Lower Thames Crossing

7.4 Project Design Report

Part D: General Design North of the River – Tilbury to the A13 Junction

APFP Regulation 5(2)(q)

Infrastructure Planning

(Applications: Prescribed Forms and Procedure)

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Part 5

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

Contents

1. Project Design Report – introduction

1.1. Document structure

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

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 - Tilbury to the A13 Junction, 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

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

Part E: Design for Walkers, Cyclists and Horse Riders

Part F: Structures and Architecture

Part G: Design Evolution

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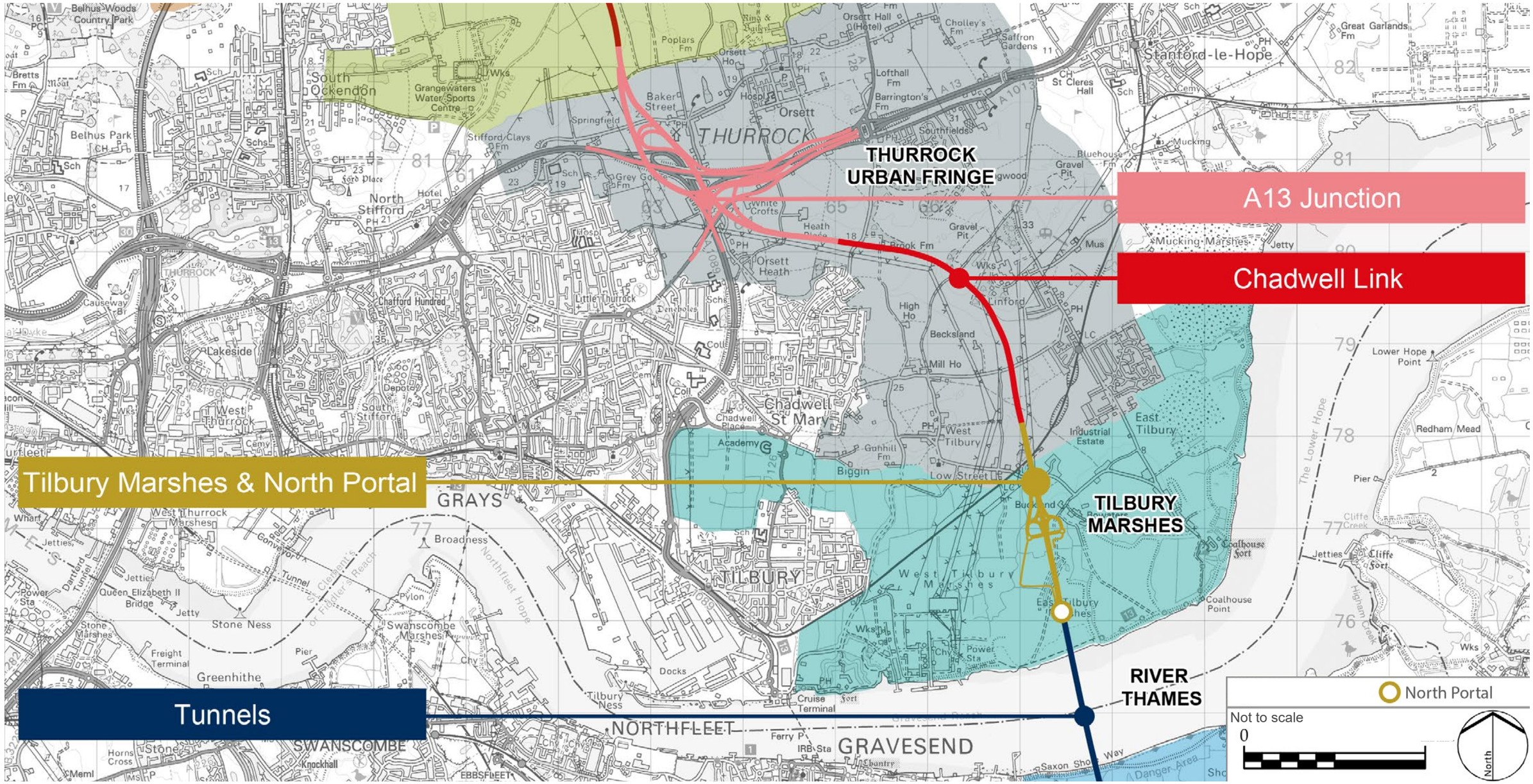
2. Existing regional context

2.1. Introduction

2.1.1. The North of the River Thames, Tilbury to the A13 Junction region contains the following area-specific sections: Tilbury Marshes and North Portal, the Chadwell Link and the A13 Junction. It spans the character areas of Tilbury Marshes and Thurrock Urban Fringe.

2.1.2. The Preliminary Design of the Project 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).

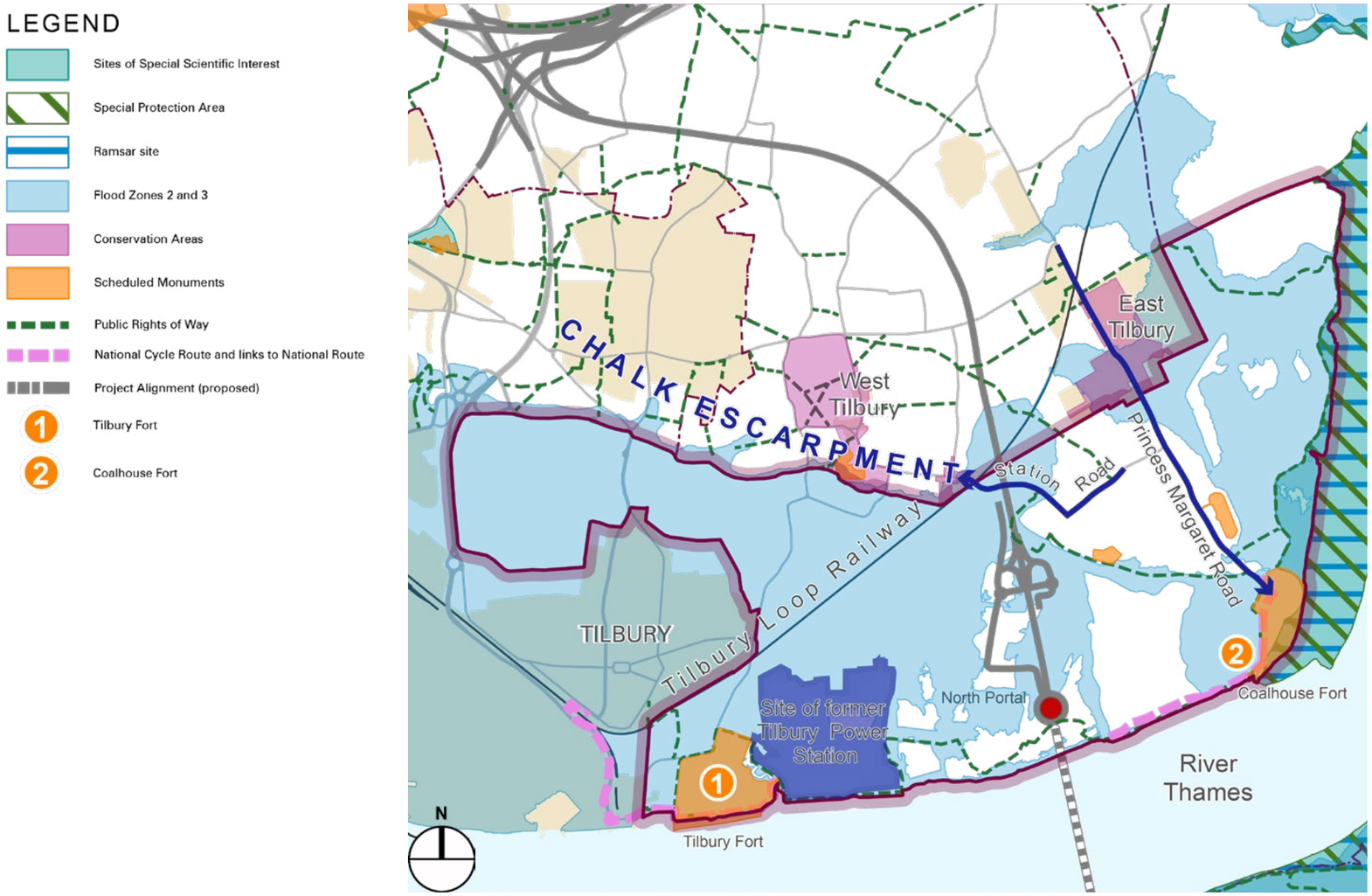
2.1.3. The designs and images shown in this document are preliminary, which are illustrative proposals of one possible design outcome. Proposals shown may be developed differently during detail design to comply with the Project requirements.



2.2. Character Areas

Tilbury Marshes

2.2.1. Tilbury Marshes is a low-lying landscape of drained marshland with a tranquil, open and exposed character, featuring meandering drainage ditches and separate land parcels. Significant parts of the character area have been affected by landfill and spoil placement. These land uses have resulted in the amalgamation of smaller land parcels, creating a contrast between the fields of drained marshland and the larger, raised, landfill parcels. Both the flat-topped spoil placement/landfill areas and the lower drained marshland contribute to the area's flat character. However, the spoil placement/landfill areas are elevated by several metres and the steep banks that edge these areas have an impact upon the character of nearby routes and views, limiting the generally expansive views across the landscape. The important historic Tilbury Fort is situated in the south-west of the character area and Coalhouse Fort is situated in the south-east.



Aerial view south towards River Thames

Tilbury Marshes

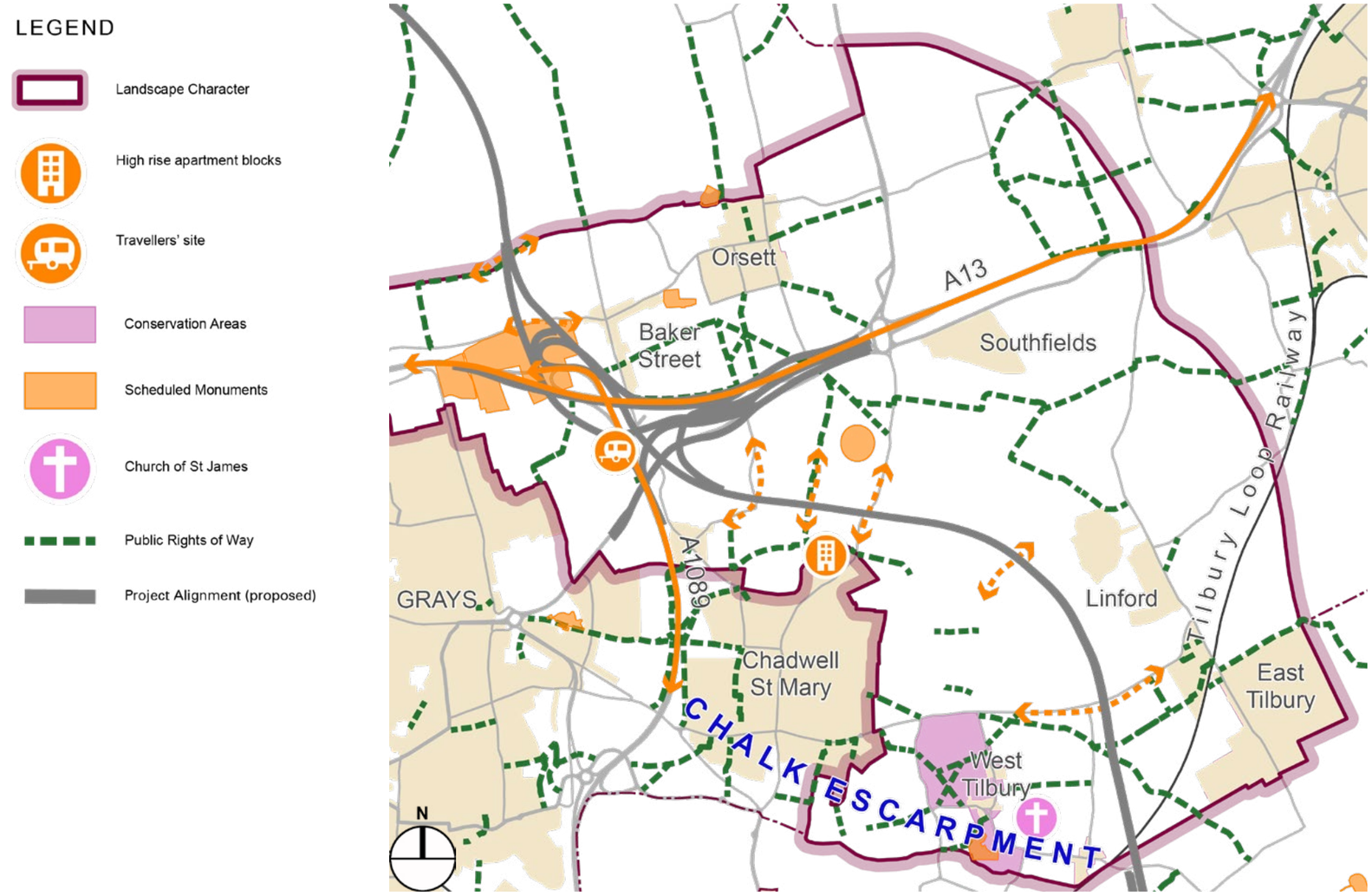
River Thames

Thurrock Urban Fringe

2.2.2. The Thurrock Urban Fringe landscape of gently undulating arable land is slightly elevated above adjacent areas in marked contrast to the flat, drained farmland of Tilbury Marshes to the south. The landscape has been subject to field aggregation through the removal of hedgerows, creating larger field parcels. Occasional woodland blocks and woodland associated with other land uses punctuate views. Hedgerows are common along the historical lanes and tracks which cross the area.

2.2.3. The exposed urban edges of East Tilbury, Grays, Chadwell St Mary and Linford significantly influence the landscape, giving it an urban edge character. Between these there is a settlement pattern of scattered farmsteads and farm buildings. The A13 dual carriageway runs south-west to northeast along a low ridge across the area. Planting associated with and close to the A13 gives it the appearance of a wooded ridge as seen from the north and south, although passing traffic is frequently visible.

2.2.4. The A13 junction is a key moment of transition both for users of the strategic road network (SRN) in the transition of landscape between the urban edge condition of the south and into the fenland setting of the Mardyke area further north.




Aerial view south-west towards A13 Junction


Urban edge of Chadwell St Mary


Edge of Blackshots towards A13

2.3. Existing historical context

2.3.1. Within the region, there are a number of historical points of interest (see Environmental Statement, Chapter 6: Cultural Heritage, Application Document 6.1).

2.3.2. The River Thames has great historical significance. The port of London was founded by the Romans and during the 18th and 19th centuries, was the busiest port in the world. The Port of Tilbury remains one of Britain's most significant ports. For 2,000 years, every ship approaching or departing from London has passed along the Thames between the city and the sea. Given this strategic significance, the Thames has been heavily defended in times of war, as evidenced by the series of forts along both banks to each side of the proposed Project route.

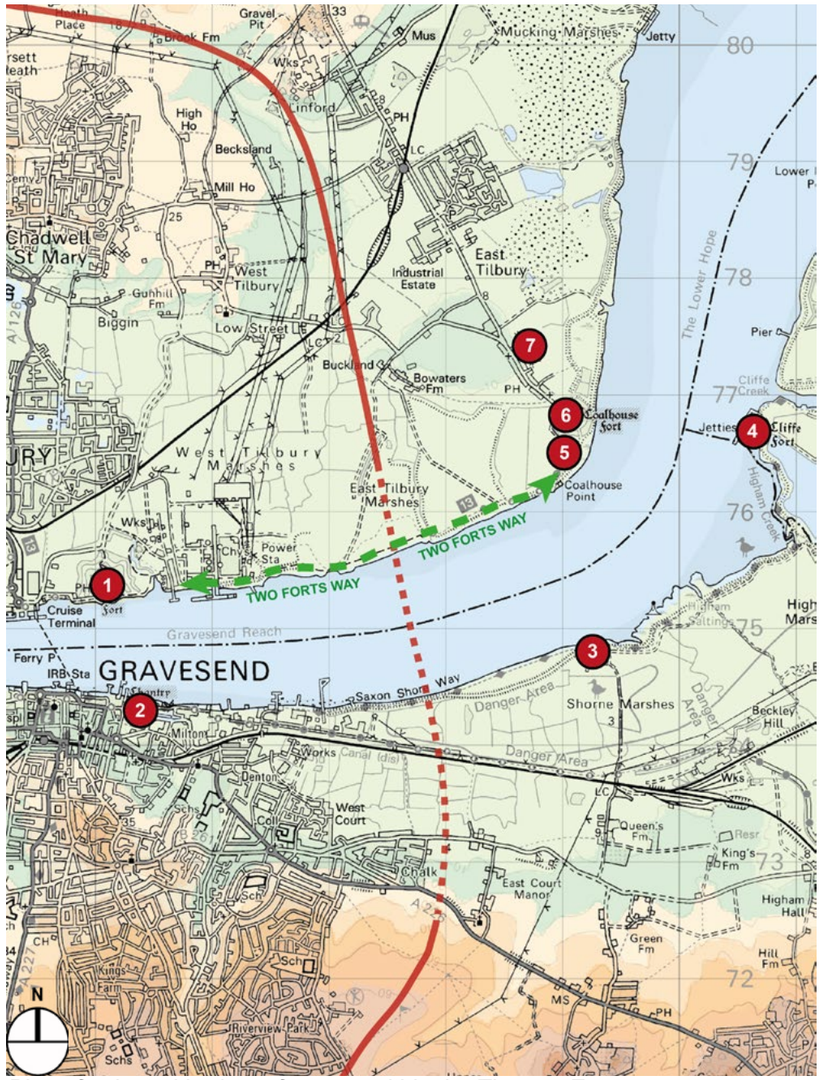
2.3.3. The density of military defences along the Thames emphasises the historical importance of this area, with a number of forts dotted along the southern shoreline, including Shornemead and Cliffe Forts. Defensive structures on the northern shore include Coalhouse Fort and Tilbury Fort. Both forts and their surrounding open space are popular local tourist attractions.

2.3.4. Within the River Thames are several non-designated historical wrecks, including a submerged mooring of a Second World War barrage balloon, however none of which lie within or immediately adjacent to the Project Order Limits.

2.3.5. In the south, the landscape close to the river has largely retained its historical marshland character. The exception to this is the development of Milton Rifle Range on Eastcourt Marshes during the 19th century.

2.3.6. The areas of floodplain near both the North and South Portals have potential to contain waterlogged organic remains dating from the Mesolithic period onwards. There is evidence of human habitation ever since, including crop marks denoting Romano-British enclosures and evidence (in the floodplain) of Post-Medieval land reclamation, comprising the draining of the marshes and construction of sea defence walls.

2.3.7. In the north, there are two recorded sites of salterns around the North Portal and historical drove ways.



Plan of selected heritage features within the Thames Estuary


1. Tilbury Fort


2 . New Tavern Fort

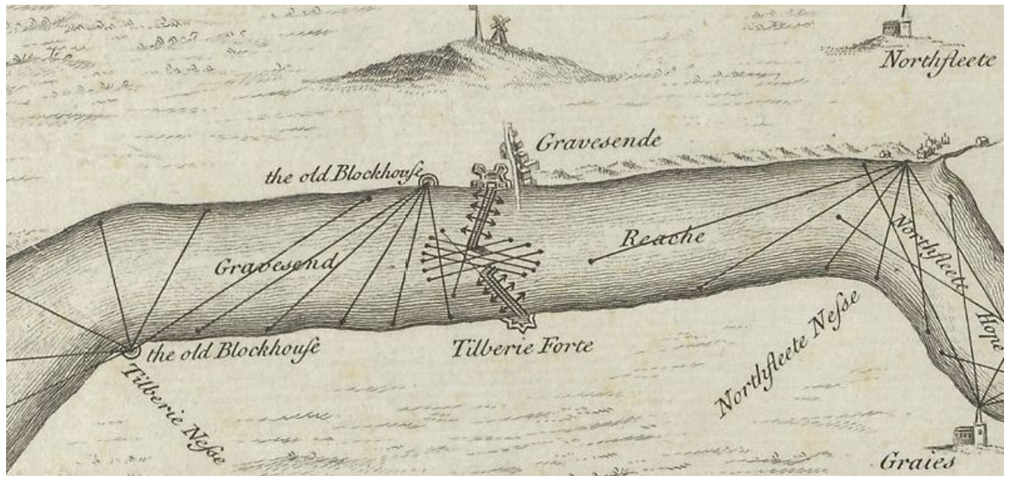

3. Shornemead Fort


4. Cliffe Fort


5. Coalhouse Fort wing


6. Coalhouse Fort


7. East Tilbury Battery



Historic image of the forts within the River Thames estuary - (Wikimedia Commons)

2.3.8. The number of military defences on the northern bank of the River Thames emphasises its historic strategic importance. Outside of the Project Order Limits to the west lies Tilbury Fort and to the east is Coalhouse Fort, both Scheduled Monuments. Inland from Coalhouse Fort lies the scheduled monuments of two former military defence sites – East Tilbury Battery and the Second World War anti-aircraft battery at Bowaters Farm. Around the North Portal are non-designated Second World War anti-glider ditches.

2.3.9. The villages of East and West Tilbury are designated as Conservation Areas. The East Tilbury (Bata) Conservation Area is on the Heritage at Risk Register, due to the poor condition of the Grade II listed British Bata Shoe Company factory and associated buildings, which sit on the western edge of the village. East Tilbury was originally designed and built to house the workforce of this factory. Located to the south of the Conservation Area, there is the Grade I listed Church of St Katherine and a Grade II listed rectory.

2.3.10. In West Tilbury, earthworks near St James' Church are a Scheduled Monument. They are thought to be a former rampart and indicate the site of a camp where, in 1588, Elizabeth I reviewed the preparation of her troops for the arrival of the Spanish Armada. Historical views to the chalk escarpment by the church on the northern boundary of this area are also important to maintain.

2.3.11. South-east of the A13 junction, there are three Grade II listed buildings within the Project Order Limits, which are Thatched Cottage, 1 and 2 Grays Corner Cottages and Murrells Cottages. In this area there are also the buried archaeological remains and a Scheduled Monument of a Neolithic causewayed enclosure and an Anglo-Saxon cemetery, which lie outside the Project boundary.

2.3.12. East of the A13 is the Orsett Conservation Area. Within Orsett village is the Grade I listed Church of St Giles and All Saints, and the Grade II* listed Orsett House. To the north of Orsett is Bishop Bonner's Palace, and to the west is the 'Springfield style' enclosure and Iron Age enclosures south of Hill House, Baker Street (both are Scheduled Monuments).

2.3.13. In Baker Street, to the west of Orsett and immediately east of the Project Order Limits, there are six Grade II listed buildings, including Baker Street Windmill.

2.3.14. At the A13 Junction lies a crop mark complex, designated as a Scheduled Monument and on the Heritage at Risk Register. It sits partially within the junction, straddling the A13 corridor, and is within the Project Order Limits. There are also other areas of non-designated cropmarks recorded within the Project Order Limits.

Tilbury Fort

Coalhouse Fort

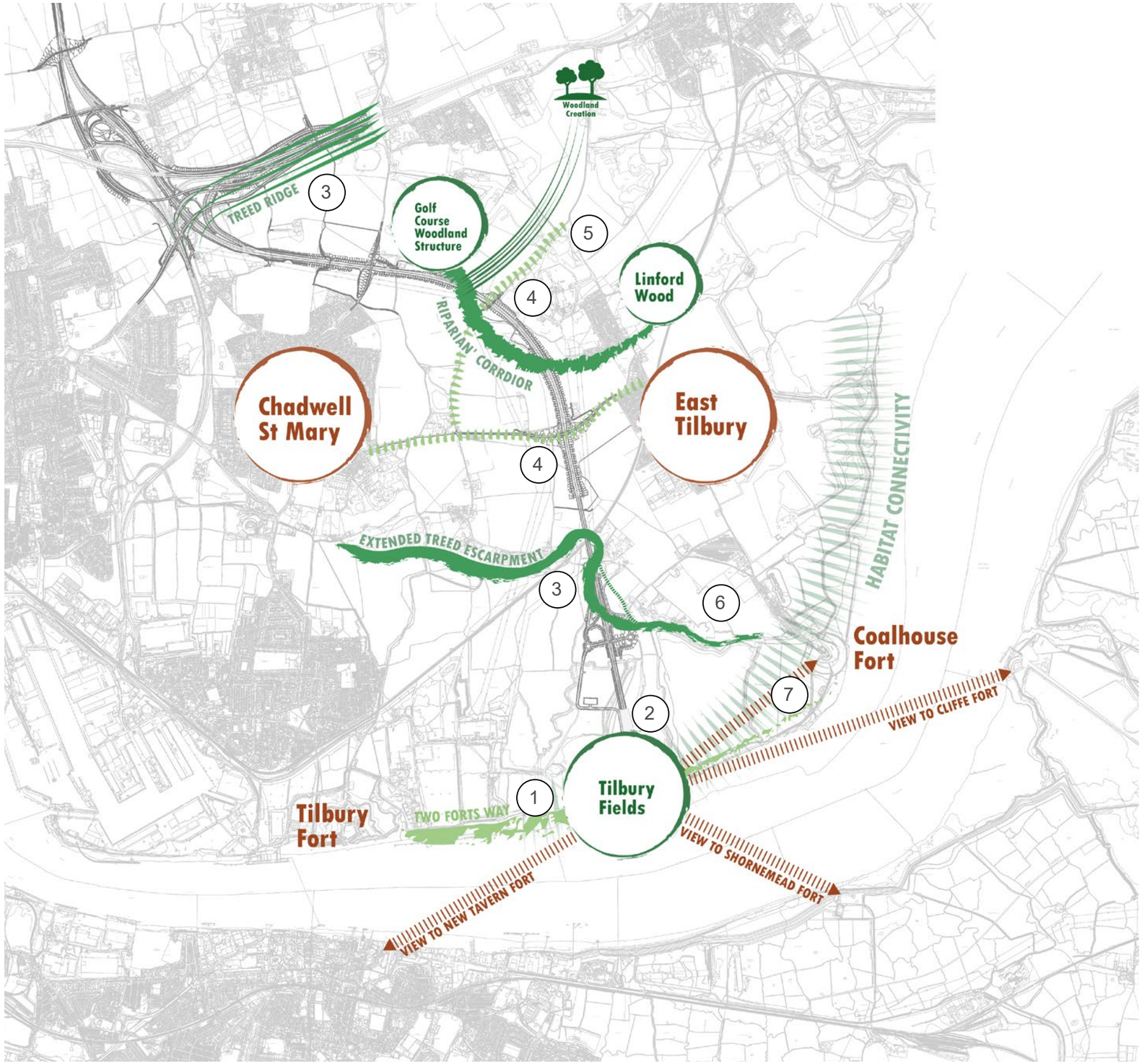
One of the Grade II listed British Bata Shoe Company factory buildings

Grade II listed Baker Street Windmill

3. Proposed regional strategies

3.1. Overview

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



1. Improved access and links between heritage assets

3.1.2. Strengthening of both the local Public Right of Way (PRoW) network and visual links to local important existing heritage assets.

2. New recreational site

3.1.3. Landscape proposals include the creation of a new recreational site at the Tilbury Fields site. Re-using spoil from the North Portal tunnel excavations, the recreational site will include subtle geometric earthworks to create a unique sense of place.

3. Enhancement of existing landscape character through planting

3.1.4. Where practicable, landscape proposals will include the extension of areas of trees and woodland on existing wooded escarpments and ridges. Similarly, where appropriate the planting design will reference the area's human-influenced rural heritage, therefore both maintaining and enhancing the landscape character of the region.

4. Green bridges

3.1.5. Green bridges within the region provide habitat links for wildlife. In addition to the ecological function, the design of the green bridges reduce people's perception of crossing a bridge by giving the impression of a continuation of the roadside landscape drawing from the character of the roads of which they have become part of.

5. Woodland enhancement

3.1.6. Nitrogen deposition and ancient woodland compensation. Creation of wildlife-rich habitats dominated by woodland to link existing habitats.

6. Enhanced habitat for invertebrates

3.1.7. Creation of open mosaic habitats to support invertebrates and connect existing habitats with new habitats at Tilbury Fields.

7. Wetland creation for birds and invertebrates

3.1.8. Creation of wetand habitats to enhance support for the birds of the Thames Estuary and invertebrates of ditches and pools.

3.2. Routes for Walkers, Cyclists and Horse Riders

3.2.1. The walkers, cyclists and horse riders (WCH) strategy in the region between Tilbury and the A13 Junction, following numerous rounds of consultation and ongoing stakeholder engagement, includes several proposals.

3.2.2. These proposals focus upon two broad topics, improving recreational access to the countryside and improving commuter connectivity.

3.2.3. New routes and upgrades to existing PRoWs will improve WCH connectivity from the A13 to Coalhouse Fort in line with the aspirations of Thurrock. The creation of permissive footpaths will connect heritage assets Bowaters Farm Battery, East Tilbury Battery and Coalhouse Fort, and the creation of new routes through Tilbury Fields will connect this new country park to both the existing coastal route, and the existing PRoW network further north. Some of these routes through Tilbury Fields will rise to the top of new landforms that will provide users with views across the River Thames and towards Kent.

3.2.4. A new roadside pedestrian-cycle track along Muckingford Road, improved pedestrian-cycle provision along the A1013 and extended pedestrian-cycle provision alongside Stifford Clays Road will afford people better access to jobs and services.

3.2.5. 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

Preliminary WCH routes around East Tilbury and the North Portal

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 tables below. These have been considered and integrated into the preliminary design where practicable.

Tilbury Marshes

	Constraint	Opportunity
Topography	The landscape already has large landforms resulting from landfill. There are concerns regarding more built forms in the landscape and further detrimental effects on the area. Poor ground conditions including peat and alluvium. Contamination of historical landfill sites, particularly around the East Tilbury Marshes. Much of the site lies in Flood Zones 2 and 3.	The riverside has a unique character, history and ecology to celebrate It may be possible to take advantage of the man-made nature of the landscape to provide sculptural landforms that add interest and offer views. Where reasonably practicable, WCH users and drivers could experience expansive views over the Thames made possible by the open marshland.
Communities	Impacts on communities and proposed works in East Tilbury and for residents on Church Road, Station Road and Low Street Lane, should be kept as low as reasonably practicable.	Design of landscape and structures should screen the road and associated noise. Where this is not possible structures can be designed to look as good as reasonably practicable. Access and the experience for recreational users of the riverside walkway could be improved.
Tilbury Loop	The railway line limits local road access to the marshes area. The Project route will need a viaduct to bridge the railway line. The structure will be highly visible to the community nearby so should be kept as low as reasonably practicable. The poor access limits potential for the future development of the area.	Potential for views for road users as they cross the high point over the Tilbury Loop to West Tilbury Church. Bridging structure should be as attractive as reasonably practicable. Attention should be given to the landscape below the viaduct.
Historic context	Impact of the portal and tunnel pre-construction/construction on their setting and landscape character amongst a number of historic fortifications and designated heritage assets of the Thames Estuary. Historical views to the chalk escarpment and West Tilbury Church on the northern boundary of this area need protection.	To celebrate the rich history of the area and provide interpretation on the Two Forts Way. Access could be increased to local heritage sites through recreational routes and interpretation. Road users could be given a sense of place by providing historical views of the chalk escarpment. Opportunity for a new park celebrating the historic environment.
Ecology	Special Protection Area and Ramsar site alongside the Thames approximately 1.5km east of Project route. Notable loss and disturbance of habitats that support birds and invertebrates from designated and undesignated sites.	Opportunity to provide well designed mitigation habitats and interpretation to enhance understanding and appreciation of local ecology.
Watercourses within the marshes	The Tilbury Main will permanently require diversion/culverting around the Project alignment resulting in a loss of biodiversity. Diversions should be as limited as far as reasonably practicable. This, and the loss of water vole habitat in the construction site, require mitigation offsite.	More naturalised watercourses can be provided where diversions and mitigation are required.
Landfilling operations	These will continue after the Project is complete so access will need to be maintained and Project works designed for future loading.	Landfills allow the Project to retain as much spoil onsite as reasonably practicable to limit number of vehicle movements. Integrate access, such as to existing jetties, into landscape restoration works.

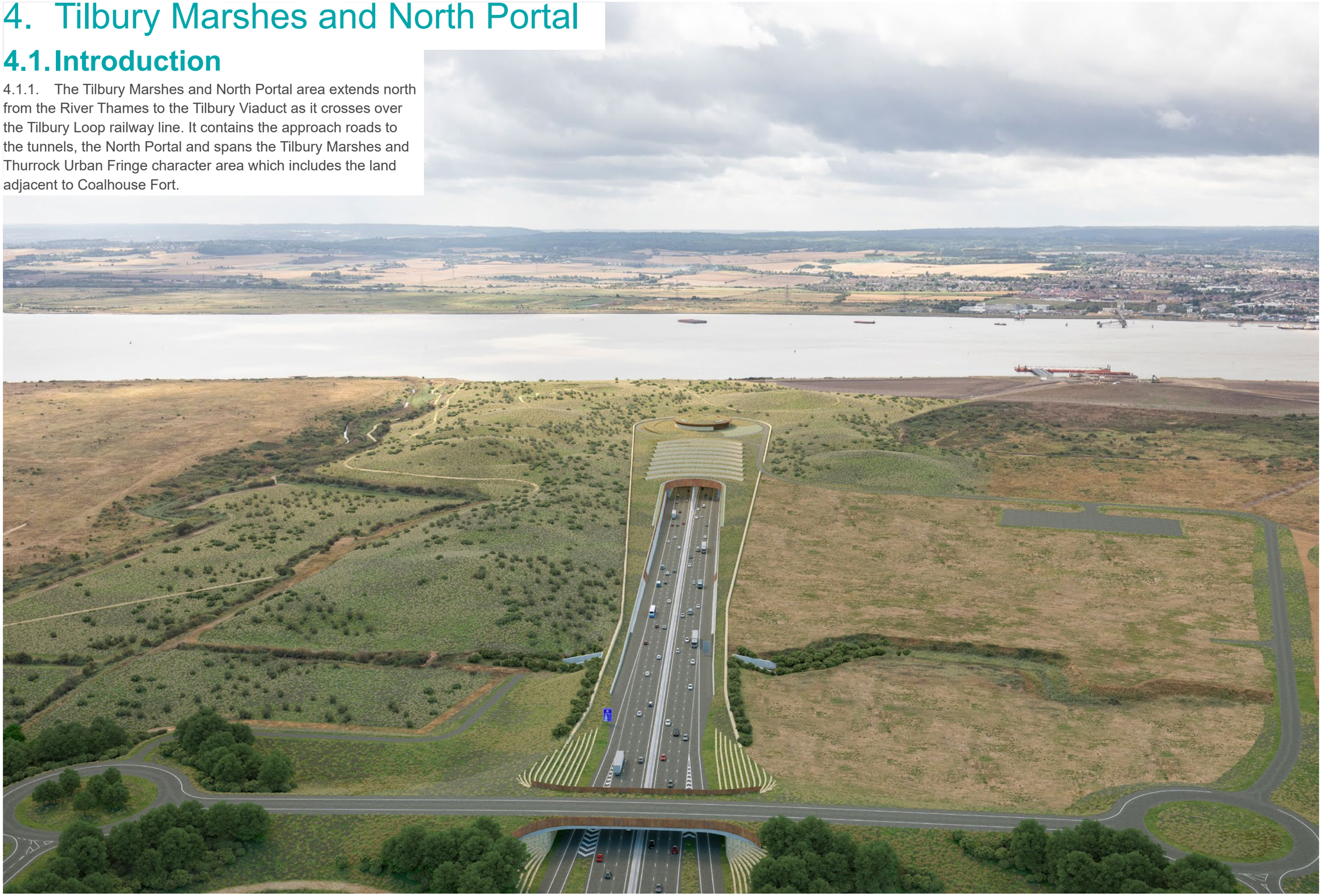
Chadwell Link and A13 Junction

	Constraint	Opportunity
Topography	The natural valley may make the road prominent when viewed from surrounding elevated land.	Use of planting and false cutting to shield the road from the exposed urban edges. Design of earthworks and planting associated with the A13 junction to build on the existing character of the A13 wooded ridge.
Open space	Blackshots nature area and local wildlife site, Orsett show ground.	Provision of high quality replacement land where reasonably practicable.
Communities	Proximity to residential properties and community amenities such as a care home and riding school. Prime agricultural land and farm buildings – some very close to the alignment. Retention of farm tracks in addition to WCH routes. Gammon Field Travellers' Site to be relocated nearby.	PRoW network could be improved by rationalising routes and enhancing amenity and connectivity, particularly east to west routes between urban areas and linking across the A13 junction to recreational areas in the north. Integration of earthworks and acoustic barriers to reduce noise impacts.
User experience	Complicated junction arrangement and interface with the local road network designed to accommodate weaving and merging movements.	Elevated views from the Tilbury Viaduct across the rural landscape and to West Tilbury Church on the southern boundary of this area. Elevated view across Orsett Fen for northbound drivers north of A13 junction.
Historic context	Protected laneway at Hoford Road. High density of buried archaeology.	Use of green bridges to retain rural historical character over the Project route.
Existing infrastructure	Lines of pylons carrying high voltage overhead powerlines running north from Tilbury are dominant features.	Explore opportunities to underground powerlines.

4. Tilbury Marshes and North Portal

4.1. Introduction

4.1.1. The Tilbury Marshes and North Portal area extends north from the River Thames to the Tilbury Viaduct as it crosses over the Tilbury Loop railway line. It contains the approach roads to the tunnels, the North Portal and spans the Tilbury Marshes and Thurrock Urban Fringe character area which includes the land adjacent to Coalhouse Fort.



4.2. Existing context summary

4.2.1. The Tilbury Marshes area extends north from the River Thames to the Tilbury Viaduct as it crosses over the Tilbury Loop railway line. It contains the approach road to the tunnel, the North Portal and the surrounding landscape including the land adjacent to Coalhouse Fort.

4.2.2. The Tilbury area is located within the Tilbury Marshes character area described Section 2.2 of this document.

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

a. Open with expansive views.

b. Mix of arable and grazing land use.

c. Significant areas affected by previous and ongoing landfill and spoil placement, creating flat-topped areas elevated several metres above the natural level.

d. Scattered residential properties along Station Road, along with a few industrial units.

e. Ribbon development along Princess Margaret Road; settlement of East Tilbury in adjacent Thurrock Urban Fringe sector.

f. Important historic Tilbury Fort to south-west and Coalhouse Fort to south-east.

g. Large scale infrastructure such as former Tilbury power station (demolished) and proposed Tilbury2 freeport.

h. Port of Tilbury further west is important attractor for employment and business.

i. Other infrastructure including Tilbury Loop railway and several overhead high voltage powerlines with pylons running north from the former power station.

j. Tranquil, sometimes haunting, character.

k. An area of strong contrast between the horizontal lines of the natural landscape and riverscape and the vertical man-made elements such as the power station, pylons and other infrastructure. The strong contrast allows the natural character of the landscape to prevail despite the many human interventions.

l. More enclosed character with stronger vegetation structure between Station Road and the railway.

m. Wooded ridge on chalk escarpment along northern edge of this area north of the railway.

n. Area used by birds from the Thames Estuary SPA / Ramsar.

o. Ditch network supports important biodiversity including invertebrates.

Further details on the preliminary design of the North Portal can be found in Project Design Report Part F: Structures and Architecture

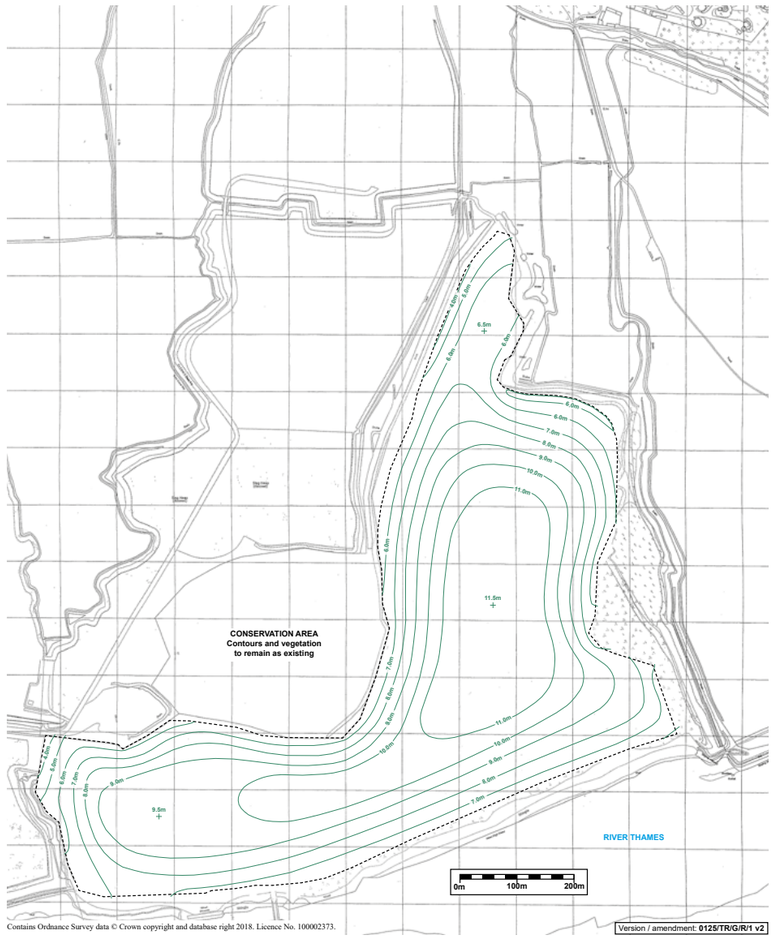
Tilbury Marshes future context: land raising permissions in the area

4.2.4. It is important to note that, due to landfilling activities in the Tilbury Marshes area, the topography at time of writing will change considerably over the duration of the Project and beyond. A land restoration company is currently undertaking the removal of pulverised fuel ash (PFA) from the area and (by taking advantage of transport by river), back filling and raising the ground levels with excavated material imported from other infrastructure projects in the London area. There have been a number of planning applications to alter the landscape. The drawing below illustrates the levels that Thurrock Council has approved. These will be implemented over a number of years. This may result in the earthworks, (provided by the Project) sitting above current ground level and in the longer term will become recessed features when surrounding levels are raised.

4.2.5. In support of the most recent planning application (18/01564/CV 2018) to restore the landscape on Goshems Farm to agriculture and raise levels there to +11.5m Above Ordnance Datum (AOD), the land restoration company commissioned Matt Lee Landscape Architects to produce an aspirational masterplan of the broader landscape. This illustrates a number of improvements to the broader landscape including the creation of salt marsh habitat and recreational areas on East Tilbury Marshes. Though the Project has had reference to these proposals in the Preliminary Design, it was not possible to determine that there are firm plans to implement any of these proposals outside of the Goshems Farm area.

4.2.6. The proposal to raise levels on Goshems Farm using inert material received planning permission in 2018, however, the necessary permits to implement the decision have not yet been obtained.

Landscape restoration plan produced by Matt Lee Architects as part of planning application (18/01564/CV 2018)



Proposed restoration contours of planning application (18/01564/CV 2018)

Tilbury Marshes future context: Tilbury2 and Tilbury Freeports Proposal

Tilbury2

4.2.7. The Tilbury2 Nationally Significant Infrastructure Project (NSIP) is a newly constructed terminal at the Port of Tilbury (PoT) on part of the former Tilbury Power Station site in Essex. The development consists of a Roll-on, Roll-off (RoRo) terminal and a Construction Materials and Aggregates terminal (CMAT), and associated infrastructure including rail and road facilities and revisions to the existing marine infrastructure.

4.2.8. Tilbury2 is located to the west of the Project's North Portal on the north side of the River Thames, east of the existing PoT. The Tilbury2 Order Limits overlap with the Project Order Limits in some locations (see Application Document 7.17: Interrelationships with other Nationally Significant Infrastructure Projects and Major Development Schemes). Most overlaps relate to existing access roads which the Project will utilise and the infrastructure corridor to the south of the Tilbury Loop railway line, for which conduits have already been installed for future proofing as part of the Tilbury2 works. The Project Order Limits also overlap with landscaped and compensatory wetland habitat areas for Tilbury2 (LEMP areas), within which the Project has allowed for an aggregate conveyor route connecting the CMAT to the North Portal construction compound. Mitigation has been secured through the Register of Environmental Actions and Commitments (REAC) to avoid and reduce impacts of the conveyor on the integrity of the ecological habitat.

Tilbury Freeports proposal

4.2.9. The freeport is an economic zone that benefits from tax relief. It is not an individually designated project, but will be made up of a number of developments which will have different planning pathways. The Port of Tilbury London Limited (PoTLL) is yet to detail the extent of development for the freeport (beyond the economic zone) nor the proposed planning pathways for construction.

4.2.10. The northern tunnel entrance compound of the Project is located within the Thames Freeport area, designated by The Designation of Freeport Tax Sites (Thames Freeport) Regulations 2021 SI 2021/1195. PoTLL have earmarked land:

a. Immediately to the east of Tilbury2 for a new port development proposed as Tilbury3

b. Situated to the west of the Project's North Portal along the river front, also for new port development

c. Situated to the west of the Project extending to the Tilbury Loop railway, for other commercial developments

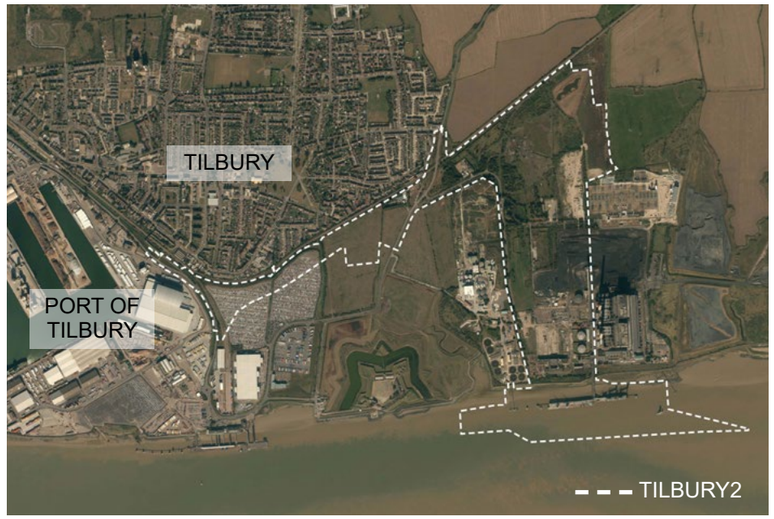
4.2.11. The consenting for developments within the designated area will depend on the nature of the developments and so cannot be determined while PoTLL are still developing their masterplan. It is anticipated that there will be a combination of different development routes, including use of permitted development rights, Town and Country Planning Act (TCPA), Local Development Order (LDO), and potentially DCO.

4.2.12. National Highways is awaiting the masterplan documents and details of the proposed planning framework for the Thames Freeport to understand the full details of PoTLL's proposal. Land uses would depend in part on the nature of the businesses coming into the freeport area.

4.2.13. The relevant benefits (tax) associated with the Thames Freeport became available on 19 November 2021. Many of these benefits will only apply to facilities and operations that are brought into qualifying use on or before 30 September 2026. PoTLL have not confirmed a timeline for either the construction or operation of the Freeport with the Project.

Existing Port of Tilbury

Tilbury2



Tilbury2 location and approximate boundary

Aerial view towards the River Thames

River Thames and Two Forts Way

Bowaters Farm Anti-Aircraft Battery emplacement

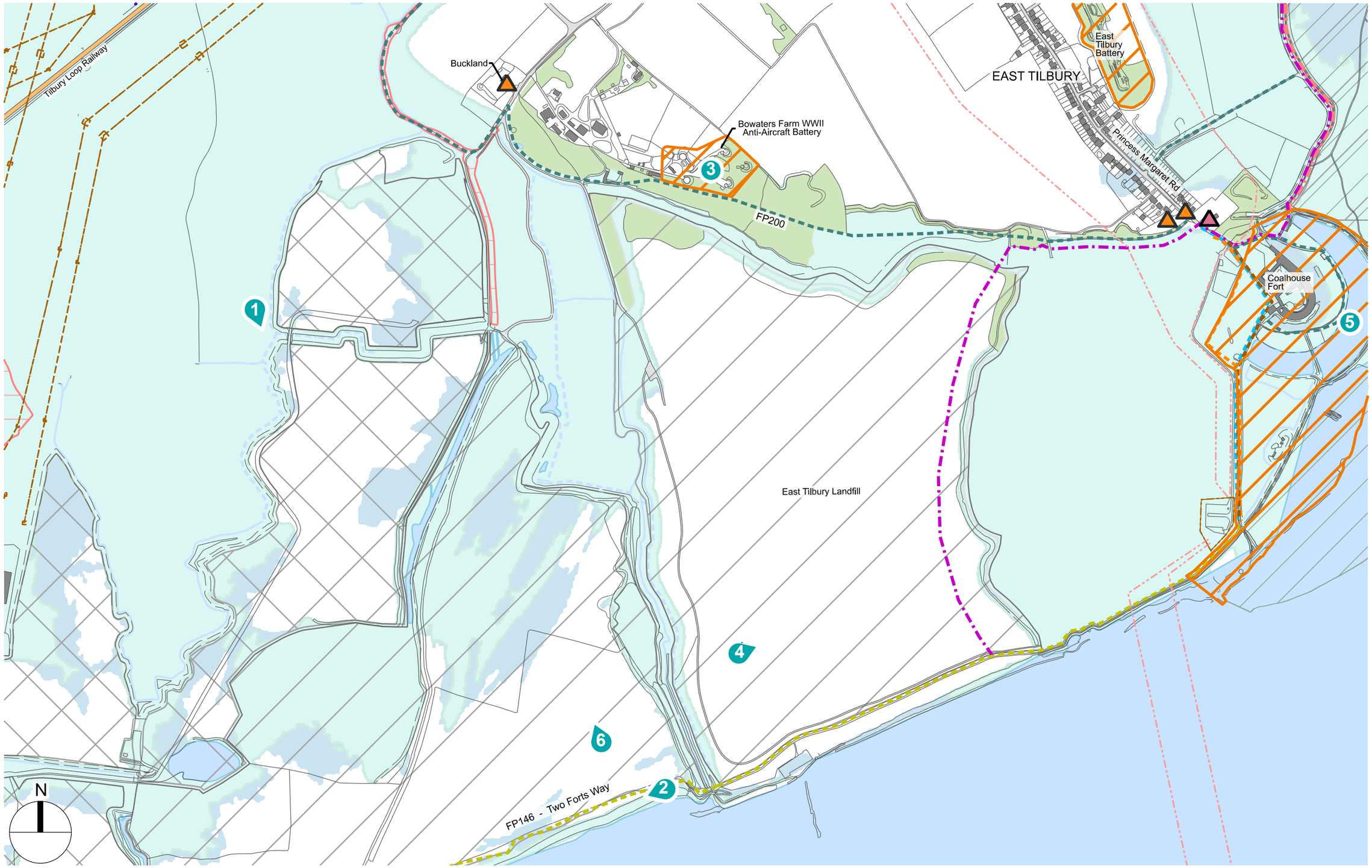
View towards Coalhouse Fort and Radar Tower

Aerial view of Coalhouse Fort

View north from Two Forts Way

Existing context diagram of Tilbury Marshes north of River Thames

- Woodland
- Conservation Area
- Scheduled Ancient Monuments
- Flood Zone 2
- Flood Zone 3
- Common Land
- Historic Landfill
- Authorised Landfill
- Existing Waterways
- Below ground Gas Main
- High Voltage Overhead
- Existing Byway
- Existing Public Footpath
- Existing Combined Public Footpath, Cycle Track and SUSTRANS Route
- Potential realignment of Two Forts Way (by others)
- Existing SUSTRANS Route
- Grade I Listed Building
- Grade II Listed Building
- Photomarker



Existing context diagram showing proposed preliminary design at Tilbury Marshes north of River Thames

4.3. Design proposals: highways and operational requirements

4.3.1. The bored tunnels end at a headwall at the southern of the Tunnel Service Building (TSB). At this point the highway is designed at a depth of approximately -12m AOD (approx. 22m below ground level (BGL). The highway then continues through a short section of cut and cover up to 300m in length before entering open cutting at a depth of approximately -5m AOD (approx. 12m BGL). The design of the route reaches an existing ground level about 400m north of the North Portal.

4.3.2. Due to the low-lying ground, a flood protection bund (+7.83m AOD) has been designed around the TSB integrated with the Tilbury Fields latest landscape design and along the length of the Project route to the north and south. An operational access on and off the mainline with two roundabouts linked by an overstructure has been designed to facilitate egress and ingress in case of emergency or maintenance purpose. The operational access has been designed above flood level and, where required, flood bunds have been included.

4.3.3. From the cut and cover section the Project route becomes elevated, passing up an embankment to a maximum height of +10m AOD (approx. 9m above ground level (AGL)) approaching the viaduct. At a point north of the North Portal operational access bridge, the carriageway widens to provide a place of relative safety on the northbound and southbound carriageways. Emergency access has been provided from Station Road onto the operational access western loop and the access track to the TSB departs off the western roundabout and is designed at approximately 9m AOD (1.5m AGL).

Further details on the preliminary design of the North Portal can be found in Project Design Report Part F: Structures and Architecture

Illustrative view of the North Portal

Illustrative section of the North Portal approach ramp and tunnels entrance

4.4. Preliminary Design: utility works

4.4.1. Significant works in this area include the diversion of and undergrounding of overhead powerlines and the installation of power and water supplies for the tunnel boring machines. The power supply requires the construction of a temporary substation within the works area.

4.4.2. The works in this area include installing utilities to supply power and services to the construction site on a temporary basis and for the permanent tunnels and North Portal building operation.

4.4.3. Works include the diversion of the Thurrock Flexible Regeneration Plant high pressure gas pipeline to enable construction of the North Portal approach road.

Existing pylons in the landscape at Tilbury Marshes

4.5. Preliminary Design: landscape

4.5.1. The key landscape components in the Tilbury Marshes and North Portal area are described in this section.

1. Tilbury Fields

4.5.2. The landform proposals within the proposed Tilbury Fields site draw inspiration from the landform and angles of the nearby forts. The grassland landforms, which have been designed in conjunction with providing open mosaic ecological habitat, target views towards the three nearby forts on the south bank of the river, and Coalhouse Fort and the batteries to the east. The extended landforms stretching from the vista points align with the cannon mounts on the nearby forts, to focus the viewer's eye toward the heritage features. Placemaking features and interpretation material increase the legibility of the landscape and increase the recreational value of the route between Coalhouse Fort and Tilbury Fort.

4.5.3. The Project alignment and North Portal at Tilbury Fields creates a definite division between an area of industry to the west and then more open agricultural and ecological areas to the east. Between these is the new linear shape park which will help draw people down to the riverfront through new footpath connections leading from Station Road to Two Forts Way. Improved WCH connections in the area create a circular route, taking in the new park, that can improve access to cultural heritage features.

4.5.4. Tilbury Fields will largely comprise Open Mosaic Habitat, and provides important habitat connectivity from existing sites to the west, linking into existing and proposed habitats further east along the River Thames estuary waterfront.

4.5.5. Further to this, the creation of Open Mosaic Habitat has been extended further north, adjacent the Project route, to link into existing and proposed habitat sites adjacent to, and further north of the Tilbury Loop railway line and extending the new Open Mosaic Habitat creation at Linford.

Existing view looking towards Tilbury Fields

Illustrative view looking towards Tilbury Fields showing an indicative line at 50m for Tilbury Freeport

Preliminary design in plan of Tilbury Fields

Example of Open Mosaic Habitat

Illustrative view over estuary from new landforms

2. Cultural heritage connections

4.5.6. The Project route runs underneath the Two Forts Way footpath between Tilbury Fort and Coalhouse Fort. The current route of the Two Forts Way is subject to erosion and intermittent closures during high tide events. The Project proposals strengthen the setting of the route, by reinstating an old footpath on higher land, and subsequently strengthening the link between the heritage assets.

4.5.7. The design of the surrounding landscape includes landform changes that create elevated areas, creating vista points to three more nearby forts on the south bank. Associated sculpted landform, interpretation material and placemaking elements have been designed to become a local landmark, creating a sense of place and directing the viewer's line of sight towards Cliffe Fort, New Tavern Fort, Shornemead Fort and Coalhouse Fort.

4.5.8. The Two Forts Way links into the wider regional routes for walkers, cyclists and horse riders. This includes FP200 south, which passes Bowaters Farm Battery heading towards Coalhouse Fort.

Existing view of the Two Forts Way

Illustrative view of Two Forts Way and Tilbury Fields

3. Escarpment expansion

4.5.9. An existing largely wooded chalk escarpment topped with sand and gravel soils rises above Tilbury Marshes to the north. An existing small dry valley intersects the escarpment where the Project route is proposed. The Preliminary Design proposals have been designed to expand the line of the escarpment to envelop the road. The proposed alignment of the access loop road west of the Project route and accessed from Station Road gently arcs, as does the associated flood protection landform giving the impression of a wider escarpment line east of the dry valley. Proposed wide areas of woodland planting help to accentuate the extended raised landform creating a strong contrast against the flat drained land to the south, in line with the landscape's existing character, whilst lessening the impact of the rising road and viaduct crossing Tilbury loop railway line.

Existing view from Station Road and wooded escarpment

Illustrative proposal showing continuation of the treed escarpment

4. Habitat Regulations Assessment (HRA) Wetland Ecological Mitigation

4.5.10. Wetland habitat creation is proposed in a parcel of land just to the west of Coalhouse Fort, immediately north of the River Thames. This proposed ecological management area extends west to a drainage ditch on the boundary of the East Tilbury landfill. New water courses, consisting of banks and ditches, will follow an historic ditch pattern reflecting the heritage of the site and its setting to Coalhouse Fort. Other wetland proposals will include shallow scrapes, natural water bodies with associated native marginal planting and marsh and wet grassland areas.

Examples of HRA Wetland Ecological Mitigation

5. Coalhouse Fort Open Mosaic Habitat Area

4.5.11. Located north of Coalhouse Fort, east and west of Princess Margaret Road, this proposed ecological mitigation area comprises nine fields in agricultural use, a number of which adjoin Coalhouse Battery Scheduled Monument. The proposed sites will act as replacement habitat and a receptor site for translocated species including amphibians (particularly great crested newts) and reptiles. This area will also be suitable replacement habitat for the displaced invertebrate population from the Goshems Farm Local Wildlife Site (LWS). Open mosaic habitat is proposed in eight of the nine parcels consisting of grassland, woodland, bare ground and scrub. Acidic grassland will be transplanted from nearby Low Street Pit LWS in the other parcel. The addition of ecological ponds will also be included.

Example of Open Mosaic Habitat Area

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 Tilbury Marshes and the North Portal responds to the 10 Principles of Good Design are described below:

Fits in context

4.6.2. The proposed design has retained the open and flat landscape between the river and the railway where reasonably practicable. The area has been designed with extensive earthworks as a result of constructing the portal and tunnels. Therefore the earthworks are distinct from the existing landscape so as not to blend the two and to retain the existing character and landform where reasonably practicable.

4.6.3. The proposed design demonstrates sensitivity to the local context by extending the wooded escarpment along its current alignment instead of following the Project route. Woodland planting along the escarpment alignment adjacent to the highway and earthworks retains a sense of the local character and helps integrate the Project route, and the Tilbury Viaduct, into the landscape.

Is inclusive

4.6.4. The excavated material provides an opportunity to create publicly accessible spaces and routes via the Two Forts Way above the tunnels and south of the North Portal. The excavated material has allowed the landscape to be designed to retain the existing open agricultural character, but also allows extensive views out towards surrounding heritage assets and the wider Thames Estuary.

4.6.5. The design of the earthworks has reflected the heritage of the area, drawing inspiration from the man-made earthworks and forms of the fortifications used in the area, and allow for this heritage to be celebrated. The WCH network has been improved to provide informal routes off the existing Two Forts Way to explore the artificial landscape and provide interpretation of the wider landscape.

4.6.6. Existing views, particularly to the chalk escarpment and West Tilbury Church have been retained.

Is environmentally sustainable

The excavated material from the tunnel provides an opportunity to retain the material on-site and avoid disposal of material off-site that would generate a large number of HGV movements. By utilising the material on-site in the creation of open mosaic, suitable habitats can be created on the River Thames that would be appropriate to the existing underlying geology from the tunnel. By linking into existing and proposed habitats along the Thames Estuary, Tilbury Fields will provide resilience rather than creating isolated pockets of habitat.

Is collaborative

4.6.7. The proposed design of Tilbury Fields has been in part of a collaborative process involving the Port of Tilbury, relevant Statutory Environmental Bodies and other appropriate stakeholders. Workshops identified opportunities for design that could facilitate requirements for the other large scale developments in the Tilbury area.

Illustrative view of Tilbury Marshes area and North Portal

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5. Chadwell Link

5.1. Introduction

5.1.1. The Chadwell Link area extends from the Tilbury Viaduct in the south to the A13 junction. The area includes the green bridges at Hoford Road and Muckingford Road and sits within the Thurrock Urban Fringe character area.

5.2. Existing context summary

5.2.1. The Chadwell Link are extends from the Tilbury Viaduct in the south to the A13 Junction. The area includes the green bridges at Hoford Road and Muckingford Road and the surrounding landscape.

5.2.2. The Chadwell Link area is located within the Thurrock Urban Fringe character area described in Section 2.2 of this document

5.2.3. Other existing key features of this landscape are summarised below:

a. Gently undulating farmland on sands, clays and gravels.

b. Arable landscape of medium sized, irregularly shaped fields divided by hedgerows with occasional woodland blocks.

c. Five lines of pylons carrying high voltage overhead powerlines running north from Tilbury Power Station are dominant features.

d. The tower of the Grade II* listed West Tilbury Church forms a local landmark.

e. South of the A13 ridge, the Project follows a small natural valley running north and from Tilbury Marshes, following two lines of pylons.

f. Hoford Road is a protected lane.

g. Pockets of woodland including Ashen Shaw and Rainbow Wood.

View from Orsett Golf Course, hole 12 towards the south.

Aerial view west towards West Tilbury

View from Station Road towards the now demolished Tilbury Power Station

Bata Factory buildings

St James' Church, West Tilbury

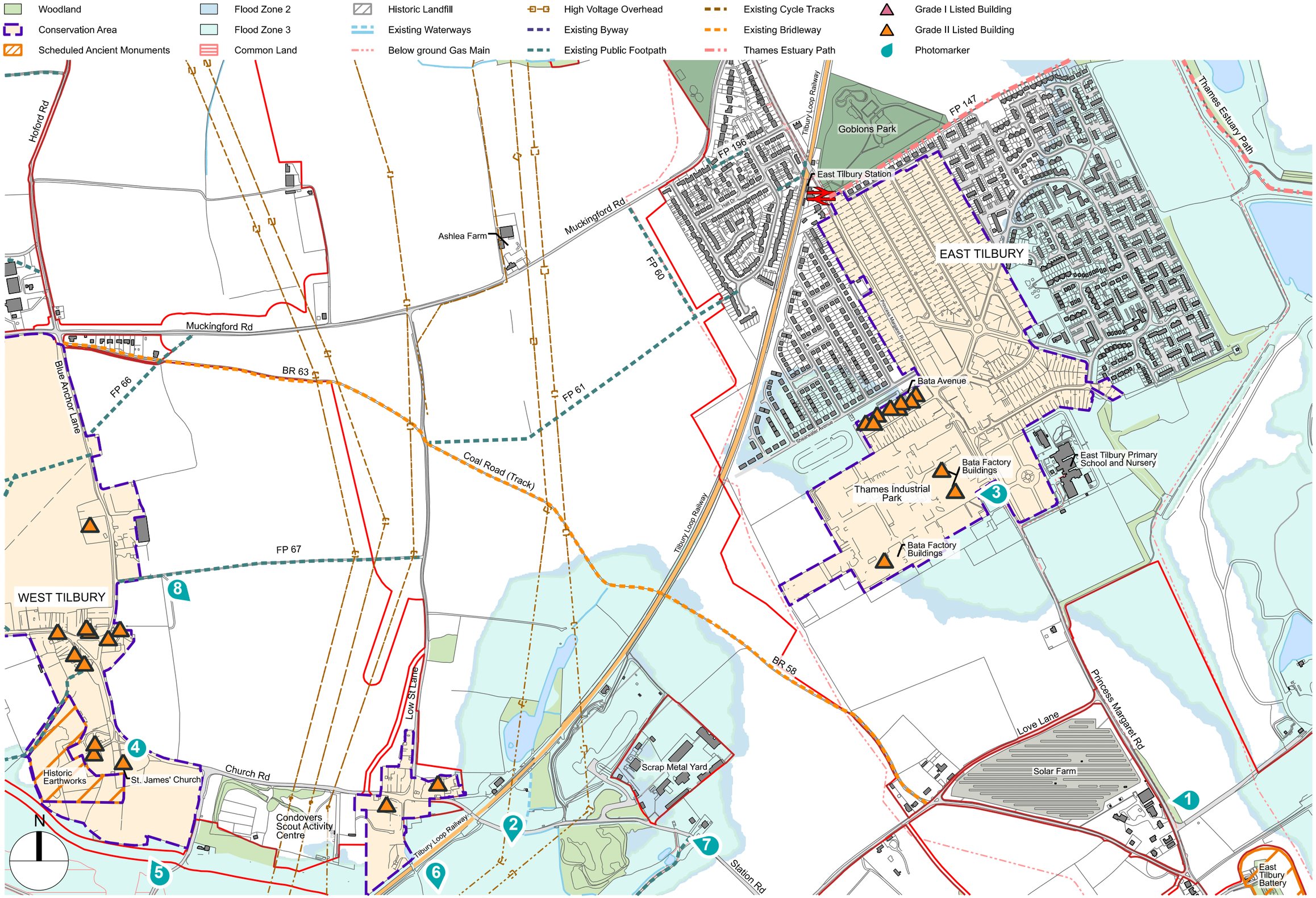
View of St James' Church from Coopers Shaw Road

Open landscape character

Station Road

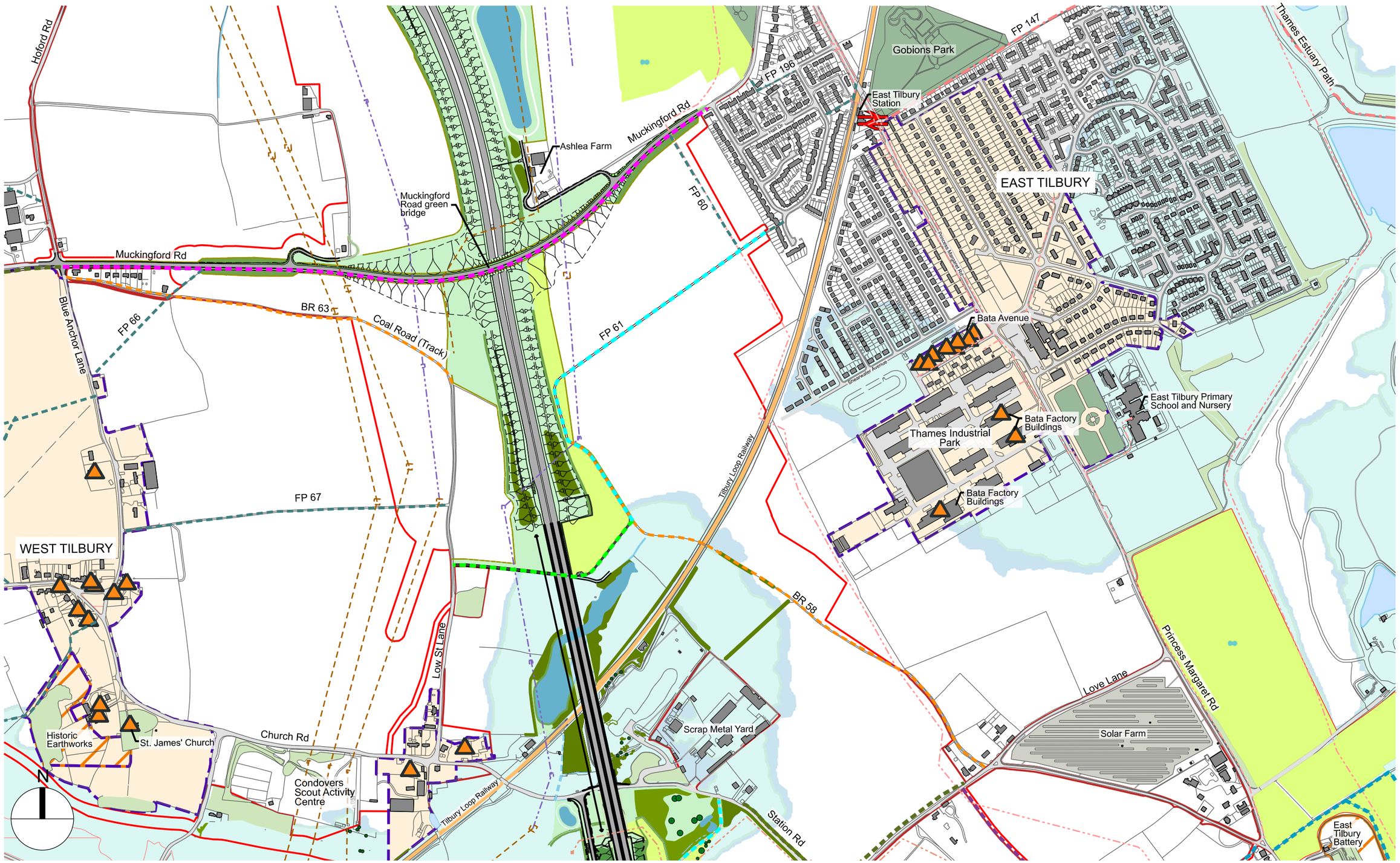
Eye level view south towards Tilbury Fields

Existing context diagram of the Chadwell Link at East Tilbury



Existing context diagram showing proposed preliminary design at the Chadwell Link at East Tilbury

Woodland
Conservation Area
Scheduled Ancient Monuments
Flood Zone 2
Flood Zone 3
Common Land
Historic Landfill
Existing Waterways
Existing Public Footpath
Existing Bridleway
Thames Estuary Path
New cycle and pedestrian route
Cycle pedestrian equestrian route adjacent road
Upgrades to or realignment of existing Bridleway
New Bridleway
New Permissive Footpath
New footpath realigned or resurfaced footpath
Proposed Woodland
Proposed Grassland
Proposed Scattered Tree Woodland
Reinstated Agricultural Land
Open Mosaic Habitat
Native Hedgerow with Trees
Proposed Waterbodies
Grade II Listed Building
Gas Main
Overhead line
Gas diversion
Overhead line diversion
Order limits



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Aerial view west over Chadwell St Mary towards the River Thames

Edge of Chadwell St Mary along Brentwood Road

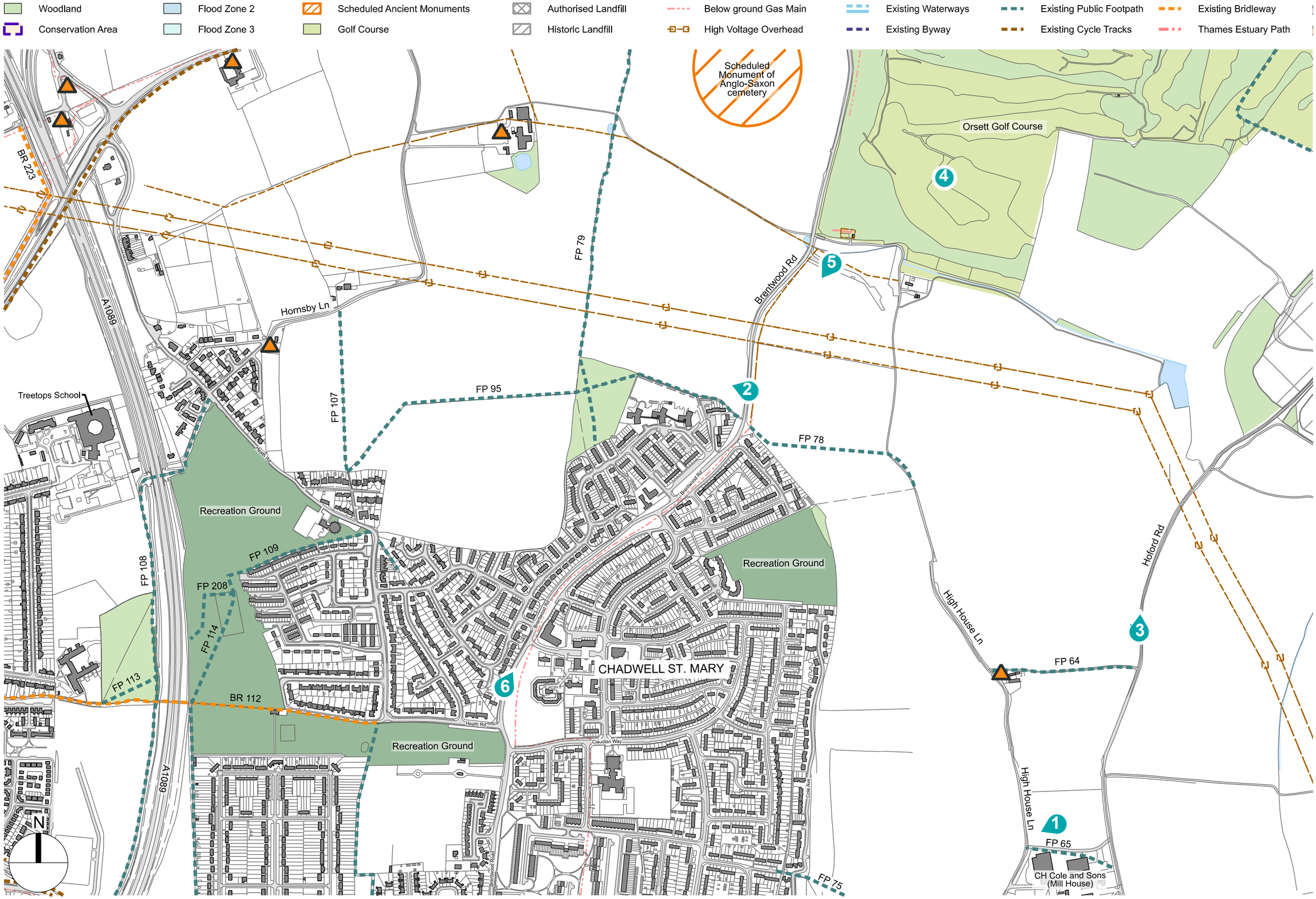
Hoford Road

View from Orsett Golf Course, hole 9 towards the east

Chadwell St Mary

North on Brentwood Road, Chadwell St Mary

Existing context diagram of the Chadwell Link



Grade I Listed Building

Grade II Listed Building

Photomarker

Hoford Rd

Clearserve

FP 43

Buckingham Hill Rd

Tarmac Building Products

Northumberland Rd

LINFORD

Lower Crescent

King George V Playing Field

Walton Hall Farm

Walton's Hall Rd

Tilbury Loop Railway

FP 147

Linford Wood

Princess Margaret Rd

Tilbury Loop Railway

Gobions Park

FP 196

East Tilbury Station

EAST TILBURY

Muckingford Rd

FP 60

Essex Wildlife Trust Thurrock Thameside Nature Park

MUCKING MARSHES

Thames Estuary Path

Thames Estuary Path

Existing context diagram showing proposed preliminary design at the Chadwell Link

- Woodland
- Conservation Area
- Scheduled Ancient Monuments
- Flood Zone 2
- Flood Zone 3
- Golf Course
- Authorised Landfill
- Historic Landfill
- Existing Waterways
- Existing Public Footpath
- Existing Cycle Tracks
- Existing Bridleway
- Thames Estuary Path
- New or upgraded cycle and pedestrian route
- Footpath upgraded to bridleway
- Footpath diverted and upgraded to bridleway
- New bridleway
- Proposed Woodland
- Proposed Grassland
- Proposed Scattered Tree Woodland

Reinstated Agricultural Land
NDEP Compensation
Open Mosaic Habitat
Native Hedgerow with Trees
Proposed Waterbodies
Grade II Listed Building
Gas Main
Overhead line
Gas diversion
Order Limits
Overhead line diversion
New Pegasus crossing

Hoford Rd
Clearserve
FP 43
Buckingham Hill Rd
Walton's Hall Rd
Tilbury Loop Railway
FP 147
Walton Hall Farm
Essex Wildlife Trust Thurrock Thameside Nature Park
MUCKING MARSHES
rd Road
n bridge
Tarmac Building Products
Northumberland Rd
Linford Wood
LINFORD
Lower Crescent
King George V Playing Field
Princess Margaret Rd
Tilbury Loop Railway
Thames Estuary Path
Gobions Park
FP 196
East Tilbury Station
Muckingford Rd
FP 60
EAST TILBURY

5.3. Preliminary Design: highways and operational requirements

5.3.1. The proposed Project route continues north onto the Tilbury Viaduct as it passes over the Tilbury Loop railway line (maximum elevation approximately +14.1m AOD, (13m AGL). Station Road remains at its existing location and level with the Project route passing overhead on the Tilbury Viaduct.

5.3.2. The Project route approaches at grade, passing over Coal Road, and beneath Muckingford Road green bridge. It then passes into cutting, beneath the Hoford Road green bridge, then returns to grade, passing underneath Brentwood Road.

5.3.3. Muckingford Road has been realigned to the south of the existing route for about 900m and has been raised by up to 7.5m AGL to cross over the Project route.

5.3.4. Hoford Road has been realigned to the south of the existing route for about 250m and raised by up to 2m AGL to cross over the Project route.

5.3.5. Brentwood Road (A128) has been realigned to the east of the existing road for about 600m to straighten the existing alignment and has been raised by up to 12m AGL to cross over the Project route.

5.3.6. High House Lane is stopped up where it crosses the Project route. The section south of the Project route has been diverted to the west for about 300m to join Brentwood Road. The section north of the Project route is realigned to the north of its existing alignment for about 200m and raised to join the realigned Brentwood Road as it climbs to cross the Project route.

Illustrative view of Tilbury Viaduct from a farm access track

Existing view from Station Road towards the proposed position of Tilbury Viaduct

Tilbury Viaduct

5.3.7. A number of key considerations influenced the design of the Tilbury Viaduct. These included:

a. Appreciation of the changing context with a variety of scales.

b. Endeavouring to ensure the space created below is not detrimental to the existing or future context.

c. Endeavouring to ensure the structural layout is not detrimental to the existing or future uses of each side.

d. Avoidance of impeding access to each side

5.3.8. Tilbury Viaduct is the first structure beyond the North Portal on the Project route. The structure passes over the Tilbury Loop on the London, Tilbury and Southern Railway Line. The line is electrified and relocation of one gantry is required. The design of the structure complies with Network Rail Standards as it crosses the railway. The viaduct passes over a series of drainage ponds and drainage ditches, some of which have been designed with local diversions to avoid pier foundations, before crossing Coal Road and continuing towards Muckingford Road to the north.

5.3.9. The structure emerges from embankments south of Station Road and north of Coal Road. The structure is experienced primarily by people travelling along Station Road, by those using the diverted BR58, and at a greater speed, by those travelling by train. All three of these routes pass beneath the viaduct allowing people to view the viaduct in detail.

5.3.10. The design of the viaduct is also visible in elevation from Low Street Lane and from BR58 to the east of the viaduct. From these locations users are able to perceive the extent of the structure in its context. The design of the structural form comprises a series of shallow arches that sit discreetly within this landscape.

5.3.11. The headroom required by highway and railway standards defined the proposed height of the viaduct. This, in addition to varying topography below, has resulted in the height of the viaduct piers varying by approximately 4m, which should be considered in the detail design of the piers.

5.3.12. The parapet has been designed with an increase to a height of 1.8m over the railway to comply with Network Rail regulations. This is to be managed by a gentle slope to either side of the railway.

5.3.13. The design and construction methodology of the structure has taken into account construction over operational highways and railway and as such precast concrete is proposed.

Illustrative view of Tilbury Viaduct (behind hedgerow) and utility diversions from Station Road

5.4. Preliminary Design: utility works

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

5.4.2. Significant works include the diversion of three overhead powerline networks to ensure compliance and safe operation of the Project and the electricity networks. A majority of the eastern 132kV network is to be undergrounded as part of the proposals. The visual benefits of this can be found in the Environmental Statement (Application Document 6.1, Chapter 7: Landscape and Visual). To facilitate these works temporary diversions of the overhead powerlines onto temporary pylons are required to maintain supply during the installation of the new permanent assets.

5.4.3. Other significant works include the diversion of a high pressure gas pipeline at Brentwood Road.

5.4.4. 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 in the landscape. A view from Chadwell St Mary (the rooftop of Gooderham House, approximately 33m high) looking down towards the A13 Junction

5.5. Preliminary Design: landscape

5.5.1. The key proposed landscape components in the Chadwell Link area are described in this section.

1. Muckingford Road green bridge

5.5.2. Muckingford Road green bridge has been designed to provide a habitat link for bats, badgers and other wildlife. The design of the bridge draws inspiration from the character of the wider Muckingford Road and incorporates hedgerow planting adjacent to paved areas and a more open grassland character behind the hedge relating to the open character of adjacent fields.

5.5.3. In order to counter the isolation of Linford, East Tilbury, and even further north to Stanford-le-Hope, east-west inter-urban connectivity for access to employment and services to Tilbury and Grays shall be improved in this location with Muckingford Road green bridge playing an important role. To help achieve this access improvement, WCH connections will be enhanced across the bridge and also beyond, including a new shared track parallel to Muckingford Road between residential areas and areas of employment.

Further details on the routes for WCHs across Muckingford Road green bridge can be found in Project Design Report Part E: Design for Walkers, Cyclists and Horse Riders

Further details on the preliminary design of Muckingford Road green bridge can be found in Project Design Report Part F: Structures and Architecture

Illustrative cross section through Muckingford Road green bridge

Illustrative view towards Muckingford Road green bridge

2. Drainage retention pond north of Muckingford Road

5.5.4. A large drainage retention pond has been designed north of Muckingford Road. Its size is comparable to nearby agricultural reservoirs; however, it is designed to deal with large rainfall events and may be dry for much of the year. The design shown includes a linear hedgerow associated with the drainage retention pond that aligns with the eastern edge of the adjacent barn compound, creating an edge to the roadside infrastructure that could be read as an element of the existing agricultural landscape.

Drainage retention pond north of Muckingford Road

Example of a drainage retention pond

3. False Cut earthworks north and south of Muckingford Road green bridge

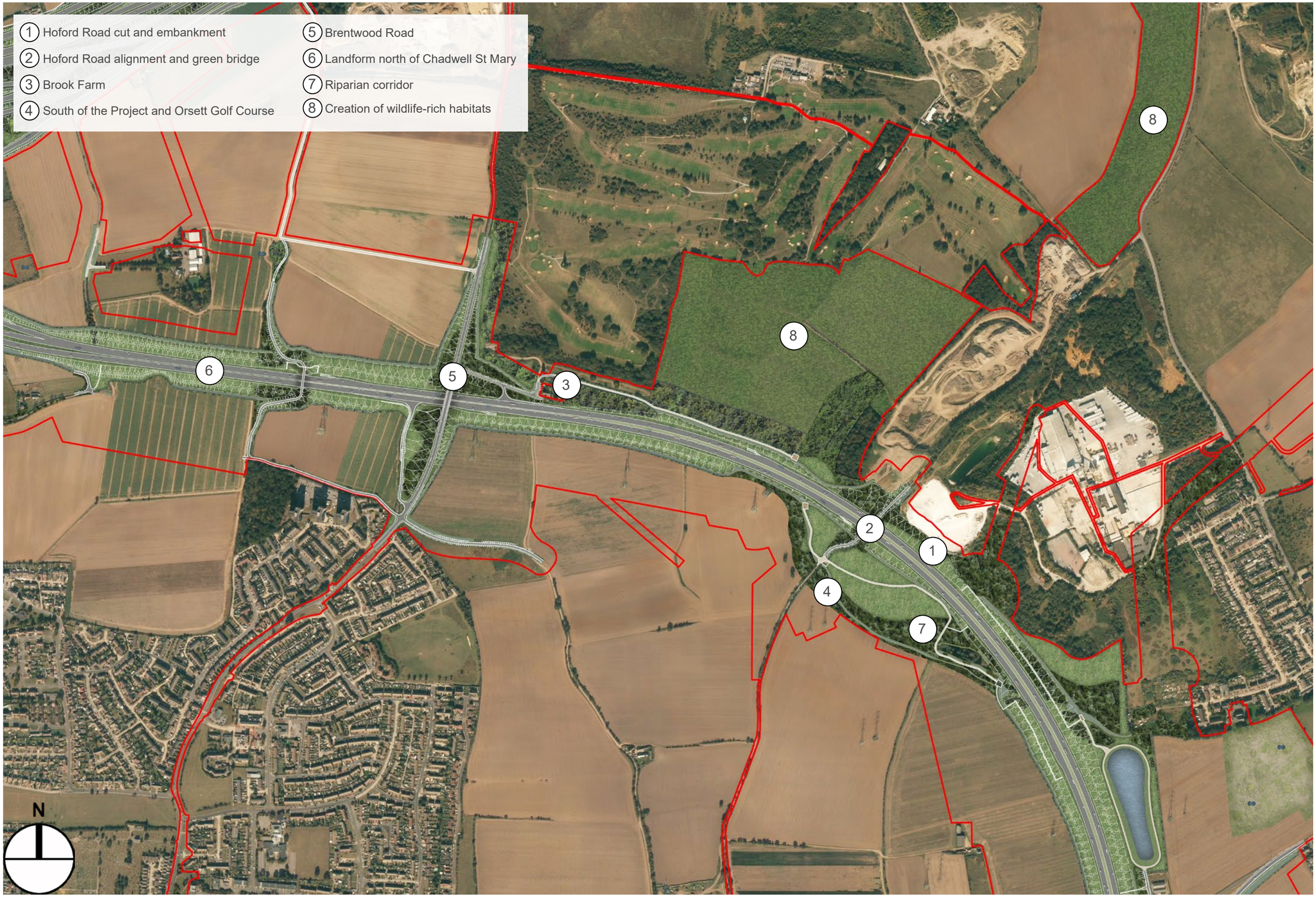
5.5.5. Extending from the Tilbury Viaduct in the south to the northern edge of the drainage retention pond in the north, false cut earthworks are proposed either side of the Project alignment for approximately half a kilometre north and south of Muckingford Road green bridge. Proposed false cuttings of 4m height in this location provide visual and noise mitigation, are sympathetic to the existing topography, work with the existing land profile to reduce the impact of the proposed road and shield the road from the exposed urban edges of Linford, Tilbury and Chadwell St Mary. The earthworks shall be seeded with species rich grassland, with no woodland planting, to reflect the local landscape character.

Example cross section of false cut earthworks

4. Open Mosaic connectivity

5.5.6. Small parcels of land adjacent the Project route impacted by construction and that cannot be meaningfully returned to agriculture have been identified for Open Mosaic Habitat creation that can provide additional habitat connectivity between the proposed habitats at Tilbury Fields and Linford. Inclusion of pollinator species can improve connectivity for invertebrate species, creating a series of ‘stepping stones’ in the wider landscape, aligning with existing Green Infrastructure projects such as ‘Making a Buzz for the Coast’.

Illustrative plan showing connectivity of small land parcels


1 Hoford Road cut and embankment
2 Hoford Road alignment and green bridge
3 Brook Farm
4 South of the Project and Orsett Golf Course
5 Brentwood Road
6 Landform north of Chadwell St Mary
7 Riparian corridor
8 Creation of wildlife-rich habitats
N

1. Hoford Road cut and embankment

5.5.7. Woodland planting limited to the low-lying land has been designed to link the adjacent riparian corridors along the valley floor to accentuate existing topography through a naturalistic landscape feature, reducing the impact of the proposed cutting on the area's landscape character. The proposals include species diverse grassland on the slopes of the existing hill that emphasise the raising landform and further accentuate the new and existing riparian corridor running at the foot of the hill. The proposed road alignment results in the removal of established woodland forming Ashen Shaw and a large proportion of Rainbow Wood. With new woodland planting, the proposals connect the remaining part of Rainbow Wood with woodland structure planting associated with Orsett Golf Course.

Illustrative view of Hoford Road cut and embankment

2. Hoford Road alignment and green bridge

5.5.8. The character of Hoford Road varies widely along its length. There are places where the existing road appears to have been raised above the surrounding valley floor and other areas where the road's surface lies well below the surface of the adjacent land. The existing enclosure created by the sunken character is further intensified by the dense vegetation lining the route in these locations. To limit the Project's impact on users of Hoford Road, the sunken lane character is adopted along the proposed replacement parts of the route and over the proposed Hoford Road green bridge. The enclosed character created by the route lying below surrounding ground along with roadside hedgerow planting has been designed to limit views toward the Project route. Where the route is diverted to allow the road to remain below surrounding levels, the existing roadside vegetation has been retained where reasonably practicable, and reinforced to further limit views to and the perception of noise from the Project.

Further details on the preliminary design of Hoford Road green bridge can be found in Project Design Report Part F: Structures and Architecture

Existing Hoford Road character

Illustrative cross section through Hoford Road green bridge

3. Brook Farm

5.5.9. The proposed Project route is located in close proximity to Brook Farm. An acoustic barrier has been proposed south of the property which is required to be visually softened whilst meeting the acoustic design requirements. Low noise road surfacing is also proposed in this location. The proposals retain the more open aspects from the property to the north, east and west. Existing vegetation lines the stream east of Brook Farm and additional tree planting is proposed between the road and the existing vegetation. An area of grassland has been designed immediately east of the property to retain a sense of openness. To the west an area of grassland and half-open scrubland creates a more open elevated view north toward the existing woodland.

South of the Project and Orsett Golf Course

4. South of the Project and Orsett Golf Course

5.5.10. The existing woodland structure that Orsett Golf Course sits within is a prominent feature on the horizon in views from the south. Proposed woodland planting on the proposed false cutting south of the Project route has been designed to become the edge of this horizon feature in views from the south. The proposed woodland cover has been designed to limit the prominence of the road corridor situated between the areas of woodland.

Illustrative view facing south from Orsett Golf Course showing proposed woodland planting (left of image)

5. Brentwood Road

5.5.11. Where planting exists on the west side of Brentwood Road it integrates with the woodland that Orsett Golf Course sits within and limiting the visual intrusion of the road and passing traffic. Apart from the hill associated with Rainbow Wood, steep gradients more than 1:15 are not a part of the local character. The design draws upon the existing landscape features by expanding the woodland associated with Orsett Golf Course onto the west-facing slopes of the proposed embankment. The woodland cover has been designed to soften the uniformity of the engineered earthworks and help limit the increased visual intrusion created by the road's increased height.

6. Landform north of Chadwell St Mary

5.5.12. North of Chadwell St Mary, the proposed road alignment broadly follows existing contour lines, sitting above the base of the basin-shaped landform on the north-facing slope. Proposed false cuttings in this location are sympathetic to the existing topography and work with the existing land profile to reduce the impact of the proposed road. The design and profile of the new and existing land has provided the impression of a closer valley bottom or a steeper hill.

Existing view from Brentwood Road

7. Riparian corridor

5.5.13. The Project planting strategy uses features which are part of the area's human-influenced rural heritage, such as small woodlands. Planting has been designed to resemble assarted woodland (woodland left between fields cleared for agriculture), hedgerows, waterside coppice and meadow flower grassland to create a finer grain that creates a landscape where the road becomes a subservient visual element of the visual hierarchy.

5.5.14. To the west of Linford, the proposed Project route crosses areas of low lying and higher land. To maintain an acceptable vertical alignment the adjacent ground level required lifting and lowering. The impact on the area's landscape character, that has been created by the difference between the proposed vertical alignment and the existing landform, are lessened by strengthening the prominence of the adjacent valley floor. Valley floors are often associated with tree-lined riparian corridors. An existing heavily treed riparian corridor skirts south of Linford and another runs south of Orsett Golf Course.

5.5.15. The proposals link these sinuous vegetated features, helping to emphasise the natural landform to mitigate the impact of the proposed landform change. Proposed ditches and the existing pond reinforce the concept.

Illustrative proposal of the riparian corridor at Chadwell Link

8. Creation of wildlife-rich habitats dominated by woodland

5.5.16. The creation of habitats dominated by woodland is proposed to compensate for effects on ancient woodland and from nitrogen deposition. The sites have been specifically located to link existing habitat areas to enhance connectivity. Whilst generally aiming to be dominated by woodland, the design will be sensitive to the landscape character and existing views by including parkland type habitat and open habitats such as grassland.

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 Chadwell Link responds to the 10 Principles of Good Design are described below:

Fits in context

5.6.2. The alignment of the Project route has been designed to keep it as low as reasonably practicable, keeping within the natural valley in the landscape. The Project route utilises earthworks and false cuttings that blend into the existing topography to provide visual screening from nearby receptors and residents. The proposed planting strategy for this area has been designed to break up the linearity of the Project and to follow the existing landscape pattern, so as not to exacerbate the Project route and instead enhance the character of the river valley.

5.6.3. The proposed design of Hoford Road bridge is sensitive to the local landscape character and the protected lane status of Hoford Road. The proposed design realigns the route slightly so that it continues in cutting before it crosses the Project route and retains a sense of a sunken lane as far as reasonably practicable.

Is restrained

5.6.4. The Project route passes through extensive areas of prime agricultural land, so the design has sought to reduce the extent of land-take, whilst still providing the required mitigation.

Is inclusive

5.6.5. The overbridges and structures in this area are designed to retain and enhance the connectivity and integrate into the existing landscape. The green bridge at Hoford Road retains the existing character of the historic protected lane through hedgerow planting.

Is long lasting

5.6.6. The Projectroute has been proposed along a natural valley in this area. Use of false cut earthworks have therefore been proposed which are more in keeping with the naturally undulating landscape and provide a longer term solution to noise and visual mitigation.

Is environmentally sustainable

5.6.7. Muckingford Road green bridge has been designed to provide ecological connectivity from east to west through hedgerow planting on the bridge and connects into existing habitats. The bridge design has provided enhanced WCH connectivity through the inclusion of a segregated WCH track, improving the accessibility of the surrounding areas.

5.6.8. Large areas of species rich grassland have been proposed either side of the Project route, on the naturally steeper gradient outcrop sides, to create habitat stepping stones in the wider landscape.

Illustrative eye level view of proposed Muckingford Bridge

Illustrative view of the Chadwell Link looking towards the A13 Junction

Illustrative view from Chadwell St Mary (Brentwood Road, at ground level) looking towards the A13 Junction. The false cutting obscures the road from the residential area.

Illustrative view from Chadwell St Mary (the rooftop of Gooderham House, approximately 33m high) looking down towards the A13 Junction showing the Project behind false cuttings.

6. A13 Junction

6.1. Introduction

6.1.1. The A13 Junction area extends from the existing A13 junction to Green Lane in the north, beyond the Orsett Cock roundabout to the east and sits within the Thurrock Urban Fringe character area.

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6.2. Existing context summary

6.2.1. The A13 Junction area extends from the existing A13 junction to the Green Lane in the north and extends beyond the Orsett Cock roundabout to the east.

6.2.2. It is located within the Thurrock Urban Fringe character area described in Section 2.2 of this document.

6.2.3. Other existing key features of this landscape are summarised below:

a. A13 dual carriageway runs south-west to north-east along a low ridge across the area.

b. Existing planting associated with and close to the A13 gives it the appearance of a wooded ridge as seen from the north and south, although passing traffic is frequently visible.

c. North of the A13, urban influences reduce, and the landscape has a more rural character with open views north towards Orsett Fen. Orsett village is on the north edge of this area.

d. Important public open spaces including Blackshots nature area LWS and Orsett Showground.

e. PRoWs, including NCR along Stifford Clays Road, through Baker Street and Orsett.

f. High levels of buried archaeology.

6.2.4. Gammon Field Travellers Site is currently located south of the A13. As part of the Project, it is being relocated and the design of the new site has been the subject of an extensive design process.

Aerial view south-west over the A13 Junction

Baker Street Windmill

Edge of Blackshots nature area towards A13

Orsett Village

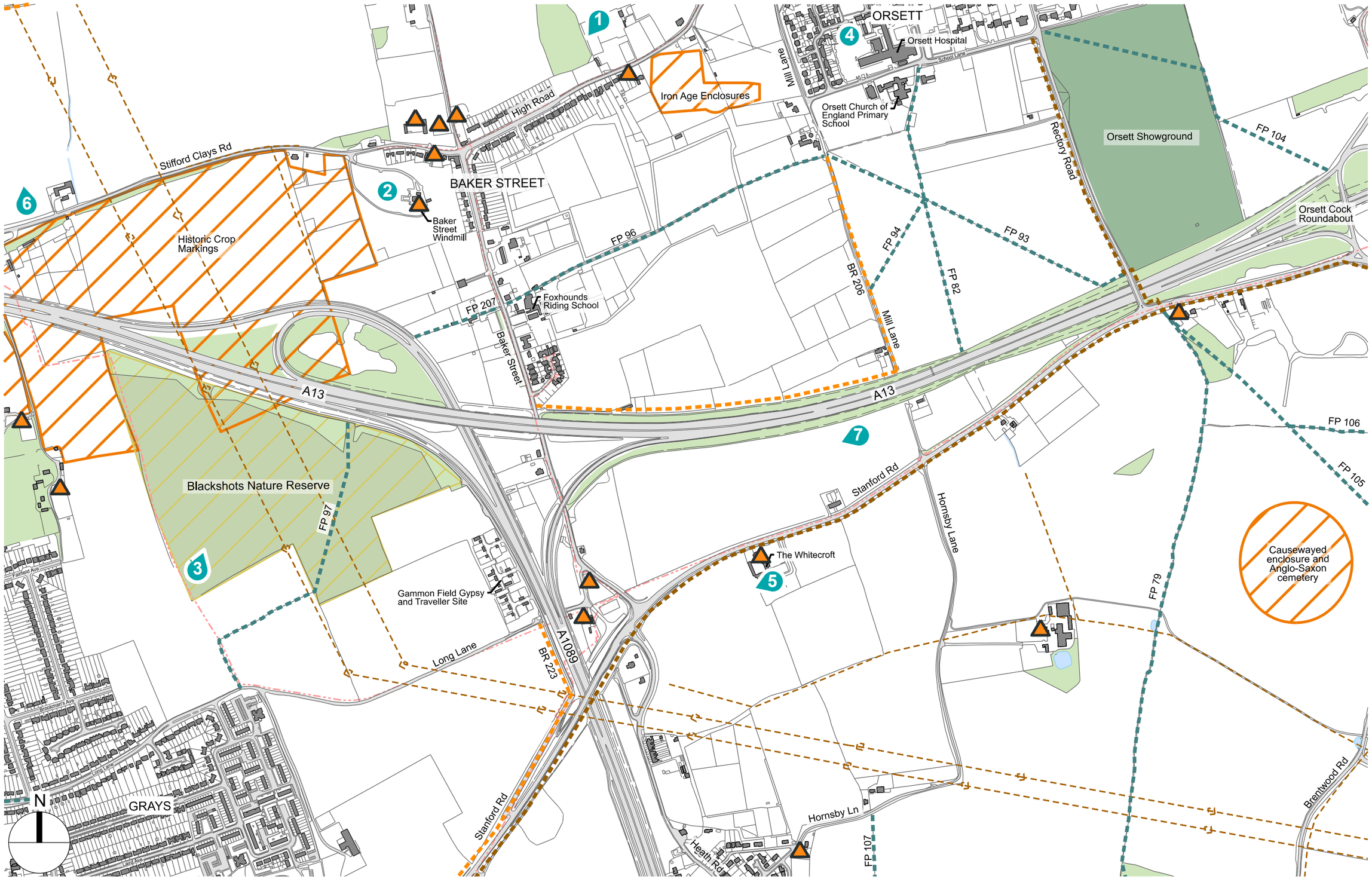
View west from the Whitecroft Care Home

View north from Stifford Clays Road

The A13 wooded ridge, Orsett Heath

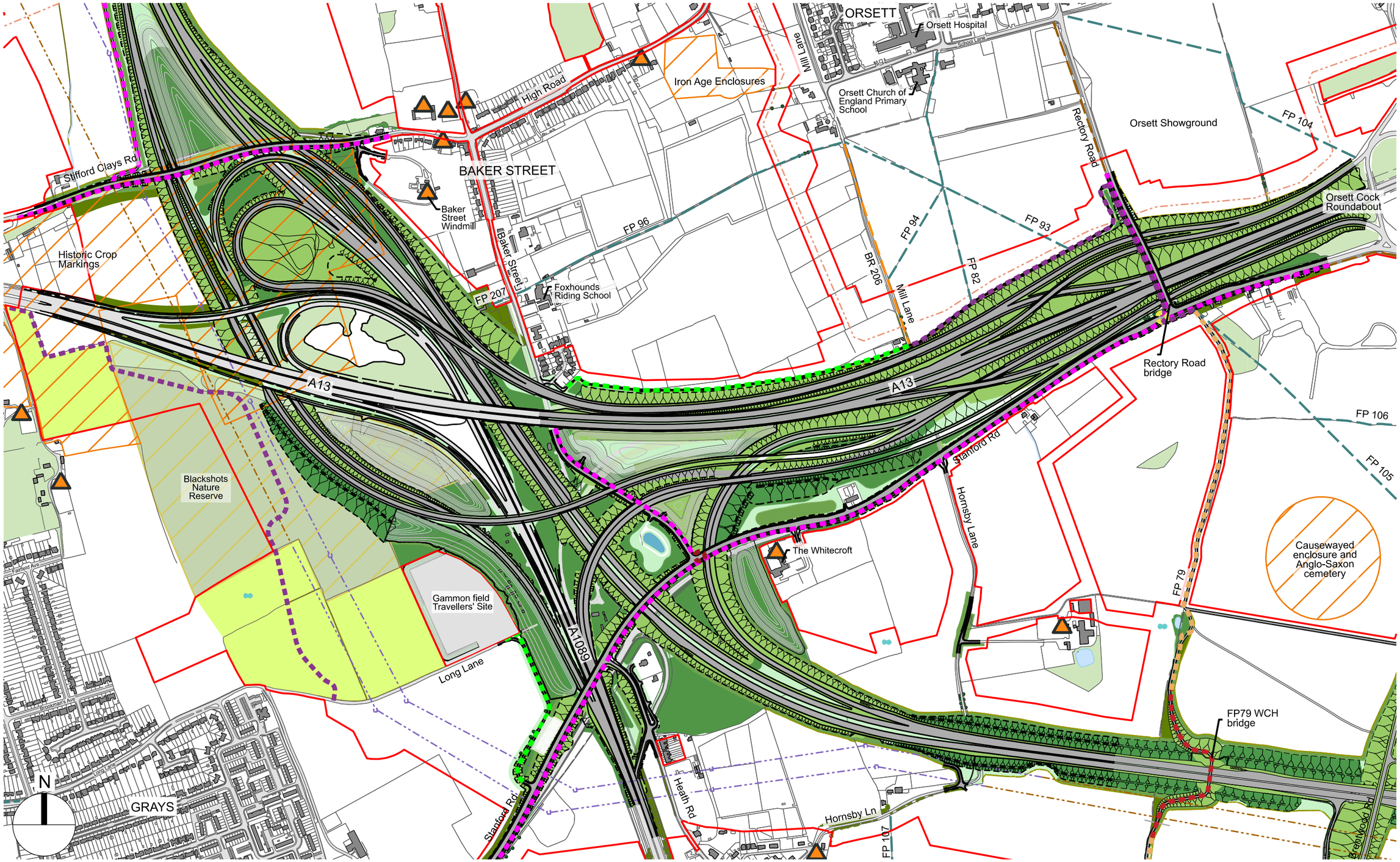
Existing context diagram of the A13 Junction

Woodland
Conservation Area
Scheduled Ancient Monuments
Site of Specific Scientific Interest (SSSI)
Existing Waterways
Below ground Gas Main
High Voltage Overhead
Existing Bridleway
Existing Public Footpath
Existing Cycle Tracks
Grade I Listed Building
Grade II Listed Building
Photomarker



Existing context diagram showing proposed preliminary design at the A13 Junction

- Woodland
- Conservation Area
- Scheduled Ancient Monuments
- Site of Specific Scientific Interest (SSSI)
- Existing Waterways
- Order Limits
- Grade II Listed Building
- Existing public footpath
- Existing bridleway
- Existing ped-cycle track
- New Pegasus crossing
- New Bridleway
- Upgrades to or realignment of existing bridleway
- Existing footpath upgraded to bridleway
- Existing footpath diverted and upgraded to bridleway
- New or upgraded pedestrian & cycle route
- Proposed Grassland
- Open Mosaic Habitat
- Reinstated Open Space
- Proposed Woodland
- Proposed Scattered Tree Woodland
- Reinstated Agricultural Land
- Native Hedgerow with Trees
- Proposed Waterbodies
- Overhead line
- Overhead line diversion
- Gas Main
- Gas diversion



6.3. Preliminary Design: highways and operational requirements

6.3.1. As the Project route continues north, a new junction has been designed to connect the Project route with the A13 and the A1089. The Project route has been reduced to two lanes in both directions through the junction.

6.3.2. The new junction between the Project route and the A13 and A1089 has been located at the site of the existing junction between these roads to the west of Orsett.

6.3.3. The Project route has been designed to pass under the A13 to the east of the existing A1089 bridge in a new structure.

6.3.4. The proposals illustrate a continuous highway for the Project route in the northbound direction. The highway has been designed to be in cutting (maximum depth approximately 7m below ground level (BGL)) passing under Stanford Road (A1013), the A13 and multiple slip roads.

6.3.5. A link from the Project route northbound connects directly to the A13 in the eastbound direction. The highway has been designed to start in cutting and then rise on embankment to pass over the Project route and Baker Street on a structure at a height of approximately +37m AOD (8m AGL), descending into cutting as it links onto the A13.

6.3.6. A link from the Project northbound is proposed to connect directly onto the Orsett Cock roundabout. The highway has been designed to be in cutting as it passes under Rectory Road (maximum depth approximately 7.5m BGL)

6.3.7. The proposals show a continuous highway for the Project route in the southbound direction. The highway has been designed to be in cutting (max depth approximately 7m BGL) passing under Stanford Road (A1013), the A13 and multiple slip roads.

6.3.8. A direct link from the Project has been provided onto the A13 in the eastbound direction. The highway has been designed to be in cutting under Stifford Clays Road (maximum depth approximately 6.5m BGL) rising on embankment to pass over Baker Street on a structure at approximately +36m AOD (10m AGL).

6.3.9. A direct link has been provided onto the A13 from the Orsett Cock roundabout. The A13 eastbound has been designed to remain on the current alignment.

6.3.10. The A13 eastbound to A1089 southbound link has been designed to remain on the current alignment.

6.3.11. The A13 eastbound to Orsett Cock roundabout has been designed on a modified alignment. The highway is elevated on embankment and structure over the Project route to the A13 eastbound link, at approximately +34m AOD (2.5m AGL), and in cutting under Rectory Road, at approximately 7m BGL.

6.3.12. The A13 westbound has been designed to remain on the current alignment.

6.3.13. A link has been designed to directly connect the A13 westbound onto the Project route northbound. The link road is elevated on embankment rising to:

a. A bridge over the A13 westbound to the Project southbound link at approximately +32.5m AOD (approx. 6m AGL).

b. On embankment, rising towards Baker Street.

c. On viaduct over Baker Street, the Project, the A1089 and the A1089 to the Project link, at a maximum height of approximately 36m AOD (approx. 9m AGL).

d. The highway then descends into cutting under the A13 and Stifford Clays Road (maximum depth approximately 10m BGL).

6.3.14. A link is proposed to directly connect the A13 westbound onto the Project route southbound. The highway is in cutting, of up to 9m depth, passing under the Orsett Cock roundabout to the A13 westbound slip.

6.3.15. A link has been designed to connect the A13 westbound onto the A1089 southbound, via the Orsett Cock roundabout. The highway is elevated on embankment, passing over the A13 to Project route southbound links, Baker Street and the Project route.

6.3.16. The A1089 northbound to A13 westbound and eastbound links are proposed to remain on the current alignment.

6.3.17. A link has been provided from the A1089 directly onto the Project route northbound. The highway starts at grade, descending into cutting under the A13, returning to grade at Green Lane, with a maximum depth of approximately 8m BGL.

6.3.18. A link has been provided from the A1089 directly onto the Project route southbound. The highway starts in cutting, rises on a structure to a maximum height of approximately +31.5m AOD (6m AGL) as it passes over the Project route before descending into cutting.

6.3.19. The Orsett Cock roundabout to the A13 eastbound is proposed to remain on the current alignment.

6.3.20. The Orsett Cock roundabout to the A13 westbound is proposed to be changed on a modified alignment. The highway has been designed to be in cutting passing under Rectory Road (maximum depth approximately 8m BGL) before rising to pass over the A13 westbound to the Project route northbound and southbound.

6.3.21. The Orsett Cock roundabout to A1013 westbound is proposed to remain on a modified alignment, also providing a link to Rectory Road, Bakers Street and Heath Road. The highway is mostly at grade, rising to pass over the Project and the A1089 at approximately +36m AOD (8m AGL).

6.3.22. A link has been designed to connect from the A13 Orsett Cock roundabout to the A13 westbound slip road directly onto the A1089 southbound. The highway is elevated on embankment, passing over the A13 to Project route southbound links, Baker Street and the Project route, at a maximum height of approximately +34m AOD (8m AGL).

6.3.23. No direct connections have been provided from the Project route to the A13 westbound or to the A1089 southbound.

6.3.24. No direct connections have been provided from the A13 eastbound to the Project route.

6.3.25. As part of the works, Long Lane has been designed to be realigned to join the A1013 west of its bridge over the A1089 to Project route northbound connection at a left-in and left-out only T-junction. Heath Road is proposed to be diverted to join the A1013 west of its bridge over the Project route and east of its existing bridge over the A1089.

6.3.26. Hornsby Lane has been designed to be stopped up where it crosses the Project route.

6.3.27. The A1013 Stanford Road existing bridge over the A1089 has been replaced. Three new bridges have been provided on the route of the existing road:

a. One over the Project route

b. One over the connection from A1089 northbound to Project route northbound as part of the A13 junction works

c. One over the A13 westbound to Project route southbound connection

6.3.28. The section of the A1013 Stanford Road either side of its junction with Rectory Road has been realigned to the south for about 800m and raised slightly to accommodate the realigned Orsett Cock roundabout westbound on-slip and replacement Rectory Road bridge over the A13.

6.3.29. Baker Street has been realigned for about 400m to run on the east side of the Project route north from a new junction with the A1013 Stanford Road east of the A1013 bridge over the Project route. The route is proposed to pass under the A13 to the Project route northbound connection and the Orsett Cock roundabout to the A1089 southbound slip road before rejoining the existing road south of the existing bridge under the A13 main road which has been unaltered.

6.3.30. The Rectory Road crossing of the A13 has been designed with a new bridge on the line of the existing road. The new bridge has been raised to cross the realigned slip roads connecting the A13 to the Orsett Cock roundabout.

6.3.31. Stifford Clays Road has been realigned to the south of the existing route for about 600m and raised by about 7m AGL to cross over the Project route and connections from the A13 westbound and the A1089 northbound to the Project route northbound and the Project route southbound to the A13 eastbound (which are in cutting at this point).

6.3.32. Green Lane has been realigned to the north of the existing route for about 600m and raised by up to 11m AGL to cross over the Project route.

Illustrative view looking north from the A13 Junction

Existing view from Blackshots

Existing view from Baker Street

6.4. Preliminary Design: utility works

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

6.4.2. Significant works within this area include the diversion of two electricity networks from Hornsby Lane, west of the A13 junction and north beyond Green Lane via the construction of pylons and overhead powerlines. To facilitate these works temporary diversions of the overhead powerlines onto temporary pylons are required to maintain supply during the installation of the new permanent assets.

6.4.3. One high pressure pipeline has been designed to be diverted around the junction as part of the works required including the relocation of an integral valve required for operation and maintenance of the network. To enable this a compound has been proposed along Stanford Road.

6.4.4. The Project proposal includes the undergrounding of multiple local overhead electricity and telecommunications networks and the removal of the associated poles to subsequently open up views of the local areas. The visual benefits of this can be found in the Environmental Statement (Application Document 6.1, Chapter 7: Landscape and Visual).

6.4.5. 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 in the landscape

6.5. Preliminary Design: landscape

6.5.1. Key proposed landscape components in the A13 Junction area are described below.

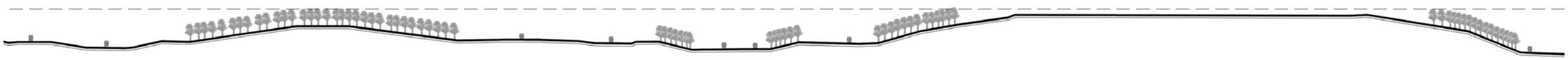
1. Wooded ridge

6.5.2. The existing A13 dual carriageway runs south-west to north-east along a low ridge across the Project route. Existing planting associated with and close to the A13 gives it the appearance of a wooded ridge as seen from the north and south.

6.5.3. Therefore, woodland planting has been designed to envelop the proposed A13 junction and fill in the junction parcels and is proposed to build upon the wooded ridge landscape feature created. The current vegetated A13 corridor helps to mitigate the visual impacts of the junction for residents whilst creating a distinctive character through the junction for road users.

Illustrative plan showing location of cross section AA cut

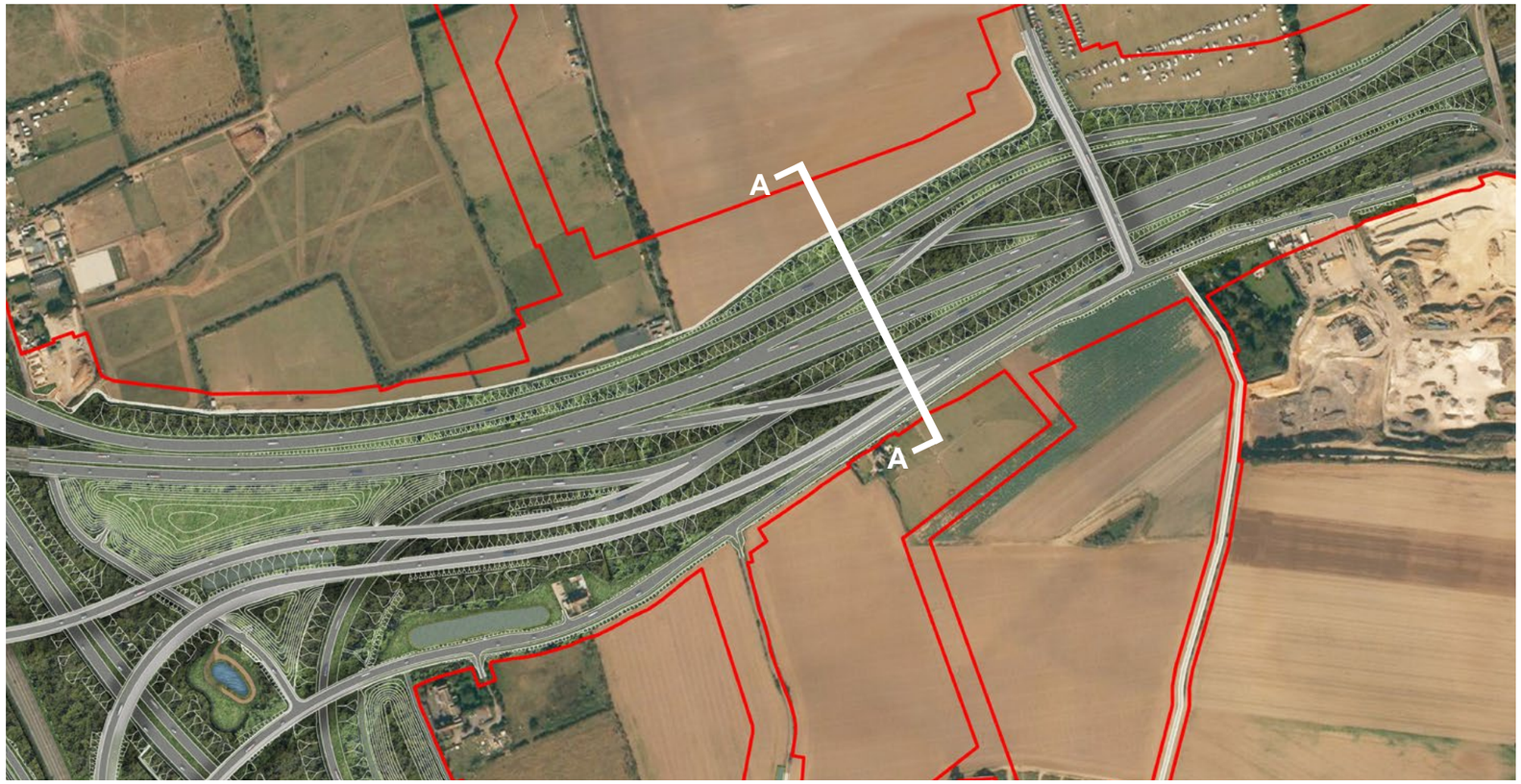
Existing wooded ridge



Illustrative cross section AA demonstrating the level of woodland planting within the junction

6.5.4. Excavated material has been placed within the A13 Junction islanded parcels at varying heights. Therefore within some land parcels, woodland planting has only been proposed around the periphery of the earthworks, and scrub grassland at the top of the earthworks. Once the woodland fully matures, the woodland will appear at a uniform height across the entire junction.

Illustrative cross section AA through the A13 Junction continuing the wooded ridge



Illustrative plan showing location of cross section AA cut

2. Ron Evans Memorial Field

6.5.5. To the south-west of the A13 junction, the Preliminary Design includes replacement land adjacent to the existing Ron Evans Memorial Field that has been lost to the proposed junction. Ron Evans Memorial Field is a designated public open space located to the west of Baker Street and the A1089 and to the south of the A13. The Field is well used by members of the local community for informal recreational purposes such as walking and off-road cycling. There are a number of formal and informal footpaths passing through it, including footpath 97 from Long Lane, which provides the main access to the Field. The landscape has been designed to match the existing site in character and allow for the spaces to interlink together and function as one.

Illustrative view from Ron Evans Memorial Field looking towards the A13 Junction

6.6. Preliminary Design response summary to the 10 Principles of Good Design

6.6.1. Some examples of how the proposed design of the A13 Junction responds to the 10 Principles of Good Design are described below:

Fits in context

6.6.2. In accordance with the overarching objective of creating a wooded character to the major junctions on the Project route, the Preliminary Design of the A13 junction has been designed to draw from the existing wooded ridge character of the surrounding landscape and maximise woodland planting within the land parcels in the junction.

6.6.3. The land surrounding the A13 junction has also been included within the landscape design to maximise the extent of woodland planting and emphasise the wooded ridge.

Is restrained/is innovative

6.6.4. Particular care has been taken at the A13 Junction to integrate noise and visual mitigation in the landscape design through the use of earthworks (such as false cuttings) to lessen these effects (see the Environmental Statement, Application Document 6.1, Chapter 7: Landscape and Visual). However, there are many constraints in the area so, where the Project has sought to limit the land-take for these measures, hedgerow and/or woodland planting is proposed in conjunction with more engineered solutions such as reinforced earth slopes at Baker Street and acoustic barriers further to the south.

Makes roads understandable

6.6.5. Given the complex nature of the proposed A13 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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