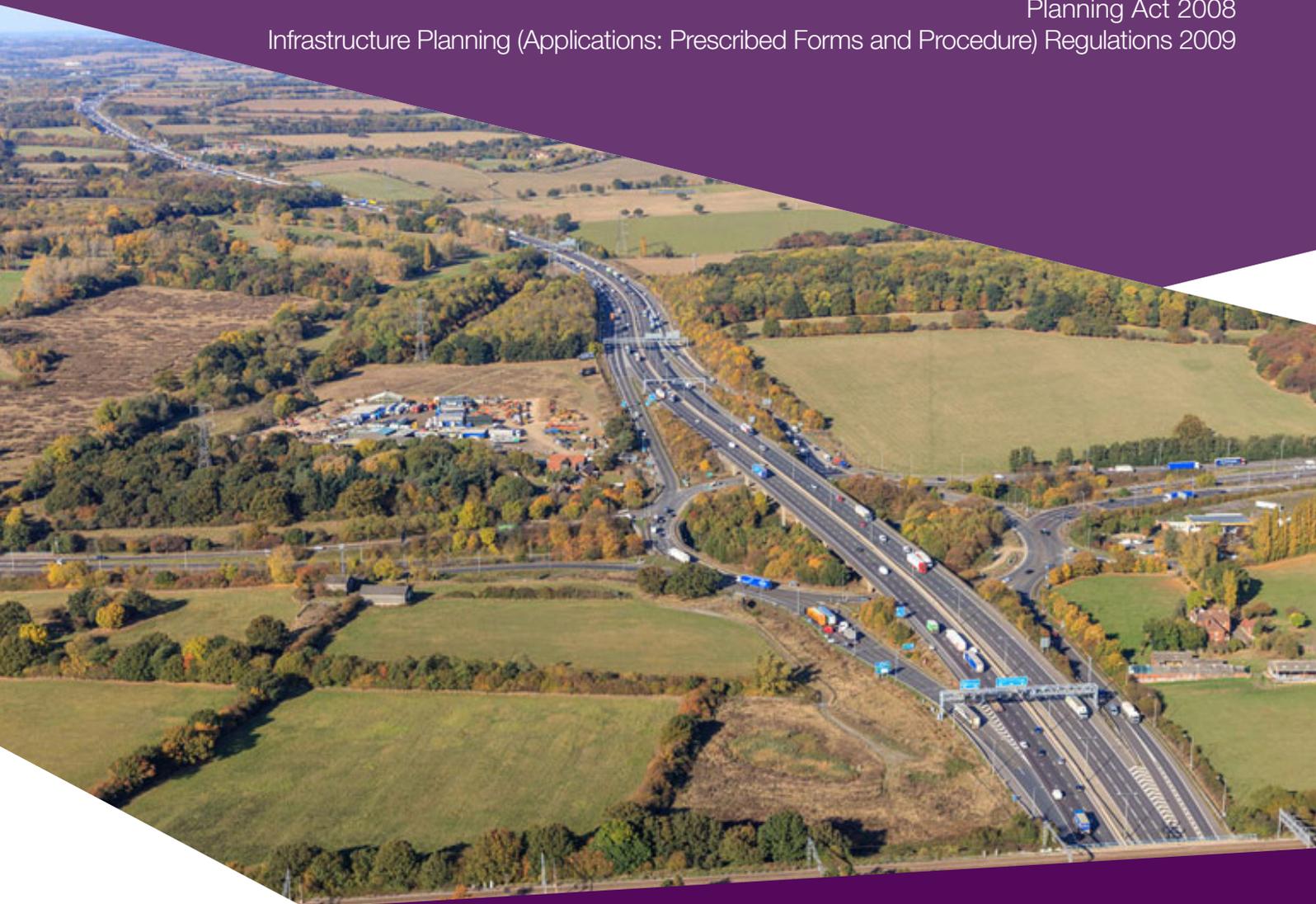


**M25 junction 28 improvement scheme
TR010029
6.4 Environmental Statement
Non-technical summary**

APFP Regulation 5(2)(a)
Planning Act 2008

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



Introduction

This Non-Technical Summary has been prepared for the proposed M25 junction 28 improvement scheme (the Scheme).

Highways England, is proposing to deliver the Scheme to provide better access towards Essex and London, as well as improved connectivity between Brentwood, Chelmsford, Colchester and Suffolk with London and other key destinations. These improvements will reduce congestion and delays, as well as improve journey time reliability through the junction during peak and off-peak periods. The Scheme will also address safety issues, reducing the high occurrence of accidents.

The Scheme is an alteration of the existing junction 28 on the M25 which includes the provision of a dedicated loop road from the M25 northbound carriageway heading eastbound onto the A12, the demolition and reconstruction of the existing A12 eastbound off-slip and of the M25 northbound entry slip road, together with other improvements to the existing junction 28 roundabout, M25 and A12 carriageways.

The area of development exceeds the relevant area threshold for highway-related development to amount to a nationally significant infrastructure project (NSIP) as prescribed in sections 14(1)(h) and 22(1)(b) and 22(3) of the Planning Act 2008, the relevant thresholds being 15 hectares in relation to the alteration of motorways. Accordingly, the Scheme is an NSIP and this means that permission, known as a Development Consent Order (DCO), is required to build and operate the Scheme.

The DCO application will be examined by the Planning Inspectorate which will report its findings and make a recommendation to the Secretary of State to aid decision making.

An Environmental Statement (ES) has been prepared to accompany the DCO application which sets out a description of the Scheme, reasonable alternatives considered in the development of the design, the environmental setting, the likely significant effects of the Scheme on local communities and the environment, and the measures proposed to mitigate these effects.

This Non-Technical Summary provides a summary of the ES in non-technical language.

The full ES comprises four volumes in total, as follows:

- Volume 6.1** Environmental Statement main text setting out the results of the environmental assessment across 16 chapters
- Volume 6.2** Environmental Statement figures, including drawings, photos and other illustrative material
- Volume 6.3** Environmental Statement technical appendices
- Volume 6.4** (this document) Environmental Statement Non-Technical Summary

Printed hard copies will be available to view at:

Highways England,
Bridge House, 1 Walnut Tree Close, Guildford,
Surrey, GU1 4LZ M
Monday to Friday (9.30am - 5pm)

The Environmental Statement and supporting documents can be viewed online at:
<https://infrastructure.planninginspectorate.gov.uk/projects/south-east/m25-junction-28-improvements/>

The Scheme

M25 junction 28 is where the M25, with three lanes in each direction, meets the A12, with two lanes in each direction. The existing junction has three levels, the M25 at the highest level, a three lane roundabout below the M25 and the A12 underpass below the roundabout.

The roundabout has traffic signals on most of the slip road entries. Junction 28 is located between Brentwood and Romford as is shown on page 5 to 6.

The junction 28 roundabout also caters for traffic accessing Brentwood via the A1023 (Brook Street). The Brook Street arm of the roundabout is the only one not controlled by traffic lights.

As far as practicable, the Scheme has been designed to avoid, as far as practicable, and minimise the impact on key environmental features.

The design currently includes an extensive environmental mitigation area and improvement works to watercourses to mitigate and compensate for the permanent loss of land required to deliver the road improvements. Also, the Scheme would restore and release land used for temporary works back to the reasonable satisfaction of the land owners after construction has been completed.

There will be enhancement of the surrounding habitat and vegetation cover to reduce views of the Scheme. During detailed design, opportunities to reduce and avoid residual environmental effects will be developed further.



Current challenges within the Scheme area include:

- Junction 28 is already operating at capacity, with motorists regularly experiencing congestion and delays.
- Traffic in the area is expected to increase by up to 30% by 2037.
- There have been several traffic incidents at junction 28, which create delays and congestion along the M25, A12 and local roads.



The Scheme objectives are:

- To increase the capacity and reduce congestion and delays.
- To reduce the incident rate but increasing capacity.
- To improve safety of the roundabout by reducing traffic and resigning the roundabout.
- To cater for future traffic demands support development and economic growth.
- To minimise the impact on local air quality and noise by smoothing traffic flow.
- To protect access for non-motorised users and improve conditions where possible.



Looking east towards junction 28 over Maylands Golf Club with Maylands Cottages on the right

The key environmental constraints are summarised below and shown on the plan on pages 7 to 8:

- The Scheme is located in a predominantly rural setting in a narrow strip of Green Belt between the edge of the settlement of Brentwood to the east and Romford to the west.
- Brentwood Borough Council have declared three Air Quality Management Areas (AQMAs). The Scheme is partially located within AQMA No. 2 which comprises parts of Brook Street, Brentwood and the A12.
- The London Borough of Havering has also declared a Borough wide AQMA covering areas to the west of the Scheme.
- Monitoring by the Department for Environment, Food and Rural Affairs (Defra) recorded elevated nitrogen dioxide (NO₂) concentrations on the A12.
- There are several noise important areas (NIAs) within the area (noise hotspots), with one centred on junction 28.
- There are eight Grade II and II* Listed Buildings in the vicinity of the Scheme. The Nags Head is a Grade II Listed Building located 600 m along Brook Street to the east of junction 28. The Golden Fleece Inn and the Moat House (Grade II*) are located 1 km to the east of junction 28. Weald Park is a Registered Park and Garden located 800 m to the north of the junction.
- There are no designations for landscape quality but there are several Ancient Woodlands around junction 28. Lower Vicarage Wood and Vicarage Wood are both designated Ancient Woodlands and located approximately 400 m and 800 m respectively to the north east from the junction. The Manor Local Nature Reserve (LNR) is located approximately 1 km to the northwest of junction 28. The Ingrebourne Valley Site of Metropolitan Importance (SMI) is located directly west of junction 28 and a section of it is within the Scheme DCO boundary.
- Fifteen veteran trees have been identified within the Scheme DCO boundary.
- The area surrounding the junction is Grade 3 Agricultural Land Classification (ALC) and there is a former landfill site immediately to the north west of junction 28 within Grove Farm.
- Two waterbodies cross the area, the Ingrebourne River and the Weald Brook, both have associated fluvial flood plains.

- Five ponds have been identified within the vicinity of the Scheme and Great Crested Newts (GCN) have been confirmed to be present in four of these ponds.
- The Scheme lies within the Northern Thames Basin National Character Area.

The main components of the Scheme are outlined below and shown on pages 9 and 10.

Improvements to M25 junction 28

A new two lane loop road will be created for traffic travelling from the M25 northbound carriageway onto the A12 eastbound carriageway. The new loop road will descend down from the M25 to the existing A12 largely following the contours of the current terrain.

The A12 eastbound off-slip road and M25 northbound on-slip road will be realigned to accommodate the new loop road.

Four new bridges will be created to facilitate the new loop road. Alder Wood bridge over M25 northbound on-slip road to carry the new loop road, Duck Wood bridge to carry the loop road over the realigned Weald Brook, Grove bridge to carry the new loop road over the realigned Weald Brook and the Ingrebourne River and Maylands bridge which will carry the realigned A12 off-slip over the Weald Brook and the new loop road.

An underpass will be provided under the loop road to allow access to areas north of the loop road. The existing egress from Grove Farm will be altered to tie in with the new A12 eastbound off-slip road. All other existing accesses to nearby properties will be retained.

An underground high-pressure gas pipeline is present within the Scheme DCO boundary which will need to be diverted around the new loop road. The Scheme will provide land for re-aligning hole 2 within Maylands Golf Club which is impacted by the gas diversion. Other utility diversions, including the undergrounding of an overhead electric line belonging to UK Power Networks, will also be required.

An extension of the existing Grove culvert not exceeding 80 m in length beneath the realigned A12 eastbound off-slip road will be required. The Scheme will also provide three new drainage attenuation ponds and two flood compensation areas to manage the water discharging from the road infrastructure and provide drainage in the area.

Environmental proposals

The creation of the new loop road, bridges and culverts will impact the water environment. The Scheme will involve the realignment of sections of the Ingrebourne River and the Weald Brook to a more natural course to minimise the effects on the water environment. Mitigation proposed includes lowering of the floodplain to provide storage and river habitat, creation of backwaters for wetland habitat and maintenance works to manage the riparian trees to reduce shade cover along the river will be undertaken. Natural river beds and mammal passages will be installed in the culvert design. Significant lengths of unlined drainage ditches will be created to manage clean run off and will generate habitat for various species. Widespan bridges will be installed to minimise the impacts on the floodplain.

The Scheme will provide ecological compensation for the permanent loss of land within the Ingrebourne Valley SMI. Proposals include restoration of habitats in temporary working areas, on new earthworks, around ponds and flood compensation areas. Specific mitigation measures for protected species will include creation of ponds and refuges for great crested newts, basking areas for reptiles and installation of bird and bat boxes. Works on the rivers described above will create new wet habitats for various species. River bank re-profiling will be undertaken for a kingfisher bank on the Weald Brook.

Woodland planting will be provided along the loop road to screen the new road from nearby receptors. All land that is used for temporary works during construction will be restored to the reasonable satisfaction of the owners of the land.

Construction

The Scheme is expected to start construction in spring 2022 and be open to traffic by autumn 2024.

Construction will take place on weekdays between 6am and 7pm and weekends between 6am and 5pm. Night work will also be required for installing traffic management and various construction activities such as working on the gantries, surfacing, white lining and constructing the tie ins to the existing network.

The contractor will require parcels of land around the permanent Scheme to use for site compounds, materials storage for permanent and temporary works, haul roads for vehicles, heavy machinery and personnel around the site. This land that is used for temporary works will be restored to the reasonable satisfaction of the owners of the land.

The main construction compound will be located to the west of the proposed loop road and will operate for the duration of the works. The compound will be accessed from the A12 (eastbound). A second satellite compound will be required within the area of the proposed new loop road within Grove Farm. This will also operate throughout the duration of the works. Various haul roads are required within the works area to construct the Scheme. The haul roads will be required to cross the Weald Brook in two locations and temporary bridges will be installed and utilised primarily for the earthwork's operations.

Traffic management will be used to ensure a safe environment for the workforce and minimise the effects of construction on the journey times for road users.

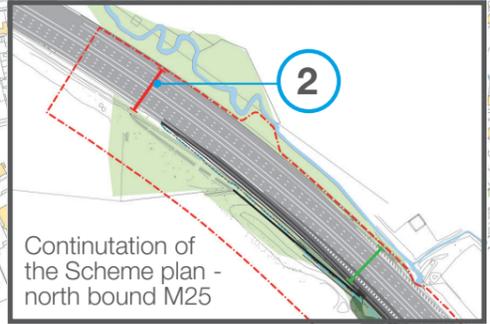
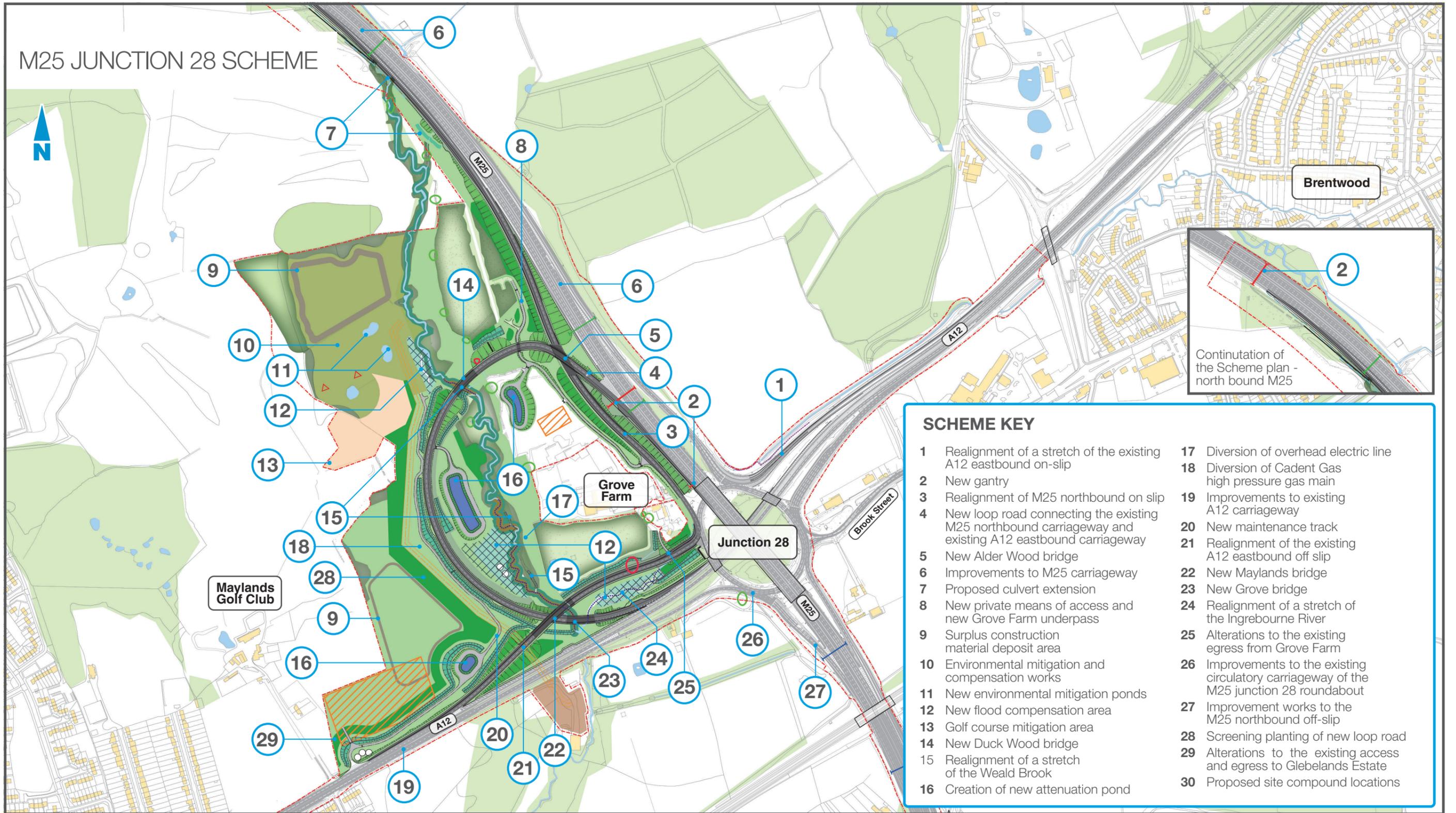
The high-pressure gas main diversion will require a 40 m wide corridor for the installation of the new pipe adjacent to the loop road. Sections of the diversion will be implemented without breaking the ground surface under the A12 and golf course, to limit the impacts on the road users and golf course.

An Outline Construction Environmental Management Plan (CEMP) has been prepared as part of the ES. This includes a Record of Environmental Actions and Commitments (REAC) that identifies the measures required to be implemented within the Scheme to mitigate the likely significant environmental effects of the Scheme. The measures will be implemented during the detailed design and construction stages of the Scheme. The principal contractor appointed to implement the Scheme will develop and implement the CEMP that will outline further information on the construction methodology and programme and the environmental mitigation measures.

M25 JUNCTION 28 CONTEXT



M25 JUNCTION 28 SCHEME



SCHEME KEY

- | | | | |
|----|---|----|--|
| 1 | Realignment of a stretch of the existing A12 eastbound on-slip | 17 | Diversion of overhead electric line |
| 2 | New gantry | 18 | Diversion of Cadent Gas high pressure gas main |
| 3 | Realignment of M25 northbound on slip | 19 | Improvements to existing A12 carriageway |
| 4 | New loop road connecting the existing M25 northbound carriageway and existing A12 eastbound carriageway | 20 | New maintenance track |
| 5 | New Alder Wood bridge | 21 | Realignment of the existing A12 eastbound off slip |
| 6 | Improvements to M25 carriageway | 22 | New Maylands bridge |
| 7 | Proposed culvert extension | 23 | New Grove bridge |
| 8 | New private means of access and new Grove Farm underpass | 24 | Realignment of a stretch of the Ingrebourne River |
| 9 | Surplus construction material deposit area | 25 | Alterations to the existing egress from Grove Farm |
| 10 | Environmental mitigation and compensation works | 26 | Improvements to the existing circulatory carriageway of the M25 junction 28 roundabout |
| 11 | New environmental mitigation ponds | 27 | Improvement works to the M25 northbound off-slip |
| 12 | New flood compensation area | 28 | Screening planting of new loop road |
| 13 | Golf course mitigation area | 29 | Alterations to the existing access and egress to Glebelands Estate |
| 14 | New Duck Wood bridge | 30 | Proposed site compound locations |
| 15 | Realignment of a stretch of the Weald Brook | | |
| 16 | Creation of new attenuation pond | | |

LEGEND	DCO boundary	New sign gantry	Proposed drainage pond	Proposed woodland	Land to be returned to former use	Flood reconnection
	Gas Main route	Removed sign gantry	Proposed species rich grassland	Retained woodland	Earthworks	Veteran trees to be retained
	Realigned waterbodies	Existing sign gantry to be upgraded	Existing woodland and trees	Riverbank grassmix	Surplus construction material deposit area	Veteran trees to be removed
	Flood compensation area	Existing waterbodies	Proposed amenity grassland	Proposed drainage ditch grassland	Golf course mitigation area	Hibernacula
		Proposed grass and scrub planting	Riparian tree management	Proposed compound location		

Alternatives

A staged approach was undertaken in developing options for the Scheme. Of the strategic options considered, the highway improvements based strategy was selected as best to meet the Scheme objectives (as described above on page 2). A list of highway options were then developed to give effect to the Scheme objectives which were assessed based on their ability to achieve the identified Scheme objectives, cost and key issues and risks relating to Scheme delivery.

Three options were taken forward for further assessment in terms of environmental impacts, traffic performance, economic assessments, and value for money. Consideration was also given to identified constraints, risks, affordability and deliverability. It was concluded that the single cloverleaf option (Option 5) was the best performing option, presenting fewer delivery risks and issues. From Option 5, a further six variants of the cloverleaf option were initially developed and three variants (Option 5B, 5C and 5F) were seen to be performing best in the traffic, environmental and economic assessments and were taken forward to the option selection stage.

All three options were presented for non-statutory public consultation (November 2016 to January 2017). Based on the assessment of the options and the response received from the public consultation, Option 5F was selected as the preferred route for the Scheme. In August 2017 the Preferred Route Announcement (PRA) of Option 5F was published.

Further consultation was undertaken; statutory consultation took place between December 2018 and January 2019, a further non-statutory supplementary consultation took place in November 2019 and a targeted consultation between January and February 2020. These consultations, along with ongoing stakeholder engagement, have refined the design and led to the proposal submitted as part of the DCO application and on which an Environmental Impact Assessment (EIA) has been undertaken.



View looking northeast towards junction 28 with A12 eastbound exit slip road on the left

Environmental Statement - scope and approach

The Environmental Statement provides:

- A description of the Scheme and the mitigation measures included as part of the Scheme
- A summary of the alternatives considered
- Assessment of the likely effects of the Scheme on the environment
- Assessment of the cumulative effects

The EIA considers both the indirect and direct effects of the Scheme. Direct effects are the physical changes made by the Scheme, such as the removal of vegetation. Indirect effects are those generated by the construction or operation of the Scheme, such as noise from construction machinery or road traffic. Best practice guidance has been used to assess the Scheme, including established criteria outlined in the Design Manual for Roads and Bridges Volume 11. This guidance combines the magnitude of the impacts and the sensitivity of the environmental receptors or places to arrive at the significance of the environmental effects. This significance is, therefore, an expression of the importance of the effect, relative to the existing environment. Environmental effects can be adverse or beneficial and can range from neutral to very large. Moderate, large or very large effects are considered 'significant' in decision-making terms.

Where significant adverse effects are identified, measures to avoid, reduce and mitigate these effects have been included within the assessment as far as practicable.



The following topics are included in this Environmental Statement:

- Chapter 5: Air quality
- Chapter 6: Noise and vibration
- Chapter 7: Biodiversity
- Chapter 8: Road drainage and the water environment
- Chapter 9: Landscape and visual
- Chapter 10: Geology and soils
- Chapter 11: Cultural heritage
- Chapter 12: Materials and waste
- Chapter 13: People and communities
- Chapter 14: Climate
- Chapter 15: Assessment of cumulative effects
- Chapter 16: Summary



Looking south towards junction 28 on the M25 with Grove Farm on the right

Assessment of likely significant effects of the Scheme

Air Quality

What is the existing environment like?

There are two Air Quality Management Areas (AQMA) - an area where national air quality objectives have been breached - within the air quality study area (200 m from the construction activities or new roads during operation) that could be affected by changes in traffic with the Scheme.

AQMA No 2. is within Brentwood Borough Council and has been declared for exceedances of the annual average nitrogen dioxide (NO₂) objective. The AQMA comprises parts of Brook Street, Brentwood and the A12.

London Borough of Havering has declared a borough wide AQMA for exceeding the annual mean NO₂ and the 24-hour mean PM₁₀ objective.

Air quality monitoring data shows that in recent years there have been exceedances of the national annual mean air quality objective for NO₂ at sites within the air quality study area (along Brook Street and near junction 28).

NO₂ projections used by Defra to report on compliance with the EU limit values showed that there were roadside exceedances of the annual mean NO₂ EU limit value of 40 µg/m³ on the A12 both east and west of junction 28, but not on Brook Street. However, by the opening year, the roadside concentrations were projected to comply with the EU limit value.

There are no designated ecological sites within the air quality study area.



Summary of construction assessment:

There will be no significant effects with the implementation of suitable mitigation measures.

What are the effects during construction?

During construction, there is the potential for increased dust deposition and soiling at properties within 200 m of the Scheme DCO boundary. However, with the application of appropriate mitigation measures such as regular water-spraying and sweeping of unpaved roads, using wheel washes for vehicles, sheeting vehicles leaving site and enforcing speed limits, it is considered significant adverse effects at nearby receptors would be unlikely.

Additional traffic from construction vehicles is considered unlikely to significantly affect air quality, given that the numbers of additional heavy goods vehicles per day does not meet the criteria for assessment.

The mitigation measures proposed for the Scheme are detailed in the Outline CEMP and REAC.

What are the effects during operation?

The air quality assessment has concluded that there are not expected to be any exceedances of the NO₂ annual mean objective at the human health receptors in the opening year (with or without the Scheme).

Five receptors representing the buildings at Grove Farm are expected to have a small increase in NO₂ concentrations with the Scheme due to the A12 slip road being realigned approximately 20 m closer to these buildings. Four receptors included within the Caravan Park, Putwell Bridge to the south of the A12 are expected to have a decrease in NO₂ concentrations with the Scheme. All other receptors are expected to experience an imperceptible change in NO₂ concentrations with the Scheme, including at locations within the AQMAs. There are not expected to be any exceedances of the PM₁₀ objectives with the Scheme.



Summary of operational assessment:

The Scheme is not expected to have a significant adverse effect on human health or ecological receptors with regards to air quality.



Noise and Vibration

What is the existing environment like?

The noise assessment has considered the locations that could be sensitive to changes to noise within 600 m of the affected roads. The nearest noise sensitive residential receptors include Grove Farm, Maylands Cottages, The Poplars and Nag's Head Lane. Other receptors include businesses located along Brook Street.

Putwell Bridge, Caravan Park and various residential communities (Brook Street, Harold Park, Wigley Bush Lane and South Weald) are also located near to the junction. Non-residential noise sensitive receptors include Harold Park Baptist Church, St Peters Church, St Peter's C of E Primary School and the Holiday Inn, Brentwood.

There are six Defra NIAs, which are areas that have been identified as being subject to high levels of noise are located near the Scheme. The dominant noise source influencing the noise climate in the area consists of road traffic noise from M25 and A12.

What are the effects during construction?

Construction activities as well as construction vehicles on the road network can give rise to increases in noise levels if not effectively managed and this can affect nearby sensitive receptors. The construction assessment has identified that without mitigation it is predicted that there will be significant adverse effects on Grove Farm and Maylands Cottages and adverse effects at Putwell Bridge, Caravan Park and 17 Colchester Road from construction activities during the daytime. For night-time works significant adverse effects are predicted for Grove Farm and adverse effects are predicted at Maylands Cottages, Putwell Bridge, Caravan Park and 17 Colchester Road.

The mitigation measures proposed to be implemented during construction works are outlined in the Outline CEMP and REAC.

During the installation of the site compound receptors at Maylands Cottages are predicted to experience high noise levels for less than two weeks before the solid boundary fence along the western side of the site compound boundary is installed and therefore it is expected that the duration required for a significant adverse effect will not be exceeded.

No significant noise and vibration effects at Grove Farm and other nearby receptors are predicted with the implementation of mitigation measures outlined in the Outline CEMP and REAC. Considerate working hours as well as frequent and open communications with stakeholders will also help to reduce the effects of construction noise and vibration.

the night. There will be temporary significant effects from construction vibration at two properties on Seven Hills Road due to road works on the adjacent A245.



Summary of construction assessment:

With the implementation of suitable mitigation, effects are unlikely to be significant.

What are the effects during operation?

Without the Scheme, all properties in the area will experience either no change or a negligible change (up to 3 dB) in road traffic noise in the future year (typically 15 years after Scheme opening). However, with the Scheme, all properties in the area are expected to experience either no change or a negligible and not significant change in noise in both opening and future years.

No further noise mitigation measures are proposed.



Summary of operational assessment:

The Scheme will not have a significant effect on any noise sensitive receptors.

Biodiversity

What is the existing environment like?

The Scheme lies within the northern extent of Ingrebourne Valley SMI. This large SMI covers the Ingrebourne River corridor and associated habitats through London Borough of Havering. There are no statutory designated sites within the Scheme DCO boundary or within the predicted ecological zone of influence of the Scheme.

Semi-natural habitats are present northwest of junction 28 where the loop road will be constructed. These habitats include veteran trees, broadleaved semi-natural and plantation woodland, coniferous woodland, small areas of scrub, semi-improved neutral grassland and hedgerow. There are two watercourses which run through the Scheme; Ingrebourne River and Weald Brook. Ephemeral ditches and two ponds are also present.

The habitats within and adjacent to the Scheme support the following priority and protected species: great crested newt, seven species of bat (roosting, foraging and commuting), breeding birds, otter, terrestrial invertebrates, common lizard, fish, aquatic invertebrates and badger. Non-native invasive species Himalayan balsam, early goldenrod and signal crayfish are also present.



Looking west towards junction 28 from Wiggly Bush Lane bridge over the A12

What are the effects during construction?

Construction of the Scheme would result in significant adverse effects on veteran trees due to the direct permanent loss of two veteran trees and on Ingrebourne River due to the permanent loss of open channel as a result of a culvert extension.

Construction of the Scheme would result in the permanent and temporary loss of habitat within Ingrebourne Valley SMI.

During construction, loss of habitat and disturbance of species has the potential to result in temporary adverse effects on the Ingrebourne Valley SMI, Weald Brook, great crested newt, bats, breeding birds, otter and terrestrial invertebrates (including stag beetle and alder flea-weevil) aquatic invertebrates and fish.

To reduce the effects of the Scheme on biodiversity resources, mitigation and compensation measures have been incorporated into the design. These include: protection of species during construction, appropriate reinstatement and creation of terrestrial habitats and remodelling and enhancement of Ingrebourne River and Weald Brook. New habitat creation includes broad-leaved woodland, flower-abundant grasslands (for invertebrates), tussocky grassland, scrub and hedgerows. Along the watercourses, straight channels will be realigned to new sinuous courses and new backwaters and lowered floodplain areas will be created. Specific measures for species will be incorporated into the design including safe mammal passage through the existing culvert and culvert extension, bird and bat boxes, and habitat for invertebrates requiring dead wood. When established, replacement habitats created during construction will be suitable to support a diverse range of species. Newly created habitats would be managed and monitored as part of a long-term management plan.

The application of appropriate mitigation measures included in the Outline CEMP will prevent harm to species and habitats through appropriate timing and methods of site clearance, pre-construction surveys, and prevention of indirect impacts from lighting, noise, dusk or water pollution during construction. A European Protected Species Licence will be obtained from Natural England for works affecting great crested newt. A method statement will be implemented to avoid the spread of non-native invasive species.

What are the effects during operation?

During operation, replacement habitats created during construction will become established and will be suitable to support a diverse range of species. All newly created habitats will be managed and monitored as part of a long-term management plan. Widespan bridges and safe mammal passage included in the design will allow the continued movement of species along the river corridors.

Sensitive lighting will be designed to minimise light spill onto adjacent vegetation, including designated sites and other habitats adjacent to the Scheme.

Once the Scheme is in operation, there is a risk of incidental injury to mammal species crossing onto the new loop road, but this incidental risk would not result in any adverse effects.



Summary of operational assessment:

- There will be no additional significant adverse effects for veteran trees as a result of operation.
- There will be no additional significant adverse effects on the Ingrebourne River in relation to the permanent loss of open water habitat due to the culvert extension as a result of operation.
- There will be no significant effects on other biodiversity receptors due to the establishment of newly created habitats.



Summary of construction assessment:

- A significant adverse effect on veteran trees will occur due to the unavoidable loss of two veteran trees.
- A significant adverse effect on the Ingrebourne River would occur in relation to the permanent loss of open water habitat due to the culvert extension under junction 28.
- A temporary significant adverse effect on the northern extent of Ingrebourne Valley SMI is anticipated due to the permanent and temporary loss and disturbance of habitat. Once replacement habitats have established, and long-term habitat management has commenced, it is anticipated that effects will reduce to slight adverse and not significant.
- A temporary significant adverse effect on otter and terrestrial invertebrates (including stag beetle and alder flea-weevil) is anticipated due to the disturbance and loss of habitat. Habitat creation and mitigation measures are anticipated to result in neutral effects once established.
- Temporary adverse effects on great crested newts, bats, breeding birds, badger, common lizard, terrestrial and aquatic invertebrates or fish are anticipated however, due to replacement habitats created during construction which would be suitable to support a diverse range of species once established these effects are not considered to be significant.

Road Drainage and the Water Environment

What is the existing environment like?

The key water environment features within the study area (1 km from the Scheme DCO boundary) include:

- Three Main Rivers, the Ingrebourne River (identified as a Water Framework Directive (WFD) waterbody), running parallel and north of the A12, the Weald Brook, located to the west and parallel to the M25 joining the Ingrebourne River at Putwell Bridge; and Paine's Brook located downstream of these
- Tributaries of both the Ingrebourne River and Weald Brook
- Secondary A bedrock aquifers and Secondary A and Secondary (undifferentiated) superficial aquifers underlain the Scheme
- There are no Source Protection Zones
- Flood zones 2 and 3 are present throughout the study area. These flood zones are associated with the Ingrebourne River, Weald Brook and Paine's Brook watercourses

What are the effects during construction?

Temporary impacts during construction have the potential to affect the water environment through the excavation and deposition of materials, spillage of contaminating liquids (i.e. fuels) and runoff from construction sites. With the implementation of industry best practice and other mitigation measures, such as the use of sustainable drainage systems SuDS and construction of wide-span bridges over the watercourses, the use of natural beds in culverts, realignments and in-stream channel works and with lowering of the watercourses to create wet grassland, no significant effects are predicted.

No significant effects are predicted for flood risk and groundwater during construction.



Summary of construction assessment:

There will be no significant effects, with the implementation of mitigation measures on surface water, flood risk, groundwater and WFD compliance.

What are the effects during operation?

During operation, contaminants on the road surface and accidental spillages can cause pollution incidents by water runoff into watercourses, ponds, ditches and groundwater. The design of the drainage system will comply with all current standards and SuDS best practice techniques.

A combination of attenuation dry ponds, ditches, filter drains and sediment catch-pits are the proposed mitigation for surface water quality and sediment mitigation. Floodplain compensation areas have been constructed to mitigate against lost floodplain volume as a result of the Scheme. No significant effects are anticipated on the surface water, flood risk, groundwater and the Scheme will be compliant with the requirements of the WFD.



Summary of operational assessment:

There will be no significant effects, with the implementation of mitigation measures on surface water, flood risk, groundwater and WFD compliance.



Landscape and Visual

What is the existing environment like?

The landscape around the existing junction 28 is characterised by wooded rolling hills and slopes, narrow, tree-lined roads, and swathes of relatively open commons, a sense of tranquillity exists away from main road corridors.

The landscape to the south of the junction is characterised by strongly undulating wooded farmland/ wooded hills with extensive patches of woodland, small-scale field patterns with mature tree lined field boundaries, and narrow, quiet and sinuous rural lanes connecting small-scale settlements. Noise and movement associated with the M25 and A12 road corridors are apparent, and a strong sense of place and orientation is provided by views towards London and North Kent across the Thames Chase Community Forest.

The vegetation pattern of the area is varied including blocks of Ancient Woodland and semi-natural woodland, small-scale pastoral and arable fields bounded by hedgerows with intermittent trees, and by linear woodland belts. Semi-mature woodland belts are largely present along the entry and exit slip roads of the M25, as well as along the A12 east and west of the junction towards the fringes of the built-up areas of Brentwood and Romford. Most of the inner perimeter of the junction 28 roundabout is filled with the existing mature woodland, although there some localised areas of scrub vegetation.

What are the effects during construction?

Construction effects include the loss of vegetation, alteration to the landform, the presence of construction machinery as well as the introduction of man-made features. The largest effects will be in the area between Grove Farm and Maylands Golf Club where the new loop road is to be constructed. These effects are largely temporary, short-term, and reversible.



Summary of construction assessment:

- There will be significant adverse effects on the following landscape receptors: Alder Wood, Maylands Golf Club, the A12 Corridor due to the removal of vegetation and introduction of the new loop road.
- There will be significant adverse visual effects on residential properties at Grove Farm and Maylands Cottages where they have direct open views towards the junction. The removal of mature vegetation would increase the visibility of the road infrastructure. There will also be significant adverse visual effects on PRow users to Bridleway 272_186 and Byway 272_151, where they have elevated views towards the junction.

What are the effects during operation?

Views of the Scheme opened up during construction would remain until the proposed mitigation planting has matured. Mitigation planting will take the form of a combination of woodland, shrub, scrub and grassed areas, some of this planting will be to offset vegetation lost as a result of the construction period. Remainder of the planting will be to offset biodiversity impacts and to assist in the successful long term integration of the Scheme into the surrounding landscape. Significant effects are still anticipated during operation year 1 but as planting matures over time these will reduce by year 15. However, even with the establishment of planting some residual significant effects will still remain.



Summary of operational assessment:

- At operation year 15, it is anticipated that there will be a residual significant effect on Alder Wood, Maylands Golf Club and A12 Corridor.
- There will be a residual significant effect on residential properties at Grove Farm and Maylands Cottages and patrons of Maylands Golf Club.

Geology and Soils

What is the existing environment like?

The soils across the Scheme are clayey and poorly drained, considered to be of moderate or poor quality. Agricultural land is present in the vicinity however is it not Best and Most Versatile. Clayey superficial deposits of Alluvium and Head material are present along local watercourses and the Scheme is mostly underlain by a thick formation of London Clay. An area in the south of the Scheme is underlain by clay, silt and sand known as the Claygate Member. Made Ground is present beneath the M25 and A12 and in the historical landfill at Grove Farm.

Groundwater in the Alluvium is classified as a Secondary A aquifer (capable of supporting water supplies at a local scale). Groundwater in the Head is classified as an undifferentiated aquifer which means it may have the attributes to also be a Secondary A aquifer or it may only have the ability to provide limited amounts of groundwater. The London Clay is considered unlikely to provide a groundwater supply and the Claygate Member is classified as a Secondary A aquifer.

There are potential ground stability issues in the area, including compressible material, unstable ground conditions caused by areas with a high water-table or man-made slopes, and areas of shrinking or swelling clay.

Potential land contamination issues are identified in areas of historical landfills and infilled land, as well as other land uses such as waste management facilities, a railway, fuel stations (active and historic) and a former aerodrome. These sources present potential risks to sensitive receptors.

Nearby receptors to potential contamination and ground stability risks include residents and workers, groundwater and surface water bodies (Ingrebourne River and Weald Brook) and existing infrastructure, property and services.

What are the effects during construction?

Construction activities (such as piling, dust generation or groundwater control activities) have the potential to introduce new pathways for the migration of existing contamination. The proposed attenuation pond to be created within the footprint of the historical landfill has the potential to introduce new pathways mobilising and connecting leachable contaminants into controlled water receptors. Construction activities and site clearance have the potential to increase soil erosion and ground instability.

As well as ground investigation, mitigation measures to reduce these potential risks include the completion of appropriate risk assessment and method statements and remediation (if required) prior to construction. Further measures will include appropriate dust suppression, groundwater and surface water management methods, stockpile management measures, limits to the size and duration of earthwork areas and soil exposure at any one time and adherence to appropriate pollution control measures. Appropriate design will be applied to ensure ground stability and to limit the creation of new pollution pathways that may be formed as a result of the Scheme, for example with relation to the proposed attenuation pond.



Summary of construction assessment:

- No significant effects are anticipated with the implementation of design and mitigation measures with regards to land contamination, geomorphology and ground stability.
- Beneficial and not significant effects are anticipated on a number of identified land contamination, geomorphology and ground stability receptors.
- No significant effects are anticipated on agricultural soils and land use.

What are the effects during operation?

During operation, it is unlikely that new pathways will be created. Accidents and incidents have the potential to create new sources however, these will be minimised by good practice measures outlined in the Outline CEMP and REAC.



Summary of operational assessment:

- No significant residual effects with regards to land contamination, geomorphology and ground stability are expected during operation of the Scheme.
- No significant residual effects are anticipated agricultural soils and land use during operation of the Scheme.



Cultural Heritage

What is the existing environment like?

- The Scheme study area (500 m from the Scheme DCO boundary) includes the following historic resources:
- One Grade II Registered Park and Garden (RPG), Weald Park (northeastern boundary of the study area)
- Two Grade II* listed buildings: The Golden Fleece Inn and Moat House (located along the London Road, outside of Brentwood)
- Six Grade II listed buildings: Tylers Hall Farm House, a timber-framed range of outbuildings, Stony Hills Farm, Nos 17, 19 and 21 Brook Street, The Bull Inn and The Nag's Head Inn (within study area)
- Two conservation areas: South Weald and Weald Park Conservation Area (southern edge of Weald Park RPG)
- Post-medieval park at Dagnam
- Three archaeological priority zones (APZ), within the study area

Within the study area, there are also sixteen non-designated heritage assets. These include the London to Colchester Roman Road, the presumed sites of a

medieval manor house and hospital, post-medieval domestic and agricultural buildings, and the former Maylands Aerodrome site.

What are the effects during construction?

During construction, direct physical impacts on heritage assets (such as the APZs) could occur as a result of earthmoving operations, creation of site compounds, road construction; and construction of proposed overbridges and other structures however, the impacts to setting would be temporary, short term and reversible. Direct impacts are expected at the Former Maylands Aerodrome Site as works could have the potential to remove any remains associated with the asset. An archaeological management and mitigation strategy will be prepared that includes excavation, targeted watching briefs, monitoring and sampling. This will ensure preservation by record of the known heritage assets affected and will enable identification and preservation by record of any previously unrecorded archaeological remains.



Summary of Construction assessment:

No significant effects are anticipated on heritage assets with the implementation of mitigation measures.

What are the effects during operation?

During operation, two heritage assets (Stony Hills Farm Grade II listed building and Post-medieval park at Dagnam) would experience effects from the operation of the Scheme from noise and visual intrusion however, these effects would not be significant.



Summary of operational assessment:

No significant effects are anticipated on heritage assets with the implementation of mitigation measures.

Materials and Waste

What is the existing environment like?

The materials and waste assessment considers the effects the Scheme will have on the capacity of the local / regional waste infrastructure (e.g recycling facilities, landfills etc.) and the availability of aggregate materials within the region.

The baseline for materials and waste includes:

- The materials baseline - sourced from the Greater London and East of England regional baselines which identifies the main construction materials. The regional sales of aggregate (the main material to be used on the Scheme) is estimated to be 18,300,000 tonnes per annum.
- The waste infrastructure baseline - sourced from the Environment Agency Waste Data Integrators, which identifies the capacity of waste infrastructure for an area. Essex has the capacity to manage 8,677,432 tonnes of non-hazardous construction, demolition and excavation waste per annum, and 6,365 tonnes of hazardous construction, demolition and excavation waste per annum.

What are the effects during construction?

During construction the Scheme has the potential to impact the market and availability of material assets and total available waste infrastructure capacity.

The impact on the material assets markets would be due to the use of construction materials and the impact on waste infrastructure capacity would be due to the generation of waste. Significant effects are anticipated on the waste infrastructure capacity due to large quantities of earthworks and reduced quantities of re-used / recycled material assets. Embedded mitigation including, re-using soils for landscaping within the Scheme will help to reduce waste generation. Further mitigation measures such as employing best practice waste management, not overordering materials, reusing materials and training staff will also be implemented.



Summary of Construction assessment:
Significant adverse effects on the waste infrastructure capacity will occur due to large quantities of earthworks and reduced quantities of re-used / recycled material assets.

What are the effects during operation?

During operation, only small quantities of materials will be used and waste generated will be minimal.



Summary of operational assessment:
Operational assessment was scoped out due to the minimal impact it was estimated to have.



Looking north towards junction 28 from the PRow near Nags Head Lane, west of the A12

People and Communities

What is the existing environment like?

Residential and commercial dwellings and community facilities are found in the main settlements of Romford and Brentwood and the smaller local villages and areas of Harold Park, Nags Head Lane, South Weald, Brook Street, Wigley Bush Lane, Weald Park Way and Warley Road. The closest private residential dwellings to the Scheme include Grove Farm and Maylands Cottages. Maylands Golf Club is a private facility within close proximity to the Scheme. Other community facilities include Henderson Sports and Social Club, Spirit Health Club and the proposed Gardens of Peace burial ground (formerly known as Land at Oak Farm) site which are located near the Scheme.

Two rural enterprises are also located near the Scheme. Several Public Rights of Ways (ProW) and footways cross the Scheme allowing pedestrians and others travelling between the nearby villages to cross the junction.

Most of the views of the Scheme are screened by vegetation adjacent to the M25 and A12. The M25 and A12 carry high volumes of traffic at peak times through junction 28 which can cause disruption and delays to the surrounding road network, particularly when emergency closures and lane closures are imposed which contributes to increased driver stress.

The health of residents in Brentwood and Havering is generally better than or in line with the England average. The overall employment levels and long-term unemployment levels for the relevant wards of Brentwood and Havering are also significantly better than the national average.

What are the effects during construction?

Land take from Grove Farm is required to build the loop road, slip roads, ponds and other Scheme components and will result in a significant adverse effect on this private property. Significant adverse effects on amenity are anticipated on Grove Farm and Maylands Cottages from the combination of visual, air quality and noise impacts during construction.

Land take is required from the tee off area to hole 2 of Maylands Golf Club in order to construct the Scheme and it is therefore proposed that a replacement hole is provided of equal quality adjacent to the existing hole. The new hole would also be able to be constructed prior to the existing hole closing and therefore no significant effects are anticipated.

There is expected to be a significant effect on amenity to Maylands Golf Club during the construction phase as a result of a combination of visual, air quality and noise impacts. This is will reduce to not significant by the operation phase as the planting mitigation measures establish.

Temporary land take is required from the proposed Gardens of Peace development, situated at Oak Farm, in order to divert the high-pressure gas pipeline. A permanent right of access is also required to enable future maintenance of the pipeline. Given that the site will continue to be able to operate and having regard to the existing easements over the land, taking a permanent right over this site, no effect is anticipated to arise. Permanent land take required for the Scheme is located on land that has been identified as suitable for the provision of wind related development, however, due to other alternative locations identified for the wind farms, this is not considered to be a significant effect.

Temporary disruption and visual amenity effects are predicted for vehicle travellers and NMUs from increased traffic congestion and/or delays during construction however, these effects are not considered to be significant.

Mitigation measures will help reduce the effects from construction. This includes minimising permanent land take, ensuring an access is retained to private residential dwellings, community land and facilities, notifying NMU and vehicle travellers of changes to routes; providing clear signage, screening vegetation and ongoing community engagement.

With suitable mitigation measures in place, no significant effects are predicted to occur on human health.



Summary of construction assessment:

- Land take required at Grove Farm will result in significant adverse effects.
- Significant adverse effects to Grove Farm and Maylands Cottages will result from changes in the level of amenity enjoyed by both properties.
- A temporary significant adverse effect on amenity to Maylands Golf Club is also expected as a result of visual, air quality and noise impacts from construction.
- No significant adverse effects are predicted for any other people and communities receptors types and health determinants.

What are the effects during operation?

Permanent land take from Grove Farm is required during operation and will still result in a significant effect on this private property. Significant visual amenity effects on Grove Farm and Maylands Cottages will remain during operation. No further land take (permanent or temporary) is required during operation and therefore no further effects.

With the establishment of mitigation planting, the effects on amenity will reduce over time on Maylands Golf Club and will reduce to not significant.

Significant beneficial effects are predicted on driver stress during operation due to an improvement in journey times and reduction in traffic.

No significant operational effects are predicted for community assets, rural enterprises and human health.

Mitigation proposed includes screen planting to reduce the impact from changes in views.



Summary of operational assessment:

- Significant adverse effects due to permanent land take required at Grove Farm will remain.
- Significant adverse effects to Grove Farm and Maylands Cottages will remain during operation from changes in the level of amenity enjoyed by both properties.
- Significant beneficial effects on driver stress due to improvement journey times.
- No significant adverse effects are predicted for any other people and communities receptors types and health determinants.



Climate

The climate chapter is presented in two separate sub-chapters:

Effects of the Scheme on climate

Vulnerability of the Scheme to climate change

What is the existing environment like?

For effects on climate, the condition of the existing environment is based on the quantity of emissions that are generated by the existing road users in terms of greenhouse gases.

For vulnerability of the Scheme to climate change, the baseline includes the current climatological conditions, as well as the projected climate changes for the area. The current climate in Essex is one of relatively mild winters and warm summers and the monthly average and mean maximum temperatures are amongst the highest in the UK. Long term average monthly rainfall is close to the lowest in the UK and the study area receives fewer heavy rainfall days than is usual for the UK. It is projected that, on average, the study area is likely to experience hotter and drier summers and warmer and wetter winters. Alongside these changes in the average conditions, it is likely that climate change will increase the frequency and severity of extreme weather events, such as heavy rainfall, storms and heatwaves.

What are the effects during construction?

Emissions are produced from the production and transportation of materials to be used in construction and those emitted onsite through construction activities (for example from emissions from fuel use in construction plant). The construction of the Scheme will lead to the release of an additional 36,954 tonnes of carbon dioxide equivalent (tCO₂e) which will lead to a long-term negative effect on the atmosphere however, this is not considered significant due to the small magnitude in comparison with overall UK national budgets. Mitigation measures include exploring the potential for low carbon solutions (including technologies, materials and products) to minimise resource consumption and reusing and / or refurbish existing assets to reduce the extent of new construction.

With regard to vulnerability of the Scheme to climate change, construction is not expected to be sufficiently far into the future for the climate to change so significantly that construction related impacts would be different to those expected in the current climate. Climate change would therefore not intensify construction related impacts and accordingly no significant construction effects are identified.



Summary of construction assessment:

No significant construction effects are predicted.

What are the effects during operation?

Emissions are produced from road users and operational energy use (for example street lighting). In both the opening and design years (15 years after opening) the Scheme will lead to an increase in operational emissions, of 358 tCO₂e and 4,877 tCO₂e respectively which is not considered significant due to the small magnitude in comparison with overall UK national budgets.

Although the Scheme will produce emissions, it may cause a reduction in emissions due to changes in traffic flow compared to not building the Scheme which would in turn result in improvements in effects on climate. Mitigation includes designing the Scheme to minimise emissions by the use of low energy lighting and traffic management systems.

UK climate projections for the 2050s consider that average mean temperatures are likely to increase throughout the year leading to warmer and wetter winters. Warmer temperatures are likely to result in a reduction in the cost and frequency of winter road maintenance and improved driver safety. The increased risk of heat waves could lead to increased deformation and rutting of road surfaces as well as over expansion and buckling structures including bridges. Increased erosion due to drier summers may occur which may cause sedimentation with the drainage infrastructure. Higher rainfall is also predicted which can lead to increased flooding, pothole formation and also reduce driver safety.

Mitigation measures include best practice bridge and road construction techniques, use of appropriate materials, monitoring of infrastructure and appropriate design of drainage systems and landscaping to reduce impacts from climate change.



Summary of operational assessment:

No significant operational effects are predicted.

Assessment of Cumulative Effects

What is the existing environment like?

The cumulative effects assessment considers both, the in-combination effects (the combined environmental effects identified within the different environmental assessments, on the same receptor, caused by the Scheme) and cumulative effects (the cumulation of effects on a receptor from the Scheme in tandem with effects from other developments planned or under construction within the Scheme's study area).

The baseline for each environmental topic is described above in the previous sections. A summary of the developments that have been shortlisted in the cumulative effects assessment includes:

- Highways England's Lower Thames Crossing (LTC) – a Nationally Significant Infrastructure Project (NSIP)
- Large, Medium and Small Scale Wind Development Sites
- Putwell Bridge, Caravan Park
- Gardens of Peace (formerly known as Land at Oak Farm) – new burial ground
- Cycleway proposals, including works along Brook Street
- One Transport for London reconfiguration proposal
- Six other residential and mixed-use developments in the vicinity

What are the effects during construction?

In-combination

The in-combination effects during the construction period are principally related to visual impacts, land take, localised noise and vibration impacts, temporary disturbance to ecological receptors, and potential localised disturbance to some heritage assets.

The overall in-combination effect is considered to be moderate adverse and significant, with large adverse effects on some human (residential, community and business) receptors and landscape receptors primarily due to the visual and amenity impacts of construction works.

There are no significant effects anticipated on human travellers, the water environmental, townscape, geology and soils and heritage assets.

Cumulative effects

Development of LTC could result in adverse cumulative effects on landscape and visual receptors if the construction period of LTC and the Scheme align, however these would not be significant.

Adverse cumulative effects between the Scheme and several sites in relation to biodiversity impacts are anticipated, due to disturbance to species and displacement of SMI land however, these are not expected to be significant.

Adverse cumulative effects in relation to construction noise, should construction periods overlap with the Scheme, are expected at several sites, however, these are not expected to be significant.



Summary of construction assessment:

- Significant adverse in-combination effects are anticipated on localised human receptors due to land take and visual impact, including very large landscape adverse effects upon Grove Farm and Maylands Cottages however, these are only temporary.
- Significant adverse in-combination effects on ecological receptors are expected however, these are only temporary.
- Significant adverse in-combination effects on landscape receptors due to visual impacts during construction however, these are only temporary.
- No other significant in-combination or cumulative effects are anticipated during the construction phase.

What are the effects during operation?

In-combination

The in-combination adverse effects during operation are principally related to biodiversity (with regard to loss of veteran trees) and landscape and visual effects. Water environment works, as well as improved vehicular traffic flows would generally result in beneficial in-combination effects in these respects.

The overall in-combination effect during operation is considered to be neutral to slight adverse and not significant, with slight adverse effects upon human (residential, community and business) receptors, ecological receptors and landscape receptors.

No significant adverse effects are anticipated on townscape, geology and soils and heritage receptors.

Cumulative effects

Adverse cumulative effects in relation to landscape and visual effects at Land East of Nags Head Lane and Dunton Hills Garden Village, where proposals could combine with the Scheme to have an urbanising effect on the existing rural character. However, these effects are not expected to be significant.



Summary of operational assessment:

- Significant beneficial in-combination effects on human travellers through improved traffic flow and reduced congestion.
- No other significant in-combination or cumulative effects are anticipated during the operational phase.

What happens next

Highways England has submitted an application under Section 37 of the Planning Act 2008 for an Order to grant Development Consent for the M25 junction 28 improvement Scheme. Following submission of the application for Development Consent, the Planning Inspectorate will consider, on behalf of the Secretary of State for Transport, whether the application should be accepted for examination.

If accepted, the documents accompanying the application will be publicly available on the Planning Inspectorate's website. Interested parties will be able to make relevant representations about the Scheme and its potential impacts. Representations received by the Planning Inspectorate will be considered as part of the examination into the application.

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