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Cable Tunnel Replacement
Project

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Ecological Appraisal

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National Grid TKRE

Preliminary Ecological Appraisal

National Grid

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1. Executive Summary

Site Details	Name: National Grid TKRE Location: Tilbury Power Station, Tilbury (RM18 8UL) and Metropolitan Training Grounds, Gravesend (DA12 2HN) Size: Gravesend Site (32.3ha), Tilbury Site (40.84ha) Both Sites are in close proximity to the River Thames, with the Tilbury Site on the north bank of the River and the Gravesend site on the south bank. Both Sites primarily comprised of tussocky semi improved grassland, with areas of scrub. The Tilbury Site has a large gravel lake to the north east of Site, and has a large, elevated plateau which features a combination of short ephemeral, bare ground and grassland habitats. The Gravesend Site has a central strip of amenity grassland which is used as part of the rifle range. Strips of marshy grassland are located to the north of this block of amenity grassland and a large block of scrub vegetation is located in the north east corner of the Site.
Scheme Details	The National Grid TKRE 400kV circuits are currently predominantly overhead line, with a cable section installed within a deep tunnel crossing beneath the River Thames. As the Transmission Licence Holder with responsibility for the TKRE circuits, National Grid Electricity Transmission is assessing approaches to upgrade the existing circuits. The preferred option is understood to be a new cable tunnel parallel to the existing. However, the scope of the PEA covered a larger area in order to provide an indication of the ecological constraints and opportunities associated with the wider local area. It is understood that ground investigation may be required in advance of the main works.
Ecological Features that may be affected by the Scheme	Both of the sites are located in close proximity to the Thames Estuary and Marshes Ramsar/Special Protection Area (SPA) designated for floodplain and costal habitats, as well as the associated assemblage of waterfowl and wading birds that use the area. The Gravesend site is located within the Canal and Grazing Marsh, Higham Local Wildlife Site which is designated for its grassland habitats. The Tilbury Site is located within parts of the Tilbury Power Station Local Wildlife Site, which is designated for its invertebrate and vegetation assemblage. This Local Wildlife Site is understood to be currently in the process of being notified as a Site of Special Scientific Interest (SSSI). The Tilbury Site contains a mixture of scrubland, grassland and short ephemeral vegetation, concentrated on the western side of the Site. A large plateau sits within the centre of the Site and supports an open mosaic habitat consisting of bare ground and short ephemeral vegetation. Three ditches; one located on the west of the Site, one running adjacent to the haul road and one running up the centre of the Site are present, as is a large former gravel pit that currently supports a shallow lake. The Gravesend Site contains a single ditch running along the southern edge of the Site with a line of trees running alongside it. Most of the Site consists of semi improved grassland, but a small lane of amenity grassland is maintained as part of the function of the rifle range. Strips of scrub and marshy grassland are present in the northern areas of the Site, and a bare ground path runs through the centre of the Site.

Recommendations for further survey and assessment		
Feature	Recommendation	Timing
Thames Estuary & Marshes (Ramsar Site and Special Protection Area)	Habitat Regulations Assessment will be required to consider potential for effects on the nearby Thames Estuary and Marshes SPA and Ramsar. This should include consideration of ground investigation works. Wintering bird surveys are being undertaken to inform the assessment and it is possible noise modelling will also be required.	Initial HRA to be undertaken prior to commencement of ground investigation works.
Tilbury Power Station LWS (and proposed SSSI)	Further consultation is required with Natural England to determine the proposed boundary of the proposed SSSI, and potential impact on features for which this site is to be designated. The area to be covered by the SSSI designation should be avoided, or if not possible impacts minimised and appropriate reinstatement specified.	Undertake as soon as possible to inform design process.
Canal and Grazing Marsh, Higham LWS	Minimise extent and duration of works within the LWS.	Undertake as soon as possible to inform design process.
Habitats	National Vegetation Classification (NVC) survey of both sites is recommended to fully characterise the grassland communities on Site	Single visit between May and September
Badger	Undertake further badger survey at Tilbury to characterise the setts at Tilbury. Seek to avoid works within 30m of identified setts.	No seasonal constraint
Bats	Undertake bat activity transects across both Sites concentrating on the areas of grassland, scrubland and marginal vegetation should be carried out on both the Gravesend and Tilbury Sites. Emergence/re-entry surveys on the substation building (Tilbury) and the high potential bat roost tree (Gravesend).	One survey per month at each site between April and September Late April to September Three emergence/re-entry surveys on the bat roost tree. A single emergence/re-entry on the substation building.
Water Voles and Otters	Water vole and otter surveys on both Sites looking for field signs such as latrines, holts/burrows, feeding remains, footprints as well as sightings and soundings along the four ditches on Site (three on Tilbury and one in Gravesend).	Two visits between April and September
Wintering Birds	Surveys are already taking place to determine the use of habitats and surrounding habitats by overwinter species of bird.	November to March
Breeding Birds	A series of five visits should be undertaken at monthly intervals to allow the value of the site for breeding birds to be established and confirm requirements for mitigation/compensation	March to July
Great Crested Newt	An eDNA survey and single survey using traditional survey techniques (e.g. torch light survey) should be carried out on each of the suitable waterbodies within 250m of the Site. A series of six great crested newt surveys should be carried out if presence is confirmed within the waterbodies to determine the presence or absence of breeding great crested newts. These surveys should include a mixture of torch surveys, egg searches, bottle trapping and netting to help determine the presence of the species.	Late April to end June. Mid-March to mid-June.
Reptiles	A series of seven reptile surveys should be carried out on both sites to determine the presence or absence of reptiles. Should reptiles be found on Site then further surveys (up to 20) may be required to determine population size.	April/May or September/October
Terrestrial Invertebrates	Two or three survey visits to be carried out by suitably qualified entomologists after liaison with Natural England to determine the makeup of the invertebrate assemblage, and identify any species that need additional protection during works.	April to September
Fish	No further surveys required assuming that no works within watercourses.	-

Marine Mammals	Marine ecologist to review proposals for any marine GI to identify any requirement for further survey, mitigation or monitoring	Prior to commencement of marine GI works.
Invasive non-native plant species	Walkover survey to check if any invasive non-native species are present.	April to September
Construction and Environment Management Plan (CEMP)	A CEMP informed by the surveys carried out as well as the Habitat Regulations Assessment will cover protection of ecological features and sensitive working methods.	Prior to construction
Biodiversity Net Gain Calculation	When an initial scheme design is available it is recommended that a biodiversity net gain calculation is undertaken to establish the likely change in biodiversity units and establish the requirements for compensation	Prior to planning/consenting
Recommendations for Mitigation	Further liaison with Natural England and other relevant stakeholders should be undertaken in order to minimise impacts of the work on the existing Ramsar/SPA. Wherever possible works should aim to avoid direct impacts on the areas of the Tilbury Site which are to be designated as a SSSI. The results of the surveys and liaison mentioned above will help determine what, if any, European Protected Species Licence are needed to commence activities associated the proposed development. These surveys will also inform any compensation, enhancements and mitigation required on Site. A Precautionary Method of Working (PMoW) will be produced that details methods to protect protected and notable species during ground investigation works and while the works are being carried out.	
Opportunities for Biodiversity Enhancement	Opportunities for biodiversity enhancement will be explored further in liaison with Natural England and other relevant stakeholders once further baseline surveys have been undertaken. This may include natural revegetation, or seed harvesting from retained habitat to aid revegetation of impacted areas. In addition opportunities will be explored for enhancing retained habitats through sensitive ongoing management. The proposed new cable tunnel is likely to generate a significant volume of arisings, and the potential for this material to be utilised for habitat creation in the wider local area should be explored	

2. Introduction

2.1 Background

This Preliminary Ecological Appraisal report (PEAR) has been prepared by AECOM on behalf of National Grid, to assess the ecological constraints in connection with the proposed 400kv cable tunnel upgrade from Tilbury to Grain and Tilbury to Kingsnorth (TKRE) (hereafter referred to as the Scheme). The Scheme is for an upgrade for the TKRE circuits crossing the River Thames located between Tilbury, Essex, and Gravesend, Kent, as shown by the red line boundary in Figure 1.

The assessment of ecological constraints has been undertaken with reference to current good practice¹ and forms part of the technical information commissioned by National Grid in connection with the Scheme. The PEAR addresses relevant wildlife legislation and planning policy as summarised in Appendix B and is consistent with the requirements of *British Standard 42020:2013 Biodiversity. Code of Practice for Planning and Development*.

This PEAR is intended for advice in respect of Scheme design, site layout and / or site investigation. Further ecological surveys and / or ecological impact assessment (including detailed mitigation measures) may be required in connection with a planning application or to contribute to an Environmental Impact Assessment once the Scheme proposals have been finalised and any required surveys have been completed.

2.2 The Site

The PEAR covers two distinct works sites located on opposite banks of the River Thames as follows (see Figure 1):

2.2.1 Tilbury Site

The area north of the river (hereafter referred to as the Tilbury Site) is located in Tilbury in the borough of Thurrock, Essex at grid reference TQ 66397 75618 and is approximately 40.84 ha in size. The land on the Tilbury Site is a mixture of in-use and disused industrial grounds. The western parts of the Site include grassland, scrubland, bare ground, ditches and short ephemeral vegetation. The eastern parts of the Site consist of bare ground with no vegetation and large areas of unconsolidated sandy/silty soils.

The Site is surrounded by an industrial and agricultural landscape with the River Thames adjacent to the south. The wider landscape includes Tilbury town to the north-west of the Site.

2.2.2 Gravesend Site

The area to the south of the river (hereafter referred to as the Gravesend Site) is located in Gravesend, in the borough of Gravesham, Kent at grid reference TQ 67659 74153. The habitats on Site include grassland, scrubland, bare ground, ditches and marshy grassland. The majority of the Site is within Milton Rifle Range, with the wider landscape consisting of agricultural fields, and an industrial area. The main town is located to the west. The River Thames adjoins the northern boundary and the Thames and Medway Canal runs along the south boundary.

2.3 The Scheme

The National Grid TKRE 400kV circuits are currently predominantly overhead line, with a cable section installed within a deep tunnel crossing beneath the River Thames. As the Transmission Licence Holder with responsibility for the TKRE circuits, National Grid Electricity Transmission is assessing approaches to upgrade the existing circuits.

It is understood that the current proposal is for the installation of new cables within a new tunnel and associated infrastructure installed adjacent to the existing tunnel. However, the PEAR covers a larger area both north and south of the River Thames in order to provide ongoing flexibility in design.

¹ CIEEM (2017). *Guidelines for Preliminary Ecological Appraisal, 2nd edition*. Chartered Institute of Ecology and Environmental Management, Winchester.

2.4 Purpose of the Preliminary Ecological Appraisal

This PEAR presents ecological information obtained during the following:

- A desk-study undertaken on 30th November 2022 to obtain records of designated sites, notable habitats² and protected and notable species³ within 2 km of the Site (the area covered by the desk study is hereafter referred to as the Study Area); and,
- A walkover survey of accessible land within and adjacent to the Site (the area covered by the survey is hereafter referred to as the Survey Area) over several days in November 2022.

The purpose of the PEAR is to provide a high-level ecological appraisal of the Site, specifically to:

- establish baseline conditions and determine the presence of Important Ecological Features (IEF)⁴ (or those that could be present), as far as is possible;
- to identify potential ecological constraints to the Scheme and make initial recommendations to avoid impacts on IEFs, where possible;
- to identify requirements for mitigation, where possible, including mitigation measures that will be required and those that may be required (depending on results of further surveys or final scheme design);
- to establish any requirements for more detailed surveys; and,
- to identify any opportunities offered by the Scheme to deliver biodiversity enhancements.

The methodology followed for undertaking the desk study and field surveys is detailed in Appendix C, including any limitations to the assessment.

²Notable habitats are taken as principal habitats for the conservation of biodiversity listed under Section 41 of the *Natural Environment and Rural Communities Act 2006*; habitats listed under the Essex Biodiversity Action Plan and the Kent Biodiversity Strategy; hedgerows identified as being 'important' under the wildlife criteria of the *Hedgerow Regulations 1997*, ancient woodlands and veteran trees.

³Notable species are taken as principal species for the conservation of biodiversity listed under Section 41 of the *Natural Environment and Rural Communities Act 2006*; any species listed in an IUCN Red Data Book; and any other species listed under the Essex Biodiversity Action Plan and the Kent Biodiversity Strategy.

⁴ Important Ecological Features are habitats, species, ecosystems and their functions and processes that are of conservation importance and could potentially be affected by the Scheme.

3. Ecological Baseline, Constraints and Recommendations

The following sections detail the results of the desk and field-based studies undertaken to inform this PEAR. Where necessary, recommendations for mitigation measures to protect known IEFs, or further surveys to determine the presence or likely absence of likely IEFs, are provided.

With regard to background data, 'recent' records are considered to be those no older than 10 years from the date of the desk study. Records outside of this period are historical and have only been reported where more recent records for a feature do not exist. Exceptions to this are detailed in the appropriate sections below. Designated Sites

3.1 Designated Sites

3.1.1 Desk Study

There are 3 sites with an international designation based on their importance for nature conservation within 10km of the Site and two sites with a statutory designation within 2km of the Site. There are six non-statutory-designated sites within 1km of the Tilbury and Gravesend sites.

Table 1 summarises the statutory and internationally designated sites situated within the Study Area while Table 2 summaries the non-statutory sites within the Study Area.

Table 1. International and Statutory Designated Sites for Nature Conservation

Designated Site	Reason for Designation	Distance from Tilbury Site ⁵	Distance from Gravesend Site
Internationally Designated Sites			
Thames Estuary & Marshes (Ramsar Site and Special Protection Area)	The site consists of coastal, estuary, floodplain, and intertidal habitats, hosting a range of internationally significant overwintering birds such as pied avocet (<i>Recurvirostra avosetta</i>).	1.9km east	0km east (adjacent)
North Downs Woodlands (Special Areas of Conservation)	The site consists of mature Asperulo-Fagetum beech forests and yew (<i>Taxus baccata</i>) woods within a mosaic of scrub and other woodland types. The site also contains semi-natural dry grasslands and scrubland facies on calcareous substrates which is an important orchid site.	10km South	8.5km South
Medway Estuary & Marshes (Ramsar Site and Special Protection Area)	The site is a wetland of international importance comprising grazing marshes, intertidal flats and saltmarshes, providing breeding and wintering habitats for important assemblages of wetland bird species.	11.4km south-east	9.8km south-east
Statutory Designated Sites			
South Thames Estuary and Marshes Site of Special Scientific Interest (SSSI)	The site consists of an extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of the north Kent marshes.	1.6km south	0.5km south
Mucking Flats and Marshes SSSI	The site comprises an extensive stretch of Thames mudflats and saltmarsh together with sea wall grassland. Wintering wildfowl and waders reach nationally and internationally important numbers here, roosting and feeding on adjacent saltmarsh and disused silt lagoons.	1.9km east	2.0km north-east

⁵Where designated sites are situated outside of the Site boundary, the distance and direction is given at the closest point of the designated site from the Site

Table 2. Non-Statutory Designated Sites for Nature Conservation

Designated Site	Reason for Designation	Distance from Tilbury Site ⁶	Distance from Gravesend Site
Canal and Grazing Marsh, Higham Local Wildlife Site (LWS) (60.57ha)	Coastal and floodplain grazing marsh is found on low-lying coasts and along slow-flowing rivers and estuaries. Some 500 plants have been recorded from the most diverse grazing marshes, but these comprise just 5% of grazing marshes - most have been agriculturally 'improved' and are of limited botanical interest. Perennial rye-grass (<i>Lolium perenne</i>), Yorkshire fog (<i>Holcus lanatus</i>) and rushes tend to dominate the sward, enlivened by damper patches of floating sweet-grass (<i>Glyceria fluitans</i>), creeping bent (<i>Agrostis stolonifera</i>) and silverweed (<i>Argentina anserina</i>).	1.3km south-south east	On site
Low Street Pit LWS (3.6ha)	A site that lies on regionally important Thames terrace gravel. Remnants of old grassland with a diverse invertebrate community associated with the site, including hornet robberfly (<i>Asilus crabroniformis</i>) a national BAP species.	1.6km north-east	3.0km north
Tilbury Marshes LWS(40.5ha)	Relict grazing-marsh, brackish ditches, outer moats and grasslands at Tilbury Fort. The Site supports many Nationally Scarce plant species and important invertebrate communities.	0.5km west	2.0km north-west
Tilbury Power Station LWS (48.8ha)	A large, multi-site designation that encompasses a number of previously designated sites including Lytag Brownfield, Tilbury Centre and Goshems Farm. The sites are of importance for their coastal grazing marshes, post-industrial sites and hotspots for reptile diversity. The habitat also supports key invertebrate communities.	On site	1.3km north
West Tilbury Church LWS (0.5ha)	Ancient grassland beyond a privately owned church with nationally restricted plant assemblages including Wild Clary (<i>Salvia verbenaca</i>) and Lesser Calamint (<i>Clinopodium calamintha</i>).	1.6km north	3.7km north-west
West Tilbury Hall LWS (1.6ha)	A river terrace slope site selected for the lowland dry acid grassland habitat of principal importance and diverse invertebrate fauna including nationally rare Bryony Mining Bee (<i>Andrena florea</i>)	1.6km north	3.7km north-west

The Tilbury Site includes part of the Tilbury Power Station LWS, which is designated for its invertebrate and vegetation assemblage. This LWS is understood to be currently in the process of being notified as a Site of Special Scientific Interest (SSSI).

3.1.2 Field Survey

Summary descriptions of the designated sites within the Survey Area are provided below and shown in Figure 1, with specific features highlighted by target notes (TN). TN descriptions and photographs are provided in Appendix D. Further habitat descriptions are provided in Section 3.2.

3.1.2.1 Tilbury Site

Part of Tilbury Power Station LWS is located within the Tilbury Site. In 2003 planning consent was granted for the restoration of the former waste disposal site. The habitat on Site is a mixture of grassland, short ephemeral vegetation and scrub.

⁶Where designated sites are situated outside of the Site boundary, the distance and direction is given at the closest point of the designated site from the Site

3.1.2.2 Gravesend Site

The Gravesend Site is within Canal and Grazing Marsh, Higham LWS and is directly adjacent to the South Thames Estuary and Marshes SSSI and Thames Estuary and Marshes Ramsar Site. The habitat on Site consists of tussocky semi improved grassland and areas of scrub, with marshy grassland present along the ditches as per the descriptions of the designated Site provided by the Kent Biological Records Centre and Natural England.

3.1.3 Constraints and Recommendations

Due to the proximity of both sites to the Thames Estuary and Marshes Ramsar and SPA, both proposed ground investigation works and the proposed construction of the new cable tunnel will require the 'competent authority' to carry out a Habitats Regulations Assessment (HRA) to test if the project could significant harm the features for which these sites are designated.

The areas of foreshore habitat along the banks of the River Thames which directly adjoin the Tilbury and Gravesend sites are potentially suitable to support the overwintering assemblage of waders and waterfowls for which the Ramsar and SPA are designated. Because of the suitability and linkage of habitats the works associated with the construction on Site may potentially impact these bird populations and by extension the Ramsar and SPA sites. On that basis there is a need for further winter bird surveys and subsequent assessment to quantify the potential effect of the works (including GI) on the Ramsar/SPA and associated populations. Modelling of noise data may be required to establish the extent of any disturbance impacts on birds when works are undertaken.

As a statutory undertaker National Grid will be considered the 'competent authority' for the Likely Significant Effects Test stage of HRA. However, it is recommended that Natural England are allowed to comment on the outcomes of the assessment. In the event that a likely significant effect is expected (in the absence of mitigation) and the HRA process progresses to an Appropriate Assessment then there would be a formal requirement to consult with Natural England.

Part of Tilbury Power Station LWS is scheduled to be notified as a SSSI. It is understood the main reason for its designation will be the importance of the invertebrate populations it supports. While the boundary of the proposed SSSI has not been confirmed it is understood the areas of greatest invertebrate interest are within the restored plateau area to the west of the Site. Liaison with Natural England and the Port of Tilbury (landowners) will be required to assess the potential impact of the works on the area covered by the pending SSSI designation. The design should aim to avoid direct impacts in the area proposed for SSSI designation where possible, and where that cannot be achieved the extent and duration of works should be minimised and working areas reinstated after works.

Planning permission has already been approved for the restoration of the area of Goshems Farm that is within the eastern section of the Tilbury Site. The consented development has an approved environmental method statement⁷. The Client should liaise with Thurrock Council to ensure that works undertaken within the Local Wildlife Site follow the approved environmental method statement.

Canal and Grazing Marsh, Higham LWS is covered under the Gravesham Local Plan⁸ Policy CS12: Green Infrastructure. This states that there will be no net loss of biodiversity in the borough and opportunities to enhance, restore, recreate and maintain habitats should be sought. Surveys for Biodiversity Net Gain should be undertaken prior to works commencing to ensure the Scheme does not result in a net loss of biodiversity. The works should be undertaken under an environmental method statement or similar which details replanting to improve biodiversity.

Methods of reducing impacts to the designated sites (e.g. noise disturbance, light and dust pollution) should be detailed in a Construction and Environmental Management Plan.

⁷ Goshems Farm. <https://www.ingrebournevalley.com/site/> [Accessed 19/12/2022]

⁸ <https://www.gravesham.gov.uk/local-plan-policy>

3.2 Habitats

3.2.1 Desk Study

3.2.1.1 Tilbury Site

The desk study returned records of coastal saltmarsh and mudflats adjacent to the south boundary of the Tilbury Site along the south of the Site adjacent to the River Thames. Both of these are identified as habitats of principal importance listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act, 2006.

3.2.1.2 Gravesend Site

The Gravesend Site was recorded as being part of an area of Coastal and Floodplain Grazing Marsh, with intertidal mudflats present along the north of the Site along the River Thames. Both of these are identified as habitats of principal importance listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act, 2006.

3.2.2 Field Survey

Summary descriptions of the habitats within the Survey Area are provided below in Table 3 and Table 4, and shown in Figure 1, with specific features highlighted by TNs. TN descriptions and photographs are provided in Appendix D.

3.2.2.1 Tilbury Site

Table 3. Description of habitats on the Tilbury Site

Habitat	Brief Description	Area (hectares)	% area of the Site
Bare ground	A strip of western block of bare ground runs along the western ditch on Site. The eastern half of the Site consists of bare ground currently under construction.	13.2	32.5%
Scrub	Three blocks of scrub; one within the western grassland, one in the south west corner of Site, and one running along the western and southern slopes of the plateau, were recorded on Site.	11.56	29%
Semi-improved Grassland	Three blocks of semi-improved grassland; one running along the west of the Site, one running along the southern section of Site, and one located on the northern edge of the plateau, were recorded on Site.	9.63	23.5%
Hardstanding	Hard standing area consisting of a former car park and the haul road runs from east to west across the centre of the Site.	3.19	7.5%
Ephemeral/short perennial	Small patches of ephemeral and short perennial vegetation growing through areas of previously bare ground	2.04	5%
Standing water	Gravel lake within the construction site, fenced off. Additionally, several ditches within the grassland containing standing water with areas of tall fen species.	0.87	2%
Introduced Shrub	A block of buddleia (<i>Buddleia davidii</i>) dominated scrub was present on the western edge of the Site north of the car park	0.34	0.5%

Semi-improved grassland

Three blocks of semi-improved grassland; one running along the west of the Site, one running along the southern section of Site, and one located on the northern edge of the plateau in the centre of the Site, were recorded on Site.

All three grasslands contained a mix of false oat grass (*Arrhenatherum elatius*), red fescue (*Festuca rubra*) and cock's foot grass (*Dactylis glomerata*). The western grassland contained frequent cow parsley (*Anthriscus sylvestris*) and scentless mayweed (*Tripleurospermum inodorum*) with occasional hawkbit (*Leontodon* species) and fennel (*Foeniculum vulgare*) also present. The grassland running along the south of the Site featured frequent red clover (*Trifolium pratense*) and occasional hawkbit and tufted vetch (*Vicia caracca*). The grassland on the north side of the plateau featured occasional fennel, red clover and hawkbit.

Bare ground

The eastern half of the Site consisted of bare ground that was subject to major earth works to reprofile the area. No vegetation was present on this block of habitat.

The bare ground located along the edge of the ditch in the west of the Site consisted of 85% of bare ground, with the remaining 15% consisting of occasional mugwort (*Artemisia vulgaris*) and rare examples of sea beet (*Beta vulgaris*).

Dense scrub

Three blocks of scrub; one running along the west of the Site, one running along the southern section of Site, and one located on the northern edge of the plateau in the centre of the Site, were recorded on Site.

All three blocks of scrub were dominated by a thick covering of bramble (*Rubus fruticosus* agg.). The block of scrub featured frequent mugwort and occasional fennel and hogweed (*Heracleum spondylium*). The scrub within the south west corner of the Site included frequent blackthorn (*Prunus spinosa*) and occasional hawthorn (*Crataegus monogyna*). The scrub running along the base of plateau included occasional dog rose (*Rosa canina*), dogwood (*Coronus sanguinea*) and hawthorn.

Ephemeral/short perennial

A block of short ephemeral vegetation was present within the southern half of the plateau. Approximately 60% of the habitat consisted of bare ground. The remaining 40% of vegetation consisted of frequent scentless mayweed and occasional dandelion (*Taraxacum officinale* agg.) and narrow leaved ragwort (*Senico inaequidens*). Rare specimens of non-native pampas grass (*Cortaderia stelloana*) were present within this habitat.

Standing water

A flooded gravel pit was located in the north-east corner of the site, and is mostly outside the Site boundary, within the construction site. This body of water is currently fenced off to avoid it being damaged from the adjacent construction work and is being used by a population of wildfowl including moorhen (*Callinua chloropus*), mute swan (*Cygnus olor*) and little egret (*Egretta gazetta*) as well as birds associated with wetlands such as marsh harrier (*Circus aeruginosus*).

Hardstanding

An area of hard standing area, previously used as a car park, and a haul road with a thin layer of discarded ceramic, rocks and other building debris ran from east to west of the centre of the Site. This area also contained the disused single storey sub-station building.

3.2.2.2 Gravesend Site

Table 4. Description of habitats on the Gravesend Site

Habitat	Brief Description	Area (hectares)	% area of the Site
Semi-Improved Grassland	The majority of the site consists of semi-improved grassland that is managed infrequently.	26.8	82.5%
Amenity Grassland	A strip of improved grassland managed frequently to keep the sward height short year-round for shooting.	2.61	8.5%
Scattered scrub	Scattered scrub is present in the north-east corner of the site with small clusters of shrubs throughout the semi-improved grassland.	1.35	4.5%
Hard Standing	Hard standing area consists of paths running across the south and centre of the Site.	1.12	3.5%
Marshy Grassland	A damp strip of grassland is present to the north of the block of amenity grassland.	0.39	1%
Buildings	A substation is already present in the south-south west of the Site	N/A	N/A
Running water	Ditch with flowing water running along the southern edge of the site.	N/A	N/A
Line of Trees	A line of trees runs along the southern bank of the ditch on Site.	N/A	N/A

Semi-Improved grassland

A block of grassland dominated by red fescue with frequent false oat grass was present across the majority of the Site. This grassland also featured occasional instance of creeping cinquefoil (*Potentilla reptans*), marsh thistle (*Cirsium palustre*) and Alexanders (*Smyrniololium olusatrum*).

Marshy Grassland

A strips of marshy grassland dominated by common reed (*Phragmites australis*) with occasional immature willow (*Salix* sp.) and rare dog rose and hawthorn was present within this block of habitat.

Amenity Grassland

A large rectangular strip of grass is heavily managed for the site's use as a shooting range. The grass is kept low by being frequently mown. This area of grassland has minimal diversity and is dominated by perennial rye grass (*Lolium perenne*)

Scattered scrub

The scrub is dominated by bramble with occasional dog rose (*Rosa canina*), common reed and hawthorn growing within this block of vegetation.

Buildings

An existing sub-station is located into the south western corner of the Site. This sub-station is surrounded by a metal fence to prevent trespass.

Line of Trees

A line of trees that included blackthorn (*Prunus spinosa*), willow, apple (*Malus domestica*) and hawthorn was present growing along the southern edge of the ditch.

Running water

A ditch runs along the southern and western end of the site and curves round past the western extent of the Site where it joins the River Thames. The ditch is well sheltered and full of vegetation dominated by common reed.

3.2.3 Constraints and Recommendations

National Vegetation Classification (NVC) survey of both sites is recommended to fully characterise the grassland communities on Site, including the presence/distribution of any rare or protected/notable species. The NVC surveys should be carried out between April and September during the main growing season of plants. These surveys will help to inform the ongoing design and promote avoidance and mitigation in order to minimise the impact of the works.

A Construction and Environmental Management Plan (CEMP), or similar, should be produced to detail this, as well as methods of working required to prevent contamination of nearby waterbodies.

When a preliminary design for the Proposed Development has been developed, an initial Biodiversity Net Gain (BNG) calculation should be undertaken to quantify any losses in biodiversity that may occur as a consequence of the scheme, and identify any requirements for compensation in order to secure BNG.

The CEMP, or similar, should include working methods to minimise impacts and damage to the surrounding habitats such as controls for noise, air/dust pollution and light spill and the use of hard standing pathways and track matting for vehicles and machinery to avoid damage to grassland and topsoil. The document should also include details for reinstatement of effected habitat upon completion of the works.

3.3 Badger

3.3.1 Desk Study

There is one recent record of badger within 1km of the Tilbury Site from over the last 10 years. Badgers were recorded approximately 200m east of the Site. In addition there are two anecdotal records of setts within the Tilbury site provided by Port of Tilbury.

No other recent records of badger were returned within the Study Area. This data was returned from the Kent & Medway Biological Records Centre who note that more recent records may be held by the East Kent Badger Group and West Kent Badger Group. No badger records have been requested directly from either group.

3.3.2 Field Survey

Table 5 summarises the evidence of badger presence recorded within the Survey Area.

Two subsidiary setts were located within the Tilbury Site along the southern edge of the banks of the plateau in the centre of the Site. No signs of badgers were recorded on the Gravesend Site.

The target note locations can be found in Figure 1 in Appendix A34. Photographs are provided in Appendix D.

Table 5. Summary of Badger presence/ potential presence within the Survey Area

Feature	Site Location	Description of Feature and Location ⁹	Relevant Target Notes
Subsidiary Sett	Tilbury Site	Subsidiary sett consisting of 4 active entrances, all south facing. Fresh spoil was present at the sett entrances with distorted footprints. The sett is currently being monitored using camera traps by another consultancy.	TN1
Subsidiary Sett	Tilbury Site	Subsidiary sett consisting of 2 entrances, one of which may have been made by rabbits. Both entrances are clear of vegetation with recent spoil nearby.	TN2

3.3.3 Constraints and Recommendations

Badgers and their setts are protected from disturbance, damage and destruction by the Protection of Badgers Act (1992)¹⁰.

Badger surveys are recommended to provide additional detail on the setts found on Site. This can be used to inform the works and may also be used to support a Natural England mitigation licence (if required). Natural England has advice for local planning authorities who need to assess the impacts of development on badgers which related to survey effort, mitigation and licencing requirements (DEFRA, 2015)¹¹. Licences for sett closures are only issued for works between July and November to avoid destruction of setts containing breeding females and dependent cubs.

Excavation can impact badgers, with close proximity excavations able to collapse badger setts, and also disturb badgers in their setts. The works occurring within the Site may also alter the foraging areas badgers use, as well as force them to build setts in other locations. The excavations present on Site may also trap badgers, if they are not probably covered, or an escape route isn't provided.

No badger records were reported in the desk study and field survey on the Gravesend Site. No further surveys for badger are recommended on this part of the Site.

Both the desk study and field study returned evidence of badger presence on the Tilbury Site. It is recommended that a 30m buffer zone is established and retained around these setts to avoid disturbance and damage to the setts.

It is recommended that precautionary measures to protect badgers and their habitat are included in a Construction and Environment Management Plan or equivalent. Measures should include:

- ensuring fencing/hoarding allows gaps so badgers can enter and exit the site safely whilst foraging at night;
- storing chemicals in a secure lock-up each night to prevent badgers from exposure to poisons;
- covering up any digging excavations at night so badgers don't fall in and injure themselves;
- minimising the construction footprint so as not to encroach onto the woodland/grassland,

⁹Where features are situated outside of the Site boundary, the distance and direction is given at the closest point of the feature from the Site

¹⁰HMSO. (1992) Protection of Badgers Act.

¹¹ <https://www.gov.uk/guidance/badgers-advice-for-making-planning-decisions> [Accessed: 10/01/2023]

- minimising lighting at night so low-level security lighting doesn't disturb badgers; and
- after development is complete, ensuring badgers are not cut off from the surrounding suitable habitat and landscaping contains wildlife friendly planting, providing shelter and berries.

If it is not possible to avoid impacts upon the setts, the works within 30m of the setts may require a Natural England mitigation licence.

3.4 Bats

3.4.1 Data Search

The desk study returned no records of bats from within a 1km radius of the Tilbury Site from over the last 10 years were returned by the records from the Essex Field Club.

The Kent Biological Records Centre returned records of nine bat species from a 1km radius of the Gravesend Site from over the last 10 years. These species and the number of records associated with them are listed below;

- Twenty-one records of common pipistrelle (*Pipistrellus pipistrellus*);
- Eleven records of soprano pipistrelle (*Pipistrellus pygmaeus*);
- Two records of Nathusius pipistrelle (*Pipistrellus nathusii*);
- Fourteen records of Daubenton's bat (*Myotis daubentonii*);
- Fifteen records of Natter's bat (*Myotis nattereri*);
- Eight records of whiskered bats (*Myotis mystacinus*);
- Eighteen records of brown long-eared bat (*Plecotus auritus*);
- Seven records of noctule bat (*Nyctalus noctula*); and
- One record of serotine bat (*Eptesicus serotinus*)

A licence for the destruction of a breeding site and resting place was granted in 2019 (licence reference: 2019-39320-EPS-AD2-1) approximately 200m west of the Tilbury Site.

3.4.2 Field Survey

The Tilbury Site has no trees with potential for supporting roosting bats. The only structure on Site is a small disused storage building (TN4, Photographs 4) The building is constructed of bricks and mortar with a bitumen felt flat roof. The door to the building is broken and open, leaving the inside quite exposed. The roof is in good condition with no lifts. The structure was deemed to have low potential for supporting roosting bats.

There are opportunities for foraging and commuting bats on the Tilbury Site with areas of scrub, grassland and ditches on the western section of the site that could act as both foraging habitat and provide commuting corridors. However, the area is very exposed with limited cover. Given the habitats on Site and the surrounding landscape, with large sections of coastal and floodplain grazing marsh, the Site is considered to have moderate suitability habitat for commuting and foraging bats.

The Gravesend Site has a single tree with high suitability for supporting roosting bats due to the multiple bark fissures, woodpecker holes and callous rolls in its trunk (TN14, Photograph 14). There is one structure within the Site (TN7, Photograph 11). This is a container made entirely of corrugated metal currently in use as a storage container. The container is in good condition with no gaps observed therefore, the structure was deemed to have negligible potential for supporting roosting bats.

The Gravesend Site contains opportunities for foraging and commuting bats within the scrub habitat and semi-improved grassland, as well as the ditch that runs along the southern edge of the Site. The Site is connected to a wider network of suitable habitat including ditches, the Thames and Medway Canal, and unmanaged grasslands. The Site has moderate suitability habitat for commuting and foraging bats.

3.4.3 Constraints and Recommendations

All native bats, and their roosting sites are protected from harm, killing and disturbance by Schedule 5 of the Wildlife and Countryside Act and the Conservation of Habitats and Species Regulations 2017 (as amended).

If works are proposed within a 20m radius of the high bat roosting suitability tree (see Figure 2 - TN14) at Gravesend, or the location is likely to be impacted by light spill from the Proposed Development then a series of emergence/re-entry surveys will need to be carried out to confirm presence/absence of bats. This tree will require three surveys between late April and late September, with at least one dawn survey carried out, preferably with one survey covering each of the three months when bats are active.

If works or light spill are expected within a 20m radius of the low suitability building at the Tilbury Site then a single emergence survey should be carried out. This survey should consist of either an dusk emergence or dawn re-entry survey on the building carried out between late April and late September.

Surveys will include a mixture of observation and audio recording to determine bat species, and any emerging/returning bats will be recorded. If bats are found to be using these features as a roost then a European Protected Species Licence will be required to remove or disturb the tree, before works can commence.

In line with the guidance for bat activity surveys set out within the Bat Conservation Trust (BCT) survey guidelines¹² a series of transect surveys are recommended to be carried out on both Sites between May and September, with one survey carried out per month. These surveys will feature a route around the Sites with numerous listening points, where three minute stops will be conducted to record bats within the area. Any bat calls and sightings on the transect route will also be recorded. These surveys will determine what features on Site are most attractive to bats, as well as determine the species currently using the Sites.

Given the desk study records of bats within 1km of the Sites and the moderate suitability of both Sites to support commuting and foraging bats, there is potential for commuting and foraging bats to pose a constraint to works. The noise and extra illumination on Site may impact which areas bats feed in and may alter the commuting works bats take across Site. Going forward the design of the proposals should take into account the likely presence of foraging/commuting bats and seek to minimise lighting and associated light spill.

3.5 Hazel Dormouse

3.5.1 Desk Study

There are no records of hazel dormouse (*Muscardinus avellana*) from within 1km over the last 19 years of either the data search from the Essex Field Club or the Kent Biological Records Centre desk studies.

3.5.2 Field Survey

While the scrub habitat on both Sites has some suitability for dormice, featuring food plants such as blackthorn and bramble, it is too isolated from other suitable habitats by both water courses, human development and open grassland to support dormice. In addition, neither of the Sites supported hazel (*Corylus avellana*) the primary food source of hazel dormice.

Due to the relative isolation of habitats on Site from other suitable areas for dormice, it is assumed dormouse is absent and that the species doesn't represent a constraint to development.

3.5.3 Constraints and Recommendations

Hazel dormice are a European Protected Species, protected under the Habitats Regulations (2017, as amended), and they and the habitat that they use for breeding and resting are fully protected by Schedule 5 of the Wildlife and Countryside Act.

Due to lack of suitable connected habitats on Site, hazel dormice can be scoped out, and do not need to be considered for further works at either Site.

3.6 Otter

3.6.1 Desk Study

There are no records of otter (*Lutra lutra*) from within 1km over the last 19 years within the data searches from the Essex Field Club and the Kent Biological Records Centre.

¹² Collins J (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). Bat Conservation Trust.

3.6.2 Field Survey

Both Sites have ditches that connect to the wider habitat and the River Thames however two of these, (TN12 & TN3) are quite narrow and would unlikely support otters. The Tilbury Site has two larger streams (TN9 & 10) with densely vegetated banks that are suitable for holt building. The presence of the large gravel pit lake (TN11) at Tilbury provides an additional habitat where otters may be present, as well as providing a source of water (other than the River Thames) that remains wet throughout the year.

Besides the two ditches present on the south and central section of the Site, there is no other suitable habitats on Site for otters.

3.6.3 Constraints and Recommendations

Otters are protected from deliberate or negligent killing or injury by Schedule 5 of the Wildlife and Countryside Act (1981) as amended, the Habitats Regulations (2017, as amended) and Section 41 of the Natural Environment and Rural Communities (2006) Act.

Despite the lack of desk study records from the Tilbury Site, there is some potential for otter to utilise the streams on Site. It is therefore recommended that otter surveys are undertaken to confirm presence or likely absence. One of the ditches, TN9 is located within 100m of the area where works are proposed to take place.

The survey will include a detailed search of the waterbodies and surrounding habitat for otter field signs and should include a search for evidence of otter presence at least 200-300m upstream and downstream of the Site. The optimal period for conducting this survey is the period of May to September. It is recommended that two survey visits are undertaken at least two months apart, ideally one at either end of the survey period. The survey may be undertaken in conjunction with a water vole survey.

Should otter presence be confirmed on Site a 30m buffer zone around otter habitat will be required. If otter presence is likely on Site then a precautionary working method should be implemented when working within 30m of otter habitat.

During construction impacts on waterbodies should, where possible avoid impacts on the ditches and gravel lake on the Sites. Where necessary solid and waterproof barriers should be erected between ditches and areas where construction is scheduled to take place.

3.7 Water Vole

3.7.1 Desk Study

There are no recent records of water vole (*Arvicola amphibius*) within 1km of the Tilbury Site however, there is a Water Vole mitigation site approximately 650m north of the Site. Water voles were translocated to this site in 2019 as mitigation for the Tilbury2 project¹³

There are 12 recent records of water vole within 1km of the Gravesend Site. The nearest record is directly adjacent to the Site to the south and was recorded in 2022.

3.7.2 Field Survey

All streams and ditches (TN9, 10 & 12) on both sites have potential to support water vole. Details of their locations can be seen in Figure 1. All the ditches are vegetated with slow flowing water, some had more shallow banks than others, but all were wide enough and deep enough for water vole. These surveys should be undertaken between April and September.

3.7.3 Constraints and Recommendations

Water voles are protected from harm and killing by Schedule 5 of the Wildlife and Countryside Act (1981) as amended.

It is recommended that a baseline survey is carried out in water bodies on Site to determine the presence/likely absence of water voles. Water vole surveys involve a walkover of the edges of water courses; with field signs including latrines, feeding remains, burrows and runs, as well as sightings and soundings recorded. While water vole surveys are not constrained to certain times of year, it is recommended they are carried out between May and

¹³ <https://tilbury2.co.uk/wildlife-mitigation/> [accessed: 11/01/2023]

September in combination with survey for otter. The optimum timing is survey visits at the start and end of this survey period.

If water voles are found on Site, it is recommended that barriers to minimise disturbance of water courses are erected and that where possible routes of the proposed development should avoid crossing water bodies (with the exclusion of the River Thames), to reduce disturbance. Further protection of water bodies including protections for water voles should be covered in the CEMP produced for the Site.

During construction impacts on waterbodies should, where possible avoid impacts on the ditches and gravel lake on the Sites. Where necessary solid and waterproof barriers should be erected between ditches and areas where construction is scheduled to take place

3.8 Great Crested Newt

3.8.1 Desk Study

There are four waterbodies present within 500m of the Tilbury Site. Three of the waterbodies have been screened out for further assessment because they are flowing watercourses and likely brackish. As such they are considered unsuitable for great crested newt (*Triturus cristatus*).

No recent records of great crested newt were returned within 1km of the Tilbury Site. The most recent record was recorded 200m west of the site in 2007.

There are eight waterbodies present within 500m of the Gravesend Site. Two of the waterbodies have been screened out for further assessment because they are flowing watercourses that are likely brackish and unsuitable for great crested newts¹⁴.

No recent records of great crested newt were returned within 1km of the Gravesend Site. The nearest record was approximately 1.2km east of the Site in 2013.

3.8.2 Field Survey

The majority of waterbodies on Site were ditches (TN9 & 10) with slow flowing water and were deemed to be potentially suitable for breeding great crested newts. All three of these ditches were deemed to have 'good suitability' to support breeding great crested newts, with Habitat Suitability Index (HSI) assessment scores of 0.78, 0.74 and 0.75.

There was one gravel pit on Site that had standing water and was being used by a population of waterfowl. This gravel pit lake (TN11) is likely too large to support great crested newt due to impacts of wind driven wave action, and the presence of large amounts of waterfowl including diving ducks, making the waterbody less attractive to newts. An HSI assessment was carried out on the gravel lake, the water body was deemed to have 'poor suitability' to support breeding great crested newts with an HSI score of 0.46.

There is one ditch (TN12), running along the access road through the Tilbury Site, and one ditch that runs along the southern boundary of the Gravesend Site that are slow flowing, support marginal vegetation including southern reed and reed mace (*Typha angustifolium*) that are suitable to support breeding great crested newts. An HSI assessment of this water body was recorded as having 'good suitability' to support breeding great crested newts with an HSI score of 0.76.

The terrestrial habitat on both sites particularly the scrub and poor semi-improved grassland habitat has some suitability to support terrestrial great crested newts. There are limited above ground opportunities for great crested newt hibernation (e.g. wood or rubble piles). However, areas of existing scrub and margins of existing waterbodies provide habitat that could be utilised.

A full overview of the assessment of the HSI scores are recorded in Appendix F.

¹⁴ Great crested newts do not generally like running water, though they will inhabit slow-flowing watercourses such as backwaters, ditches and canals.

3.8.3 Constraints and Recommendations

Great crested newts are a European Protected Species, protected under the Habitats Regulations (2017, as amended), and Schedule 5 of the Wildlife and Countryside Act. Under this legislation both individuals and the habitat that they use for breeding and resting are afforded full protection.

It is recommended that eDNA surveys are carried out on the suitable water bodies on Site, and those within a 250m radius deemed suitable for great crested newt to confirm presence/absence. eDNA surveys need to be carried out between mid-April and end of June.

Given that the waterbodies on site are ditches with potential for some elements of brackish water it is recommended that a single survey using traditional survey methods (night time torching and/or bottle trapping where appropriate) is conducted alongside the eDNA survey to provide a robust indication of presence/absence.

Where the presence of great crested newt is confirmed a series of six surveys carried out between March and early June should be undertaken to determine population and breeding status through a series of torching surveys, bottle trapping and egg searches. At least two of the surveys should be carried out between mid-April and mid-May when breeding is most likely to take place and all surveys should be carried out by an ecologist with a valid great crested newt survey licence.

3.9 Widespread Species of Reptile

Widespread species of reptile refers to common lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*), adder (*Viper berus*) and grass snake (*Natrix helvetica*).

3.9.1 Desk Study

The records from the Essex Field Club returned two records of slowworm, one record of grass snake, five records of adder and two records of common lizard from within 1km of the Tilbury Site from over the last 10 years. In addition Port of Tilbury have provided anecdotal records of established populations of adder, common lizard and slow worm within the Site.

The records from the Kent Biological Records Centre returned seven records of slowworm, one record of grass snake and two records of common lizard from within 1km of the Gravesend Site from over the last 10 years.

3.9.2 Field Survey

The tussocky grassland, scrub and tall ruderal habitats on both Sites provide suitable habitats for the widespread species of reptiles.

The presence of ditches on and in close proximity to both sections of Site offer suitable foraging and commuting habitat for grass snakes. While vegetated, the banks leading up to the 'plateau' area in the centre of the Tilbury Site, as well as the bunds that form the sea wall on both sites, feature banks with a south facing aspect that has potential to act as basking habitats, particularly for species more active in the earlier part of the year such as adders and common lizard. The plateau itself features a mosaic mix of grassland, ruderal and bare ground habitats that make this area highly suitable for reptiles, offering exposed ground for basking in close proximity to vegetative cover.

3.9.3 Constraints and Recommendations

All native UK reptile species; adder, common lizard, grass snake, sand lizard (*Lacerta agilis*), smooth snake (*Coronella austriaca*) and slow worm, are listed on Schedule 5 of the Wildlife and Countryside Act.

With the exception of the eastern bare ground sections of Tilbury (unsuitable for reptiles), a series of reptile surveys should be carried out on both parts of the Site between April and September when reptiles are most active. A series of artificial refugia (a combination of roofing felt and corrugated iron) should be placed on Site and be left to bed in for a period of at least one week before surveying commences on Site. Surveys consist of seven visits spread out through the active season and should ideally be carried out during conditions when reptiles are likely to be using the mats i.e. in temperatures below 18°C or after rainfall.

In the event that a reptile population is found, a population size class assessment may be required (up to a total of 20 visits), to confirm in greater detail the likely numbers of reptiles present and the form of mitigation works required. For impacts on smaller areas of habitat this may involve habitat manipulation to disperse reptiles into

adjoining areas of retained habitat, or for larger areas capturing and translocating reptiles to a suitable local receptor site.

The receptor site may require preparation through creation or management of a suitable grass/ scrub mosaic habitat and installation of features for reptile sheltering and hibernation (log piles and hibernacula). The details of any mitigation requirements would be set out in the reptile survey report following further surveys.

3.10 Birds

3.10.1 Desk Study

There are recent records for thirty one notable¹⁵ bird species within 1 km of both Sites. This includes fifteen species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), nine Species of Principal Importance (SPI), eleven species on the Birds of Conservation Concern 4 (BoCC4) Red list and six species on the BoCC4 Amber list.

Table 6. Bird Species Records

Common Name	Latin Name	Designation	Records Centre
Bar-tailed Godwit	<i>Limosa lapponica</i>	Birds of Conservation Concern – Red List	Essex Field Club, Kent Biological Records Centre
Barn Owl	<i>Tyto alba</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Essex Field Club
Black Redstart	<i>Phoenicurus ochrous</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1, Birds of Conservation Concern – Amber List	Essex Field Club
Black-tailed Godwit	<i>Limosa limosa</i>	Section 41 NERC Act, Birds of Conservation Concern – Amber List	Essex Field Club, Kent Biological Records Centre
Brambling	<i>Fringilla montifringilla</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Essex Field Club, Kent Biological Records Centre
Cetti's Warbler	<i>Cettia cettia</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Essex Field Club, Kent Biological Records Centre
Corn Bunting	<i>Emberiza calandra</i>	Section 41 NERC Act, Birds of Conservation Concern – Red List	Kent Biological Records Centre
Curlew	<i>Numenius arquata</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1, Birds of Conservation Concern – Red List	Essex Field Club, Kent Biological Records Centre
Fieldfare	<i>Turdus pilaris</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1, Birds of Conservation Concern – Red List	Essex Field Club, Kent Biological Records Centre
Firecrest	<i>Regulus ignicapilla</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Kent Biological Records Centre
Green Sandpiper	<i>Tringa ochropus</i>	Birds of Conservation Concern – Amber List	Essex Field Club
Herring Gull	<i>Larus argentatus</i>	Section 41 NERC Act, Birds of Conservation Concern – Red List	Essex Field Club, Kent Biological Records Centre
Hobby	<i>Falco subbuteo</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Kent Biological Records Centre

¹⁵ Notable bird species are taken as those listed: on Annex I of the EC Birds Directive (2009/147/EC); on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); as Species of Principal Importance (SPI) for the Conservation of Biodiversity in England listed in Section 41 of the Natural Environment and Rural Communities Act 2006; as Red or Amber in the Birds of Conservation Concern (BoCC) 4 (Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708-746)

Common Name	Latin Name	Designation	Records Centre
House Sparrow	<i>Passer domesticus</i>	Section 41 NERC Act, Birds of Conservation Concern – Red List	Kent Biological Records Centre
House Martin	<i>Delichon urbica</i>	Birds of Conservation Concern – Red List	Essex Field Club
Kingfisher	<i>Alcedo atthis</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Essex Field Club, Kent Biological Records Centre
Merlin	<i>Falco columbarius</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1, Birds of Conservation Concern – Red List	Kent Biological Records Centre
Mistle Thrush	<i>Turdus viscivorus</i>	Birds of Conservation Concern – Red List	Kent Biological Records Centre
Nightingale	<i>Luscinia megarhynchos</i>	Birds of Conservation Concern – Red List	Kent Biological Records Centre
Peregrine Falcon	<i>Falco peregrinus</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Essex Field Club
Pied Avocet	<i>Recurvirostra avosetta</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1, Birds of Conservation Concern – Amber List	Essex Field Club, Kent Biological Records Centre
Red Kite	<i>Milvus milvus</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1	Essex Field Club, Kent Biological Records Centre
Short Eared Owl	<i>Asio flammeus</i>	Bird of Conservation Concern – Amber	Essex Field Club
Skylark	<i>Alauda arvensis</i>	Section 41 NERC Act, Birds of Conservation Concern – Red List	Essex Field Club
Song Thrush	<i>Turdus philomelos</i>	Section 41 NERC Act, Birds of Conservation Concern – Amber List	Essex Field Club, Kent Biological Records Centre
Spotted Flycatcher	<i>Muscicapa striata</i>	Section 41 NERC Act, Birds of Conservation Concern – Red List	Kent Biological Records Centre
Starling	<i>Sturnus vulgaris</i>	Section 41 NERC Act, Bird of Conservation Concern - Red	Essex Field Club, Kent Biological Records Centre
Turtle Dove	<i>Streptopelia turtur</i>	Section 41 NERC Act, Bird of Conservation Concern - Red	Essex Field Club
Western Marsh Harrier	<i>Circus aeruginosus</i>	Wildlife and Countryside Act 1981: Schedule 1 - Part 1, Birds of Conservation Concern – Amber List	Essex Field Club, Kent Biological Records Centre

The Thames Estuary and Marshes Ramsar and Special Protection Area (SPA) is located in close proximity to both the Gravesend and Tilbury Sites. The Ramsar is designated for supporting an internationally important populations of hen harrier (*Circus cyaneus*) and pied avocet (*Recurvirostra avosetta*), as well as important migratory populations of redshank (*Tringa totanus*), ringed plover (*Charadrius hiaticula*), grey plover (*Pluvialis squatarola*), dunlin (*Calidris alpina*), knot (*Calidris canutus*) and black-tailed godwit (*Limosa limosa*). The SPA also support an international assemblage of gadwall (*Mareca strepera*), shoveler (*Anas clypeata*), pochard (*Aythya ferina*) and tufted duck (*Aythya fuligula*).

3.10.2 Field Survey

At low tide both Sites are adjoined by areas of foreshore habitat that provide habitat suitable to be utilised by the overwintering bird populations for which the SPA/Ramsar are designated. While none of the species for which the SPA/Ramsar is designated were seen to be utilising these areas during the extended Phase 1 habitat survey, their use and functional linkage to the SPA/Ramsar cannot at this stage be ruled out.

The scrub habitat on Site is suitable to support small nesting bird species that may be present on Site. Both areas contained swathes of grassland that were suitable for ground nesting species such as skylark (*Alauda arvensis*) and herring gull (*Larus argentatus*), particularly the Tilbury Site which has limited human intrusion. Areas of the Tilbury Site such as the grassland on the plateau feature areas of open ground that are suitable for ground foraging bird species such as black redstart (*Phoenicurus ochrous*), although there is no habitat suitable for the species to breed on Site.

A large gravel lake present within the Tilbury Site as well as the water bodies on both Sites are suitable for foraging waterfowl and possess marginal vegetation that is suitable as cover for nesting birds. Due to its close proximity to the Thames Estuary Ramsar, the gravel lake and to a lesser extent the ditches could be used for overwintering species that typically used shoreline habitats. The exposed mud along the banks of the gravel lake are suitable for wading species to forage in.

Sightings of western marsh harrier (*Circus aeruginosus*) and eider duck (*Somateria mollissima*) were recorded on the Tilbury Site. Sightings and soundings of kingfisher (*Alcedo atthis*), herring gull, song thrush (*Turdus philomelos*) and starling (*Sturnus vulgaris*) were recorded on the Gravesend Site.

3.10.3 Constraints and Recommendations

The Thames Estuary Ramsar is partially designated for the aggregation of waterfowl and waders that use the Site as overwintering habitat, as well as the populations of resident bird species it supports. The proposed works on Site have potential to cause for disturbance on Site, via increased levels of light, noise, air and water pollution as well as increased human presence during the construction phase. The presence of mudflat habitat at the foreshore adjacent to the north or south of the Site for the Gravesend and Tilbury sides of the site respectively makes the Site and immediate area attractive to overwintering birds, and increases the chances of disturbance.

A series of wintering bird surveys are already being carried out on Site to determine the assemblage of bird species on Site and with the immediate surrounding area. The results of these surveys will be coupled with noise modelling to determine the likely level of disturbance that the works will produce to the assemblage of the waterfowl and wading birds in the designated areas around Site. The results of these surveys will provide baseline information for a report to inform Habitat Regulations Assessment (HRA). This will include consideration of potential impacts of ground investigation works

Works involving excavation, or that produce high levels of noise are recommended to take place as far away from water sources used by birds as possible, and when required after clearance of vegetation suitable to support overwintering species, has been carried out by AECOM between November and March 2023 on both Site either side of the Thames.

Breeding birds and their nests are protected under the Wildlife and Countryside Act (1981, as amended). Schedule 1 species are afforded additional protection which makes it an offence to disturb individuals of these species when 'at or near' an active nest.

Breeding bird surveys are recommended to confirm the value of each site for breeding birds. A total of 5 monthly visits in the period March to July, inclusive should be undertaken. Experienced ornithologists would use bird sound and behaviour to classify the breeding status of birds present. The locations of all species of conservation importance that are breeding or likely to breed will be mapped and an estimate of their numbers (pairs/territories) derived.

During the implementation phase it is recommended that any trees or scrub vegetation is removed outside of the bird nesting season (i.e. during period September to February inclusive) to prevent breeding birds from being disturbed. It is also recommended that if any structures are scheduled to be demolished, they are searched prior to works commencing to determine if any birds are present within the structure.

If any site clearance of trees or scrub is due to take place between March and the beginning of September, an ecologist will be required to confirm the absence of active bird nests immediately prior to works commencing to avoid a breach of legislation.

If a nest is discovered, clearance or other construction works should be stopped immediately within an exclusion zone to be determined by an ecologist (generally 5m radius). The exclusion zone will be demarcated appropriately. The nest will subsequently be monitored, typically on a weekly basis, by a suitably qualified ecologist. Once it is confirmed that all fledglings have flown and ceased to return to the nest, and that no other nests are in use within the exclusion zone, the vegetation can be removed.

3.11 Terrestrial Invertebrates

3.11.1 Desk Study

The records supplied by the Essex Field Club returned three records of white letter hairstreak (*Satyrus y-album*) from within a 1km radius of the Tilbury Site from over the last 10 years.

Additional records of species listed on Section 41 of the NERC Act (2006) as amended and that are listed as red list species by the International Union for Conservation of Nature. These species included brown banded carder bee (*Bombus humilis*), shrill carder bee (*Bombus sylvarum*), five-banded digger wasp (*Cerceris guinefasciata*), sea aster bee (*Colletes halophilus*) and the picture winged fly (*Doryceus graminum*).

The records supplied by Kent Biological Records Centre returned fifteen records of stag beetle (*Lucanus cervus*) from within a 1km radius of Gravesend Site from over the last 10 years.

3.11.2 Field Survey

The range of habitats present at the site (grassland, ephemerals/short-perennials, ditches, scrub, areas of bare ground) provide good structural diversity, and as a result the habitats are considered potentially suitable to support a diverse range of invertebrates.

The assemblage of bee and fly species recorded by the data search supplied by the Essex Field Club are associated with coastal grassland and sparsely vegetated land with areas of exposed bare ground. Suitable habitats suitable for these insect species is present within the plateau on the southern central area of the Tilbury Site. Notably the food plants for the two species of carder bee; red clover (*Trifolium pratense*) and tufted vetch (*Vicia caracca*) are present within the habitats on Site.

Stag beetles are typically associated with woodland, wood-pasture and parkland with significant quantities of fallen deadwood, preferably partially buried deadwood from English oak (*Quercus robur*) that acts as a breeding resource. This deadwood is then used by the larvae as a feeding resource for three to seven years. The lack of mature oak trees on either Site makes them less attractive to stag beetles. White letter hairstreak butterflies are associated with elms (*Ulmus* species) their larval food source and are often found in scrubland, hedges or woodland edge habitats. Adult white letter hairstreaks are pollinators of bramble and privet (*Ligustrum vulgare*) with the former present on both sites in large quantities. Despite the presence of adult food, the lack of elm trees makes inhabitation of the Site by white letter hairstreak unlikely on either of the two Sites.

Due to the lack of suitable larval food sources on either Site it is determined that neither stag beetles nor white letter hairstreaks represent a constraint to development. The short ephemeral vegetation and grassland habitats on the Tilbury Site are suitable to support the assemblage of bee and fly species.

3.11.3 Constraints and Recommendations

Further surveys for the general terrestrial invertebrate assemblage of both sites are recommended due to the designation of the current Tilbury Power Station LWS and future SSSI for invertebrates.

This survey should be carried out by an experienced entomologist with two or three survey visits undertaken between April and September to provide good coverage of different species groups. Each visit should involve use of a range of collection measures (e.g. direct observation, sweep netting, pooter) and collect specimens to allow identification to species level wherever possible.

3.12 Fish

3.12.1 Desk Study

There are two records of European eel (*Anguilla anguilla*) returned from within 1km of the Site within the last 10 years from the data provided by the Kent Biological Records Centre. Both these records come from the River Thames and were located 700m to the north west of the Site.

3.12.2 Field Survey

Table 7 summarises both the evidence of fish species being present within the Survey Area, and the potential for features and habitats within the Survey Area to support fish species.

Table 7. Summary of Fish presence/ potential presence within the Survey Area

Feature	Description	Location ¹⁶	Relevant Target Notes
Ditch (Gravesend Side)	Shallow ditch with steep banks and thick reed covered connected to the Thames and Medway Canal.	Makes up part of the southern boundary of the Gravesend Site	TN12
Ditch (Tilbury Side)	Wide, deep ditch with marginal vegetation and steep banks with aquatic connection to the River Thames.	Makes up the western boundary of the Tilbury Site	TN9
Ditch (Tilbury Side)	Shallow ditch with shallow banks with no aquatic connection to the River Thames.	Located within the Tilbury Site	TN10

3.12.3 Constraints and Recommendations

European eels are protected by 'The Eels' (England and Wales) Regulations (2009) that prohibits the obstruction of this species path to marine habitats, or to freshwater sources which eels use to mature in.

While no works within water courses are scheduled to be carried out it is recommended that any spoil removed during excavations are kept away from water course to prevent temporary blockages that prevent migration of eels to and from marine habitats. A CEMP that covers the impacts such as increased noise, vibration and pollution that may impact water courses on Site. This CEMP should also cover the management and mitigation to reduce the impact on the water course.

European eels are able to temporarily persist and move across terrestrial habitats, primarily at night or when water levels drop. If eels are found in terrestrial habitats works should cease and their progress should be monitored to ensure it reaches more suitable aquatic or marine habitats.

3.13 Marine Mammals

3.13.1 Desk Study

The records supplied by the Essex Field Club returned a single record of grey seal (*Halichoerus grypus*) and two records of beluga whale (*Delphinapterus leucas*) from within a 1km radius of the Tilbury Site from over the last 10 years.

The records supplied by Kent Biological Records Centre returned a single record of grey seal, harbour porpoise (*Phocoena phocoena*) and two records of beluga whale from within a 1km radius of Gravesend Site from over the last 10 years

3.13.2 Field Survey

Both harbour porpoise and grey seal are coastal species that are known to be present within the Thames estuary all year round. While there is no marine habitat suitable for harbour porpoise on either the Tilbury or Gravesend Site, the banks of the Thames have some suitability to support basking sites for both grey seal and harbour seal (*Phoca vitulina*), even though there are no records of this species in the data searches provided.

The two records of beluga from the data searches, are likely the same animal as the species is not a permanent resident or regular visitor to the UK. As such its presence is unlikely to be repeated during the lifespan of the construction works scheduled to take place, although there are other references of vagrant cetacean species such as northern bottlenose whale (*Hyperoodon ampullatus*) and humpback whale (*Megaptera novaeangliae*) within the Thames Estuary from outside the 10 year period, and as such the presence of larger cetacean species should be considered in relation to any works within the Thames that could result in potential disturbance to cetaceans/main mammals (e.g. marine ground investigation works).

¹⁶Where features are situated outside of the Site boundary, the distance and direction is given at the closest point of the feature from the Site

3.13.3 Constraints and Recommendations

All cetacean species are protected under the Habitats Regulations (2017, as amended), and are fully protected by Schedule 5 of the Wildlife and Countryside Act. Common seals are protected by Section 41 of the Natural Environment and Rural Communities (2006) as amended.

It is understood ground investigation works are scheduled to take place in the River Thames between the two Sites and in the absence of mitigation there would be the potential for these works to have an impact upon seals and cetaceans within the watercourse. It is recommended that prior to marine ground investigation works commencing on Site an assessment of the potential on marine habitats is undertaken by a suitably qualified marine ecologist. A separate Precautionary Method of Working (PMoW) detailing the impacts, mitigation and enhancements in regard to marine mammals may be required.

3.14 Other Mammals

3.14.1 Desk Study

The records returned by the Essex Field Club listed no additional mammals species of note from within 1km of the Tilbury Site from over the last 10 years.

The records returned by the Kent Biological Records Centre returned a single record of water shrew and two records of hedgehog (*Erinaceus europaeus*) from within a 1km radius of the Gravesend Site from over the last 10 years.

3.14.2 Field Survey

The ditches on both Sites are suitable habitats for water shrews, due to the presence of reeds and emergent vegetation that can support prey species and allow shelter for hunting water shrews. The banks also provide habitat suitable for water shrews to build burrows in.

The scrub and ruderal habitat on both Sites is suitable foraging habitat for hedgehogs as well as providing shelter for the species during hibernation. Due to the connectivity to suitable adjacent habitat on the Gravesend Site there is potential for hedgehogs to commute on and off Site without coming into contact with roads or other barriers.

3.14.3 Constraints and Recommendations

Hedgehogs are listed on both Section 41 of the Natural Environment and Rural Communities Act (2004) as amended and Section 6 of the Wildlife and Countryside Act that protects them from killing and injury from certain methods. Both hedgehogs and water shrews as well as all other UK mammals are protected by the Wild Mammals (Protection) Act 1996.

It is recommended that works likely to impact the ditches on Site have a barrier placed between them and the work site to reduce or negate the impact on water shrews. Additionally the CEMP produced for the Site should elaborate on the protection and mitigation.

It is recommended that excavations are backfilled the same day where possible, and where this is not possible that a cover is placed over any excavations that are present. If this is not possible, one end of the excavation should be formed into a ramp to allow hedgehogs and other animals (including other mammals such as foxes) to escape the excavations under their own power.

3.15 Notable Plants

3.15.1 Desk Study

Six plant species, chicory (*Chicorium intybus*), common sea lavender (*Limonium vulgare*), common vetch (*Vicia sativa*), fern grass (*Catapodium rigidum*), horned pondweed (*Zannichelia palustris*) and hounds tongue (*Cynoglossum officinale*), listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006) as amended were recorded within 1km of the Tilbury Site from over the last 10 years.

While no plants listed on either Schedule 8 of the Wildlife and Countryside Act (1981) as amended or on Section 41 of the Natural Environment and Rural Communities a species covered by the Convention on International

Trade in Endangered Species (CITES), the man orchid (*Orchis anthropophora*) was recorded within 1km of the Gravesend Site and from the last 10 years.

3.15.2 Field Survey

No notable species were noted during the Phase 1 survey. However, the survey was undertaken in November when some plant species would not be visible and therefore presence of protected/notable species cannot be ruled out.

Common vetch and chicory are two species that are found in grassland and short ephemeral vegetation. Suitable grassland and short ephemeral vegetation habitats are both present on the Tilbury Site. Horned pondweed is an aquatic plant that grows in slow moving waterbodies and in marshland, and as such the four ditches on Site are suitable to support this plant. Common sea lavender grows in salt marsh and coastal wetlands, and while there is no preferred habitat suitable on either Site, the species occasionally grows on the edges of brackish water bodies, and as such may establish itself along the ditches on Site.

Man orchid grows primarily on chalk soils which are not present within either the Tilbury or Gravesend Site while fern grass primarily grows on walls and as such both species are unlikely to be encountered on Site.

3.15.3 Constraints and Recommendations

A series of National Vegetation Classification surveys are recommended to be carried out on both the Gravesend and Tilbury Sites due to its partial designation for vegetation assemblages. These surveys should be carried out between May and September when plant species are most likely to be above ground on site, and the results will be used to inform the Habitat Regulations Assessment regarding the constraints and mitigation of designated sites on and in close proximity to the Site. The results of the NVC surveys will inform the design of the Site and promote areas to avoid when construction works are undertaken.

Should any of the species mentioned above, or additional species of note be found on Site, it is recommended that their proximity to the works are assessed and if needed, reports produced addressing the protection and mitigation in regard to these species. These reports may also result in changes to the work schedule and overall development and construction plans.

3.16 Invasive Non-Native Species

3.16.1 Desk Study

Four non-native invasive plant species; water fern (*Azolla filiculoides*), Nuttall's waterweed (*Elodea nuttallii*), Japanese knotweed (*Reynoutria japonica*), Virginia creeper (*Parthenocissus quinquefolia*), and one non-native invasive animal species; Chinese mitten crab (*Eriocheir sinensis*), listed on Schedule 9 of the Wildlife and Countryside Act (1981) as amended were recorded within 1km of the Gravesend Site from over the last 10 years in the records provided by Kent Biological Records Trust.

Two non-native invasive plant species; Japanese rose (*Rosa rugosa*) and perfoliate Alexanders (*Smyrniium perfoliatum*) listed on Schedule 9 of the Wildlife and Countryside Act (1981) as amended were recorded within 1km of the Tilbury Site from over the last 10 years in the records provided by the Essex Field Club.

The Essex Field Club also identified five other species; buddleia (*Buddleja davidii*), goat's rue (*Galega officinale*), false acacia (*Robinia pseudoacacia*), holm oak (*Quercus ilex*) and Russian vine (*Fallopia baldschuanica*) with potential to become invasive but not currently listed on any legislation.

3.16.2 Field Survey

No species listed on either Schedule 9 of the Wildlife and Countryside Act (1981) as amended or on the Invasive Alien (Enforcement and Permitting) Order (2019) were recorded on either of the Sites.

A single species; buddleia, with potential to become invasive was recorded on Site. Buddleia is very attractive to pollination insects, particularly butterflies, to the point where it can outcompete native plants. Buddleia is also able to grow on bare rock, and if allowed can grow and potentially damage any masonry or buildings it grows on.

While not listed on any legislation or mitigation, the presence of pampas grass (*Cortaderia selloana*) can quickly spread across existing grasslands via wind pollination, particularly from the elevated position on the plateau and outcompete native species.

3.16.3 Constraints and Recommendations

Buddleia can be cleared using typical mechanical and hand cutting means, with excavation of the root ball, or the application of contact herbicide to prevent regrowth. Buddleia does not represent a risk of regrowth from cut or fragmentary remains and can be disposed of alongside regular green waste. Pampas grass can regenerate from rhizomes and as such it is recommended that the root ball is excavated and disposed of as part of regular green waste..

A follow up walkover should be carried out, between April and September when plants are growing, in close proximity to where earthworks are being carried over to determine if invasive species are present. Should species found on either Schedule 9 of the Wildlife and Countryside Act and the Invasive Alien Species (Enforcement and Permitting) Order be found on Site, additional measures regarding mitigation and monitoring will be required for the works on Site

4. Biodiversity Accounting

A habitat condition assessment of the habitats found on site was prepared based on the results of the site visit. This data can be used to inform the baseline of a separate Biodiversity Net Gain assessment (if required) once defined development proposals are available.

Table 8. Habitat Classification Conversion (Baseline) - Tilbury

Phase 1 Habitat Classification	UK Habitat Classification	Habitat Condition Assessment	Habitat Condition Assessment Sheet	Assessment	Assigned Condition
Semi Improved Grassland - West	Grassland – Modified Grassland	Grassland with scrub and areas of bare ground present.	5. Grassland	Biodiversity Metric 3.1 Technical Specification - Grassland	Moderate (2)
Semi Improved Grassland – South	Grassland – Modified Grassland	Grassland with areas of scrub present.	5. Grassland	Biodiversity Metric 3.1 Technical Specification - Grassland	Moderate (2)
Semi Improved Grassland – Plateau	Grassland – Modified Grassland	Grassland with low sward height and areas of bar ground present.	5. Grassland	Biodiversity Metric 3.1 Technical Specification - Grassland	Moderate (2)
Short Ephemeral Vegetation	Sparsely Vegetated Land – Ruderal/Ephemeral	Clear signs of succession on Site, with varied vegetation structure and invasive species below 5%.	21. Urban	Biodiversity Metric 3.1 Technical Specification - Urban	Good (3)
Scrub – Western Grassland	Scrub – Bramble Scrub	Scrub with grassland edge, with no invasives but dominated by bramble.	19. Scrub	Biodiversity Metric 3.1 Technical Specification - Scrub	Moderate (2)
Scrub – South West Corner	Scrub – Bramble Scrub	Scrub with grassland edge, with no invasives but dominated by bramble.	19. Scrub	Biodiversity Metric 3.1 Technical Specification - Scrub	Moderate (2)
Scrub – Plateau Perimeter	Scrub – Bramble Scrub	Scrub with grassland edge, with no invasives but dominated by bramble.	19. Scrub	Biodiversity Metric 3.1 Technical Specification - Scrub	Moderate (2)
Ditch I	Rivers and Streams - Ditches	Ditch with marginal vegetation cover but with one bank significantly shaded.	4. Ditches	Biodiversity Metric 3.1 Technical Specification - Ditches	Moderate (2)
Ditch II	Rivers and Streams - Ditches	Seasonal ditch with limited water plants present.	4. Ditches	Biodiversity Metric 3.1 Technical Specification - Ditches	Moderate (2)

Table 9. Habitat Classification Conversion (Baseline) - Gravesend

Phase 1 Habitat Classification	UK Habitat Classification	Habitat Condition Assessment	Habitat Condition Assessment Sheet	Assessment	Assigned Condition
Amenity Grassland	Grassland – Improved Grassland	Regularly managed grassland with limited biodiversity.	5. Grassland	Biodiversity Metric 3.1 Technical Specification - Grassland	Poor (1)
Line of Trees	Line of Trees (Associated with Bank or Ditch)	Native line of trees with no gaps or veteran trees present.	15. Line of Trees	Biodiversity Metric 3.1 Technical Specification – Line of Trees	Moderate (2)
Marshy Grassland	Grassland – Floodplain Wetland Mosaic	Wet all year round most years, with limited scrub and bare ground.	23. Wetland	Biodiversity Metric 3.1 Technical Specification - Wetland	Moderate (2)
Scrub	Scrub – Bramble Scrub	Scrub with grassland edge dominated by bramble.	19. Scrub	Biodiversity Metric 3.1 Technical Specification - Scrub	Moderate (2)
Semi Improved Grassland	Grassland – Improved Grassland	Grassland with limited sward height variation.	5. Grassland	Biodiversity Metric 3.1 Technical Specification - Grassland	Moderate (2)
Ditch I	Rivers and Streams - Ditch	Shaded ditch with good water quality and both marginal and water plants present.	4. Ditches	Biodiversity Metric 3.1 Technical Specification - Ditches	Moderate (2)

5. Opportunities for Enhancements

Opportunities for biodiversity enhancement will be explored further in liaison with Natural England and other relevant stakeholders once further baseline surveys have been undertaken. This may include natural revegetation, or seed harvesting from retained habitat to aid revegetation of impacted areas. In addition opportunities will be explored for enhancing retained habitats through sensitive ongoing management.

The proposed new cable tunnel is likely to generate a significant volume of arisings, and the potential for this material to be utilised for habitat creation in the wider local area should be explored.

6. Conclusion

This PEAR is based on a desk study and ecological surveys undertaken on the 17th and 25th of November to assess the ecological constraints to the Scheme and to provide advice in respect of Scheme design, site layout and / or site investigation.

The following further surveys summarised in Table 10 are likely to be required to support the proposed works. However, the full scope of surveys required should be finalised when the design of the scheme has been further developed, and there has been further consultation with Natural England.

Table 10. Summary of Recommendations

Feature	Recommendation	Timing
Thames Estuary & Marshes (Ramsar Site and Special Protection Area)	Habitat Regulations Assessment will be required to consider potential for effects on the nearby Thames Estuary and Marshes SPA and Ramsar. This should include consideration of ground investigation works. Wintering bird surveys are being undertaken to inform the assessment and it is possible noise modelling will also be required.	Initial HRA to be undertaken prior to commencement of ground investigation works.
Tilbury Power Station LWS (and proposed SSSI)	Further consultation is required with Natural England to determine the proposed boundary of the proposed SSSI, and potential impact on features for which this site is to be designated. The area to be covered by the SSSI designation should be avoided, or if not possible impacts minimised and appropriate reinstatement specified.	Undertake as soon as possible to inform design process.
Canal and Grazing Marsh, Higham LWS	Minimise extent and duration of works within the LWS.	Undertake as soon as possible to inform design process.
Habitats	National Vegetation Classification (NVC) survey of both sites is recommended to fully characterise the grassland communities on Site	Single visit between May and September
Badger	Undertake further badger survey at Tilbury to characterise the setts at Tilbury. Seek to avoid works within 30m of identified setts.	No seasonal constraint
Bats	Undertake bat activity transects across both Sites concentrating on the areas of grassland, scrubland and marginal vegetation should be carried out on both the Gravesend and Tilbury Sites. Emergence/re-entry surveys on the substation building (Tilbury) and the high potential bat roost tree (Gravesend).	One survey per month at each site between April and September Late April to September Three emergence/re-entry surveys on the bat roost tree. A single emergence/re-entry on the substation building.
Water Voles and Otters	Water vole and otter surveys on both Sites looking for field signs such as latrines, holts/burrows, feeding remains, footprints as well as sightings and soundings along the four ditches on Site (three on Tilbury and one in Gravesend).	Two visits between April and September
Wintering Birds	Surveys are already taking place to determine the use of habitats and surrounding habitats by overwinter species of bird.	November to March
Breeding Birds	A series of five visits should be undertaken at monthly intervals to allow the value of the site for breeding birds to be established and confirm requirements for mitigation/compensation	March to July
Great Crested Newt	An eDNA survey and single survey using traditional survey techniques (e.g. torch light survey) should be carried out on each of the suitable waterbodies within 250m of the Site. A series of six great crested newt surveys should be carried out if presence is confirmed within the waterbodies to determine the presence or absence of breeding great crested newts. These surveys should include a mixture of torch surveys, egg searches, bottle trapping and netting to help determine the presence of the species.	Late April to end June. Mid-March to mid-June.

Feature	Recommendation	Timing
Reptiles	A series of seven reptile surveys should be carried on both sites to determine the presence or absence of reptiles. Should reptiles be found on Site then further surveys (up to 20) may be required to determine population size.	April/May or September/October
Terrestrial Invertebrates	Two or three survey visits to be carried out by suitably qualified entomologists after liaison with Natural England to determine the make-up of the invertebrate assemblage, and identify any species that need additional protection during works.	April to September
Fish	No further surveys required assuming that no works within watercourses.	-
Marine Mammals	Marine ecologist to review proposals for any marine GI to identify any requirement for further survey, mitigation or monitoring	Prior to commencement of marine GI works.
Invasive non-native plant species	Walkover survey to check if any invasive non-native species are present.	April to September
Construction and Environment Management Plan (CEMP)	A CEMP informed by the surveys carried out as well as the Habitat Regulations Assessment will cover protection of ecological features and sensitive working methods.	Prior to construction
Biodiversity Net Gain Calculation	When an initial scheme design is available it is recommended that a biodiversity net gain calculation is undertaken to establish the likely change in biodiversity units and establish the requirements for compensation	Prior to planning/consenting

6.1 Survey Updates

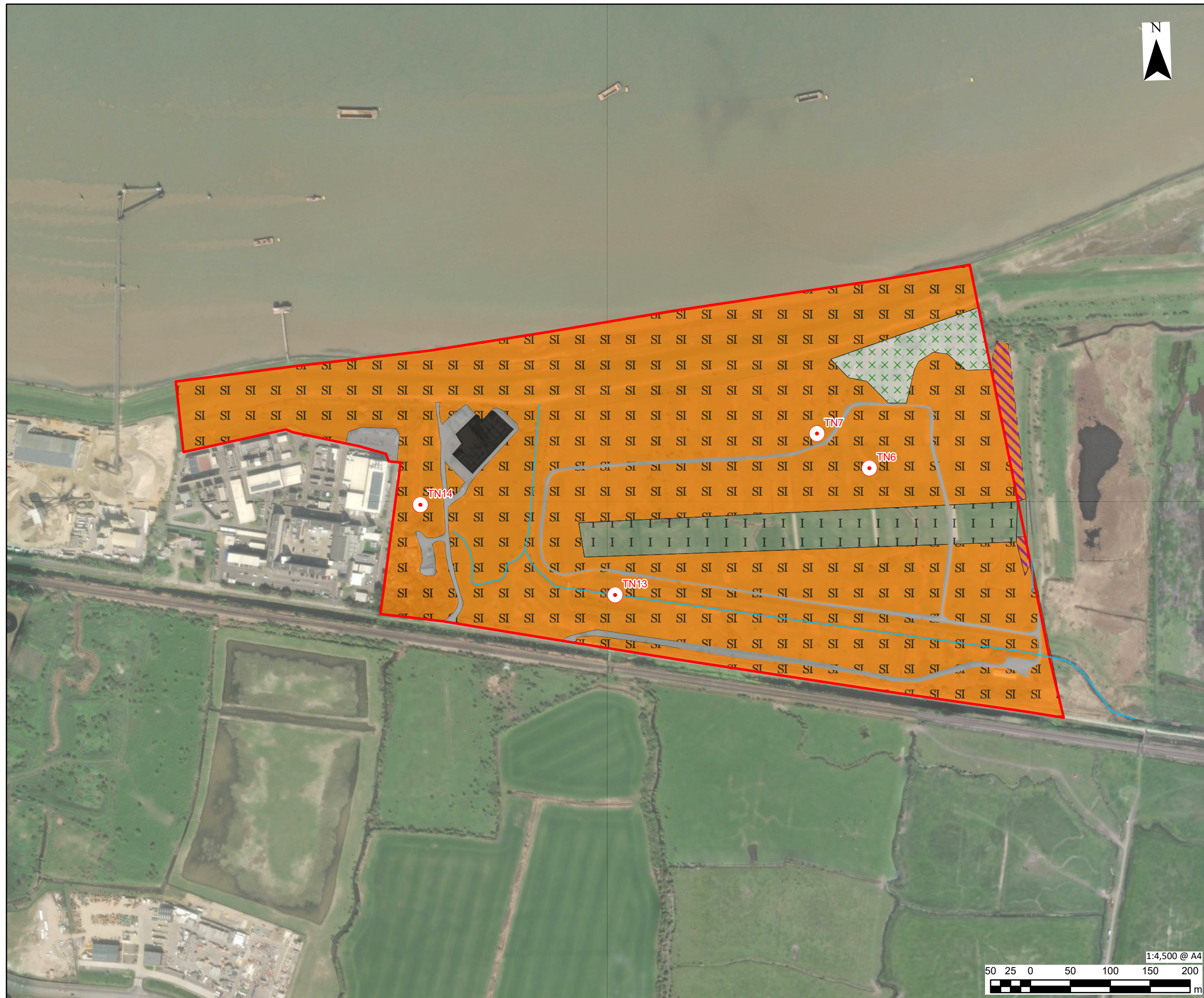
Due to the mobility of animals and the potential for colonisation of the Site, the conclusions of this report are considered valid for a period of 12 months from writing. Beyond this date the ongoing validity of conclusions should be reviewed by appropriately qualified ecologist and the requirement for update surveys considered.

Appendix A Figure

Figure 1. Phase 1 Map



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Appendix B Relevant Legislation and Planning Policy

B.1 Legislation

The UK is no longer a member of the European Union (EU). EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation. EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'.

The Secretary of State for the Environment, Food and Rural Affairs and Welsh Ministers have made changes to parts of the *Conservation of Habitats and Species Regulations 2017* (referred to as the 2017 Regulations) so that they operate effectively. Most of these changes involve transferring functions from the European Commission to the appropriate authorities in England. All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

B.2 Designated Sites

6.1.1 Special Protection Areas (SPA) / Special Areas of Conservation (SAC)

These sites in the UK no longer form part of the EU's Natura 2000 ecological network. The *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019* (referred to as the 2019 Regulations) have created a national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes:

- existing SACs and SPAs
- new SACs and SPAs designated under these Regulations

Any references to Natura 2000 in the 2017 Regulations and in guidance now refers to the new national site network.

Formal Appropriate Assessment is required to be undertaken by the competent authority before undertaking, or giving consent, permission or other authorisation for any work which are likely to have a significant effect on such a site.

6.1.2 Wetland of International Importance (Ramsar site)

Designated under the *Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971* (the Ramsar Convention), in the UK, these sites are treated as having the same level of protection as SPA's and SAC's.

6.1.3 Sites of Special Scientific Interest

Under the *Wildlife and Countryside Act 1981* (as amended), it is an offence to carry out or permit to be carried out any operations likely to damage the Site of Special Scientific Interest (SSSI). These operations are listed in the SSSI notification.

Owners, occupiers, public bodies and statutory undertakers must give notice and obtain the appropriate consent under S.28 of the *Wildlife and Countryside Act 1981* (as amended), before undertaking operations likely to damage a SSSI.

6.1.4 National Nature Reserve

National Nature Reserves (NNR) are established under the National Parks and Access to the Countryside Act 1949. Most NNRs are also underpinned by SSSIs and are therefore protected by the measures detailed above. For NNRs not underpinned by SSSIs it is still an offence to carry out or permit to be carried out any potentially damaging operation.

NNRs are given protection through policies in a local development plan.

6.1.5 Local Nature Reserve

A Local Nature Reserve (LNR) is a statutory designation made under National Parks and Access to the Countryside Act 1949, by principal local authorities (district, borough or unitary councils).

The local authority must control the LNR land - either through ownership, a lease or an agreement with the owner.

LNRs are given protection through policies in a local development plan.

6.1.6 Locally Designated Sites

Local Wildlife Sites are sites with 'substantive nature conservation value'. They are defined areas, identified and selected for their nature conservation value, based on important, distinctive and threatened habitats and species with a region.

They are usually selected by the relevant Wildlife Trust, along with representatives of the local authority and other local wildlife conservation groups.

The LWS selection panel, select all sites that meet the assigned criteria, unlike SSSIs, which for some habitats are a representative sample of sites that meet the national standard. Consequently, many sites of SSSI quality are not designated and instead are selected as LWSs. Consequently, LWSs can be amongst the best sites for biodiversity.

B.3 Protected Species

6.1.7 Bats / Hazel Dormouse / Otter / Great Crested

These species, known as European Protected Species, are protected under Regulation 43 of the 2017 Regulations as amended by the 2019 Regulations. This makes it an offence to deliberately capture, injure or kill an animal; deliberately disturb an animal; or damage or destroy a breeding site or resting place used by an animal.

Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing. Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.

Where development works are at risk of causing one or more of the offences listed above, a mitigation licence from Natural England can be obtained to facilitate the works that would otherwise be illegal.

These species are also protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). This makes it an offence to intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb an animal in such a place.

Lower levels of disturbance not covered by the *Conservation of Habitats and Species Regulations 2017* remain an offence under the *Wildlife and Countryside Act 1981* although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

6.1.8 Water Vole

Water voles are protected under the *Wildlife and Countryside Act 1981* (as amended). There are no licensing purposes that explicitly cover development or other construction activities which could have an impact on water voles.

When development work is proposed in or near an area which is either known to or likely to contain water voles, then the developer will need to implement suitable mitigation to prevent impacts to water voles. The preferred mitigation option is to leave water voles *in situ*, with the development works adopting avoidance measures through redesign of the proposals.

Where impacts cannot be avoided, operations aimed at displacing water voles from a development site are now no longer covered by the "incidental result of an otherwise lawful action" defence in the *Wildlife and Countryside Act 1981* (as amended). Displacement of water voles now needs to be undertaken under a licence.

In England, small scale (limited to continuous lengths of bank not exceeding 50 m) displacement of water voles can be carried out at certain times of the year (February to April) for the purposes of conservation under a Class Licence by a registered person. For larger scale displacements or displacements outside of this period, displacement can be undertaken under a site-specific conservation licence.

Where it is considered that the best outcome for water voles is capture and translocation to a different location then this action is considered by Natural England to be outside the scope of the defence as the intentional capture of water voles is unlikely to be considered 'incidental'. In these circumstances there may be genuine grounds for issuing a conservation licence for the purpose of translocating the water vole population to suitable alternative habitat.

6.1.9 Nesting Birds

All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended), with some species afforded greater protection under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). In addition to the protection from killing or taking that all birds receive, Schedule 1 birds and their young must not be disturbed at the nest.

There are no licensing purposes that explicitly cover development activities affecting wild birds.

6.1.10 Widespread Species of Reptile (common lizard, slow worm, grass snake and adder)

Widespread species of reptile are protected against intentional killing and injury under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). There is no requirement for a licence where development works affect common species of reptiles. Instead, Natural England advise¹⁷ that where reptiles are present, they should be protected from any harm that might arise during the development works through appropriate mitigation.

6.1.11 Badgers

Badgers and their setts are protected under the *Protection of Badgers Act 1992* (as amended). This makes it an offence to wilfully kill, injure or take a badger; or intentionally or recklessly damage, destroy or obstruct access to a badger sett or disturb a badger in its sett.

It is not illegal to carry out disturbance activities near setts that are not occupied, i.e. those that do not show signs of current use.

Where required, licences for development activities involving disturbance or sett interference or closure are issued by Natural England. Licences for activities involving watercourse maintenance, drainage works or flood defences are issued under a separate process.

When assessing the requirement for a licence in respect of development, Natural England¹⁸ state that badgers are relatively tolerant of moderate levels of noise and activity around their setts, and that a low or moderate level of apparent disturbing activity at or near to badger setts does not necessarily disturb the badgers occupying those setts.

Licences are normally not granted from December to June inclusive (the badger breeding season) because dependent cubs may be present within setts.

6.2 Species and Habitats of Principal Importance for the Conservation of Biodiversity

Section 40 of the Natural Environment & Rural Communities Act (NERC) 2006 sets out the duty for public authorities to conserve biodiversity in England.

Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State for England, in consultation with Natural England, are referred to in Section 41 of the NERC Act for England. The list, known as the 'England Biodiversity List', of habitats and species can be found on the Natural England web site.

The 'England Biodiversity List' is used as a guide for decision makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006 to have regard to the conservation of biodiversity in England when carrying out their normal functions.

¹⁷Reptiles: guidelines for developers, English Nature 2004

¹⁸ Interpretation of 'Disturbance' in relation to badgers occupying a sett, Natural England (2009)

6.3 Non-native Invasive Plant Species

Under the Wildlife and Countryside Act 1981 (as amended), it is an offence to plant or otherwise cause these species to grow in the wild.

Any contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the *Environmental Protection Act 1990*.

B.4 Planning Policy

6.3.1 National Planning Policy Framework, 2021

The NPPF was first published in March 2012 and has been updated in July 2018, February 2019 and most recently in July 2021.

The NPPF states the commitment of the UK Government to minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity. It specifies the obligations that the Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this is to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

Chapter 15 of the NPPF 'Conserving and enhancing the natural environment' sets out the requirements to consider biodiversity in planning decisions. A summary of the paragraphs of the NPPF relevant to terrestrial ecology and nature conservation, and to the IERRT project, is provided below.

Paragraph 174 states that "*Planning policies and decisions should contribute to and enhance the natural and local environment by:*

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate".*

Paragraph 175 states that "Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries."

Paragraph 179 states that "To protect and enhance biodiversity and geodiversity, plans should:

- a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and*

b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity”.

Paragraph 180 states that “When determining planning applications, local planning authorities should apply the following principles:

a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.”

6.3.2 Biodiversity Net Gain

Under the *Environment Act 2021*, Schedule 14, all planning permissions granted in England, unless exempt, will have to deliver at least 10% biodiversity net gain from an as yet unconfirmed date, expected to be in November 2021.

B.5 Regional Planning Policy

Relevant regional policies for the Gravesend side of the Site is detailed in the following documents;

- Kent Environment Strategy (2016)
- Kent’s Plan Bee: Kent County Council’s Pollinator Action Plan (2019)

Table 11 provides a summary of the relevant regional planning policies. For a precise wording of each specific policy, please refer back to the source document. The planning policy has been considered when assessing potential ecological constraints and opportunities identified by the desk study and field surveys; and when assessing requirements for further survey, design options and ecological mitigation as described in Appendix C.

Essex County Council influences planning through the local borough councils it represents as such the relevant planning policies are covered in Section B.6.

Table 11. Summary of Regional Planning Policy

Document	Policy	Purpose
Kent Environment Strategy (2016)	4 - Monitoring and Evaluation	4.1 - Establish and monitor key performance indicators 4.2 - Evaluate progress and identify future risks, opportunities and actions aligned to Kent Environment Strategy priorities to inform current and future action
	5 - Conserve and enhance the quality and supply of the county of Kent’s natural and historical resources and assets.	5 – Conserve and enhance the quality and supply of the county of Kent’s natural and historical resources and assets. 5.1 - Establish a coherent, landscape-led approach to decision making through identification of the natural and historic features that underpin landscape character and a strategic approach to assessment of character and trends in landscape condition. 5.2 - Improve and increase functional habitat networks on land and in the sea, identifying opportunities and protecting and enhancing our natural and historic environment and landscape character through planning and decision making.

Document	Policy	Purpose
		5.3 - Identify and take forward opportunities for sustainable water management to improve quality and quantity of our water environment and resources
	8 - Influence future sustainable growth for the county of Kent	8.2 - Mitigate the impacts and address the ambitions identified through the Growth and Infrastructure Framework and local plans, such as sustainable and alternative transport options, green infrastructure, energy, water and flooding
	9 - Improve the county of Kent's environmental, social and economic resilience to environmental change.	9.3 - Improve water management and build flood resilience, maximising opportunities to deliver multiple benefits for our environment and residents into the future
Kent's Plan Bee: Kent County Council's Pollinator Action Plan (2019)	Objective 1 - For Kent County Council to manage the land it owns or controls or can influence in a way which can benefit pollinators' forage and habitat	The Council is: • putting in place, where it can, revised grass-cutting and pollinator-friendly planting regimes. It is reviewing how it reinstates land and manages it generally on road verges, in maintained schools and parks and all other parts of its estate. • reviewing the use of pesticides in its estate and seeking to end the use of the controversial neonicotinoid sprays. • finding ways to create corridors for wildlife throughout the landscape within and adjacent to its estate. • identifying, promoting and arranging where possible, appropriate training for staff involved in land management (including parks, highways, estate management and grounds maintenance) to better their understanding of the needs of pollinators and how they can help them in the course of their work (where they are not already doing that). • looking for opportunities to 'green' its buildings and assets with pollinator friendly planting and such things as bee hotels (space people can make for solitary bees to nest).
	Objective 2 - For Kent County Council to use the planning system to protect pollinators and improve the habitats on which they rely.	The council is: • looking to support the connection of landscapes to each other. • looking to develop approaches within KCC's planning services that will help to protect pollinator habitats. • using the Kent Design Guide, Kent Planning Officers Group and other appropriate • means to work with Kent's district planning authorities to encourage developments that improve pollinator habitats. • working with community groups, district and borough councils and through the Kent Association of Local Councils to map pollinator features at a community level in order to help people to take action. • looking to understand and better articulate the economic value of pollinators to Kent. • looking at how it might develop a pollinator impact assessment tool to inform planning decisions.

B.6 Local Planning Policy

Relevant local planning policies regarding the Tilbury Site are produced by Thurrock Borough Council are detailed in the following documents;

- Thurrock Borough Council Local Plan (2012)

Relevant local planning policies regarding the Gravesend Site are produced by Gravesham Borough Council are detailed in the following documents;

- Gravesham Local Plan Core Strategy (2014)

A summary of the relevant local planning policies is provided in the table below. For the precise wording of each specific policy please refer back to the source document. This planning policy has been considered when assessing potential ecological constraints and opportunities identified by the desk study and field surveys and when addressing requirements for further survey, design option and ecological mitigation.

The planning policies related to Gravesham Borough Council are listed in Table 12 and those listed in Thurrock Borough Council are listed in Table 13.

Table 12. Summary of Gravesham Local Planning Policy

Document	Policy	Purpose
Gravesham Borough Council Local Plan (2014)	Policy CS01: Sustainable Development	4.1.6 Planning applications that accord with the policies in the development plan for Gravesham will be approved without delay, unless material considerations indicate otherwise. 4.1.7 When considering development proposals the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework and in this Core Strategy. It will work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area. 4.1.8 Where there are no policies relevant to the application or relevant policies are out of date at the time of making the decision then the Council will grant permission unless material considerations indicate otherwise, taking into account whether: - Any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies in the National Planning Policy Framework taken as a whole; or - Specific policies in that Framework indicate that development should be restricted.
	Biodiversity	5.7.7 Gravesham Borough has a significant biodiversity resource. This includes: - Sites of international and national significance for wildlife, e.g. Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar Site, North Downs Woodlands Special Area of Conservation (SAC), and Cobham Woods Site of Special Scientific Interest (SSSI). Internationally significant sites are all designated as Sites of Special Scientific Interest and so are protected by national legislation; - Species protected by European and/or national legislation, e.g. bats, great crested newts; - Local wildlife sites which are important for the conservation of wildlife at the county level, e.g. Ebbsfleet Marshes, Court Wood Shorne; - Roadside nature reserves, e.g. A226 Gravesend Road, Chalk; and - Priority habitats and species identified in the UK Biodiversity Action Plan, e.g. native woodland including ancient woodland, lowland calcareous (chalk) grassland. 5.7.8 Some previously developed sites in the urban area have high biodiversity value. The green space and green grid networks together with other areas such as school grounds and private gardens also have a role in providing and connecting habitats. 5.7.9 Recent evidence suggests that there has been a decline in bird populations in the internationally significant Special Protection Areas (SPA) and Ramsar sites that make up the North Kent marshes (Thames Estuary and Marshes SPA/Ramsar Site, Medway Estuary and Marshes SPA/Ramsar Site, and The Swale SPA/Ramsar Site). There is currently insufficient evidence to adequately assess the cause of this decline although interim findings indicate that recreational activity causes disturbance to birds and that more development will lead to an increase in disturbance. Further work is being carried out by the North Kent Environmental Planning Group (NKEPG) in relation to this matter. In the meantime, a precautionary approach to development will be applied. This means that developers may need to provide or contribute to mitigation measures for the recreation needs arising from their developments, which may include provision of alternative greenspace, contributions to visitor control mechanisms and/ or management of the SPAs, to ensure that detrimental impacts on the integrity of the SPAs/ Ramsar sites are avoided.

Document	Policy	Purpose
		5.7.10 As part of its commitment to ensuring the ongoing protection of SACs, SPAs and Ramsar sites, the Council will: implement the findings of the bird population and visitor studies commissioned by the NKEPG; ensure that any proposed strategic avoidance and/or mitigation measures are adopted as appropriate in all planning documents and in the assessment of planning applications; and adopt a flexible approach that enables development on a case by case basis, which also takes into consideration the potential for in-combination effects based on best available evidence until the full results of the NKEPG studies are available, using a precautionary approach to require Habitats Regulations Assessment (HRA) where effects are uncertain. The Council will consider the need for HRA to be undertaken for sites with outline planning permission at the reserved matters stage. 5.7.11 The Greater Thames Marshes has been declared a Nature Improvement Area (NIA). This recognises that it has a unique yet fractured landscape and significant biodiversity importance but that the biodiversity is in decline and struggling to compete with increasing pressures. The NIA seeks to protect and enhance this valuable habitat, increase numbers of endangered species and protect existing flora and fauna. In Gravesham, the NIA includes the River Thames and much of the marshland to the east of Gravesend. 5.7.12 Local Nature Partnerships have been set up to help local areas to manage the natural environment as a system and to embed its value in local decisions for the benefit of nature, people and the economy. Local Nature Partnerships have been approved for Kent and Thames Gateway. 5.7.13 The strategy is to ensure that there is no net loss of biodiversity in the Borough and to take every opportunity to improve biodiversity. Existing sites of biodiversity value will be protected according to their importance. Where development is proposed, ecological surveys must be conducted and mitigation strategies produced, where applicable, prior to seeking planning permission. Development will then be expected to be designed, laid out and constructed in a manner which protects habitats and important species and also includes features to enhance biodiversity. Biodiversity Opportunity Areas have been identified across Kent and the wider South East which incorporate areas of the greatest biodiversity value. In Gravesham, these comprise: North Kent Marshes; Thames-side Green Corridors; and Medway Gap and North Kent Downs. These areas give opportunities for the restoration or creation of new priority habitats and will be the focus for improvement where opportunities arise, for example through the Local Nature Partnerships and the Nature Improvement Area.
	Policy CS12: Green Infrastructure	5.7.22 A multifunctional linked network of green spaces, footpaths, cycle routes and wildlife stepping stones and corridors will be created, protected, enhanced and maintained. The network will improve access within the urban area, from the urban area to the rural area and along the River Thames. 5.7.23 Sites designated for their biodiversity value will be protected, with the highest level of protection given to internationally designated Special Protection Areas, Special Areas of Conservation and Ramsar sites, followed by nationally designated Sites of Special Scientific Interest, followed by Local Wildlife Sites and then by other areas of more local importance for biodiversity. 5.7.24 There will be no net loss of biodiversity in the Borough, and opportunities to enhance, restore, re-create and maintain habitats will be sought, in particular within the Biodiversity Opportunity Areas shown on the Strategic Green Infrastructure Network map and within new development. 5.7.25 Where a negative impact on protected or priority habitats/species cannot be avoided on development sites and where the importance of the development is considered to outweigh the biodiversity impact, compensatory provision will be required either elsewhere on the site or off-site, including measures for ongoing maintenance. 5.7.26 The overall landscape character and valued landscapes will be conserved, restored and enhanced. The greatest weight will be given to the conservation and enhancement of the landscape and natural beauty of the Kent Downs Area of Outstanding Natural Beauty and its setting. Proposals will take account of the Kent

Document	Policy	Purpose
		Downs Area of Outstanding Natural Beauty Management Plan, the Gravesham Landscape Character Assessment, and the Cluster Studies where relevant.

Table 13. Summary of Thurrock Local Planning Policy

Document	Policy	Purpose
Thurrock Borough Council Local Plan (2012)	Core Strategy Spatial Objectives	SSO11 - To sustain and enhance the open character of the Green Belt in Thurrock and only allow development in very special circumstances SSO12 - Protect and enhance the natural, historic and built environment including biodiversity, landscape character, Conservation Areas, Listed Buildings, Scheduled Monuments and other heritage assets and open space through positive improvement. SSO13 - Develop the Greengrid network of biodiversity sites, historic sites, green infrastructure and open spaces linking existing and new communities, the urban areas to countryside and access to the river. Provide new open spaces, improve the accessibility of existing open spaces and ensure safe connecting routes and corridors linking them. SSO19 - To safeguard and enhance the Thurrock riverside and coastal land for its various roles as a key asset of the Borough: as a haven for wildlife, a cultural and heritage environment, providing for leisure and recreation at Grays and East Tilbury and for port – related activity at Tilbury, London Gateway and other locations. To provide land for flood risk management including new/relocated habitats across the Borough.
	CSTP18 – Green Infrastructure	1. Green Infrastructure Network 1. The Council, with its partners, will restore, protect, enhance and where appropriate create its green assets. The Green Infrastructure seeks to address the connectivity between urban and rural areas in the Borough and ensure that such green assets are multi-functional in use. Green assets can be those in public or private ownership and can be legally protected or covered by non-statutory designations. 2. A net gain and New Development 1. The Council will require a net gain in Green Infrastructure. This will contribute to addressing the existing and developing deficiencies, ensuring connectivity and relieving pressure on designated biodiversity sites such as SSSI's. 2. Alongside the requirements for biodiversity set out in Policy CSTP19, development must contribute to the delivery of Green Infrastructure, including the acquisition, planning, design and ongoing management consistent with the emerging Greengrid SPD. A key element of this will be connectivity and the integrity of the network; sites should not be considered in isolation. 3. Opportunities to increase Green Infrastructure will be pursued in new developments through the incorporation of features such as green roofs, green walls and other habitat/wildlife creation and also innovative technology. 4. Green Infrastructure assets will be identified, enhanced and safeguarded through: - Not permitting development that compromises the integrity of green and historic assets and that of the overall Green Infrastructure network; - Using developer contributions to facilitate improvements to the quality, use and provision of multi-functional green assets and green linkages; and - Investment from external funding sources. 3. Deficits Where there is an identified deficit the Council will require the creation of green assets including parks and gardens; natural and semi-natural spaces; amenity greens; children's play space; and outdoor sports facilities. Developments in areas of deficiency should provide for the supply and ongoing management of new areas of high quality natural and semi-natural space to address the new demand for green infrastructure. The guidance for provision of Green Infrastructure will be identified in the Greengrid SPD.

Document	Policy	Purpose
		4. Programmes i. The Council will work with partners to develop and implement Green Infrastructure through an area-based Greengrid Improvement Zones at a local level as necessary in order to deliver the green infrastructure in accordance with the overarching objectives of the Greengrid Strategy. ii. The Council will lead in Green Infrastructure management through developing best practice biodiversity enhancement throughout both urban-amenity and infrastructure land. This will be coordinated by programmes of education and community engagement and will support the development of environmental skills training in the region. iii. Allocations for new Green Infrastructure for Lakeside will be identified in other relevant Development Plan Documents. iv. The Council will identify projects to enhance the network further by improving the quality of existing provision and create new facilities to address existing deficiencies and serve the increasing population and to improve links between sites.
	CSTP19 - Biodiversity	Development will be encouraged to include measures to contribute positively to the overall biodiversity in the Borough. 1. The Biodiversity Network The Council will create a robust network of ecological sites centring on the Core Strategy and Policies for Management of Development (as amended) Chapter 5 – Thematic Policies Adopted January 2015 128 designated sites, i.e. SSSIs, SPAs, Ramsar, Local Nature Reserves and Local Wildlife Sites. These sites will be safeguarded and enhanced to mitigate the effects of past habitat loss and fragmentation, development and climate change. 2. Positive Biodiversity Management i. The Council will ensure that all designated sites are managed appropriately and will prepare suitable Biodiversity Management Plans, with partners, to demonstrate how positive management will be achieved. ii. Buffering and extensions to existing sites and additional habitat will be sought through the adoption of appropriate Biodiversity Site Management Plans. iii. Access will be balanced against biodiversity interest. 3. Key Sites The Council has identified the following key sites that it will work with partners to enhance and will pursue appropriate opportunities to increase the biodiversity network in the Borough. i. East Thurrock Marshes; ii. Mardyke Valley Project; iii. Local Wildlife Sites; and iv. Living Landscapes Sites. 4. Climate Change and Habitat Loss The Council recognises the need for mitigation for habitat loss due to climate change. It supports the identification, through the Thames Estuary 2100 project, of potential inter-tidal habitat creation sites at Fobbing Marshes and East Tilbury, and fresh water habitat creation sites at North Fobbing Marshes, South Fobbing Marshes, Tilbury and West Tilbury Marshes and the Mardyke. 5. Biodiversity and Geodiversity Action Plans i. The Council is committed to delivering the actions set out within the Thurrock, Essex and UK Biodiversity Action Plans. ii. The Council will promote small-scale biodiversity interventions such as green roofs. iii. The Council supports the production and implementation of the Geodiversity Action Plans being

Document	Policy	Purpose
		developed by local 'geo' groups in Eastern England as part of the East of England Geodiversity Partnership.
	PMD7 – Biodiversity, Geological Conservation and Development.	1. Development proposals will be required to demonstrate that any significant biodiversity habitat or geological interest of recognised local value is retained and enhanced on-site. Where it can be demonstrated that this is not possible, and there is no suitable alternative site available for the development, developers will be required to show that their proposals would mitigate any loss of biodiversity or geological interest. In circumstances where it can be demonstrated that neither retention on site nor mitigation is possible, developers will be required to provide appropriate compensation for any significant loss of biodiversity or geological interest, such that there is no overall net loss of biodiversity habitat or features of geological conservation interest in Thurrock. The Council will seek to achieve net gains in biodiversity where such gains would be possible, with particular reference to the desirability of re-creating priority habitats and the recovery of priority species. 2. The Council will not permit development that would result in the loss, or partial loss, of a locally designated biodiversity or geological site, except in exceptional circumstances where it can be demonstrated that there is no alternative, subject to the sequential approach outlined in (1) above. 3. To enable the Council to determine an application which would result in a loss of biodiversity or geological value, the developer will be required to submit a detailed justification setting out: i. why the loss is considered to be unavoidable ii. an assessment of what species and habitat would be lost or adversely affected as a result of development (including an ecological survey where appropriate) iii. how the loss or adverse effect is proposed to be mitigated on-site through habitat restoration or creation; and/or compensated for through the acquisition and management of a suitable site within the area, or a financial contribution towards the purchase and management of such a site or management of an existing site to bring it up to a necessary standard. 4. Thurrock Council will require development proposals to incorporate biodiversity or geological features into the design as far as possible. These may include green roofs, brown roofs and the creation of green corridors for wildlife. 5. Where it is necessary to secure the biodiversity or geological interest of a development site, the Council will seek the provision and implementation of a Biodiversity or Geological Management through planning obligations. The Council will evaluate development proposals and biodiversity management plans or geological management plans against recognised best practice.

Appendix C Methodology

C.1 Desk Study

A desk study was carried out to identify nature conservation designations and protected and notable habitats and species potentially relevant to the Proposed Development including scheduled invasive non-native species.

A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the Proposed Development on different ecological receptors and an understanding of the maximum distances typically considered by statutory consultees. Accordingly, the desk study identified any international nature conservation designations within 10 km of the Site boundary, other statutory nature conservation designations within 2 km of the Site boundary and local non-statutory nature conservation designations and protected and notable habitats and species within 2 km of the Site boundary.

The desk study was carried out in November 2022 using the data sources detailed in Table 14. Protected and notable habitats and species include those listed under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended); Schedules 2 and 4 of the Conservation of Habitat & Species Regulations 2010 (as amended); and species and habitats of principal importance for nature conservation in England listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Records of invasive non-native scheduled species were also collated. Such species are listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and the Invasive Alien species (Permitting and Enforcement) Order 2019.

A request was made for local biological records from both the Essex Field Club and the Kent Biological Records Centre.

Table 14. Summary of desk study sources

Document	Date	Purpose
Multi-Agency Geographic Information for the Countryside (MAGIC) website	December 2022	International statutory designations within 10 km of the Site. Other statutory designations within 2 km. Ancient woodlands and notable habitats within 500m of the Site. Higher Level Environmental Stewardship agreements applied to the Site. Information on habitats and habitat connections (based on aerial photography) relevant to interpretation of planning policy and assessment of potential protected and notable species constraints.
Essex Field Club	December 2022	Statutory and Non-statutory designations within 1 km of the Site Protected and notable species records within 1 km of the Site (records for the last 10 years only).
Kent Biological Records Centre	December 2022	Statutory and Non-statutory designations within 2 km of the Site Protected and notable species records within 1 km of the Site (records for the last 10 years only).
Ordnance Survey 1:2500 Pathfinder maps and aerial photography	December 2022	Information on habitats and habitat connections (based on aerial photography) relevant to interpretation of planning policy and assessment of potential protected and notable species constraints.

C.2 Field Survey

The field survey comprised an extended Phase 1 Habitat Survey and an appraisal of the potential suitability of the habitats present to support protected and notable species and invasive species.

Two AECOM ecologists visited the Site on 17th and 25th November 2022 and carried out an extended Phase 1 Habitat Survey, including the classification of all habitats on-site and adjacent to the Site, and an assessment of the potential of the Site to support nesting birds and roosting bats as well as a check for invasive species. A further walkover of the Gravesend site on 23rd January 2023 extended the survey to cover areas that were not accessible during the November 2022 visits.

6.4 Phase 1 Habitat Survey

A Phase 1 Habitat Survey, a standard method of environmental audit, was undertaken in November 2022 in accordance with the standard survey methods (Joint Nature Conservation Committee, 2016)¹⁹. It involved categorising the different habitat types and habitat features within the survey area. The information gained from the survey was used to determine the likely ecological value of the Site, and to direct any more specific survey work, which may need to be carried out prior to the submission of a planning application. The standard Phase 1 Habitat Survey method was extended to record target notes on protected, notable and invasive species.

Where relevant ecological receptors were present, target notes were recorded and the positions of these are shown on the Phase 1 Habitat map (Figure 1 in Appendix A). Typical and notable plant species were recorded, where present, for different habitat types and reflect the conditions at the time of survey. This was not intended to be a detailed inventory of the plant species present in the survey area, as this is not required for the purposes of a Phase 1 Habitat Survey.

6.5 Appraisal of Potential Suitability of Habitats to Support Protected and Notable Species

An appraisal was made of the potential suitability of the habitats present to support protected and notable species of plants or animals. Field signs, habitat features with potential suitability to support protected species and any sightings or auditory evidence were recorded when encountered, but no detailed surveys were carried out for any particular species.

A note was made of visible instances of any invasive non-native plant species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and the Invasive Alien Species (Enforcement and Permitting) Order (2019, as amended).

6.6 Plant Abundance (DAFOR) Results

Plant species were recorded for different habitat types and reflect the conditions at the time of the survey. Phase 1 Habitat surveys are not intended to be a detailed inventory of the plant species present on the survey area, nor is it required to possess a full list of plant species found within the red-line boundary. DAFOR stands for Dominant, Abundant, Frequent, Occasional and Rare, and is a way of measuring species abundance. The frequency of plant species present was recorded using the DAFOR Scale, and the overall values of species within habitat blocks are recorded in Appendix E.

Table 15. Plant Abundance (DAFOR) Scale Designations

Abundance		Relative Cover (percentage)
D	Dominant	50-100
A	Abundant	30-50
F	Frequent	15-30
O	Occasional	5-15
R	Rare	<5

Source: Guidance Notes for Recording DAFOR, Norfolk Wildlife Trust

6.7 Great Crested Newt Habitat Suitability Index (HSI) Assessment

Prior to undertaking the Phase 1 Habitat survey, aerial photography and 1:2500 Ordnance Survey mapping were examined to attempt to identify all ponds and other freshwater waterbodies within 250m of the Site's red line

¹⁹ Joint Nature Conservation Committee (JNCC) (2016) Handbook for Phase 1 Habitat Survey – a technique for environmental audit. JNCC

boundary. The process could not guarantee to definitively identify all ponds present but is reasonable within the limits (i.e. access to ponds and resolution of aerial photography) of available data.

Access allowing, all ponds identified by the desk study and field survey were inspected and appraised for their suitability to support great crested newts (*Triturus cristatus*). This entailed deriving a Habitat Suitability Index (HSI) for all the waterbodies based on the standard method (Oldham *et al.*, 2000)²⁰. The HSI uses ten suitability indices thought to affect great crested newt. Water bodies were scored between 0 and 1, according to the published scoring system, with zero indicating the poorest habitat and one indicating excellent great crested newt habitat as shown in Table 16. Water bodies that are brackish, or have high quantities of salt water are considered unsuitable for great crested newts due to the toxic nature of high salinity levels to amphibians. The suitability indices are listed in Appendix F.

Table 16. Categories of HSI Scores

HSI Score	Water Body Suitability for GCN
<0.5	Poor
0.5-0.59	Below Average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

6.8 Initial Bat Roosting Assessment

On the basis of the external assessment, the overall suitability of these trees and structures to support roosting bats was classified according to the scale outlined in the table below with the follow up survey effort requirement outlined in the following table.

Table 17. Criteria used to describe Bat Roost Suitability

Suitability Level		Type of Roost	
Habitat Suitability/Level of Risk	Summer/Transitional Roost used by non-breeding birds	Habitat Suitability/Level of Risk	Summer/Transitional Roost used by non-breeding birds
Confirmed	Presence of bats or evidence of bats. Confirmation of roost status may require further survey.		
High	Feature with multiple roosting opportunities for one or more species of bats with good connectivity to high quality foraging habitat.	Feature with multiple roosting opportunities for breeding bats (size, temperature), with close proximity and connectivity to high quality foraging habitat.	Large site that offers cool stable conditions with multiple roosting opportunities in close proximity to high quality foraging habitat.
Medium	Feature with some roosting opportunities and connectivity to moderate or high-quality foraging habitat	Feature providing some roosting opportunities with some connectivity to moderate or high-quality foraging habitat.	Medium sized feature with some roosting opportunities and some connectivity to moderate or high-quality foraging habitat.
Low	Feature with a limited number of roosting opportunities with poor connectivity to foraging habitat.	Feature with a limited number of roosting opportunities for breeding bats with low proximity and connectivity to low or moderate quality foraging habitat	Small sized feature which may be subject to disturbance or environmental variations, with a limited number of roosting opportunities and poor connectivity to foraging habitat.

²⁰ Oldham R.S, Keeble K., Sean M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal, 10(4), 143-155.

Table 18. Survey Effort for Bat Roosts

Roost Location	Low Suitability	Moderate Suitability	High Suitability
Building	One survey visit; either a dusk emergence or dawn re-entry survey.	Two separate survey visits. One dusk emergence and a separate dawn re-entry survey.	Three separate survey visits consisting of at least one dusk emergence and a separate dawn re-entry survey, with the third visit either a dusk or dawn survey
Tree	No Survey Effort Required	Two separate survey visits. One dusk emergence and a separate dawn re-entry survey.	Three separate survey visits consisting of at least one dusk emergence and a separate dawn re-entry survey, with the third visit either a dusk or dawn survey.

Source: Adapted for Table 4.1 within the Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)

C.3 Limitations and Assumptions

The south eastern section to the Tilbury Site was inaccessible due to the proximity of unconsolidated sands/muds within this section. The majority of this area is bare ground, and the recent disturbance and prevalence of bare ground makes it unsuitable for most species. This is not considered a constraint to the conclusions of the PEA.

Existing sub-stations at both sites were not accessible. However, these areas consist of hardstanding areas and this is not considered a constraint.

An ecological survey represents a 'snapshot' in time of the ecological condition of a site. The ecological character of a site can change substantially throughout both the course of a year, and from year to year impacting on the extent and quality of habitats potential to support protected species. As the survey was carried outside the main plant growing season for both native and invasive non-native species it is probable that some species weren't present during the time of survey. This technical note is however not a detailed inventory of plant species present and the potential oversight of some species is not a constraint for this level of survey.

None of these limitations either singly or in combination is significant enough to affect the baseline, impact assessment and resulting mitigation or enhancement referenced in this report.

Appendix D Target Notes and Photographs

TN Number	Target Note
TN1	Badger Setts with camera traps mounted outside (Tilbury)
TN2	Location of Mammal Burrow (Tilbury)
TN3	Plateau with grassland and ephemeral vegetation (Tilbury)
TN4	Shed with negligible bat potential (Tilbury)
TN5	Reptile Refugia on Site (Tilbury)
TN6	Location of the strip of Marshy Grassland (Gravesend)
TN7	Location of the Shooting Range Green (Gravesend)
TN8	Line of Trees along Ditch (Gravesend)
TN9	Ditch on Tilbury Site
TN10	Ditch on Tilbury Site
TN11	Ditch on Tilbury Site
TN12	Gravel Pit on Tilbury Site
TN13	Ditch on Gravesend Site
TN14	High Potential Bat Roost Tree



Photograph 1 – Western Block of Grassland and Scrub at Tilbury Site



Photograph 2 – Grassland and Scrub on the Southern Edge of the Tilbury Site



Photograph 3 – Hardstanding at Tilbury Site



Photograph 4 – Building with low bat suitability at Tilbury



Photograph 5 – Grassland and Short Ephemeral habitat on Tilbury Plateau



Photograph 6 – Scrub and grassland habitat on the banks of the Tilbury Plateau



Photograph 7 – Shooting Range Amenity Grassland at Gravesend Site



Photograph 8 – Semi Improved Grassland Bare Ground at the Gravesend Site



Photograph 9 – Strip of Marshy Grassland at Gravesend Site



Photograph 10 - Scrub at Gravesend Site



Photograph 11 – Large Ditch at the western edge of the Tilbury Site



Photograph 12 – Gravel Pit Lake at Tilbury Site



Photograph 13 – Grassland and shipping container on Site



Photograph 14 – High Potential Bat Roost Tree

Appendix E DAFOR Results

E.1 Tilbury Site

Bare Ground

Common Name	Latin Name	Frequency
Broad Leaved Dock	<i>Rumex obtusifolius</i>	Rare
Hawkbit	<i>Leontodon</i> species	Rare
Mugwort	<i>Artemisia vulgaris</i>	Occasional
Scentless Mayweed	<i>Tripleurospermum inodorum</i>	Rare
Sea Beet	<i>Beta vulgaris</i>	Rare

Introduced Shrub

Common Name	Latin Name	Frequency
Bramble	<i>Rubus fruticosus</i> aggregate	Occasional
Buddleia	<i>Buddleja davidii</i>	Abundant
Prickly Lettuce	<i>Lactuca serriola</i>	Rare
Ragwort	<i>Jacobaea vulgaris</i>	Rare
Red Fescue	<i>Festuca rubra</i>	Rare
Southern Reed	<i>Phragmites australis</i>	Occasional
Willow	<i>Salix</i> species	Frequent

Scrub

Species		Location		
Common Name	Latin Name	Scrub I	Scrub II	Scrub III
Blackthorn	<i>Prunus spinosa</i>	Occasional	Frequent	-
Bramble	<i>Rubus fruticosus</i> aggregate	Dominant	Dominant	Dominant
Broad Leaved Dock	<i>Rumex obtusifolius</i>	-	-	Rare
Buddleia	<i>Buddleja davidii</i>	-	-	Rare
Burnet Rose	<i>Rosa pimpinellifolia</i>	-	Rare	-
Cleavers	<i>Galium aparine</i>	Occasional	-	-
Dogwood	<i>Coronus sanguinea</i>	-	-	Occasional
Dog Rose	<i>Rosa canina</i>	-	-	Occasional
Elder	<i>Sambucus nigra</i>	-	-	Rare
Fennel	<i>Foeniculum vulgare</i>	Occasional	-	Occasional
Hawkbit	<i>Leontodon</i> species	-	-	Rare
Hawthorn	<i>Crataegus monogyna</i>	-	Occasional	Occasional
Hogweed	<i>Heracleum spondylium</i>	Occasional	-	-
Mugwort	<i>Artemisia vulgaris</i>	Frequent	-	Occasional
Scotch Broom	<i>Cytisus scoparius</i>	-	-	Rare
Teasel	<i>Dipsacus fullonum</i>	-	Rare	-
Traveller's Joy	<i>Clematis vitalba</i>	Occasional	-	-
Willow	<i>Salix</i> species	-	Occasional	Rare

Short Ephemeral

Common Name	Latin Name	Frequency
Annual Mercury	<i>Mercurialis annua</i>	Rare
Bramble	<i>Rubus fruticosus</i> aggregate	Rare
Broad Leaved Dock	<i>Rumex obtusifolius</i>	Occasional
Dandelion	<i>Taraxacum officinale</i>	Occasional
Dog Rose	<i>Rosa canina</i>	Rare
Dwarf Mallow	<i>Malva neglecta</i>	Rare
Mullein	<i>Verbascum thapsus</i>	Rare
Narrow Leaved Ragwort	<i>Senecio inaequidens</i>	Occasional
Pampas Grass	<i>Cortaderia selloana</i>	Rare
Scentless Mayweed	<i>Tripleurospermum inodorum</i>	Frequent
Teasel	<i>Dipsacus fullonum</i>	Rare

Semi Improved Grassland

Common Name	Species	Location		
	Latin Name	Grassland I	Grassland II	Grassland – Plateau
Apple	<i>Malus domestica</i>	Rare	-	-
Bramble	<i>Rubus fruticosus</i> aggregate	-	-	Rare
Beech	<i>Fagus sylvatica</i>	-	Rare	-
Bristly Oxtongue	<i>Helminthotheca echioides</i>	Occasional	-	-
Broad Leaved Dock	<i>Rumex obtusifolius</i>	-	Occasional	-
Cherry	<i>Prunus avium</i>	Rare	-	-
Chicory	<i>Cichorium intybus</i>	Rare	Rare	-
Cleavers	<i>Galium aparine</i>	-	-	Occasional
Cocks Foot	<i>Dactylis glomerata</i>	Abundant	Frequent	Dominant
Common Nettle	<i>Urtica dioica</i>	Occasional	Occasional	
Cow Parsley	<i>Anthriscus sylvestris</i>	Frequent	-	-
Creeping Thistle	<i>Cirsium arvense</i>	Occasional	-	-
Dandelion	<i>Taraxacum officinale</i>	-	-	-
English Ivy	<i>Hedera helix</i>	-	Rare	-
Everlasting Pea	<i>Lathyrus latifolius</i>	Rare	-	-
False Oat Grass	<i>Arrhenatherum elatius</i>	Abundant	-	Abundant
Fennel	<i>Foeniculum vulgare</i>	Occasional	-	Occasional
Garlic Mustard	<i>Alliaria petiolate</i>	Rare	-	-
Hawkbit	<i>Leontodon</i> species	Occasional	Occasional	Frequent
Hawthorn	<i>Crataegus monogyna</i>	Rare	-	-
Hogweed	<i>Heracleum spondylium</i>	Occasional	-	-
Horse Radish	<i>Armoracia rusticana</i>	Rare	-	-
Narrow Leaved Ragwort	<i>Senecio inaequidens</i>	Rare	-	Occasional
Red Clover	<i>Trifolium pratense</i>	-	Frequent	Occasional

Species		Location		
Common Name	Latin Name	Grassland I	Grassland II	Grassland – Plateau
Red Fescue	<i>Festuca rubra</i>	Frequent	Abundant	Abundant
Ribwort Plantain	<i>Plantago lanceolata</i>	Occasional	-	-
Scentless Mayweed	<i>Tripleurospermum inodorum</i>	Frequent	-	-
Scotch Broom	<i>Cytisus scoparius</i>	-	-	Rare
Shining Cranesbill	<i>Geranium lucidum</i>	-	-	Occasional
Teasel	<i>Dipsacus fullonum</i>	-	Rare	-
Tufted Vetch	<i>Vicia caracca</i>	-	Occasional	Occasional
White Dead Nettle	<i>Lamium alba</i>	-	Rare	-
Willow	<i>Salix</i> species	Rare	Rare	Rare
Yarrow	<i>Achillea millefolium</i>	Occasional	Rare	-

E.2 Gravesend Site

Amenity Grassland

Common Name	Latin Name	Frequency
Creeping Cinquefoil	<i>Potentilla reptans</i>	Occasional
Dandelion	<i>Taraxacum officinale</i>	Rare
Perennial Rye Grass	<i>Lolium perenne</i>	Dominant
Red Fescue	<i>Festuca rubra</i>	Rare
Yarrow	<i>Achillea millefolium</i>	Rare

Bare Ground

Common Name	Latin Name	Frequency
Bristly Oxtongue	<i>Helminthotheca echioides</i>	Occasional
Canadian Fleabane	<i>Conzya canadensis</i>	Rare
Creeping Cinquefoil	<i>Potentilla reptans</i>	Occasional
Dandelion	<i>Taraxacum officinale</i>	Occasional
Hawkbit	<i>Leontodon</i> species	Rare
Perennial Rye Grass	<i>Lolium perenne</i>	Occasional
Red Fescue	<i>Festuca rubra</i>	Rare
Ribwort Plantain	<i>Plantago lanceolata</i>	Rare

Line of Trees

Common Name	Latin Name	Frequency
Apple	<i>Malus domestica</i>	Rare
Blackthorn	<i>Prunus spinosa</i>	Frequent
Broad Leaved Dock	<i>Rumex obtusifolius</i>	Rare
Dog Rose	<i>Rosa canina</i>	Occasional
Hawkbit	<i>Leontodon</i> species	Occasional

Common Name	Latin Name	Frequency
Hawthorn	<i>Crataegus monogyna</i>	Abundant
Mugwort	<i>Artemisia vulgaris</i>	Rare
Reed Mace	<i>Typha angustifolium</i>	Rare
Red Fescue	<i>Festuca rubra</i>	Rare
Southern Reed	<i>Phragmites australis</i>	Occasional
Willow	<i>Salix</i> species	Frequent

Marshy Grassland

Common Name	Latin Name	Frequency
Bramble	<i>Rubus fruticosus</i> aggregate	Rare
Dog Rose	<i>Rosa canina</i>	Rare
Hawthorn	<i>Crataegus monogyna</i>	Rare
Southern Reed	<i>Phragmites australis</i>	Dominant
Willow	<i>Salix</i> species	Occasional

Scattered Scrub

Common Name	Latin Name	Frequency
Bramble	<i>Rubus fruticosus</i> aggregate	Dominant
Colts Foot	<i>Tussilago farfara</i>	Rare
Dog Rose	<i>Rosa canina</i>	Occasional
Elder	<i>Sambucus nigra</i>	Rare
Hawthorn	<i>Crataegus monogyna</i>	Occasional
Red Fescue	<i>Festuca rubra</i>	Occasional
Southern Reed	<i>Phragmites australis</i>	Rare
Yarrow	<i>Achillea millefolium</i>	Rare

Semi Improved Grassland

Common Name	Latin Name	Frequency
Alexanders	<i>Smyrniolus olusatrum</i>	Occasional
Bristly Oxtongue	<i>Helminthotheca echioides</i>	Occasional
Broad Leaved Dock	<i>Rumex obtusifolius</i>	Occasional
Canadian Fleabane	<i>Conyza canadensis</i>	Rare
Cleavers	<i>Galium aparine</i>	Rare
Cocks Foot	<i>Dactylis glomerata</i>	Frequent
Cherry	<i>Prunus avium</i>	Rare
Common Nettle	<i>Urtica dioica</i>	Occasional
Cow Parsley	<i>Anthriscus sylvestris</i>	Occasional
Creeping Cinquefoil	<i>Potentilla reptans</i>	Occasional
Dog Rose	<i>Rosa canina</i>	Occasional
False Oat Grass	<i>Arrhenatherum elatius</i>	Frequent
Elder	<i>Sambucus nigra</i>	Rare

Common Name	Latin Name	Frequency
Hawkbit	<i>Leontodon species</i>	Occasional
Hawthorn	<i>Crataegus monogyna</i>	Occasional
Herb Robert	<i>Geranium robertianum</i>	Rare
Hogweed	<i>Heracleum spondylium</i>	Rare
Marsh Thistle	<i>Cirsium pratense</i>	Occasional
Mugwort	<i>Artemisia vulgaris</i>	Frequent
Ragwort	<i>Jacobaea vulgaris</i>	Rare
Red Fescue	<i>Festuca rubra</i>	Dominant
Southern Reed	<i>Phragmites australis</i>	Rare
Yarrow	<i>Achillea millefolium</i>	Occasional

Appendix F Habitat Suitability Index Assessment Results

Table 19. Great Crested Newt Habitat Suitability Indices and Description

Suitability Indices	Suitability Index Title	Suitability Index Description
1	Geographic Location	Different areas of the UK represent different indices scores
2	Water Body Area	The optimum water body size is between 500 and 750m ² .
3	Water Permeance	The optimal frequency of drying is one year a decade
4	Water Quality	The presence of indicator organisms (that same that are used to assess running water) is the water quality indicator.
5	Water Body Shading	Great crested newt occurrence is significantly reduced above a threshold of 75% shade.
6	Impact of Waterfowl	Waterfowl impact on water body vegetation, water turbidity and are predators of newts.
7	Occurrence of Fish	The effect if fish presence is related to the species, Some species can have negative impacts and newts hardly ever coexist with larger predatory fish species. Other species (depending on conditions) are not detrimental.
8	Waterbody Density	In general; scrub, unimproved grassland, woodland and gardens are regarded as being suitable terrestrial habitat, unlike arable fields, improved pasture and hard standing. The SI9 is the combination between positive factors (suitable habitat) and negative factors (e.g. inherent barriers to movement such as roads). The surrounding habitat is scored according to the extent of high-quality terrestrial newt habitat.
9	Terrestrial Habitat	The highest occurrence of great crested newt is found in water bodies with emergent vegetation cover between 25% and 50% and submerged vegetation between 50% and 75%
10	Macrophytes	

The resulting HSI for the water bodies were calculated using the geometric mean of the ten suitability indices;

$$HSI = SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$$

Water bodies were scored between 0 and 1, according to the published scoring system, with zero indicating the poorest habitat and one indicating excellent great crested newt habitat.

Table 20. GCN HSI Assessment Results

HSI Assessment Category	Ditch I		Ditch II	
	Description	Value	Description	Value
S1 – Geographic Location	Geographic Location A (South and South East)	1	Geographic Location A (South and South East)	1
S2 – Pond Area	622m ²	1	1563m ²	0.87
S3 – Pond Permanence	Never Dries	0.9	Rarely Dries	1
S4 – Water Quality	Moderate	0.67	Moderate	0.6
S5 – Shade	60% Shade from Trees	1	0% Shade on Waterbody	1
S6 – Waterfowl	Minor waterfowl presence on the ditch surface	0.67	Minor waterfowl presence on the ditch surface	0.67
S7 – Fish	Fish likely to be present within the ditch on Site	0.67	Fish likely to be present within the ditch on Site	0.67
S8 – Number of Ponds within 1km	Over 10 water bodies in close proximity	1	Over 10 water bodies in close proximity	1

HSI Assessment Category	Ditch I		Ditch II	
	Description	Value	Description	Value
S9 – Terrestrial Habitat	Good surrounding terrestrial habitat	1	Moderate surrounding terrestrial habitat	0.67
S10 – Macrophyte Cover	0-5% Cover	0.3	0-5% Cover	0.3
Overall HSI Score		0.78		0.74
Pond Habitat Suitability Category		Good		Good

HSI Assessment Category	Ditch III		Ditch IV	
	Description	Value	Description	Value
S1 – Geographic Location	Geographic Location A (South and South East)	1	Geographic Location A (South and South East)	1
S2 – Pond Area	1084m ²	0.95	711m ²	1
S3 – Pond Permanence	Rarely Dries	1	Rarely Dries	1
S4 – Water Quality	Moderate	0.67	Moderate	0.67
S5 – Shade	0% Shade on waterbodies	1	60% Shade from Trees	1
S6 – Waterfowl	Minor waterfowl presence on the ditch surface	0.67	Minor waterfowl presence on the lake surface	0.67
S7 – Fish	Fish likely to be present within the ditch on Site	0.67	Fish likely to be present within the lake on Site	0.67
S8 – Number of Ponds within 1km	Over 10 water bodies in close proximity	1	Over 10 water bodies in close proximity	1
S9 – Terrestrial Habitat	Moderate surrounding terrestrial habitat	0.67	Moderate surrounding terrestrial habitat	0.67
S10 – Macrophyte Cover	0-5% Cover	0.3	0-5% Cover	0.3
Overall HSI Score		0.75		0.76
Pond Habitat Suitability Category		Good		Good

HSI Assessment Category	Gravel Lake	
	Description	Value
S1 – Geographic Location	Geographic Location A (South and South East)	1
S2 – Pond Area	6610m ²	Over 2000 ² m in area, so omitted from calculation
S3 – Pond Permanence	Never Dries	0.9
S4 – Water Quality	Moderate	0.67
S5 – Shade	10-20% Shade from Trees	1
S6 – Waterfowl	Major waterfowl presence on the ditch surface	0.01
S7 – Fish	Fish likely to be present within the lake on Site	0.67

HSI Assessment Category		Gravel Lake
	Description	Value
S8 – Number of Ponds within 1km	Over 10 water bodies in close proximity	1
S9 – Terrestrial Habitat	Poor surrounding terrestrial habitat	0.33
S10 – Macrophyte Cover	0-5% Cover	0.3
Overall HSI Score		0.46
Pond Habitat Suitability Category		Poor

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