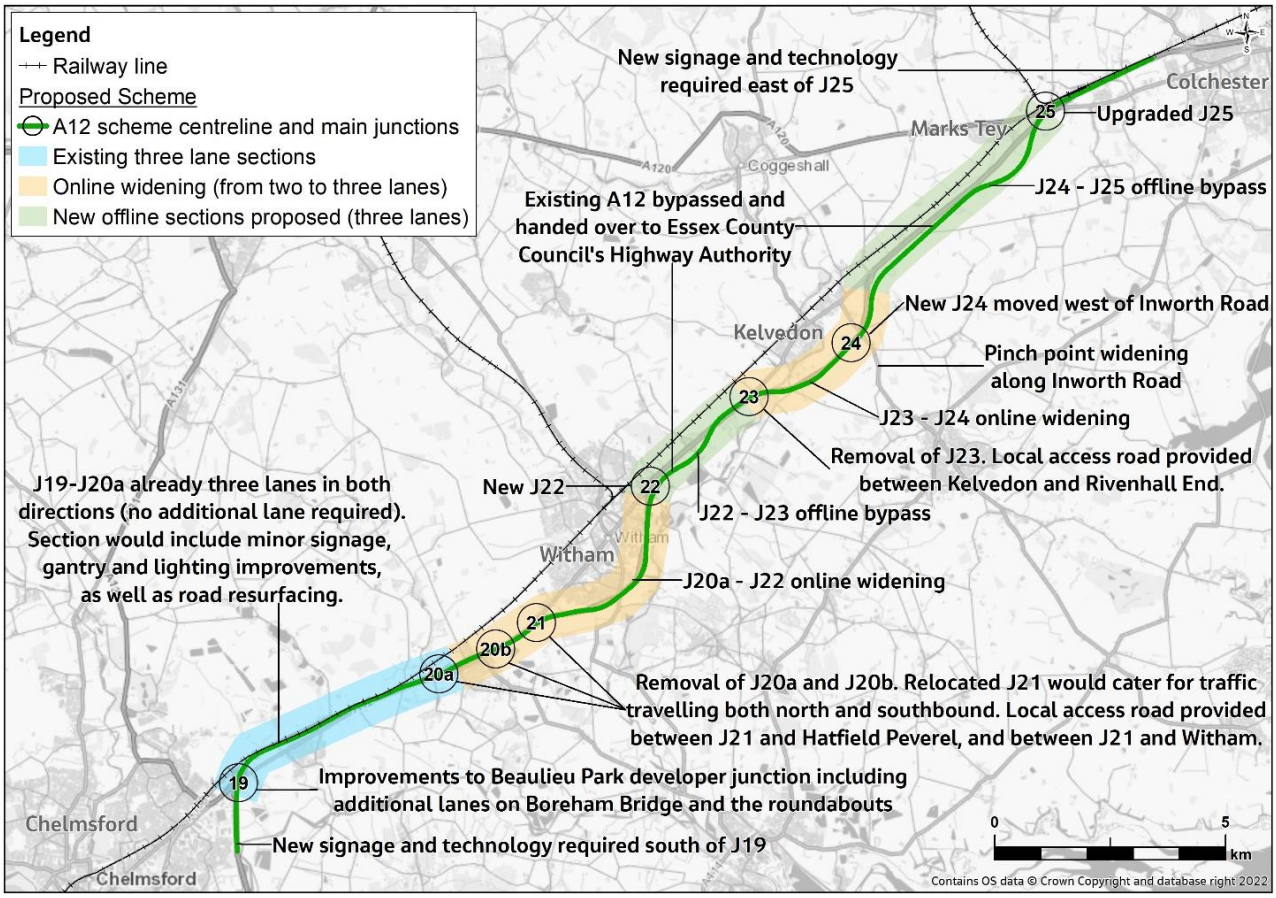
2.5.1 The existing A12 between junctions 19 and 25 is predominantly a dual two-lane carriageway, with a limited length of dual three-lane carriageway between junctions 19 (Boreham interchange) and 20a (Hatfield Peverel South interchange). There are a number of direct accesses onto the carriageways, particularly between junctions 22 (Colemans interchange) and 23 (Kelvedon South interchange) and between junctions 24 (Kelvedon North interchange) and 25 (Marks Tey interchange).

2.5.2 The proposed scheme involves widening the existing A12 to three lanes throughout in each direction (Plate 2.1), where it is not already three lanes. This would mainly involve online[4] widening of the carriageway, with offline[5] bypasses created between junctions 22 and 23 (Rivenhall End Bypass) and between junctions 24 and 25 (Kelvedon to Marks Tey). This would be accompanied by junction improvements (junctions 19 and 25), construction of new junctions catering for traffic movements both north and southbound (junctions 21, 22 and 24), and removal of existing junctions (junctions 20a, 20b and 23).

[4] 'Online' works relate to highway development proposed along, or on the line of, an existing road, for example road widening.

[5] 'Offline' works relate to highway development on land under non-highway use, for example a new dual carriageway constructed on agricultural land.

Plate 2.1 Overview of the proposed scheme highway design



2.5.3 The proposed scheme is split into three design sections for ease of reference in the Environmental Statement (note that these do not represent construction phases):

- Design section 1 – works between junction 19 and the existing junction 21
- Design section 2 – works between the existing junction 21 and existing junction 23
- Design section 3 – works between the existing junction 23 and junction 25

2.5.4 The following sub-sections provide more information on the proposed mainline[6] and junction works at each design section. Further information on side road works (including local accesses) and structures is provided in the 'Side roads' and 'Structures' sub-sections respectively.

2.5.5 The proposed scheme works are described in Schedule 1 of the draft DCO [TR010060/APP/3.1]. The General Arrangement Plans [TR010060/APP/2.9] illustrate the preliminary design of the proposed scheme and identify its key components and features. The Highways Engineering Section Drawings

[6] Mainline' is a term used to describe the carriageway carrying the main flow of traffic, generally traffic passing straight through a junction or interchange.

[TR010060/APP/2.11] present further proposed scheme design information. Reference to these plans is made in the following sections where applicable.

2.5.6 As noted in Section 2.4 of this chapter, the RIS3 A120 Scheme could result in a future connection to the A12. It is anticipated that some permanent land areas would overlap between the proposed scheme and the A120 Scheme, which is not yet at the preliminary design stage. National Highways therefore needs to have rights over all the land, as shown on the Land Plans [TRO10060/APP/2.7], to ensure the proposed scheme is deliverable in entirety and in its own right, without dependencies on other schemes yet to be subject to a DCO application. However, the development teams for the two projects have been collaborating to ensure as far as practicable that the schemes can be delivered efficiently, minimising the impact on the public and key stakeholders. Further information can be found in the Interrelationship Document, within Volume 7 of the DCO application [TRO10060/APP/7.6].

Design section 1

2.5.7 Design section 1 covers works between junction 19 and the existing junction 21. This section of work is shown on sheets 1 to 6 of the General Arrangement Plans [TR010060/APP/2.9].

2.5.8 Junction 19 is being improved as part of the Beaulieu Park development. The changes are being made by the developer, and the construction is due to be completed by early 2023. As construction of the improvements required for Beaulieu Park is due to be completed before construction of the proposed scheme begins, consent is not being sought for them in the DCO application but these improvements have been taken into account in the design proposals.

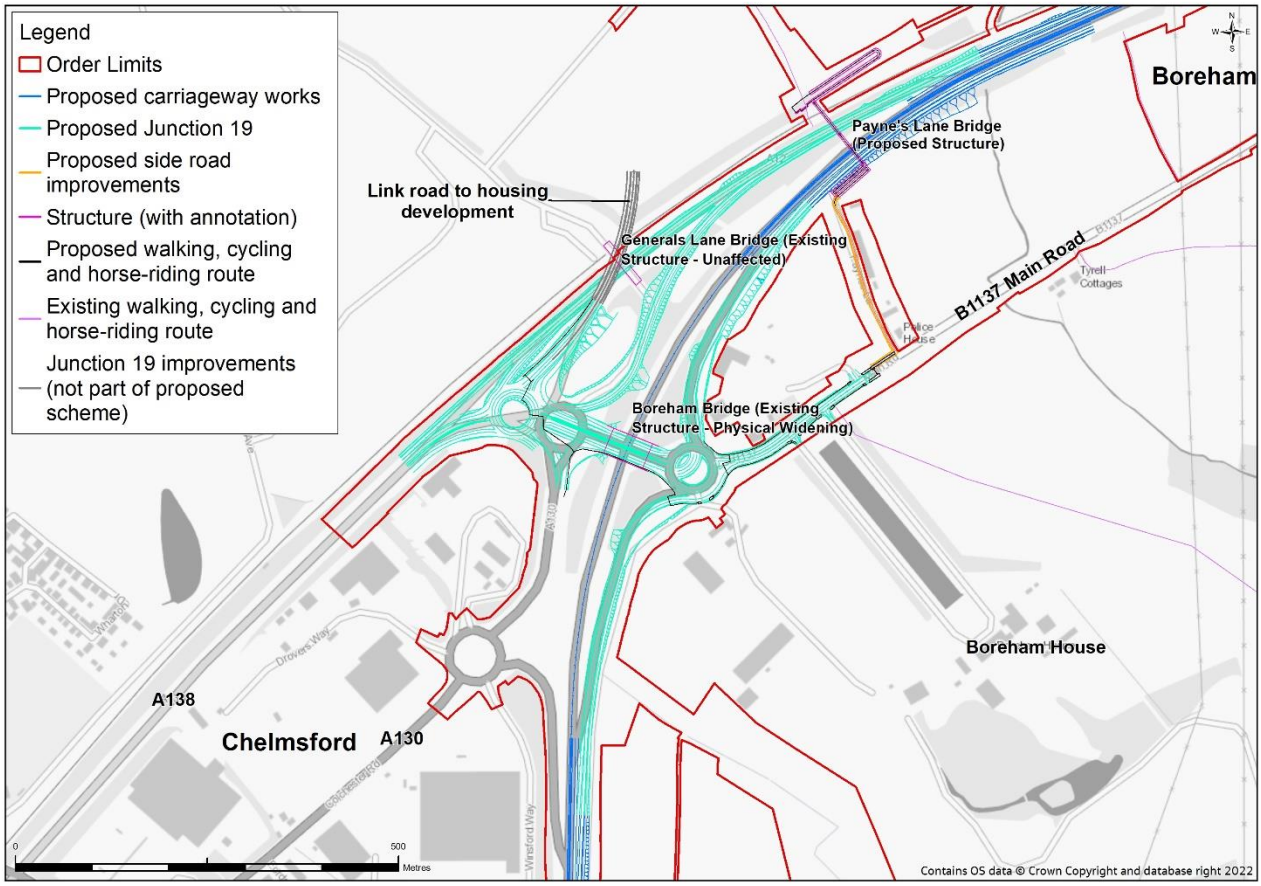
2.5.9 The proposed junction 19 layout is shown on Plate 2.2 and sheets 1 to 2 of the General Arrangement Plans [TR010060/APP/2.9]. The proposed scheme would deliver additional improvements to junction 19, including:

- additional lanes on Boreham Bridge (symmetrical widening)
- additional traffic lights added to the southern roundabout
- additional lanes on various roundabouts, and their approaches and exit roads
- a new controlled crossing which would allow both walkers and cyclists to cross the A12 safely and a new bridge for walkers, cyclists and horse riders on the north side of junction 19 (new Paynes Lane Bridge)

2.5.10 Junction 19 is raised above the A12 mainline.

2.5.11 The A12 as it passes through junction 19 is two-lanes in each direction and would not be widened, but carriageway improvements would be implemented for the junction slip roads to increase capacity by widening the slip road cross-section and merge and diverge arrangements. The Order Limits also extend to the south of junction 19 to allow for roadside works in the verges such as new signage and works associated with the junction 19 improvements.

Plate 2.2 Overview of proposed junction 19 highway works



2.5.12 The approximately 3.2km section between junctions 19 and 20a already consists of three lanes in each direction; works here would consist of localised improvements to roadside infrastructure (such as signage). The southbound carriageway of this section would also be resurfaced with surfacing with better noise reducing properties than a conventional low noise road surface (see Section 2.5 – Road pavement and re-surfacing, of this chapter for further information). This section of works is shown on sheets 2 to 4 of the General Arrangement Plans [TR010060/APP/2.9].

2.5.13 The approximately 3.3km section between junction 20a and the existing junction 21 would be subject to online widening works to provide a dual three-lane carriageway. This would be predominantly symmetrical widening, where each existing carriageway would be widened by approximately 3.65m. The A12 would generally be in cutting through this section, as in the existing situation. This section of works is shown on sheets 5 to 6 of the General Arrangement Plans [TR010060/APP/2.9]. Five existing structures would be affected in this section (see Section 2.5 – Structures, of this chapter for more information):

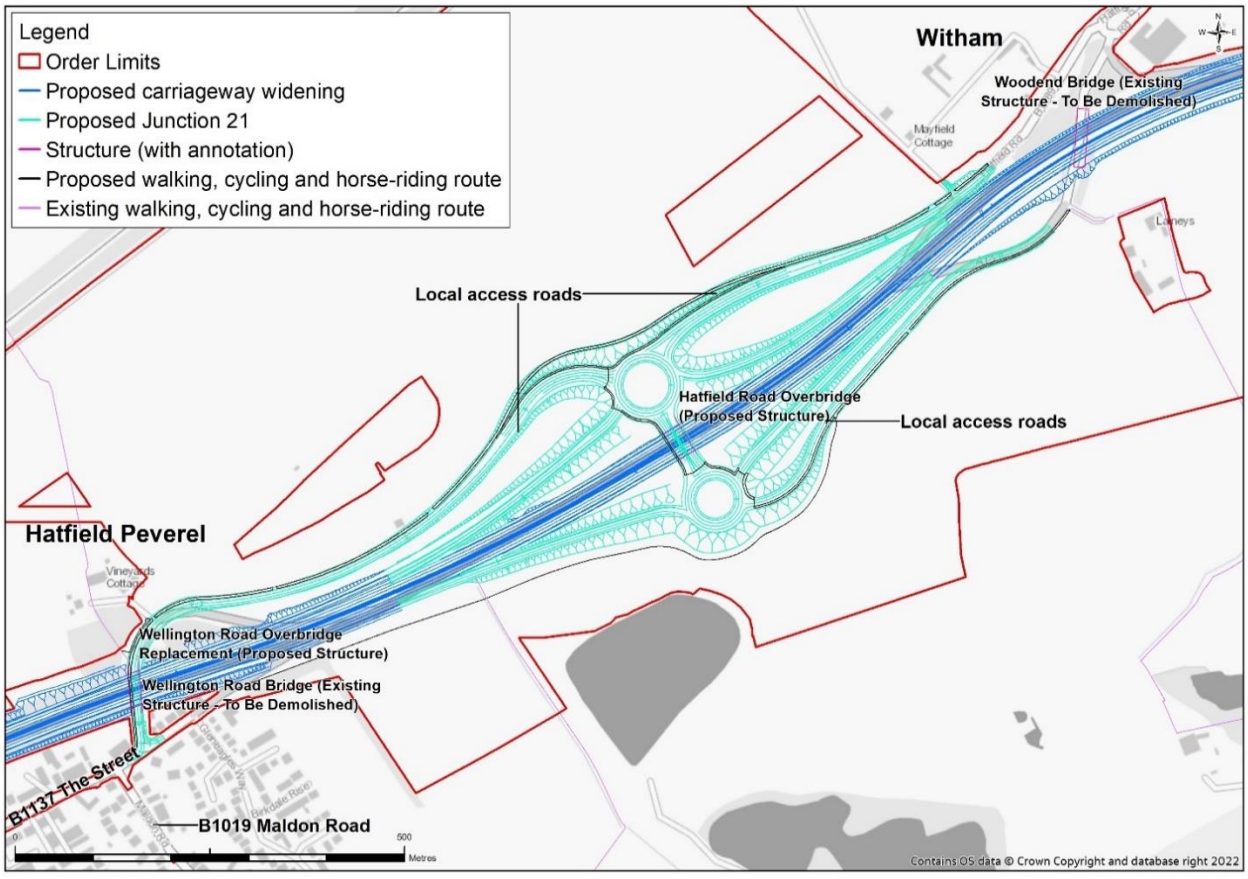
- River Ter Bridge (A12 crossing over the River Ter, west of the existing junction 20a) – carriageway would be widened, but the existing bridge structure would not be physically widened
- Bury Lane Bridge (part of existing junction 20a) – existing bridge would be demolished and replaced with a new overbridge

- Station Road Bridge (Hatfield Peverel) – existing bridge would be demolished and replaced with a new overbridge
- Wellington Bridge (part of existing junction 20b) – existing bridge would be demolished and replaced with a new overbridge
- Woodend Bridge (part of the existing junction 21) – existing bridge would be demolished

2.5.14 Junctions 20a and 20b would both be closed and replaced by a new junction 21, situated east of Hatfield Peverel between the existing junctions 20b and 21. The proposed junction 21 layout is shown on Plate 2.3 and sheet 6 of the General Arrangement Plans [TR010060/APP/2.9]. It has been designed as an elevated two-tier junction (raised above the A12 mainline) with a dumbbell layout, connected by a new Hatfield Road Overbridge, with three access roads:

- a road linking the northern roundabout to Hatfield Peverel, intended as the main access between the proposed scheme and areas to the south and west, such as Hatfield Peverel and Maldon
- a road linking the northern roundabout to Witham, intended as the main access between the proposed scheme and the west side of Witham
- a local access road from the southern roundabout linking to Latney's Boarding Kennels, Cattery and Grooming Parlour only

Plate 2.3 Overview of proposed junction 21 highway works



Design section 2

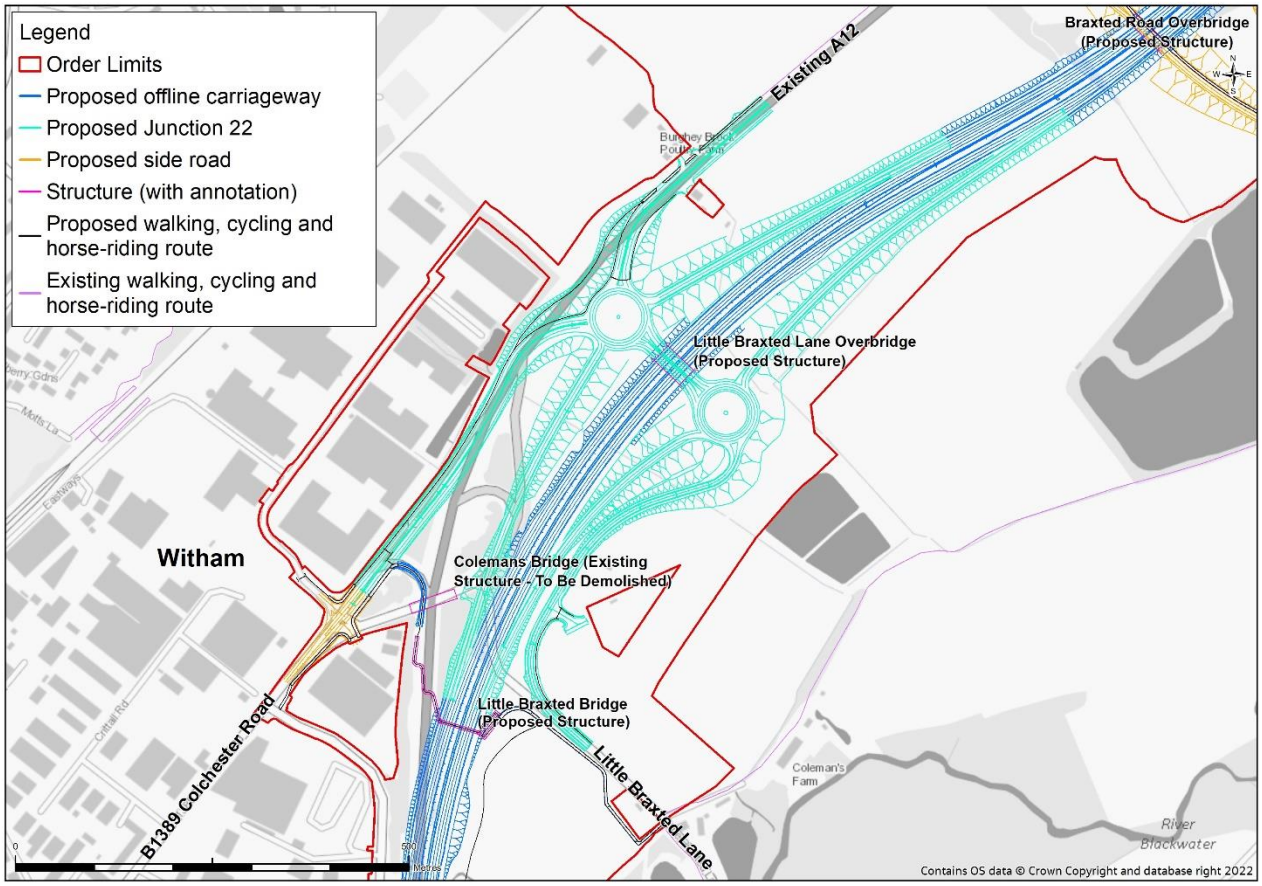
2.5.15 Design section 2 covers work between the existing junction 21 south of Witham and junction 23 south of Kelvedon. This section of work is shown on sheets 7 to 12 of the General Arrangement Plans [TR010060/APP/2.9].

2.5.16 The approximately 3.7km section of A12 between junctions 21 and 22 (Witham bypass) would be widened, upgrading the two-lane dual carriageway to a three-lane dual carriageway in each direction. This would be predominantly symmetrical widening, where each existing carriageway would be widened by approximately 3.65m, except near Dengie Farm where asymmetric widening is proposed to the northbound carriageway. The A12 is generally in cutting on the approach to the existing junction 21 and junction 22, and on an embankment in the middle section of the Witham bypass. This section of works is shown on sheets 7 to 10 of the General Arrangement Plans [TR010060/APP/2.9]. Four existing structures would be affected in this section, and one new bridge for walkers would be provided (see Section 2.5 – Structures, of this chapter for more information):

- Gershwin Boulevard Bridge (south of Witham) – new bridge for walkers
- Olivers Bridge (A12 crossing over Maldon Road, south of Witham) – existing bridge would be widened
- Benton Bridge (A12 crossing over the Blackwater Rail Trail east of Olivers Bridge) – existing bridge would be widened
- Brain Bridge (A12 crossing over the River Brain, south-east of Witham) – existing bridge would be widened
- Barrows Creep Underpass (south-east of Witham) – existing underpass south of the existing junction 22 would be decommissioned

2.5.17 The proposed junction 22 layout is shown on Plate 2.4 and sheet 10 of the General Arrangement Plans [TR010060/APP/2.9]. The proposed junction 22 would be located north-east of the existing junction 22 and would have a two-tiered elevated dumbbell layout (raised above the A12 mainline) connected by a new Little Braxted Lane Overbridge. There are two access roads on the northern roundabout, utilising the existing A12 to link to Witham and Rivenhall End, and one access road on the southern roundabout, providing access to the realigned Little Braxted Lane and existing quarry. Colemans Bridge (part of the existing junction 22 arrangement) would be demolished. A new bridge for walkers and cyclists (Little Braxted Bridge) would be provided over the A12 from Little Braxted Lane.

Plate 2.4 Overview of proposed junction 22 highway works



2.5.18 From south of the existing junction 22, a section of new carriageway is proposed. This would be approximately 3.5km in length, consist of three lanes in each direction and would generally be on a slight embankment. The new carriageway would pass to the south-east of Rivenhall End before crossing the existing A12 east of Rivenhall End and re-joining the existing A12 carriageway just west of Cranes Bridge to the west of Kelvedon. The lanes are proposed to be of standard cross-section, with a carriageway width of approximately 13m in each direction (3 x 3.65m wide lanes, 2 x hard strips), with a central reserve and verges. This section of works is shown on sheets 10 to 12 of the General Arrangement Plans [TR010060/APP/2.9]. Three new bridges would be provided in this section (see Section 2.5 – Structures, of this chapter for more information):

- Braxted Road Overbridge (south of Rivenhall End) – new overbridge would be constructed to take Braxted Road over the new A12 alignment
- Rivenhall Brook Culvert (A12 crossing over Rivenhall Brook, east of Rivenhall End) – new underbridge would be constructed to take the new A12 alignment over the Rivenhall Brook
- Snivellers Lane Bridge (north of the existing A12, between Rivenhall End and junction 23) – new bridge for walkers and cyclists

2.5.19 The existing junction 23 would be removed, with traffic movements associated with this junction being moved to junction 22 and junction 24 (see Chapter 3: Assessment of alternatives [TR010060/APP/6.1], for the reasons why junction 23 would be removed). Parts of junction 23 would, however, be retained to provide local access, including Cranes Bridge (which would be widened) and parts of southbound and northbound slip roads (see Section 2.5 – Side roads, of this chapter for further information on local accesses).

Design section 3

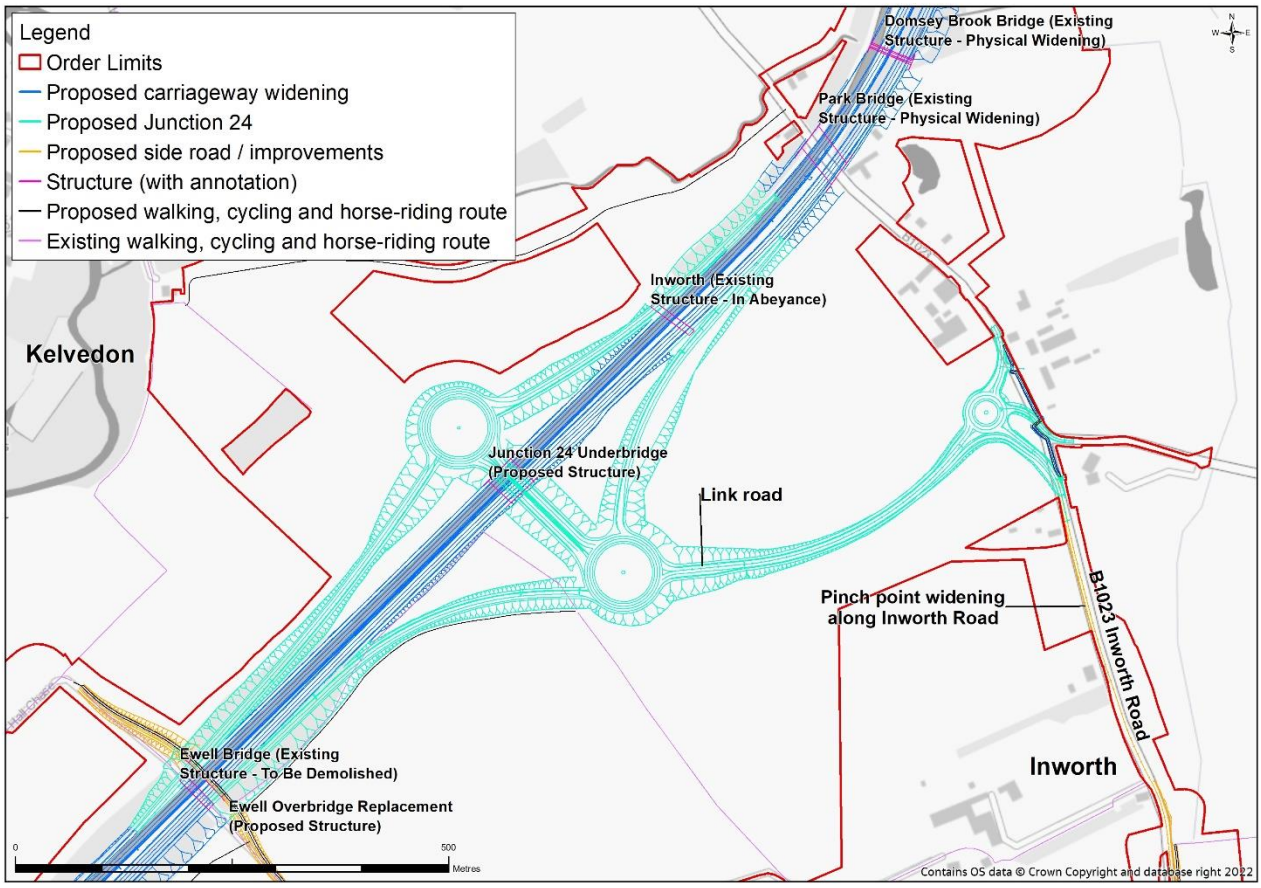
2.5.20 Design section 3 covers works between the existing junction 23, south of Kelvedon, to junction 25 at Marks Tey, where the proposed scheme ends. This section of work is shown on sheets 12 to 21 of the General Arrangement Plans [TR010060/APP/2.9].

2.5.21 The approximately 2.7km section of A12 between the existing junction 23 and proposed junction 24 (Kelvedon bypass) would be widened, upgrading the two-lane dual carriageway to a three-lane dual carriageway in each direction. This would be predominantly symmetrical widening, where each existing carriageway would be widened by approximately 3.65m, except near Cranes Bridge and Ashmans Bridge (east of the existing junction 23), and Park Bridge (where the A12 crosses the B1023 Inworth Road) where asymmetric widening is proposed to the southbound carriageway. The A12 is generally on embankment on the approach to the existing junction 23 and junction 24, and in cutting or at grade in the middle section of the Kelvedon bypass. This section of works is shown on sheets 12 to 14 of the General Arrangement Plans [TR010060/APP/2.9]. Six existing structures would be affected in this section (see Section 2.5 – Structures, of this chapter for more information):

- Ashmans Bridge (A12 crossing over the River Blackwater, south-west of Kelvedon) – existing bridge would be widened
- Ashmans Farm Footbridge (just south of Ashmans Bridge) – a bridge would be repositioned south of its existing position
- Highfields Bridge (Maldon Road crossing over the A12, south of Kelvedon) – existing bridge would be demolished and replaced with a new overbridge
- Ewell Bridge (Ewell Hall Chase crossing over the A12, south of Kelvedon) – existing bridge would be demolished and replaced with a new overbridge
- Inworth Subway (south-west of the A12 crossing over B1023 Inworth Road) – existing subway would be decommissioned
- Park Bridge (A12 crossing over B1023 Inworth Road) – existing bridge would be widened

2.5.22 The proposed junction 24 layout is shown on Plate 2.5 and sheet 14 of the General Arrangement Plans [TR010060/APP/2.9]. Junction 24 would be a two-tiered dumbbell layout west of Inworth Road. A single link road would provide access between the proposed scheme and neighbouring towns, such as Kelvedon and Tiptree, via a new roundabout on the locally realigned B1023 Inworth Road. The junction would be in cutting, with the proposed scheme mainline travelling over the dumbbell link road. A new Junction 24 Underbridge would be built where the proposed main alignment crosses the new junction 24.

Plate 2.5 Overview of proposed junction 24 highway works



2.5.23 From the proposed junction 24, a section of new carriageway is proposed. This would be approximately 6.2km in length, consist of three lanes in each direction and would be a mixture of embankment and cutting. The new carriageway would tie into the upgraded junction 25. The lanes are proposed to be of standard cross-section, with a carriageway width of approximately 13m in each direction (3 x 3.65m wide lanes, 2 x hard strips), with a central reserve and verges. The remainder of the section consists of online widening through Marks Tey. This section of works is shown on sheets 14 to 19 of the General Arrangement Plans [TR010060/APP/2.9]. Four existing structures would be affected in this section, and five new bridges would be provided (see Section 2.5 – Structures, of this chapter for more information):

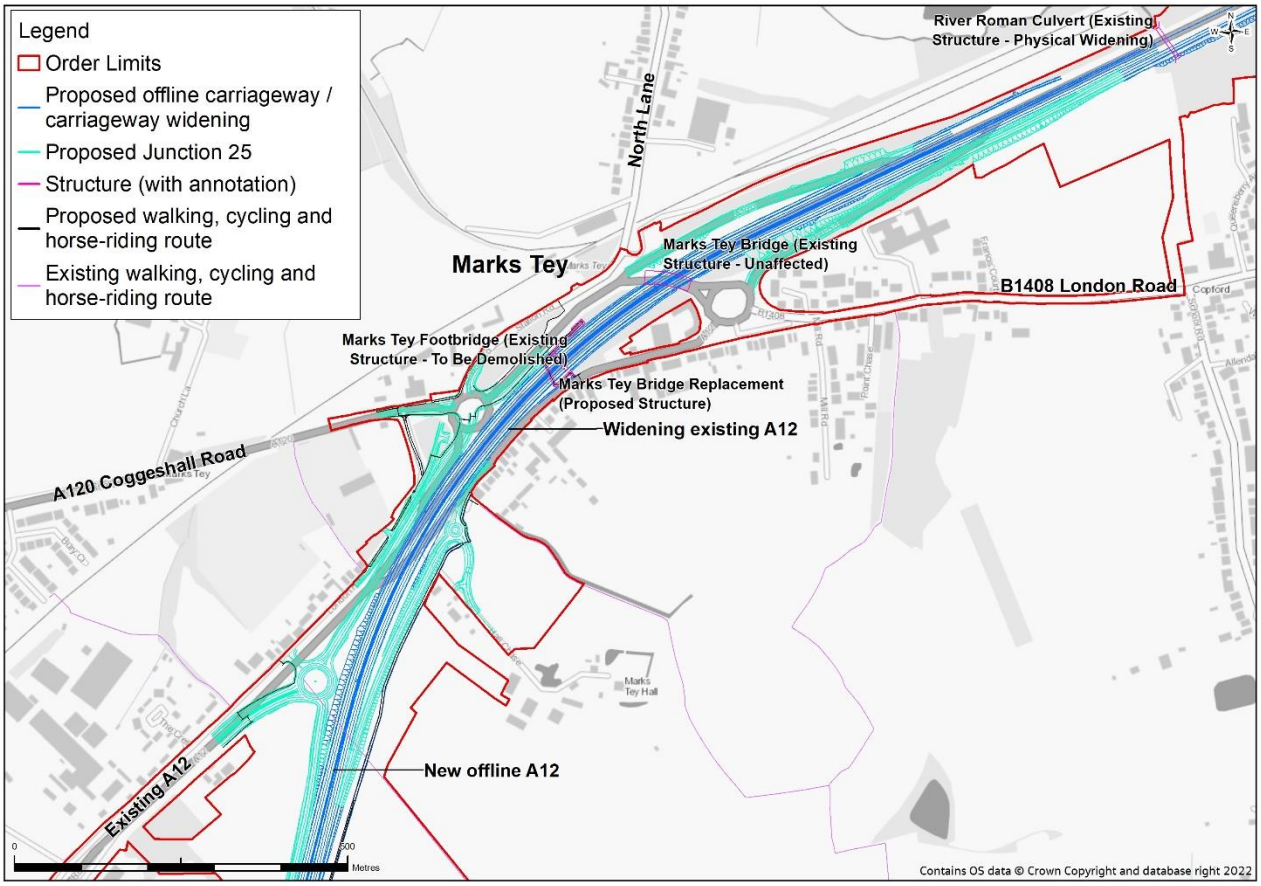
- Domsey Brook Bridge (A12 crossing over Domsey Brook, east of Kelvedon) – existing bridge would be extended

- Threshelfords Bridge (south of the existing junction 24) – existing bridge would be demolished
- Prested Hall Overbridge (south of the existing junction 24) – new overbridge would be constructed to take the new combined Prested Hall and Threshelfords access road over the new A12 alignment
- Nursery Bridge (part of the existing junction 24 arrangement) – existing bridge would be demolished
- Easthorpe Road Overbridge (Easthorpe Road crossing over the A12, between junctions 24 and 25) – new overbridge would be constructed to take Easthorpe Road over the new A12 alignment
- Domsey Brook East Culvert (A12 crossing over the Domsey Brook, between junctions 24 and 25) – new underbridge would be constructed to take the new A12 alignment over the Domsey Brook
- Wishingwell Overbridge (north-east of Easthorpe Green) – new overbridge would be constructed to take a local access road over the new A12 alignment
- Potts Green Bridge (south of Doggetts Lane) – new bridge for walkers
- Roman River Culvert (A12 crossing over the Roman River, north-east of junction 25) – existing culvert would be extended

2.5.24 The proposed junction 25 layout is shown on Plate 2.6 and sheets 18 to 19 of the General Arrangement Plans [TR010060/APP/2.9]. Junction 25 would be a two-tier split dumbbell layout, connecting with surrounding roads in Marks Tey including the A120 and the B1408. The Marks Tey Bridge (which is part of the existing junction 25 arrangement) would be retained to connect the junction roundabouts. The western Marks Tey Roundabout would be converted to a signalised junction. The existing Marks Tey footbridge would be demolished, and a replacement bridge (Marks Tey Replacement Bridge) provided for walkers and cyclists. Junction 25 is raised above the A12 mainline.

2.5.25 The Order Limits extend to the north of junction 25 to allow for roadside works in the verges, such as new signage and works associated with the junction 25 improvements.

Plate 2.6 Overview of proposed junction 25 highway works



Side roads

2.5.26 There would be side road upgrades and local accesses across the proposed scheme, as detailed in Table 2.3, and shown on Figure 2.3: Temporary Working Areas, Side Roads and Structures [TR010060/APP/6.2] and the General Arrangement Plans [TR010060/APP/2.9]. Table 2.3 references the relevant sheets from the General Arrangement Plans.

2.5.27 Table 2.3 describes WCH routes associated with side road upgrades. The dimensions described in Table 2.3 are approximate based on the preliminary design, and are subject to design evolution that will take place at the detailed design (within the limits of deviation shown on the Permanent Works Plans [TR010060/APP/2.2.1]).

Table 2.3 Details of proposed side road upgrades

Side road	Description
Design section 1	
Paynes Lane Bridleway, Boreham Shown on sheet 2 of the General Arrangement Plans [TR010060/APP/2.9]	Paynes Lane is an existing PRoW (bridleway 213_45) south of the existing A12. Bridleway 213_23 is north of the GEML railway. The proposed scheme includes a new Paynes Lane Bridge to link the two bridleways and provide a continuous walkers, cyclists and horse riders route across the A12, side roads and railway. The walkers, cyclists and horse riders proposal to the south of the A12 along Paynes Lane is limited to improving the surfacing of the 3m wide existing bridleway. A 35m long, 3m wide shared use cycle track facility has been proposed adjacent to the northbound lane of the existing B1137 Main Road to provide a connection for these users between the proposed crossing of Main Road (near to its junction with Paynes Lane), and junction 19. The cycle track would continue across junction 19, on the southern side of Boreham Bridge, to connect to the Beaulieu Park Radial Distributor Road. The ramps of Paynes Lane Bridge would tie in with the existing bridleway levels to the north of the GEML. Existing vehicular access rights on Paynes Lane would not be altered by the proposed scheme.
Main Road, Hatfield Peverel Shown on sheets 4 to 5 of the General Arrangement Plans [TR010060/APP/2.9]	Localised amendments to Main Road are proposed to remove the arrangement that allows southbound traffic to access the A12 via junction 20a. A 3m wide shared use cycle track would be provided along Main Road connecting to the existing PRoW crossing over the River Ter.
Bury Lane Overbridge replacement, Hatfield Peverel Shown on sheet 5 of the General Arrangement Plans [TR010060/APP/2.9]	This overbridge would be replaced to accommodate the widening of the A12 mainline. The carriageway on the replacement bridge would approximately match the existing bridge width and would, in addition, include a 3m wide shared use cycle track adjacent to the southbound traffic lane. Due to site constraints, a maintenance access path only would be provided adjacent to the northbound traffic lane.
Station Road Overbridge replacement, Hatfield Peverel Shown on sheet 5 of the General Arrangement Plans [TR010060/APP/2.9]	This overbridge would be replaced to accommodate the widening of the A12 mainline. This is a constrained site, with property access directly adjacent to the bridge abutments on both sides. The proposed cross-section would be a standard two-way single carriageway, including a 2.5m footway on both sides of the road to tie in with existing footways.

Side road	Description
Junction 21 link roads, Witham Shown on sheet 6 of the General Arrangement Plans [TR010060/APP/2.9]	The proposed J21 upgrade is expected to cause an increase in southbound traffic on the B1389. To accommodate the increased traffic, a section of the B1389 in west Witham would be realigned to provide access to the new J21. The proposed cross-section would be a two-way single carriageway. A 3m wide shared use cycle track adjacent to the northbound lane would be included which would tie in with proposed housing developments. The closure of J20a and J20b, along with the upgrade of J21, means that a northern link road between J21 and the B1137 would be required to provide a link with Hatfield Peverel. Therefore, Wellington Bridge would be replaced to accommodate the A12 widening and also provide local access for the Vineyards (a cluster of properties in the northern side of Wellington Bridge) and Hatfield Peverel to the northern roundabout of J21. Wellington Bridge would include a 4m wide shared use cycle track adjacent to the northbound carriageway. The cycle track would continue around the northern dumbbell of the new J21, connecting to the B1389. The Street, east of Wellington Bridge, would be converted to a cul-de-sac to provide local access. As J21 would be relocated, a local access road would be provided for access between the J21 southern roundabout and Latney's Boarding Kennels, Cattery and Grooming Parlour. There would be a shared use cycle track from The Street, around the southern dumbbell of the new J21, to Latney's, connecting to existing PRoW.
Access to Dengie Farm, Witham Shown on sheet 7 of the General Arrangement Plans [TR010060/APP/2.9]	Howbridge Hall Road is a 2.5m wide existing private means of access (PMA), providing a connection to a single property to the south of the existing A12 at Witham. The PMA would be realigned slightly to the south due to the land forming the existing PMA being required for the proposed A12 alignment and earthworks. The majority of the section to be realigned is a private access road within a private plot, with minor amendments required to the existing section under Essex County Council's ownership where the alignment bends from north–south to east–west. The width and surface of the new PMA would be similar to the existing PMA.

Side road	Description
Gershwin Boulevard/Olivers Drive, Witham Shown on sheet 8 of the General Arrangement Plans [TR010060/APP/2.9]	Olivers Drive is the location of an existing PRoW (footpath 121_95) that is bisected by the existing A12. Although a crossing over the A12 and a gap within the central reserve barrier exist at this location, crossing a high-speed dual carriageway with a high volume of traffic is not safe for either pedestrians or road users. To the north of the existing A12, footpath 121_95 runs along Olivers Drive to provide local connectivity. A 3m wide footpath would be provided between Olivers Drive and the new Gershwin Boulevard Bridge to provide a connection between the existing footpath along Gershwin Boulevard and footpath 121_95 south of the A12. A bridge for walkers over the A12 is proposed to provide a safe crossing point over the A12 and remove the existing severance of footpath 121_95 by the A12. Further detail on Gershwin Boulevard Bridge is provided in Table 2.4. To the south of the A12, the existing footpath 121_95 continues southwards to provide connectivity to Oliver Farm House and links with footpath 268_4. South of the A12, a new connection would be provided from the existing southern length of footpath 121_95 to the proposed Gershwin Boulevard Bridge and its approach.
Design section 2	
Little Braxted – PRoW 121_103 Shown on sheet 10 of the General Arrangement Plans [TR010060/APP/2.9]	The existing PRoW 121_103, which provides a connection from Little Braxted Lane to Freebournes Road with access available to cross over the A12 via a staggered crossing, would be severed by the new proposed A12 alignment. The new proposed Little Braxted Bridge crossing over the A12 would be located to the west of J22 to avoid being within floodplain, and to provide a suitable connection between National Cycle Network Route 16 and PRoW 105_63, adjacent to Little Braxted Lane to the south of the A12, and the A12 northbound exit slip road leading to Eastways junction, to the north-west of A12. The proposal includes a bridge for walkers and cyclists over the proposed A12, conveying both the existing National Cycle Network Route 16 and PRoW 121_103, providing connection to PRoW 105_63 to the south of A12. To the north of the A12, the proposed shared use cycle track would utilise part of the existing A12 northbound carriageway and exit slip road to connect with Eastways junction and PRoW 121_119 via the B1389 Colchester Road.

Side road	Description
Eastways junction with J22, Witham Shown on sheet 10 of the General Arrangement Plans [TR010060/APP/2.9]	The proposed A12 J22 includes a new dual carriageway link from the western dumbbell to the B1389 Colchester Road, leading to the existing Eastways junction in Witham. As a result of the construction of the new J22, removal of the existing Colemans Bridge southbound on and off-slips, and the new dual carriageway layout, the Eastways junction would need to be reconfigured. The Eastways junction proposal is a four-arm signalised junction with a dual carriageway in the eastern arm and single carriageways on the remaining three arms with improved walker and cyclist routes on both sides of the B1389 road.
Rivenhall End West Roundabout Shown on sheet 11 of the General Arrangement Plans [TR010060/APP/2.9]	The proposed scheme runs approximately 220m to the south of the existing A12 and would sever the existing north-to-south connection via Henry Dixon Road and Braxted Road. The following are proposed to address the severance caused by the proposed scheme: • A roundabout linking the existing A12 to Braxted Road and Henry Dixon Road • A new overbridge to Braxted Road from Rivenhall End and the de-trunked A12 • Oak Road (north) to be closed at the existing A12 • Oak Road (south) junction with the de-trunked A12 to be converted to a simple priority junction There would be a 3m wide shared use cycle track through Rivenhall End to the north of the de-trunked A12, connecting with existing cycle tracks, with a new crossing of the de-trunked A12 connecting to Oak Road (south). A new 4m wide shared use cycle track would also be provided over Braxted Road Overbridge.
Essex County Fire and Rescue Service Headquarters access, Rivenhall End Shown on sheet 12 of the General Arrangement Plans [TR010060/APP/2.9]	The existing A12 and J23 southbound on-slip would become the access from Witham for the Essex County Fire and Rescue Service Headquarters and Hole Farm. The carriageway is proposed to be de-trunked and handed to Essex Country Council, with access provided to each premises via a private junction. The proposed cross-section would be a two-way single carriageway together with a 2.5m wide footway adjacent to the northbound lane.

Side road	Description
B1024 Rivenhall Link Road/Cranes Lane Shown on sheets 11 to 12 of the General Arrangement Plans [TR010060/APP/2.9]	A new road linking Rivenhall End to Kelvedon would run adjacent to the northern carriageway of the proposed scheme. A roundabout would facilitate the transition between the A12 de-trunked section and the new single carriageway link road connecting to the existing J23 northbound off-slip. The proposed cross-section would be a two-way single carriageway with a 3m wide shared use cycle track adjacent to the northbound carriageway. Bus stops would be provided within this new section of road connecting the Essex County Fire and Rescue Service Headquarters to public transport links via the new Snivellers Lane Bridge. The removal of the J23 entry and exit slip roads requires a slight modification of the existing B1024 and Cranes Lane crossroads to a staggered type junction at the eastern side of the proposed single carriageway link road, as well as localised realignment works to both approaches to the junction of the B1024. This is to improve safety for road users and smooth flow of traffic.
Ashmans Bridge PRoW 92_30, Kelvedon Shown on sheet 12 of the General Arrangement Plans [TR010060/APP/2.9]	The existing PRoW 92_30 (a public footpath) is located to the south of the A12 Ashmans Bridge and runs parallel to the A12. It provides connections with the B1024 at the western side and Braxted Road/Highfield Lane at the eastern side. The PRoW includes a timber footbridge (Ashmans Farm Footbridge) across the River Blackwater. PRoW 92_30 would be realigned to the south due to clashes with the proposed A12 widening earthworks and a construction haul road. A footbridge would be repositioned approximately 75m south of the existing location. This was decided to minimise the potential impacts on the floodplain and to avoid clashes with construction traffic haulage. PRoW 92_30 would also be realigned to provide the required connection with the footbridge on both sides. The footbridge ramps would be constructed with reinforced earthworks with 1:20 slopes on both sides. The proposed effective width of the footpath at the bridge and ramps would be 3m.
Highfields Lane Overbridge replacement, Kelvedon Shown on sheet 13 of the General Arrangement Plans [TR010060/APP/2.9]	The existing overbridge would be replaced by a new bridge adjacent to the existing to accommodate the A12 mainline widening. The bridge would connect to a realigned Maldon Road north of the A12, and to a realigned Highfields Lane to the south of the A12. The bridge would include a 4m wide shared use cycle track. A shared use cycle track would also be provided on the south side of the realigned Highfield Lane.

Side road	Description
Design section 3	
Ewell Overbridge replacement, Kelvedon Shown on sheet 14 of the General Arrangement Plans [TR010060/APP/2.9]	The existing overbridge would be replaced by a new bridge adjacent to the existing to accommodate the A12 mainline widening. The proposed carriageway would include a single lane with a 2.5m footpath adjacent to the southbound lane. A footpath would also be provided south of the A12 connecting Highfields Lane to Ewell Hall Chase.
Inworth Road Shown on sheets 14 and 20 of the General Arrangement Plans [TR010060/APP/2.9]	To accommodate the predicted traffic flow and improve the safety of road users along Inworth Road, carriageway widening between the proposed J24 roundabout and the Perrywood Garden Centre has been proposed. The proposed carriageway widening ranges from 0.25m to approximately 1.5m. The main purpose of the widening is to improve the substandard width of the existing carriageway and also to remove the pinch-points along the curvatures of the road to facilitate the smooth flow of traffic and reduce the risk of collisions between HGVs.
Prested Hall and Threshelfords access, Kelvedon Shown on sheet 15 of the General Arrangement Plans [TR010060/APP/2.9]	The Threshelfords accommodation bridge would be demolished, with a new bridge providing joint access to Threshelfords Farm and Prested Hall, crossing over the proposed scheme near the existing J24. The new road would be a PMA. The proposed Prested Hall access road is a two-way single carriageway with a 3m wide shared use cycle track adjacent to the southbound lane, designed to provide access from the local road network to all premises served by the existing Prested Hall access road. The proposed Threshelfords access is a two-way farm track access with a 2.5m wide footpath on its southbound side.
Existing A12 junction 24 improvements, Kelvedon Shown on sheet 15 of the General Arrangement Plans [TR010060/APP/2.9]	A new J24 would be provided west of the existing J24. The layout of the existing J24 would be converted to a new five-arm roundabout to accommodate local movements in all directions. The section of the existing A12 leading towards the proposed roundabout's eastern arm would be retained as a two-lane dual carriageway, with a 3m shared use cycle track adjacent to the northbound lane and a footway adjacent to the southbound lane. New Lane (northern arm of the roundabout) would include a two-way single lane carriageway with a shared use 3m wide cycle track either side of the carriageway. The south-west arm along the B1024 London Road would become a two-way single carriageway (matching the existing), with a 3m wide shared use cycle track adjacent to both the northbound and southbound lanes. Heathfield Farm access road has been designed with a single lane. Localised realignment works to New Lane to the north of the proposed roundabout, and a private road providing access to a number of properties including Prested Hall Cottages and Heathfield to the south of the existing A12, are required to ensure the reconfiguration of the existing junction 24 arrangement is compatible with the approach roads.

Side road	Description
Easthorpe Road Shown on sheet 16 of the General Arrangement Plans [TR010060/APP/2.9]	To maintain the existing connectivity with the de-trunked A12, Easthorpe Road would be replaced with a new overbridge to cross the proposed A12 mainline. A farm access road is located approximately 160m away from the existing junction between Easthorpe Road and the A12, and would be realigned to form a T-junction with the proposed new Easthorpe Road. A new four-arm roundabout would be included at the tie-in location with the existing A12 de-trunked section to provide all-direction movements. The proposed new Easthorpe Road is a two-way single carriageway with a footway adjacent to the southbound lane. This road is intended for farm and emergency access only and not for public traffic.
Wishingwell Farm access road (providing access to Wishingwell Farm, Easthorpe Green Farm and 1 & 2 The Lodge), Marks Tey Shown on sheets 17 and 18 of the General Arrangement Plans [TR010060/APP/2.9]	Wishingwell Overbridge would be a new offline road for access to Easthorpe Green Farm and Wishingwell Farm and Numbers 1 & 2 The Lodge, replacing the two private roads which these premises are currently accessed by. The tie-in with the de-trunked A12 would be via a new three-arm roundabout. The proposed access road consists of a two-way single carriageway with a 2.5m wide footway adjacent to the southbound lane. Where the proposed overbridge crosses the A12, the width of the footway increases to 3m.
Doggetts Lane – PRoW 144_19, Marks Tey Shown on sheet 18 of the General Arrangement Plans [TR010060/APP/2.9]	Doggetts Lane is an existing PMA to Doggetts and Hammer Farm from the existing A12, and it is the location of PRoW 144_19 (a public footpath) that would be severed by the new alignment of the A12. To the north of the proposed A12, PRoW 144_19 continues northwards and connects to the footway that runs along the existing A12 to connect with PRoW 144_15 and PRoW 144_18 (a public footpath) crossing over the existing A12. To the south of the proposed A12, PRoW 144_19 continues south-westwards and joins PRoW 128_28 (a bridleway). A new bridge for walkers (Potts Green Bridge), with a clear width of 4m, has been proposed over the new alignment of the A12. This bridge would connect the extended Doggetts Lane (PRoW 144_19) on the north side of the A12 to the proposed footway running on the southern side of the A12 (as described above for the Wishingwell Farm side road). This proposal would ensure the existing PRoW 144_19 maintains existing local connections and serves the community at large on both sides of the proposed A12. A shared use cycle track, with a width of 3m, would be provided to the south of the A12 and would provide connections with the new J25 roundabout at Hall Chase, and the PRoW network north of Easthorpe.

Side road	Description
Old London Road, Marks Tey Shown on sheet 18 of the General Arrangement Plans [TR010060/APP/2.9]	To facilitate capacity improvements at the A120 approach to J25, the existing junction between the A120 Coggeshall Road and Old London Road is planned to be closed and Old London Road to be realigned to the east to provide a turning head. Access to Old London Road is currently achievable from the northbound carriageway of the existing A12, and to supplement this arrangement a further access is proposed from the roundabout at the northern end of the proposed J25 northbound diverge exit slip road.
Hall Chase, Marks Tey Shown on sheet 18 of the General Arrangement Plans [TR010060/APP/2.9]	The current junction between London Road (Marks Tey) and Hall Chase is proposed to be relocated due to the alignment of the offline A12 as it ties-in to the existing alignment near J25. At the junction of London Road (Marks Tey) and the northern end of the J25 southbound entry slip road, a third arm would provide access to the realigned Hall Chase. The realigned section of Hall Chase consists of a two-way single carriageway.

Structures

2.5.28 Table 2.4 and Table 2.5 describe the proposed overbridge and underbridge works respectively. The location of structures is shown on the General Arrangement Plans [TR010060/APP/2.9], and more design information is included on the Structures Engineering Drawings and Sections [TR010060/APP/2.12]. Tables 2.4 and 2.5 reference the relevant sheets from these plans.

2.5.29 The dimensions described in Tables 2.4 and 2.5 are approximate based on the preliminary design, and are subject to design evolution that will take place at the detailed design (within the limits of deviation shown on the Permanent Works Plans [TR010060/APP/2.2.1]).

Table 2.4 Overbridge descriptions

Overbridge	Description
Boreham Bridge (J19)	Boreham Bridge is part of the J19 design, connecting the two roundabouts. The bridge would be physically widened on both the north and south side. There would be a 3.5m wide shared use cycle track adjacent to the southern bridge carriageway. This bridge is shown on sheet 2 of the General Arrangement Plans and sheet 1 of the Structures Engineering Drawings and Sections.
Payne's Lane Bridge	A bridge would be provided for walkers, cyclists and horse riders across the proposed scheme east of J19. The clear width of the bridge would be approximately 4m. This bridge is shown on sheet 2 of the General Arrangement Plans and sheet 2 of the Structures Engineering Drawings and Sections.
Generals Lane Bridge	This bridge would be unaffected by the proposed scheme. This bridge is shown on sheet 2 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be unaffected).

Overbridge	Description
Porter's Park Bridge	This bridge would be unaffected by the proposed scheme. This bridge is shown on sheet 3 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be unaffected).
Crix Bridge	This bridge would be unaffected by the proposed scheme. This bridge is shown on sheet 4 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be unaffected).
Bury Lane Overbridge replacement	The existing Bury Lane Bridge, which crosses the existing A12 as part of J20a, would be demolished and rebuilt to accommodate the widening for the proposed scheme. The clear width of the new bridge would be approximately 11.5m (accommodating a verge, 7.3m carriageway, and 3m shared use cycle track). This bridge is shown on sheet 5 of the General Arrangement Plans and sheet 4 of the Structures Engineering Drawings and Sections.
Station Road Overbridge replacement	The existing Station Road Bridge, which crosses the existing A12 to connect the northern and southern areas of Hatfield Peverel, would be demolished and rebuilt to accommodate the widening for the proposed scheme. The effective width of the new bridge would be approximately 12.3m (accommodating a 7.3m carriageway and 2.5m footway either side of the carriageway). This bridge is shown on sheet 5 of the General Arrangement Plans and sheet 5 of the Structures Engineering Drawings and Sections.
Wellington Road Overbridge	The existing Wellington Bridge would be demolished and rebuilt to accommodate the widening of the proposed scheme. The effective width of the new bridge would vary between 11.9m and 16.1m (accommodating a variable width verge, 7.3m carriageway, and 4m shared use cycle track). This bridge is shown on sheet 6 of the General Arrangement Plans and sheet 6 of the Structures Engineering Drawings and Sections.
Hatfield Road Overbridge (J21)	Hatfield Road overbridge is part of the J21 design, connecting the two roundabouts. The effective width of the new bridge would be approximately 27.1m (accommodating a verge, 9.3m southbound carriageway, central reserve, 9.3m northbound carriageway, and 3.5m footway). This bridge is shown on sheet 6 of the General Arrangement Plans and sheet 7 of the Structures Engineering Drawings and Sections.
Woodend Bridge	Woodend Bridge would be demolished as part of the proposed scheme. This bridge is shown on sheet 6 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be demolished).
Gershwin Boulevard Bridge	A bridge would be provided for walkers across the proposed scheme south of Witham. The clear width of the bridge would be approximately 4m. This bridge is shown on sheet 8 of the General Arrangement Plans and sheet 8 of the Structures Engineering Drawings and Sections.

Overbridge	Description
Little Braxted Bridge	A bridge would be provided for walkers and cyclists across the proposed scheme south of J22. The clear width of the bridge would be approximately 4m. This bridge is shown on sheet 10 of the General Arrangement Plans and sheet 12 of the Structures Engineering Drawings and Sections.
Colemans Bridge	Colemans Bridge would be demolished as part of the proposed scheme. This bridge is shown on sheet 10 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be demolished).
Little Braxted Lane Overbridge (J22)	Little Braxted Lane Overbridge is part of the new J22, connecting the two roundabouts. The effective width of the new bridge would be approximately 25.6m (accommodating south and northbound verges, 9.3m southbound carriageway, central reserve, and 9.3m northbound carriageway). This bridge is shown on sheet 10 of the General Arrangement Plans and sheet 13 of the Structures Engineering Drawings and Sections.
Braxted Road Overbridge	Braxted Road overbridge would cross the proposed scheme with a modified Braxted Road alignment, west of the existing Braxted Road. The effective width of the new bridge would be approximately 12.5m (accommodating a verge, 7.3m carriageway, and 4m shared use cycle track). This bridge is shown on sheet 11 of the General Arrangement Plans and sheet 14 of the Structures Engineering Drawings and Sections.
Memorial Bridge	This bridge would be unaffected by the proposed scheme. It would be handed back to Essex County Council as part of the de-trunked A12. This bridge is shown on sheet 11 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be unaffected).
Rivenhall Bridge	This bridge would be unaffected by the proposed scheme. It would be handed back to Essex County Council as part of the de-trunked A12. This bridge is shown on sheet 11 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be unaffected).
Snivellers Lane Bridge	A bridge would be provided for walkers and cyclists across the proposed scheme from the Essex County Fire and Rescue Service Headquarters. The clear width of the bridge would be approximately 4m. This bridge is shown on sheet 12 of the General Arrangement Plans and sheet 16 of the Structures Engineering Drawings and Sections.
Ashmans Farm Footbridge	A footbridge would be repositioned approximately 75m south of its existing location and would be for walkers only, as per the existing situation. This bridge is shown on sheet 12 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be relocated).

Overbridge	Description
Highfields Overbridge replacement	The existing Highfields Bridge would be demolished and rebuilt to the west to accommodate the proposed scheme carriageway. The effective width of the new bridge would be approximately 12m (accommodating a verge, 6.75m carriageway, and 4m shared use cycle track). This bridge is shown on sheet 13 of the General Arrangement Plans and sheet 19 of the Structures Engineering Drawings and Sections.
Ewell Overbridge replacement	The existing Ewell Bridge would be demolished and rebuilt to the east to accommodate the proposed scheme carriageway. The effective width of the new bridge would be approximately 6.7m (accommodating a verge, 3.6m carriageway, and 2.5m footpath). This bridge is shown on sheet 14 of the General Arrangement Plans and sheet 20 of the Structures Engineering Drawings and Sections.
Prested Hall Overbridge	The existing Threshelfords accommodation bridge would be demolished. A new overbridge is proposed as part of the Prested Hall and Threshelfords access roads, south of the existing J24. The effective width of the new bridge would be approximately 10.6m (accommodating a verge, 6m carriageway, and 4m shared use cycle track). This bridge is shown on sheet 15 of the General Arrangement Plans and sheet 24 of the Structures Engineering Drawings and Sections.
Nursery Bridge	Bridge would be demolished as part of the proposed scheme. This bridge is shown on sheet 15 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be demolished).
Easthorpe Road Overbridge	A new overbridge would be built as part of the new Easthorpe Road alignment, which is designed to cross the proposed scheme. The effective width of the new bridge would be approximately 11m, including a 3m footway. This bridge is shown on sheet 16 of the General Arrangement Plans and sheet 25 of the Structures Engineering Drawings and Sections.
Wishingwell Overbridge	A new overbridge would be built to accommodate the new Damyon's Farm access road across the proposed scheme. The effective width of the new bridge would be approximately 9.6m (accommodating a verge, 6m carriageway, and 3m footway). This bridge is shown on sheet 17 of the General Arrangement Plans and sheet 27 of the Structures Engineering Drawings and Sections.
Potts Green Bridge	A bridge would be provided for walkers across the proposed scheme west of J25. The clear width of the bridge would be approximately 4m. This bridge is shown on sheet 18 of the General Arrangement Plans and sheet 28 of the Structures Engineering Drawings and Sections.
Marks Tey Replacement Bridge	The existing Marks Tey Footbridge would be demolished and rebuilt as a bridge for walkers and cyclists across the proposed scheme through J25. The clear width of the bridge would be approximately 4m. This bridge is shown on sheet 19 of the General Arrangement Plans and sheet 29 of the Structures Engineering Drawings and Sections.

Overbridge	Description
Marks Tey Bridge (J25)	This bridge would be unaffected by the proposed scheme. This bridge is shown on sheet 19 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the bridge would be unaffected).

Table 2.5 Underbridge descriptions

Underbridge	Description
River Ter Bridge	The A12 mainline crosses the River Ter west of Hatfield Peverel. The existing three-span reinforced concrete structure would be retained, with the carriageway widened to three lanes in each direction. There are no geometric modifications proposed. The additional lane in each direction would be provided by altering the width of the running lanes and verges. This bridge is shown on sheet 5 of the General Arrangement Plans and sheet 3 of the Structures Engineering Drawings and Sections.
Olivers Bridge	The proposed new dual three-lane A12 mainline crosses Maldon Road (B1018) south of Witham. The aspiration is that this bridge would be widened within the extents of the existing deck without widening the physical structure. However, for the purpose of the Environmental Statement a worst case of 4m widening either side has been assumed. This bridge is shown on sheet 8 of the General Arrangement Plans and sheet 9 of the Structures Engineering Drawings and Sections.
Benton Bridge	The existing Benton Bridge carries the A12 over the abandoned Witham to Maldon railway line (now part of the Blackwater Rail Trail). The aspiration is that that this bridge would be widened within the extents of the existing deck without widening the physical structure. However, for the purpose of the Environmental Statement a worst case of 4m widening either side has been assumed. This bridge is shown on sheet 8 of the General Arrangement Plans and sheet 10 of the Structures Engineering Drawings and Sections.
Brain Bridge	The proposed dual three-lane A12 mainline crosses the River Brain, a single-lane unclassified road and a PRoW south of Witham. The existing structure would be widened to accommodate the new A12 cross-section, with three running lanes in each direction, a central reserve, and associated hard strips and verges. The structure would be extended by approximately 7m to the east and 5m to the west. This bridge is shown on sheet 8 of the General Arrangement Plans and sheet 11 of the Structures Engineering Drawings and Sections.
Barrows Creep Underpass	Underpass would be decommissioned (infilled) as part of the proposed scheme. This underpass is shown on sheet 9 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the underpass would be decommissioned).
Rivenhall Brook Culvert	An underbridge is required to cross the Rivenhall Brook east of Rivenhall End. A new culvert would be located approximately 90m south-east of the existing A12 crossing of the river, and would have a length of approximately 46m. This bridge is shown on sheet 11 of the General Arrangement Plans and sheet 15 of the Structures Engineering Drawings and Sections.

Underbridge	Description
Cranes Bridge	The proposed dual three-lane A12 mainline crosses the existing London Road southbound on-slip (B1024) west of Kelvedon. The bridge would be upgraded to accommodate three running lanes in each direction, a central reserve, and associated hard strips and verges. Structural modifications are proposed to accommodate the increased cross-section, and the structure would be extended to the south by approximately 10.3m. This bridge is shown on sheet 12 of the General Arrangement Plans and sheet 17 of the Structures Engineering Drawings and Sections.
Ashmans Bridge	The proposed dual three-lane A12 mainline crosses the River Blackwater west of Kelvedon. The abutments and intermediate piers are supported on piled foundations. The structure would be upgraded to accommodate a cross-section with three running lanes in each direction, a central reserve, and associated hard strips and verges. The structure would be asymmetrically extended by approximately 10.1m to the south to accommodate the increased cross-section. This bridge is shown on sheet 12 of the General Arrangement Plans and sheet 18 of the Structures Engineering Drawings and Sections.
New Junction 24 Underbridge	A new underbridge would be built where the proposed main alignment crosses the new J24. The effective width of the new bridge would be approximately 36.5m (accommodating south and northbound verges, 11m southbound carriageway, central reserve, and 11m northbound carriageway). This bridge is shown on sheet 14 of the General Arrangement Plans and sheet 21 of the Structures Engineering Drawings and Sections.
Inworth Subway	The proposed dual three-lane A12 crosses a cattle creep near Inworth. This would be decommissioned as this access is no longer expected to be suitable and access between the landowner's fields north and south of the A12 would be possible via the nearby proposed J24. This bridge is shown on sheet 14 of the General Arrangement Plans (it is not shown on the Structures Engineering Drawings and Sections as the subway would be decommissioned).
Park Bridge	The proposed dual three-lane A12 mainline crosses the B1023 at Messing-cum-Inworth. The existing structure would be widened to accommodate a cross-section with three running lanes in each direction, a central reserve, and associated hard strips and verges. The structure would be widened by approximately 28.8m to the south and 5.3m to the north to accommodate the increased cross-section. This bridge is shown on sheet 14 of the General Arrangement Plans and sheet 22 of the Structures Engineering Drawings and Sections.
Domsey Brook Bridge	The proposed dual three-lane A12 crosses Domsey Brook at Gore Pit. The structure would be extended to accommodate the new carriageway with three running lanes in each direction, a central reserve, and associated hard strips and verges. The structure would be asymmetrically extended by approximately 34.6m to the south-east to accommodate the additional lanes and slip roads. This bridge is shown on sheet 14 of the General Arrangement Plans and sheet 23 of the Structures Engineering Drawings and Sections.

Underbridge	Description
Domsey Brook East Culvert	Culvert would carry the realigned Domsey Brook under the new A12 bypass. The culvert would be located approximately 100m from the existing A12, and would have a length of 60m. This culvert is shown on sheet 17 of the General Arrangement Plans and sheet 26 of the Structures Engineering Drawings and Sections.
Roman River Culvert	Proposed scheme would involve widening the southbound highway embankment and extending the existing watercourse culvert by approximately 12m. This would necessitate the realignment of a section of the Roman River south of the A12. This culvert is shown on sheet 19 of the General Arrangement Plans and sheet 30 of the Structures Engineering Drawings and Sections.

Embankments and retaining walls

2.5.30 The proposed scheme would require a number of embankments and cuttings to accommodate the horizontal and vertical alignment of the new road. As a general principle, these slopes are proposed to be 1:3 or 1:2.5, except at cuttings deeper than 2.5m deep where the slope would be slackened to 1:3.5 to improve slope stability. Where there would be very localised widening, short sections of 1:2 embankment slopes would be employed to limit the overall widening needed and land-take required.

2.5.31 Earthworks have been designed to allow for planting on them to screen views of the proposed scheme.

2.5.32 Earth bunds have been included within the design near to the alignment of the new offline sections of the A12 to reduce noise levels at the following locations:

- Dwellings on The Drive, Rivenhall End
- Dwellings (e.g. Heathfield, Prested Hall Cottages) to the east of junction 24, to the south of the A12
- Dwellings on Easthorpe Green, south of the A12 between junctions 24 and 25
- Little Domsey Cottages, south of the A12 between junctions 24 and 25
- Dwellings on Doggetts Lane, to the south of the A12 between junctions 24 and 25
- Hall Chase Farm House, Hall Chase, to the south of the A12 at Marks Tey

2.5.33 Retaining walls have been proposed in some areas instead of earthwork slopes to reduce the footprint of the proposed scheme and encroachment into third party land. The locations of retaining walls are shown on the General Arrangement Plans [TR010060/APP/2.9]. Sections where substantial lengths of retaining wall have been identified during preliminary design (subject to detailed design), or where they would be close to residential or business premises, include the following (chainages mentioned below are shown on the General Arrangement Plans):

- At the junction 19 southbound off-slip, approximately 100m in length (mainline chainage 10950 to 11050). Also at the junction 19 northbound on-slip, approximately 100m in length (mainline chainage 11550 to 11650).
- Through Hatfield Peverel, approximately 600m in length along the northbound carriageway (mainline chainage 16100 to 16700), and 975m along the southbound carriageway (mainline chainage 16025 to 17000).
- Along the Witham bypass, approximately 800m in length along the northbound carriageway (mainline chainage 20300 and 21100), and 300m along the southbound carriageway (mainline chainage 20300 and 20600). Construction of a section of retaining wall along the northbound carriageway between Olivers Bridge and Brain Bridge may require the temporary removal of an existing noise barrier which would be reinstated once the retaining wall is constructed (see Chapter 3: Assessment of alternatives, of the Environmental Statement [TR010060/APP/6.1] for further detail).
- At Park Bridge, approximately 125m in length along the northbound carriageway (mainline chainage 31750 to 31875) and 75m along the southbound carriageway (mainline chainage 31775 to 31850).
- Through the constrained area of Marks Tey, approximately 500m in length along the northbound carriageway (250m between mainline chainage 37900 to 38150, and 250m between mainline chainage 38375 and 38625), and 650m along the southbound carriageway (mainline chainage 38100 to 38750).

2.5.34 These would generally be sheet pile retaining walls, gravity retaining walls, or modular block (with the exception of Park Bridge, which would likely be reinforced earth wall).

Road pavement and re-surfacing

2.5.35 The existing A12 along the proposed scheme alignment has a mixture of road surfacing, with sections of concrete, asphalt and some low noise surfacing.

2.5.36 Low noise thin surface course system (TSCS) has been proposed for offline sections of the proposed scheme. For online sections of the proposed scheme, it is proposed to renew the surface course with new low noise TSCS. For the existing concrete section on the Kelvedon bypass, asphalt overlay with low noise TSCS has been proposed. There are sections of road where surfacing with better noise reducing properties than a conventional low noise road surface is proposed instead of TSCS, as described in the next paragraph.

2.5.37 Road surfacing with better noise reducing properties than a conventional low noise road surface has been incorporated into the design at the following locations (the chainages referred to below are shown on the General Arrangement Plans [TR010060/APP/2.9]):

- A12 southbound carriageway would be resurfaced between junction 19 and junction 20a (mainline chainage 11525 to 15375)

- Through Hatfield Peverel on both carriageways (mainline chainage 15375 to 17175)
- Witham bypass and the new Rivenhall End bypass between junction 22 and junction 23, starting east of the new junction 21 and finishing at junction 23, on both carriageways (mainline chainage 17950 to 26175)
- The new A12 bypass between junction 24 and junction 25, starting west of Easthorpe Green and finishing at junction 25, on both carriageways (mainline chainage 35725 to 38200)

2.5.38 Low noise road surfacing is a form of embedded mitigation (i.e. mitigation which is an integral part of the scheme design). Road surfacing with better noise reducing properties than a conventional low noise road surface has been proposed as an additional mitigation measure to reduce adverse noise impacts from vehicles using the proposed scheme. See Chapter 12: Noise and vibration, of the Environmental Statement [TR010060/APP/6.1] for more information on noise impacts and mitigation.

Walkers, cyclists and horse riders

2.5.39 Section 5 of the Design and Access Statement, provided in Volume 7 of the DCO application [TR010060/APP/7.4], provides information on the WCH proposals for the proposed scheme, including existing or impacted rights of way, and new or enhanced rights of way. Proposals are also shown on the Streets, Rights of Way and Access Plans [TR010060/APP/2.6].

2.5.40 The proposed scheme has been assessed in accordance with Design Manual for Roads and Bridges (DMRB) GG 142 Walking, Cycling and Horse-Riding Assessment and Review (Highways England, 2019a) and Cycle Infrastructure Design: Local Transport Note 1/20 (DfT, 2020b). In this context, all existing WCH provision has been assessed, and impacts identified. Additionally, existing and potential desire lines for WCH usage have been identified. The impact of the proposed scheme on existing PRoWs has also been reviewed, including consideration of those locations where there is severance (including existing severance).

2.5.41 Where the proposed scheme would directly affect existing PRoWs, such as footpaths, bridleways and existing cycle routes, provision has been proposed to ensure that, once the proposed scheme is open to traffic, the route remains open. This is through provision of overbridges (see Table 2.4) or, where a direct connection is not feasible, alternative routes using suitable diversions are proposed.

2.5.42 The proposed scheme would have direct impacts on PRoWs, as well as impacts on PRoWs from sections of the A12 which would be bypassed by the proposed scheme. It would also impact a national cycle route, links at various proposed junctions and where the existing A12 is to be bypassed, and existing shared walking/cycling facilities.

2.5.43 Proposals for WCH provision have been developed in discussion with a broad range of stakeholder groups and with local authorities throughout the development of the proposed scheme. The proposals are shown on the Streets, Rights of Way and Access Plans [TR010060/APP/2.6] and include the following:

- Separate walker and cyclist links across four proposed major junctions, enabling users to bypass slip road junctions, including the national cycle route affected by the proposed scheme
- Provision of PRoW bridge connections, either as separate walking and cycling facilities or in conjunction with overbridges or side roads
- Provision of paths to link groups of PRoWs to proposed bridge facilities
- Provision of new toucan crossing facilities (crossings that allow both walkers and cyclists to cross)
- Improvements to existing shared walking/cycling facilities
- Improved walking and cycling connections across sections of the existing A12 to be bypassed, and reintroduction of bus stopping facilities

2.5.44 For safety reasons, WCH, horse-drawn carriages and slow-moving vehicles would be prohibited from using the A12 mainline between junctions 21 and 25 (Witham South interchange to Marks Tey interchange). These user groups would be diverted to safe alternative routes, including de-trunked sections of A12, once realigned sections have been implemented. This is consistent with the specific requirements of the DMRB GD 300 design standard (Highways England, 2020a). Prohibitions would involve signing on direction signs and on-slips to the A12 mainline to alert users as to where prohibitions apply.

2.5.45 Effects on WCH from the proposed scheme are assessed in Chapter 13: Population and human health, of the Environmental Statement [TR010060/APP/6.1].

Watercourse crossings and flood risk

2.5.46 The proposed scheme would require new crossings of watercourses and alterations to existing culvert and bridge crossings. There are eight crossings of Main Rivers (see Table 2.6), six of which comprise existing crossings and two of which comprise new crossings on proposed offline sections of road. Four of the crossings would require minor realignments at the crossing points. Main River crossings are shown on the General Arrangement Plans [TR010060/APP/2.9]. Table 2.6 references the relevant sheets from these plans.

Table 2.6 Main River crossings

Watercourse	Description of crossing
Boreham Brook	This crossing is shown on sheet 2 of the General Arrangement Plans. Proposed scheme would involve slip road widening in this location. This would require widening the northbound and southbound highway embankment but would not involve altering or extending the existing A12 Boreham Brook culvert. Flood modelling shows the proposed scheme would have a negligible impact on flooding, and therefore no flood risk mitigation would be required.
River Ter	This crossing is shown on sheet 5 of the General Arrangement Plans. Proposed scheme would involve upgrading the A12 to three lanes per carriageway in this location. This widening would be achieved with no geometric change to the existing bridge structure or highway embankment. No flood risk mitigation would be required at this crossing.
River Brain	This crossing is shown on sheet 8 of the General Arrangement Plans. Proposed scheme would involve upgrading the highway to three lanes per carriageway in this location. This would require widening of the highway embankment on both sides by up to 14m and would require an extension of the existing bridge (by 7m and 5m to the east and west respectively) under the highway. Flood modelling shows the proposed scheme would have a negligible impact on flooding, and therefore no flood risk mitigation would be required.
Rivenhall Brook	This crossing is shown on sheet 11 of the General Arrangement Plans. Proposed scheme would involve a new crossing of the Rivenhall Brook. It is proposed that the Rivenhall Brook would be realigned, and that the new A12 crossing of the river would be through a 46m long culvert structure, located approximately 90m south-east of the existing A12 crossing of the river. A 22m long raised flood mitigation bund would be placed along the right bank of the watercourse immediately downstream of the new Rivenhall Brook culvert, to ensure the watercourse realignment would not result in any increased flooding to the western floodplain of the watercourse.
River Blackwater	This crossing is shown on sheet 12 of the General Arrangement Plans. Proposed scheme would involve upgrading the A12 to three lanes per carriageway in this location. This would require asymmetrical widening of the existing bridge structure (Ashmans Bridge) by approximately 10.1m to the south. As the A12 widening works clash with an existing PRoW and Ashmans Farm Footbridge, it is proposed to realign this PRoW approximately 75m to the south. The proposed relocated footbridge would include accessibility ramps at either end. Flood mitigation proposed for another watercourse (Watercourse 21[7]) includes a ditch draining flows into the River Blackwater along the southern side of the A12. This has been included in the flood modelling at this location. Flood modelling shows the proposed scheme would have negligible impact on flooding, and therefore no flood risk mitigation would be required.

[7] All unnamed watercourses within the proposed scheme Order Limits have been assigned a number. A description of these watercourses is provided in Chapter 14: Road drainage and the water environment, of the Environmental Statement [TR010060/APP/6.1], and they are shown on Figure 14.1 [TR010060/APP/6.2].

Watercourse	Description of crossing
Domsey Brook (West Crossing)	This crossing is shown on sheet 14 of the General Arrangement Plans. Proposed scheme would involve widening and realigning the existing A12 in this location. This would require extending the existing arch structure, which the Domsey Brook flows through under the existing A12, asymmetrically by approximately 34.6m to the south-east. A section of the watercourse immediately upstream of the crossing would be realigned. Flood modelling shows the proposed scheme would have negligible impact on flooding, and therefore no flood risk mitigation would be required.
Domsey Brook (East Crossing)	This crossing is shown on sheet 17 of the General Arrangement Plans. Proposed scheme would require a slight realignment of the Domsey Brook (to the north-east) and installation of a new crossing of the Domsey Brook through a 60m long culvert structure. Flood modelling shows the proposed scheme would have negligible impact on flooding, and therefore no flood risk mitigation would be required.
Roman River	This crossing is shown on sheet 19 of the General Arrangement Plans. Proposed scheme would involve widening the existing A12 southbound highway embankment and extending the existing watercourse culvert (retaining existing cross-sectional dimensions) by approximately 12m. This would necessitate the realignment of a section of the Roman River south of the A12. The realigned channel would be designed to match the existing channel capacity. Flood modelling shows the proposed scheme would have negligible impact on flooding, and therefore no flood risk mitigation would be required.

2.5.47 In addition to the Main River crossings, there would be 30 new culvert structures for Ordinary Watercourses, and improvements or extensions to 10 existing culvert structures. There would also be additional new culverts for drainage channels, which are shown on the Drainage and Surface Water Plans [TR010060/APP/2.13].

2.5.48 Five Ordinary Watercourses were hydraulically modelled to assess the potential flood risk associated with these watercourses. Of these, four of the Ordinary Watercourses require flood risk mitigation:

- Watercourse 21, located south of Kelvedon
- Watercourse 21a, located south-east of Kelvedon
- Watercourse 23, located east of Feering
- Watercourse 26, located south-east of Marks Tey

2.5.49 Flood risk mitigation for Watercourses 21a and 26 consists of flood storage areas. Watercourse 23 requires mitigation ditches to capture flows upstream of the proposed A12, two flood mitigation bunds, and an excavated flood storage area downstream of the A12. For Watercourse 21, the mitigation consists of a flood storage area in conjunction with a diversion to take flood flows in this watercourse directly to the River Blackwater via a drainage ditch and buried pipe along the southern boundary of the A12.

2.5.50 Flood storage areas have also been included within the Order Limits along Inworth Road. These are required because there is existing flood risk to the road from Ordinary Watercourses in the area, which needs to be mitigated.

2.5.51 Flood risk mitigation is shown on Figure 2: Environmental Masterplan [[TR010060/APP/6.2], and will be secured through the Register of Environmental Actions and Commitments (REAC), which is part of the first iteration Environmental Management Plan (EMP) [TR010060/APP/6.5].

2.5.52 Measures are embedded into the drainage design to avoid or reduce groundwater flooding, in line with the Environment Agency guidance (2017), Protect Groundwater and Prevent Groundwater Pollution, including:

- Drainage designed to collect groundwater seepage where there are cuttings
- Drainage systems would be installed to prevent groundwater reaching the surface and protect at-grade infrastructure, and up-gradient of embankments and retaining walls to limit the build-up of water, where pre-existing groundwater conditions are known to be shallow
- All foundations at or below ground structures which could form a barrier to groundwater flow would be designed to allow existing groundwater flow paths to function
- Embankments would be designed to allow existing groundwater flow paths to function where ground compaction would be expected to restrict groundwater flow
- Flood mitigation and floodplain compensation areas would be designed taking groundwater levels into account

2.5.53 Further information on flood risk mitigation is provided in Chapter 14: Road drainage and the water environment [TR010060/APP/6.1], and the Flood Risk Assessment in Appendix 14.5 of the Environmental Statement [TR010060/APP/6.3].

2.5.54 Designs take into account climate change considerations as appropriate, as detailed in Section 1.6 of the Flood Risk Assessment [TR010060/APP/6.3].

Drainage

Existing highway drainage

2.5.55 The primary drainage elements along the existing A12 between junctions 19 and 25 include the following surface water drainage edge collection features:

- Concrete surface water channels with catchpit gratings at regular intervals
- Kerb inlet gullies and traditional kerb/gully drainage
- Combined kerb drainage
- Filter drains

2.5.56 Concrete surface water channels are the most commonly used drainage edge collection feature along the existing A12 mainline outside of urban and residential areas. The surface water drainage arrangement of traditional kerb and gully drainage and kerb inlet gullies are the most commonly used drainage edge collection features along the existing A12 mainline through urban and residential areas. Combined kerb drainage is used for the kerb edges on bridge decks, along road edges for underbridges (e.g. where it has not been feasible to continue drainage methods such as concrete surface water channels and filter drains), lay-bys and at junction locations with other local roads.

2.5.57 The highway drainage networks serving the existing A12 generally have outfalls discharging to nearby field drains, open ditches, Ordinary Watercourses and Main Rivers depending on their proximity to the highway. Some of the existing minor side roads have no defined drainage system and rely on over-the-edge drainage into field ditches or runoff into adjacent land.

2.5.58 Drainage surveys did not identify any existing surface water attenuation features, such as attenuation ponds, underground attenuation tanks, flow control devices and pollution control measures.

2.5.59 The drainage surveys and as-built records did not confirm the presence of soakaways or other infiltration techniques other than a few localised soakaway chambers located along the A138 highway just north of junction 19. As a result, it has been assumed that the existing highway drainage is likely to discharge unattenuated and untreated into the nearby receiving water body types mentioned previously.

Proposed highway drainage

2.5.60 The proposed scheme highway drainage is designed such that, where practicable, existing surface water drainage and outfalls are retained. Proposed offline road sections would have new surface water collection and conveyance systems and new outfalls. Online sections with proposed widening works would also require new surface water collection and conveyance systems, and this would generally be a like-for-like replacement in terms of the type of drainage system, where practicable.

2.5.61 Where the proposed road is in cutting, the surface water runoff would generally be drained to combined surface and sub-surface filter drains located in the verges. Where the proposed road is on embankment and the width can be justified, the surface water runoff would be drained via concrete surface water channels and/or linear drain solutions (slot drains) located in the verges. Linear drain solutions (slot drains) would be provided for spatially constrained locations in the central reserve or adjacent to verges. The type of edge drainage collection system varies across the proposed scheme extent depending on the proposed highway geometry and the spatial constraints.

2.5.62 Where kerbs are required as part of the proposed highway design across the whole proposed scheme, the surface water runoff would be drained via roadside gullies or a combined kerb drainage system. A combined kerb drainage system is typically required where the longitudinal slope of the proposed highway is flat and would result in a large number of gullies at close spacing intervals. The existing and proposed bridge structures would be

provided with adequately sized bridge deck drainage units with outlets connected to downstream carrier drains.

2.5.63 The proposed scheme would result in an increase in the amount of impermeable road surfacing, and therefore surface water runoff rates and volumes are likely to increase in the absence of additional attenuation storage measures. The surface water runoff rates are to be restricted to the existing site condition allowable discharge rates (for online road widening) or greenfield runoff rates (for new offline road sections) to mitigate the potential increased flood risk.

2.5.64 Attenuation storage would generally be provided in the first instance by attenuation ponds (where space is available), prior to discharge to nearby existing watercourses or existing drainage systems. For spatially constrained sites (e.g. road sections subject to online widening works), attenuation storage would be provided through the use of underground attenuation storage units or oversized pipes and chambers depending on the space available. Where the proposed highway drainage system is depth constrained, attenuation storage would be achieved within shallow ditches or swales (linear grass covered depressions which lead surface water overland from the drained highway surface to an attenuation storage feature, receiving watercourse, or existing highway drainage system). Locations of proposed attenuation storage are shown on the Drainage and Surface Water Plans which are available in Volume 2 of the DCO application [TR010060/APP/2.13]).

2.5.65 The proposed highway drainage systems are being designed to provide attenuation storage such that surface water flooding for design events up to and including the 1 in 100 year event with an allowance for climate change would be contained within the proposed scheme boundaries and that the proposed scheme would remain safe for use during the aforementioned design event.

2.5.66 The feasibility of using different sustainable drainage system techniques (e.g. infiltration methods, filter drains and swales) has been investigated with the provisional ground investigation data currently available. The findings from the provisional ground investigation data indicate that the ground drainage conditions are generally poor to practically impervious across the proposed scheme. Although River Terrace, Glaciofluvial, Kesgrave Sand and Gravel Deposits are present throughout the proposed scheme, they can be highly variable and often contain a significant percentage of fines (i.e. clay and silt). The presence of clay and silt material within a coarser matrix (sands and gravels) can significantly reduce permeability and therefore make infiltration generally unfeasible. Therefore, the drainage design has been progressed (and assessed) on the assumption of ‘no infiltration’, which represents a realistic design outcome given the preliminary ground investigation undertaken and resulting data assessed to date. However, where no or limited/inconclusive provisional ground investigation data was available, or the locations of drainage assets have been subject to change, then supplementary ground investigations will be undertaken and assessed accordingly in the subsequent design stages as part of the proposed highway drainage design refinement (including the feasibility of using of infiltration techniques). National Highways would demonstrate that the use of the alternative measures would not lead to any

materially new or materially different environmental effects compared to those reported in the Environmental Statement.

2.5.67 The level of water quality treatment required for routine highway surface water runoff to receiving water bodies varies along the route of the proposed scheme depending on the catchment size and the contributing paved area. Treatment levels and pollution control requirements have been assessed in accordance with DMRB LA 113 Road Drainage and the Water Environment (Highways England, 2020b) and the Highways England Water Risk Assessment Tool (HEWRAT). More information on the HEWRAT assessment can be found in Chapter 14: Road drainage and the water environment, of the Environmental Statement [TR010060/APP/6.1], and Appendix 14.1: Water quality assessment report [TR010060/APP/6.3].

2.5.68 Further information on the drainage strategy is provided in Appendix 14.6 of the Environmental Statement [TR010060/APP/6.3].

Design measures to address climate change

2.5.69 In addition to those measures taken to reduce the risk of flooding and manage surface water drainage, which include appropriate allowances for climate change, the application of the following standards is also considered likely to improve the resilience of the proposed scheme to potential future changes in climate:

- DMRB CG 501 Design of Highway Drainage Systems (Highways England, 2020c)
- DMRB CD 524 Edge of Pavement Details (Highways England, 2021c)
- DMRB CD 226 Design for New Pavement Construction (Highways England, 2021d)
- DMRB CD 225 Design for New Pavement Foundations (Highways England, 2020d)
- Manual of Contract Documents for Highways Works (Highways England, 2021a)
- DMRB CD 236 Surface Course Materials for Construction (Highways England, 2021b)
- DMRB CD 356 Design of Highway Structures for Hydraulic Action (Highways England, 2020e)
- Eurocode standard EN 1991-1-5 and its associated National Annex (British Standards Institution, 2010; 2007)
- Eurocode 7: Geotechnical Design (British Standards Institution, 2004)

2.5.70 Further details regarding potential climate change related impacts and relevant embedded mitigation measures can be found in Chapter 15: Climate, of the Environmental Statement [TR010060/APP/6.1].

Lighting

2.5.71 Lighting column locations are shown on the proposed scheme General Arrangement Plans [TR010060/APP/2.9]. A scheme-wide lighting assessment has been undertaken which determined that lighting would only be required at the junctions, and not on the mainline, along with handrail lighting on the bridges for WCH. Side roads would also have lighting on the approach to junctions. Overbridges and underbridges would not have lighting where the road itself is not planned to be lit. The lighting zones for these junctions have been calculated at this stage, and criteria for the equipment to be used have been identified. Luminaires are to have a glare rating of G4 or higher, which means they will be designed with zero tilt to produce no upward glare and minimal back light.

2.5.72 Lighting used would be appropriate for the proposed scheme, and would consist of a mix of 10–12m high columns with LED luminaires on the junctions, and 8m high columns on the side roads. Such LED lighting uses less energy than conventional luminaires, while reducing light spill into adjacent areas.

2.5.73 Columns with LED luminaires would be provided at the new junction roundabouts and the approaching slip roads, while the A12 mainline through the junctions would be unlit to minimise visual intrusion upon nearby residents. The majority of slip roads would have lighting columns in a single sided arrangement in the verge adjacent to the carriageway.

2.5.74 The design has been carried out in accordance with the latest BS 5489 standard (British Standards Institution, 2020) and National Highways' specifications. The design also takes into consideration guidance notes from the Institution of Lighting Professionals, including Guidance Note 01/21 – The Reduction of Obtrusive Light (2021) and Guidance Note 08/18 – Bats and Artificial Lighting in the UK (2018).

Roadside technology

2.5.75 The roadside technology being designed as part of the proposed scheme includes the following:

- Variable message signs mounted on cantilever and long span cantilever gantries (known as MS4)
- Above lane signals mounted on gantries
- Closed-circuit television (CCTV) cameras
- Above ground traffic detectors
- Highways Agency Detection Enforcement Camera System (HADECS) and external aspect verification technology
- Technology on masts or gantries to identify breakdowns or other incidents resulting in stationary vehicles
- Magnetometers to monitor vehicle movements

- Entry slip signals
- Electrical interface cabinets

2.5.76 Variable message signs, mounted on cantilever and long span cantilever gantries, would be used by the National Highways Regional Control Centres to display essential mandatory and advisory signalling to drivers, along with travel information and any potential or upcoming hazard warnings.

2.5.77 Lane signals would also be placed on the long span cantilever gantries above each lane to outline mandatory speed limits. Gantries would have a maximum height of 12m. Gantry locations are shown on the proposed scheme General Arrangement Plans [TR010060/APP/2.9].

2.5.78 CCTV cameras would be positioned on masts and gantries to provide a minimum of 95% coverage of the mainline with complete coverage of any emergency areas. Standard mast height would be between 10m and 15m above ground level.

2.5.79 Traffic detection would be undertaken by radar units mounted on posts at approximately 500m intervals, and within a short distance of every gantry location.

2.5.80 HADECS and external aspect verification technology would be located at one gantry location per link, in order to enforce the variable mandatory speed limits set by the MS4s and above lane signals.

2.5.81 Each of the above assets would require power and associated equipment cabinets to enable operation. These would be located in the verge near equipment clusters. Electrical interfaces would be provided at the highways boundary, approximately every 1–2km, ideally over or under bridges or adjacent to local roads to ensure safe and easy access for maintenance workers.

Emergency areas

2.5.82 The proposed scheme includes emergency areas at intervals between junctions 21 and 25. There are 12 northbound and 13 southbound, as shown on the General Arrangement Plans [TR010060/APP/2.9].

Fencing and boundary treatment

2.5.83 The proposed scheme has allowed for boundary fencing to delineate the A12 from the local area. Where an upgraded fence is not required to specifically prevent animals from accessing the A12, fencing would be in line with DMRB standards (i.e. post and 3 or 4 rail wooden type). There is a short section near the existing Witham Bypass where an existing tunnel would be closed by the proposed scheme, and the fencing is proposed to be a palisade or similar solution to prevent unauthorised access to the A12.

Speed limits

2.5.84 The A12 itself would be subject to the national speed limit for dual carriageways throughout the length of the proposed scheme. There are a number of new local roads included in the proposed scheme each with their own speed limit. There are also existing local roads proposed to have changes to their speed limits,

namely Main Road (Boreham) to reduce rat running, and Inworth Road due to the introduction of a new roundabout. Speed limits are shown on the Traffic Regulation Measures Speed Limits Plans which are available in Volume 2 of the DCO application [TR010060/APP/2.3.1].

De-trunked A12 sections

2.5.85 The existing A12 between junctions 22 and 23 through Rivenhall End is proposed to be de-trunked (trunk road status removed) and to become part of the local highway network. Essex County Council would become the responsible highway authority. The de-trunking proposals include the following improvements.

2.5.86 The existing southern Oak Road junction with the A12 southbound carriageway, shown on sheet 11 of the De-trunking and Stopping-Up Plans, available in Volume 2 of the DCO application [TR010060/APP/2.10], would be changed to a simple T-junction to improve the suitability with local road standards at Rivenhall End. The northern Oak Road would be closed and become a cul-de-sac with a turning head. This would improve safety and restrict through-traffic. A speed limit reduction to 40mph would be implemented through Rivenhall End.

2.5.87 To improve public services, a bus stop at Rivenhall End is proposed with provision of controlled walker and cyclist crossing points to remove existing A12 north–south severance. The proposal also includes roundabouts on both sides of Rivenhall End to provide turning movements and also provide a smooth transition between dual and single carriageways at the eastern ends.

2.5.88 The existing junction 23 southbound on-slip would also be de-trunked and is proposed to be used for access to Hole Farm and Essex County Fire and Rescue Service Headquarters as a single carriageway with one lane in each direction.

2.5.89 The existing A12 dual carriageway between Feering and Marks Tey (junctions 24 and 25) is proposed to be de-trunked and become part of the local highway network, as shown on sheets 15 to 18 of the De-trunking and Stopping-Up Plans [TR010060/APP/2.10]. Essex County Council would become the responsible highway authority. The total carriageway length is approximately 4.5km. This section of de-trunked road would continue to be used by local traffic to gain access into and out of Marks Tey, Feering, Kelvedon and other surrounding villages and would enable traffic to gain access to the proposed scheme via the new junctions 24 and 25.

2.5.90 The design proposals are to maintain the dual carriageway as per the existing layout and provide roundabouts in three locations to improve connectivity with local road networks and walking and cycling routes: a four-arm roundabout at the existing junction 24; a four-arm roundabout at Easthorpe Road; and a three-arm roundabout at Wishingwell Farm access road.

2.5.91 These roundabouts would function as traffic calming measures and self-enforcing speed limits, in addition to providing the ability to U-turn and improvements to local road connectivity.

Utilities

Gas main diversions

2.5.92 There are various gas mains that would be affected by the proposed scheme and would therefore need to be diverted from their existing location to avoid clashes with the proposed scheme.

2.5.93 The assets affected vary from low pressure pipelines to assets which operate at high-pressure, and which are therefore deemed important for considerations as part of the Environmental Statement.

2.5.94 The high and intermediate pressure gas mains affected by the proposed scheme are:

- Little Braxted to Springfield – AIA1: has a diameter of 600mm and maximum operating pressure of 42barg (a unit of gauge pressure), with a proposed diversion length of 200m because the pipe would be exposed due to the widening works.
- Little Braxted to Springfield – AIA2: has a diameter of 600mm and maximum operating pressure of 42barg, with a proposed diversion length of 3200m because the pipe would clash with widening works at various locations.
- Little Braxted Tye Green – AIA3: has a diameter of 600mm and maximum operating pressure of 42barg, with a proposed diversion length of 970m because the cover to the pipe would be affected by the proposed works and would be affected by new road embankments.
- Langham-Daisy Green-Little Braxted – AIA4: has a diameter of 200mm and maximum operating pressure of 15barg, with a proposed diversion length of 400m because the cover to the pipe would be affected by the proposed works and would be affected by new road embankments.
- Little Braxted-Witham – AIA5: has a diameter of 300mm and maximum operating pressure of 7barg, with a proposed diversion length of 180m because the pipe would be exposed due to the widening works.

2.5.95 The asset referred to as Little Braxted to Springfield - AIA2 is of particular importance due to the extent of the diversion required (this is referred to as ‘the gas main diversion’ throughout the Environmental Statement). This asset is owned and operated by Cadent Gas Limited (Cadent), and runs parallel to the A12 between Whetmead LNR and north of Colemans Bridge (B1389).

2.5.96 To the east of Witham, the existing gas main runs north–south on the southern side of the A12. The 600mm diameter gas main has a maximum operating pressure of 42barg.

2.5.97 The section of gas main that would need to be diverted starts west of Maldon Road and runs adjacent to the A12 before feeding into an existing Cadent above ground installation called Little Braxted Pressure Reduction Station, south-west of Little Braxted (south of junction 22).

2.5.98 The works to widen the A12 as part of the proposed scheme would cause two principal pinch-points that would require diversion of the existing gas main into a new corridor. The two pinch-points are:

- where the gas main passes between the A12 and existing housing and church by Maldon Road
- where the gas main passes between the A12 and Whetmead LNR, which contains a historic landfill and therefore is potentially contaminated

2.5.99 The route of the proposed gas main diversion corridor is shown as Work No. U69 on the Utility Diversion Works Plans [TR010060/APP/2.2.2]. The corridor diverts from the existing gas main at approximately national grid reference TL 821 130, west of Maldon Road (B1018). It diverts south-east, away from the A12 and around Maldon Road and then returns north-east to run alongside the existing A12 mainline before diverting east away from the A12 again, crossing the River Blackwater to go around Whetmead LNR, avoiding the potential contaminated land, before continuing north towards the A12. It re-joins the existing gas main at approximately national grid reference TL 830 144, south-west of Little Braxted.

2.5.100 As discussed in Chapters 1 and 5 of the Environmental Statement [TR010060/APP/6.1], the gas main diversion could result in significant environmental effects and is therefore a Nationally Significant Infrastructure Project in its own right (but included within the proposed scheme DCO application).

2.5.101 Besides the Little Braxted to Springfield - AIA2, there are four further diversions required for the high-pressure gas mains as identified above. Little Braxted to Springfield - AIA1, located near junction 19, would be diverted locally as it would be exposed due to the proposed scheme and three other diversions would be required at junction 22 due to the interaction of the gas mains at this locations with the proposed scheme. These four other diversions are not a Nationally Significant Infrastructure Project.

Other utility diversions

2.5.102 Other utilities existing on the proposed scheme that would require diversion include potable water mains, storm drains and sewers, overhead and buried electricity cables, overhead and buried communication cables and gas pipes of a lower pressure rating than those mentioned previously. Utility diversions are shown on the Utility Diversion Works Plans [TR010060/APP/2.2.2].

2.5.103 Water pipes differ in size and construction and range from 90mm diameter polyethylene up to 900mm diameter concrete, and are either pressurised or gravity fed mains.

2.5.104 Electricity cables include both low and high voltage, up to 11kVA. Generally, existing overhead services that require diversion would be buried to suit the Distribution Network Operator’s preference and further safeguard their assets. This may not be true for all electricity cable diversions and would depend on the surrounding infrastructure and reason for diversion.

2.5.105 Communication cables include both fibre and copper type cables on overhead poles and also those buried in cable ducts. They are generally located along adopted highway routes. With the A12 being a trunk road, the communications assets are generally 'trunk route' type systems and compile vast numbers of cables feeding information across East Anglia. Diversion of these utilities would generally be into the verge of an adopted highway, such as the A12 and its surrounding side roads.

2.5.106 Low and medium pressure gas mains, ranging from 90mm diameter to 250mm diameter polyethylene pipes, are buried across areas of the proposed scheme transmitting gas supplies to individual properties and businesses.

2.5.107 Utility diversions would aim to keep service interruptions to a minimum with diverted routes being constructed first, followed by a short shut down period during off-peak traffic hours to tie-in the new asset and reinstate the service. This would not be possible in all scenarios and short disruption of service may be experienced if space and logistical constraints prevent the former option from being carried out. Any disruptions to supplies would be communicated to all affected parties in advance of the works taking place.

2.5.108 The diverted location of utilities is currently being explored with the relevant statutory undertakers. The solutions will range from being included within the adopted highway boundary to being located in private land, depending on the existing location of the service and its long-term maintenance requirement.

2.5.109 Utility diversions may also include asset protection, such as constructing protection slabs over the existing asset to protect it from construction activities and overburden from new road construction.

2.5.110 Some statutory undertakers would require an easement over the total length of their diverted asset for future access and maintenance purposes.

Replacement land

2.5.111 The proposed scheme requires a number of areas of open space land. Replacement land would be provided for the open space that is to be acquired (or would no longer be as advantageous to its owners and the public when new rights are imposed on it) that is equivalent in terms of size, usefulness, attractiveness, quality and accessibility.

2.5.112 The areas of open space land that would be lost, as well as the locations for replacement land, are shown on the Special Category Land Plans [TR010060/APP/2.5] and described in the Replacement Land Statement [TR010060/APP/7.9].

Colemans Farm Quarry

2.5.113 Part of the proposed offline A12 alignment at junction 22 passes over Colemans Farm Quarry, which is an existing operational minerals site within the local Minerals Safeguarding Area for sands and gravels. The site is currently owned and operated by Brice Aggregates. Mineral extraction has commenced within the proposed A12 corridor.

2.5.114 Brice Aggregates has submitted a planning application to Essex County Council (planning reference ESS/98/21/BTE) which allows it to change the phasing, accelerate extraction and allow import of inert material to backfill the quarry to pre-quarrying ground levels ahead of the proposed scheme works. This application is currently under determination and it has been developed in cooperation with the A12 team in order to enable the construction of the new junction 22 and Rivenhall End bypass in a timely manner should the DCO be granted.

2.5.115 It is therefore anticipated that those voids left by quarrying activities at Colemans Farm Quarry, that sit within the footprint of the Order Limits, will be backfilled by the operators of the quarry within the constraints governed by its planning application.

2.5.116 However, given the criticality of backfilling the quarry voids for the proposed scheme to be constructed, and the dependence on Brice Aggregates having its planning applications approved, the Environmental Statement has assessed the works required to backfill voids in Colemans Farm Quarry, within the Order limits, left unfilled after the extraction operations. This assessment has been undertaken as a worst case in the event that it became necessary for the applicant to undertake any such works as part of the construction of the proposed scheme.

2.5.117 The following assumptions apply to the assessment of the Colemans Farm Quarry void backfilling:

- The additional volume of HGV traffic generated by the backfilling operations, commencing shortly after Start of Works and distributed over a period of time, would not exceed the peak number of HGVs estimated in Section 2.6 – Logistics and traffic management, of this chapter.
- The volume of inert material required for the backfill would be sought through a combination of imported material, which would arrive via the A12, and materials extracted from the proposed scheme borrow pit(s) which would be transported via a combination of haul roads and the A12.
- HGV road haul movement of any additional material would not need to use the local road network.

2.5.118 Brice Aggregates has submitted a planning application (planning reference ESS/36/21/BTE) for the proposed western extension to the current site using existing approved facilities. For the purpose of this Environmental Statement, it is assumed that this planning application is approved, as this represents the worst case scenario in terms of fill material required and HGV movements.

2.5.119 The assessment on minerals and waste from the quarry infilling is included in Chapter 11: Material assets and waste, of the Environmental Statement [TR010060/APP/6.1].

2.5.120 Existing planning consent for Colemans Farm Quarry also includes the restoration of the site. For the purpose of the Environmental Statement, the restored site has been considered in the baseline, as per the restoration plans approved by the planning authority at the time of DCO submission. The

proposed scheme provides habitats of a similar size and context in order to deliver at least an equivalent level of compensation to that already permitted. Chapter 9: Biodiversity, of the Environmental Statement [TR010060/APP/6.1] describes the habitat creation proposals for the proposed scheme, with reference to Colemans Farm Quarry.

Landscape design

2.5.121 The landscape design has been informed by landscape objectives that have been defined as part of an overarching set of scheme-specific design principles presented within the Design Principles [TR010060/APP/7.10], as discussed in Section 2.2 of this chapter.

2.5.122 The landscape design aims to integrate the proposed scheme into the local context and minimise the impact on the landscape. This is a form of embedded mitigation. The landscape design includes the following:

- Alignment of the proposed scheme and location of junctions and borrow pits designed to reduce landscape and visual effects.
- Sensitive design of residual water bodies within restored borrow pits (see Section 2.6 – Borrow pits, of this chapter) and attenuation ponds, to integrate these features into the landscape and reduce visual effects.
- Planting to reduce adverse landscape and visual effects, including native hedgerows, shrubs and trees. Consideration of the species, pattern and distribution of proposed hedgerows, shrubs and trees along the proposed scheme to reflect the distinctive local character of vegetation within the adjacent landscape and provide screening for visual receptors.
- Native tree and shrub planting on and adjacent to highway earthworks to create woodlands, copses and shelterbelts in order to break up the scale of the road, screen structures, traffic and lighting, and help integrate the proposed scheme into the existing landscape pattern.

2.5.123 See Chapter 8: Landscape and visual, of the Environmental Statement [TR010060/APP/6.1] for more information on landscape design.

Environmental design and mitigation

2.5.124 The proposed scheme design has been an iterative process which has considered the potential significant effects on environmental receptors. The first option in mitigating any impact is to seek design measures that would enable the impact to be avoided or, if this is not possible, reduced. This is referred to as embedded mitigation and includes measures such as changing the road's horizontal and vertical alignment, reducing the temporary and permanent footprint of the proposed scheme and altering construction methods.

2.5.125 Environmental considerations that have influenced the option development and selection process, and proposed scheme design, are set out in Chapter 3: Assessment of alternatives, of the Environmental Statement [TR010060/APP/6.1].

2.5.126 Embedded mitigation designed as part of the proposed scheme is described in this chapter, under the descriptions above. This includes, for example, the following:

- Landscape design, including planting proposals, to screen views and integrate the proposed scheme into the local context
- Use of low noise road surfacing and acoustic bunds to reduce noise impacts
- Provision of new and improved WCH routes, crossing and connections
- Consideration of flood risk when designing all elements of the proposed scheme, including siting WCH paths and structures outside of floodplains and designing drainage systems to avoid or reduce groundwater flooding
- Provision of sustainable drainage systems and attenuation to reduce flood risk and mitigate water quality impacts
- Designing the proposed scheme in line with relevant standards to adapt to future climate change
- Only lighting the junctions, handrails on the bridges for WCH, and side road approaches to junctions, and designing lighting to best practice to reduce light spill and impacts on bats
- Reducing speed limits on Main Road (Boreham) and Inworth Road to discourage rat-running (and therefore reduce environmental impacts from increased traffic flows on these local roads)

2.5.127 Embedded mitigation that is integral to the construction process, such as the siting of construction compounds, traffic management measures, and use of borrow pits, is included in Section 2.6 of this chapter.

2.5.128 Further information on embedded mitigation, relevant to specific aspect assessments, is provided in Chapters 6 to 15 of the Environmental Statement [TR010060/APP/6.1].

2.5.129 It is not always possible to design out environmental impacts. As such, it is necessary to develop additional mitigation measures to reduce or offset impacts, and to include land within the proposed scheme Order Limits to deliver these measures.

2.5.130 Examples of permanent environmental mitigation measures that have been developed for the proposed scheme include noise barriers and road surfacing with better noise reducing properties than conventional low noise road surfaces to mitigate noise level increases from road traffic, flood risk mitigation, and biodiversity habitat creation.

2.5.131 More details on specific mitigation for each environmental aspect are provided in Chapters 6 to 15 of the Environmental Statement [TR010060/APP/6.1].

2.5.132 An Environmental Masterplan has been produced which shows the proposed scheme design and areas within the Order Limits reserved for environmental mitigation. This is included in Figure 2.1 of the Environmental Statement

[TR010060/APP/6.2]. This is also supported by illustrative cross-sections shown on Figure 2.2 [TR010060/APP/6.2].

2.5.133 The Environmental Masterplan shows both embedded and additional mitigation measures as integral elements of the proposed scheme design where these are known to be effective and deliverable. The mitigation measures shown on the Environmental Masterplan have been factored into the assessment of significant effects presented in the Environmental Statement aspect chapters (Chapters 6 to 15) [TR010060/APP/6.1].

2.5.134 Mitigation measures are also described in the REAC, which is within the first iteration of the EMP [TR010060/APP/6.5].

2.5.135 The first iteration EMP will be developed further prior to construction into the second iteration EMP to confirm how environmental mitigation will be delivered, secured through requirements in the draft DCO. These measures will be secured by National Highways by placing a contractual responsibility on the appointed Principal Contractor and subcontractors to comply with the DCO requirements.

Demolition and land-take

2.5.136 Land would be required both temporarily and permanently to construct, operate and maintain the proposed scheme. Permanent land-take requirements include the footprint of all the proposed highway infrastructure and associated earthworks, drainage works and access roads, together with environmental mitigation areas such as landscape planting and biodiversity habitat creation.

2.5.137 The total land-take within the Order Limits is estimated to be 835ha as shown on the Land Plans [TR010060/APP/2.7]:

- Temporary land-take – 132ha
- Temporary land-take with permanent access rights – 56ha
- Permanent land-take – 647ha

2.5.138 There are a number of properties within the Order Limits. Four of these – two private residences, one barn, and one a private business – would require demolition:

- Two private residences would need to be demolished north of the A12 near Rivenhall End (Hare Lodge and Badgers).
- A barn would need to be demolished north-east of Hatfield Peverel.
- One private business premises may be demolished in whole or in part where the existing A12 crosses Inworth Road (Barconn). The extent of the impact of the building will be known at detailed design, but it has been assessed as totally demolished for the purposes of this environmental assessment.

2.5.139 In addition to the above, a number of outbuildings would also need to be demolished. These are at Maldon Road (Rowanbank and Segenhoe) and Burghey Brook Cottages.

2.5.140 The Statement of Reasons in Volume 4 of the DCO application [TR010060/APP/4.1] provides the reasoning for why land associated with the above properties needs to be acquired for the proposed scheme.

2.6 Construction

Construction programme and phasing

2.6.1 Construction is scheduled to commence in 2024. The proposed scheme would take approximately four years to construct, with an assumed opening year of 2027. Key dates are shown in Table 2.7.

2.6.2 To minimise the disruption caused by construction of the proposed scheme, certain works (referred to as advanced and pre-commencement works) would be undertaken ahead of the main construction works to allow these works to proceed, and to optimise the overall delivery programme for the proposed scheme:

- Advanced works would be undertaken prior to consent for the DCO application being granted, and would be secured through separate planning permissions and landowner agreements outside of the powers contained in the DCO. Advanced works would primarily comprise archaeological investigations, advanced ecology work, and diversions of key utilities.

- Pre-commencement works are preparations to make a building site ready for construction. It covers activities from site preparation, creation of access routes, and the installation of facilities like security fencing, ramps, and placing of signs. Pre-commencement works would primarily comprise works associated with the establishment of construction compounds (although some compound establishment would be undertaken as advanced works), including construction of accesses. These works would also include preliminary site clearance works, haul road and site access works, and permanent/temporary works to PRoWs.

2.6.3 Advanced and pre-commencement works are shown in Table 2.8. There would be some overlap between advanced and pre-commencement works. In addition, although advanced works would be delivered outside the powers of the DCO, powers are included within the draft DCO [TR010060/APP/3.1] to deliver these advanced works, in the event that National Highways is unsuccessful in securing the necessary planning permissions and agreements outside of the DCO application and/or is unable to implement them in the periods assumed in the construction programme. Advanced works have therefore been included in the draft DCO and assessed as such in the Environmental Statement.

2.6.4 The main construction works would commence following on from the advanced and pre-commencement works.

2.6.5 The extent and volume of earthworks is the main determining factor for the duration of the programme. In order to maximise the efficiency of the earthworks operations, these bulk activities would be carried out in periods of good weather, typically between mid-March and the end of October each year. There are therefore only three earthworks seasons in which to complete these

works. The earthworks operations could be extended into winter months if the weather is good.

2.6.6 The proposed scheme would be constructed as a single project in order to meet the planned open-to-traffic date, with the three design sections of the proposed scheme described in Section 2.5 of this chapter being undertaken concurrently.

2.6.7 Each design section of the proposed scheme has complex construction works, the timings of which are critical to the construction programme. The construction programme is dictated by critical areas where existing traffic links are to be maintained while the new alignment and links are being constructed in a phased manner. These critical areas are in Hatfield Peverel, where three bridges need to be demolished and re-built; the construction of junction 22 and associated links; and the construction of junction 24 and the new underbridge.

2.6.8 Where the existing A12 requires symmetric carriageway widening, and in particular where the working room is very tight within the Order Limits, the traffic management strategy would be to either harden the central reserve and turn it into a running surface, to set up one lane to run in contraflow; or to turn all four existing lanes of traffic into narrow lanes against the central barrier. The method chosen will depend on the geometry of the existing carriageway in that area (e.g. width, grade separation between the southbound and northbound carriageways, presence of overbridges), and would require night-time carriageway closures to set up and for working room (see Section 2.6 – Logistics and traffic management, of this chapter for details on traffic management measures).

2.6.9 Where asymmetric widening of the existing A12 would be undertaken, works to the side of the road requiring the most widening would be carried out first, advancing the works furthest from the existing carriageway as much as possible before moving the existing traffic into narrow lanes.

2.6.10 The final stage of construction for all areas of online widening would consist of the construction of the central concrete barrier and the planning and inlaying of the asphalt surfacing.

2.6.11 The construction of the offline sections of the proposed scheme would be progressed to its permanent condition (i.e. to include barriers, surface course, road markings) before undertaking the tie-ins to the online sections, one carriageway at a time and during overnight and weekend full carriageway closures.

2.6.12 The new junctions would be constructed in several phases in order to maintain access on and off the A12. The first phase would consist of constructing as much of the junction offline as possible (i.e. slip roads, side access roads and overbridges where applicable). Following this initial phase, traffic would progressively be switched from the existing carriageway alignment to the new alignment to further advance the construction. Carriageway closures would be required overnight or on weekends to carry out tie-ins.

2.6.13 In the final phase, once all traffic is running along the new alignment and slip roads, works to de-trunk the existing A12 would commence.

2.6.14 The last eight months before the proposed scheme opens to traffic would be used for the scheme-wide installation and commissioning of lighting, roadside technology and signage.

2.6.15 Peak construction works would likely occur in the second and third quarters of 2025. During this time, the earthworks operations would be at full capacity in every section of the proposed scheme and every borrow pit (see Table 2.10 for information on the proposed borrow pits) would be operating to its maximum capacity. Drainage works would also be at their peak. It is anticipated that there would be 14 bridges at different stages of construction, and road surfacing works would be starting in earnest.

Table 2.7 Key milestones and targeted dates

Milestone	Targeted date
Secretary of State DCO decision	Q1 2024
Advanced works (pre-DCO decision)	Q1 2023
Start-on-site date	Q1 2024
Pre-commencement works (post-DCO decision)	Q1 2024
Start of main works	Q2 2024
Full proposed scheme open to traffic	Q4 2027

Table 2.8 Advanced and pre-commencement works

Works	Phase of work		Summary of activities
	Advanced works	Pre-commencement 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. Advanced works would be covered by local planning permissions and land agreements between land owners and National Highways.

Works	Phase of work		Summary of activities
	Advanced works	Pre-commencement works	
Utilities works	✓	✓	Undertaking surveys of existing utilities within the Order Limits, and implementing diversions and protection measures where necessary on key apparatus. Works would include the following: • Trial holes and inspection pits • Open trenching • Installation of new utilities and associated assets • Establishment of site access routes and storage areas • Temporary fencing Utility works undertaken as advanced works would be completed under utility company permitted development rights or specific planning permission if required.
Construction compound establishment works	✓	✓	Works to facilitate the establishment of the main construction compounds and, where necessary, satellite compounds, laydown areas and traffic management and logistics compounds within the Order Limits, including construction of hard-standing. Installation of vehicle recovery areas and the installation of CCTV and average speed cameras. Provision of temporary utility supplies. Advanced works would be covered by local planning permission and land agreements between land owners and National Highways.
Site clearance works	-	✓	The clearance of vegetation (trees and hedgerows) within the Order Limits, with works undertaken to avoid sensitive periods for protected species where reasonably practicable. Subject to necessary environmental licenses.
Haul roads and access works	-	✓	Works to form construction haul roads and site accesses within the Order Limits, including construction of hard-standing.

Works	Phase of work		Summary of activities
	Advanced works	Pre-commencement works	
Ecological works	✓	✓	Ecological pre-construction surveys and, where applicable, preliminary ecological works (ecology mitigation) within the Order Limits. This would include provision of artificial badger setts and reptile translocation areas. Works would include the following: • Establishment of access • Fencing • Vegetation clearance • Ground preparation • Seeding • Creation of habitats to allow establishment pre-construction Advanced works would be covered by local planning permission and land agreements between land owners and National Highways.
PRoW works	-	✓	Implementing measures on routes within the Order Limits that coincide with areas where pre-commencement works activities would be undertaken to: • Segregate users from the works with temporary fencing • Divert users onto new temporary routes • Temporarily close routes to users
Other temporary activities	-	✓	Temporary activities that would not significantly affect the environment, including the following: • Erection of fencing • Environmental, geotechnical and engineering surveys • Installation of temporary drainage • Treatment or removal of invasive species where required for the proposed scheme

Compounds and haul roads

Main compounds

2.6.16 Due to the scope of works and anticipated staff numbers across the proposed scheme, two main compound areas have been identified. These are located at the existing junction 20b and at junction 22 (see Figure 2.3 of the Environmental Statement [TR010060/APP/6.2] and the Construction Phase Plans, which are available in Volume 2 of the DCO application [TR010060/APP/2.15]).

2.6.17 The main compounds are described in the following sub-sections. The below points apply to both main compounds:

- The intention has been to limit the impact to the local road network as far as practicable. This would be achieved by accessing compounds from as close to the mainline as practicable, so site traffic does not congest lower-capacity local routes.
- Compounds tend to be busy and therefore have been located away from residential areas where feasible. The main compounds would be in operation 24 hours a day during periods where night works are required. The main compounds have been assessed on this assumption, so lighting and noise impacts have been considered when locating the compounds.
- Both compounds are located close to potable water, foul water, telecoms, and power utilities. It is therefore assumed (subject to consultation with statutory undertakers) that the compounds would be connected to these utilities. However, during the site set up, the compounds would be powered by a generator for an initial period. Other temporary facilitates such as a septic tank may also be used during the initial set-up phase.
- The surface for both compounds would be a bound surface where reasonably practicable to reduce dust from moving vehicles. Where this is not practicable, unbound surfaces would be subject to dust suppression techniques (such as dampening down with water). Site speed limits would also be implemented to reduce noise, dust and carbon emissions.
- Structures, such as office and welfare buildings, within the main compounds would be two storeys tall as a worst case, and have been assessed on this basis. Batching plant would be approximately 15m high.
- Lighting within the compounds would be designed to face away from residential properties, reducing potential impacts from light spill, where reasonably practicable.
- The compounds would be fenced with an approximately 2m high chain-link fence (or similar) to prevent unauthorised access, with security barriers to control access to the sites.

2.6.18 Additional locations were considered for the main compounds, but were discounted due to environmental impacts, disruption to local communities and local roads, and a lack of existing utilities. Further information can be found in Chapter 3: Assessment of alternatives, of the Environmental Statement [TR010060/APP/6.1].

Junction 20b main compound

2.6.19 This compound would be located to the north of the A12 just off the junction 20b northbound on-slip (see sheet 6 of the Construction Phase Plans [TR010060/APP/2.15]) and has been selected as a suitable location due to the complex work around Hatfield Peverel. The area of the proposed compound would be approximately 80,000m^2. The compound would include welfare facilities, office space with sufficient parking, training rooms, material and soil storage, and asphalt and concrete batching plants.

2.6.20 The junction 20b compound access would change as construction works progress to reflect opportunities to reduce traffic on the local road network. These changes would be in four phases, which could look as follows (for full details, refer to the Outline Construction Traffic Management Plan (Outline CTMP) [TR010060/APP/7.7]):

- Phase 1 – Use of the existing local road network to allow the construction of the compound, access roads and the temporary slip roads.
- Phase 2 – HGVs to access the compound via the temporary slip road constructed to the east of the existing junction 21. This is to reduce the impact on Wellington Bridge and junction 20b.
- Phase 3 – Progress the construction of the permanent slip roads and construction of the bridge with the aim to direct the traffic over the slip roads and permanent bridge to reduce the impacts on junction 20b (Wellington Bridge) and the existing junction 21 (Woodend Bridge).
- Phase 4 – The new junction 21 would be open in all directions, making it the primary access for the junction 20b compound.

2.6.21 Topsoil from the compound area would be removed and stockpiled in bunds along the south and west perimeter of the compound area, and would be seeded. This would provide a visual screen between the compound and properties located in Hatfield Peverel and north of junction 22. Any additional topsoil would be stored in a soil storage area in the northern section of the compound. Subsoil would also be stored in the soil storage area.

2.6.22 Noisy activities, such as the concrete and asphalt batching plants, would be strategically placed at the east and north-east side of the compound to keep them as far away as possible from nearby sensitive receptors in Hatfield Peverel and north of junction 20b.

2.6.23 Site investigation has determined that there is only 3.2m of clearance to pass underneath overhead electricity lines (at the lowest point) where a potential compound access road could be. The overhead lines in this area would therefore need to be diverted underground to allow safe passage of HGVs into and out of the compound.

Junction 22 main compound

2.6.24 This compound would be located on the northern side of the A12 just east of junction 22 (see sheet 10 of the Construction Phase Plans [TR010060/APP/2.15]), and has been selected due to its central location within the proposed scheme and the critical nature of works in this area. The area of the proposed compound would be approximately 78,500m^2. The compound would include office and welfare space, car parking, material storage, a concrete batching plant, CCTV room and material testing lab.

2.6.25 Access to the compound would be directly from the northbound carriageway of the A12. Traffic management would be implemented to facilitate a temporary construction access to and from the compound onto the A12.

2.6.26 Topsoil from the compound area would be removed and stockpiled in bunds along the perimeter of the compound area, and would be seeded. This would provide a visual screen between the compound and two properties that are located close to the compound (one near the western boundary, and one near the eastern boundary).

2.6.27 Noisy activities, such as the concrete batching plant, offices and welfare, would be strategically placed towards the northern area of the compound to keep them as far away as practical from nearby sensitive receptors.

2.6.28 A high-pressure gas main that runs through the centre of the compound site presents a significant constraint. An exclusion zone would be set up either side of the gas main, along the longitudinal length of the gas main, with designated crossing points for construction traffic to use.

Satellite compounds and laydown areas

2.6.29 To mitigate the need for large numbers of staff to travel along the proposed scheme on a daily basis, and to enable efficient construction logistics and access to site welfare facilities, three satellite compounds would be provided to supplement the two main site compounds (see Figure 2.3 [TR010060/APP/6.2] and the Construction Phase Plans [TR010060/APP/2.15]):

- One satellite compound based at junction 19 for local works – the area of this compound would be approximately 11,000m^2, and it would be accessed from junction 19.
- One satellite compound at Easthorpe Road between junctions 24 and 25 for the offline works in this area – the area of this compound would be approximately 34,000m^2, and it would be accessed from Easthorpe Road.
- One satellite compound at junction 25 for the works around that area – the area of this compound would be approximately 12,000m^2, and it would be accessed from junction 25.

2.6.30 Satellite compounds would be powered by generator. There would be periods in the construction programme where the satellite compounds are in 24-hour operation to facilitate off-peak working (see Section 2.6 – Working methods, of this chapter for a description of off-peak activities).

2.6.31 In addition to the above satellite compounds, temporary laydown areas (small compounds) would be required throughout the length of the proposed scheme (see Figure 2.3 [TR010060/APP/6.2] and the Construction Phase Plans [TR010060/APP/2.15]). These would generally be self-contained units facilitating localised construction works by providing staff welfare facilities, parking areas for vehicles and material storage areas. The area of laydown areas would typically be between 200m^2 and 7,000m^2, and they would generally be located near to proposed structure works. One laydown area near Hatfield Peverel would be larger (approximately 25,000m^2), to provide space to construct the superstructures of the bridges through Hatfield Peverel, thereby reducing disruption compared to if the superstructures were built *in situ*. Laydown areas would generally be powered by self-powered mobile welfare units.

2.6.32 A traffic management and logistics compound would be located off Gershwin Boulevard in Witham (approximately 8,000m^2). This would consist of an area for the storage of traffic management equipment, parking for small site vehicles, general materials storage for the proposed scheme and a small self-contained welfare unit.

Soils storage

2.6.33 All areas of cut and fill along the proposed scheme would have the existing topsoil, and where necessary sub-soils, stripped and stored in local storage areas, where practicable. Temporary sites have been identified and included within the Order Limits for soil storage, which are illustrated on Figure 2.3 of the Environmental Statement [TR010060/APP/6.2] and the Construction Phase Plans [TR010060/APP/2.15] as temporary materials storage. These would have a maximum height of 6m.

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

Haul roads and temporary roads

2.6.35 To reduce the amount of construction traffic using the existing road network, haul roads and temporary roads would be needed. Where practicable, these would be routed alongside the existing mainline; however, where this is not practicable, additional temporary land-take is included within the Order Limits for haul roads and temporary roads offline from the A12 mainline.

2.6.36 Haul roads and temporary roads would have a similar function, the difference is that haul roads would be constructed of either clay earthworks or unbound material (such as recycled aggregate), and temporary roads would be stabilised bound material (such as asphalt). Both types of road would typically be 6m to 15m wide. Haul roads and temporary roads would have similar effects, and are therefore considered the same for the purpose of the Environmental Statement.

2.6.37 Where the existing alignment of the A12 would be widened, this would be undertaken under traffic management by narrowing the existing lanes and introducing speed restrictions. A construction haul road would be utilised along the verge, with entry and exit points into the traffic management for construction traffic. Traffic management of the A12 would be subject to an approved traffic

management plan (see Section 2.6 – Logistics and traffic management, of this chapter for details on traffic management measures).

2.6.38 Borrow pit E (see Table 2.10) would be used to fill the northbound side of the new junction 21, with material transported via haul roads and temporary roads. Borrow pit F would have two haul roads to transport fill material to the southbound side of junction 21 and to the south of Witham towards Olivers Bridge.

2.6.39 For the Rivenhall End bypass between junctions 22 and 23, a haul road would be constructed within the footprint of the new road alignment. All general fill material would be transported from borrow pit I. There are two routes that would be used for access and egress to borrow pit I:

- Route 1 – This route would be used by off-road construction plant such as dumpers. Material would be transported out of borrow pit I to required fill areas via haul roads and a temporary bridge that would span over the A12. This would reduce the requirement for vehicles on the local road network.
- Route 2 – This route would be used to transport material to and from the borrow pit via the local road network. Use of the local road network would be kept to a minimum where practicable.

2.6.40 For the new offline bypass between junctions 24 and 25, a haul road would be constructed within the footprint of the new road alignment. It is anticipated that there would be a surplus of material within this section of the construction works. All surplus material would be transported to design section 2 via haul road.

2.6.41 Borrow pit J would provide granular material for use across the proposed scheme as selected fill material and other construction aggregates. Granular material from borrow pit J would primarily be transported scheme wide via the public road network. There would also be a haul road going west from the borrow pit towards Highfields Lane, and a haul road going east towards Inworth Road.

2.6.42 Construction plant crossings would be required across minor roads to join haul roads along the length of the proposed scheme. These would be temporary, traffic-signal-controlled junctions to ensure road user safety.

Logistics and traffic management

Logistics

2.6.43 Workforce and material sourcing would aim to be as local to the proposed scheme as practicable and where it would be cost effective to do so. However, it is recognised that this is not entirely practicable for all subcontractors and speciality works. It is therefore anticipated that much of the workforce would access, and many materials would be delivered to, the proposed scheme via the following routes:

- From the north via the M11 and A120

- From the north-east (e.g. Felixstowe and Harwich ports) via the A14/A120 and A12
- From the south and west via the M25 and A12
- From Tilbury port via the A130

2.6.44 The proposed scheme would aim for just-in-time deliveries of materials to the point of work where practicable to reduce inefficient material handling. Some bulk materials would need to be stored in the main compounds, satellite compounds, and laydown areas that have been strategically positioned across the proposed scheme so they could be distributed when needed.

2.6.45 HGV movements during the construction phase would consist of two types of vehicle movements on public highways:

- Internal – These are the HGVs dedicated to the haulage of materials within the extents of the proposed scheme along the public highway. This refers exclusively to the movement of excavated materials to and from the borrow pits and between work fronts (e.g. cut to fill) and the distribution of materials stored in the compounds to the different work fronts. For the peak month of construction (expected to be during the summer of 2025), there are estimated to be 980 daily internal movements on Mondays to Fridays (i.e. 490 movements in, and 490 out), 660 movements on Saturdays, and none on Sundays.
- Imports – These encompass all the deliveries coming into the proposed scheme from outside its boundaries and include, but are not limited to, ready mix concrete, asphalt, granular materials, and miscellaneous materials such as pipes, signs, barriers, fences and cabins. For the peak month of construction (expected to be during the summer of 2025), there are estimated to be approximately 1,120 (i.e. 560 movements in, and 560 out) daily import HGV movements on Mondays to Fridays, 520 movements on Saturdays, and none on Sundays.

2.6.46 These numbers represent daily movements for the peak month of construction. Vehicle movements, including HGV movements, would be required during night-time, weekend (including Sundays), or Bank Holiday working to support certain exempted activities during off-peak working outside of standard working hours. During off-peak working, vehicle movements would be targeted to areas where works are being undertaken. Where practicable, any deliveries to support off-peak working would be undertaken during standard working hours, but this would not be feasible in all cases, for example removal of bridge demolition material. Refer to the Section 2.6 – Working methods, of this chapter, which includes exempted activities to be undertaken during off-peak working hours.

2.6.47 After travelling on the public roads, a percentage of the HGVs transporting materials would enter the haul roads at different locations along the proposed scheme for access to the work fronts, borrow pits and compounds. Measures would be put in place to ensure construction vehicles and equipment (machines, HGVs, and light goods vehicles) can gain quick and easy access to the required location onsite without impacting local traffic. Purpose-built haul

roads and temporary access points would be constructed to achieve this (refer to the Outline CTMP for details [TR010060/APP/7.7]).

2.6.48 Given the proximity of the GEML and associated railway stations near the proposed scheme, the potential for importing and exporting material by rail would be investigated if an opportunity arises. The Environmental Statement has assumed no use of rail to transport materials. Any future use of rail transport would be subject to commercial and carbon assessments, and there being no materially new or materially different environmental effects compared to those reported in the Environmental Statement.

Traffic management

2.6.49 The proposed scheme would aim to maintain two running lanes on the A12 for public traffic across the proposed scheme during construction at weekday peak traffic hours (i.e. during daytime shifts).

2.6.50 Where construction activities, such as existing online bridge demolition or online bridge construction (for example, bridge deck beam installation), prohibit safe road operation, road closures would be required at nights and weekends to minimise disruption to road users. Advance notice regarding any road closures would be given to local communities and road users. A suitable diversion would be put in place.

2.6.51 Widening of online sections of the A12 would require temporary traffic management measures during construction, such as narrow lanes, lane closures and contraflow. The two bypasses would be constructed offline, minimising the disruption to traffic flows along the existing A12 in these areas.

2.6.52 The current A12 hard strip is very narrow and the verges are soft. This means overnight road closures may be required to establish preliminary access into verge work areas, to create temporarily hardened runoff areas for safe access and egress during daytime live traffic times.

2.6.53 Overnight and weekend closures may be required at tie-in locations to install new road construction arrangements and complete surfacing.

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

2.6.55 Where road closures on the A12 are required, the strategic diversion route would be (from west to east) via the A130, A131 and A120.

2.6.56 An Outline CTMP has been prepared and submitted with the DCO application [TR010060/APP/7.7]. This provides detailed traffic management proposals for each area of construction work. The Outline CTMP will be superseded by the Construction Traffic Management Plan ahead of commencement of the construction phase of the proposed scheme. The Construction Traffic Management Plan would be drafted in consultation with the local highway authority and submitted to the Security of State for approval.

2.6.57 The anticipated traffic management measures from the Outline CTMP are summarised in Table 2.9.

Table 2.9 Anticipated traffic management

Construction element	Anticipated traffic management measures
Restrictions/operational constraints	Speed restrictions would be in place from when the works requiring traffic management commence, until completion. Lane closures during weekdays would be between the hours of 20:00 and 06:00 (traffic count dependent) and full closures from 21:00 to 06:00 (traffic count dependent). During weekends, closures could be in effect for 24 hours. Two-lane running would be maintained during weekday peak traffic hours (between 06:00 and 21:00) to minimise the disruption to traffic flows. All diversion routes for full closures would be pre-signed, and advance warning signs would be installed prior to the closure dates.
Online widening	Traffic management where online widening works would take place would predominantly take the form of narrow lanes and speed restrictions to enable central reserve hardening, if required, and verge widening. Measures such as contraflow and lane closures may also be used.
Offline bypasses between junctions 22 and 23, and between junctions 24 and 25	Where the proposed alignment goes offline and crosses existing local roads, new bypasses would be constructed first and only then would the existing roads be closed to ensure access for local traffic is maintained. In order to tie the roads in safely, temporary road arrangements including traffic lights and overnight/weekend closures would be required.
Junction 19 Shown on sheets 1 to 2 of the General Arrangement Plans [TR010060/APP/2.9].	This section of the A12 would predominantly take the form of 24/7 narrow lanes running with a speed restriction in place to enable working room within the verges, as well as the following measures: • Single carriageway night-time and weekend closures of the A12 for installation and removal of temporary works. • Slip roads – phasing of temporary traffic management including narrow lane running, lane closures, full closures, and temporary slip roads. • Occasional full carriageway closures would be put in place to allow for the hydro-demolition of the existing bridge parapets, installation of new bridge beams and other associated works. At Boreham Bridge: • 24/7 narrow lane running would be required at Boreham Bridge (A130) • Occasional directional closures at Boreham Bridge (A130), i.e. closure of either eastbound or westbound traffic, during off-peak traffic hours and weekends Traffic would be divided by a temporary barrier system and pinned where practicable to maximise running width (a pinned barrier system is when the barrier is fixed to the ground with a steel pin, reducing deflection and giving the contractor a larger working area). A speed system may be enforced.

Construction element	Anticipated traffic management measures
	Installation of the bridge decks would require full night-time and weekend carriageway closures.
Hatfield Peverel Shown on sheets 4 to 6 of the General Arrangement Plans [TR010060/APP/2.9].	The completion of the construction works through Hatfield Peverel would require the below traffic management measures: • Narrow lane running on the A12 mainline with a reduced speed limit • Narrow lane running of a contraflow (two lanes plus one lane of the opposing traffic) on the adjacent carriageway separated by a temporary barrier, with speed restrictions in place • Single carriageway night-time and weekend closures • Mainline closures during off-peak traffic hours would be required for the demolition of the existing Bury Lane and Station Road Bridges, and construction of the new Bury Lane and Station Road Overbridge replacements The works to Bury Lane and Station Road Bridges would be undertaken at separate times to minimise the disruption to users and maintain access for critical services. While Bury Lane Bridge is closed, access between the north and south of Hatfield Peverel would be via Station Road Bridge. Access would be provided to allow temporary access across the two housing estates at Hatfield Grove and Bury Farm. This would maintain local access to Hatfield Peverel for residents north of the A12 via Bury Lane Bridge while Station Road Bridge is closed. For non-residents, access to the properties to the north of the A12 (while Station Road Bridge is closed) would be via a signed diversion route which would require traffic to leave the A12 northbound at the existing J21. To minimise the duration that side roads over the A12 would be closed, it is proposed to construct the new bridge decks for Station Road and Bury Lane at a location south of Hatfield Peverel and transport them to site. This transport would also require a total closure of the carriageway. Therefore, it is anticipated that there would be at least six total closures of the A12 to support the structures work in Hatfield Peverel. The works to Wellington Bridge would only proceed once the proposed J21 is operational. A temporary two way link road would be constructed between the new southern roundabout at J21 to J20b southbound off-slip. The link would provide for vehicular, including public transport, pedestrian and cycle routes between Hatfield Peverel and Witham. It would also provide a vehicular connection to the A12.

Construction element	Anticipated traffic management measures
Hatfield Peverel – temporary parking and access to Hatfield Peverel railway station Shown on sheets 5 to 6 of the General Arrangement Plans [TR010060/APP/2.9].	A temporary car park serving Hatfield Peverel railway station is proposed for the public, for the period of the construction of Station Road Bridge. The purpose of this carpark is to provide a temporary and alternative access to the station and provide a parking area for railway station users. It would be strategically located close to the station and close to the main A12 compound north of J20b. Access would be via Wellington Bridge and then through a shared A12 compound access road. Access to the railway station from the temporary carpark would be via a temporary pedestrian access along the existing private road that runs parallel with the GEML. A temporary bridge is proposed to be erected over the A12 between Bury Lane and Station Road to accommodate walker and cyclist public access to the railway station while Station Road Bridge is closed.
Junction 21 Shown on sheet 6 of the General Arrangement Plans [TR010060/APP/2.9].	The following measures are planned to be implemented to safely undertake the construction of J21: • Safe access and egress points would be created at the A12 for construction vehicles. • Works access to the north side of the junction would be from the existing J21 northbound off-slip. This may involve widening and lengthening the current slip road to accommodate safe access and egress for construction traffic. • Works access to the south side of the junction would be via a temporary built access off of the southbound carriageway, immediately before Latney's Boarding Kennels, Cattery and Grooming Parlour. • Narrow lane running and restricted speed limits would be implemented on the A12 mainline carriageway to enable the construction works. • A temporary link road would be constructed which would tie the southern dumbbell roundabout at the new J21 to the B1137 The Street in Hatfield Peverel to maintain access during the demolition and construction of Wellington Bridge. This would include provision for walkers and cyclists. • Closures during off-peak traffic hours would be required on the J20b northbound on-slip road and existing J21 northbound off-slip road to enable the carriageway tie-ins of the new local access roads from the northern roundabout. • Closures during off-peak traffic hours, using a combination of lane closures and full closures, would be utilised to tie in the new slip roads at the new J21 into the mainline carriageway. • Full weekend closures would be required to allow for the demolition of Wellington and Woodend bridges. Other off-peak traffic hours closures may be required for other works.

Construction element	Anticipated traffic management measures
Junction 22 Shown on sheet 10 of the General Arrangement Plans [TR010060/APP/2.9].	The following proposed temporary traffic management strategies would be considered for the construction of the new J22: • Narrow lane running and full closures would be required to provide the necessary working space in the existing A12 verges to carry out the required utility service diversions and allow for the main construction works. • Off-peak traffic hours closures of the existing A12 in both directions would be required to tie in the new alignment with the existing A12. • Once significant completion is achieved and traffic is moved to the new A12, it would be kept temporarily under a two-lane, narrow lane arrangement to allow completion of ancillary works at the verges. • De-trunking works at the existing A12 carriageway would be initiated once traffic is moved to the new alignment. To allow completion of works within the existing A12, narrow lane running and lane closures would be required. • The current design proposals also require other modifications to the existing J22 which would require peak and off-peak traffic hours lane closures and four-way temporary traffic lights on the junction. • Access and egress to Colemans Farm Quarry and Little Braxted Hall would continue to be provided via Little Braxted Lane and would be maintained for as long as reasonably practicable, before switching onto the new proposed arrangement. The switchover between the existing and proposed arrangement would be communicated to the quarry owners and would take place over a full weekend closure of Little Braxted Lane.
De-trunking between junctions 22 and 23 Shown on sheets 10 to 12 of the General Arrangement Plans [TR010060/APP/2.9].	A temporary T-Junction arrangement would be required from the proposed Braxted Road onto Oak Road to maintain traffic flows with the A12 southbound carriageway via the existing slip roads onto the A12. The construction of roundabouts and the access to Essex County Fire and Rescue Service Headquarters would include daytime lane closures under two-way traffic lights and full road closures through the night to facilitate tie-ins.
Junction 24 Shown on sheet 14 of the General Arrangement Plans [TR010060/APP/2.9].	Construction of the new J24 is key as the slip roads of the junction would be utilised to divert mainline traffic while the new underbridge structure is constructed. Weekend and possible night closures would be required to construct J24 tie-ins. The use of temporary barriers and an enforced speed system would be required for maintaining traffic flows through this section.

Construction element	Anticipated traffic management measures
De-trunking between junctions 24 and 25 Shown on sheets 15 to 18 of the General Arrangement Plans [TR010060/APP/2.9].	Temporary T-junctions are likely to be required along the existing A12 southbound carriageway between J24 and J25 to link new side road diversions to the network. This would allow mainline construction to proceed. These temporary T-junctions would then be built into the permanent roundabout arrangements during the de-trunking phase. The de-trunking phases would include daytime lane closures under two-way traffic lights and full road closures through the night to facilitate tie-ins.
Junction 25 Shown on sheets 18 to 19 of the General Arrangement Plans [TR010060/APP/2.9].	The following temporary traffic management strategies would be considered for the proposed J25 construction works: • Narrow lane running with a central reserve and verge with speed restriction in place. • Narrow lane running of a contraflow with two lanes plus one lane of the opposing traffic on the adjacent carriageway separated by a temporary vehicle restraint with a speed restriction in place. • Single-lane closure during off-peak traffic hours. • Single carriageway closure during off-peak traffic hours and weekend closures of the A12. • Full carriageway weekend closures of the A12 during both peak and off-peak traffic hours. • Access to Old London Road and Hall Chase would be maintained throughout the works. During full closures, any vehicles needing access to residential properties would be escorted through the works area.
Roadside technology and drainage	Overnight closures may be required where there is limited space in verge areas to install directionally drilled telecommunications duct crossings, utility road trenching and new drainage crossings under the existing A12 carriageway.

Permitted and excluded routes

2.6.58 Where practicable, access into work areas has been planned to come off of the mainline A12 via temporary access points and junctions. However, there are areas of the proposed scheme where this form of access would not be feasible, and the use of side roads would be required to access these work areas.

2.6.59 To minimise the use of side roads, permitted, permitted with restrictions, and excluded routes would be specified to cause minimal disruption to local stakeholders and residential areas, where practicable.

2.6.60 Further information on permitted, permitted with restrictions, and excluded routes is included in Section 7 of the Outline CTMP [TR010060/APP/7.7]. These would be enforced through an updated CTMP for the construction phase.

2.6.61 Information on routes would be provided to all relevant project staff and the supply chain prior to arrival. Signage would be installed locally to advise construction traffic of the permitted, permitted with restrictions and excluded routes.

Temporary WCH route diversions and closures

2.6.62 Within the proposed scheme Order Limits, there are existing PRoWs (footpaths and bridleways), footways and cycle tracks. The proposed scheme would endeavour to maintain these routes that are affected by it, where reasonably practicable. Where these cannot be maintained, whilst ensuring the safety of the workforce and members of the public, suitable signed diversions would be put in place, or if an alternative is not practical the PRoW, footway or cycle track would be temporarily suspended. Reasonable adjustments would also be made to maintain or achieve inclusive access for all users.

2.6.63 The following types of measures would be implemented on PRoW, footway and cycle track routes that would be affected by construction activities:

- Segregation of users from the works – in locations where construction works are close to PRoWs, footways and cycle tracks, works areas would be fenced off to segregate the site works from users.
- Diversion of users onto new temporary routes – temporary diversion routes would be provided where practicable and feasible, with users diverted around construction works via an adjacent PRoW, footway or cycle track, or locally around the perimeter of the fenced works site, with appropriate signage erected.
- Suspension of routes – where a suitable diversion cannot be provided, routes would be temporarily suspended and appropriate signage would be erected at the extent of the PRoW, footway and cycle track route suspension to ensure that the public are informed. Communications to the wider public would be made via the proposed scheme's website and social media, and newsletters would also be issued to registered users.
- Use of temporary marshals – subject to a risk assessment, the use of marshals may be required in areas where there is an interface between the public, third parties and construction activities.

2.6.64 Further information on temporary WCH route diversions and closures is provided in Section 8 of the Outline CTMP [TR010060/APP/7.7].

Workforce management

2.6.65 The approximate size of the workforce is expected to peak at 1,550 staff onsite per day (of which approximately two-thirds would be site based, and the remaining one-third would be site-office based or working from home).

2.6.66 It is expected that site staff would stay overnight in the local area, using settlements such as Chelmsford, Witham, Braintree and Colchester, if not already from the local area. Onsite accommodation is therefore not proposed.

2.6.67 Peak workforce travelling times are expected to fall in line with the usual peak commuting times of 07:00–09:00 and 16:00–18:00. It is intended that the construction team would travel by minibus from main compound areas to work fronts, satellite compounds and laydown areas where feasible to reduce the volume of site traffic on the road at these times. This arrangement will not be feasible for all subcontractors or trade types due to the necessity of transporting work equipment in their company vehicles.

2.6.68 Car sharing would be encouraged, and the main compounds would also include bicycle storage, and bicycle and pedestrian access routes into the compounds, to promote sustainable travel.

2.6.69 As a worst-case scenario, it has been assumed that 20% of the workforce travel by public transport and then use mini-buses from local rail stations to the construction sites. The remaining 80% of workers would travel by car, of which 20% would car-share.

Working methods

2.6.70 Standard working hours are considered to be between 07:30 and 19:00 between Monday and 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. This would include activities such as deliveries, movements to place of work, unloading, general preparation works, maintenance and safety checking of plant and machinery, and site clean-up, but would not involve operation of plant or machinery for construction works.

2.6.71 Work undertaken outside standard hours, as well as on bank holidays, is considered off-peak working. There are certain exceptions where night-time, weekend, or Bank Holiday working would be required. Activities requiring traffic management in place on the carriageway can only be carried out during off-peak working times (for example, restricting the A12 to single lane running). Night-time, weekend, or Bank Holiday working hours would be required for the following activities:

- Installation, maintenance, modification and removal of traffic management measures
- Temporary and permanent widening of verges
- Online pavement construction which would require a hardening of the central reserve or verges to enable traffic to run in a narrow lane/contraflow arrangement during the day
- Upgrading the existing carriageway
- Carriageway and junction slip road tie-ins
- Emergency and planned carriageway maintenance and repair works
- Demolition of existing structures

- Construction of new structures and roadside technology (e.g. gantries)
- Piling
- Utility diversions.
- Any oversize deliveries
- Drainage works
- Technology commissioning
- Any activity interfacing with the GEML

2.6.72 Additionally, night-time, weekend, or Bank Holiday working hours would be required for the following activities:

- Security
- Maintenance of plant and equipment requiring 24/7 operation such as pumps

2.6.73 The two main compounds (including the concrete and asphalt batching plants) and satellite compounds would be in 24/7 operation at certain stages of the construction programme to facilitate off-peak working.

2.6.74 Aggregate processing facilities, which would be included in borrow pit areas and may include crushing, grading and washing of aggregates, would only be operational during standard working hours.

2.6.75 Piling would likely be required for widening existing bridges and new bridges, for retaining walls, and for the foundations for cantilevered road gantry signs. Piled foundation depths are expected to be between 10m to 35m below ground level. Some off-peak working may be required for piling. Assumptions related to night-time piling works are included in Chapter 12: Noise and vibration, of the Environmental Statement [TR010060/APP/6.1].

2.6.76 Traffic diversions, alternative piling methods and offline bridge deck construction are methods that would be employed, where feasible, to reduce noise impacts and the duration of any inconvenience due to overbridge road closures.

Plant and equipment

2.6.77 Construction activities would involve the use of heavy plant items with the potential to emit high levels of noise and vibration and contribute to pollution, such as excavators, dumper trucks, dozers and compaction equipment. Noisy activities also include, but are not limited to, demolition of existing features and piling for structures and retaining walls. Further information of noise impacts during construction is included in Chapter 12: Noise and vibration [TR010060/APP/6.1]. A detailed list of the plant and equipment required for various construction activities, along with the assumed noise levels, is provided in Appendix 12.4 of the Environmental Statement [TR010060/APP/6.3].

2.6.78 To mitigate the impacts associated with construction plant and equipment, standard mitigation measures would be undertaken as necessary during the construction phase of the works. This includes measures such as programming works to minimise work outside standard working hours and specifying use of lower-noise emitting equipment. This is standard sector practice in accordance with BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (British Standards Institution, 2014a) and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (British Standards Institution, 2014b).

Earthworks

2.6.79 Large amounts of fill material would be required for construction, particularly for junctions and the offline sections at Rivenhall End and Marks Tey. A proportion of this material may be generated from the construction works at the existing junctions and, if suitable, would be used within other sections of the construction works to minimise importing material. However, there is still a shortfall of material, estimated at approximately 600,000m^3.

2.6.80 The overall cut-fill balance for design section 1 shows an approximate 200,000m^3 shortfall in material. The shortfall would primarily be met by material supplied from borrow pits E and F (see next section for information on borrow pits).

2.6.81 The overall cut-fill balance for design section 2 shows an approximate 600,000m^3 shortfall of material. Borrow pit I would primarily make up for this deficit in fill material, along with excess material from the cut of the new offline alignment between junctions 24 and 25.

2.6.82 The overall cut-fill balance for design section 3 shows an approximate 200,000m^3 surplus of material. The majority of this material would be transported for fill material within design section 2.

2.6.83 Borrow pit J would primarily be used for the extraction of granular material for use across the proposed scheme as selected fill material and other construction aggregates.

2.6.84 An additional 950,000m^3 of fill material may be required to backfill Colemans Farm Quarry in the event that the quarry operators cannot perform this work themselves. In this event, the intention would be to import 650,000m^3 of inert material from off-site, and source 300,000m^3 of non-granular fill material from borrow pit J. It should be noted that this will not increase the area required for the borrow pit, because the supply would come from the overburden material that would have been replaced in the borrow pit on completion. This would therefore have a bearing on the finished landscaping of the borrow pit.

Borrow pits

Proposed borrow pits

2.6.85 Borrow pits would be used to source the required fill material for the proposed scheme, to reduce the need to import material from external sources. This would reduce potential adverse impacts associated with the transport of

imported fill due to reduced HGV movements associated with the transport of materials. Borrow pits would also provide a suitable deposition location for excavated material that is considered unsuitable for engineering requirements.

2.6.86 Ground investigations and viability studies have been undertaken on potential borrow pit sites. These studies have resulted in a short list of four borrow pits which have been included within the Order Limits (see Figure 2.3 [TR010060/APP/6.2]). Table 2.10 summarises the borrow pits within the Order Limits. Reasoning for their selection and why the other borrow pit locations were discounted is provided in Section 3.3 of Chapter 3: Assessment of alternatives [TR010060/APP/6.1].

Table 2.10 Borrow pits

Borrow pit	Location and size	Purpose
E	Located on arable agricultural land between the existing J20b and J21, between the A12 and the GEML. Access to this location would be via haul roads between the borrow pit and new J21. The total area of borrow pit E would be approximately 181,000m^2. The maximum dig depth would be approximately 4.5m below ground level.	To primarily be utilised for fill material for the construction of the new J21, northbound side. A smaller amount of material would be used for fill through Hatfield Peverel and at J19. The anticipated volume of acceptable general fill material to be gained is 100,000m^3.
F	Located on arable agricultural land to the south of the A12 between the existing J21, Latney's Boarding Kennels and Cattery and Dengie Farm. Access to this location would be from a temporary access created from J21. The total area available is approximately 221,000m^2. The maximum dig depth would be approximately 4m below ground level.	To be utilised for fill material for the construction of the new J21, southbound side. Secondary function of the borrow pit is to support fill requirements to the east along the mainline A12 embankment widening on the Witham bypass. The anticipated volume of acceptable general fill material to be gained is 100,000m^3.
I	Located on arable agricultural land to the east of Rivenhall End and to the west of J23 (Kelvedon), between the A12 and the GEML. Access and egress to the borrow pit from the A12 would either be by a haul road to J23 or via a temporary bridge over the A12. The total area of borrow pit I would be approximately 225,000m^2. The maximum excavation depth of the borrow pit would be approximately 17m below ground level.	To be primarily utilised for the new junction 22 fill embankments and mainline embankment stretching from that junction to Cranes Bridge (existing junction 23), where the largest deficit of material is required. The anticipated volume of acceptable general fill material to be gained is 400,000m^3.

Borrow pit	Location and size	Purpose
J	Located on arable agricultural land along the southbound side of the A12 with Inworth Road located immediately to the east, and Highfields Lane to the west. Access and egress to the borrow pit from the A12 would be immediately off the A12. The total area of borrow pit J would be approximately 338,000m^2. The maximum dig depth would be approximately 7m below ground level.	Granular material to be utilised for selected fill material and other construction aggregates across the proposed scheme. The borrow pit may also need to be used for the extraction of general fill material to backfill Colemans Farm Quarry. The anticipated volume of granular material to be gained is 300,000m^3. The anticipated volume of general fill required for the backfill of Colemans Farm Quarry would be 300,000m^3, bringing the total anticipated volume required from borrow pit J up to 600,000m^3.

2.6.87 The areas provided in Table 2.10 represent the maximum size and depth of the borrow pits if development consent is granted. The Environmental Statement has been based on these maximum extents as a realistic worst case scenario in terms of likely significant environmental effects.

2.6.88 Demarcation of borrow pit excavation and management areas would generally be set within existing field boundary features, for example hedgerows. These areas are shown on the Temporary Works Plans [TR010060/APP/2.2.3] as a brown outline and hatch.

2.6.89 A limit of deviation has been set around the borrow pit areas shown on the Temporary Works Plans as a pink crosshatch. This delineates potential areas required for water management associated with the borrow pit, for example water discharge outfall locations. There may be several outfalls at any one time. Where required, environmental permits for water discharge would be in place.

2.6.90 The borrow pit size and maximum depths have been set to allow for flexibility. For example, flexibility would be required for the following reasons:

- The amount of usable material from the borrow pits is less than expected, requiring more material to be excavated.
- Material extracted from the borrow pits could be spoiled by bad weather, requiring more material to be excavated.
- Geophysical surveys have indicated the possible presence of archaeological remains. If archaeological remains are encountered, the configuration of the borrow pits may need to change (but still be within the maximum extents). For example, if remains are encountered on one side of a borrow pit location, then a deeper excavation may be required on the side where remains are not present. Further investigation works will be undertaken through detailed design and advanced works stages to define the risk and any mitigation works required, in liaison with cultural heritage stakeholders.
- Exclusion zones may need to be established to protect environmental constraints, such as trees, hedgerows and protected species.

2.6.91 Environmental constraints and the sensitivity of the receiving environment have been considered when siting and designing the proposed borrow pits. Borrow pits have been located to avoid densely populated areas. Where isolated properties are close to the borrow pits, a seeded bund would be installed around the pit perimeter to provide noise and visual mitigation.

2.6.92 If required, aggregate processing plant would form part of the allocated borrow pit areas, and the environmental assessment has been undertaken on this basis. Aggregate processing facilities, which may include crushing, grading and washing of aggregates, would only be operational during standard working hours. These facilities would be approximately 15m high.

2.6.93 Utilities cross or are adjacent to the sites of borrow pits F, I and J. This includes a high-pressure gas main, foul water main, and electricity cable at borrow pit F; and overhead electric cables at borrow pit I and J. Exclusion zones would be put in place to protect these assets. No excavation would be permitted within the exclusion zones. The exclusion zones would be demarked with fencing with designated crossing points in line with the relevant statutory undertaker's requirements. There is also an irrigation water main that crosses borrow pit E. This would be maintained during borrow pit operation and, if necessary, would be diverted (this is secured through the Utilities Works Plans [TR010060/APP/2.2.2]).

2.6.94 A Borrow Pits Report has been included within Volume 7 of the DCO application [TR010060/APP/7.8]. This provides more information on the borrow pit excavation methodology, constraints (including utilities), and optioneering.

Borrow pit restoration

2.6.95 The current earthworks volume deficit does not support reinstating the borrow pits back up to original ground levels or original land use.

2.6.96 Indicative restoration proposals for the excavated areas include a combination of wetlands, water bodies, woodland planting and landscaped areas to mitigate the environmental impacts of the borrow pits themselves. For Borrow pit F, restoration proposals would include an area of woodland planting to the southern extent to offset nitrogen deposition effects on Perrys Wood, Inworth (see Chapter 9: Biodiversity [TR010060/APP/6.1] for further information).

2.6.97 Once suitable materials have been extracted from the borrow pits, they would be restored in line with the below principles:

- Borrow pits would be shaped to form natural gradients with rounded contours to integrate them into the surrounding landscape.
- Where water bodies remain after excavation, these would include scalloped edges and shallow slopes or berms to make them safe and improve access and egress for animals.
- Planting within the restored borrow pits would include woodland planting where screening is required, along with intermittent tree and scrub planting and individual trees within species-rich grassland.

- Boundaries with new or gapped-up hedgerows with trees would tie into existing features to help restore the landscape pattern and maintain ecological connectivity.
- Aquatic and wetland planting would be introduced at the margins of water bodies along with areas of wet woodland planting.
- Borrow pits would be restored such that designed flood mitigation would function as described in the Flood Risk Assessment (Appendix 14.5 of the Environmental Statement [TR010060/APP/6.3]).

2.6.98 The borrow pit restoration proposals cannot be resolved at this stage, as the final borrow pit design is subject to detailed design and site conditions. This is to allow for flexibility, for the reasons explained in the previous section and subject to the maximum parameters in Table 2.10. The Environmental Statement has been based on the restoration principles described above. Final restoration plans for the borrow pits would deliver the principles stated above.

2.6.99 The Environmental Masterplan, Figure 2.1 of the Environmental Statement [TR010060/APP/6.2], shows the indicative borrow pit restoration proposals, in line with the general principles described above.

Drainage and de-watering

Construction surface water drainage

2.6.100 Temporary site drainage would be planned to manage the risks associated with heavy rainfall or flood events appropriate to the risk during construction, such as the topography, catchment size and duration of the works. A number of discharge locations would be in operation concurrently through the proposed scheme and volumes would vary depending on the progress of the works programme. Outfalls from temporary site drainage would be to local surface water bodies and would maintain existing catchment boundaries wherever feasible.

2.6.101 Temporary site drainage would utilise the permanent ponds in the temporary situation where feasible to provide attenuation during construction, with additional ditch connections to watercourses. During the construction phase, the ponds would be temporarily sized to deal with water from the localised catchment area.

2.6.102 In some locations, new temporary ponds may need to be constructed for surface water storage needs. All temporary drainage ponds would be within the Order Limits. Land for new temporary ponds would be returned to its original use after construction.

2.6.103 Temporary pumping arrangements may also be required for localised pumping operations.

2.6.104 Standard mitigation measures would be utilised to prevent pollution of watercourses from surface water runoff during the construction phase, such as use of silt fencing, cut-off drains, and baffles at discharge locations. Further information on these measures can be found in Chapter 14: Road drainage and the water environment, of the Environmental Statement [TR010060/APP/6.1].

De-watering

2.6.105 De-watering is expected to be required at borrow pit locations. At this stage, it is anticipated that de-watering would be managed by a 'sump pumping' type arrangement, which would involve excavating approximately 1m deep sumps at natural low spots around the periphery of the borrow pit excavation area. Water would be directed to the borrow pit sumps via grip drains and ditches around the periphery of excavated area.

2.6.106 Diesel-powered pumps would remove water from the borrow pit sumps to silt lagoons located within the borrow pit area for settlement and attenuation before discharge to local watercourses. If dewatering of a borrow pit is required and excavation layout and ground conditions suit, a groundwater recharge arrangement would be implemented to manage groundwater levels. The suitability of this method will be investigated through detailed design of the proposed scheme.

2.6.107 Environmental permits for groundwater abstraction and water discharge would be sought from the Environment Agency before this work commenced.

2.6.108 In addition to de-watering at borrow pit locations, groundwater de-watering impacts could occur as a result of earthworks and excavations associated with features such as road cuttings and widenings, drainage attenuation ponds, and site compound construction that penetrates below the water table. These are relevant to the groundwater assessment and flood risk assessment, and are detailed in Chapter 14: Road drainage and the water environment [TR010060/APP/6.1].

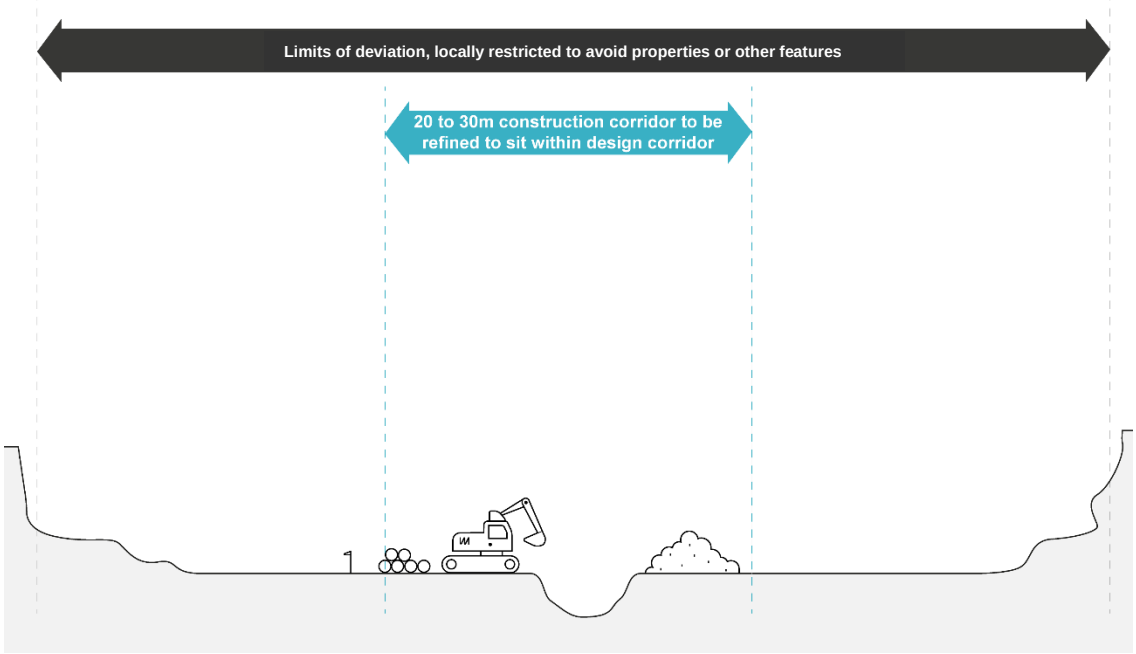
Utilities diversions

Cadent high-pressure gas main diversion

2.6.109 Section 2.5 of this chapter describes the proposed corridor for the gas main diversion.

2.6.110 A corridor is being included for the diversion, shown as the limits of deviation on the Utility Diversion Works Plans [TR010060/APP/2.2.2], to provide Cadent with sufficient space within which to design a gas main of this size. The actual width for construction would typically be much narrower than the limits of deviation. Plate 2.7 shows a typical 20m to 30m working width within the limits of deviation for design flexibility.

Plate 2.7 Typical section indicating working width for 600mm gas main diversion



2.6.111 Following construction and once operational, Cadent would require an easement over the entire length of their apparatus and routes to access the gas main from local roads.

2.6.112 The limits of deviation provide flexibility to avoid key features such as residential properties, important environmental features, or engineering design features from the widened A12. In certain locations, the limits of deviation widen to allow for future design flexibility and landowner preferences, and in some locations they have been narrowed locally to avoid residential and other buildings.

2.6.113 It is expected that construction would take around four to eight months, but this depends on the final route taken (within the limits of deviation) and any complexities involved in trenchless techniques for river crossings, seasonal environmental constraints, road crossings, and clashes with other works. The works would be transient, which means that construction would take place in one location, before moving on to the next, so that disruption is not taking place across the entire corridor throughout the construction programme. Final connections would be made after pipelaying and the associated testing has been completed.

2.6.114 The following assumptions apply to the proposed diversion corridor:

- All Main River crossing(s) would be installed using trenchless techniques. These could be techniques such as horizontal directional drilling.
- Approximately 1m of material (depending on the land use at ground level) would be required to cover the gas main. Given the diameter of the gas main, and any additional excavation for bedding materials, the base of the excavation would typically be 1.8m to 2m deep. This does not apply when using trenchless techniques, or when other infrastructure, such as drainage, needs to be avoided.

- Diversions may be carried out live, so significant temporary working areas known as stopple pits would be constructed at the tie-in areas. These would be approximately 2m to 3m deep and 20m x 20m to 30m x 30m in size.
- Where present, vegetation loss has been assumed within the 30m construction working width (as shown on Plate 2.7). There would be potential limitations on replanting trees within the gas main easement after construction is complete.
- An imported surround material would be added to the pipe trench before backfilling.
- Road crossings and connections may need to be installed at night or weekends to minimise traffic disruption. No other night working would be required.

Other utility diversions

2.6.115 The utility diversions are described in Section 2.5 of this chapter. Utility diversions would take place prior to the main construction works. Some critical diversions may take place before the start-on-site date as advanced works; it is assumed that in these cases diversions would be delivered under the statutory undertaker's permitted development rights. All advanced works have been included in the DCO application and assessed in the Environmental Statement.

2.6.116 Some diversions would require a temporary alignment during the construction phase, and would then be transferred into a permanent diversion location.

2.6.117 Buried utility diversions would generally be constructed by excavating a trench along the diversion route line using an excavator. The depths would vary depending on the size, type and number of services that require burying as well as the land use it would be passing through. Longitudinal buried services within the adopted highway would have a cover depth ranging from 350–900mm, whereas transverse services would be buried at least 900mm deep. Services buried through agricultural land are usually at least 1,200mm deep so as not to interfere with agricultural processes.

2.6.118 Trenchless techniques such as horizontal directional drilling and micro tunnelling are also likely to be employed for installing certain buried utilities through complex areas such as underneath existing carriageway or areas where open trenching is not suitable. This usually constitutes excavating separate launch and reception pits, which vary in size depending on the method chosen, where the burrowing machinery would work from and to.

2.6.119 After excavation, pipes, ducts or direct buried cables would be laid and recovered with a surround detail specific to that utility. The trench would then be completely backfilled, generally by an excavator, to completely cover the utility.

2.6.120 In the case of ducted cables, a separate team would follow behind the excavation activity to pull cables through the new ducted network using specific cable-pulling machinery. This would take place between manholes or draw pits installed along the ducted network.

2.6.121 Once the assets are in place (ducts, cables, and pipes), final testing and tie-in works would be undertaken to divert flows through the new services laid. This would generally require another team to follow up and either shut down the live service to splice new cables or pipes into the live network, or undertake a live tie-in with no disruption to service supplies. This is heavily dependent on the size and type of service being diverted and is usually undertaken during off-peak working hours.

2.6.122 All service shut downs would be communicated to those affected via the statutory undertaker carrying out the works. If access to properties would be affected during diversionary works, this would be communicated to the relevant landowners.

Environmental management

2.6.123 All construction works would be undertaken with appropriate environmental controls in place, in line with an EMP. A first iteration of the EMP is included with the DCO application [TR010060/APP/6.5]. The first iteration EMP includes the REAC, which outlines the essential mitigation developed as part of the Environmental Statement.

2.6.124 A second iteration of the EMP would be developed and implemented by the Principal Contractor prior to the start of construction works, based on the requirements of the first iteration of the EMP [TR010060/APP/6.5]. This would include the implementation of industry standard practice and control measures for environmental impacts arising during construction, such as, but not limited to, the control of dust, noise and other emissions, and the approach to waste and material management onsite.

Carbon management

2.6.125 In order to deliver National Highways' aspirations with respect to the minimisation of carbon emissions and the efficient use of resources, the carbon intensity of the proposed scheme will be established and monitored throughout the detailed design and construction phases.

2.6.126 Processes to evaluate greenhouse gas emissions associated with construction of the proposed scheme are embedded into the design process, thereby informing and identifying opportunities for iterative reductions in such emissions. These processes have supported the preliminary design decision making (and will inform the detailed design stage), allowing greenhouse gas emissions to be considered in a timely manner, rather than at the end of the design process. The sharing of information is being promoted, along with the identification of innovations and engagement with suppliers, across the project team to ensure that greenhouse gas emissions along the supply chain have been considered.

Sustainable procurement

2.6.127 In addition to ensuring a carbon efficient design, a Sustainable Procurement Plan will be implemented during the detailed design and construction stages. This will include the responsible sourcing of the key material elements (asphalt, concrete, aggregate, steel, aluminium, plastics, timber and wood-derived products) to be used in the construction of the proposed scheme (see Chapter 11: Material assets and waste [TR010060/APP/6.1], for more details).

2.6.128 As good practice, and where practicable, procurement from sustainable or responsible sourcing schemes would be the preferred procurement source, especially when procuring materials known to be difficult to procure sustainably, such as steel. Table 2.11 provides a summary of the types of construction materials and products to be consumed on the proposed scheme that are likely to hold certification to a recognised responsible sourcing standard.

Table 2.11 Responsible sourcing standards

Material	Certification
Timber	All timber and wood-derived products to be used in permanent or temporary works would be from independently verifiable legal and sustainable sources certified by a Central Point of Expertise on Timber approved scheme such as the Forestry Stewardship Council or Programme for the Endorsement of Forest Certificate.
Recycled aggregates (imported)	All recycled aggregates would be recovered in line with the Environment Agency (2013) Quality Protocol for use in permanent or temporary works, for example: • use of material in specification for highway works such as structural fill • use in temporary works, for example compounds, haul roads or as a piling mat
Recycled aggregates (site won)	A Materials Management Plan will be developed specifying potential reuse of material from demolition and excavation (cuttings, drainage, structures) through following The Definition of Waste: Development Industry Code of Practice (Contaminated Land: Applications in Real Environments, 2011), gaining relevant environmental permits or waste exemptions to crush and reuse materials in permanent or temporary works.
Aggregates (virgin)	Where practicable, imported virgin aggregates would be certified to the Building Research Establishment's (BRE's) responsible sourcing standard (BES 6001).
Steelwork	Where practicable, steel would be certified to the BRE responsible sourcing standard (BES 6001), Eco-Reinforcement or CARES Sustainability Scheme, and for reinforcing steel, BS 8902:2009 Responsible Sourcing Sector Certification Schemes for Construction Products (British Standards Institution, 2009).
Concrete	Where practicable, concrete would be certified to the BRE responsible sourcing standard (BES 6001).

Materials and waste management

2.6.129 Material resource efficiency would be implemented throughout the detailed design and construction of the proposed scheme. This would include the implementation of resource efficient construction principles, management of waste in accordance with the waste hierarchy, adoption of responsible sourcing practices, preparation of a Site Waste Management Plan and compliance with relevant legislation, policies and statutory guidance for materials and waste. Site-won (including demolition and excavation) materials arising from the proposed scheme would be reused and recycled, and where practicable, construction materials would be responsibly sourced from local sources of supply with consideration for secondary and recycled content.

2.7 Operation and maintenance

Operation of the proposed scheme

2.7.1 The proposed scheme's operation for the section between junction 21 and junction 25 is set out in DMRB GD 300 Requirements for New and Upgraded All-Purpose Trunk Roads (Expressways) (Highways England, 2020a). The key components for this include the following:

- Traffic detection technology and variable mandatory speed limits to reduce speed limits to 40, 50 or 60mph to mitigate congestion and smooth traffic flow
- Lane control signalling, which enables the control centre to set signs and signals to close lanes, for example to protect a broken-down vehicle
- Speed limit and lane control enforcement cameras and CCTV
- Technology to alert the control centre if a vehicle has broken down or is immobilised, for example following a road traffic collision. This would enable the control centre to use technology to set reduced speed limits, close lanes, and display driver information messages to maximise safety
- On-road resource, so that when incidents are detected, operatives attend to make the road safe to support clearance of the carriageway

2.7.2 The roadside technology components would be mounted on a combination of gantries across the carriageway, and separate posts.

Maintenance of the proposed scheme

2.7.3 There are a number of principles which the proposed scheme is actively pursuing for the maintenance of assets once operational. These include, but would not be limited to, the following:

- Remote monitoring and interventions to technology assets to minimise roadside activities where practicable.

- Exploring off-network access for assets to reduce the number of lane or road closures on the A12 required to facilitate maintenance. For example, technology assets can be accessed for diagnostic and repair tasks by parking in appropriate locations on local roads over, under or alongside the A12 and using steps or other paths to walk safely to the verge area and work in an area protected by vehicle restraint system.
- Combining maintenance programmes to allow for the most effective use of traffic management and reduce the amount of work requiring deployment of traffic management on the network.
- There is an aspiration for the proposed scheme to provide a maintenance-free period of five years post completion, with exceptions and not including cyclic and reactive maintenance activities.
- All new grasslands within mechanical gradient tolerances for mowers would be low nutrient as standard (the low nutrient standard is defined as not using topsoil in the design of new grassland plots).
- No topsoil would be applied to areas of the soft estate that are deemed safety critical, such as sight lines, in front of signs, and access areas. This would reduce vegetation height and plant growth, improving safety and reducing maintenance requirements while also contributing to biodiversity.
- Use of roadside technology to facilitate maintenance, including use of wireless assets to reduce the need for ducting.
- Exploring the diversion of statutory utility corridors outside the highway boundary (but within the Order Limits) to reduce the operational impact to the A12 when assets require maintenance.
- During detailed design, materials would be further considered which could reduce the amount of maintenance required for an asset.
- Complementing national policies to reduce the risk to road workers and researching the potential application of new and innovative solutions which could be of benefit to operations and maintenance.

2.7.4 Maintenance activities would be as authorised under the DCO. As required by the first iteration of the EMP, industry standard control measures would be applied and encapsulated in a third iteration of the EMP, which would be produced once construction of the proposed scheme is completed. With the implementation of these measures, no significant effects are considered likely.

Landscape aftercare

2.7.5 Landscape planting would require maintenance as part of the long-term management of the soft estate, including grass strimming, watering and weed control. Maintenance would be more intensive during the first three to five years after the proposed scheme opening to ensure the successful establishment of any planting. Maintenance operations would then typically reduce to a three- to six-month cycle following this period.

2.7.6 A Landscape and Ecology Management Plan, part of the first iteration EMP, has been included with the DCO application [TR010060/APP/6.5]. This presents how the landscape and ecological mitigation would be reinstated, monitored and maintained. A detailed landscape specification and maintenance schedule will be produced at the detailed design stage.

2.8 Decommissioning

2.8.1 It is highly unlikely that the proposed scheme would be demolished as the improvements would have become an integral part of the strategic and local road networks. In the unlikely event of the proposed scheme needing to be demolished, this would conform to the statutory process in place at that time, including any requirements for EIA as appropriate.

2.8.2 Demolition of the proposed scheme has therefore not been considered further in the Environmental Statement.

2.9 Changes in traffic flows

2.9.1 The impact that the proposed scheme is predicted to have on traffic flows is discussed in detail in the Transport Assessment [TR010060/APP/7.2] and the Combined Modelling and Appraisal Report [TR010060/APP/7.3]. A summary of the predictions is provided below.

2.9.2 On the A12 itself, the following impacts are expected:

- Traffic would reduce substantially on the two sections of the existing A12 that are bypassed as part of the proposed scheme (Rivenhall End and between junctions 24 and 25).
- Traffic levels would increase on the A12 between junctions 19 and 25, as well as on the sections of the A12 on either side of the proposed scheme. Because the A12 would see such an improvement in journey times and reliability, traffic would re-route onto the A12 away from other less suitable routes. People are also predicted to make more trips along the A12 corridor in general if the road is improved.

2.9.3 A summary of the key impacts on local roads is provided below. Details of predicted traffic changes, including tables and maps, are provided in the Transport Assessment [TR010060/APP/7.2].

B1137 Main Road, Boreham

2.9.4 Following the closure of the junction 20a access onto the A12 towards Chelmsford, most traffic which previously used this access would instead join the A12 at the new junction 21. However, some traffic is predicted to travel instead along Main Road and use A12 junction 19 due to the southbound closure of junction 20a. The majority of this traffic is predicted to be from the west side of Hatfield Peverel. This would result in an increase in traffic on Main Road next to A12 junction 19 in Boreham of around 180 vehicles per hour in the AM peak hour in 2027. Traffic in the PM peak would reduce by around 90 vehicles per hour.

The Street, Hatfield Peverel

2.9.5 Junctions 20a and 20b would be closed as part of the proposed scheme. This would mean, for instance, that traffic wanting to go southbound on the A12 from Maldon Road would now be sign-posted to the new junction 21 rather than using The Street and junction 20a. This would result in a significant reduction of traffic on The Street.

Wellington Bridge, Hatfield Peverel

2.9.6 Junctions 20a and 20b would be closed, with traffic instead using the new junction 21 to access the A12. The access route from Hatfield Peverel to the new junction 21 would be via Wellington Bridge. There would therefore be a substantial increase in traffic over Wellington Bridge.

Maldon Road and Church Road, Hatfield Peverel

2.9.7 Some traffic currently travels via Church Road to avoid congestion at the Maldon Road/The Street junction when travelling between Maldon Road and A12 junction 20a. With the proposed scheme, junction 20a would be closed and traffic would use the new junction 21 instead, reducing the attractiveness of travelling via Church Road. There would therefore be a reduction in traffic on Church Road and an increase on Maldon Road.

Braxted Park Road

2.9.8 Traffic from Tiptree would be able to access the A12 southbound directly using the new junction 24 via Inworth Road. The existing route to join the A12 at Rivenhall End via Braxted Park Road would therefore see a reduction in traffic.

Braxted Road, Kelvedon

2.9.9 The route from Braxted Park Road into Kelvedon via Braxted Road is predicted to have an increase in traffic. Although the percentage increase in traffic is high, this is due to the very low level of traffic on this road to begin with. The absolute change is small at around 90 to 140 vehicles per hour in the AM and PM peak, or around two cars per minute. It is not expected to affect the day-to-day performance of the road.

B1024 Kelvedon

2.9.10 Traffic on the B1024 near Kelvedon and Gore Pit (London Road, Kelvedon High Street, Feering Hill) is predicted to reduce. Junction 24 would be replaced by a new junction (catering for traffic travelling in all directions) with a direct connection to Inworth Road. This means that traffic from south of the A12 such as Tiptree would no longer need to travel via Kelvedon and Feering to access the A12.

B1023 Inworth Road

2.9.11 The location of the new junction 24 was proposed by several stakeholders and has several benefits. However, the proposals would see an increase in traffic on Inworth Road south of the A12 using this route to access junction 24 from the south. There would similarly be some increase in traffic on the B1023 Church

Road through Tiptree, as some traffic from Tiptree chooses to use the new junction 24 to join the A12 travelling southbound instead of travelling via Braxted Park Road/Rivenhall End.

Roads through Messing

2.9.12 The proposed new junction 24 would be located close to the western end of Kelvedon Road which links the B1023 Inworth Road with the village of Messing. The traffic model predicts that some traffic from the B1022 west of Messing would start to travel through Messing as a short-cut to reach the B1023 Inworth Road and the new junction 24. The model predicts there would be increases in flows on Kelvedon Road from 38 vehicles per hour without the proposed scheme (two-way flows in 2027) to 133 vehicles per hour with the proposed scheme in the weekday AM peak hour. In the PM peak hour it would increase from 45 to 109 vehicles per hour. While the percentage increases are high, the absolute increases in traffic are low (less than an additional two vehicles per minute in peak hours).

Easthorpe Road

2.9.13 Easthorpe Road would no longer join the A12, as that section of the A12 would be bypassed and retained for use by local traffic and have no connection to Easthorpe Road.

2.10 Limits of deviation

2.10.1 The Environmental Statement is based on a preliminary design of the proposed scheme. The location and Order Limits of the proposed scheme are shown on Figure 1.1 [TR010060/APP/6.2]. In accordance with the guidance provided in the Planning Inspectorate's (2018) Advice Note Nine: Rochdale Envelope, the Order Limits have been drawn to allow some flexibility. The proposed scheme design will be subject to detailed design before construction, and as such, the Order Limits need to accommodate any future design. Figure 1.1 shows the maximum extents of the proposed scheme (i.e. the Order Limits), including temporary working areas that could be required for construction compounds, temporary works, haul roads and borrow pits.

2.10.2 The detailed design for the authorised development must accord with the preliminary scheme design shown on the Works Plans and the Engineering Section Drawings, and the principles set out in the Environmental Masterplan, unless it is demonstrated that any amendments would not give rise to any materially new or materially different environmental effects in comparison with those reported in the Environmental Statement.

Permanent works

2.10.3 Limits of deviation have been incorporated within the Order Limits to allow minor modifications to be made to the proposed scheme during the detailed design and construction stages. Limits of deviation provide an envelope of development, as opposed to specific dimensions, and are used to allow design flexibility. Such flexibility is required, for example, to enable the Principal Contractor to alter their working procedures or make minor adjustments to the position of certain infrastructure in response to unforeseen ground conditions.

2.10.4 The limits of deviation have been determined based on the design, construction and buildability factors, and have been taken into consideration as part of the EIA as reported in the Environmental Statement. The EIA process has informed the limits of deviation. For example, where there are environmental sensitivities, the limits of deviation may be smaller, and the design more fixed, to avoid the design impacting on a particular environmental feature.

2.10.5 The limits of deviation have been defined using lateral limits of deviation for all permanent infrastructure elements of the proposed scheme, including utility diversions, and vertical limits of deviation for all the road elements. The extents of the lateral limits of deviation are shown on the Permanent Works Plans [TR010060/APP/2.2.1] and Utility Diversion Works Plans [TR010060/APP/2.2.2].

2.10.6 The vertical limits of deviation are referenced against the vertical profile levels indicated on the Highway Engineering Section Drawings [TR010060/APP/2.11]. The vertical limit of deviation for the proposed scheme is +/-1.0m, except for junction 24 where a +/-1.5m limit of deviation is proposed.

2.10.7 The approach of this Environmental Statement has been to assess the proposed scheme design based on the realistic worst-case scenario afforded by the limits of deviation being sought within the DCO application. The worst-case assessment may vary depending on the environmental aspect under consideration; for example, the worst case for visual effects may be the maximum height of a structure afforded within the limits of deviation, while the reverse may be true for potential noise effects.

Temporary works

2.10.8 The construction methodology in Section 2.6 of this chapter provides descriptions for temporary construction activities such as compounds and borrow pits. The construction methodology could change leading up to the construction start of works, particularly for elements of construction that are dependent on the supply chain (e.g. source of materials, plant, equipment, and the construction workforce), or for elements that are dependent on the detailed design. The construction methodology provided in Section 2.6 is based on maximum parameters, and therefore represents a reasonable worst-case on which the Environmental Statement is based. Limits of deviations associated with temporary works are shown on the Temporary Works Plans [TR010060/APP/2.2.3].

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