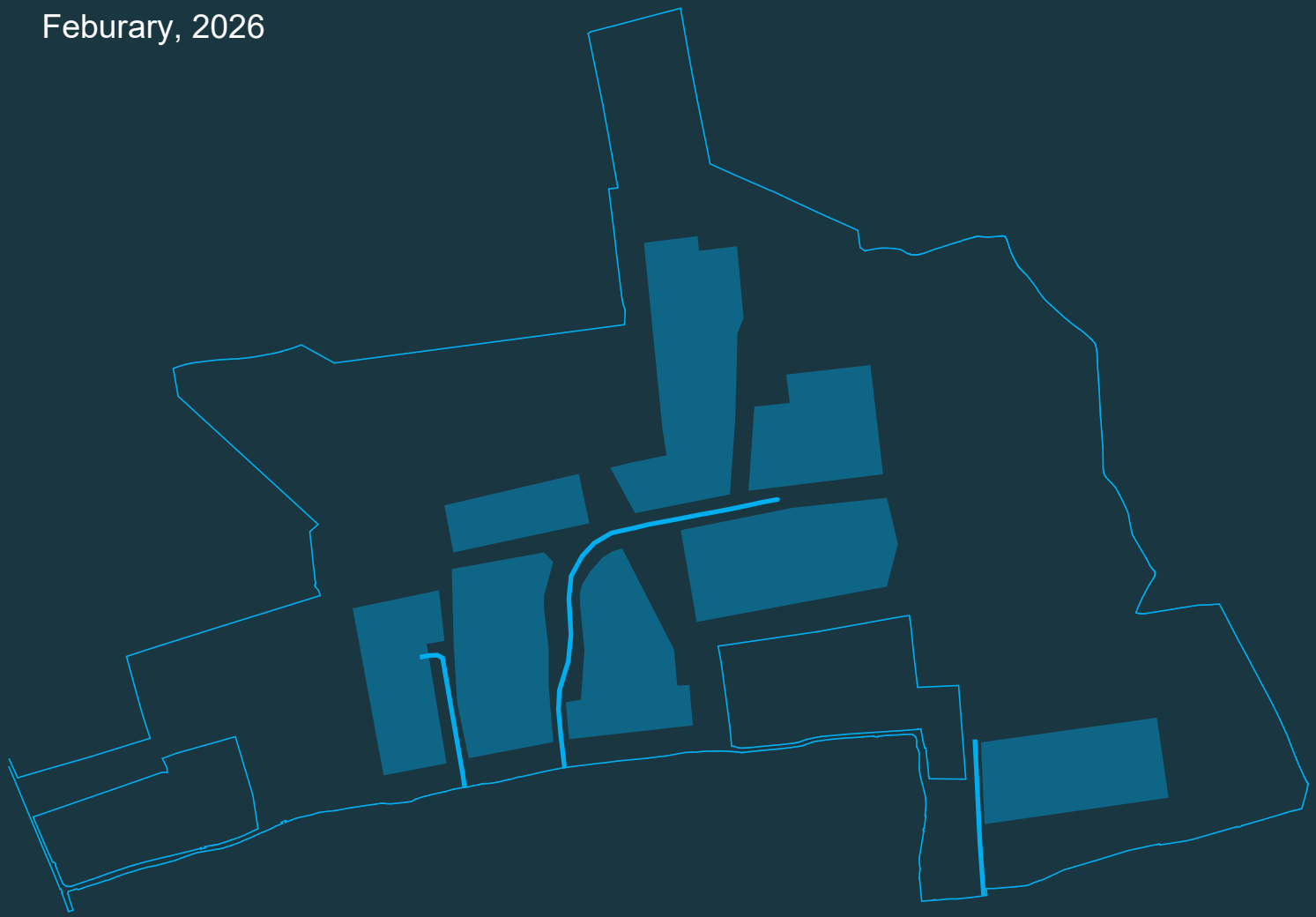
East Havering Data Centre Campus

Non-Technical Summary

North Ockendon, Havering

Feburary, 2026



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Contents

1. Introduction

1.1 Purpose of Non-Technical Summary

This Non-Technical Summary (NTS) of the Environmental Statement (ES) has been prepared by Ramboll UK Limited ('Ramboll') and a team of technical specialists to accompany the proposed Local Development Order (LDO)[1] in respect of the proposal to build a data centre campus (the 'proposed development') on land at North Ockendon within East Havering (the 'site').

The ES has been prepared on behalf of the London Borough of Havering in its capacity as Local Planning Authority (LPA) in accordance with the statutory procedures set out in the Town and Country Planning (Environmental Impact Assessment) (England) Regulations 2017 (the 'EIA Regulations')[2]. Reference to the London Borough of Havering (LBH) and the Council have been used interchangeably throughout the ES and refer to any part of the Council other than the LPA. Whilst the LPA sits within the LBH, it has a distinct statutory role to exercise urban planning functions for the Borough and must act independently of other Council departments.

The proposed development consists of the construction and operation of up to 400,000 m^2 of gross external floor area (GEA) comprising the following:

1. The erection of buildings up to a maximum of 400,000 m^2 (GEA) including:
    a. Data centre uses up to 340,000 m^2;
    b. Indoor horticulture of 50,000 m^2;
    c. Visitor Centre up to 600 m^2 (and no less than 300 m^2);
    d. District heating centre up to 3,300 m^2;
    e. Campus management facilities up to 2,700 m^2;
    f. Campus security facilities (not including local facilities ancillary to individual data centres) up to 3,400 m^2;
2. Installation of electrical infrastructure and associated plant equipment to serve the proposed development;
3. Creation of an 'ecology park';
4. Any operations or engineering works necessary to enable the delivery of the proposed development including:
    a. Excavation and earthworks (e.g. 'cut and fill');
    b. Formation of compounds for the stockpiling and sorting of excavated materials;
    c. Foundations and piling, and any other operations or engineering necessary for site mobilisation and new buildings / structures;
    d. Creation of estate roads and associated infrastructure for access by all modes of transport;
    e. Site security measures including fencing, gates and gate houses;
    f. Works to install underground services and utilities;
    g. Provision of temporary site offices and welfare facilities; and
    h. Highway works on Fen Lane and Ockendon Road.

[1] LDOs were introduced under Section 40 of the Planning and Compulsory Purchase Act 20041 which has the effect of amending the Town and Country Planning Act 19901. This measure was promoted by the Government as a means of simplifying the planning permission process and providing certainty for prospective developers, thereby promoting economic growth. An LDO grants permission for the type of development specified in the LDO and by so doing, removes the need for the submission of a planning application. An LDO must be accompanied by a Statement of Reasons that includes the description of the permitted development and defines the area that it affects, and must also be subject to formal consultation before it can be adopted.

[2] Secretary of State, 2017. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, London HMSO.

The purpose of the NTS is to provide a summary of the main findings of the Environmental Impact Assessment (EIA) that has been undertaken of the proposed development and that has been reported in the ES. The NTS provides:

- a description of the site and surrounding context;
- an outline of the reasonable development alternatives considered and an indication of the main reasons for their choice, taking into account the potential environmental impacts;
- a description of the proposed development; and
- a summary of the likely significant environmental effects predicted and key mitigation measures (as relevant).

The aim of the NTS is to summarise the main findings of the ES in a clear and concise manner to assist the public in understanding what the significant environmental effects of the proposed development are likely to be.

1.2 Viewing of and Commenting on ES and Supporting Documents

The full ES comprises the following documents:

- Volume 1: Main Environmental Statement Report;
- Volume 2: Technical Appendices; and
- Non-Technical Summary (this document).

The full ES, together with other supporting documents are available for viewing on the Council's website

Digital versions of the full ES are available in the form of a CD or USB Memory Stick are available for purchase from Ramboll at:

240 Blackfriars Road

London, SE1 8NW

Tel: 020 7631 5291

The cost of a CD or USB Memory Stick would be £25 + VAT.

1.3 Commenting on LDO

Comments on the LDO should be submitted to LBH at:

London Borough of Havering
Town Hall
Main Road
Romford
RM1 3BB

Email: planning@havering.gov.uk

Or via the Council website.

2. Environmental Impact Assessment

1.4 EIA Process and Methodology

EIA is a process that identifies the likely significant effects on the environment (both beneficial and adverse) of a proposed development and proposed mitigation to avoid, reduce or off-set any likely significant adverse environmental effects, and where possible enhance any beneficial effects. It is an iterative process which proactively seeks to integrate mitigation within the development proposals so as to avoid significant effects from arising.

The EIA process adopted for the proposed development has followed best practice guidelines, as set out by the Institute of Sustainability and Environmental Professionals ('ISEP') (formerly the Institute of Environmental Management and Assessment (IEMA)) Quality Mark Scheme. The process involved the following key steps:

- Consultation with key stakeholders such as, but not limited to, the Council, Historic England (HE), Environment Agency (EA), Thames Water (TW) and Transport for London (TfL) on the issues to be considered within the EIA;
- Collection, use and assessment of the most up-to-date information on the baseline conditions and likely evolution of that baseline without the proposed development or in the future;
- Interpretation of the proposed development planning drawings and schedules, as well as the formulation of assumptions in the absence of information, as the basis for the individual technical assessments;
- Use of relevant guidance and good practice methods to predict the likely nature, scale and significance of any environmental change; and
- Reporting of the results of the EIA process in the ES in a transparent way, to provide the information required to inform the decision-making process.

1.5 EIA Screening

Screening describes the process by which the need for EIA is considered. The proposed development falls under the definitions and thresholds set out within Schedule 2 (10(b) Urban Development Projects) of the EIA Regulations and, by virtue of factors such as its size, nature or location, has the potential to have significant effects on the environment.

On 22 May 2024, the LPA adopted an EIA Screening Opinion to the effect that the proposals constitute EIA development in accordance with Regulation 32 (2) of the EIA Regulations.

1.6 EIA Scoping

An EIA Scoping Request Report was submitted to the Council in March 2024 in support of a request for an EIA Scoping Opinion pursuant to Regulation 15(1) of the EIA Regulations. The EIA Scoping Opinion Request Report set out a description of the then emerging development proposals; the environmental topics where significant environmental effects were considered likely and required consideration within the ES ('scoped in'); the environmental topics where significant effects were considered unlikely ('scoped out'), as well as the proposed assessment approaches to be adopted for the EIA including the proposed assessment methodologies.

The LPA adopted their EIA Scoping Opinion on 23 May 2024 confirming the scope of the EIA and ES as proposed in the EIA Scoping Opinion Request Report, with no requests for additional technical assessment chapters to be included in the ES. The EIA has been undertaken and the ES prepared based on the EIA Scoping Opinion.

Since the receipt of the EIA Scoping Opinion, there have been refinements to the emerging development proposals; the boundary of the site has been amended to include proposed highway

works; and the assumptions related to electrical connections and off-site/on-site infrastructure have been updated due to ongoing consultations. Given the scale and nature of these refinements, amendments and updates, the proposed development is considered to remain materially the same as the emerging development proposals which were the subject of the EIA Scoping Opinion. Accordingly, the adopted and agreed scope of the EIA and ES is considered to remain valid and it has not been considered necessary to rescope the proposed development.

For completeness, consideration has been given to the relationship of the proposed development in respect of proposed upgrades to the existing Warley GSP substation and the proposed new Warley GSP substation.

1.7 Topics Included in ES

The following environmental topics were scoped into the ES, as confirmed during the EIA Scoping process, and their technical assessments are presented within discrete ES chapters:

- Archaeology and Cultural Heritage;
- Socio-Economics;
- Transport and Accessibility;
- Air Quality;
- Noise and Vibration;
- Ecology;
- Water Resources and Flood Risk;
- Soil and Agriculture;
- Climate Change; and
- Landscape and Visual.

1.8 Topics Excluded from ES

The following environmental topics were scoped out of the ES during the EIA Scoping process:

- Ground Contamination;
- Aviation;
- Human Health;
- Telecommunication Interference;
- Utilities;
- Major Accidents and Disasters; and
- Waste.

1.9 Assessment Approach

As the proposed development is to be implemented under an LDO, based on a set of defined parameters, the precise details and form of the final development are not known at this stage. In order to address this uncertainty, the EIA adopts a reasonable 'worst-case' assessment approach for each technical assessment scoped within the EIA and ES. Each technical assessment chapter provides detail as to how the reasonable worst-case has been derived, drawing on professional experience of developments of a similar nature and scale.

In addition to the proposed development parameters, an illustrative scheme has been developed. The illustrative scheme is just one example of how the development could come forward in compliance with the LDO. Some technical assessments include consideration of the illustrative scheme in order to provide additional commentary on the more realistic environmental effects of the development as expressed within the defined parameters.

The ES provides assessments of potential significant environmental effects during the construction works and once the proposed development is complete and operational. Each technical assessment considers different types of effects including direct, indirect, secondary and cumulative; short-, medium- and long-term; temporary and permanent; beneficial, neutral and adverse effects.

Assessments have been undertaken against the existing baseline (typically 2024/2025) or a defined year in the future ('future baseline').

Consideration has been given to the temporal and spatial nature of effects including permanent or temporary; reversible and irreversible; short- (up to 5 years), medium- (5 - 10 year) or long-term (more than 10 years).

In respect of the temporal scope, the lifespan of the LDO is proposed to be 20 years and construction would be permitted throughout this period. However, it is considered that the proposed development would be delivered within 17 years assuming the fastest reasonable programme. The approach to construction and sequencing of the proposed development would be unchanged if the construction were to take longer than 17 years.

Each of the scoped-in environmental topics have been reported on in a separate technical assessment chapter within ES Volume 1. Typically, in each chapter, a description of the assessment methodology is given together with existing site and study area conditions or predicted future conditions. This is followed by an assessment of the likely effects of the proposed development taking into account mitigation measures that are embedded in the proposed development; the consideration of additional mitigation or any enhancement measures; and a further assessment of the residual effects that would remain following the inclusion of additional mitigation measures, if relevant. Where scoped in, the chapter concludes with an assessment of the combined or additive effects of the proposed development together with or in addition to cumulative schemes that may be delivered concurrently. A summary of the assessment is then provided.

Mitigation is the term used to refer to the process of avoiding where possible and, if not, minimising, controlling and/or offsetting the potentially significant effects of a development. As part of the iterative process, mitigation measures have been integrated (embedded) into the design stage, the construction stage, and the completed development stage. The embedded mitigation measures are described in the following ES chapters:

- Chapter 3: Need and Alternatives; and
- Chapter 4: Proposed Development and Construction.

The technical chapters in ES Volume 1 report upon the scale (i.e. typically Negligible, Minor, Moderate or Major) and nature (Beneficial, Neutral and Adverse) of effects in order to determine what the likely significant effects of the proposed development would be. Significance has been determined based on published thresholds and/or the application of professional judgement and experience. Where published industry guidance (e.g. ecology and air quality) adopts a binary approach to significance reporting (i.e. the effect is either significant or not significant, with no scales of effects applied), assessment conclusions have been translated into the EIA significance terminology/criteria adopted across the EIA as a whole based on professional judgement, for consistency and to enable intra-cumulative assessment. The results of these technical assessments have been summarised in this NTS.

Consideration has also been given to the cumulative effects of the proposed development. The following two types of cumulative effects have been assessed:

- Intra-Project effects are different types of impacts from the proposed development that could interact to jointly affect a particular receptor or receptor group at the site. Potential impact interactions could include the combined effects of noise and dust during construction activities on a particular sensitive receptor; and
- Inter-Project effects which are combined or additional effects generated from the proposed development together with other 'approved or existing projects' ('cumulative schemes') as defined by the EIA Regulations. These cumulative schemes may generate their own individually insignificant effects but when considered together could amount to a significant cumulative effect, for example, combined transport and accessibility impacts from two or more schemes. A total of nine cumulative schemes (consented up to January 2026) were identified and agreed with the LPA for assessment during the EIA Scoping process. The locations of these cumulative schemes are presented in Figure 2.1.

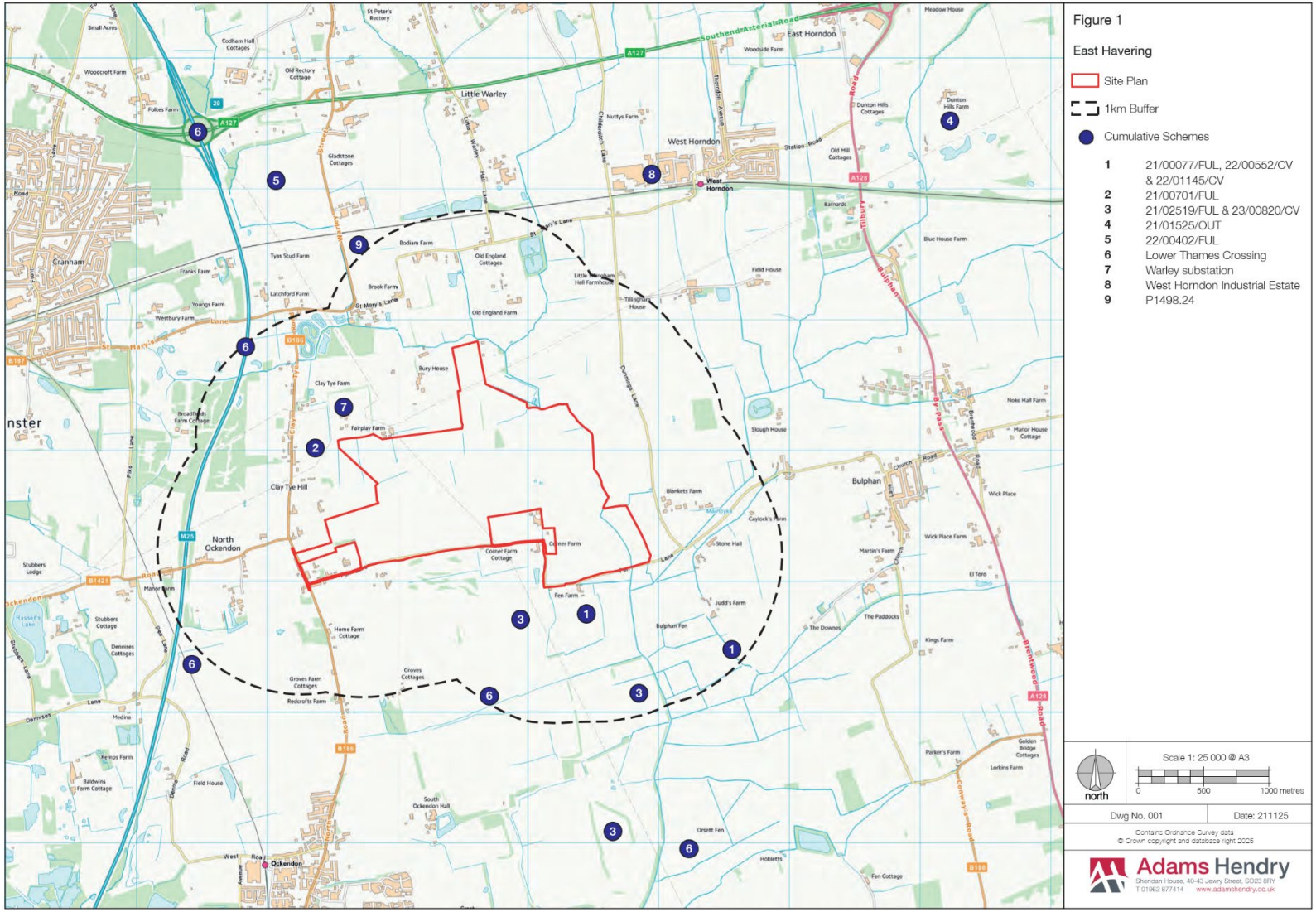

Figure 2.1: Cumulative Schemes

3. Existing Site and Surrounding Context

1.10 Site Location

The site is located within the London Metropolitan Green Belt and is situated approximately 30 km (18 miles) east of Central London within the administrative boundary of Havering Council (centred approximately at national grid reference of TQ 60005 85431), as presented in Figure 3.1.

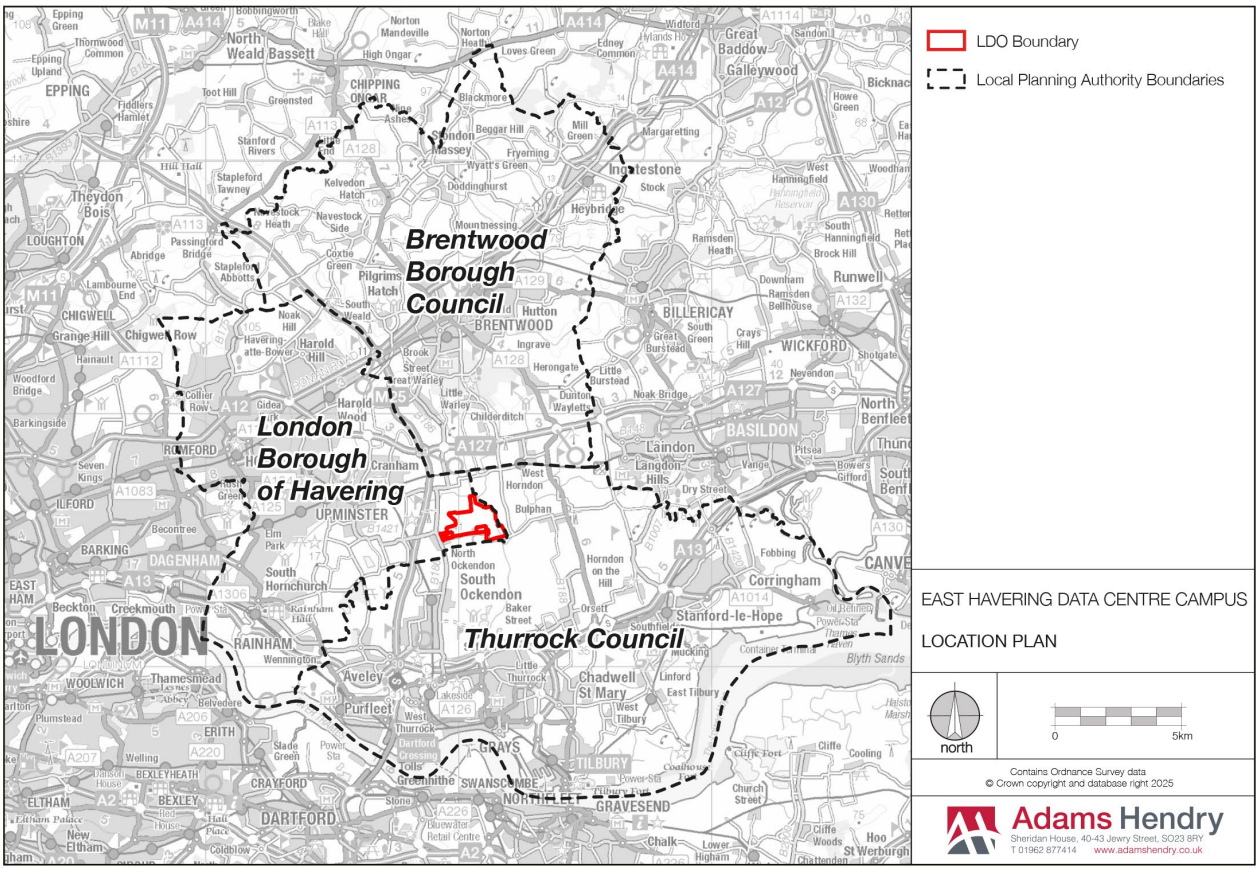

Figure 3.1: Site Location Plan

The location forms part of the Thames Freeport[3] economic zone established by the Government in 2021 to help boost global trade, attract inward investment and to generate employment opportunities.

The site boundary adjoins the administrative boundary of Thurrock Council to the east. The boundary with Brentwood Borough Council lies approximately 1.4 km to the north of the site boundary.

The site is located in an area of open agricultural land in arable use to the north and north-east of the village of North Ockendon and includes Fen Lane from its junction with B186 Ockendon Road to a location approximately 50 m east of Fen Farm Cottages; and B186 Ockendon Road extending to approximately 260 m to the north and approximately 40 m south of the junction with Fen Lane.

At their closest points, South Ockendon and the village of Bulphan, both within the jurisdiction of Thurrock Council, are located approximately 3.5 km south-west of the site and 1.7 km to the east

[3] https://thamesfreeport.com/: Thames Freeport is an economic zone located in the Thames Estuary, benefitting from excellent connectivity across the UK via road and rail. It offers easy access to Europe's largest consumer market of 18 million people within 120 km and connects to over 130 ports in over 65 international markets.

respectively. Upminster, within the administrative boundary of LBH, is approximately 4 km to the west and the village of West Horndon within the borough of Brentwood is approximately 2 km north-east.

The site has direct access to Fen Lane which forms the southern boundary of the site and connects to Junction 29 of the M25 via the B186/B187 and the A127. The A127 is approximately 1.9 km to the north of the site boundary. Junction 30 of the M25 can be accessed via the B186, the A1306 (Arterial Road North Stifford), approximately 5.5 km south, and the A126. The M25 is to the west of the site at a distance of 900 m at its closest point.

The whole of the London Borough of Havering has been declared as an Air Quality Management Area (AQMA)[4].

1.11 Site Description

As presented in Figure 3.2, the site comprises approximately 218.8 hectares (ha) and is a shape and configuration that allows for its practical development for the purposes proposed.

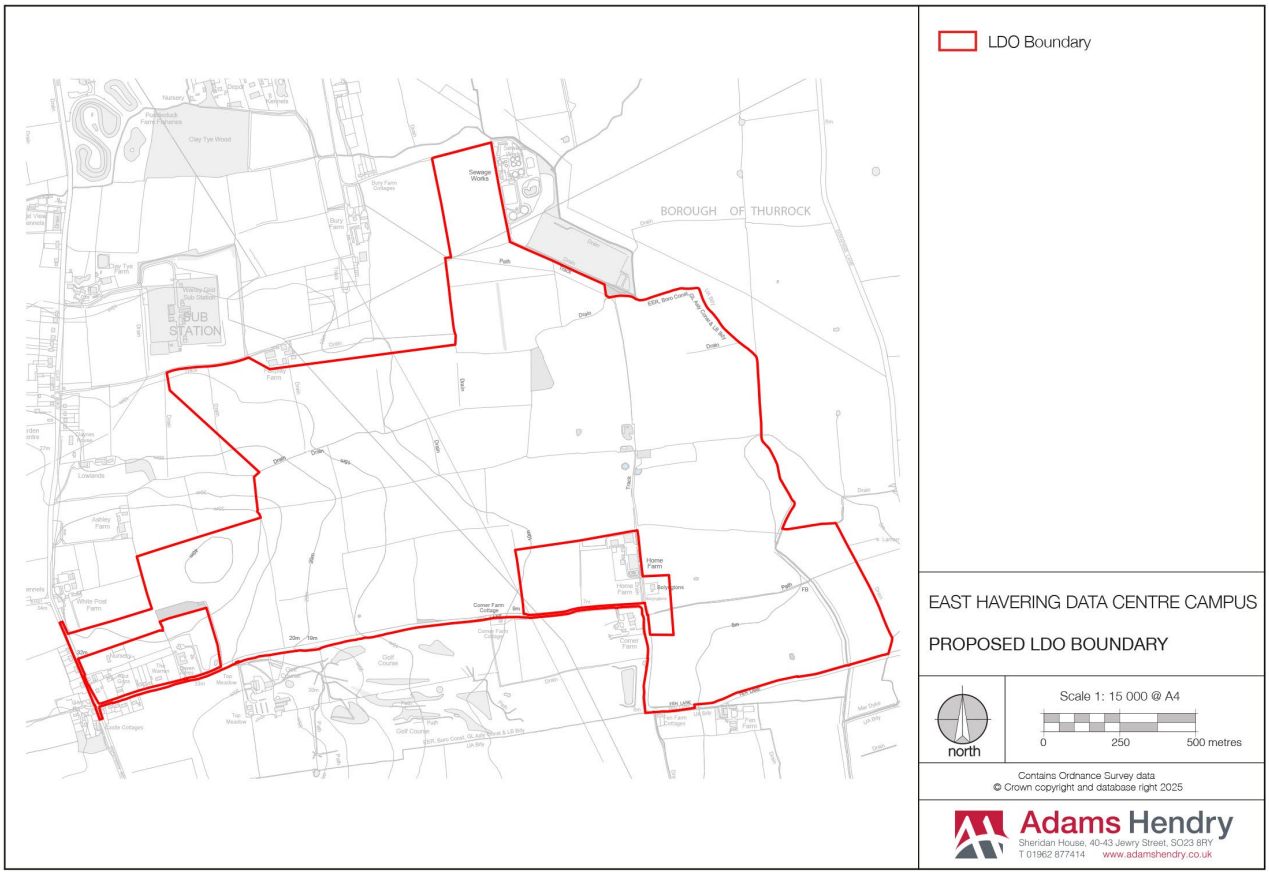

Figure 3.2: Site Redline Boundary

British Geological Survey (BGS) records indicate the site is underlain by superficial deposits of Head and Alluvium, overlying solid deposits of London Clay on Chalk at significant depth.

The site is predominantly in agricultural use and currently consists of four individual working arable farms, with associated field boundaries, ditches and vehicular access tracks/roads. Associated, minor, structures and facilities include a small field shelter, a small agricultural building and two storage

[4] London Borough of Havering, Air Quality Action Plan 2018-2023, London Borough of Havering.

areas (including waste stockpiles and bulk above ground storage tanks) located adjacent to the end of the main access track from Fen Lane. There are also remnants of old farm buildings that have been demolished.

The part of Fen Lane within the site is a narrow single-carriageway rural road providing access to several residential properties, farms, Ladyville Lodge Care Home and Top Meadows Golf Club and Hotel. Fen Lane has no footways along most of its length, except for a very narrow footway on the north side of the carriageway which extends approximately 45 m back from the junction with B186 Ockendon Road.

The part of B186 Ockendon Road within the site is a single-carriageway rural road providing access to Fenlands Nursery and residential properties. It also includes a priority chicane (traffic calming measure) approximately 260 m to the north of the junction with Fen Lane.

There is a narrow pedestrian footway along the western side of B186 Ockendon Road which varies in condition along its length. On the eastern side of the road, the pedestrian footway extends approximately 105 m north of the junction with Fen Lane (stopping at southern boundary to Fenland Nursey). A bus stop and bus shelter is located approximately 35 m north of the junction. South of the junction with Fen Lane, the footway extends approximately 25 m to serve a single residential property.

The site is situated adjacent to a watercourse, the Mardyke, which flows south along the north-east and crosses the south-east corner of the site. The Mardyke flows into the Thames Estuary at Purfleet and is designated as a Main River by the Environment Agency (EA).

A review of EA data indicates that parts of the site to the east are within Flood Zones 2 and 3 as presented in the LBH Policies Map in Figure 3.3.

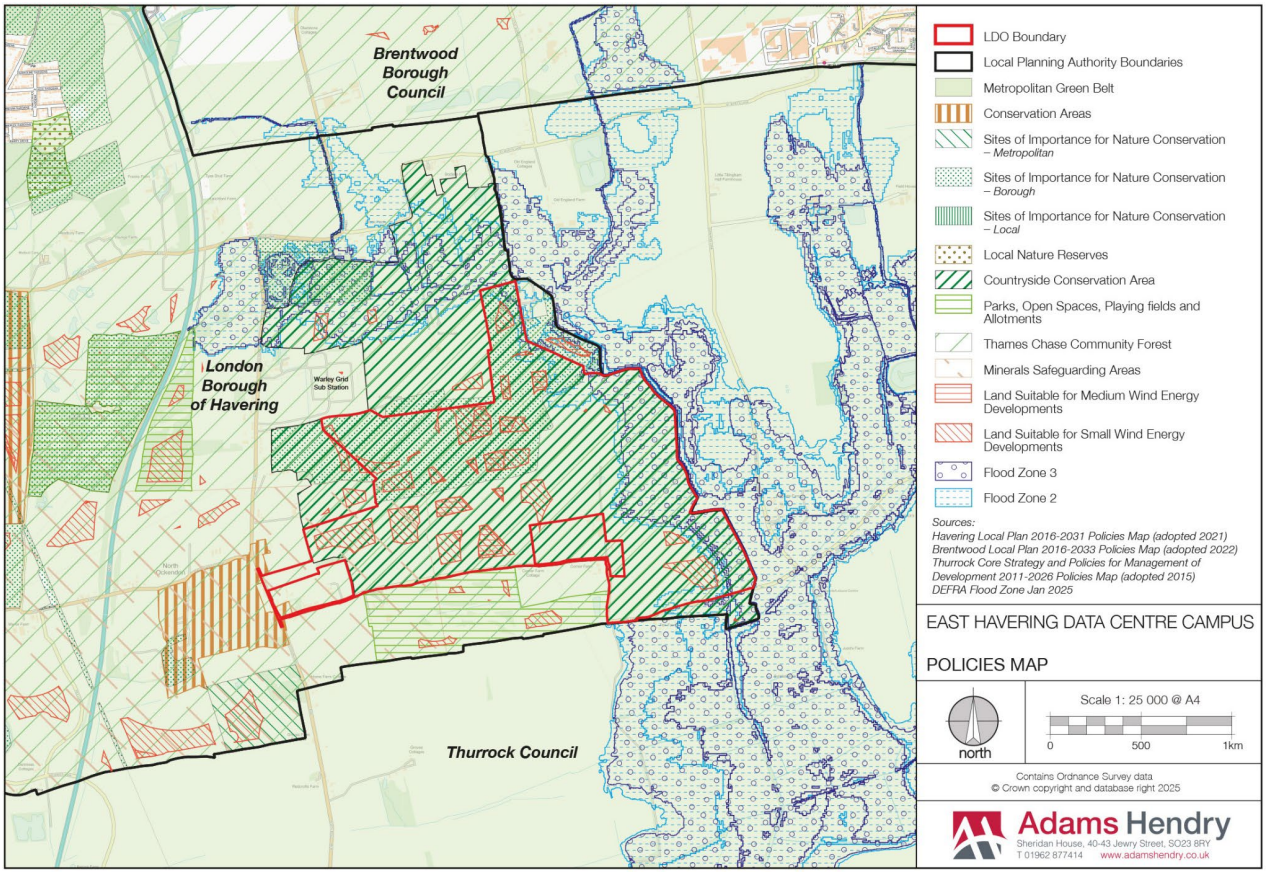

Figure 3.3: Planning Policy Map

The site is located within a Zone 3 Source Protection Zone (SPZ) for groundwater defined by the EA.

Two UK Power Networks (UKPN) overhead power lines cross the site which distribute power to and from the Warley substation to the north-west of the site as presented in Figure 3.4. A powerline crosses the centre of the site in a north-west to south-east alignment, crossing Fen Lane and across the eastern confines of the Top Meadow Golf Course. The other power line briefly crosses the northernmost part of the site in an east to west alignment, abutting the southern edge of Fen Farm Sewage Works.

The site is also crossed by the Hordon to Abridge High Pressure Gas Pipeline and is therefore within a Health and Safety Executive (HSE) major hazard zone. A further low pressure gas main crosses the westernmost confines of the site in a north-south alignment (see Figure 3.4).

As presented in Figure 3.4, the following Public Rights of Way (PRoW) cross the site:

- Footpath 233 from Fen Lane to Bury Farm which crosses through the centre of the site; and
- Footpath 283 from Fen Lane to Ockendon Road which crosses the western most confines of the site.

The site contains no listed buildings.

The western and eastern edges of the site are located within an Alluvium Deposits Archaeological Priority Zone (APZ). The proposed North Ockendon Archaeological Priority Area (APA) is located approximately 200 m south of the western site boundary.

In addition to being located within the Metropolitan Green Belt, the site is also within a Countryside Conservation Area and within the Thames Chase Community Forest designated in the adopted Havering Local Plan 2016-2031 as presented in Figure 3.3.

A small part of Fen Lane and Ockendon Road is within the North Ockendon Conservation Area as presented in Figure 3.3.

There are a number of areas suitable for wind energy developments within the site as defined in the Havering Local Plan 2016-2031 where proposals for wind turbines will in principle be supported.

Ecological surveys of the site were undertaken in 2021, 2022, 2023, 2024 and 2025 and a site visit by Ramboll ecologists in 2023. Ramboll undertook a verification survey in December 2023. The site consists of 25 different UK habitat types, with the majority of the site comprising of arable land (cereal crops, other cereal crops, other non-cereal crops and temporary grass and clover keys). The remaining habitat comprises a variety of grasslands, woodlands, the Mardyke and their associated features. Priority habitat includes other lowland mixed deciduous woodland, hedgerows and reedbeds.

The Mardyke was classified as ‘fairly poor’ following a river condition assessment.

No ‘important’ hedgerows were identified on-site following the hedgerow assessment.

As presented in Figure 3.3, the Fairplay Farm Borough Site of Importance for Nature Conservation (SINC) is partially within the site boundary.

The western part of the site is within an allocated minerals safeguarding area in the Adopted Havering Plan (2016-2031) (November 2021) also presented in Figure 3.3.

Tree Preservation Order (TPO) ref. 12/93 is located immediately adjacent to the south-western boundary of the site.

1.12 Surrounding Land Uses

The surrounding land uses are presented on Figure 3.4.

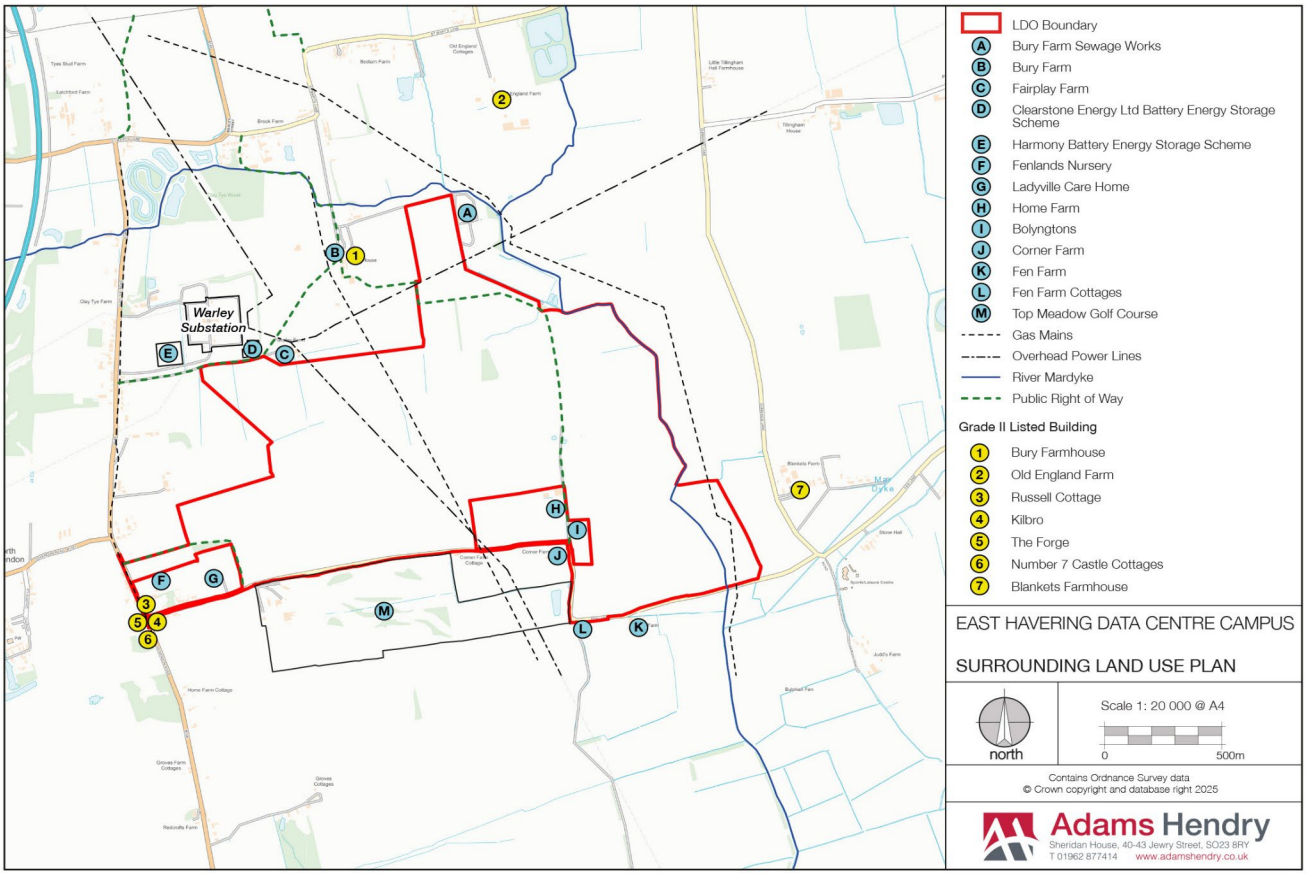

Figure 3.4: Surrounding Land Uses

The boundaries and immediate surroundings of the site comprise the following:

- North: Agricultural fields and an unnamed road. Bury Farm sewage works is immediately adjacent to the north-east site boundary;
- North-east: The Upminster sewage works grass beds SINC;
- East: Further agricultural fields beyond which is Dunnings Lane. The Grade II Blankets farmhouse is located approximately 300 m to the east of the site;
- South-east: A small cluster of industrial buildings;
- South: Home Farm adjacent to the site, including commercial buildings which are part of the wider Home Farm Estate, and Bolyngtons, accessed via an unnamed road off Fen Lane. To the south of Fen Lane is the Top Meadow Golf Course, Corner Farm and Fen Farm and Fen Farm Cottages;
- South-west: Agricultural fields and woodlands, beyond which is a small cluster of residential properties, Ladyville Lodge Care Home and Fenlands Nursery. The closest listed building to the site is the Grade II Russell Cottage approximately 130 m to the south-west of the site boundary;
- West: The Clay Tye Wood (SINC), an area of Ancient Woodland; and
- North-west: Agricultural fields, Fairplay farm and an unnamed access road to Fairplay farm, beyond which is Warley Grid Supply Point (GSP) substation. A battery storage scheme (approximately 1.7 ha), the B186 Clay Tye Road and further residential properties are also located north-west of the site. Bury Farm is appropriately 250 m to the north-west of the site boundary.

The Warley GSP substation covers an area of approximately 4.6 ha and consists of a National Grid 275 kilovolt (kV) sub-station and a UKPN 132 kV substation. The National Grid substation provides

the power supplies to the UKPN substation. The National Grid substation is supplied by 2 x 275 kV circuits from Tilbury GSP and Elstree GSP.

No Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs) or National Nature Reserves (NNRs) are located within 2 km of the site boundary.

However, there are two Local Nature Reserves (LNRs) within 2 km of the site boundary as presented in Figure 3.3:

- Cranham Marsh; and
- Cranham Brickfields.

4. Need and Alternatives

1.13 Need for Data Centres

ES Chapter 3 presents the reasonable site and development alternatives considered and the main reasons for selecting the chosen option including a comparison of the environmental effects. In order to identify reasonable alternatives, it is necessary to define the need that the proposed development is seeking to meet.

Data centres underpin the world's digital economy. Transportation, energy, finance, national security, health systems, and other essential services all rely on real-time data stored in and accessed through data centres. The sensitivity and importance of this information shapes the facility's requirements, while the communication needs dictate the data centre's connectivity to the world.

Post Covid-19 pandemic, the demand for internet-based services has increased and therefore the demand for data centre space, with public cloud currently accounting for more than 75 % of all demand in the UK.

Cloud computing is in essence, the storage of and access to data and programs over the internet instead of a computer's hard drive. Public cloud facilities are physical data centres in specific geographic locations containing servers, storage systems and other equipment.

Hyperscale data centres are typically the largest form of data centre in terms of space and power. Due to the exponential growth in the market, hyperscale demand has resulted in increasingly larger requirements with new facilities frequently exceeding 100 megawatt (MW) of IT power.

Cloud Service Providers usually organise their cloud infrastructure into different geographical regions, known as cloud regions. A region is a set of availability zones (AZs) in a designated geographical area. Each AZ within a region is connected independently to all other AZ within the same region.

The physical distance between public cloud data centres within cloud regions is limited by the speed at which data can physically travel i.e. latency, which is dependent on distance and the fibre infrastructure. Major cloud providers (e.g. AWS, Microsoft, Google) select regions and AZs closest to business operations to achieve the highest performance possible.

The principal need within the UK market centres around the London cloud region. This is as a result of several factors including London's role as a major financial and business centre in Europe, excellent connectivity, power supplies and the largest concentration of IT personnel and data centre expertise in Europe.

1.14 Need for Data Centre Capacity in London

The London data centre market, which has over 1.4 gigawatt (GW) of live IT power, is now experiencing severe supply constraints within its core AZs as demand continues to outpace available supply. Whilst it has secured substantial power for future development, there is a shortage of readily available and confirmed power to meet cloud demand over the next five years.

There is accepted evidence which indicates a very substantial growth in the need for data centre capacity across London, with a central forecast of 3,824 MW during the period 2024-2029, 95 % of which is for public cloud data centres.

The potential beneficiary of the LDO appointed Savills to undertake a site selection assessment. As part of this assessment, it was identified that there is currently 1,289 MW of secured data centre capacity within the principal sub-markets in London. Accordingly, there is an urgent need for

additional data centre capacity to meet demand in the London cloud region and to ensure that the UK retains its competitive edge in attracting data centre investment and maintaining its leading position in Europe's digital economy.

The extent of the need for new data centres is such that additional hyperscale public cloud data centres, within existing or new AZs, are the only realistic option for meeting the demand. However, there are few sites that can serve the London cloud region with secured power for scalable growth.

The significant constraints in power and land availability within core locations are pushing demand for expansion beyond the traditional AZs.

The Slough AZ and adjacent AZs in Hayes and West London have the largest quantum of public cloud infrastructure serving the London Cloud Region and include provision from all of the major public cloud providers. The search for available power to facilitate new data centre capacity should therefore be as close as possible to the Slough AZ and with good access to the existing fibre network.

A 'reasonable distance' for hyperscalers will be a product both of actual distance and the quality (i.e. capacity and speed) of the fibre infrastructure. Access to essential utilities, including a Grid Supply Point (GSP)[5], power transmission infrastructure and major fibre routes are always critical considerations. Based on how fast the system must work to meet the requirements of the user, and supported by analysis of the Frankfurt, London, Amsterdam, Paris and Dublin (FLAPD) markets, a new deployment capable of contributing to meeting the needs of the London cloud region within approximately 60 km from the AZ clusters in Slough and West London would be functionally and commercially acceptable.

1.15 Power Availability

Digital Reef has entered into a contract with UKPN to deliver 600 mega volt amperes (MVA) of power. It has been agreed between Digital Reef and UKPN that there would be a phased release of the power, with a minimum of 160 MVA to be delivered from the existing Warley GSP substation by 31 December 2029 and the total of 600 MVA available by 31 December 2033.

Consideration has therefore been given to whether there are any other GSPs closer to the Slough AZ that could deliver the same amount of power within the same or better timescale as provided for in the agreement between Digital Reef and UKPN.

At January 2025 (the latest date for which data is available pending the outcome of Connections Reform), there was no GSP closer to the Slough AZ that had sufficient power to support a hyperscale facility by 2029 than that already contracted to Digital Reef at Warley.

The timescales for constructing a new GSP or upgrading the transmission or distribution network are significant. It can take from between just under five years to nearly eight years from entering into a contract before power would be available.

1.16 Consideration of Alternative Sites

Proximity to available power is a key factor when considering alternative sites. As energy is lost as it travels, a shorter cable route minimises risk and optimises efficiency. Data centres should therefore be as near to a GSP as possible to provide maximum resilience and security for the power supplies. Whilst the commercially preferred maximum separation distance between a data centre

[5] A Grid Supply Point is the point where electricity is transferred from the transmission network (high-voltage national grid) to the distribution network (local network supplying homes and businesses).

and relevant GSP would be up to 5 km, a search area of 10 km from the Warley GSP substation has been used in the assessment of alternative sites for added robustness.

As part of the initial site screening exercise, sites that were below 40 ha were excluded on the basis that they would be too small to accommodate the proposed development.

A total of 16 sites were identified by Savills. Each site was red-amber-green (RAG) rated against a set of minimum requirements including developable area, shape and topography, flood risk, proximity to power and fibre connections, ownership and availability. Sites that scored red against any of the minimum requirements were excluded from further assessment.

The remaining sites were then considered against a number of planning and environmental constraints. All of the shortlisted sites are located in the Green Belt and therefore consideration was given to whether the shortlisted sites included previously developed land, if they were Grey Belt and if so, whether development would be considered to be appropriate development.

None of the sites were considered to comprise to any material extent previously developed land and neither were they considered to be Grey Belt. An assessment was therefore undertaken on the harm to the Green Belt from the development of a data centre campus on each of the shortlisted sites.

Finally, an assessment was undertaken on the overall suitability and availability of the shortlisted sites. The conclusion of the assessment undertaken by Savills was that the only site that is demonstrably available and potentially suitable is the proposed development site.

1.17 Do-Nothing Scenario

In the 'Do-Nothing' alternative, the proposed development would not come forward and the site would be left in its current state as agricultural land. The consequences of this are that the substantial need for data centre capacity to serve the London cloud region would be unchanged and the economic benefits, employment and training opportunities would not be forthcoming. Failure to deliver data centre floorspace will also jeopardise the UK's leading position in Europe's digital economy.

The 'Do-Nothing' scenario, where the site is left in its current agricultural state, is not considered to be a reasonable alternative.

1.18 Development Layout and Design Iteration Alternatives

The proposed LDO development parameters have been subject to an iterative design process to reduce environmental impacts. The primary objective was to reduce the landscape and visual effects of the proposed development as far as possible given the site's location within the Green Belt.

The initial layout of the proposed development was designed to:

- retain existing hedges, trees and ditches including the extensive network of ditches in the eastern side of the site;
- create a network of ecological corridors within the site and enhance connectivity between the existing site-wide hedgerow and ditch network;
- keep flood zones 2 and 3 on the eastern side of the site free from built development;
- take account of the existing topography of the site (i.e. the western extent of the site is at a higher elevation than the centre of the site); and
- maintain a corridor free from development along the route of the underground gas pipeline that crosses the site.

This initial environmentally led design approach resulted in the definition of 11 build zones (A-K) occupying the central part of the site and the creation of an ecology park around the proposed build zones including a large wetland area on the eastern side of the site and ecological corridors retained between the build zones.

Three dimensional digital software technology was used to create views of the potential massing (shape and form of development) and layout options within the build zones. The design was subsequently evaluated, improved and refined through an iterative design process at a series of collaborative workshops with the LPA and potential beneficiary of the LDO, to minimise as far as possible the likely significance of the landscape and visual effects of the proposed development. Further design changes were made following a review of the initial findings of the Landscape and Visual Impact Assessment to improve assessment outcomes. This led to a greater degree of visual permeability, more views to the open countryside and ridgelines and wider separation distances between buildings.

In addition, the landscaping strategy for the proposed ecology park and data centre campus was refined to reflect the surrounding landscape character and naturalistic and organic mounding introduced to provide optimal screening of the proposed development and filtering of views from the surrounding area.

1.19 Technology Alternatives

A Best Available Technology (BAT) assessment was carried out of the technologies capable of providing back-up power at the data centres. Based on this assessment, hydrotreated vegetable oil (HVO) generators were selected over diesel, natural gas (spark ignition), gas turbine or aeroderivative gas turbine generators.

In respect of horticultural uses, liquid carbon dioxide ($CO_{2)}$ was selected over burning natural gas to avoid use of and reliance on fossil fuels in pursuit of carbon-neutral operations.

1.20 Environmental Comparison

When considering the key environmental effects between the initial development layout and the final proposed development layout, the built footprint has been maintained outside of the key flood zones, the landscape and visual effects reduced and ecological/biodiversity benefits increased.

1.21 Preferred Option

The initial development layout was principally informed by the existing site features and by existing environmental considerations (primarily site topography, flood zones, ecological features, site access points, on-site utilities). Therefore, the design evolution process did not comprise wide ranging and divergent layout options.

The initial development layout evolved and was refined in response to iterative visual, landscape and residential amenity modelling and assessment to arrive at the final proposed development layout and massing, which has formed the basis of the development parameters assessed within the EIA and reported upon in the ES.

The site and final development layout option is the ‘preferred option’ and has been selected for the following reasons:

- Contributes towards meeting the pressing need for data centre capacity in the short term;
- Is the only deliverable site with a contracted power supply in sufficiently close proximity to the Slough AZ;

- Responds to site and environmental considerations, taking into consideration the technical and logistical requirements of the proposed land uses;
- Proactively integrates mitigation measures to avoid and/or minimise significant adverse environmental effects;
- Maximises beneficial effects; and
- Demonstrates best available technology.

5. Proposed Development

1.22 Proposed Development Description

In summary, the proposed development would comprise the following:

1. The erection of buildings up to a maximum of 400,000 m^2 (GEA) including:
   a. Data centre uses up to 340,000 m^2;
   b. Indoor horticulture of 50,000 m^2;
   c. Visitor Centre up to 600 m^2 (and no less than 300 m^2);
   d. District heating centre up to 3,300 m^2;
   e. Campus management facilities up to 2,700 m^2;
   f. Campus security facilities (not including local facilities ancillary to individual data centres) up to 3,400 m^2;
2. Installation of electrical infrastructure and associated plant equipment;
3. Creation of an 'ecology park';
4. Operations or engineering works including:
   a. Excavation and earthworks (e.g. 'cut and fill');
   b. Formation of compounds for the stockpiling and sorting of excavated materials;
   c. Foundations and piling, and any other operations or engineering necessary for site mobilisation and new buildings / structures;
   d. Creation of estate roads and associated infrastructure for access by all modes of transport;
   e. Site security measures including fencing, gates and gate houses;
   f. Works to install underground services and utilities;
   g. Provision of temporary site offices and welfare facilities; and
   h. Highway works on Fen Lane and Ockendon Road.

1.23 Site arrangement

The general site arrangement is presented in Figure 5.1.

The proposed data centre campus would be constructed in a series of build zones (Build Zones A – H) and enclosed within a steel security fence. The main entrance to the campus would be from Fen Lane via a security check point.

The primary infrastructure corridor would serve Build Zones A - F and would accommodate the primary access road, a shared cycleway and footpath, drainage swales and associated landscaping. The swale would discharge into three attenuation ponds as presented in Figure 5.1.

Build Zone G would be served by an access road including a shared pedestrian and cycleway to the west of the main entrance on Fen Lane. Access to Build Zone G would be via a security check point. The primary strategic footpaths/cycleways through the ecology park are presented in Figure 5.1. Existing public rights of way across the site would be retained.

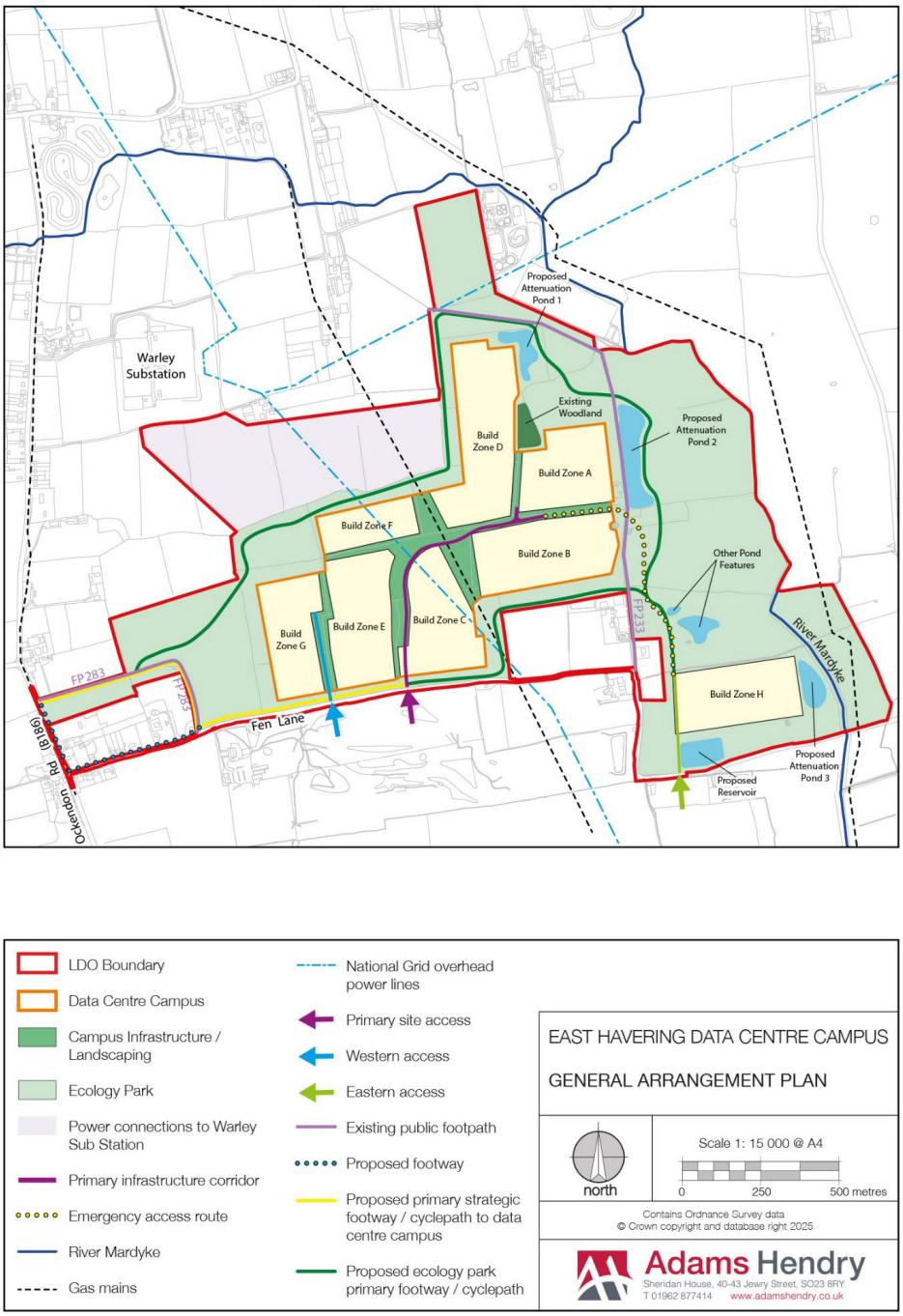

Figure 5.1: General Arrangement Plan

1.24 Data Centre Campus

Data Centres

The proposed development would include up to 340,000 m^2 GEA of data centre floorspace. The data centres would be operational 24 hours a day. The maximum length of a data centre would not exceed 200 m. External plant would include generators, heating and cooling plant, rainwater harvesting and photo voltaic (PV) renewable energy systems together with other related support tanks, plant and electrical equipment. Plant would generally be located on or under gantry support systems both on the roof and/or external to the building.

HVO generators would provide backup power for continued essential systems use in the event of a power failure. The size and number of generators required for each data centre would vary depending on the building size and required backup power load.

The standard operation of generators would be limited to testing and maintenance only, as total black-out grid outage is very unlikely. Generators would be tested weekly for a duration of 15 minutes, monthly for a duration of one hour and yearly for a duration of four hours during normal day-time operational hours. During an emergency scenario (an unplanned power outage), the anticipated maximum number of generators on-site would operate simultaneously and continuously for up to 72 hours.

Other ancillary plant within a data centre compound would include:

- low voltage (LV) substations and switch gear infrastructure;
- sprinkler tanks and associated pump houses; and
- water attenuation/rainwater tank storage (above or below ground).

Each data centre compound would include a car park, cycle bays and on-plot landscaping.

Each data centre building would be required to achieve at least BREEAM Excellent rating.

All data centre buildings would aim to be net zero carbon (i.e. cause no net release of carbon dioxide and other greenhouse emissions into the atmosphere). Where this is not possible, buildings would achieve an on-site carbon reduction of at least 40% beyond Building Regulations. Where it is clearly demonstrated that it is not possible to achieve the zero-carbon target on-site, any shortfall would be provided through a cash in lieu contribution to the borough's carbon offset fund to be secured through a planning obligation.

Data Centre Campus Landscaping

All soft and hard landscaping would be selected from a palette of plants and materials for use within the data centre campus to provide interest and a coherent landscape scheme across the proposed development whilst also optimising wildlife benefit and the potential for habitat creation.

A buffer zone would be created around each build zone comprising natural grassland with boundary shrub planting to provide an area of transition between the plot based development and internal access roads and/or the wider ecology park.

Located landscape mounds would be created within the ecology park and Data Centre Campus (if required) to make beneficial use of earth arisings generated during the construction period and to help screen views of the proposed development. Proposed tree planting is summarised in Table 5.1.

1.25 Campus Management

There would be a dedicated site wide Campus Management Security Control Facility (SCF) located at the main entrance to the data centre campus that would have oversight and management of the security of the whole site. A small generator (approximately <200 kVA) would provide backup power if required.

Provision has also been made for centralised campus management facilities which would only be constructed if 150,000 m^2 of data centre floorspace had been occupied by a single operator and would not be occupied unless 200,000 m^2 of data centre floorspace had been occupied by a single operator. A small generator (approximately <200 kVA) would provide backup power if required.

1.26 Indoor Horticulture

The proposed development would include 50,000 m^2 GEA of heated horticultural facilities. Horticultural buildings would be provided with waste heat from the data centres. Water for use in the greenhouses would be drawn from a new reservoir that would be treated and rainwater harvested. The required capacity of tank(s) for on-site water storage would be 600 m^3.

Carbon dioxide enrichment through the supply of pure (liquid) carbon dioxide within the greenhouses would be used to increase the yield of horticultural crops. A 60 tonne tank of liquid carbon dioxide would be stored on-site. A 2,000 m^3 hot water tank and reverse osmosis machine would also be required. All external plant would be within an appropriately screened compound. The greenhouses would be lit up to 20 hours a day during the winter months. During the hours of darkness, blackout screens would be provided.

The facility would require a small service yard for the delivery of goods together with the provision of employee car and cycle parking bays and two spaces for coaches. A small generator would be required to provide backup power if required.

1.27 District Heating Energy Centre

An enclosed district heating centre would house all plant and machinery required to both collect the waste heat from all of the data centre buildings on the campus and to distribute it to the indoor horticulture and to other potential offsite heat networks in the future.

1.28 Electrical Infrastructure

New electrical infrastructure would be required including up to six high and low voltage substations (up to 15 m in height including the Line Landing Gantry[6]), switch rooms, transformers (approximately 15 m in height), energy centres (approximately 8m in height) and other network distribution equipment. This electrical distribution equipment would be located within separate fenced compounds within the proposed build zones with cable network below ground. Each compound would have a mixture of external equipment and buildings with switch rooms and other indoor equipment.

The proposed substation would be connected to the existing Warley GSP substation via four diverse cable routes to facilitate power to the proposed development.

1.29 Fibre Connections

Operation of the proposed development would require new fibre optic connections, utilising existing Openreach infrastructure (ducting):

- One from the west of the site, running along the B1421 before crossing the B186 at White Post Farm to the west of the site (approximately 4.9 km in length); and
- A second from the south of the site, running northwards along the B186 and then east along Fen Lane (approximately 2.5 km in length).

New ducts and a series of related standoff/access chambers would be constructed on-site to connect the existing Openreach infrastructure to the proposed development. The precise route of the new two connections is currently unknown.

[6] Line Landing Gantry is a heavy-duty steel structure located within an electrical substation or a sealing end compound designed to receive high-voltage overhead transmission lines.

1.30 Ecology Park

The proposed data centre campus would be set in an ecology park, which would provide public access to natural landscapes that would benefit both local biodiversity and the local community.

A mosaic of habitat typologies, as depicted in Figure 5.2, would be created incorporating existing/retained and proposed broadleaf woodland, wet woodland, existing/retained and new mixed native hedgerows, seasonally wet grasslands, meadow and natural grassland, permanent water bodies and new ditches and reed beds.

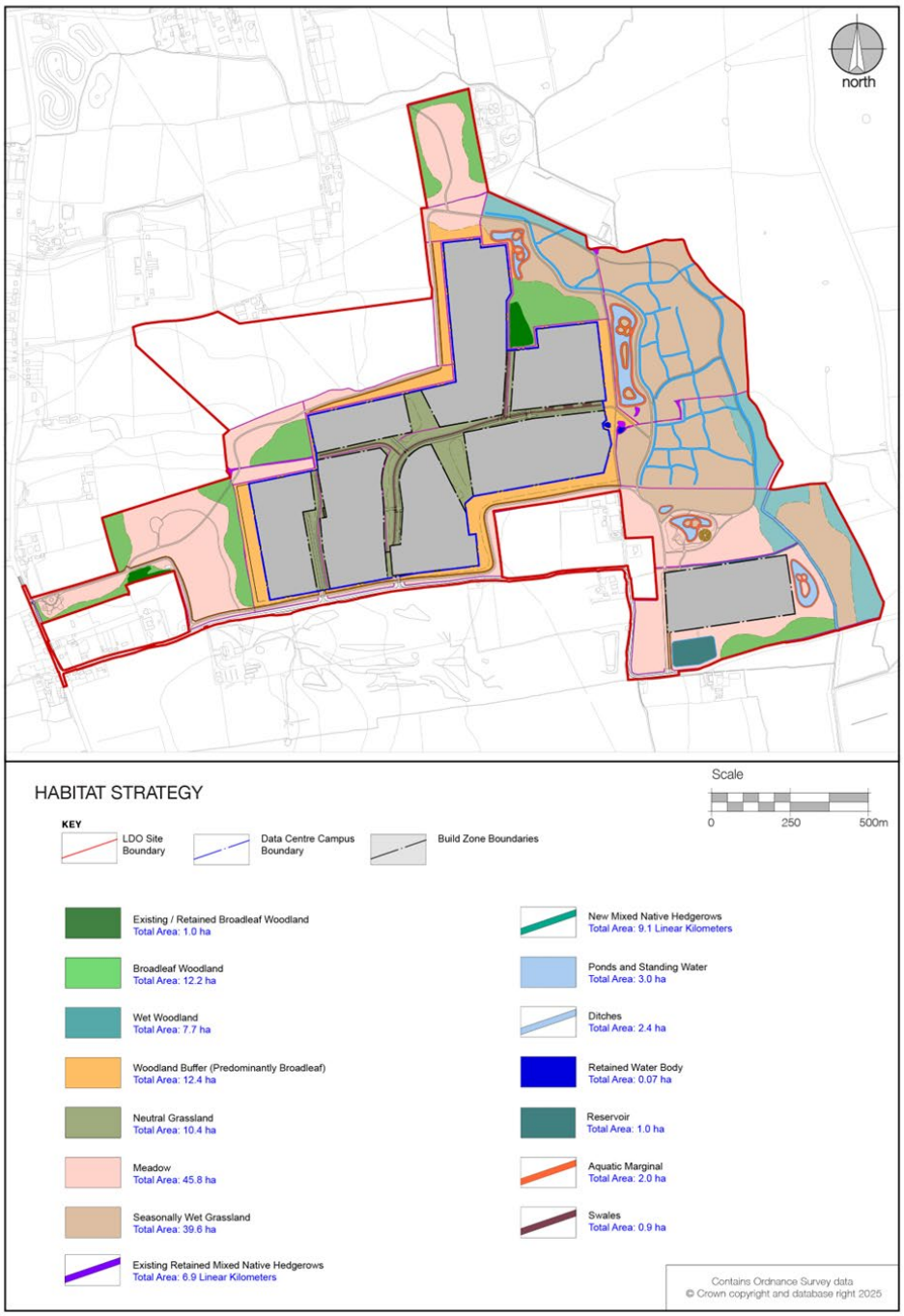

Figure 5.2: Proposed Habitats Plan

A diverse range of habitats would be provided for national key target species such as:

- Wetland bird species;
- Reptiles;
- Bats;
- Hedgehog;
- Water Vole;
- Dormouse; and
- Great Crested Newts.

The eastern part of the ecology park would feature wetlands within the existing Mardyke tributary floodplain and would incorporate existing ditches and a proposed new network of ditches (approximately 4.65 km in length).

The wetland area would incorporate several permanent water bodies including three attenuation ponds to increase flood water storage capacity. The ponds would create new habitat for a range of species. Species rich seasonally wet grassland and meadows would be created adjacent to the ponds providing suitable habitats for reptiles and insects.

Existing and proposed broadleaf woodland would help to filter views from the surrounding area, reduce water runoff and improve soil quality. The outer perimeter boundary of the ecology park would comprise mixed native hedgerows.

Tree Planting (Ecology Park and Data Centre Campus)

Tree planting would be carried out in the appropriate planting season in accordance with Table 5.1.

Table 5.1: Proposed Tree Planting Densities

Planting Area	Total Area (ha)	Total Trees
Wet woodland/broad leaf woodland/buffer woodland	32.3	53,101
Meadow/ grassland trees	4.3 (5 % of total meadow/seasonally wet grassland area)	3,210
Natural grassland trees (Data Centre Campus)	0.5	376
Total Trees		56,687

All trees and plants would be certified as UK provenance and locally sourced where possible. All plant stock would include disease resistant varieties and would be a mix of standard and semi-mature trees.

Public Access

A network of footpaths and cycleways through the ecology park would be provided including a primary strategic footway/cycleway link to the data centre campus from the B186 Ockendon Road in North Ockendon. Wheelchair accessible kissing gates would be provided at the footpath and cycleway access points to the ecology park.

Long-Term Management and Monitoring

A coherent, strategic and integrated approach to the management and maintenance of the ecology park would be secured through a Landscape and Ecological Management and Monitoring Plan.

1.31 Visitor Centre

The proposed visitor centre would provide information, discovery and learning facilities in association with the proposed ecology park and would include the ecology park management offices and welfare and storage facilities together with external amenity areas and landscaping.

1.32 Design Parameters and Standards

Data Centre Separation Distances

There would be a minimum separation distance (separation corridor) of 15 m as measured from the façade of data centre buildings (excluding gantries) in all build zones where development would be restricted.

A 45 m fixed separation corridor is defined on Build Zone B. No development would be permitted within 10 m from the western elevation of the westernmost data centre adjoining the separation corridors on Build Zones D and G.

Height

Development permitted under the LDO including buildings, roof top plant and associated acoustic screens would not exceed the maximum height (mAOD) for the build zone in which it is to be located. Exhaust flues in all height restriction zones would extend no more than 5 m above roof top plant or 5 m above the restricted building height in all other cases.

Highways, Access and Parking

Access

There would be three vehicle access points into the site, comprising:

- the primary site access from Fen Lane to serve the Build Zones A - F;
- a separate access from Fen Lane to the west of the main primary site access which would serve Build Zone G only;
- an eastern access to serve Build Zone H including the proposed ecology park, visitor centre, indoor horticulture facilities and district energy centre.

The primary site access and western and eastern access roads would include a shared pedestrian/cycleway.

Emergency access would be via the eastern access road continuing north through the ecology park to a connection point on the eastern boundary of the data centre campus, north of Build Zone B.

Highway Works on Fen Lane and Ockendon Road

The widening of the Fen Lane carriageway to a uniform width of approximately 6.2 m between the junction with Ockendon Road and the eastern site access would be required to enable two-way movement of heavy goods vehicle (HGV) traffic. Highway works would also be carried out to provide a footway on the northern side of Fen Lane between Ockendon Road and east of the Ladyville Lodge Care Home.

On Ockendon Road, an informal crossing comprising a kerbed central island reservation would replace the existing traffic chicane. The footway on the eastern side of Ockendon Road would be extended southwards from the westernmost entrance to the southern boundary. New Lighting would be provided along footpaths; at key junctions around the proposed development.

Site Security and Access

Vehicle control measures would be in place. For example, security gates, arm barriers, turnstiles, security check-in point and a rejection lane at the main entrance. A 2.4 m high (with up to 1 m anti-climb topping) perimeter security fence would be erected around Build Zones A-G.

Parking

The proposed development would include: car parking; Light Goods Vehicle (LGV) / HGV parking; cycle parking; passive and active electric vehicle (EV) parking; Blue Badge and enlarged parking; and car sharing parking measures.

Surface and Foul Drainage Works

Foul Water Drainage

Foul flows would be discharged to the existing Anglian Water public foul sewer to the north of the site. Two underground pumping stations situ would provide 24-hour storage volume to mitigate against flooding in the event of pump failure. Anglian Water has confirmed that there is currently sufficient capacity within the network for the proposed flow rates.

Surface Water Drainage

There would be two proposed levels of water storage:

- Site-wide attenuation – three attenuation ponds would manage surface water runoff from the proposed build zones; and
- Build Zone attenuation (excluding rainwater harvesting) – on plot attenuation tanks within the build zones would release water at a fixed rate into the site wide drainage system which would ultimately flow into the attenuation ponds.

A total attenuation volume of 69,560 m^3 would be required site wide; 37,641 m^3 on plot attenuation tanks and 31,919 m^3 in the three proposed attenuation ponds.

Drainage in the ecology park would be managed naturally, using permeable surfaces and the site topography to direct water to nearby ditches and swales.

Surface Water Quality

Surface water would be treated prior to discharge to the Mardyke via the attenuation ponds to maintain water quality. A fuel separator, vortex separator, filter, or green feature, such as a swale or filter strip would be used to maintain water quality. Other equipment to contain spillages, including oil booms, drain blockers and dams to contain soluble pollutants would also be used. In all areas where there is a high risk of spills, penstocks would be installed.

Lighting

Lighting installations would not exceed the level of light intrusion, sky glow and luminaire intensity (glare). The luminaires selected would be a combination of column, bollards and wall mounted fittings. All communal lighting (except for safety and security lighting) would be switched off between 23.00 and 07.00 hours. Any lighting would be directed to avoid spillage onto sensitive areas and security lighting would be controlled using timers wherever possible avoiding movement sensors adjacent to sensitive areas.

Operational Traffic and Management Measures

The proposed development is expected to generate 1,035 daily predicted Two-Way Vehicle Trips (39 HGVs). Trips would be generated through:

- an electric shuttle bus service to/from Upminster Station which would enable staff to access public transport to and from the site and would align with the three shift patterns;
- a separate coach service operated directly by commercial horticultural businesses, which would transport horticultural workers to the site daily to align with shift patterns; and
- HGV arrivals/departures (including deliveries and waste collections), which would be carefully scheduled and managed to minimise trips made in peak hours, and to avoid multiple HGV arrivals/departures at one time.

Operational Jobs

It is estimated that the proposed development would generate a minimum of 350 jobs on-site. Approximately 320 of these jobs would be from the data centre use with the remaining 30 associated with the indoor horticulture and campus management facilities.

Water Usage

The data centres would require up to 96,245,820 litres (l) of water / per annum (pa) for data centre cooling if operating at 100 % IT load (i.e. all servers operating at maximum capacity). However, the potable water usage is estimated to be 62,560,000 l/pa. The LDO would include a condition limiting the use of potable water for cooling to 62,560,000 l/pa.

It is estimated that the horticultural buildings would require approximately 41,409,000 l/pa.

Domestic water usage across the proposed development is estimated to be no more than 17,453,350 l/pa

Rainwater Harvesting

Rainwater harvesting is estimated to yield up to between 43,786,752 and 51,094,800 l/annum and is therefore predicted to meet up to 82 % of annual cooling process water demand. Rainwater harvesting for horticultural uses is estimated to yield between 30,000,000 l/annum and 25,700,952 l/annum and is therefore predicted to meet up to 85 % of annual water demand.

Operational Noise Emissions

Operational noise from the proposed development during normal operations, and in an emergency scenario (when power back-up generator would be required), would be suitably controlled.

Operational Waste

Operational waste from the proposed development would include a mixture of waste streams from the data centre, horticultural use and visitor centre, as well as municipal waste streams from publicly accessible areas. Bin storage areas would ensure the separate storage and collection of waste, reusable items, recyclable materials, compostable waste and green waste from the horticulture uses.

6. Construction Works

1.33 Construction Programme

A detailed development programme has not yet been finalised. However, an indicative, but feasible, programme has been developed. The duration of the LDO is proposed to be 20 years and therefore construction would be permitted throughout this period. However, the proposed development could be delivered within 17 years assuming the fastest reasonable programme.

The proposed development would be delivered over a number of phases as shown in Table 6.1. Based on a 17 year indicative programme, the works are anticipated to commence in 2026 and to be completed in 2043.

Table 6.1 Indicative Construction Programme

Proposed Development	
Initial Site set up and Highway Works on Fen Lane and Ockendon Road	April 2026 – July 2026
Phase 1	
Site wide infrastructure including earthworks	July 2026 – April 2027
Electrical infrastructure on Build Zone F	July 2027 – February 2028
Data Centre uses up to 100,000 m^2 (Build Zone D)	September 2026 – November 2032
Campus Security at main site entrance	May 2027 – February 2028
Ecology Park Part 1a and Part 1 Planting	Completed by July 2028
Phase 2	
Site wide infrastructure including earthworks	November 2030 – August 3031
Data Centre uses 100,000 – 200,000 m^2 (Build Zones E and G)	August 2031 – October 2036
Indoor Horticulture	January 2032 – October 2034
District Heating Centre	November 2032 - October 2034
Ecology Park Part 2 Planting	Completed by November 2032
Ecology Park Part 4 Planting	Completed by December 2036 (worst-case)
Visitors Centre	August 2035 – October 2036
Phase 3	
Site wide infrastructure including earthworks	October 2024 – July 2035
Data centre uses 200, 000 m^2 – 340, 000 m^2 (Build Zones A, B and C)	July 2035 – February 2043
Campus Management Building	December 2037 – October 2038
Ecology Park Part 3 Planting	Completed by October 2036

Highway works to Fen Lane and Ockendon Road would be completed prior to commencement of development on the site other than works to establish a temporary construction compound. Site-wide infrastructure works would be completed in Phase 1. Land would remain in agricultural use until it is required for development.

1.34 Construction Working Hours

Core working hours would be as follows:

- 08.00 am to 19.00 pm Monday to Friday; and
- 08.00 am – 13.00 pm on Saturday.

There would be no working on Sundays, bank or public holidays.

1.35 Construction Access Arrangements

Construction Routes

HGV and LGV traffic would arrive and depart from the north via the M25 (Junction 29), the A127 Southend Arterial Road and B186 Ockendon Road onto Fen Lane. The construction workforce would arrive and depart from Fen Lane via the B186 Ockendon Road or the A128.

An alternative redundancy access route to the site from the south on Ockendon Road via Junction 31 (Purfleet Interchange) of the M25 would be available for use by abnormal loads and/or should the proposed construction HGV and LGV route be unavailable for any reason. From Junction 31 of the M25, vehicles would head eastbound on the A1306 Arterial Road West Thurrock and then turn left onto the B186 Pilgrims Lane and continue north along the B186 through South Ockendon and up to Fen Lane.

Permits for abnormal load movements, and associated works and road closures, would be obtained from the relevant highway authorities for each abnormal load movement.

1.36 Construction traffic movements

The combined construction and operational, two-way vehicle trips generated by the proposed development is predicted to generate 885 daily two-way vehicle trips during the construction peak (December 2035) of which 127 two-way trips would be by HGVs.

1.37 Main Construction Works

Enabling Works

Enabling works would comprise the following:

- Establishment of main compound at Build Zone E (including Temporary office, Welfare Facilities, Canteen, Parking, HGV Parking, Laydown and storage, Temporary security hut);
- Highway Works on Fen Lane;
- Temporary services connection;
- Establishment of wheel washing facilities; and
- Establishment of monitoring infrastructure.

Portable cabins would be a maximum of three storeys in height. Temporary heras fencing, hoarding and gates would be erected to all site access points or site boundaries.

Earthworks and Site-wide Infrastructure Works

Earthworks would be undertaken through a cut and fill exercise and anticipated to be 642,504 m^3 assuming a worst-case. Earth arisings would be beneficially reused to create a series of landscape mounds in the ecology park, and if required, at the build zones.

Appropriate controls would be in place throughout the earthworks. Excavators would be used to carefully strip the topsoil layer in the areas where earthworks are proposed. The topsoil would be separately stored and separated from other earth arisings.

1.38 Construction Materials and Waste

The proposed development is estimated to require 1,052,500 m^3 of construction materials. Specifically, the substructure and superstructure works are anticipated to generate 1,009,100 m^3 of waste. Site wide infrastructure works are estimated to require 31,900 m^3 of construction materials. Meanwhile, the ecology park is anticipated to generate 2,417 m^3 of waste.

1.39 Construction Jobs

The proposed development would generate per year;

- 330 jobs in brough (Havering);
- 790 jobs in the region (London); and
- 1,340 nationwide (UK).

1.40 Public Liaison

The contractors would be expected to nominate a manager who would act as the Project Environmental Manager (PEM), who would be named at all entrances to the site, with a contact telephone number. The contact's name and details would be provided to all the relevant stakeholders by the principal contractors prior to the start of the construction works.

The PEM would deal with enquiries from the public, including any complaints. Any complaints would be logged and reported to the LPA as soon as practicable.

1.41 Construction Mitigation Measures

The following standard mitigation measures would be employed during the construction works and outlined within the LDO compliance documents (Code of Construction Practice):

- Monitoring:
  - Protocols to be implemented on-site in instances of emergencies and incidence;
  - Housekeeping and General Site Management such as hoardings or similar segregation measures would be erected to provide a clear and secure demarcation between operational and construction activities;
  - A 'clean site' policy would be maintained;
  - Wheel wash facilities would be provided on-site before vehicles exit on Fen Lane;
- Arboriculture:
  - All required works to trees would be undertaken in accordance with the British Standard 'Recommendations for Tree Work BS3998:2010' by suitably, qualified and experienced professional arborists;
  - Retained trees would be protected during construction works in accordance with BS 5837:2012 to reduce the possibility of any damage, to both crown and roots of trees;
- Lighting:
  - Artificial lighting would be provided to maintain sufficient security and health and safety;
  - Temporary lighting would be installed on posts around the construction compounds, along temporary access roads, in parking areas and on the perimeter heras fencing;
  - Lighting fixtures would be selected to minimise light pollution and environmental impact;
- Ecology:
  - An Ecological Clerk of Works (ECoW) would oversee construction works on the site and best practice environmental measures affecting biodiversity;

  - Where bat roosts are identified, monitoring of roosts may be required;
- Transport:
  - HGV arrivals/departures would be carefully scheduled and managed to minimise trips;
  - Where commercially viable, materials not forming a full load would be collected and condensed at pre agreed consolidation centres; and
  - Off-site manufacture would be encouraged to reduce waste;
- Noise and vibration:
  - All plant would conform to relevant standards and directives;
  - Noise control equipment, such as enclosures, shrouds and silencers on plant would be fitted;
  - Electrically powered plant would be used where possible;
  - All plant would be operated correctly, turned off when not in use and regularly inspected;
  - Vibrating machinery would be fixed on anti-vibration mountings;
  - Temporary screens would be used to reduce noise propagation at the nearest noise-sensitive receptors;
- Air quality:
  - Good site management and mitigation techniques would be employed to reduce emissions of dust and limit dispersion;
  - A record of all noise and dust complaints would be maintained and responded to;
- Water quality:
  - Potential for impacts to occur as a result of on-site storage of materials and contamination of water by oil or other liquids would be minimised by storage compounds, spill kits, and drums and barrels with flow control taps;
  - Control measures would be in place to manage silt generation and maintain water quality, including using cut off ditches to prevent entry of surface water and groundwater where possible, using silt fences and stockpile management;
  - Existing watercourses would be visually inspected at least on a weekly basis to identify whether there have been any changes in water quality. Where areas of concern are identified, more detailed scientific tests would be carried out where necessary;
  - A wheel wash facility would be provided for all HGVs that enter working zones;
  - Diesel bunds would be provided for the storage and transfer of petroleum products to equipment including diggers, dumpers and generators;
  - Petroleum spill kits would be readily available on-site to deal with any spillages. Any contaminated soil identified via testing would be collected and stored in hazardous waste containers prior to transport and treatment at a suitable, licenced facility;
- Climate Change:
  - Specify low carbon materials in design, where possible;
  - Use of reused and recycled materials;
  - Source materials locally;
  - Use of electrically powered plant, where possible;
- Waste Material Management:
  - Waste material generated on-site during the construction process would be handled and disposed of in accordance with Waste Management legislation;
  - The following measures would be considered to ensure that waste is minimised:
    - Avoidance of waste at the design stage;

- Just-in-time deliveries;
- Minimisation of packaging;
- Reuse of waste; and
- No wastes would be burnt or disposed on-site.

7. Likely Significant Environmental Effects

The assessments presented within technical assessment chapters have accounted for the embedded mitigation set out within ES Chapter 4: Proposed Development and Construction.

1.42 Archaeology and Cultural Heritage

Background

ES Chapter 6: Archaeology and Cultural Heritage reports on the potential archaeology and cultural heritage impacts and likely effects due to the construction and completed development stages of the proposed development. The assessment has taken into account the relevant national and local guidance and regulations.

Baseline

There are no nationally designated or non-designated cultural heritage assets within the site. Within 2 km from the site boundary there are two Scheduled Ancient Monuments (very high heritage significance), the North Ockendon and Cranham Conservation Areas, three parcels of Ancient Woodland, 25 Statutorily listed buildings, either Grade I, Grade II* (both high heritage significance) or Grade II listed (medium heritage significance) and nine locally Listed buildings.

The study area for this assessment is considered to be 1 km for archaeology and 500 m for cultural heritage, as there would be very limited visibility of the site from distances beyond this for the latter.

Archaeology

Two current Archaeological Priority Areas (APA) extend into the site. The entirety of the site lies within the new Tier 3 Havering Prehistoric Potential APA. A small part of the western part of the site, along Fen Lane and Clay Tye Road also lies within Tier 2 North Ockenden APA which overlaps with the Tier 3 APA.

There have been no archaeological investigations on the site. Previous investigation in the archaeological study area have recorded remains from the Prehistoric and Roman periods.

Buried heritage assets that may be affected by the proposed development comprise:

- Palaeoenvironmental remains, e.g. seeds etc, of low heritage significance, within alluvial deposits in the eastern part of the site;
- Prehistoric remains such as evidence of settlement (high heritage significance), flint tools or pottery (low heritage significance), ditches or field boundaries (medium heritage significance) for which there is a high potential to be found;
- Roman remains such as evidence of settlement (high heritage significance), ditches or field boundaries (medium heritage significance), and isolated finds (low heritage significance) for which there is a moderate potential to be found;
- Later medieval remains (low heritage significance) of the buried footings of two farmhouses, and ditches or field boundaries for which there is a high potential to be found; and
- Post-medieval remains (low heritage significance) such as field boundaries for which there is a high potential to be found, and remains associated with a World War II anti-aircraft battery for which there is a moderate potential to be found.

Cultural Heritage

The study area of the assessment was initially scoped as a 2 km area from the site boundary. Following site visits and desktop study, nine cultural heritage assets within 500 m of the site boundary were confirmed as sensitive receptors likely to be affected by the proposed development.

The nine cultural heritage assets comprise:

- North Ockendon Conservation Area (NOCA): Low Sensitivity;
- Four Grade II Listed Buildings (Kilbro, Russell Cottage, The Forge, no 7 Castle Cottages): Low Sensitivity;
- Two Grade II Listed Buildings (Old England and Blankets Farmhouse England): Medium Sensitivity;
- One Grade II Listed Building (Bury Farmhouse): High Sensitivity; and
- One Local Listed Building (White Post Farm): Low Sensitivity.

All other above ground heritage assets considered to be of low sensitivity to setting changes, due to a combination of visibility and their distance from the site, have not been assessed further.

Construction Stage Effects

Archaeology

During the construction stage, there is a predicted potential for the truncation or complete removal of archaeological remains. It is considered that the adverse effects on buried heritage assets could be offset by a staged programme of archaeological evaluation (Stages 1 and 2) and were necessary, mitigation (Stage 3), with dissemination at an appropriate level to increase knowledge and appreciation of the buried heritage assets. The aims and methodology of each stage would be set out in a Written Scheme of Investigation (WSI) subject to prior approval by the LPA/Greater London Archaeological Advisory Service (GLAAS).

Stage 1 would comprise:

- a programme of geophysical survey to identify anomalies indicative of buried features, which would inform the scope of Stage 2;

Stage 2 would comprise:

- a targeted archaeological trenched and/or geoarchaeological evaluation in order to confirm the underlying deposits and the nature, extent, condition and heritage significance of predicted archaeological remains at the site.

The results of Stages 1 and 2 would allow confirmation of the mitigation strategy (in particular on the need for targeted archaeological excavation in advance of construction, and/or a watching brief during earthworks) for any significant archaeological assets in order to offset the effects and ensure public benefit from the archaeological process. The scope and method of each stage of the archaeological work would be as set out in a separate archaeological WSI approved in advance by the LPA and their GLAAS archaeological advisor.

Following the implementation of archaeological mitigation the proposed development would not give rise to significant residual effects for most archaeological remains, apart from Prehistoric and/or Roman settlement remains for which there would likely be a significant adverse residual effect.

Cultural Heritage

The construction stage effects on cultural heritage assets would be restricted to changes to their setting caused by noise and dust from works on the site, an increase in road traffic and the possible visibility of construction machinery and buildings under construction.

The resulting effects caused by noise and dust from works on the site and an increase in road traffic on their settings would vary throughout the construction programme. The effects would be greater on the North Ockendon Conservation Area, Kilbro, Russell Cottage, the Forge, No 7 Castle Cottages, White Post Farm and Blankets Farmhouse as all of these lie closer to the proposed access route along Fen Lane and the B186. These effects would be variable depending on the location of the receptor to the sources of impacts.

The effect from the visibility of construction machinery would be limited to proposed enabling works, cut and fill earthworks, mound formation and the implementation of preliminary strategic landscaping.

As result of the work to be undertaken in the preliminary landscaping phase, visibility of the construction works would be reduced throughout the construction stage. In addition, standard Code of Construction Practice measures would be adopted to minimise construction impacts and effects.

Taking into consideration the nature and duration of works, the local topography, intervening built form and vegetation, separation distances, as well as the embedded mitigation measures, the effects on the setting of cultural heritage assets would be short-to medium-term adverse, but not significant, with the exception of the setting of Bury Farmhouse. This is due to the higher sensitivity of this receptor to change.

Completed Development Stage Effects

Archaeology

As no new ground disturbance would occur, there would be no effects arising from the completed development on archaeology.

Cultural Heritage

The proposed development would introduce new buildings, utility infrastructure, landscaping and green infrastructure, and an increase in traffic and other noise from day-to-day use and operation of the proposed development.

As the build zones would be located towards the approximate centre of the site, the separation distance between proposed development and the identified sensitive cultural heritage assets has been maximised.

The requirements set out in ES Chapter 4 would minimise the visual, transport and noise impact of the new buildings on the cultural heritage assets in the study area, with the result that no significant adverse residual effects would arise from changes to the settings of the majority of the assets, with the exception of Bury Farmhouse, for which the effects would be significant adverse.

Cumulative Effects

It is considered that there would be limited or no potential for cumulative effects from six of the cumulative schemes on cultural heritage. Although construction stage periods may overlap, Schemes 4, 5, 6 and 8 are at sufficient distance from the cultural heritage assets within the study area to be considered of very low impact. Schemes 1, 2, 3 and 7, having been constructed would have no cumulative impact. Taking into consideration the standard practice embedded mitigation

measures that would be adopted by the cumulative schemes, the scale of effects as reported in the main assessment would remain unchanged.

Cumulative adverse effects on setting may arise from the completed development stage of the proposed development and those cumulative schemes where the scale/mass of new buildings is greater than those of the proposed development in isolation and would be visible within the setting of heritage assets. Given the locations of the considered cumulative schemes and taking account of the reduced intervisibility as a result of the existing/proposed landscaping, as well as the screening/setting afforded by the proposed development, it is considered unlikely that the cumulative schemes would affect the settings of cultural heritage assets. With regard to scheme 7 (Warley Substation) the new infrastructure would be perceptible in the context of the existing Warley Substation and the proposed development. On this basis there would be no combined effects and therefore, effects would remain as reported in the main assessment.

1.43 Socio-Economics

Background

ES Chapter 7: Socio-Economics reports on the potential socio-economic impacts and likely effects due to the construction and completed development stages of the proposed development. The assessment has been undertaken taking into account relevant national and local policy and guidance.

The likely effects that have been considered as part of the assessment comprise the following:

- Construction stage:
  - Loss/displacement of existing on-site employment;
  - Construction employment, gross value added (GVA)[7] and training opportunities; and
  - Construction supply chain spending and local opportunities.
- Completed Development stage:
  - Completed development employment and gross value added;
  - Additional spending in the local economy; and
  - Effects on additional recreational use, public access and PRoW.

The assessment of how the proposed development would affect jobs and the local economy has been based on analysis by Oxford Economics (OE). To be cautious, the lowest likely investment figures were used wherever possible, meaning the benefits may be underestimated. The extent to which these benefits are spread across the borough and the wider region depends on OE's modelling. While this does not represent the absolute worst-case for Havering, it is based on reasonable and cautious assumptions.

Baseline

The baseline highlights key information relevant to assessment, in particular setting the employment and economic impacts in context.

Havering has a lower unemployment rate compared to London and a lower proportion of economically inactive people who want a job.

[7] Gross Value Added (GVA) measures the value of goods and services produced in an industry, sector, or region of an economy, calculated as total output minus intermediate consumption (costs of production). It reflects the net contribution to an economy by subtracting input costs from revenue,

The most common 'sought occupation' at all spatial scales (Ward, Borough, Regional (London and Essex) and National) is elementary trades, plant and storage related occupations. This includes a range of occupations that are being promoted as part of the proposed development such as security, administration and construction.

In respect of education, skills, training, health, disability, crime, living environment, the site is located within an area that is not considered particularly deprived.

There are two on-site PRoWs, but no others within 500 m of the site boundary.

In respect of the national cycle network (NCN) there are no routes within 500 m of the site. The closest route to the site is National Route 136, approximately 3.2 km from the site boundary.

All settlements within the borough that had a population density of 8,500 people per km^2 or greater have access to a public park and garden within 710 m of their homes.

There is a large area of land surrounding the site that is not within 710 m of a public park or garden. However, the population density within this area is low.

Construction Stage Effects

There would be four existing on-site jobs affected as a result of the land use change. While the effect would be adverse, it would not be of a significant scale.

It is estimated that the proposed development would generate an additional 330 construction job years of employment over the 20-year construction period. The construction stage would facilitate further spending across Havering, as well as increasing GVA by 0.5 % annually.

The impact of increased construction employment and training, as well as the associated GVA and local spending would be significantly beneficial at the borough level.

The potential beneficiary's economic consultant, OE, cite a total investment of £1.87 billion into the Havering economy over the 20-year construction period, which in turn indirectly increases GVA by £3 million annually and local spending by an additional £2 million annually. The construction supply chain spending would generate beneficial, but not significant, effects at the borough level.

Completed Development Stage Effects

It is estimated that the completed proposed development could generate 620 new or sustained jobs at the borough level. Given the sector specific growth, it is considered to be a high magnitude of impact at a borough level. Accordingly, the effect on the local economy is assessed as beneficial and significant.

Additional spending in the local economy as a result of new and sustained jobs is estimated to be beneficial but not significant at the borough level.

At the borough level there is a relatively high amount of accessible public parks and gardens. However, as stated in the baseline, there is a large area surrounding the site that is not within 710 m of a public park or garden, though the population density of this area is very low. As a result of the improved access to recreational areas and gardens to be delivered by the proposed development, via paths and footways, there would be a noticeable improvement in provision to local people. The effect would be beneficial, but not significant, at borough level.

Cumulative Effects

Based on the limited information available in the public domain, there is potential for minor (not significant) beneficial cumulative effects on local employment during the construction stage in respect of six cumulative schemes. It is considered unlikely that there would be any cumulative

effects on local receptors, due to the spatial distribution of the schemes. Accordingly, the combined effects would remain as reported for the proposed development in isolation.

During the completed development stage, no likely cumulative effects have been identified due to the nature of the cumulative schemes. Accordingly, the combined effects would remain as reported for the proposed development in isolation.

1.44 Transport and Accessibility

Background

ES Chapter 8: Transport and Accessibility reports on the potential transport and accessibility impacts and likely effects due to the construction and completed development stages of the proposed development, taking into account the relevant national and local guidance and regulations.

Baseline

Catchment area analysis based on 2021 Census data shows most staff are expected to travel to the proposed development from a relatively small catchment area of approximately 10 km radius, predominantly from suburban areas to the south (e.g. Tilbury, Grays, South Ockendon), west (Upminster, Romford), and east (Basildon). Areas to the south and west are captured by existing bus routes; areas to the south are captured by existing rail services to Ockendon; and areas to the west and east are captured by existing rail services to Upminster.

The site currently has poor pedestrian and cycling accessibility. There is generally low propensity for walking to the site, given that the closest populated residential areas are located approximately 3.25 km (2 miles) to the south in South Ockendon and approximately 4 km (2.5 miles) to the east in Bulphan, which is considered beyond a reasonable walking distance for most people. This is compounded by the general lack of segregated footways and cycleways, including no continuous footway, cycleway, nor suitable PRoWs connecting the site to these nearby residential areas, forcing users to share the road with vehicular traffic which reduces pedestrian/cyclist safety and amenity.

The site has a Public Transport Accessibility Level (PTAL) score of 0, representing the lowest possible PTAL score. The village of North Ockendon has a PTAL score of 1a to 1b. Therefore, the site is in an area of very poor public transport accessibility. The closest bus stops to the site are on B186 Ockendon Road in North Ockendon. These stops are served by bus routes 269 and 370. The closest railway stations to the site are Ockendon (located in South Ockendon) and West Horndon, both of which are served by c2c services on different branches of the line between London Fenchurch Street and Basildon, Stanford-le-Hope, Southend Central, and Shoeburyness (approximately two to four trains per hour, per direction). The closest London Underground Station to the site is Upminster, which is served by District Line trains (approximately six trains per hour) towards Barking, Ealing Broadway and Richmond. Upminster is also served by Overground services to Romford (approximately two trains per hour), providing connectivity to the Elizabeth Line.

Primary access to the site is served from Fen Lane, which is a narrow single-carriageway rural road providing access to several residential properties, farms, Ladyville Lodge Care Home and Top Meadow Golf Club and Hotel. Fen Lane connects to the B186 Ockendon Road in North Ockendon, which provides connection to South Ockendon to the south, and Upminster to the north-west via B187. The junction of B186 Ockendon Road and Fen Lane is a priority junction (of which Fen Lane forms the minor arm), with a short flare for traffic turning left-out and a longer flare for traffic turning left-in. There is no dedicated lane provision for right-turning traffic on any arms. Rather than a give-way line, priority is controlled by a stop line and sign (an arrangement permitted only where it is considered that visibility cannot be provided to an appropriate standard).

Construction Stage Effects

The construction stage would commence in 2026 and last until 2043. Individual build zones would be completed and become operational throughout the construction stage. Therefore, the estimated construction traffic flows and a proportion of the operational traffic flows have been combined to establish the peak trip generation. On this basis, the peak trip generation during the construction stage is expected to be in December 2035. Therefore, the assessment has considered impacts and effects arising during the construction stage against the 2035 future baseline (including cumulative schemes), to represent a worst-case for assessment purposes.

The assessment has considered the effects of construction on driver delay, severance, pedestrian and cyclist delay, non-motorised user (pedestrian and cyclist) amenity, fear and intimidation, and public transport.

Effects on driver delay are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system. The junction assessment demonstrates that the B186 Ockendon Road / Fen Lane junction is predicted to operate within capacity during the AM and PM network peaks during the construction stage; and the scale of vehicle trips generated by the proposed development would not be expected to generate a material impact on the operation of strategic junctions. Moreover, parking for all construction vehicles (including construction workforce cars and HGVs) would be provided within the site boundary, and waiting, loading/unloading or parking activities on the public highway would be prohibited through the Construction Logistics Plan which would be secured within the Code of Construction Practice. Therefore, the effects on driver delay in the construction stage are considered to be adverse, but not significant.

The construction stage is predicted to increase traffic flows, including the proportion of HGVs, and would introduce a wider carriageway on Fen Lane to enable two-way running for HGVs which increases exposure to HGVs and increases the crossing distance experienced by non-motorised users. A footway is also proposed on the northern side of Fen Lane, between the junction with Ockendon Road and the care home, connecting to the dedicated walking/cycling route through the proposed ecology park. A separate connection and informal crossing would also be provided between the dedicated walking/cycling route and the existing golf club and hotel. These proposed facilities would separate pedestrians from motorised traffic on Fen Lane to somewhat offset the effect of the increased traffic flows, particularly benefitting specific receptors identified on Fen Lane. No material changes in average vehicle speeds nor substantial PRoWs diversions would be expected. Therefore, the effects on severance in the construction stage are considered to be neutral, and not significant.

Given the scale of future baseline traffic flow, non-motorised users are likely to experience delay crossing A128 Tilbury Road and A128 Bulphan Bypass. However, it is expected that the proposed development would not materially increase traffic flows on these routes during the construction stage and would not induce additional delay to non-motorised users. Therefore, the effects on pedestrian and cyclist delay in the construction stage are considered to be adverse, but not significant.

There is expected to be some worsening of non-motorised user amenity during the construction stage due to increase in vehicle flows and HGV composition, particularly on Fen Lane. However, this would be offset by improvement to pedestrian and cycle infrastructure including dedicated walking/cycling routes through the proposed ecology park, including a dedicated route between Ockendon Road and the main site entrance, and the provision of a footway on Fen Lane and informal crossings on Fen Lane and Ockendon Road. However, the routes through the proposed ecology park would be of limited benefit to non-motorised users of the private residences and care home on Fen Lane, who would continue to be exposed to motorised traffic on Fen Lane. On balance, the effects on non-motorised user amenity in the construction stage are considered to be beneficial but not

significant for most non-motorised users, and adverse but not significant for non-motorised users associated with the private residences and care home on Fen Lane.

The assessment finds that in the construction stage, one link is predicted to experience a one-step change in the level of fear and intimidation experienced, and all other links are predicted to experience no change in level of fear and intimidation experienced. Therefore, the effects on fear and intimidation in the construction stage are considered to be adverse, but not significant.

Effects on public transport can be experienced by users of the local bus, rail, and London Underground networks. No change to existing public transport networks is expected during the construction stage, and the scale of uplift in passenger demand is not expected to have a material impact on public transport capacity utilisation. Therefore, the effects on public transport in the construction stage are considered to be adverse, but not significant.

Overall, it is considered that the construction stage of the proposed development would not give rise to significant adverse effects on transport and accessibility and identified receptors. Therefore, no additional mitigation (beyond the embedded mitigation identified in ES Chapter 4) is required.

Completed Development Stage Effects

The fully completed development would be operational from January 2043 at the earliest, for the lifetime of the proposed development. For the purposes of assessing the completed development stage, a worst-case has been adopted which consists of the proposed development delivered in full to the maximum extent of the floorspace parameters.

Estimates of the trips generated by the completed development stage on the local highway network have been derived from first principles based on relevant attributes of the proposed development, and information and assumptions presented by the potential beneficiary of the LDO. These have been verified by using trip generation data from suitable benchmark sites where possible, and where not possible, based on professional judgement and experience. Further detail is provided in the separate Transport Assessment (TA).

The assessment has considered the effects of completed development on driver delay, severance, pedestrian and cyclist delay, non-motorised user amenity, fear and intimidation, and public transport.

Effects on driver delay are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system. The junction assessment demonstrates that the B186 Ockendon Road / Fen Lane junction is predicted to operate within capacity during the AM and PM network peaks during the completed development stage; and the scale of vehicle trips generated by the proposed development would not be expected to generate a material impact on the operation of strategic junctions. Moreover, parking sufficient for all vehicles would be provided within the site boundary, and use of the internal private estate roads for overspill parking would be managed through the Travel Plan. Therefore, the effects on driver delay in the completed development stage are considered to be adverse, but not significant.

The completed development stage is predicted to increase traffic flows, particularly on Fen Lane. However, the proposed development would provide walking/cycling routes through the proposed ecology park, including a dedicated route between Ockendon Road to the main site entrance, allowing most non-motorised users to avoid use of Fen Lane. A footway would also be provided on Fen Lane between Ockendon Road and the care home, alongside a footway extension and informal crossing on Ockendon Road, and additional connection and crossing between the dedicated walking/cycling route and the existing golf club and hotel on Fen Lane. No material changes in average vehicle speeds nor PRoW diversions would be expected. Therefore, the effects on severance in the completed development stage are considered to be neutral, and not significant.

Given the scale of future baseline traffic flow, non-motorised users are likely to experience delay crossing A128 Tilbury Road and A128 Bulphan Bypass. However, it is expected that the proposed development would not materially increase traffic flows on these routes during the completed development stage, and therefore would not induce additional delay to non-motorised users. Therefore, the effects on pedestrian and cyclist delay in the completed development stage are considered to be adverse, but not significant.

There is expected to be some improvement of non-motorised user amenity during the completed development stage, in relation to some indicators of the Healthy Streets Approach, particularly due to the provision of a network of walking and cycling routes through the proposed ecology park, as well as provision of footway and informal crossing on Fen Lane, and footway extension and informal crossing on Ockendon Road. Balanced against the increase in traffic flows, the effects on non-motorised user amenity in the completed development stage are considered to be beneficial but not significant for most non-motorised users. However, the network of walking and cycling routes through the proposed ecology park would be of little benefit to non-motorised users associated with private residences and the care home on Fen Lane, for whom amenity would be degraded, leading to adverse but not significant effects.

The assessment finds that in the completed development stage, all links are predicted to experience no change in level of fear and intimidation. Therefore, the effects on fear and intimidation in the completed development stage are considered to be neutral, and not significant.

Effects on public transport can be experienced by users of the local bus, rail, and London Underground networks. No change to existing public transport networks is expected during the completed development stage, and the scale of uplift in passenger demand is not expected to have a material impact on public transport capacity utilisation. Therefore, the effects on public transport in the completed development stage are considered to be adverse, but not significant.

Overall, it is considered that the completed development stage of the proposed development would not give rise to significant effects on transport and accessibility and identified receptors. Therefore, no additional mitigation (beyond the embedded mitigation identified in ES Chapter 4) is required.

Cumulative Effects

Inter-project cumulative effects in relation to transport and accessibility have been considered as trips associated with relevant cumulative schemes are included in the future baseline scenarios against which the future development scenarios have been assessed.

Lower Thames Crossing (LTC) is predicted to be completed and operational prior to the predicted peak construction stage trip generation of the proposed development in 2035. Therefore, the operational impacts of LTC have been accounted for in both the construction future baseline (2035) and the completed development stage (2043). However, the construction impacts and effects of LTC, in combination with the proposed development would not be considered by these two assessment scenarios. Therefore, an additional assessment scenario has been considered to account for the LTC construction traffic peak on Ockendon Road anticipated in 2030.

In the LTC construction peak, the cumulative effects of LTC construction and the proposed development have been considered in relation to driver delay, severance, pedestrian and cyclist delay, non-motorised user amenity, fear and intimidation, and public transport. The additional assessment scenario does not identify any significant effects of the proposed development when assessed against the 2030 future baseline including LTC construction traffic.

1.45 Air Quality

Background

ES Chapter 9: Air Quality reports on the following potential impacts and associated likely effects of the proposed development on local air quality:

- Construction dust impacts and associated effects on amenity, human health and ecological sites, and amenity;
- Qualitative assessment of construction stage and completed development stage road traffic emissions on human health receptors;
- Completed development stage emergency generator emissions during emergency and testing scenarios; and
- The site's suitability for sensitive human health receptors considering potential air pollutant impacts from the testing of backup generators on-site.

The main air pollutants of focus are:

- Dust and particulate matter with an aerodynamic diameter of less than 10 microgram (µm) (PM_{10}), typically generated during construction activities;
- Nitrogen dioxide (NO_2), PM_{10} and particulate matter with an aerodynamic diameter of less than 2.5 µm ($PM_{2.5}$), typically generated by road traffic; and
- NO_2, PM_{10}, $PM_{2.5}$, sulphur dioxide (SO_2), carbon monoxide (CO) and ammonia (NH_3), typically generated by the operation of backup generators.

Baseline

The site is located within the Havering Air Quality Management Area; however, air quality monitoring data demonstrates that NO_2 concentrations in the study area are well below health-based air quality targets set as part of the National Air Quality Strategy. As such, the study area is not an area of poor air quality. Pollutant concentrations have decreased between 2018 and 2022 and are expected to continue to decline in the future.

Construction Stage Effects

During construction stage works, the risk of adverse effects from dust impacts would be controlled by the use of mitigation measures for a high-risk site. These measures would be incorporated in the LDO compliance documents. With the mitigation in place, the effects would be adverse, but not significant.

The assessment of vehicle movements for the construction stage have been based on peak vehicle movements occurring in combination with development traffic associated with the operation of the early completed phases during the peak construction year. The peak traffic generation is anticipated to occur in 2035.

The assessment of vehicle movements for the construction stage confirmed that significant increases in vehicle movements would be limited to Fen Lane. The limited spatial extent of significant increases in traffic movements combined with the low pollutant concentrations in the study area indicate construction stage traffic effects would be adverse, but not significant.

Overall, it is considered that the construction of the proposed development would not give rise to significant adverse effects on air quality at sensitive receptors.

Completed Development Stage Effects

The assessment of vehicle movements for the completed development stage shows substantial increases in vehicle movements would be limited to Fen Lane. The limited spatial extent of significant increases in traffic movements combined with the low pollutant concentrations in the study area indicate completed development stage traffic effects would be adverse, but not significant.

Backup generators would be required to provide power to the proposed development in the event that there is a loss of external power to the site. The backup generators are subject to periodic testing to ensure that they would start and operate correctly in the event of a loss of power to the site. In addition to this testing and assessment of the emergency scenario has been undertaken. In this emergency scenario (where there is a loss of power supply to the site) the generators would potentially operate for longer periods of time at higher loads than during testing.

The dispersion modelling assessment of the emergency generator emissions during the emergency scenario demonstrates that it is unlikely that there would be significant effects on human health unless all of the emergency generators were required to operate for in excess of 39 hours continuously which is considered to be unlikely.

However, impacts on ecological receptors would potentially be significant and would require abatement in the form of selective catalytic reduction (SCR) to reduce the impacts of NOx emissions. With the abatement (SCR) in place, the impacts of NOx emissions would be greatly reduced and there would be no significant effects at ecological receptors and significantly less effects on human health receptors, although no exceedances have been reported prior to the consideration of abatement.

The dispersion modelling assessment of the emergency generator testing regime shows the effect at human health and ecological receptors would be adverse but not significant for all pollutants assessed.

Overall, it is considered that the completed proposed development would not give rise to significant adverse effects on air quality.

Cumulative Effects

Significant cumulative effects as a result of construction stage dust are unlikely to occur as each scheme is anticipated to employ standard dust and construction mitigation in accordance with best practice and relevant guidance; therefore, the individual construction stage effects would not be significant, in isolation or in combination with the proposed development.

There would not be significant cumulative effects from road traffic or generator emissions during the completed development stage, alone or in combination with cumulative schemes.

The additional Lower Thames Crossing construction stage scenario assessment indicates that the proposed developments contribution to trip generation in 2030 would be below assessment thresholds.

1.46 Noise and Vibration

Background

ES Chapter 10: Noise and Vibration presents the potential noise and vibration effects due to the construction and completed development stages of the proposed development taking into account the relevant national and local guidance and regulations.

The following potential impacts and associated likely effects of the proposed development have been assessed:

- Noise from construction activity;
- Vibration generated by specific construction works and plant;
- Changes in road traffic noise on the local road network during the construction stage;
- Changes in road traffic noise occurring on the local road network as a result of the completed development; and
- Effects due to sound of an industrial and commercial nature generated by the completed development (including noise from mechanical and electrical plant), including an emergency scenario with all emergency generators operating in the event of complete power failure.

Baseline

Baseline conditions at sensitive receptors within the study areas were determined either through environmental noise monitoring, or through road traffic noise predictions for the relevant future baseline scenarios.

The noise climate across the site and at the nearest receptors within the study area was observed to be relatively quiet, predominantly influenced by distant and continuous road traffic noise from motorways and trunk roads, with intermittent road traffic noise from occasional traffic movements on the local road network.

Construction Stage Effects

During construction stage works, the risk of adverse effects from construction activity noise and vibration would be controlled by the use of mitigation measures outlined in ES Chapter 4: Proposed Development and Construction. These measures would be incorporated into the LDO compliance documents.

Additional mitigation for construction activity noise identified through the assessment comprises restrictions on the use of impact driving piling for key build zones (or the use of mitigated impact piling if no other form of piling can be implemented); temporary acoustic screening for works at Build Zone C, and restrictions on on-site cutting of steel; temporary screening for earthworks and mound works near the Home Farm receptors, the Fen Farm receptors and Corner Farm Cottage; and temporary screening during the main phases of the highway works should these works occur for more than the identified duration thresholds. In addition, noise monitoring with real-time alerts is to be carried out at positions representing Corner Farm Cottage, Bolyngtons, Fen Lane and Ockendon Road.

Additional mitigation for construction activity vibration identified through the assessment comprises prior notification of compaction works to receptors where vibration levels are expected to be 1 mm/s or more, limiting these works to weekday daytime hours, building condition surveys of the identified receptors prior to works, and vibration monitoring with real-time alerts at Corner Farm Cottage.

With additional mitigation in place, the effects of construction activity noise and vibration would not be significant.

The assessment of vehicle movements for the construction stage have been based on peak vehicle movements occurring in combination with development traffic associated with the operational stage of the early completed phases during the peak construction year. The peak traffic generation is anticipated to occur in 2035. During the peak construction year, construction road traffic is expected to cause perceptible changes in road traffic noise at receptors within 50 m of Fen Lane, such that significant adverse effects are expected. However, the level of road traffic noise during construction

at these receptors would not exceed 68 dB LA10,18hour and would not be atypical for dwellings adjacent to similar semi-rural roads.

No further significant effects are expected to occur due to construction road traffic noise at all other receptors within the study area.

Overall, it is considered likely that the construction of the proposed development would result in significant adverse effects at receptors within 50 m of Fen Lane due to the additional road traffic in the peak year of construction, and result in significant adverse effects at receptors within 50 m of the proposed highway works on Fen Lane and Ockendon Road due to construction activity noise. No further significant construction noise or vibration effects are expected.

Completed Development Stage Effects

The assessment of vehicle movements for the completed development stage has been based on vehicle movements expected to occur due to the fully completed development from 2043 onwards. During the completed development stage, operational road traffic is expected to cause perceptible changes in road traffic noise at receptors within 50 m of Fen Lane, such that significant adverse effects are expected. However, the level of road traffic noise at these receptors would not exceed 68 dB LA10,18hour and would not be atypical for dwellings adjacent to similar semi-rural roads.

No further significant effects are expected to occur due to completed development road traffic noise at all other receptors within the study area.

Prior to and during completed development stage, the risk of adverse effects from operational noise (noise of an industrial nature arising from mechanical and electrical plant including emergency generator testing) is to be controlled through implementation of a Framework for Managing Operational Noise (to be embedded within the LDO compliance documents) and compliance with the noise limits that apply to development within each build zone set out within the assessment and the compliance documents. In summary, the framework would require further assessment of operational noise during the design development stages to achieve the required operational noise limits, evaluation of change during the construction stage, and noise monitoring during the commissioning stages for each build zone. Design development and remedial action will be required should design stage or commissioning stage assessments demonstrate that noise limits are exceeded.

To support the evaluation of likely significant residual effects, an assessment of the illustrative scheme has been carried out and this demonstrates the likely operational noise effects of one form of proposed development that could be delivered under the parameters of the proposed LDO. This demonstrates that significant effects can be avoided and provides an indication of the likely forms of mitigation that would be required. Of particular note, the results demonstrate that up to 24 emergency generators (1-2 per building) could be tested simultaneously at any point in the day and still accord with these noise limits. However, given the flexibility sought thought the parameters, it is possible that the proposed development could be delivered in a different form and still achieve compliance with the noise limits via other means.

The framework includes limits for an emergency scenario in which large quantities of emergency power back-up systems could operate for up to 72 hours. The noise limits account for the low likelihood of occurrence and the fact that, in an emergency, any noise effect would be temporary. The assessment of the illustrative scheme demonstrates that, for one form of proposed development that could be delivered under the parameters of the proposed LDO, typical forms of mitigation (screening and enclosures) would be sufficient to achieve compliance with these noise limits.

Overall, it is considered that the operation of the proposed development would result in a significant adverse effect on receptors within 50 m of Fen Lane due to the addition road traffic generated by

the completed development. No further significant completed development noise or vibration effects are expected.

Cumulative Effects

The potential for significant cumulative noise and vibration effects have been evaluated for five of the eight identified cumulative schemes, due to proximity to the proposed development.

The potential for significant cumulative traffic noise and vibration effects has not been separately evaluated as the cumulative schemes have been included in the future baseline traffic data.

Overall, it is considered that cumulative noise and vibration effects would be no worse than the noise and vibration effects of the proposed development in isolation and therefore not significant.

An additional assessment scenario has been presented, considering the potential cumulative effects of LTC construction traffic and the proposed development construction traffic. This demonstrates that the combined road traffic noise effects would be no worse than the effects of the proposed development in isolation.

1.47 Ecology

Background

ES Chapter 11: Ecology reports on the assessment of potential ecological impacts and likely effects due to the construction and completed development stages of the proposed development. The assessment has been undertaken taking into account the relevant national and local guidance and regulations.

Baseline

The site comprises predominately agricultural land, with associated field boundaries, ditches, vehicular access tracks/roads and a small area of woodland in the approximate centre of the site. Small agricultural structures are also present on-site.

There are no international statutory designated sites within a 2 km radius of the site. Thames Estuary & Marshes SPA and Thames Estuary & Marshes Ramsar site are 9.19 km south-east of the site.

There are two Local Nature Reserves within 2 km of the site boundary, Cranham Marsh and Cranham Brickfields. A further 13 non-statutory designated sites are present within a 2 km radius of the site boundary, ranging from Metropolitan to Borough Grade 2, including Fairplay Farm SINC which is partially within the site and Upminster Sewage Works Grass Beds adjacent to the site.

The habitats currently on-site provide a varying level of ecological importance from Negligible to Local scale of ecological importance, with potential veteran trees of National scale ecological importance.

Invertebrate assemblages are considered to be of Local scale importance as the site contains various habitats which are of importance for invertebrates including woodland which is a valuable habitat for stag beetles, and neutral grassland which is a valuable habitat for notable pollinator species.

On-site amphibians are considered to be of up to Local scale importance. Although great crested newts have not been identified as present on the site, they are known to be in the local area and are considered likely to be present or to become present on the site in the future.

Reptile assemblages are considered to be of Local scale importance, with both grass snake and common lizard being recorded as present with a small population on the site.

On-site breeding and wintering birds are considered to be up to Local scale importance.

Foraging commuting and roosting common bat species (common pipistrelle, soprano pipistrelle and brown long-eared) are considered to be of Local scale importance. The site contains hedgerows, treelines and woodland which supports foraging and commuting bat species. There is a confirmed tree roost of a pipistrelle bat on the site, and a further 86 trees have been classed as having high and moderate potential to support roosting bats.

Badgers are considered to be up to Local scale importance.

Water vole are considered to be of Local scale importance. Although none were recorded on-site, there is suitable habitat present and they are assumed to be present as they are known to be in the local area.

Hedgehogs, harvest mice and brown hare are assumed present on the site and are considered to be of Local scale importance.

Construction Stage Effects

Extensive embedded mitigation measures have been considered in the assessment. These mitigation measures would ensure that the operation of the proposed development would reduce potential impacts and effects where possible.

A Habitat Regulations Assessment Stage 1 Screening has confirmed that there would be no effects in respect of Thames Estuary & Marshes SPA and Thames Estuary & Marshes Ramsar Site as a result of the construction stage. On this basis it is considered that there would be no effects on these designated sites.

During construction works, temporary and permanent, direct and indirect, adverse effects on ecologically sensitive receptors and biodiversity are likely to arise as a result of loss and degradation of habitat; loss of connectivity; loss of nesting, resting and foraging habitats; work practices; increased traffic and accidental vehicle collisions; contractor work force and activity presence and lighting leading to disturbance; spread of non-native and invasive species; as well as disturbance, emissions and discharges. However, these effect would not be significant.

The effects during the construction stage on designated sites, habitats, invertebrates, amphibians, reptiles, birds, bats, badgers, water voles and other species would be adverse but not significant. These effects would be temporary and reduce as new habitat is created on-site and becomes established over time.

Additional mitigation has been proposed based on legislative requirements, best practice and with the aim of delivering biodiversity gain. These measures would reduce and off-set identified adverse effects.

Completed Development Stage Effects

Extensive embedded mitigation measures have been considered in the assessment. These mitigation measure ensure that the operation of the proposed development would reduce potential impacts and effects where possible.

A Habitat Regulations Assessment Stage 1 Screening has confirmed that there would be no effects in respect of Thames Estuary & Marshes SPA and Thames Estuary & Marshes Ramsar Site as a result of the completed development stage. On this basis it is considered that there would be no effects on these designated sites.

Following completion of the proposed development, beneficial effects on biodiversity are likely to arise as a result of the introduction of extensive new habitats within the strategic landscaping and

ecology park. These habitats would be managed to support a range of protected and notable species.

The effects during the completed development stage would be beneficial and significant for habitats, and beneficial but not significant for designated sites, invertebrates, reptiles, amphibians, birds, bats, badgers and water vole. There would be no effects on other protected and notable species.

Additional mitigation has been proposed based on legislative requirements, best practice and with the aim of delivering biodiversity gain. These measures would reduce and off-set identified adverse effects.

Cumulative Effects

Of the nine cumulative schemes identified, three are considered to be located far enough away from the site that cumulative effects are not considered to be likely. The remaining six cumulative scheme would be required to accord with standard mitigation measures for schemes of their scale such as Construction Environmental Management Plans, etc. This includes meeting 10 % Biodiversity Net Gain and implementing procedures to reduce demolition and construction effects.

On this basis, cumulative effects from the construction and completed development stages are considered to be the consistent with those reported for the proposed development in isolation.

1.48 Water Resources and Flood Risk

Background

ES Chapter 12: Water Resources and Flood Risk presents the potential water resources and flood risk impacts and likely effects due to the construction and completed development stages of the proposed development. The assessment of construction and completed development stages has been undertaken taking into account the relevant national and local guidance and regulations.

Baseline

The site is situated adjacent to a watercourse, the Mardyke, which flows south along the north-east and crosses the south-east corner of the site. The Mardyke is designated as an Environment Agency (EA) main river.

The EA mapping indicates the majority of the site is within Flood Zone 1 (Low probability of fluvial or tidal flooding). There are areas within the site boundary in the east of the site, close to the Mardyke, within Flood Zones 2 and 3 (Medium and High probability of fluvial or tidal flooding).

There are several overland flow pathways crossing the site, predominantly routing surface water from west to east across the site towards the Mardyke, where the EA identified a potential surface water flood risk.

The British Geological Survey (BGS) map of the area (1:50,000 scale map series), accessed via online digital mapping, indicates the site is directly underlain by the London Clay Formation. Records show the site is underlain predominantly by superficial deposits of Head and Alluvium.

The site and study area are located within the Mardyke Nitrate Vulnerable Zone.

The site lies within Zone 3 (Total Catchment) of the groundwater Source Protection Zones.

The Mardyke watercourse lies within the Mardyke (West Tributary) Water Body catchment (Ref: GB106037028080) as delineated by the EA's Catchment Data Explorer. The catchment was classified as overall Moderate Status in 2022 although a failed Chemical Status in 2019 due to 'Mercury and Its Compounds' and 'Polybrominated diphenyl ethers (PBDE)'.

Construction Stage Effects

During construction works, the following effects have been identified:

- Increase in surface water runoff arising from construction works;
- Changes to the hydrodynamic status of the on-site ditch network and downstream watercourses;
- An increase in sediment loading of water discharged into the Mardyke and the resulting changes to the hydrodynamic status of downstream water features;
- Changes to the water quality status of the downstream water environment arising from construction works and associated drainage;
- Increase in potable water demand from the construction stage; and
- Increase in discharge volumes of effluent to foul sewers.

Taking into account the standard embedded management and control measures within the Code of Construction Practice which would be adopted on-site, it has been concluded that the existing site and construction of the proposed development would not result in significant adverse effects on water resources and flood risk and identified receptors.

Completed Development Stage Effects

During the completed development stage, the following effects have been identified:

- Increased surface water runoff rates leading to flood risks off-site;
- Direct changes to the extent and depth of the floodplain;
- Changes to the water quality status of on-site and downstream water features during the operational stage;
- Increase in potable water demand from the completed development stage; and
- Increase in discharge volumes of effluent to foul sewers.

Taking into account the embedded drainage strategy which would be adopted on-site, it has been concluded that the completed proposed development would not result in significant adverse effects on water resources and flood risk and identified receptors.

Cumulative Effects

This water resources and flood risk assessment has given consideration to the combined effects of the proposed development together with cumulative schemes within 1 km of the site boundary.

It is anticipated that the cumulative schemes would be required to offer betterment in terms of surface water runoff volumes when compared to the pre-developed situation and include measures to offer suitable treatment of runoff and demonstrate there would be no increase in off-site flood risks.

Similarly cumulative schemes would be reasonably expected to implement the same standard construction management measures and controls to those that would be adopted by the proposed development.

Furthermore, any surface water connections would be subject to approval and if a requirement for network upgrades were to be identified, these would be completed prior to connection.

Accordingly, no significant cumulative effects have been idenfitied.

1.49 Soils and Agriculture

Background

ES Chapter 13: Soils and Agriculture presents the potential impacts and likely effects on soils and agricultural land due to the construction stage of the proposed development, as a result of land being taken out of agricultural production. There are not anticipated to be any potential significant effects during the completed development stage and therefore this stage of the proposed development has not been assessed.

The assessment has been undertaken taking into account relevant policies and guidance.

Baseline

The site extends to 218.8 ha of primarily agricultural land in arable use, growing cereals together with break crops such as oilseeds and legumes.

The study area for this assessment has been determined as the agricultural land within the site boundary and comprises the following distinct areas targeted for development:

- Build Zones (including on-plot landscaping) and infrastructure corridors;
- Ecology park;
- Cable routing connecting to Warley substation; and
- Fibre optic cable routing.

The proposed highway works on Fen Lane and Ockendon Road would not impact on agricultural land or soil resource and therefore have not been assessed.

The proposed off-site fibre optic cable routes would also not impact on agricultural land or soil resources where they would be delivered within the highways network and on this basis have not been assessed within this chapter. Where the construction of new on-site fibre optic cable routes would be outside of the build zones and infrastructure corridors, they would not have a material effect on either agricultural land value or soil resource and therefore have not been assessed.

The superficial geology at the site comprises mostly head deposit, with alluvium in the east, all lying over a bedrock of London Clay. This gives rise to mostly clay, heavy clay loam and heavy silty clay loam soils, with variable permeability and drainage characteristics.

Detailed Agricultural Land Classification surveys were undertaken in March and October 2024 of the land proposed for development at the build zones. The remainder of the site, which is proposed for an ecology park and cable routing, was surveyed in October 2024 at a reconnaissance level as there would not be an irreversible loss of agricultural land or soil in this part of the site.

The survey identified three similar soil types, differentiated by subsoil permeability and drainage characteristics, and a small area in the west of a separate soil type with coarser textures and subject to soil draughtiness. Overall, the soil resource is of a heavy texture (clay or heavy (silty) clay loam).

The permeable soils are limited to Subgrade 3a, with the slowly permeable soils and those with heavier topsoil textures limited to Subgrade 3b. The droughty soils are also limited to Subgrades 3a and 3b, with the draughtier soils limited to the lower grade. Subgrade 3a is within the category of best and most versatile agricultural land and considered to be of high sensitivity while 3b is considered to be of medium sensitivity.

Construction Effects

During the construction stage, there would be a permanent irreversible loss of agricultural land of 75.0 ha within the build zones (including on-plot landscaping), of which 28.6 ha is BMV land in Subgrade 3a and 46.4 ha is non-best and most versatile land in Subgrade 3b.

The 114.1 ha of land within the proposed ecology park of which 34.6 ha is in Subgrade 3a and 79.5 ha is in Subgrade 3b would also be removed from agricultural production but is considered to be potentially reversible to agricultural use.

The up to four cable routes proposed to connect to Warley substation of which substantially less than 5 ha would be disturbed but would not be permanently removed from agricultural as it would be restored to its former use upon completion of the installation of the cables.

Off-site there would be a temporary and reversible loss of approximately 0.0165 ha of agricultural land within the fibre optic cable route at White Post Farm.

There are no universally applicable measures available to mitigate the irreversible loss of agricultural land.

The permanent, irreversible loss of Subgrade 3a best and most versatile land within the build zones and infrastructure corridors would give rise to significant adverse effects, while the permanent, irreversible loss of Subgrade 3b land has been assessed as not significant adverse.

The permanent, but potentially reversible loss of Subgrade 3a best and most versatile land and Subgrade 3b land within the ecology park has been assessed as significant adverse.

The temporary, reversible loss of Subgrade 3a best and most versatile land within the cable routing connecting to Warley substation has been assessed as not significant adverse.

The heavy-textured soils are sensitive to disturbance and handling, but the implementation of soil resource management measures with the LDO compliance documents would reduce the effect on soil resources. With this additional mitigation in place, the residual construction effects on soil resources are considered to be:

- Permanent significant adverse within the build zones and infrastructure corridors;
- Permanent, but potentially reversible, significant adverse within the ecology park; and
- Temporary and reversible, not significant adverse within the cable routing connecting to Warley substation.

Cumulative Effects

Five cumulative schemes are likely to give rise to cumulative effects on agricultural land in combination with the proposed development. Of the five, four include land of Subgrade 3b quality with some Subgrade 3a, but the Lower Thames Crossing is likely to involve the loss of Grade 2 agricultural land, which is a resource of high sensitivity. Therefore, the cumulative effect on agricultural land in combination with the proposed development is anticipated to be significant and adverse.

1.50 Climate Change

Background

ES Chapter 14: Climate Change presents the likely climate change effects due to the construction and completed development stages of the proposed development. The assessment of construction and completed development stages has been undertaken taking into account the relevant national

and local guidance and regulations. An end of life stage has been considered in respect of greenhouse gas emissions for information purposes.

Baseline

There is no operational energy or operational transport greenhouse gas (GHG) emissions associated with the site. In addition, for LBH, the UK Climate Projections (UKCP18) over land indicate increased likelihood of milder, wetter winters and hotter, drier summers for the future assessment period in comparison to the UKCP18 baseline, respectively.

Construction Stage Effects

Climate Change Resilience

During the construction works, the Climate Change Resilience (CCR) assessment has reviewed the potential vulnerability of the proposed development to extreme weather and projected climate change.

Taking into account the embedded mitigation measures, the effects are predicted to be of low magnitude. The construction of the proposed development would result in adverse effects, but these would not be significant in respect of identified receptors and climate change.

Greenhouse Gas Emissions

During the construction works, GHG emissions would be produced from raw materials required, transport and construction processes. The estimate of GHG emissions from the construction stage is approximately 622,992 tonnes of carbon dioxide equivalent (tCO_2e).

As the emissions would be small in respect of carbon budgets at borough and national level, it has been concluded that the construction of the proposed development would result in adverse, but not significant effects on identified receptors and climate change.

Completed Development Stage Effects

Climate Change Resilience

The CCR assessment has reviewed the potential vulnerability of the proposed development to extreme weather and projected climate change; however, taking into account embedded mitigation measures, the impacts are predicted to be of low magnitude.

While the completed development stage of the proposed development would result in adverse effects on identified receptors and climate change, the effects would not be significant.

Greenhouse Gas Emissions

Once the proposed development is completed, GHG emissions would be generated primarily from the use of the proposed development and from its maintenance. The provisional estimate of emissions from the completed development stage of the proposed development over the 60-year design life (including end of life) totals 71,751,469 tCO_2e. In the absence of additional mitigation, the effect would be significant adverse.

The necessary additional mitigation would be secured within the LDO and via legal agreement. On this basis, the residual completed development GHG emissions would result in adverse, but not significant effects on identified receptors and climate change.

Cumulative Effects

Climate Change Resilience

The climate resilience effects identified as a result of the construction and completed development stages are limited in their spatial extent to the site boundary and the proposed development in isolation. Therefore, cumulative CCR effects with other schemes are not applicable.

Greenhouse Gas Emissions

The atmospheric concentration of GHGs and resulting effect on climate change is affected by all sources and sinks globally, anthropogenic and otherwise. As GHG emission impacts and resulting effects are global rather than affecting one localised area, the approach to cumulative effects assessment for GHGs differs from that for many EIA topics where only projects within a geographically bounded study area of, for example, 1-2 km would be included.

Therefore, effects of GHG emissions from specific cumulative schemes have not been individually assessed. However, GHG emissions, have been contextualised within the UK, LBH and UK building sector carbon budgets.

1.51 Landscape and Visual

Background

ES Chapter 15: Landscape and Visual presents the potential landscape and visual impacts and likely effects due to the construction and completed development stages of the proposed development. The assessment of construction and completed development stages has been undertaken taking into account the relevant legislation, policies, and published guidance.

The following potential impacts and associated likely landscape and visual effects of the proposed development have been assessed:

- Construction stage activities resulting in the removal of vegetation to facilitate the build programme; the introduction of site compounds, storage of materials, lighting (if necessary, during the autumn and winter months); the presence of plant machinery; earthworks; and the power connection to Warley Substation; and
- Completed development stage that considers the maximum development envelopes (with roof plant and flues) within build zones with embedded mitigation measures as set out in ES Chapter 4: Proposed Development Description and Construction, resulting in the presence of new built form and planting within the ecology park.

The illustrative scheme has been assessed for additional context; the findings of this assessment has been set out in Technical Appendix 15.4 of ES Volume 2.

Methodology

The technical scope of the assessment has been informed by GLVIA3 and subsequent GLVIA 3 clarifications, and by application of professional judgement. The assessment has taken account of applicable legislation, guidance and policy.

The technical scope of the assessment for both the construction stage and completed development stage has considered the potential impacts and likely effects on the following:

- Landscape fabric (the site and immediate context 500 m form the site boundary);
- Landscape character; and
- Visual amenity.

Whilst the proposed landscape planting within the ecology park is embedded mitigation, it would not be immediately effective as landscape and visual mitigation at the time of initial planting. Therefore, the completed development stage has been assessed for each landscape and visual receptor on the basis of the following two scenarios:

- Scenario 1 assesses the maximum development envelopes (with roof plant and flues) within build zones with embedded mitigation measures as set out in ES Chapter 4: Proposed Development Description and Construction, at the end of the LDO (2045). Scenario 1 presents a worst-case for the completed development stage; and
- Scenario 2 assesses the maximum development envelopes (with roof plant and flues) within build zones with embedded mitigation measures as set out in ES Chapter 4: Proposed Development Description and Construction, with any screening effects of the proposed ecology park planting at 10 years following the end of the LDO (2055).

Baseline analysis has been informed by a review of published studies, desk top research, site visits, and ZTV analysis. The study area covers an area of 10 km radius from the site boundary.

Accurate visual representations (AVRs) (Type 3 photowire and/or photomontages) have been prepared in accordance with current best practice, to predict the completed development effects of the proposed development based on the development parameters and to inform the assessment.

Baseline

The site is located within arable farmland and contains the following landscape elements:

- Within the northern section of the site is a parcel of woodland. The field boundary hedgerows thin out and the landscape becomes open with a network of ditches delineating land parcel boundaries;
- The east of the site is relatively flat. The Mardyke runs along the boundary of the site, separating the site from the surrounding agricultural fields;
- The south of the site is characterised by arable fields with small ponds; and
- In the west the topography rises by 20 m from the centre of the site towards North Ockendon which sits on a plateau and forms a vantage looking towards the north-east.

The site sits within Landscape Character Area (LCA) 7 Essex Plateau; however, the eastern section of the site shares more characteristics with the adjacent LCA A1 Bulphan Fenland with an open rural character where major roads and development have less influence.

The visual amenity of the study area is predominantly of a semi-rural or rural landscape containing small settlements with visual enclosure provided by hedgerows and trees and small areas of woodland. The land rises to the north and east resulting in some elevated views across the landscape. The overall quality of the views and the visual amenity of residents is limited to some degree by major road corridors, commercial and utilities development and by networks of pylons and power lines that interrupt or foreshorten panoramic views.

A series of 23 representative assessment viewpoints were agreed during the EIA Scoping process, baseline photography was taken from each viewpoint, with night-time photography taken from four viewpoints.

Construction Effects

During construction works, there is potential for adverse effects on both landscape and the visual receptors. These effects would be controlled by the use of embedded mitigation measures incorporated within the LDO control documents.

It is noted that some of the on-site landscape planting within the ecology park would be delivered early int the construction programme. However, the most pronounced effects would be associated with changes to the landscape fabric on the site, and the introduction of tall machinery and plant such as cranes that would have localised impacts that would move position as the build out programme progresses. In this respect they may be considered transient in nature although the construction period would extend up to 20 years in extent.

Landscape

The effects of the construction stage of the proposed development on landscape character would be significant adverse for the site and immediate context (500 m from the site boundary).

The effects on landscape character would be adverse but not significant for host LCA 7: Essex Plateau and the adjoining LCA A1: Bulphan Fenland.

Visual Day-Time

The effects of the construction stage of the proposed development on visual amenity during the day-time would be significant adverse at viewpoints 1 (PRoW South of Great Warley Hall), 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 8 (PRoW Passing Through the Site), 9 (Dunnings Lane), 10 (PRoW North-west of Bulphan), 15 (PRoW to the west of Langdon Hills), 18 (Fen Lane), 19 (PRoW south of Harrow Bridge) and 22 (PRoW at Clay Tye Cottage).

Effects would be adverse, but not significant from viewpoints 2 (PRoW North of Childerditch), 3 (PRoW to the South of Thorndon Hall Grade II Registered Park and Garden and Country Park), 4 (PRoW North of Dunton Hall), 5 (PRoW on the Western Edge of Little Burstead), 11 (PRoW Near the Grove), 12 (PRoW West of Orsett), 13 (PRoW West of Brentwood Road), 14 (PRoW West of Langdon Hills Golf Club), 16 (Near St. Mary's Church), 17 (B186 Railway Bridge), 20 (B186 and A127 Junction) and 21 (St Mary's Lane and Dunning's Lane Junction).

There would be no effect at viewpoint 23 (PRoW at Belhus Wood Country Park).

Visual Night-Time

The effects of the construction stage of the proposed development on visual amenity during the night-time would be adverse but not be significant at all four viewpoints assessed (6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 15 (PRoW to the west of Langdon Hills) and 22 (PRoW at Clay Tye Cottage)).

Completed Development Effects

The embedded and additional mitigation described in this assessment would soften the edges of built form, and filter views to the proposed development. The ecology park and other planting would provide 'in character' habitat creation that would establish green corridors throughout the site. Seven view corridors, and separation distances between built form would retain a degree of visual permeability across the site with views to the ecology park and wider landscape. These would reduce the scale and extent of completed development stage landscape and visual effects, but significant landscape and visual effects would persist for some receptors arising from the presence of built form on previously visually open agricultural land, particularly within and adjoining the site, and where views extend across and along the full extent of the proposed development.

Scenario 1

Landscape

The effects of the completed development stage for scenario 1 (end of LDO 2045) on landscape character would be significant adverse for the site and immediate context (500 m from the site boundary).

The effects on landscape character would be adverse but not significant for host LCA 7: Essex Plateau and adjoining LCA A1: Bulphan Fenland.

Visual Day-Time

The effects of the completed development stage for scenario 1 (end of LDO) on visual amenity during the day-time would be significant adverse at viewpoints 1 (PRoW South of Great Warley Hall), 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 8 (PRoW Passing Through the Site), 9 (Dunnings Lane), 10 (PRoW North-west of Bulphan), 15 (PRoW to the west of Langdon Hills), 18 (Fen Lane), 19 (PRoW south of Harrow Bridge) and 22 (PRoW at Clay Tye Cottage).

Effects would adverse but not be significant from viewpoints 2 (PRoW North of Childerditch), 3 (PRoW to the South of Thorndon Hall Grade II Registered Park and Garden and Country Park), 4 (PRoW North of Dunton Hall), 5 (PRoW on the Western Edge of Little Burstead), 11 (PRoW Near the Grove), 12 (PRoW West of Orsett), 13 (PRoW West of Brentwood Road), 14 (PRoW West of Langdon Hills Golf Club), 16 (Near St. Mary's Church), 17 (B186 Railway Bridge), 20 (B186 and A127 Junction) and 21 (St Mary's Lane and Dunning's Lane Junction).

There would be no effect at viewpoint 23 (PRoW at Belhus Wood Country Park).

Visual Night-Time

The effects of the completed development stage for scenario 1 (end of LDO) on visual amenity during the night-time would be significant adverse at viewpoints 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), and 22 (PRoW at Clay Tye Cottage).

Effects would adverse but not be significant from viewpoint 15 (PRoW to the west of Langdon Hills).

Scenario 2

Landscape

The effects of the completed development stage for scenario 2 (10 years following the end of the LDO) on landscape character would be significant adverse for the site and immediate context (500 m from the site boundary).

The effects on landscape character would be adverse but not significant adverse for host LCA 7: Essex Plateau and adjoining LCA A1: Bulphan Fenland.

Visual Day-Time

The effects of the completed development stage for scenario 2 (10 years following the end of the LDO) on visual amenity during the day-time would be significant adverse at viewpoints 1 (PRoW South of Great Warley Hall), 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 8 (PRoW Passing Through the Site), 9 (Dunnings Lane), 10 (PRoW North-west of Bulphan), 18 (Fen Lane), and 22 (PRoW at Clay Tye Cottage).

Effects would adverse but not be significant from viewpoints 2 (PRoW North of Childerditch), 3 (PRoW to the South of Thorndon Hall Grade II Registered Park and Garden and Country Park), 4 (PRoW North of Dunton Hall), 5 (PRoW on the Western Edge of Little Burstead), 11 (PRoW Near

the Grove), 12 (PRoW West of Orsett), 13 (PRoW West of Brentwood Road), 14 (PRoW West of Langdon Hills Golf Club), 15 (PRoW to the west of Langdon Hills), 16 (Near St. Mary's Church), 17 (B186 Railway Bridge), 19 (PRoW south of Harrow Bridge), 20 (B186 and A127 Junction) and 21 (St Mary's Lane and Dunning's Lane Junction).

There would be no effect at viewpoints 23 (PRoW at Belhus Wood Country Park).

Visual Night-Time

The effects of the completed development stage for scenario 2 (10 years following the end of the LDO) on visual amenity during the night-time would be significant adverse at viewpoints 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), and 22 (PRoW at Clay Tye Cottage).

Effects would adverse but not be significant from viewpoint 15 (PRoW to the west of Langdon Hills).

Cumulative Effects

Construction Effects

The landscape and visual cumulative effects during the construction stage and completed development assessment relate to combined visibility and sequential views with other similar developments of equivalent scale and type.

Eight of the cumulative schemes have the potential to generate in combination effects with the proposed development during the construction stage.

Landscape

The cumulative effects of the construction stage in combination with the proposed development on landscape character would be significant adverse for the site and immediate context (500 m from the site boundary), the host LCA 7: Essex Plateau, and adjoining LCA A1: Bulphan Fenland.

Visual Day-Time

The cumulative effects of the construction stage in combination with the proposed development on visual amenity during the day-time would be significant adverse at viewpoints 1 (PRoW South of Great Warley Hall), 2 (PRoW North of Childerditch), 3 (PRoW to the South of Thorndon Hall Grade II Registered Park and Garden and Country Park), 4 (PRoW North of Dunton Hall), 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 8 (PRoW Passing Through the Site), 9 (Dunnings Lane), 10 (PRoW North-west of Bulphan), 11 (PRoW Near the Grove), 12 (PRoW West of Orsett), 15 (PRoW to the west of Langdon Hills), 17 (B186 Railway Bridge), 18 (Fen Lane), 20 (B186 and A127 Junction) and 22 (PRoW at Clay Tye Cottage).

Effects would be adverse but not be significant from viewpoints 5 (PRoW on the Western Edge of Little Burstead), 13 (PRoW West of Brentwood Road), 14 PRoW (West of Langdon Hills Golf Club), 16 (Near St. Mary's Church), and 21 (St Mary's Lane and Dunning's Lane Junction).

The effects from viewpoints 19 (PRoW south of Harrow Bridge) and 23 (PRoW at Belhus Wood Country Park) would remain as previously reported for the construction stage for the proposed development.

Visual Night-Time

The effects of the construction stage of the proposed development on visual amenity during the night-time would remain as previously reported for the proposed development.

There would be no cumulative effects from viewpoints; 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), and 22 (PRoW at Clay Tye Cottage), effects would remain as previously reported for the proposed development.

Completed Development Stage

Scenario 1

Nine of the cumulative schemes have the potential to generate in combination effects with the proposed development during the completed development stage.

The cumulative assessment has considered the proposed development as set out in scenario 1 in combination with cumulative schemes to identify residual cumulative effects.

Landscape

The effects of the completed cumulative schemes in combination with the proposed development on landscape character would be significant adverse for the site and immediate context (500 m from the site boundary), the host LCA 7: Essex Plateau, and adjoining LCA A1: Bulphan Fenland.

Visual Day-Time

The effects of the completed cumulative schemes in combination with the proposed development on visual amenity during the day-time would be significant adverse at viewpoints 1 (PRoW South of Great Warley Hall), 2 (PRoW North of Childerditch), 3 (PRoW to the South of Thorndon Hall Grade II Registered Park and Garden and Country Park), 4 (PRoW North of Dunton Hall), 5 (PRoW on the Western Edge of Little Burstead), 10 (PRoW North-west of Bulphan), 11 (PRoW Near the Grove), 12 (PRoW West of Orsett), 15 (PRoW to the west of Langdon Hills), 17 (B186 Railway Bridge), 18 (Fen Lane), 20 (B186 and A127 Junction) and 22 (PRoW at Clay Tye Cottage).

Effects would be adverse but not be significant from viewpoints 5 (PRoW on the Western Edge of Little Burstead), 13 (PRoW West of Brentwood Road), 14 PRoW (West of Langdon Hills Golf Club), 16 (Near St. Mary's Church), and 21 (St Mary's Lane and Dunning's Lane Junction).

There would be no cumulative effects from viewpoints 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 8 (PRoW Passing Through the Site), 9 (Dunnings Lane), 19 (PRoW south of Harrow Bridge), and 23 (PRoW at Belhus Wood Country Park). Effects would remain as previously reported for the scenario 1 stage of the proposed development.

Visual Night-Time

The effects of the completed cumulative schemes in combination with the proposed development on visual amenity during the night-time would be adverse but not significant from viewpoint 15 (PRoW to the west of Langdon Hills).

There would be no cumulative effects from viewpoints6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), and 22 (PRoW at Clay Tye Cottage), effects would remain as previously reported for the proposed development.

Scenario 2

Nine of the cumulative schemes have the potential to generate in combination effects with the proposed development during the completed development stage.

The cumulative assessment has considered the proposed development as set out in scenario 2 in combination with cumulative schemes to identify residual cumulative effects.

Landscape

The effects of the completed cumulative schemes in combination with the proposed development on landscape character would be significant adverse for the site and immediate context (500 m from the site boundary), the host LCA 7: Essex Plateau, and adjoining LCA A1: Bulphan Fenland.

Visual Day-time

The effects of the completed cumulative schemes in combination with the proposed development on visual amenity during the day-time would be significant adverse at viewpoints 1 (PRoW South of Great Warley Hall), 2 (PRoW North of Childerditch), 3 (PRoW to the South of Thorndon Hall Grade II Registered Park and Garden and Country Park), 4 (PRoW North of Dunton Hall), 5 (PRoW on the Western Edge of Little Burstead), 10 (PRoW North-west of Bulphan), 11 (PRoW Near the Grove), 12 (PRoW West of Orsett), 17 (B186 Railway Bridge), 18 (Fen Lane), 20 (B186 and A127 Junction) and 22 (PRoW at Clay Tye Cottage).

Effects would be adverse but not be significant from viewpoints 5 (PRoW on the Western Edge of Little Burstead), 13 (PRoW West of Brentwood Road), 14 PRoW (West of Langdon Hills Golf Club), 15 (PRoW to the west of Langdon Hills), 16 (Near St. Mary's Church), and 21 (St Mary's Lane and Dunning's Lane Junction).

There would be no cumulative effects from viewpoints 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), 8 (PRoW Passing Through the Site), 9 (Dunnings Lane), 19 (PRoW south of Harrow Bridge), and 23 (PRoW at Belhus Wood Country Park). Effects would remain as previously reported for the scenario 2 stage of the proposed development.

Visual Night-Time

The effects of the completed cumulative schemes in combination with the proposed development on visual amenity during the night-time would be adverse but not significant from viewpoint 15 (PRoW to the west of Langdon Hills).

There would be no cumulative effects from viewpoints; 6 (PRoW at North Ockendon), 7 (PRoW to the North of the Site), and 22 (PRoW at Clay Tye Cottage), effects would remain as previously reported for the proposed development.

8. Cumulative Effects

1.52 Inter-Project Effects

The inter-project cumulative effects have been summarised in each of the relevant technical topics in Section 7 of this NTS.

No additional significant effects have been reported when combined or additive cumulative effects are considered.

1.53 Intra-Project Cumulative Effects

Construction Stage

From the assessment of intra-project cumulative effects, one significant beneficial construction effect has been identified in respect of the following receptors and receptor groups:

- The labour market.

Five significant adverse construction effects have been identified in respect of the following receptors and receptor groups:

- Existing off-site residential receptors;
- Agricultural Land;
- Soil Resource;
- Existing Landscape Character; and
- Existing Views.

Completed Development Stage

No significant beneficial completed development effects that have been identified.

Two significant adverse completed development effects have been identified in respect of the following receptors and receptor groups:

- Existing Landscape Character; and
- Existing Views.

9. Summary

1.54 Additional Mitigation

The EIA process has identified the need for additional mitigation as summarised in Table 9.1. The additional mitigation measures are over and above the embedded mitigation measures, as the embedded mitigation forms part of the proposed development description.

Table 9.1: Summary of Proposed Additional Mitigation

Topic	Proposed Additional Mitigation
Construction	
Archaeology and Cultural Heritage	**Archaeology** It is considered that the adverse effects on buried heritage assets could be offset by a staged programme of archaeological evaluation (Stages 1 and 2) and mitigation (Stage 3), with dissemination at an appropriate level to increase knowledge and appreciation of the buried heritage assets. The aims and methodology of each stage would be set out in a WSI subject to prior approval by the LPA/ GLAAS. Stage 1 would comprise the following: • A programme of geophysical survey to identify anomalies indicative of buried features, which would inform the scope of Stage 2; Stage 2 would comprise the following: • Where necessary, a targeted archaeological trenched and/or geoarchaeological evaluation in order to confirm the underlying deposits and the nature, extent, condition and heritage significance of predicted archaeological remains at the site. The results of Stages 1 and 2 would allow confirmation of the mitigation strategy (in particular on the need for targeted archaeological excavation in advance of construction, and/or a watching brief during earthworks) for any significant archaeological assets in order to offset the effects and ensure public benefit from the archaeological process. All archaeological work would be undertaken in consultation with the GLAAS as the archaeological advisor to LBH, and in accordance with an approved archaeological WSI.
Socio-Economics	None.
Transport and Accessibility	None.
Air Quality	None.
Noise and Vibration	For Build Zones B, C, G and H, substructure works shall be carried out without the use of impact driven piling. Piling using augured or vibratory methods shall be implemented, or an alternative means of mitigating noise from piling shall be employed, such as with the drive system enclosed within an acoustic shroud. For Build Zone C, the following additional mitigation shall apply: • On-site cutting of structural steel shall be minimised as far as possible through off-site manufacture. Should this be essential to carry out on site, these works shall be carried out within the northern half of the build zone (at least 150 m from Corner Farm Cottage) where feasible; and • Temporary acoustic screening (a 2.4 m tall imperforate barrier of minimum mass per unit area of 10 kg/m^2) shall be provided around works associated with a proposed building where the proposed building footprint encroaches into the southern 100 m wide part of the build zone.

Table 9.1: Summary of Proposed Additional Mitigation

Topic	Proposed Additional Mitigation
	For earthworks and the closest mound works to the Home Farm receptors (R01 and R05), the Fen Farm receptors (R02 and R08) and Corner Farm Cottage (R06), temporary acoustic screening (minimum mass per unit area of 10 kg/m^2) shall be provided where these works occur within 100 m of the receptor and for a duration of two weeks or more. Acoustic screening shall be a minimum height of 2 m (and, in general, with a height of no more than 3 m) and shall be positioned to completely hide the surface level works from view at the receptor. For Phases S2 to S4 of the highway works, temporary acoustic screening (minimum mass per unit area of 10 kg/m^2) shall be provided where these works occur within 100 m of noise-sensitive receptors for a duration of two weeks or more. Acoustic screening shall be a minimum height of 2 m and shall be positioned and selected to hide surface level works from view at the overlooking windows to noise-sensitive rooms within these dwellings. For Phase S1 of the highway works, it is assumed that provision of temporary screening during the limited site clearance and enabling works would not be practical or appropriate. Where vibration levels are predicted to exceed Significant Observed Adverse Effect Level (SOAEL) for human perception effects (such as at Corner Farm Cottage, and the dwellings closest to the Fen Lane and Ockendon Road highway works), the contractors shall: • carry these works out only during weekday daytime; • provide prior notification to the occupiers of affected receptor building of the type of works, the reason for the works, the likely times and duration of works; and • offer to carry out a building condition survey prior to the works to ensure the current status of the receptor building is recorded, and carry this out if consent is given by landowner. To further reduce the risk of significant effects occurring: • Noise and vibration monitoring shall be carried out at a position representing Corner Farm Cottage during substructure works at Build Zone C and during mound works (during which potential significant effects have been identified); • Noise and vibration monitoring shall be carried out at a position representing Bolyngtons (near Home Farm Estate) during mound works (during which potential significant effects have been identified); and • Noise and vibration monitoring shall be carried out during the highway works at one position on Fen Lane and one position on Ockendon Road (north of Fen Lane) representing the closest dwelling to the Fen Lane and Ockendon Road highway works. For the above monitoring, the instrumentation shall be located at a position representing the worst-affected receptor building(s) and shall provide the Contractor with real-time alerts such that action can be taken to reduce the likelihood of significant effects occurring when noise or vibration levels approach or exceed the SOAEL values.
Ecology	As no significant effects have been identified within the assessment, no additional mitigation is considered to be necessary in EIA terms. However, non-significant effects have been identified and additional mitigation has been proposed on the basis of best practice and legislative requirements (such as protected species licencing). The final design and location of mitigation would be secured by condition (with a preference for locating within build zones where possible). All mitigation would be provided in the following build zones and/or on-site areas:

Table 9.1: Summary of Proposed Additional Mitigation

Topic	Proposed Additional Mitigation
	• Phase 1 Mitigation - in Build Zones D and F or in areas of existing habitat which would remain unaltered (i.e. the woodland area to the north of Build Zone A) or within Part 1 and 1A of the ecology park; • Phase 2 Mitigation - in Build Zones E, G and H or in areas permissible for Phase 1 or within Part 2 or Part 4 of the ecology park; and • Phase 3 Mitigation - in Build Zones A, B and C or in areas permissible for Phase 1 and 2 or within Part 3 or Part 4 of the ecology park. **Fairplay Farm SINC** Skylark plots would be provided in on-site habitats (likely within retained SINC habitat) in the north-west of the site. These would be created from the commencement of the relevant construction stage and throughout the phased completed development stage. They would be created in line with up-to-date guidance. Assuming a maximum of four breeding pairs could potentially be lost from the area, eight skylark plots would be provided each year (delivered in sets of two plots). Skylark plots have the potential to also benefit rare arable weeds, through provision of suitable uncropped habitat. As these are proposed to benefit skylarks using the SINC, the benefits of this are considered as part of the residual effects SINC assessment rather than in the bird residual effects assessment. **Amphibians** In addition to the embedded mitigation measures, at least 12 permanent artificial refugia (hibernaculum) would be created for GCN built from stone, wood, earth, and turf to make them permanent. They would be built with one aspect facing south, and away from waterlogged areas, and in accordance with up to date guidance. These would also be beneficial for reptiles and invertebrates. **Birds** In addition to embedded mitigation such as provision of appropriate habitat and careful timing of work, additional bird mitigation would include provision of a minimum of 150 bird boxes in a range of sizes and locations to suit various species (including three barn owl boxes, boxes suitable for other owls, house sparrow terraces and swift boxes) would be provided. The exact location and type would be advised by an experienced ecologist at each build stage. **Bats** In addition to the embedded mitigation provisions of appropriate habitat, and an appropriate lighting strategy, specific bat mitigation would include update surveys in the season ahead of work commencing, including further survey in advance of tree clearance, and provision of a minimum of 80 bat boxes installed on suitable features including existing mature trees within the retained hedgerows, in the proposed broadleaved woodland and built into new buildings. Bat box specification, mounting instructions and exact location would be advised by an experienced bat ecologist at each build stage. A variety of box types would be included, with hibernating and maternity boxes included.
Water Resources and Flood Risk	None.
Soils and Agriculture	The implementation of soil resource management measures which would be secured by the LDO compliance documents. The soil resource management measures would ensure that soils are handled, stored and replaced according to good practice as set out in the Defra Construction Code of Practice for the Sustainable Use of Soils. In this way, soils that are reused on the site would be

Table 9.1: Summary of Proposed Additional Mitigation	
Topic	**Proposed Additional Mitigation**
	used for their most suitable purposes in the detailed design and would be able to continue to fulfil their various ecosystem functions. The soil resource management measures would confirm the most appropriate re-use for the topsoil within the site and aim to re-use as much of the displaced topsoil on-site as is possible. The soil resource management measures would contain descriptions of the following: • Principles and measures for soil management during construction, including conditions for soil handling, preparatory works, soil stripping, soil storage and the maintenance of soil stockpiles; • Principles and methods to be used to reuse and reinstate soils in the site; and • Aftercare of reinstated soils.
Climate Change	None.
Townscape and Visual	None.
Completed Development	
Archaeology and Cultural Heritage	None.
Socio-Economics	None.
Transport and Accessibility	None.
Air Quality	The use of SCR or another suitable equivalent technology would be conditioned for all generators within the proposed development. This would be secured by means of an appropriately worded planning condition.
Noise and Vibration	None.
Ecology	As previously set out, the provision of skylark plots within retained arable land at Fairplay Farm SINC, to the north-west of the site boundary, would ensure that sufficient habitat for farmland birds is retained during the completed development stage, and the integrity of the SINC for use by these species would not be compromised.
Water Resources and Flood Risk	None.
Soils and Agriculture	None.
Climate Change	**Greenhouse Gas Emissions** Additional mitigation would be required to reduce the completed development GHG emissions to ensure the proposed development aligns with a science-based 1.5 °C compatible trajectory and the UK's trajectory towards net zero. To fulfil this, achievement of net zero emissions in the operational stage would be set out within energy statements, the delivery of which would be secured within the LDO. Net zero emissions in the operational stage would be achieved by implementing the principles of the Institue of Sustainability and Environmental Professionals (ISEP's) GHG management hierarchy: • Firstly, eliminate emissions: For example, considering decisions about operational design/use to prevent GHG emissions across the lifecycle; • Then, reduce GHG emissions: For example, achieving real and relative (per unit) reductions in carbon and energy; achieving efficiencies in operations, processes, fleet and energy management;

Table 9.1: Summary of Proposed Additional Mitigation	
Topic	**Proposed Additional Mitigation**
	• Then, substitute GHG emissions: For example, adopting renewable or low-carbon technologies; reducing carbon (GHG) intensity of energy use and of energy purchased; or purchasing inputs and services with lower embodied/embedded emissions; and • Finally, compensate: After implementing the measures outlined above, the completed development would be required to seek to compensate unavoidable residual emissions via securing a contribution to the Council's Carbon Reduction Fund to offset GHG emissions. The Sustainability and Energy Statement has been developed in line with the previously set out ISEP's GHG management hierarchy and provides initial estimates of site-level carbon savings, carbon shortfalls and offset payments. It also reports how the proposed development would meet the objectives and requirements set by the London Plan. As these findings are initial, carbon estimates for offset payments would be further refined at the design stage. These refinements to the carbon estimates would be set out within energy statements (the production of which would be secured within the LDO). These energy statements would also be produced in line with the ISEP's GHG management hierarchy The final offset payments would therefore be decided based on information presented in the energy statements and would be secured through legal agreement. The LDO would require a Whole Lifecycle Carbon Assessment (WLCA) and Circular Economy Statement to be submitted at the detailed design stage pre-commencement of any building. This would enable the WLCA models to capture the updated design detail to refine the accuracy of the analysis and to provide an increasingly representative estimate of the embodied carbon result at practical completion, as the proposed development moves through each design phase. This would also drive carbon reduction through recommending low carbon alternatives at each stage.
Landscape and Visual	None.

1.55 Significant Construction Stage Effects

After taking in consideration the additional mitigation measures, the following significant residual beneficial environmental effect have been identified:

- Creation of employment and associated GVA within the labour market.

The following significant residual adverse environmental effects have been identified:

- Localised removal of archaeological prehistoric archaeological settlement remains through cut and fill earthworks, foundation construction, ponds and reservoir earthworks;
- Localised removal of archaeological Roman settlement remains through cut and fill earthworks, foundation construction, ponds and reservoir earthworks;
- Change in setting due to increased traffic; noise, dust, visibility of traffic and construction equipment/plant during enabling works, cut and fill earthworks, infrastructure works, construction equipment and plant during mound earthworks, building construction, highway works and off-site fibre optic cable installation of Bury Farmhouse;
- Construction activity noise on receptors within 50 m of Fen Lane highway works (13 dwellings) and Ockendon Road highway works (19 dwellings);
- Construction stage road traffic noise on receptors within 50 m of Fen Lane;
- Permanent, irreversible loss of BMV agricultural land (Subgrade 3a) in the build zones and infrastructure corridors;

- Permanent, potentially reversible loss of BMV agricultural land (Subgrade 3a) and Non-BMV agricultural land (Subgrade 3b) agricultural land in the ecology park;
- Permanent, irreversible loss of or damage to soil resources in the build zones and infrastructure corridors;
- Loss of existing vegetation. Large areas of bare earthworks. Prominence of construction elements on the landscape fabric and character of the site and immediate context;
- Change in daytime views due to visibility of construction elements and activities at:
  - Viewpoint 1 (PRoW South of Great Warley Hall);
  - Viewpoint 6 (PRoW at North Ockendon);
  - Viewpoint 7 (PRoW to the North of the Site);
  - Viewpoint 8 (PRoW Passing Through the Site);
  - Viewpoint 9 (Dunnings Lane);
  - Viewpoint 10 (PRoW North-west of Bulphan);
  - Viewpoint 15 (PRoW to the west of Langdon Hills);
  - Viewpoint 18 (Fen Lane);
  - Viewpoint 19 (PRoW south of Harrow Bridge); and
  - Viewpoint 22 (PRoW at Clay Tye Cottage).

From the assessment of intra-project cumulative effects, one significant beneficial effect has been identified during the construction stage in respect of the following receptors and receptor group:

- The labour market.

From the assessment of intra-project cumulative effects, five significant adverse effects have been identified during the construction stage in respect of the following receptors and receptor group:

- Existing off-site residential receptors;
- Agricultural Land;
- Soil Resource;
- Existing Landscape Character; and
- Existing Views.

1.56 Significant Completed Development Stage Effects

After taking in consideration the additional mitigation measures, the following residual significant beneficial environmental effects have been identified:

- Creation of employment and associated GVA within the labour market; and
- Habitat loss, fragmentation and/or severance, habitat enhancement and creation, root compaction of retained trees and hedgerows.

The following significant residual adverse environmental effects have been identified:

- Change in setting of Bury Farmhouse due to new buildings and landscaping on the site;
- Road traffic noise at receptors within 50 m of Fen Lane;
- Loss of open rural character and increased recreational, conservation and education resource at the site and immediate context for Scenario 1 (Scenario 1 considers the maximum development envelopes (with roof plant and flues) within build zones with embedded mitigation measures as set out in ES Chapter 4: Proposed Development Description and Construction with proposed landscape mitigation such as minimum height mounding and perimeter and ecology park planting as it would be at the end of the LDO. This equates to impacts occurring immediately after construction (2045); and is a worst-case.);

- Change in daytime views for Scenario 1 due to built form, urbanising influences and loss of openness at:
  - Viewpoint 1 (PRoW South of Great Warley Hall);
  - Viewpoint 6 (PRoW at North Ockendon);
  - Viewpoint 7 (PRoW to the North of the Site);
  - Viewpoint 8 (PRoW Passing Through the Site);
  - Viewpoint 9 (Dunnings Lane);
  - Viewpoint 10 (PRoW North-west of Bulphan);
  - Viewpoint 14 (PRoW West of Langdon Hills Golf Club);
  - Viewpoint 15 (PRoW to the west of Langdon Hills);
  - Viewpoint 18 (Fen Lane);
  - Viewpoint 19 (PRoW south of Harrow Bridge); and
  - Viewpoint 22 (PRoW at Clay Tye Cottage).
- Change in night-time views for Scenario 1 due to lighting changes associated with the operation of the completed development at:
  - Viewpoint 6 (PRoW at North Ockendon);
  - Viewpoint 7 (PRoW to the North of the Site); and
  - Viewpoint 22 (PRoW at Clay Tye Cottage).
- Loss of open rural character and increased recreational, conservation and education resource on the landscape character and fabric of the site and immediate context for Scenario 2 (Scenario 2 considers effects of the agreed maximum development envelopes (with roof plant and flues) with minimum height mounding with matured perimeter and ecology park landscaping (10 years following the end of the LDO));
- Change in daytime views for Scenario 2 due to built form, urbanising influences and loss of openness at:
  - Viewpoint 1(PRoW South of Great Warley Hall);
  - Viewpoint 6 (PRoW at North Ockendon);
  - Viewpoint 7 (PRoW to the North of the Site);
  - Viewpoint 8 (PRoW Passing Through the Site);
  - Viewpoint 9 (Dunnings Lane);
  - Viewpoint 10 (PRoW North-west of Bulphan);
  - Viewpoint 18 (Fen Lane); and
  - Viewpoint 22 (PRoW at Clay Tye Cottage).
- Change in night-time views for Scenario 2 due to lighting changes associated with the operation of the completed development at:
  - Viewpoint 6 (PRoW at North Ockendon);
  - Viewpoint 7 (PRoW to the North of the Site); and
  - Viewpoint 22 (PRoW at Clay Tye Cottage).

From the assessment of intra-project cumulative effects, two significant adverse effects have been identified during the completed development stage in respect of the following receptors and receptor group:

- Existing Landscape Character; and
- Existing Views.

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