

Lower Thames Crossing  
**7.4 Project Design Report**  
**Part D: General Design North of the River – North of the A13 Junction to the M25**

APFP Regulation 5(2)(q)  
Infrastructure Planning  
(Applications: Prescribed Forms and Procedure)  
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Part 6

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# Project Design Report Part D: General Design North of the River - North of the A13 Junction to the M25

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# 1. Project Design Report – introduction

## 1.1. Document structure

1.1.1. This Project Design Report (PDR) covers the general design for the section North of the River - North of the A13 Junction to the M25.











1.1.2. General design broadly covers the following areas:

- a. Existing context
- b. Preliminary design: landscape
- c. Preliminary design: highways
- d. Preliminary design: utilities

## 1.2. Navigation

1.2.1. This document, Project Design Report Part D: General Design North of the River - North of the A13 Junction to the M25, is one of 10 parts that cover the preliminary design aspects of the Project.

1.2.2. Each part has been assigned a colour, as outlined below, to assist with navigation between documents and for further information on other preliminary design aspects of the Project.

	Part A: Introduction and Project Background
	Part B: Policy Context and Project Design Process
	Part C: Design Rationale
	Part D: General Design South of the River
	Part D: General Design North of the River - Tilbury to the A13 Junction
	<b>Part D: General Design North of the River - North of the A13 Junction to the M25</b>
	Part E: Design for Walkers, Cyclists and Horse Riders
	Part F: Structures and Architecture
	Part G: Design Evolution
	Part H: References and Glossary



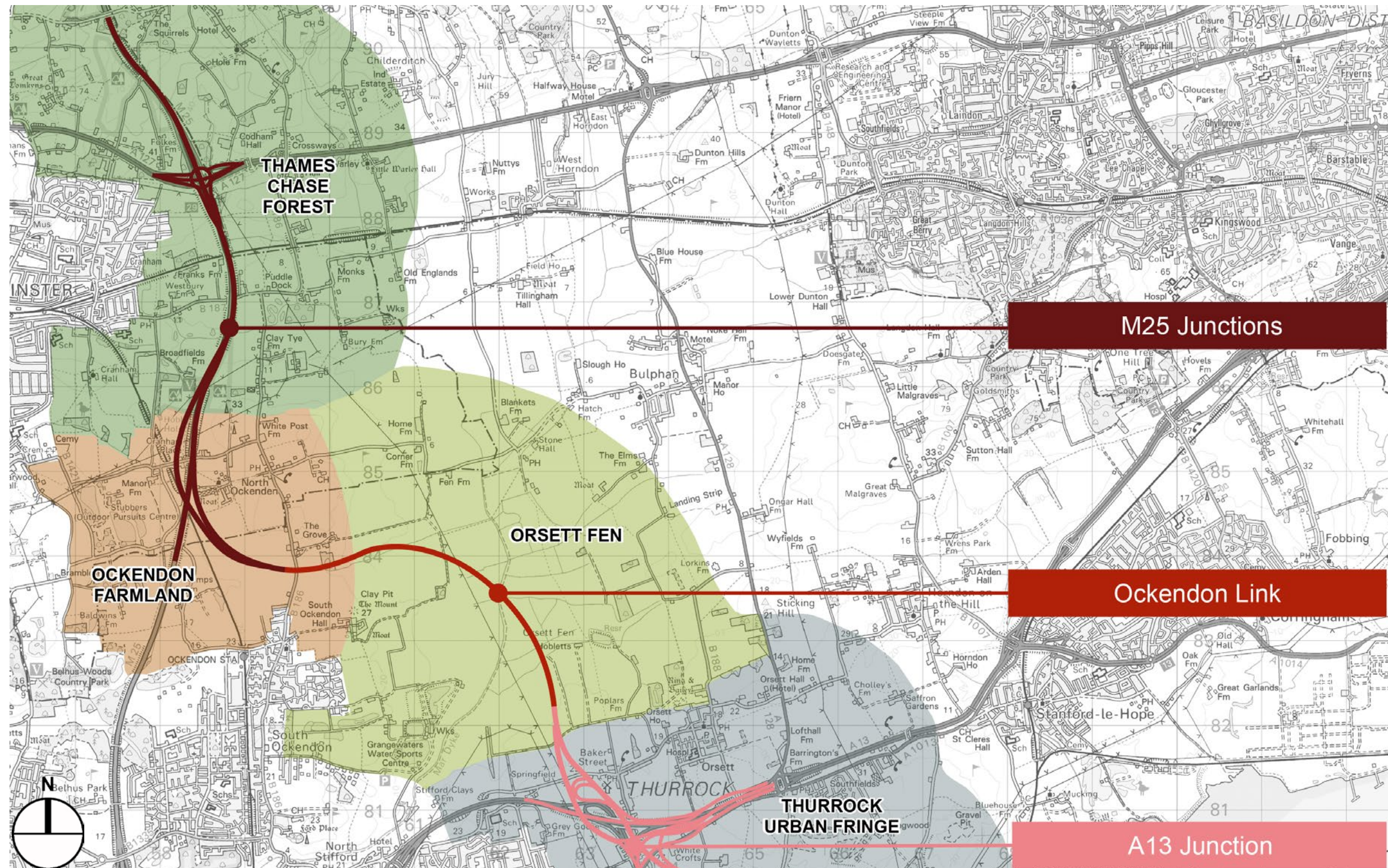
## 2. Existing regional context

### 2.1. Introduction

2.1.1. The North of the A13 Junction to the M25 region contains the following area-specific sections; Ockendon Link and M25 Junctions. It spans the character areas of Orsett Fen, Ockendon Farmland and Thames Chase Forest.

2.1.2. The Preliminary Design has been developed for the purposes of this application. The design will continue to be developed at detailed design stage within the context of the Preliminary Design presented in accordance with the requirements of the Development Consent Order (DCO).

2.1.3. The designs and images shown in this document are preliminary, which are illustrative proposals of one possible design outcome. Proposals shown may be developed differently during detail design to comply with the Project requirements.

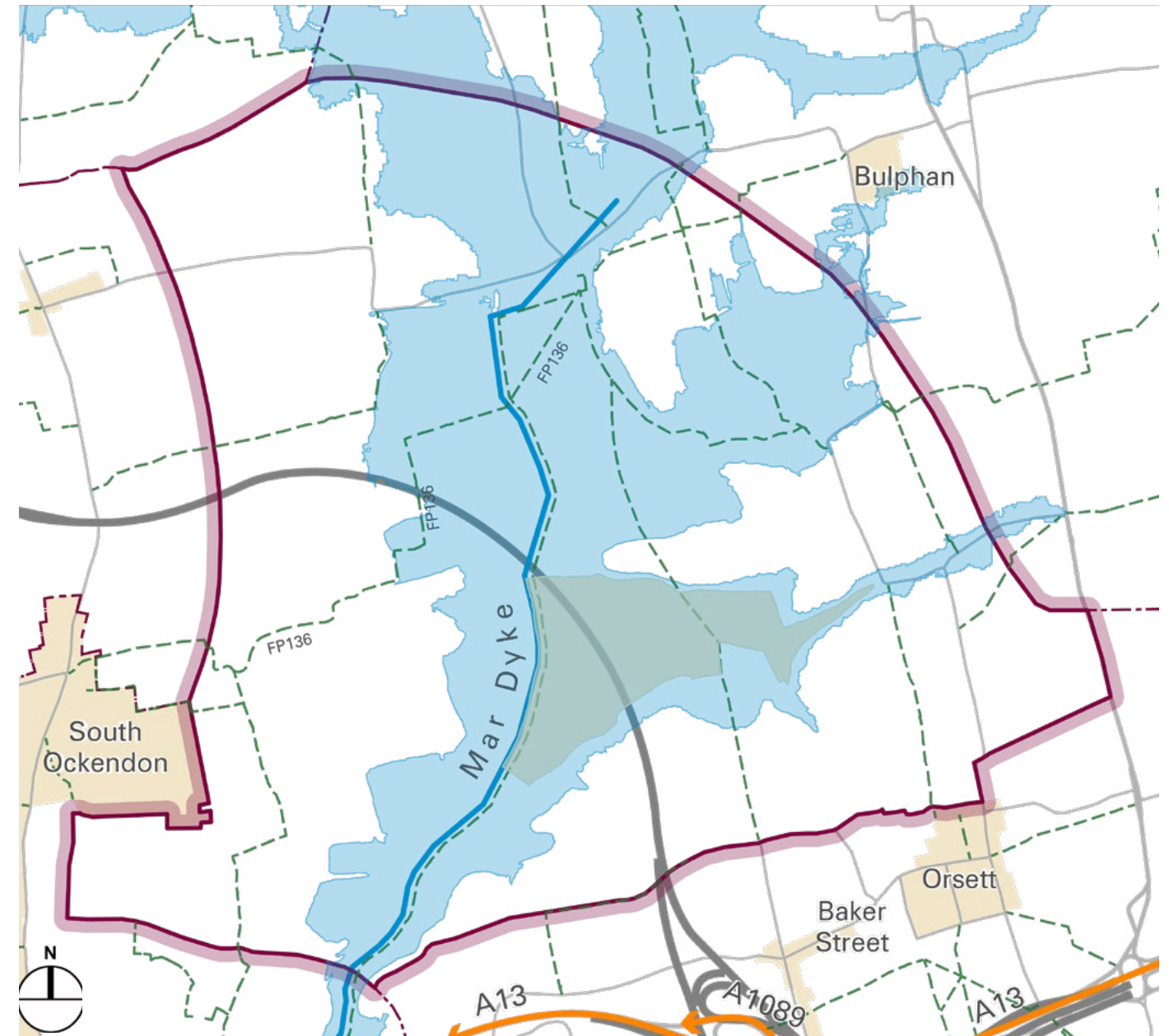
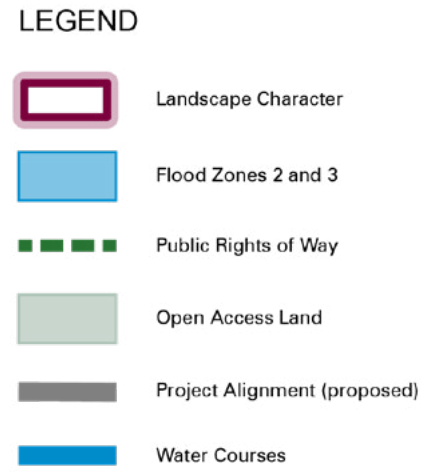




## 2.2. Character Areas

### Orsett Fen

2.2.1. The Orsett Fen is a low-lying landscape of drained fen, predominately in arable use. The area includes Orsett Fen common land. The site is registered as common land and is subject to public access rights under section 193 of the Law of Property Act 1925, although as the land is used for agricultural purposes, the public's actual use of the land is limited. The landscape is flat and open, with the horizon line being formed by surrounding higher ground. The sense of openness is further amplified in the lowest parts of the area where fields are separated by ditches rather than hedgerows. The Mardyke, the area's principal watercourse, is legible in views over the area, with riparian vegetation mapping its course through the flat landscape. There are no roads or settlements within the heart of the fen which contributes to a sense of remoteness and relative tranquillity.



Aerial view of Orsett Fen



Orsett Fen



Mardyke River












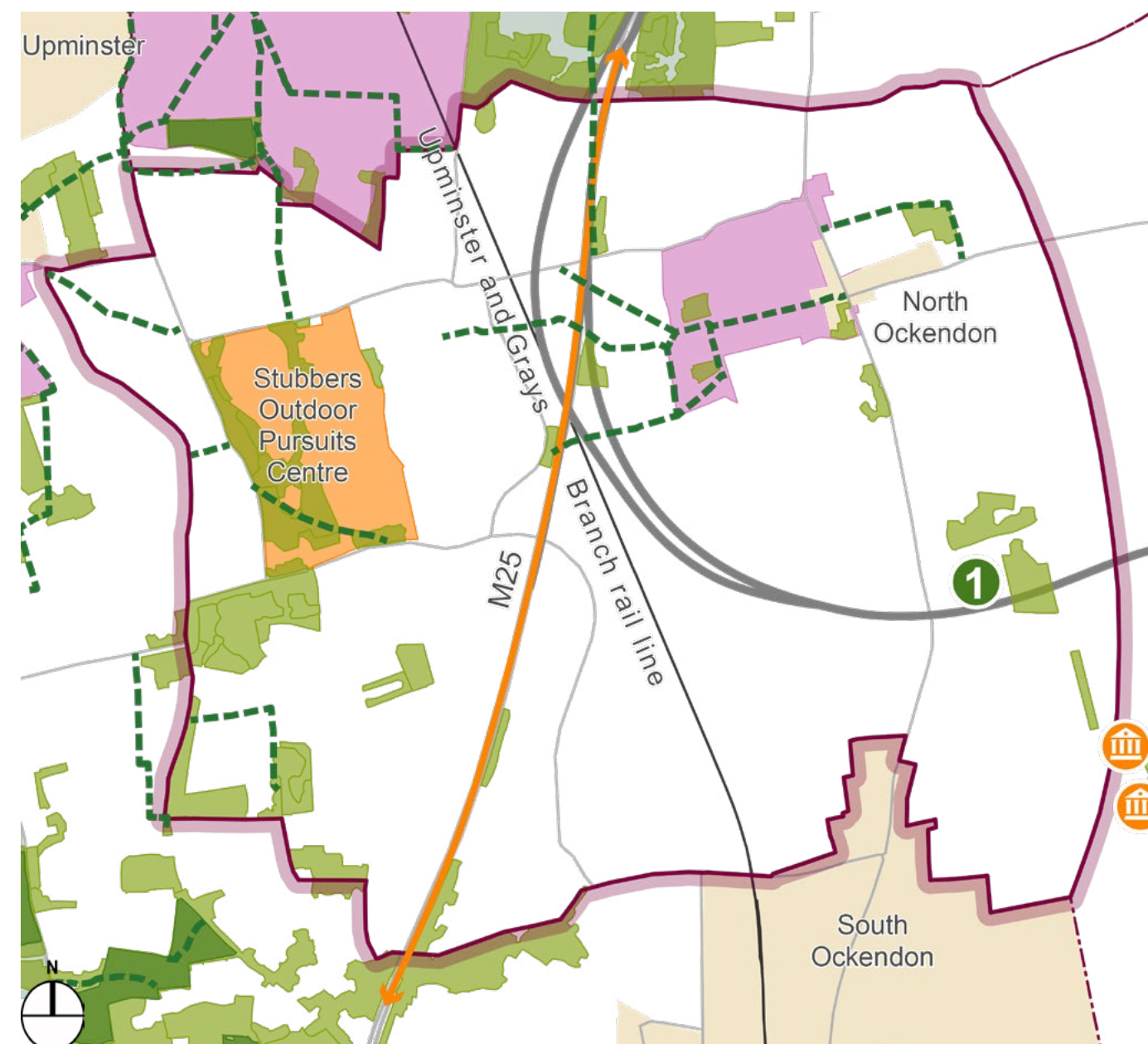
## Ockendon Farmland

2.2.2. Ockendon Farmland is a gently rolling landscape made up of large rectilinear arable fields separated by sparse hedgerows. Aggregate extraction activities have had a significant impact on the landscape, with numerous lakes and raised areas of landfill on former quarry sites. The lakes are associated with boundary vegetation and it is this vegetation rather than the lakes themselves that have an impact upon views through the landscape. Landfill sites with raised topography have created new skylines and foreshortened views. In places these embankments have been softened by woodland planting.

2.2.3. The Wilderness is a privately owned woodland to the north of South Ockendon. It is used by an educational activity provider known as Wild Thyme Outdoors.

### LEGEND

-  Landscape Character
-  Conservation Areas
-  Open Access Land
-  Public Rights of Way
-  Ancient Woodland
-  Other Woodland
-  Scheduled Monuments
-  'The Wilderness'
-  Project Alignment (proposed)



Aerial view west towards M25



North Ockendon Open Farmland

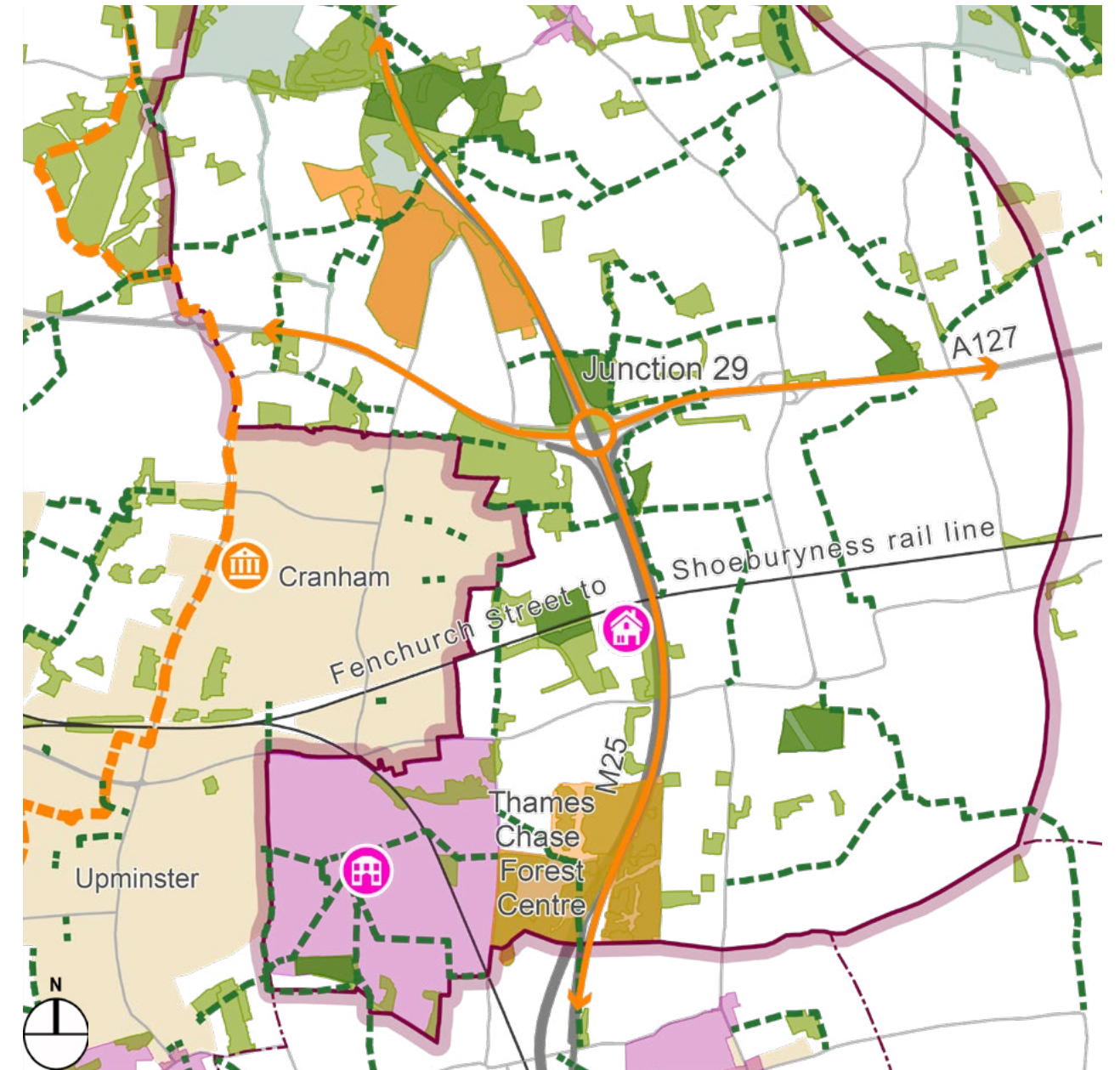
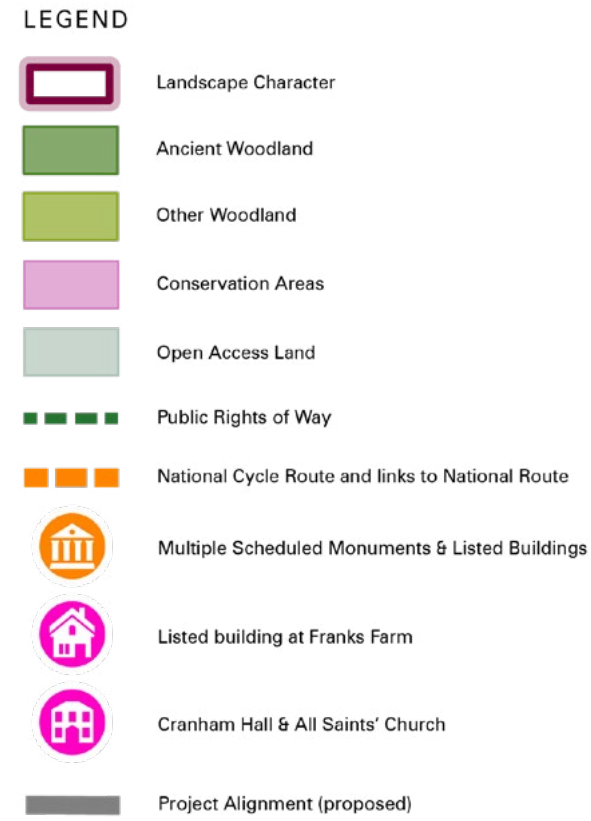


North Ockendon Open Farmland



## Thames Chase Forest

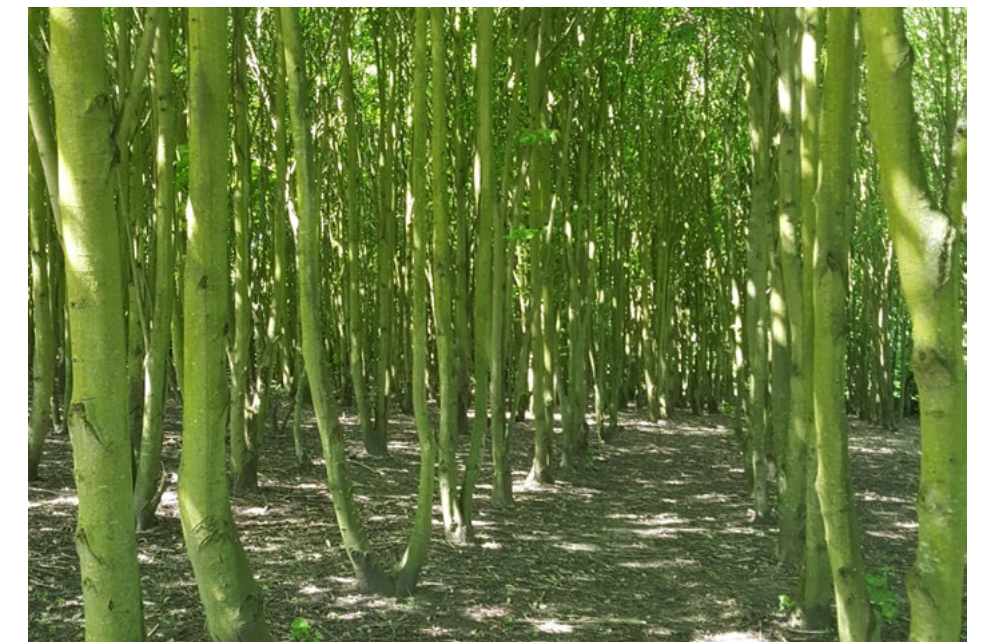
2.2.4. To the northwest of this area the alignment moves into Thames Chase Community Forest. The topography here is varied across the character area ranging from gently undulating in the south to steeper slopes in the north. This varied topography is unified by the woodland cover across the character area. To the south, the Thames Chase Forest Centre, an extensive area of 1990s woodland planting straddling the motorway, gives this section of the M25 an an enclosed, wooded character. To the north of the A127 two areas of ancient woodland were previously impacted upon by the M25 and parts of those woodlands lie either side of the carriageway. Large areas of younger woodland have established alongside the M25 in between these areas of ancient woodland.



Aerial view north along M25



Thames Chase Community Forest



Thames Chase Community Forest



## 2.3. Existing historical context

2.3.1. In South Ockendon is the Grade I listed Church of St Nicholas. East of the town are two scheduled ancient monuments – a Roman barrow, which is outside the Order Limits and the moat and gatehouse of South Ockendon Old Hall, which is within the southern end of the Order Limits. To the west of the moat are non-designated cropmarks. Grade II listed buildings in the region generally consist of farmhouses and barns, except for a former gateway at Groves Barns and a granary at Great Mollands.

2.3.2. In addition, there is the site of a Romano-British cremation, evidence of ridge and furrow, an area of possible prehistoric enclosure and a ditch, all within the Order Limits.

2.3.3. In North Ockendon there is the Grade I listed St Mary Magdalene Church. There are seven Grade II listed buildings, one of which is the garden walls to the former North Ockendon Hall. These are also on the Heritage at Risk Register (Historic England). A small area of the north-west part of North Ockendon Conservation Area is within the Order Limits.

2.3.4. West of the M25, within Thames Chase Community Forest, is a Grade II listed barn and stable block, to the north of the former Broadfields Farmhouse. Further north is Franks Farmhouse, located close to the western edge of the Order Limits adjacent to the M25.

2.3.5. Further west of Thames Chase Community Forest is Cranham Conservation Area. It has a number of Grade II listed buildings including All Saints Church, Cranham Hall and its garden walls. The walls are also on the Heritage at Risk Register (Historic England).

2.3.6. The other listed buildings in the region are predominantly farmhouses and agricultural buildings, located in rural areas, such as the Grade II listed farmhouse at Hole Farm.



*Grade I listed St Mary Magdalene Church*



*Grade II listed All Saints Church*



*Grade II listed barn at Thames Chase Community Forest*



*Heritage buildings at Thames Chase Community Forest*



# 3. Proposed regional strategies

## 3.1. Overview

3.1.1. The following outlines the regional design proposals at a broader scale that have informed and shaped the Preliminary Design landscape proposals in the area-specific sections.

### 1. Wetland Creation/Mardyke Corridor

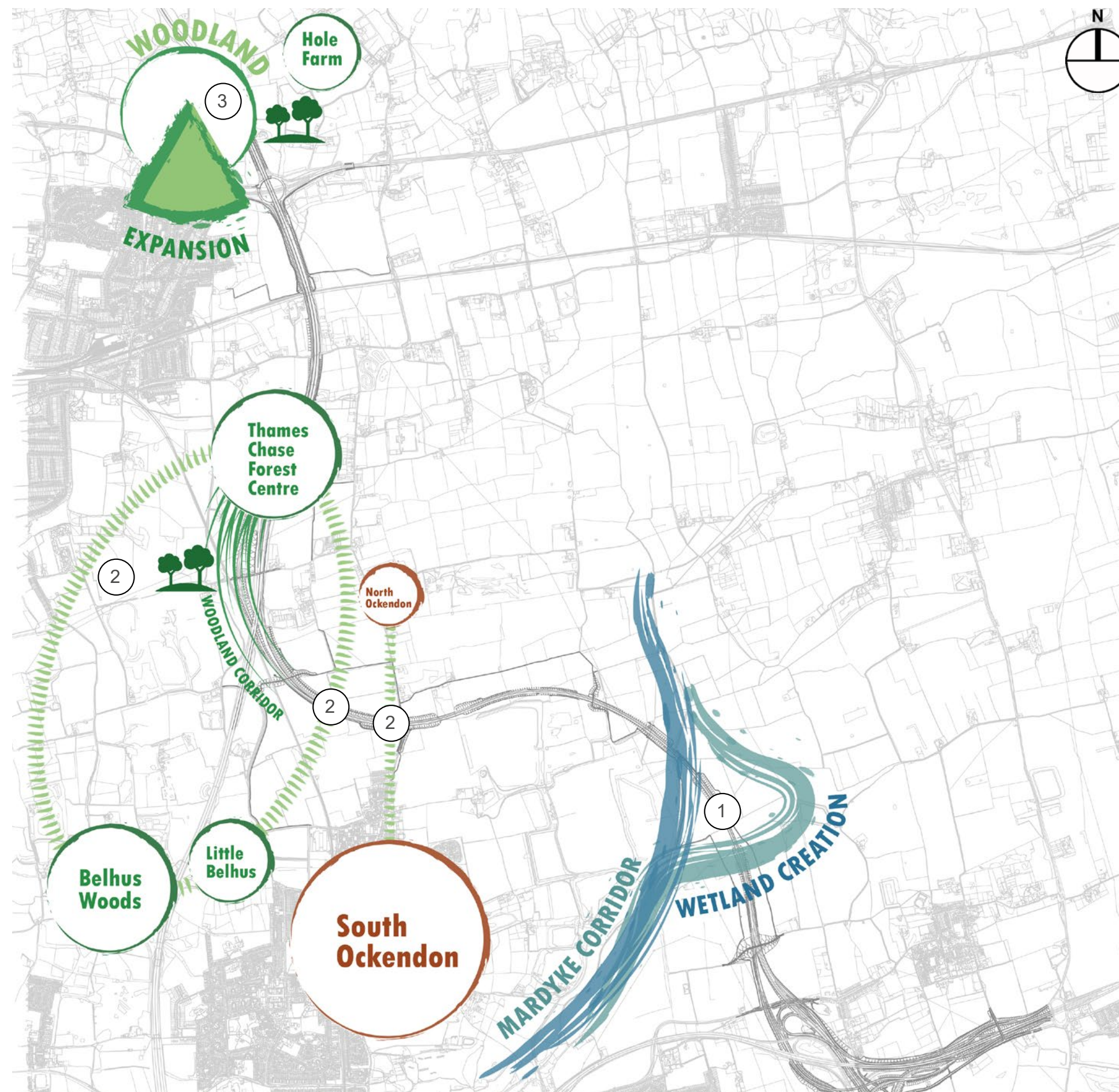
3.1.2. Land between the Mardyke and the viaduct is proposed to be restored to suitable wetland habitat to integrate the built structure into the wider fenland landscape. This will include water vole habitat.

### 2. Green connections

3.1.3. The landscape proposals will ensure that green connections are maintained and enhanced wherever possible. These include the creation of green bridges and the linking of woodland for both visual and habitat connectivity over the Project route and the existing M25.

### 3. Woodland expansion

3.1.4. Where possible within this area there is a general strategy to extend and expand existing woodlands to create larger and better connected areas of woodland therefore reinforcing the woodland character of the location. This includes areas of habitat creation to compensate for effects on ancient woodland and from nitrogen deposition.





## 3.2. Routes for Walkers, Cyclists and Horse Riders

3.2.1. While walkers, cyclists and horse riders (WCH) provision in the southern and eastern part of this area is characterised by footpaths and bridleways through open countryside, the northern and western part is characterised by historic severance caused by the M25 and the A127. This constrains WCH users to a small number of crossing points.

3.2.2. Within this area lie Thames Chase Community Forest (with its Forest Centre visitor facility), Orsett Fen, Belhus Woods Country Park, Little Belhus Country Park, with Thorndon Country Park north of the A127. Existing WCH connectivity between these assets is poor and the M25 acts as a barrier to walkers, cyclists and horse riders in residential areas. For example, this occurs at Upminster with limited access to countryside walks and rides to the east. The A127 also severed many north-south footpaths and compounds the problem.

3.2.3. A number of strategies, such as Thurrock's Greengrid and the Thames Chase Trust's Forest Circle, were previously designed to improve access to the countryside as well as improve connectivity between country parks and publicly accessible spaces.

3.2.4. Informed by conversations with stakeholders, including Thames Chase Trust, as well as landowners, a WCH strategy in this region has been developed that will resolve part of this historic severance where benefit is high. In doing so, this will improve the connectivity of residential areas and existing community green spaces, such as Thames Chase, and to open countryside around the Mardyke. Improvements to the existing network, as well as the filling in of missing links, will connect Thames Chase Community Forest to Little Belhus Country Park, onwards to the Mardyke and beyond to the residential areas of Baker Street and Orsett. This will also improve local commuter routes.



Preliminary WCH routes around Thames Chase Forest Centre and where the Project joins the M25



3.2.5. Severance caused by the Project is also being addressed at Junction 29 of the M25, where new free-flowing slips between the A127 and M25 sever the southern A127 footway. A new WCH bridge to both the east and west of the junction, as well as crossing improvements at the northern side of the junction, will allow users of the southern footway to cross to the north of the M25, cross through the junction and return to the southern footway. The western bridge coincides with a historic route between Cranham and Great Warley that was severed by the A127 and the bridge will re-establish this route for WCH users.

3.2.6. The WCH strategy in this area will be achieved through:

- a. Resolution of new and historic severance around M25 and M25 junction 29 through new bridges
- b. Upgrades to existing PRow network, including new links
- c. New roadside WCH provision

3.2.7. Further detail on the WCH routes can be found in Rights of Way and Access Plans (Application Document 2.7).

Further details on the routes for WCHs, including the proposed preliminary designs, can be found in Project Design Report Part E: Design for Walkers Cyclists and Horse Riders



*Existing WCH provision along North Road*



*Existing WCH provision along Dennises Lane*



*Mardyke*



*Existing WCH route crosses London Tilbury and Southend Railway railway tracks*



## 3.3. Design constraints and opportunities

3.3.1. The main constraints and opportunities with respect to the integration of the Preliminary Design into the region are set out in the table below. These have been considered and integrated into the preliminary design where practicable.

	Constraint	Opportunity
Topography	<p>Much of the Fen is Flood Zones 2 or 3 so the Project route will need to be raised and prominent in the landscape.</p> <p>Flood zone status limits ability to use earthworks to screen the Project.</p>	<p>Work with partner organisations to restore natural fen/wetland areas.</p> <p>Opportunities to combine wetland creation with the flood compensation areas required.</p> <p>Strengthen wooded character of Thames Chase with planting around the junction.</p>
Open space	<p>Impacts on Thames Chase Community Woodlands including loss of habitat and screening from the strategic road network (SRN).</p>	<p>Replacement land to be provided to compensate for land taken at Thames Chase Community Forest – opportunity for significant public benefit.</p> <p>New community woodland at Hole Farm and open access land in the Mardyke Valley.</p>
Communities	<p>Proximity to properties in North Ockendon.</p> <p>Retention of farm tracks in addition to WCH routes.</p> <p>Concerns about security and anti-social behaviour on the WCH network.</p> <p>Impact on 'Greenways' (recreational routes to and from Thames Chase Community Forest) that encourage informal access to the site by foot, cycle and horse, and public transport.</p> <p>Interface with new development of Brentwood Business Park.</p> <p>Maintaining WCH route along the A127 across the junction.</p>	<p>Improve fragmented rights of way network by rationalising and enhancing recreational routes.</p> <p>Anticipate possible future development (by others) by improving WCH access between North and South Ockendon.</p> <p>Address historical severance, created by the M25, between the two sides of Thames Chase Community Woodland and beyond into Ockendon Farmland character area.</p>
User experience	<p>Acoustic mitigation removing views allowing users to identify context.</p>	<p>Experience for road users of a landscape of very different character from other areas.</p> <p>Viaduct and/or embankments will be visible ahead for road users due to the curving alignment.</p>
Existing infrastructure	<p>Buried gas pipelines and pylons running north-south.</p> <p>Rail lines.</p> <p>Pylons running east-west.</p> <p>Water main running along western boundary of M25.</p> <p>Solar Farm to west of M25.</p>	<p>Utilise routes required for utilities diversions and maintenance routes for WCH.</p>
Historic context	<p>Listed buildings close to the alignment (Franks Farm).</p>	<p>Reinstate historic field patterns and boundaries.</p>
Construction	<p>Remote area difficult to access for construction traffic.</p> <p>Land-take required for large water main diversion at Thames Chase Forest Centre.</p>	<p>Utilise routes required for utilities diversions and maintenance routes for WCH.</p>

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## 4. Ockendon Link

### 4.1. Introduction

4.1.1. The Ockendon Link area extends from the Green Lane green bridge in the south to where the route is close to joining the M25, just west of the North Road green bridge. This area includes the Mardyke & Orsett Fen Viaducts and embankment, and spans the character areas of Orsett Fen and Ockendon Farmland.





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## 4.2. Existing context summary

4.2.1. Stretching from the Green Lane green bridge in the south to the M25 in the north, the Ockendon Link section of the Project route is characterised by drained open fen arable farmland with tree lined watercourses. This flat, low lying area offers extensive views out to the surrounding distant landscape.

4.2.2. The Ockendon Link is located within the Orsett Fen character area and partly within the Ockendon Farmland area described in Section 2.2 of this document.

4.2.3. Other key existing features of this landscape are summarised as follows:

- a. Low-lying drained fen farmland, predominantly in arable use, sits in natural bowl with distant views out to rising land.
- b. Flat and open with willow and poplar along watercourses, including some shelterbelts, and limited, gappy hedgerows.
- c. Principal watercourse is the Mardyke, which flows south-west to join the Thames at Purfleet.
- d. Roads to the north and east are straight, at grade or very slightly elevated with sparse low hedges and/or ditches alongside.
- e. Long views particularly to the south and east.
- f. Much of the Fen is Flood Zone 2 or 3.
- g. Common land (former fenland) east of the Mardyke.
- h. The Mardyke Trail.
- i. Thames Chase Community Forest extends into this area and therefore there will be an impact on 9 of 13 Strategic Opportunities identified within the Thames Chase Plan (2014).
- j. Ecology associated with watercourses (including water voles).
- k. Gently rolling landscape with a low ridge rising to around +30m AOD with geology of sands and gravels.

- l. Remainder of area is arable farmland of large rectilinear fields with sparse hedgerows and occasional small woodland blocks.
- m. Small, dispersed settlement of North Ockendon and larger, nucleated settlement of South Ockendon.
- n. Numerous lakes and waterbodies associated with former sand and gravel quarries, along with some areas of landfill.
- o. Urban edge condition especially along South Ockendon.
- p. Landfill sites with raised topography have created new skylines and foreshortened views. In places, these embankments have been softened by woodland planting.



View north over Orsett Fen



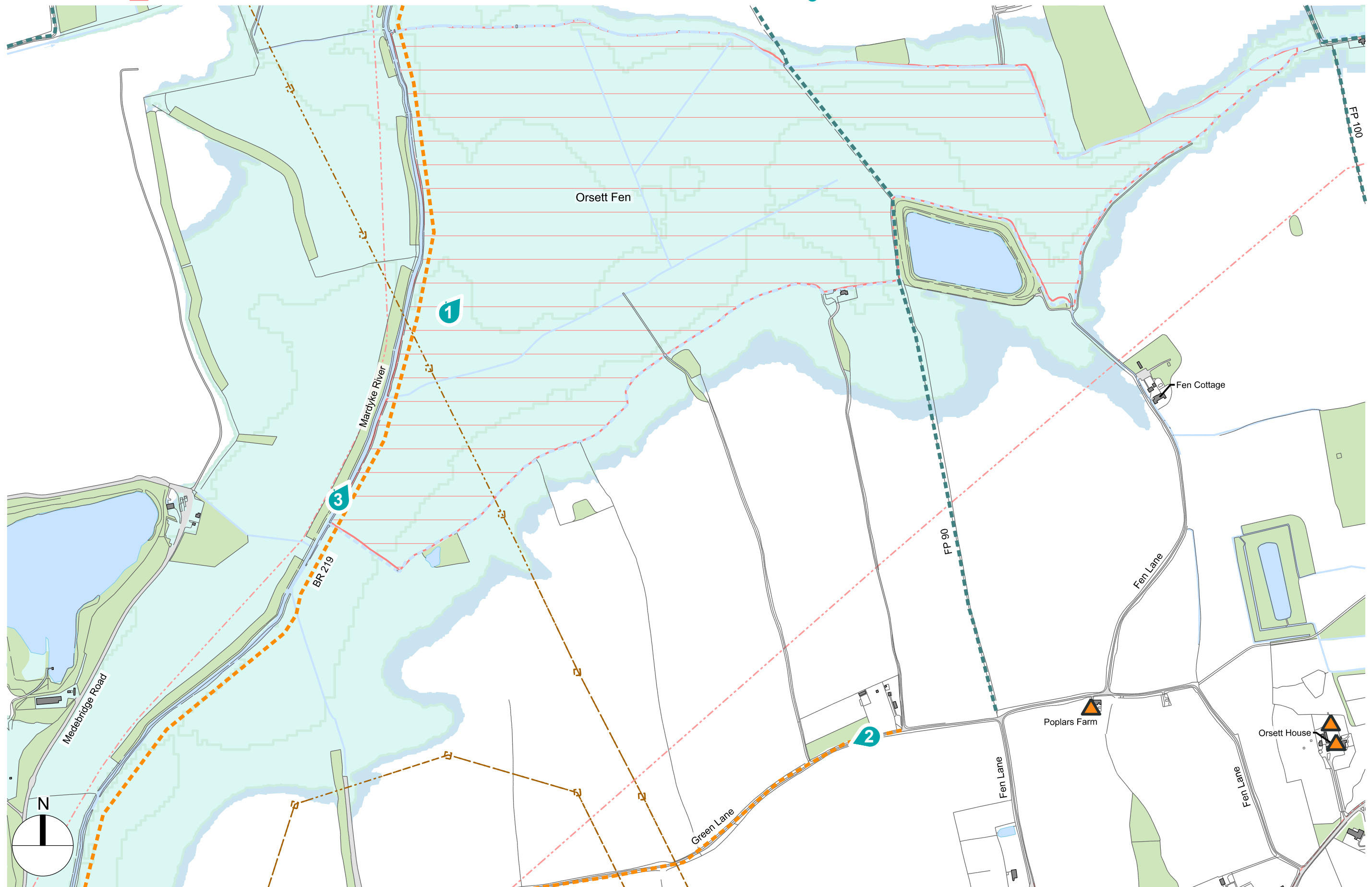
Green Lane



Mardyke River

# Existing context diagram of the Ockendon Link

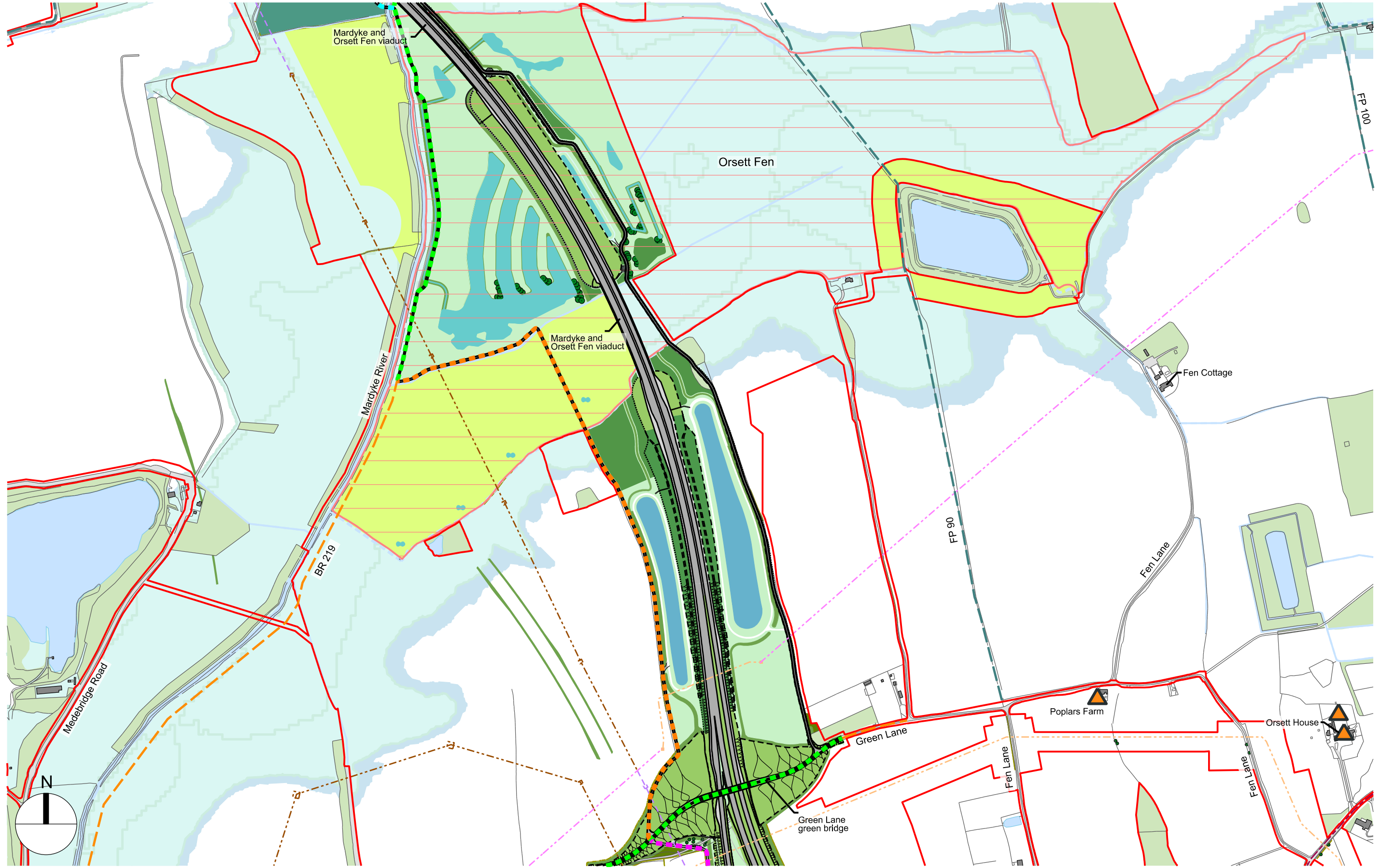
- Woodland
- Flood Zone 3
- Existing Waterways
- High Voltage Overhead
- Existing Public Footpath
- Grade II Listed Building
- Flood Zone 2
- Common Land
- Below ground Gas Main
- Existing Bridleway
- Existing Cycle Tracks
- Existing Cycle Tracks
- Photomarker





# Existing context diagram showing proposed preliminary design at the Ockendon Link

- |                    |                          |   |                                  |                            |                          |               |
|--------------------|--------------------------|---|----------------------------------|----------------------------|--------------------------|---------------|
| Woodland           | Order Limits             | New, realigned or resurfaced footpath             | Proposed Woodland                | Wetland Creation           | Ecology Pond             | Gas diversion |
| Flood Zone 2       | Common Land              | New bridleway                                     | Proposed Grassland               | Native Hedgerow with Trees | Grade II Listed Building | Gas Main      |
| Flood Zone 3       | Existing public footpath | New cycle-pedestrian route                        | Proposed Scattered Tree Woodland | Grassland bank ditch       | Overhead line            |               |
| Existing Waterways | Existing bridleway       | Upgrades to, or realignment of existing bridleway | Proposed Open Mosaic Habitat     | Proposed Waterbodies       | Overhead line diversion  |               |



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View west towards the M25



North Road



Grade II Listed former gateway at Groves Barns



Footpath 135



South Ockendon



Footpath 136



FP 136 access to Veolia landfill site



Ockendon Road

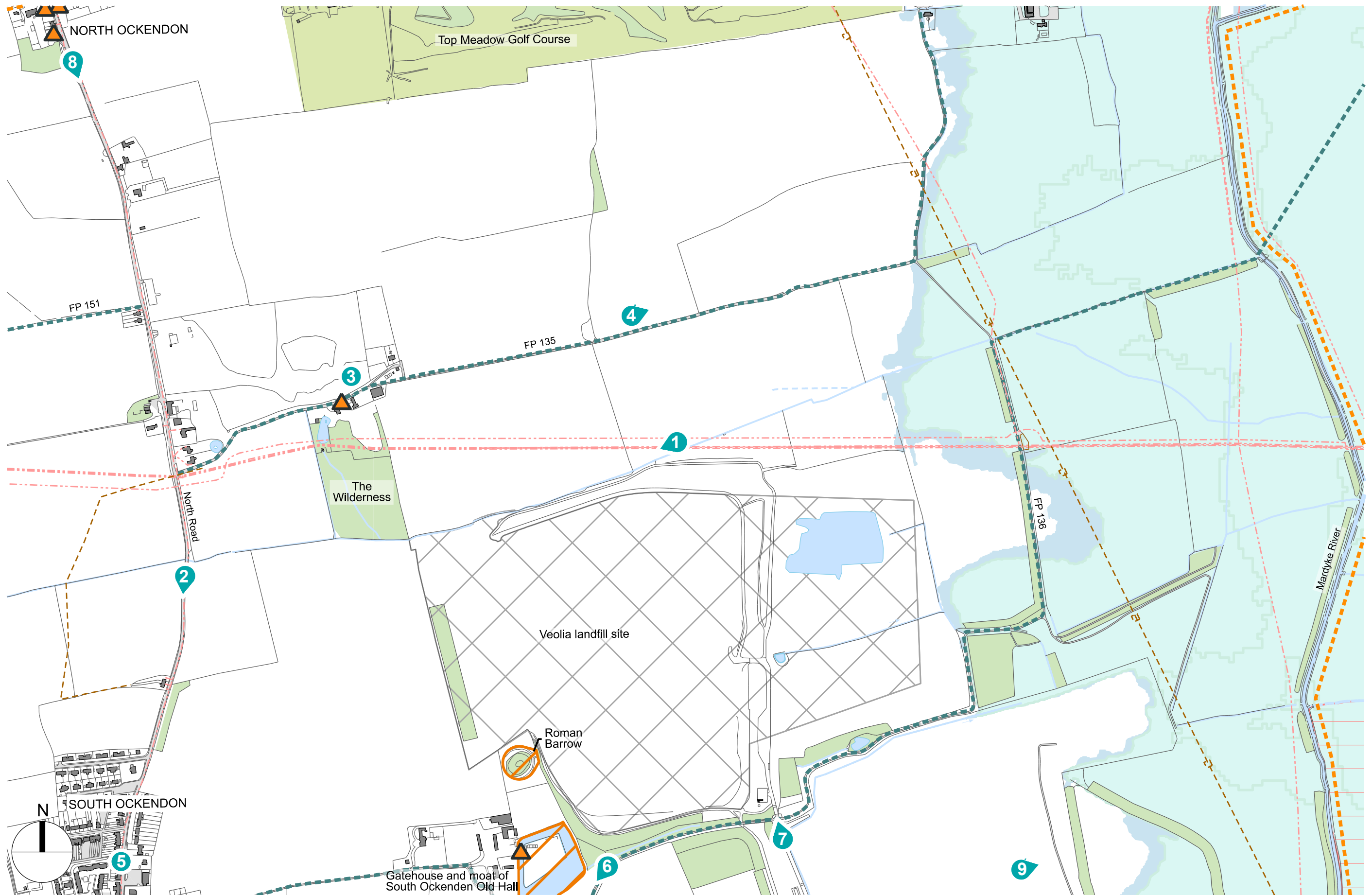


View east over Mardyke



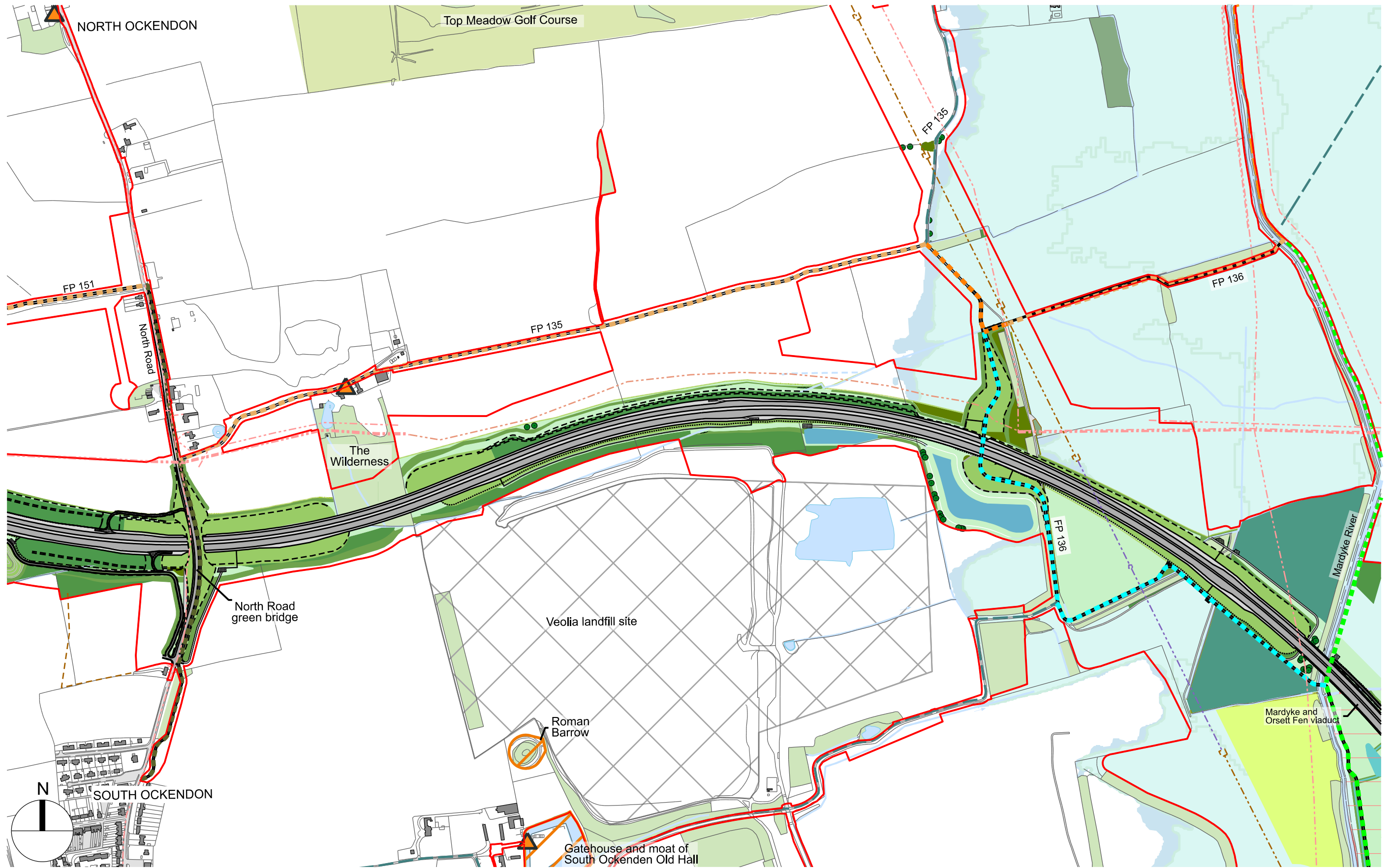
# Existing context diagram of the Ockendon Link

- Woodland
- Flood Zone 3
- Existing Waterways
- High Voltage Overhead
- Existing Bridleway
- Existing Cycle Tracks
- Photomarker
- Flood Zone 2
- Golf Course
- Below ground Gas Main
- Authorised Landfill
- Existing Public Footpath
- Grade II Listed Building



# Existing context diagram showing proposed preliminary design at the Ockendon Link

- |              |                             |                                       |   |                              |                          |                         |
|--------------|-----------------------------|---------------------------------------|---|------------------------------|--------------------------|-------------------------|
| Woodland     | Existing Waterways          | Existing bridleway                    | Upgrades to, or realignment of existing Bridleway   | Proposed Woodland            | Native Untrimmed Hedge   | Overhead line           |
| Golf Course  | Authorised Landfill         | New, realigned or resurfaced footpath | New cycle-pedestrian-equestrian route adjacent road | Proposed Grassland           | Proposed Waterbodies     | Overhead line diversion |
| Flood Zone 2 | Scheduled Ancient Monuments | New Bridleway                         | New Pegasus crossing                                | Reinstated Agricultural Land | Grade II Listed Building | Gas Main                |
| Flood Zone 3 | Existing public footpath    | Footpath upgraded to bridleway        | Proposed Scattered Tree Woodland                    | Open Mosaic Habitat          | Order Limits             | Gas diversion           |





## 4.3. Preliminary Design: highways and operational requirements

4.3.1. To the north of the A13 the Project route northbound has been designed to be three lanes, while the southbound route is proposed to be two lanes. The alignment passes to the west of Orsett and then turns to the west passing north of South Ockendon.

4.3.2. North of the A13 junction the Project route is proposed to be at-grade for approximately 500m, passing under Green Lane, before climbing to cross the flood plain of the Mardyke. The route crosses the Mardyke flood plain for 1.7km with about 0.5km of embankment rising to an elevation of approximately +12m above ordnance datum (AOD) (8m above ground level (AGL)), then a 200m long viaduct across Orsett Fen and the Golden Bridge Sewer and a 353m long viaduct across the Mardyke. West of the Mardyke, where the route runs to the north of the Ockendon landfill site, it has been designed to continue on shallow embankment for about 1km, underneath Footpath 136, before entering a cutting up to 6m deep.

4.3.3. The B186 North Road has been realigned to the east of the existing route for about 450m and raised by up to 3.5m AGL to cross over the Project route.

Further details on the preliminary design for the Mardyke and Orsett Fen Viaducts can be found in Project Design Report Part F: Structures and Architecture



*Illustrative view of the Mardyke and Orsett Fen Viaducts*



## 4.4. Preliminary Design: utility works

4.4.1. The works in this area include installing utilities to supply power and services to the construction site on a temporary basis.

4.4.2. Significant works include the diversion of a high-pressure gas pipeline north of Green Lane and the diversion of multiple gas pipelines west and east of North Road to ensure compliance and safe operation of the Project and the pipelines.

4.4.3. The electricity transmission network requires modification by means of constructing a new pylon, on the alignment of the current network but taller to ensure compliance. A temporary pylon and overhead powerline is required to achieve this work.

4.4.4. The Project has proposed the undergrounding of multiple local overhead electricity networks and the removal of the associated poles to open up views of the local areas.

4.4.5. All permanent assets such as valve requirements have been designed to be visually mitigated and integrated with the Project design as far as reasonably practicable.



*Existing electricity transmission infrastructure looking across Orsett Fen from the Mardyke river*



*Existing gas compound along FP136*



## 4.5. Preliminary Design: landscape

4.5.1. The key proposed landscape components in the Ockendon Link are described in this section.





- ④ Strengthened woodland north of landfill site
- ⑤ The Wilderness
- ⑥ North Road green bridge





## 1. Green Lane green bridge

4.5.2. The existing vegetation along Green Lane creates a varied experience for users of the route. At times, the existing vegetation encompasses the lane on both sides creating an enclosed and shaded space. Elsewhere, the vegetation is much more open on one side providing views into the surrounding open farmland. At other times, the lane is open on both sides providing expansive views toward distant higher land. The variance in the level of the enclosure is an asset, providing a varied experience for users who are moving relatively slowly through the landscape. The enclosed areas create a level of contrast that helps to accentuate open views. The landscape design for the green bridge over the proposed Project route draws inspiration from the more enclosed parts of Green Lane to reduce the impact the proposal has on the lane. More open views have been designed to form part of the character of the lane at points more removed from the Project route and associated earthworks, the openness accentuated by the enclosure created by the proposed works.



*Illustrative cross section through Green Lane green bridge*

## 2. Linear drainage retention ponds within existing field boundaries

4.5.3. On the marginally higher ground south of Orsett Fen, existing hedgerows line the arable fields rather than the drainage ditches that mark the boundaries further north. Two drainage retention ponds are proposed on this land north of Green Lane. The ponds have been designed to be linear in form to work within the existing field pattern and retain the field edge vegetation and historical field pattern.



*Plan of the linear retention ponds*



### 3. Water vole habitat creation

4.5.4. The proposed Project route crosses the Orsett Fen character area. This existing low-lying fen farmland, predominantly in arable use, is surrounded by slightly higher land which forms the horizon. Ditches form the field boundaries in the lowest-lying areas and the absence of hedgerows creates a more open expansive landscape. Flood protection has required the proposed road to be raised above ground level as it crosses the character area. The proposed earthworks create new skyline horizons and foreshorten views.

4.5.5. The water vole mitigation and landscape proposals have been designed to strengthen the individual character of the area by drawing upon its pre-drainage character and existing water's edge habitat. One of the purposes of creating a more diverse landscape is to create a more visually engaging space in the foreground that may lessen the impact of the raised route whilst softening the appearance of the engineered banks. The proposed Project route crosses Orsett Fen common land, and as such the design will need to meet the tests in sections 131/132 of the Planning Act 2008. Refer to Statement of Reasons (Application Document 4.1) for more information.

4.5.6. For road users along the Project route, views out towards the fenland are retained as far as reasonably practicable, to allow for a memorable experience of a view across a fenland full of character and as a way to identify where they are along the route.



*Illustrative cross section AA through wetland restoration at Orsett Fen*



*Illustrative plan showing location of cross section AA cut*



4.5.7. To strengthen the individual character of the low-lying land east of the Mardyke, wetland creation proposals have been centred on Orsett Fen. This area of the Orsett Fen was drained more recently than much of the surrounding Fen and its ability to be 're-wetted' without impacting upon surrounding land uses may be greater. Tree planting associated with existing watercourses has been proposed, to strengthen the legibility of the riparian corridors within the landscape and increase their prominence in the visual hierarchy of views. Areas of carr wooded wetland have been designed to be situated at the interface of the viaduct structure and the abutment earthworks, to integrate the structures into the landscape. The woodland form has been designed to reflect the existing rectangular blocks of woodland found within the local context and fits the existing character. The proposed carr wooded wetland consists of riparian shrubs and trees and has been designed to create an edge habitat between the wetter areas, where wooded vegetation would struggle to establish, with the drier higher land beyond. Visually this edge habitat has been designed to be especially valuable where the low-lying wetland meets the rising ground of the road embankments, with the wooded vegetation of the carr wooded wetland able to soften the appearance of the landform and eventually mask the level change.



*Illustrative view of the Project across Orsett Fen*

4.5.8. The Mardyke trail (bridleway BR219) is a significant route for walkers, cyclists and horse riders (WCHs) in the area. It follows the Mardyke from near Bulphan in the north to Pilgrims Lane, near the A13, in the south. The Mardyke and Orsett Fen Viaducts will be visible to WCHs using this route and the route will pass directly underneath it.



*Illustrative view looking at the Mardyke and Orsett Fen Viaducts from the Mardyke trail (BR219)*

Further details on the preliminary design for the Mardyke and Orsett Viaducts can be found in Project Design Report Part F: Structures and Architecture

Further details on the routes for WCHs, including the proposed preliminary designs, can be found in Project Design Report Part E: Design for Walkers Cyclists and Horse Riders

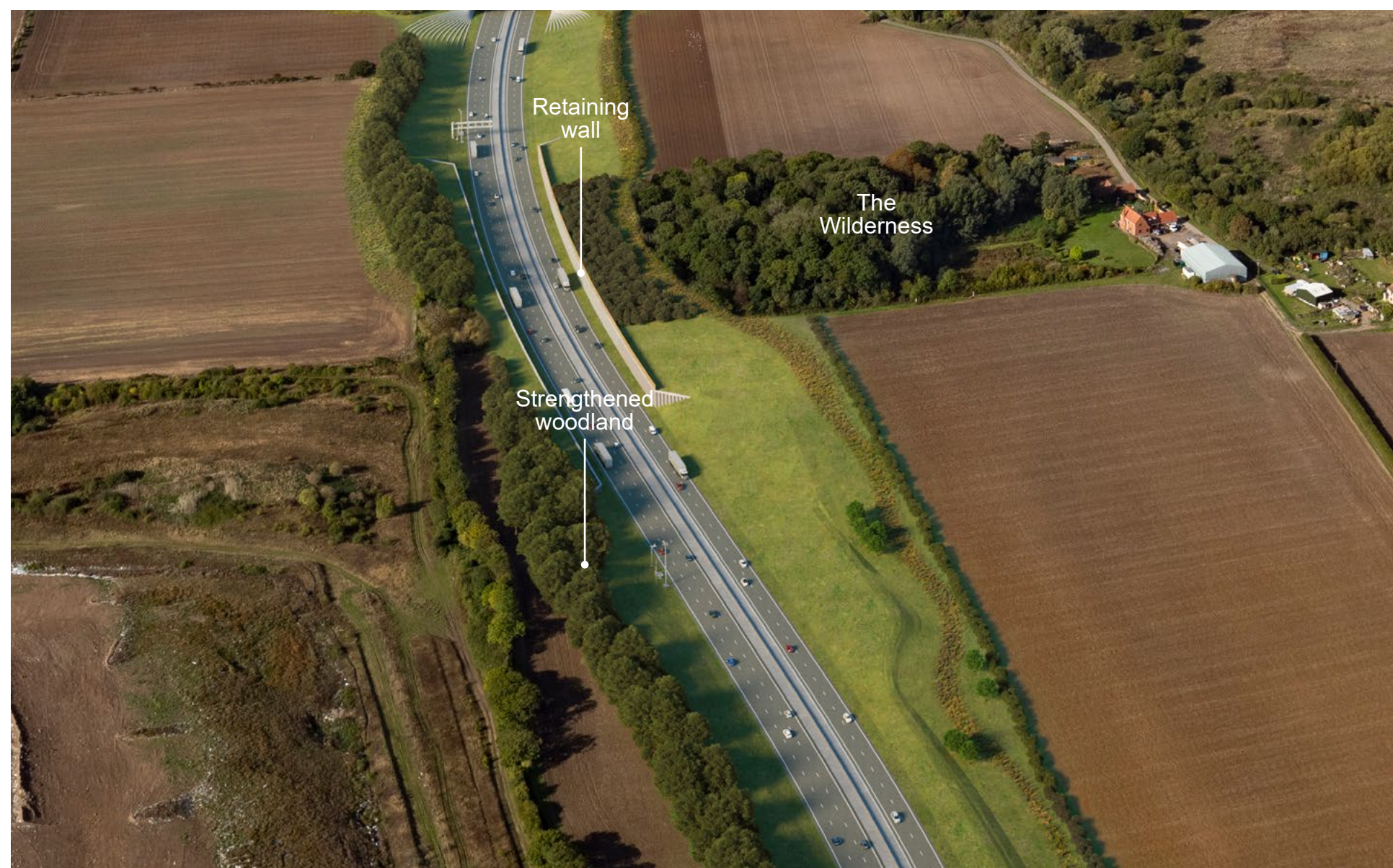


#### 4. Strengthened woodland north of landfill site

4.5.9. The existing raised landform associated with the landfill site west of the Mardyke foreshortens views, blocking sightlines toward the naturally higher land that generally forms the horizon line in views within the Orsett Fen character area. Proposed woodland planting associated with the existing and proposed watercourse at the foot of the north-facing landfill slope has been designed to soften the appearance of the uniform slope. The long-term aim is to shape a plantation associated with the riparian corridor, creating a landscape feature that is part of the character area's human-influenced rural landscape heritage: a character appropriate element that has been designed to foreshorten views within the flat landscape.

#### 5. The Wilderness

4.5.10. The Project route passes through the south of an area of woodland known as the Wilderness. A retaining wall is proposed along the Project route to the south of the Wilderness to retain as much of the existing woodland as far as reasonably practicable. The retaining wall is proposed instead of cutting earthworks to reduce the overall footprint, and impact to the woodland.



*Illustrative view of proposed woodland planting north of existing landfill site*



## 6. North Road green bridge

4.5.11. The existing North Road is a key connection route between North Ockendon and South Ockendon. It currently doesn't include any provision for WCH users and is enclosed by dense hedgerow planting creating an undesirable environment for WCH users wishing to use the route. The proposed design includes a designated off-road WCH route on the green bridge and extending north and south of the bridge. The proposed hedgerow planting reflects the existing character of North Road. The bridge forms part of improved connections across the Project route and into an improved PRow network.

Further details on the routes for WCHs, including the proposed preliminary designs, can be found in Project Design Report Part E: Design for Walkers Cyclists and Horse Riders



*Illustrative cross section through North Road green bridge*



*Existing North Road, north of South Ockendon*



*Illustrative view of North Road, north of South Ockendon with WCH route*

## 4.6. Preliminary Design response summary to the 10 Principles of Good Design

4.6.1. Some examples of how the proposed design of the Ockendon Link responds to the 10 Principles of Good Design are described below:

### Fits in context

4.6.2. The Mardyke & Orsett Fen Viaducts and embankment have been designed to sit sympathetically within the surrounding landscape, as it is a distinct vertical element in an otherwise flat open landscape. The viaduct design is proposed to allow for views beneath the structure out to the wider landscape, especially towards the higher land on the periphery of the area. These views help define the character of the Orsett Fen.

4.6.3. The reinstatement of fenland habitat around the Mardyke & Orsett Fen Viaducts and embankment maximises the use of land within this area, especially given the route passes through prime agricultural land. The creation of wetland habitat reinstates the former landscape character and has been designed to provide visual mitigation and integration of the viaduct and embankment, especially for users of the Mardyke trail.

4.6.4. Woodland and wet woodland has been proposed to be planted adjacent to, and on the Mardyke embankment to further integrate the road into the landscape and emphasise the rectilinear field pattern through this area. Woodland planting has been designed to be extended to corners of fields and isolated parcels of land cut through by the alignment to further emphasise the landscape pattern.

### Is restrained/Is innovative

4.6.5. The Mardyke Viaduct design aspirations are a prime example of how the Project has endeavoured not only to fit in with its context but also to provide restraint. The viaduct will respond positively to place by allowing the continuation of views through, demonstrating innovative yet sensitive design.

4.6.6. The creation of wetland and waterbodies as part of the wetland creation can also be combined with the requirements for flood compensation land, reducing the land-take required in other areas.

### Is environmentally sustainable

4.6.7. The reinstatement of fenland habitat shows a commitment to enhancing the natural environment and seeking to achieve net environmental gain.

### Is inclusive/Is thorough

4.6.8. In line with the aspirations of other green infrastructure projects in this area, recreational access has been enhanced by improvements to the local PRow network, especially along the existing Mardyke trail. WCH route improvements along North Road and over North Road green bridge will improve accessibility in this area.

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# 5. M25 Junctions

## 5.1. Introduction

5.1.1. The Project includes widening the M25 through this area and the provision of an extended northbound slip road between the Project route junction and M25 junction 29. This area spans both Ockendon Farmland and Thames Chase Forest – an undulating rural landscape heavily influenced by the M25.





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## 5.2. Existing context summary

5.2.1. The M25 Junctions area extends just west of North Road green bridge and north along the M25 beyond junction 29 and Folkes Lane woodland. This area includes Thames Chase Forest Centre and the surrounding landscape.

5.2.2. The M25 area lies within the Ockendon Farmland and Thames Chase Forest character areas described in Section 2.2 of this document.

5.2.3. Existing key features of this landscape are summarised below:

- a. Varied topography landscape ranging from gently undulating in the south to steeper slopes in the north.
- b. From upper slopes, views are afforded to the south to adjacent wooded ridgelines.
- c. Mix of agriculture, woodland and built development, including Upminster to the west.
- d. Thames Chase Forest Centre, an extensive area of 1990s woodland planting straddling the motorway, gives this section of the M25 an enclosed, wooded character.
- e. To the north of the A127, more mature woodland and former designed parkland, with irregular edges following watercourses and contours.
- f. The existing M25 is a dominant feature with its strong north/south orientation and associated embankments, cuttings and road noise.
- g. Rail lines run east-west (Fenchurch Street to Shoeburyness railway line crossing beneath M25 south of junction 29).
- h. Existing footbridge at Folkes Lane.
- i. Hole Farm has been acquired by National Highways to be developed into a community woodland in partnership with Forestry England.
- j. Brentwood Enterprise Park (Planning Application pending at the time of writing).



View south along M25



Stubbers Adventure Centre



Dennis Road showing M25 overbridge



Pea Lane



St Mary Magdalene Church, North Ockendon

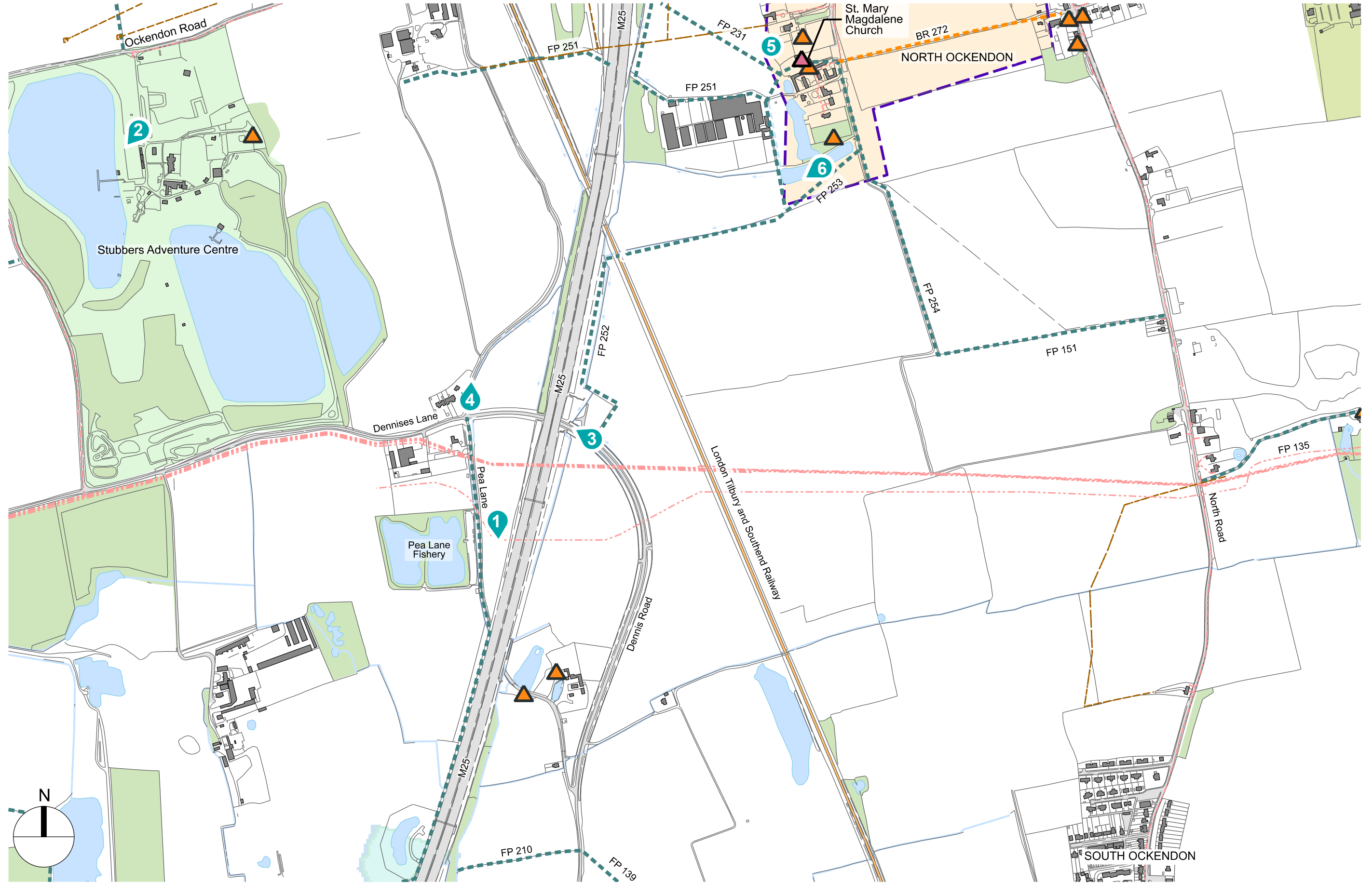


FP 253 at North Ockendon



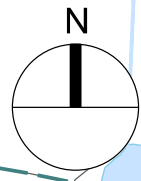
# Existing context diagram of the M25 Junctions

- Woodland
- Flood Zone 3
- Golf Course
- Below ground Gas Main
- Existing Bridleway
- Existing Cycle Tracks
- Grade II Listed Building
- Flood Zone 2
- Conservation Area
- Existing Waterways
- High Voltage Overhead
- Existing Public Footpath
- Grade I Listed Building
- Photomarker



# Existing context diagram showing proposed preliminary design at the M25 Junctions

- |              |                          |                          |   |                                  |                        |                         |
|--------------|--------------------------|--------------------------|---|----------------------------------|------------------------|-------------------------|
| Woodland     | Existing Waterways       | Existing brideway        | New, realigned or resurfaced footpath               | Reinstated Agricultural Land     | Native Untrimmed Hedge | Overhead line           |
| Golf Course  | Conservation Area        | Existing public footpath | New cycle-pedestrian-equestrian route adjacent road | Proposed Scattered Tree Woodland | Open Mosaic Habitat    | Overhead line diversion |
| Flood Zone 2 | Grade I Listed Building  | New Pegasus crossing     | Footpath diverted and upgraded to bridleway         | Proposed Grassland               | Proposed Waterbodies   | Gas Main                |
| Flood Zone 3 | Grade II Listed Building | New bridleway            | Footpath upgraded to bridleway                      | Proposed Woodland                | Order Limits           | Gas diversion           |





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1

Thames Chase Community Forest



2

Grade II listed barn at Thames Chase Community Forest



3

M25 southbound



4

Existing culvert beneath M25, Thames Chase Forest



5

London Tilbury and Southend Railway



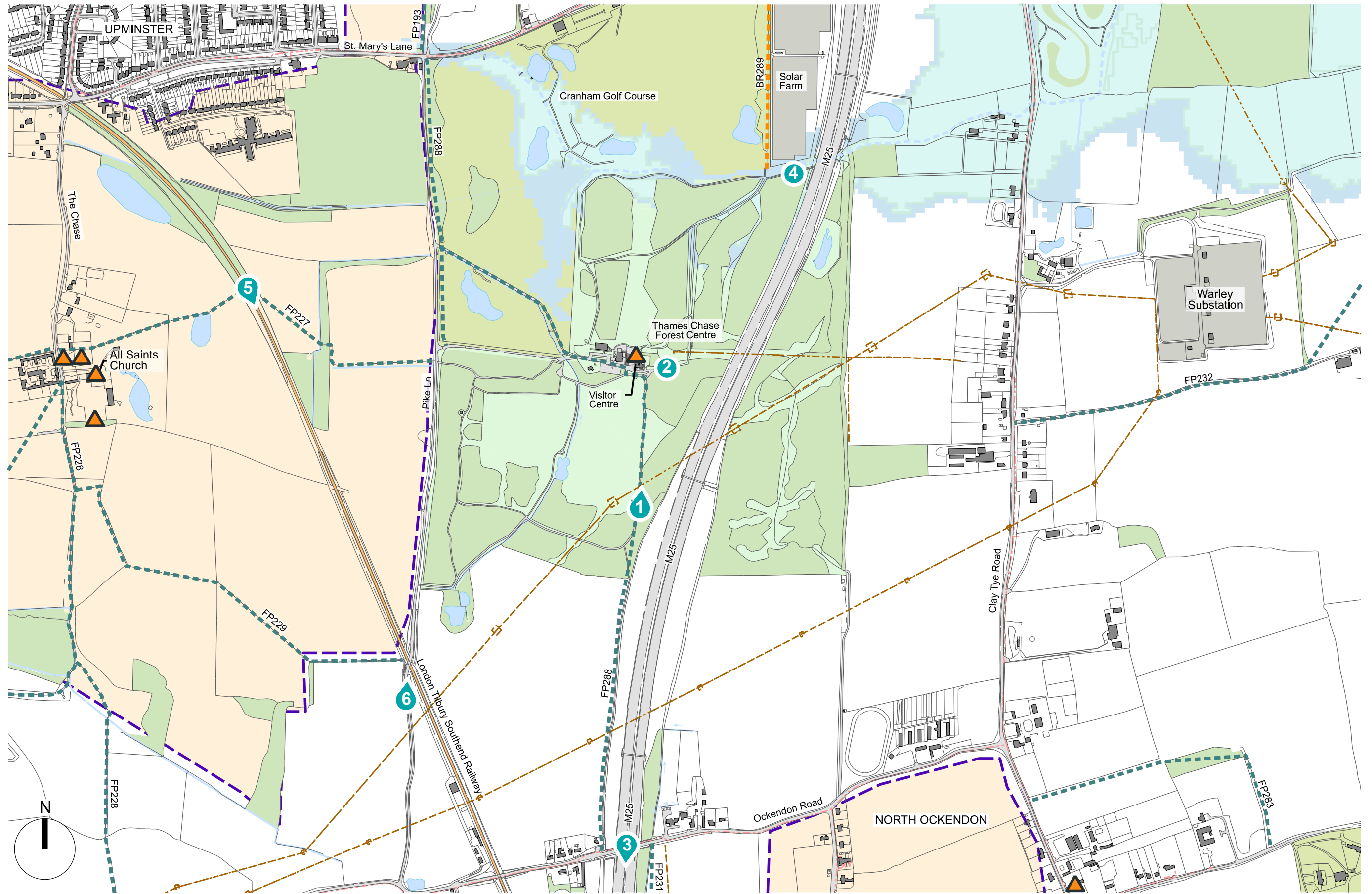
6

Pike Lane



# Existing context diagram of the M25 Junctions

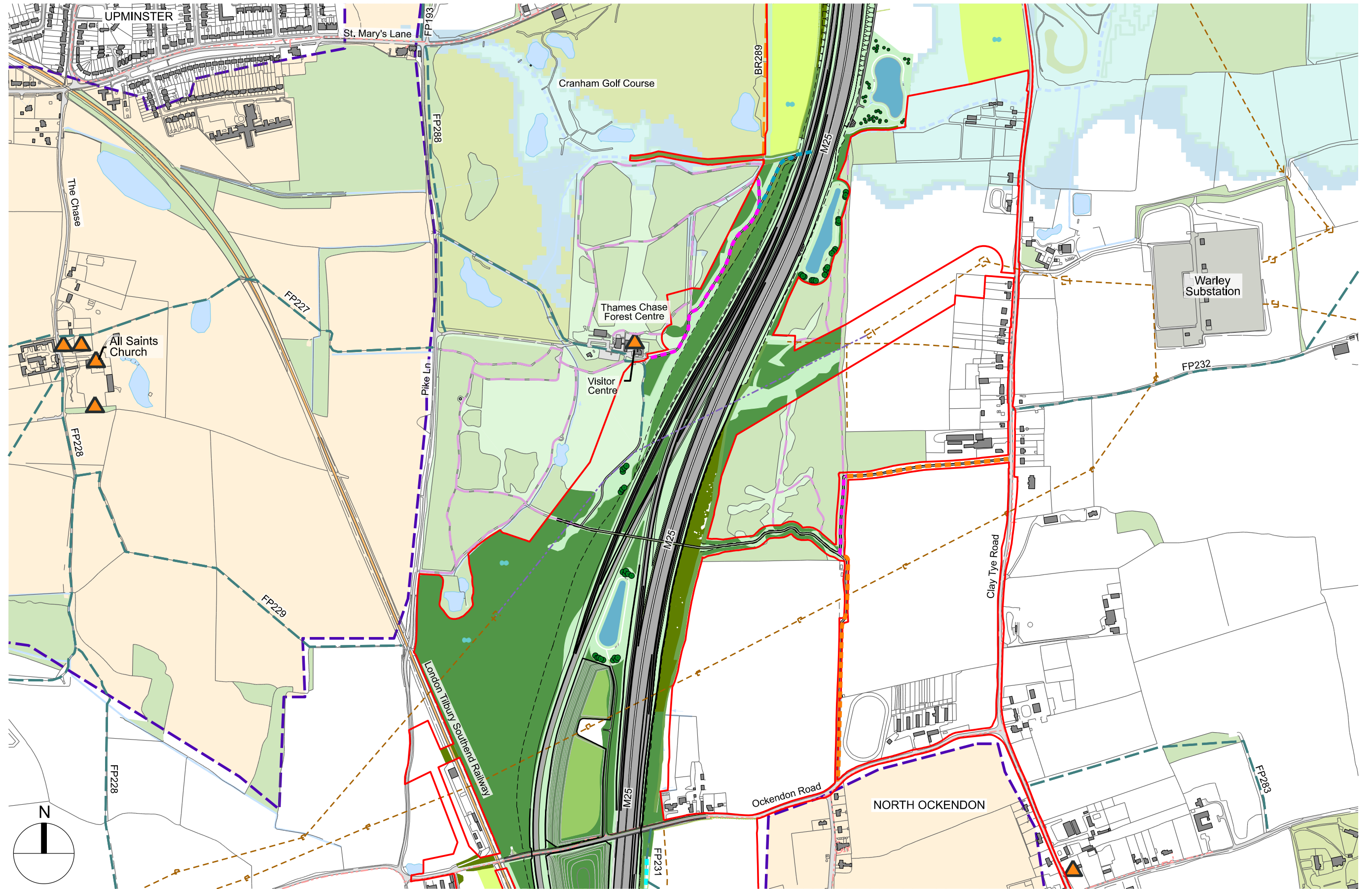
- Woodland
- Flood Zone 3
- Golf Course
- Below ground Gas Main
- Existing Bridleway
- Existing Cycle Tracks
- Photomarker
- Flood Zone 2
- Conservation Area
- Existing Waterways
- High Voltage Overhead
- Existing Public Footpath
- Grade II Listed Building





# Existing context diagram showing proposed preliminary design at the M25 Junctions

- |              |                    |                           |                                       |  |                                  |                          |                    |
|--------------|--------------------|---------------------------|---------------------------------------|--|----------------------------------|--------------------------|--------------------|
| Woodland     | Conservation Area  | Existing public footpath  | New, realigned or resurfaced footpath | Diverted footpath Permissive Bridleway use | Proposed Scattered Tree Woodland | Proposed Waterbodies     | Overhead line      |
| Flood Zone 2 | Golf Course        | Existing bridleway        | New bridleway                         | Native Untrimmed Hedge                     | Proposed Woodland                | Grade I Listed Building  | Gas Main diversion |
| Flood Zone 3 | Existing Waterways | Existing permissive trail | New Permissive path, bridleway use    | Reinstated Agricultural Land               | Proposed Grassland               | Grade II Listed Building | Overhead diversion |
|              |                    | New Permissive Footpath   |                                       |  | Open Mosaic Habitat              | Gas Main                 | Order Limits       |





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1

M25 junction 29



2

Puddledock Farm Fishery



3

Franks Wood



4

Cranham Brickfields Local Nature Reserve



5

Illustrative view of proposed Brentwood Enterprise Park (St Modwen Logistics, 2021)



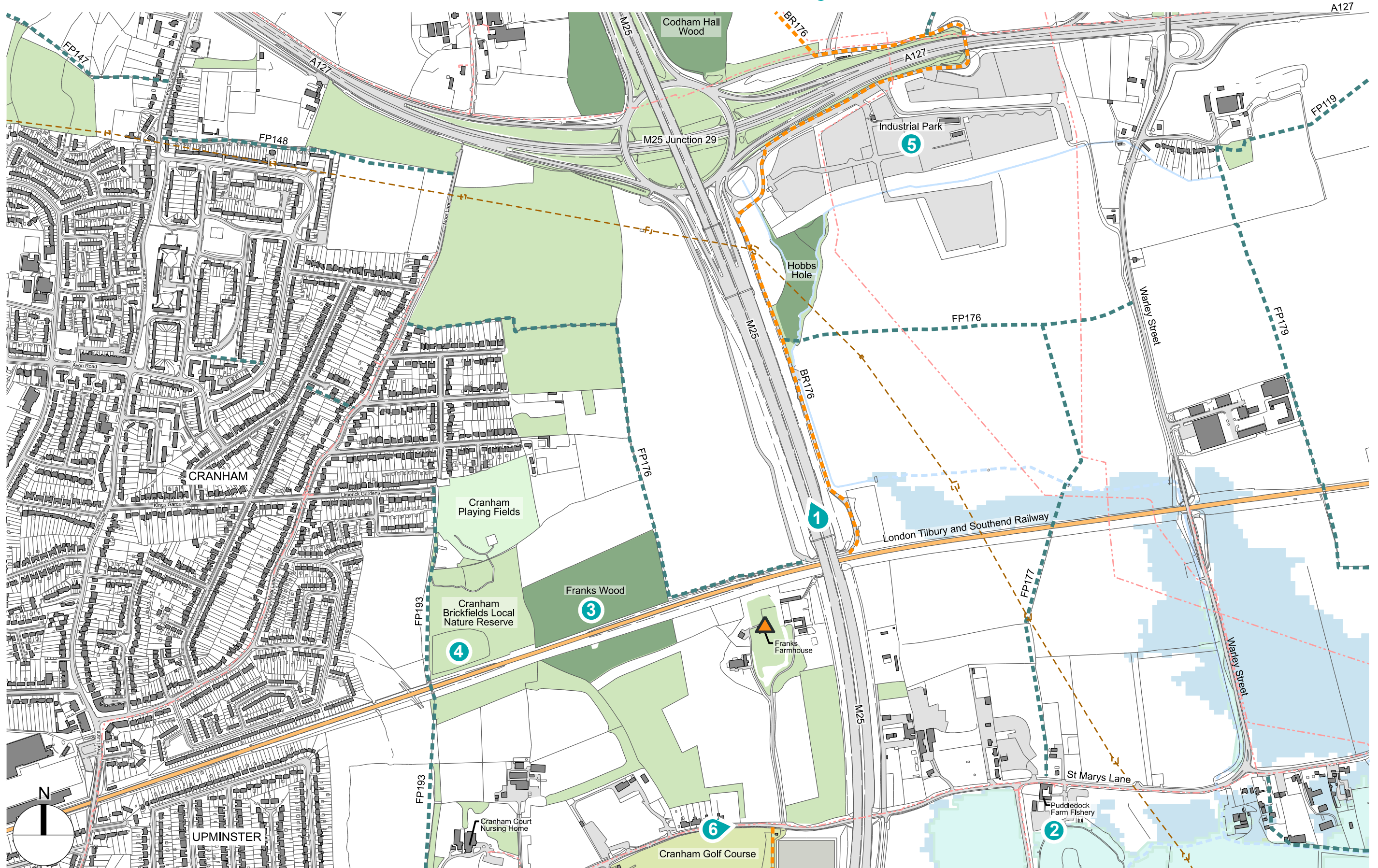
6

View from St Marys Lane to west of M25



# Existing context diagram of the M25 Junctions

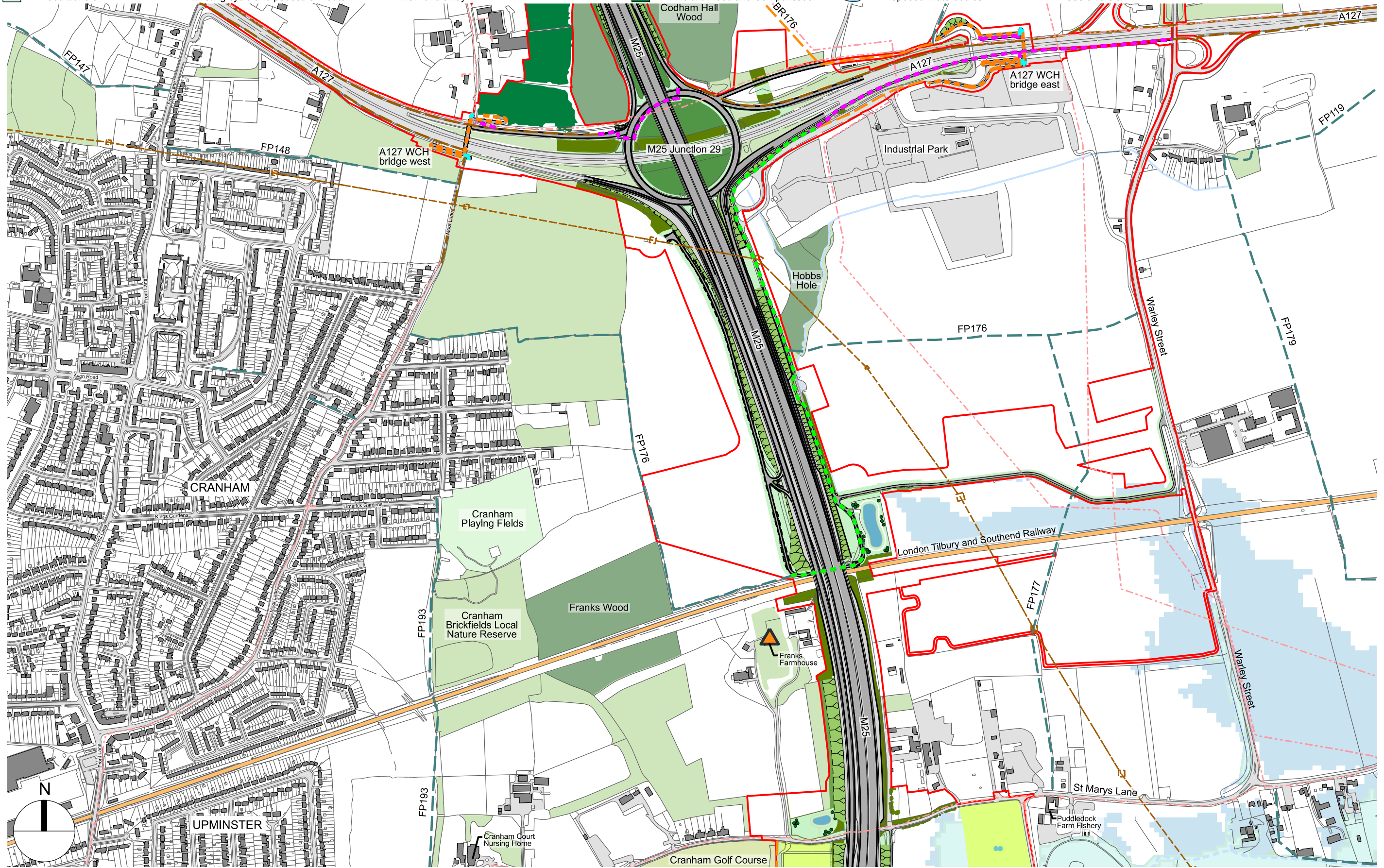
- Woodland
- Flood Zone 2
- Existing Waterways
- High Voltage Overhead
- Existing Public Footpath
- Grade II Listed Building
- Ancient Woodland
- Flood Zone 3
- Below ground Gas Main
- Existing Bridleway
- Existing Cycle Tracks
- Photomarker





# Existing context diagram showing proposed preliminary design at the M25 Junctions

- |                  |                                     |  |                                  |                        |                          |                         |
|------------------|-------------------------------------|--|----------------------------------|------------------------|--------------------------|-------------------------|
| Woodland         | Existing Waterways                  | New footpath realigned or resurfaced footpath    | Proposed Scattered Tree Woodland | Proposed Grassland     | Grade II Listed Building | Overhead line diversion |
| Ancient Woodland | Existing Public Footpath            | New or upgraded cycle and pedestrian route       | Reinstated Agricultural Land     | Open Mosaic Habitat    | Gas Main                 | Order Limits            |
| Flood Zone 2     | Existing Bridleway                  | Upgrades to or realignment of existing Bridleway | Proposed Woodland                | Native Untrimmed Hedge | Overhead line            |                         |
| Flood Zone 3     | Existing cycle and pedestrian route | New bridleway                                    | Ancient Woodland Compensation    | Proposed Waterbodies   | Gas diversion            |                         |





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*Folkes Lane Woodland*

1



*Hole Farm*

2



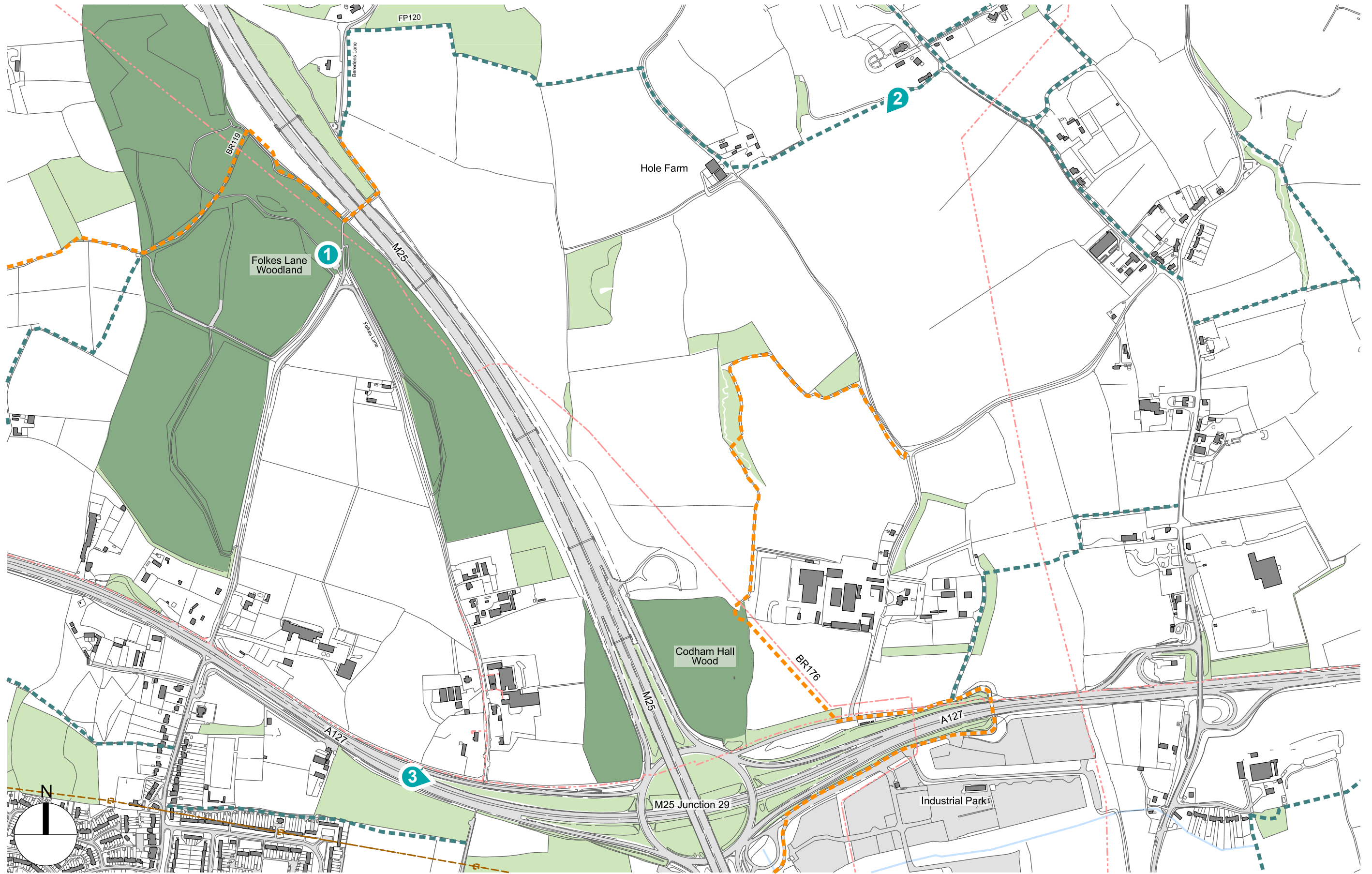
*View along A127*

3



# Existing context diagram of the M25 Junctions

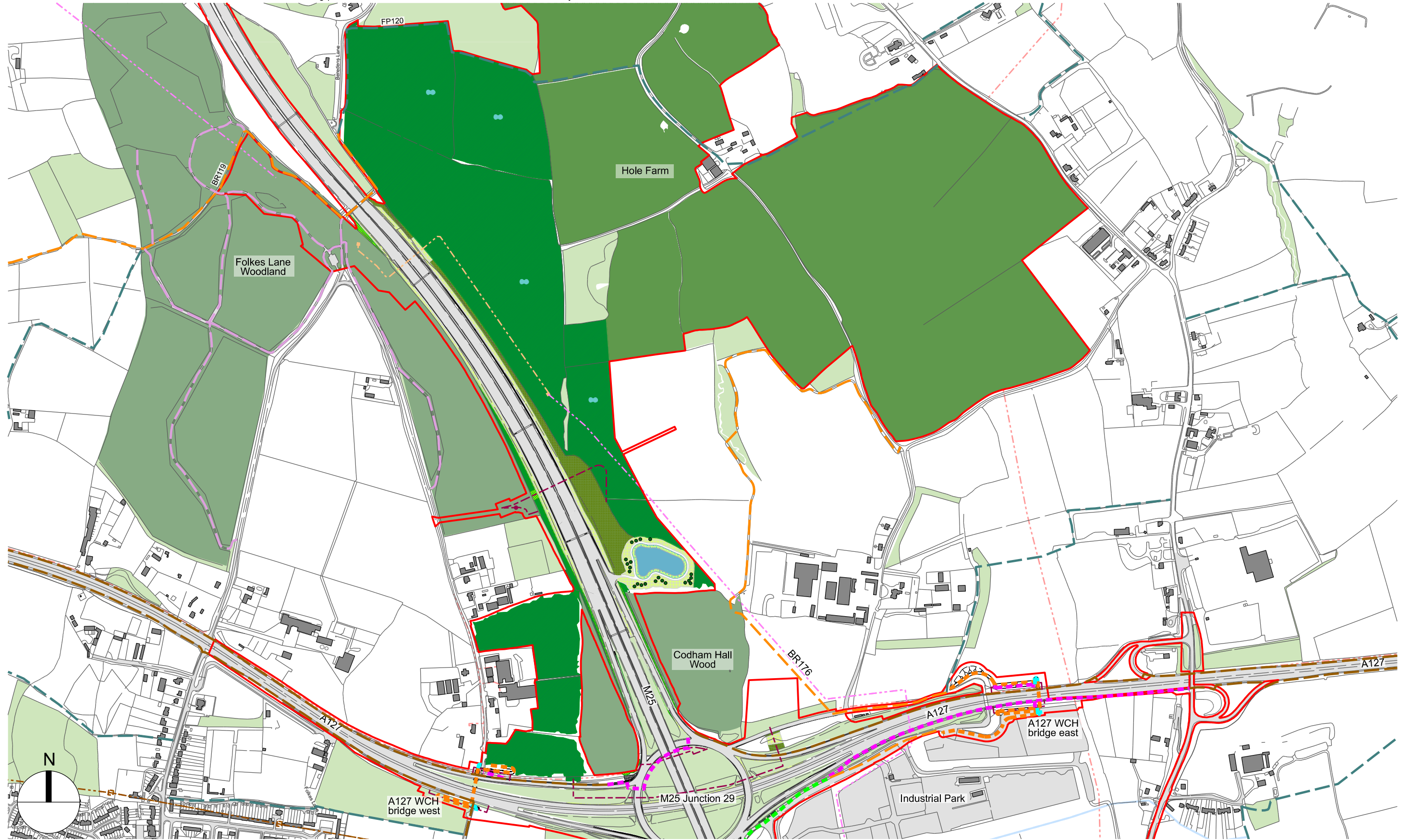
- |                  |              |                       |                       |                          |                          |
|------------------|--------------|-----------------------|-----------------------|--------------------------|--------------------------|
| Woodland         | Flood Zone 2 | Existing Waterways    | High Voltage Overhead | Existing Public Footpath | Grade II Listed Building |
| Ancient Woodland | Flood Zone 3 | Below ground Gas Main | Existing Bridleway    | Existing Cycle Tracks    | Photomarker              |





# Existing context diagram showing proposed preliminary design at the M25 Junctions

- |                  |                           |                                     |  |                                  |                               |                          |                         |
|------------------|---------------------------|-------------------------------------|--|----------------------------------|-------------------------------|--------------------------|-------------------------|
| Woodland         | Conservation Area         | Existing public footpath            | New footpath realigned or resurfaced footpath    | Proposed Woodland                | Ancient Woodland Compensation | Proposed Waterbodies     | Overhead line           |
| Ancient Woodland | Golf Course               | Existing bridleway                  | Upgrades to or realignment of existing Bridleway | Proposed Grassland               | NDEP Compensation             | Grade I Listed Building  | Gas diversion           |
| Flood Zone 2     | Existing Waterways        | Existing cycle and pedestrian route | New or upgraded cycle and pedestrian route       | Proposed Scattered Tree Woodland | Open Mosaic Habitat           | Grade II Listed Building | Overhead line diversion |
| Flood Zone 3     | Existing permissive trail | New bridleway                       | Reinstated Agricultural Land                     | Native Untrimmed Hedge           | Gas Main                      | Order Limits             |                         |





## 5.3. Preliminary Design: highways and operational requirements

5.3.1. The Project has been designed to connect with the M25 between junctions 29 and 30 via a new junction, which is proposed to be located about 3km south of junction 29 near Ockendon Road. It has been designed only to have north facing slip roads for northbound Project route traffic to join the M25 and southbound M25 traffic to join the Project route. A two-lane parallel connecting road has been designed to the west of the existing M25, providing a connection to the M25 junction 29 and to the A127.

5.3.2. As the Project route approaches the existing M25 it has been designed to pass under North Road and FP252 then the lanes are designed to diverge.

5.3.3. The Project northbound carriageway has been proposed to pass under the M25 through an underpass, then remain in cutting up to 8m deep under Ockendon Road bridge, the proposed Thames Chase WCH bridge and the M25 junction 29 offslip, connecting onto the M25 adjacent to the Thames Chase Forest. About 500m north of Ockendon Road the northbound slip road has been designed to divide, with two lanes continuing to connect to the M25 northbound and the third lane connecting to junction 29.

5.3.4. Access to the Project southbound carriageway has been proposed to be at grade via a new slip from the existing M25, south of Ockendon Road. Ockendon Road has been designed to remain at its current elevation and cross over the Project northbound carriageway.

5.3.5. Where the Project link roads pass through Thames Chase Forest, a new WCH bridge has been designed to provide access to the east and west of the woodland. Improvement works and widening are proposed along this stretch of the M25, up to and including junction 29.

5.3.6. Modification works have also been designed on the M25 between the new junction and junction 29, at junction 29 and to the north of junction 29. Between the Project route junction and junction 29 northbound, a one-way two-lane parallel connecting road, linking to the junction 29 northbound off-slip has been

proposed, which has been designed to no longer connect to the M25. In the southbound direction the M25 widens from four lanes with a hard shoulder to five lanes with a hard shoulder between the junction 29 southbound on-slip and Project route southbound off-slip.

5.3.7. Approaching the M25 from the east the Project route has been designed to be in cutting and to the west of North Road the carriageways have been proposed to divide. The design of the northbound carriageway descends into a deeper cutting passing under the M25 just to the north of its crossing of the Upminster and Grays branch railway. East of the railway it has been designed to remain in cutting to pass under Ockendon Road. Ockendon Road has been proposed to be realigned to the south of its existing route with a new bridge over the Project route northbound slip road and a replacement bridge over the M25.

5.3.8. On the northbound M25 main carriageway, a two-lane slip road leaves close to the Ockendon Road crossing. This has been designed to pass over the Project route northbound to M25 northbound connection before merging with the connection from Project route northbound to the northbound parallel connecting road.

5.3.9. The M25 has been reduced to three lanes locally between the diverge of the connection to the junction 29 connecting road and the merge from Project route northbound. North of the connection from the Project route the M25 northbound main road has reverted to its existing four lanes with hard shoulder as far as the disconnected junction 29 northbound off-slip.

5.3.10. Through junction 29 the M25 main carriageway has been widened from three lanes each way with hard shoulder to four lanes each way with hard shoulder in both directions. This will require the widening of the existing viaduct structure over the existing roundabout and A127.

5.3.11. North of junction 29 the connections of the north facing slip roads have been modified because of the widening of the main road through the junction. The northbound on-slip has been modified from a lane gain arrangement to an extended auxiliary

lane for about 950m north of the junction. In the southbound direction a two-lane auxiliary lane parallel diverge has been provided in place of the existing lane drop. These auxiliary lanes have been designed to be about 0.8km long.

5.3.12. Modifications have also been carried out at the existing junction 29 roundabout. Full signalisation has been provided in place of the current partial signalisation and free-flow left turn lanes have been provided from the A127 westbound off-slip to M25 southbound on-slip and from the northbound parallel connecting road to the A127 westbound on-slip.

5.3.13. Ockendon Road has been realigned to the south of the existing route for about 700m close to existing ground level to cross over the M25 and Project route to M25 northbound on new bridges as part of M25 junction works.



## 5.4. Preliminary Design: utility works

5.4.1. The works in this area include installing utilities to supply power and services to the construction sites on a temporary basis.

5.4.2. Significant works include the diversion of the 132kV overhead electricity network within the Thames Chase Forest area onto two taller pylons north of the existing alignment.

5.4.3. From St Marys Lane to south of Ockendon Road the diversion of a water trunk main is required and requires operational valves to be installed along the route.

5.4.4. Via the modification of the retaining wall proposals the Project has omitted the need to divert an electricity transmission powerline and associated pylons and the diversion of a high-pressure gas pipeline.

5.4.5. North of the M25 junction 29, a high pressure gas pipeline has been designed to be diverted beneath the M25 to ensure compliance and safe operation of the Project and the pipeline.

5.4.6. The Project proposes the undergrounding of multiple local overhead electricity and telecommunications networks and the removal of the associated poles to open up views of the local areas.

5.4.7. All permanent assets such as substations and valve requirements have been designed to be visually mitigated and integrated with the Project design as far as reasonably practicable.



*Existing pylons within Thames Chase Forest*



*Existing utilities around M25 junction 29*



## 5.5. Preliminary Design: landscape

5.5.1. The key proposed landscape components in the M25 Junctions are described in this section.





## 1. Wooded junction

5.5.2. Roadside woodland planting is proposed around the M25/Project route junction. The wooded junction has been designed to extend the enclosed wooded character of the Thames Chase Forest Centre and has been chosen to reinforce the proposed southern extension to the publicly accessible site. The wooded junction and extension to the Thames Chase Forest Centre has been designed to facilitate delivery of objectives outlined in the Thames Chase Community Forest Plan to improve recreational access to the area and increase woodland planting to the north and west of South Ockendon. The woodland has been extended to the east of the Project route to create separation between it and the setting of St Mary Magdalene Church. This proposed and existing wooded landscape, over 2.5km in length, has strengthened the individuality of the character area, creating a stronger contrast with the more open landscape to the east.

## 2. User connection between Thames Chase and Belhus

5.5.3. The landscape proposals have been designed to facilitate stronger links between the land parcels that form Thames Chase Community Forest Centre as well as Belhus Woods and Little Belhus Country Park to the south.



*Illustrative woodland planting at the M25 junction*



① Thames Chase Community Forest





## 1. Thames Chase Community Forest

5.5.4. The proposed junction and associated widening of the M25 corridor will have an impact on the Thames Chase Community Forest. As part of the Project's mitigation proposals, the Thames Chase Forest Centre site has been designed to be extended south to Ockendon Road. This publicly accessible woodland has been designed to lie adjacent to the wooded M25/Project route junction, creating a 2.5km long woodland corridor.

5.5.5. Woodland planting has been designed on the earthworks adjacent to the Thames Chase Community Forest in keeping with the existing wooded character. Informal footpaths have been created, utilising the routes required for utilities diversions and maintenance to the culvert, and connect back into existing routes within the Thames Chase Community Forest.

5.5.6. The M25 currently divides Thames Chase Community Forest into two halves. The only access route between these are currently via a culvert, under the M25. The new Thames Chase WCH bridge provides an accessible way of crossing the M25 for WCHs.

Further details on the preliminary design for the Thames Chase WCH bridge can be found in Project Design Report Part F: Structures and Architecture



*Existing woodland planting within Thames Chase*



*Existing woodland planting within Thames Chase*



*Illustrative image of the preliminary design of the Thames Chase WCH bridge*





- ① Woodland connectivity
- ② Hole Farm



## 1. Woodland connectivity

5.5.7. The works to the M25 north of Thames Chase Forest Centre have a smaller impact upon the area's landscape character and subsequently, the landscape interventions are smaller, aiming to reinstate existing landscape treatment to banks and cuttings. However, north of the A127, where widening works impact upon Codham Hall Wood ancient woodland, proposed woodland areas have been designed to further add to the strong wooded character and create a clearer visual connection between the woodlands (ancient and recently planted) either side of the M25. The new A127 WCH bridge west will be softened on its northern access by this ancient woodland compensation planting.

5.5.8. Adding to the strong woodland character is the proposed mitigation planting on land around Hole Farm which will link into the ancient woodland compensation on the eastern side of the Project route, north of the A127.

Further details on the routes for WCHs, including the proposed preliminary designs, can be found in Project Design Report Part E: Design for Walkers, Cyclists and Horse Riders

Further details on the preliminary design of the A127 WCH bridge west and east can be found in Project Design Report Part F: Structures and Architecture



*Illustrative view showing woodland surrounding the M25 junction 29*



*Illustrative plan showing areas of woodland to the north of the M25 junction 29*

## 2. Hole Farm

5.5.9. Hole Farm will be developed as a community woodland in partnership with Forestry England with habitat creation to compensate for effects from nitrogen deposition and loss of ancient woodland. The site will include replacement open space and be integrated with the landscape character.



*Existing Hole Farm*



## 5.6. Preliminary Design response summary to the 10 Principles of Good Design

5.6.1. Some examples of how the proposed design of the M25 Junction responds to the 10 Principles of Good Design are described below:

### Fits in context

5.6.2. Within this area, the design has maximised woodland and boundary planting adjacent to the Project route to reflect and strengthen the existing landscape character. Field parcels that have been severed by the route and cannot meaningfully be returned to the former land use have been planted with woodland to emphasise the rectilinear field patterns. This sensitive enhancement of woodland planting helps to strengthen a sense of place, reflecting and emphasising the landscape character and responding positively to context by not accentuating the Project route.

### Is environmentally sustainable

5.6.3. By maximising woodland planting in this area, the Project demonstrates its commitment to enhancing the natural environment and to achieving sustainable and regenerative goals leading to net environmental gain.

### Is thorough

5.6.4. Utilities and maintenance access have been co-ordinated to maximise the extent of replanting that can be achieved, especially in public areas such as Thames Chase Forest where woodland planting has been required for visual mitigation as well as to retain the existing character.

### Is inclusive

5.6.5. The preliminary design of pedestrian overbridges and WCH routes has addressed recreational access to the surrounding countryside and has also addressed historical severance caused by the M25. The new Thames Chase WCH bridge has been designed to improve access for users at the centre.

### Is collaborative

5.6.6. Proposals for Hole Farm Community Woodland have been developed in partnership with Forestry England who will take on its long term maintenance. The new footbridge east of Junction 29 has been the subject of detailed conversations with the developers of the adjacent Brentwood Enterprise Park to ensure that they do not compromise the development which is part of Brentwood Borough Council's local plan.

### Makes roads understandable

5.6.7. Given the complex nature of the proposed M25 Junction, the design has sought to envelope the junction in woodland planting. This will enclose views for road users as they navigate through the junction and slip roads for their required route. Proposed woodland planting within the junction will also screen views of the junction infrastructure, such as gantries and lighting columns, from nearby receptors.



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