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London Borough of Havering Council

Project

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EAST HAVERING DATA CENTRE CAMPUS

FLOOD RISK ASSESSMENT

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1. INTRODUCTION

1.1 Appointment and Brief

1.1.1 Ramboll UK Limited (Ramboll) has been commissioned by the Local Planning Authority of the London Borough of Havering (the 'LPA') to undertake a Flood Risk Assessment (FRA) for a data centre campus (the 'proposed development'), on land located within East Havering, to the north of South Ockendon (the 'site').

1.2 Proposed Development

1.2.1 The description of the proposed development to be permitted in the proposed LDO includes design parameters to allow flexibility in the land uses and quantum of floorspace that would be permitted on-site.

1.2.2 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. The phasing of the proposed works would be arranged such that any surface water drainage measure installation or drainage ditch diversions (as described in Section 5 of this report) would be undertaken in advance of the construction of any build zone or infrastructure which would rely on such measures to manage flood risks.

1.0.2 The proposed development would consist of up to 400,000 m^2 of gross external area (GEA) comprising

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; and
   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 development.
3. Creation of an 'ecology park'.
4. Any operations or engineering works necessary to enable the delivery of the 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 for 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.

1.2.3 Localised widening and improvements are proposed along Fen Lane and Ockendon Road. Where feasible, these works would reuse existing drainage assets but the works would involve the realignment of existing drainage ditches or replacement of the capacity of the ditches through alternative measures, as well as the relocation of existing gullies and kerb lines. Due to the introduction of a new footway on the eastern end of Fen Lane, a positive drainage network would be provided. This would be sized to drain the existing footway only. The existing footway would discharge to the highway where gullies would be provided which would discharge to Hydrorock blocks which are designed to infiltrate underneath the footway.

1.2.4 The potential land uses in each of the eight build zones (A – H) to be permitted by the proposed LDO is presented in Figure 1.1.

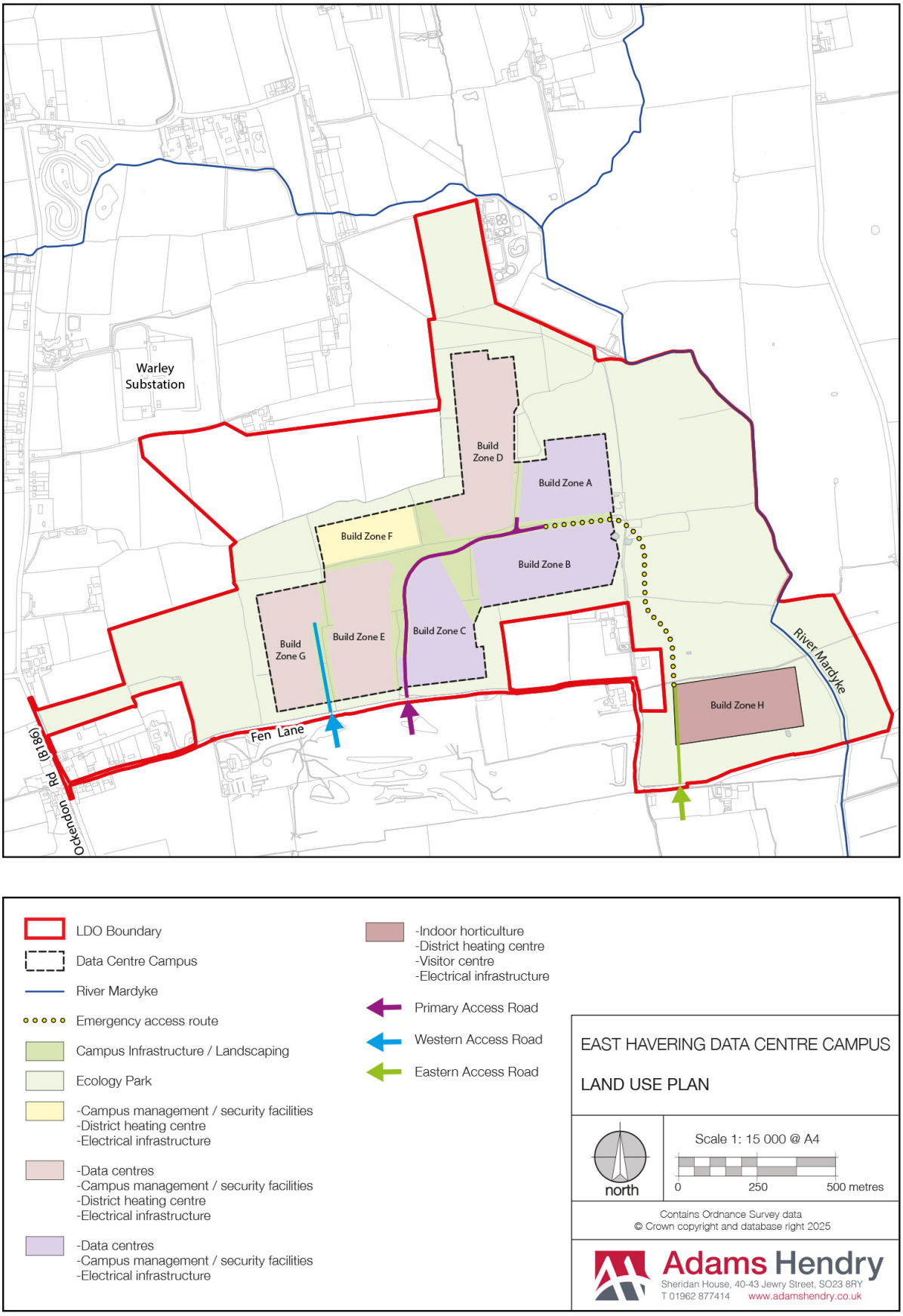

Figure 1.1: Proposed Land Use Parameter Plan

1.3 Scope and Objectives

1.3.1 This report considers the risks of various sources of flooding to the site and the potential for change to the flood risk to downstream receptors (such as people, property, habitats, infrastructure, and statutory sites) from the proposed development as a consequence of surface water runoff changes. A comparison is made between the existing baseline and the completed proposed development.

1.3.2 This FRA has been carried out in accordance with the December 2024 National Planning Policy Framework (NPPF)[1] as amended in February 2025. It has been prepared to assist the LPA and relevant statutory consultees (such as the Environment Agency (EA) and Lead Local Flood Authority) when considering the potential flooding risk arising from the proposed development.

1.3.3 This report provides the following information:

- A review of the flood risk to the site based upon flood data and the flood maps provided by the EA and the relevant Strategic Flood Risk Assessment (SFRA);
- An assessment of flood risk from all sources including tidal, fluvial, pluvial, groundwater and infrastructure failure to the proposed development;
- An assessment of the compatibility of the proposed development for its location based on flood risk and its proposed usage;
- An assessment of the impact of the proposed development to the flood risk status of downstream receptors (in terms of surface water runoff or changes to the floodplain);
- Proposals for measures to mitigate the generation of surface water runoff as a result of the proposed development (where necessary); and
- Proposals to mitigate any residual flood risks to the development (where necessary).

1.4 General Limitations and Reliance

1.4.1 In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions reached in this report are valid only to the extent that the information provided to Ramboll was accurate, complete, and available to Ramboll within the reporting schedule.

1.4.2 The key sources of information used to prepare this report are footnoted within the document. Ramboll cannot accept liability for the accuracy or otherwise of any information derived from third party sources.

1.4.3 Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and/or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

1.4.4 Unless stated otherwise, the geological information provided is for general environmental interpretation and should not be used for geotechnical and/or design purposes.

[1] Ministry of Housing, Community and Local Government, December 2024. National Planning Policy Framework. London. HMSO. https://www.gov.uk/government/publications/national-planning-policy-framework--2

2. POLICY FRAMEWORK

2.1 National Policy Framework

2.1.1 The December 2024 NPPF was most recently amended in February 2025, with flood risk remaining primarily regulated through planning policy. The NPPF requires that an FRA should be prepared for all developments within Flood Zones 2 and 3; and all development sites over 1 hectare in area to determine the risks of flooding from all sources including rivers, the sea, sewers, and groundwater. The NPPF sets out that flood risk should be defined according to Flood Zone 3 (High Probability), Flood Zone 2 (Medium Probability) and Flood Zone 1 (Low Probability).

2.1.2 In terms of flood risk, the NPPF classifies land uses according to vulnerability as follows:

- Essential infrastructure;
- Highly vulnerable;
- More vulnerable;
- Less vulnerable; and
- Water-compatible development.

2.2 Climate Change Guidance

2.2.1 The Government's current climate change guidance[2] for developers and their agents when they prepare FRAs for Local Development Orders, is provided online and seeks to minimise vulnerability and provide resilience to flooding and coastal change. They key climate change factors which are covered with regard to flood risk include the following:

- Peak river flow allowances which show the anticipated changes to peak flow by river basin district;
- Increased rainfall depths which affect river levels and land and urban drainage systems; and
- A range of allowances for each river basin district and epoch for sea level rise.

2.2.2 This online guidance was originally published in February 2016 and had been updated periodically, most recently in August 2022, to reflect changes in climate science such as updated sea level rise allowance to reflect latest climate chance projections (UKCP18) which replaced previous projections (UKCP09).

2.3 The London Plan

2.3.1 The London Plan[3] is the Spatial Development Strategy for London. As the overall strategic plan for London, it sets out an integrated economic, environmental, transport and social framework for the development of London over a 20-25 year period.

2.3.2 Policy 'SI 12 - Flood Risk Management' sets out that "*Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses*".

2.3.3 In regard to Sustainable Drainage Systems (SuDS) Policy 'SI 13 - Sustainable Drainage' sets out "*Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:*

[2] Environment Agency, 2025. Flood risk assessments and costal change. https://www.gov.uk/guidance/flood-risk-and-coastal-change#para62

[3] Greater London Authority, 2021. The London Plan. The Spatial Development Strategy for Greater London. London. GLA. https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

1. *rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation);*
2. *rainwater infiltration to ground at or close to source;*
3. *rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);*
4. *rainwater discharge direct to a watercourse (unless not appropriate);*
5. *controlled rainwater discharge to a surface water sewer or drain; and*
6. *controlled rainwater discharge to a combined sewer.*".

2.3.4 Therefore, consideration must be given to the inclusion of flood risk management measures throughout the development design process.

2.4 London Borough of Havering Strategic Flood Risk Assessment

2.4.1 The London Borough of Havering (LBH) Level 1 Strategic Flood Risk Assessment (SFRA) was developed by Jacobs in November 2016[4]. The SFRA identifies the spatial variation in flood risk across the Havering administrative area allowing a borough-wide comparison of future development sites with respect to flood risk considerations. The primary objective of the LBH SFRA is to inform the Local Plan in respect of the development and review of policies related to flood risk management.

2.5 Havering Local Plan

2.5.1 The London Borough of Havering Local Plan[5] sets out the Council's strategy for future growth and sustainable development up to 2031. The policies within the Local Plan help ensure that the sustainability needs of the borough over the next 15 years are met. Policy 32 Flood Management states that the Council will support development that seeks to avoid flood risk to people and property and manages residual risk by applying the Sequential Test and, if necessary, the Exception Test as set out in the NPPF.

[4] Jacobs, London Borough of Havering, November 2016, Level 1 Strategic Flood Risk Assessment, B08600D2-L-01, 04 21

[5] London Borough of Havering (2016) Havering Local Plan 2016–2031. London: London Borough of Havering. Available at: https://www.havering.gov.uk/downloads/download/641/havering_local_plan (Accessed October 2025).

3. SITE DESCRIPTION

3.1 Site Location

3.1.1 As presented in Figure 3.1, the site is located approximately 30 km east of central London, 12 km to the north of the River Thames and 4 km east of Upminster town centre. The London Orbital Motorway (M25) is situated less than 1 km west of the site boundary. The site is located at the eastern edge of the administrative boundary of LBH, immediately adjacent to the administrative boundary of Thurrock Council, whilst the boundary of Brentwood Borough Council lies approximately 1.4 km to the north.

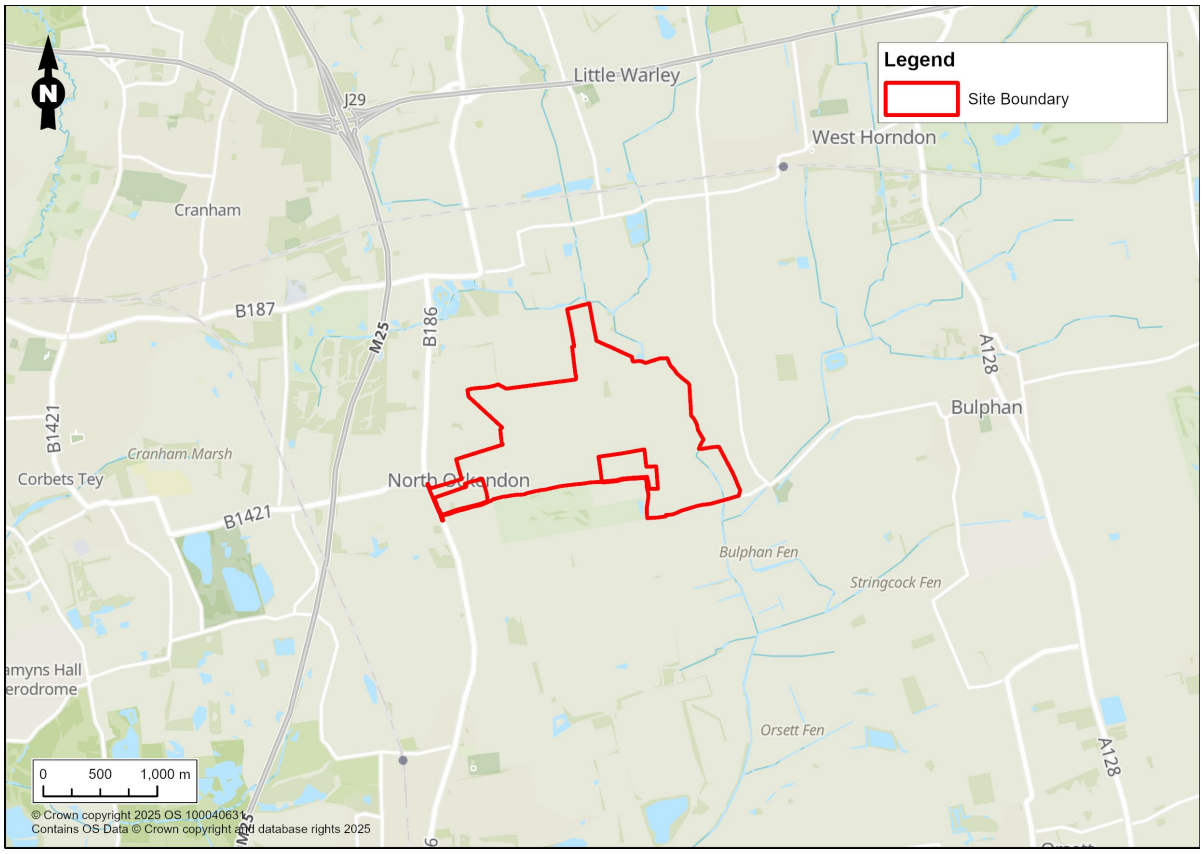

Figure 3.1: Site Location

3.1.2 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.

3.1.3 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 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.

3.2 Site Description

3.2.1 The site comprises an irregularly shaped parcel of mostly open agricultural land in arable use and extends to 218.8 hectares (ha) in area.

3.2.2 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.

3.2.3 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 approximately 260 m to the north of the junction with Fen Lane.

3.2.4 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 Nursery). 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.

3.3 Site Topography

3.3.1 As presented in Figure 3.2, the site topography generally slopes down from west to east, with a fall from approximately 40 m above Ordnance Datum (AOD) near the western boundary to approximately 4 m AOD at the eastern boundary. Most of the change in elevation is in the far western portion of the site, with the majority of the central and eastern parts relatively level at approximately 5 to 10 m AOD.

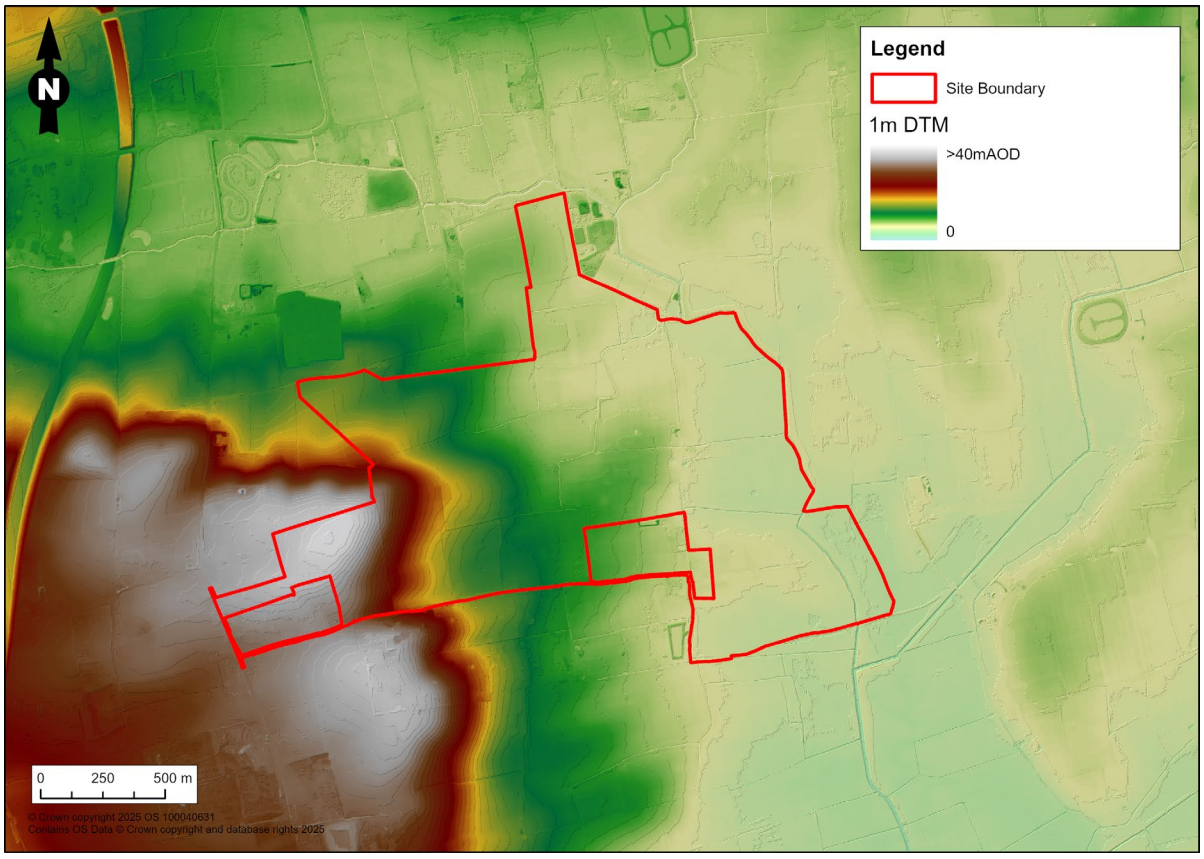

Figure 3.2: Site Topography - Environment Agency LiDAR Data

3.4 Site Hydrology

3.4.1 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 EA 'main river'.

3.4.2 The Baseline Compiled Survey Report of the site prepared by SLR in 2025[6] identified a total of 23 ponds within the site plus a 250 m buffer from the site boundary. These were identified through a combination of ground truthing and aerial mapping. Of these, five were located within 30 m of the site boundary.

3.4.3 It was also confirmed by SLR in the EcIA report that a network of arable drainage ditches is present across the survey area, the majority of which held little (<5 cm) to no water and were likely to be seasonal in nature (i.e., store water in the wetter months of the year). Where water was present, water was found only in deeper areas or more lower lying areas of the ditch line, rather than a continuous stretch of water. Figure 3.3 shows an example of these drainage ditches.

Figure 3.3: Typical Image of Ditch Network (Source: SLR EcIA Report)

3.5 Geological Setting

3.5.1 The British Geological Survey (BGS) map of the area (1:50,000 scale map series), accessed via online digital mapping[7], indicates that the site is directly underlain by the London Clay Formation. Records show the site is underlain predominantly by superficial deposits of Head and Alluvium. There is a small area of Black Park Gravel Member superficial deposits located in the west of the site.

3.5.2 DEFRA's online Magic Map classifies the site as containing an Unproductive bedrock Aquifer. A Secondary (Undifferentiated) Superficial Drift Aquifer is located in the south of the site whilst a Secondary A Aquifer is situated in the north-west of the site.

[6] SLR, November 2025, Havering Data Centre Campus Baseline compiled survey report

[7] The British Geological Survey (BGS) Geology of Britain Viewer.
25.6https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.20478462.751019057.1623140982-555024661.1620222646 (accessed April 2024)

- Unproductive Aquifer: "*These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow*."
- Secondary (Undifferentiated) Aquifer: "A*ssigned where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type*."
- Secondary A Aquifer: "*Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*"

4. BASELINE DATA REVIEW

4.1 Fluvial and Tidal Flood Risk

4.1.1 In England, flood risk is regulated through planning policy, with key requirements being outlined in the NPPF. The primary resource for reviewing fluvial and tidal flood risk is the EA's indicative floodplain maps[8]. These classify risks as follows:

- Flood Zone 1 (Low Probability): annual probability of flooding less than 1 in 1,000 (<0.1 %);
- Flood Zone 2 (Medium Probability): annual probability of flooding more than 1 in 1,000 (0.1 %) but less than 1 in 100 (1 %) for fluvial flooding or 1 in 200 (0.1 %) for tidal flooding; and
- Flood Zone 3 (High Probability): annual probability of flooding of more than 1 in 100 (1 %) for fluvial flooding or 1 in 200 (0.5 %) for tidal flooding.

4.1.2 As presented in Figure 4.1, 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). The LBH Level 1 SFRA suggests that the land within Flood Zone 3 at this location is designated as a functional floodplain (Zone 3B).

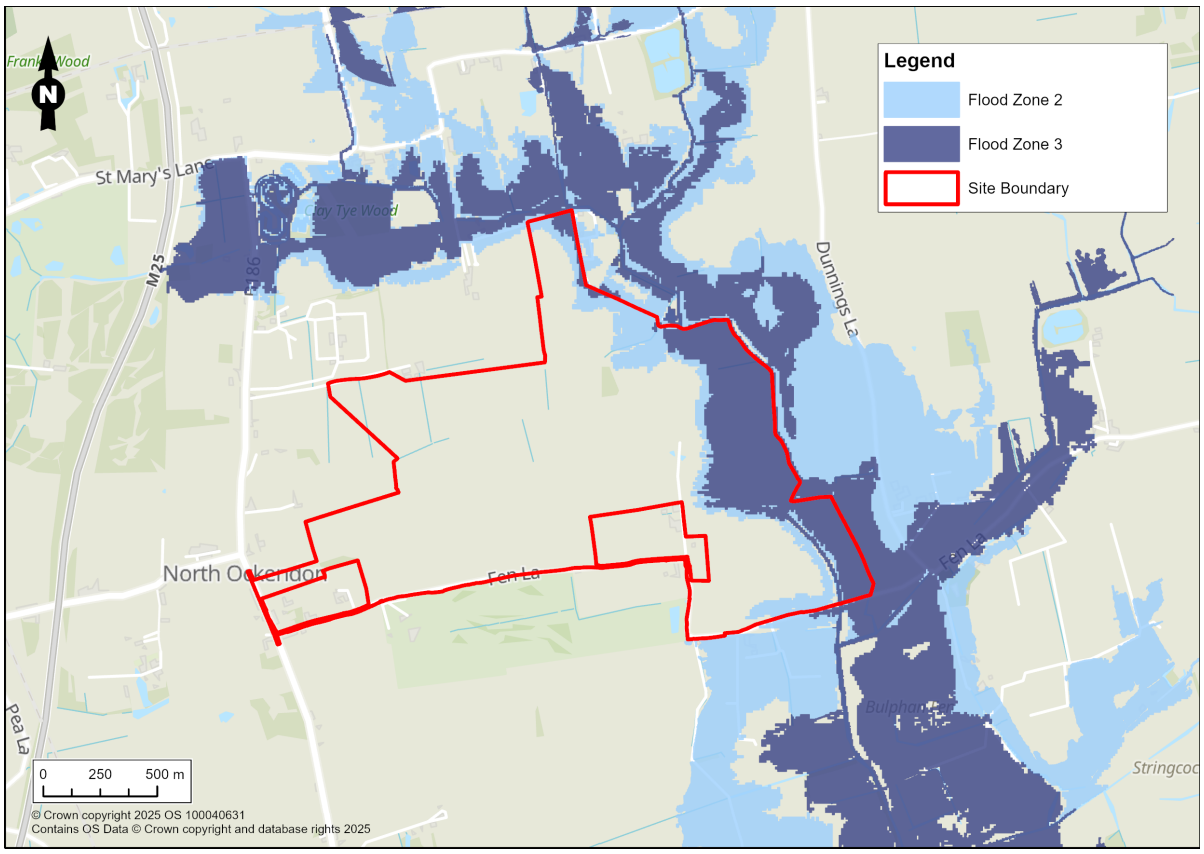

Figure 4.1: Site - Environment Agency Fluvial and Tidal Flood Map

4.2 Hydraulic Modelling

4.2.1 Mott MacDonald was appointed by the EA in March 2018 to update the previous hydraulic model of the River Mardyke (JBA Consulting, 2011) and its tributaries. The EA has provided data from the Mott MacDonald study which was completed in May 2019. The aim of the River Mardyke

[8] EA's Flood Map for Planning https://flood-map-for-planning.service.gov.uk/ (accessed May 2025)

model update project was to ensure that flood modelling outputs, including flood extents along the River Mardyke, are reliable and based on the latest available data. The outputs were then used to inform the EA's flood risk planning and permitting work along the main river.

4.2.2 Current government guidance suggests a 17% increase in river flow to account for potential change by the 2080s. The modelling was undertaken prior to publication of this guidance and included a range of allowances. The 25% is deemed the most suitable allowance to represent the government guidance, however this is 8% increase from the required allowance and is therefore considered a conservative estimate of the proposed climate change flood extent. The 35% allowance has also been included to represent an enhanced climate change flood extent.

4.2.3 The peak modelled flood extents are presented in Figures 4.2, 4.3 and 4.4.

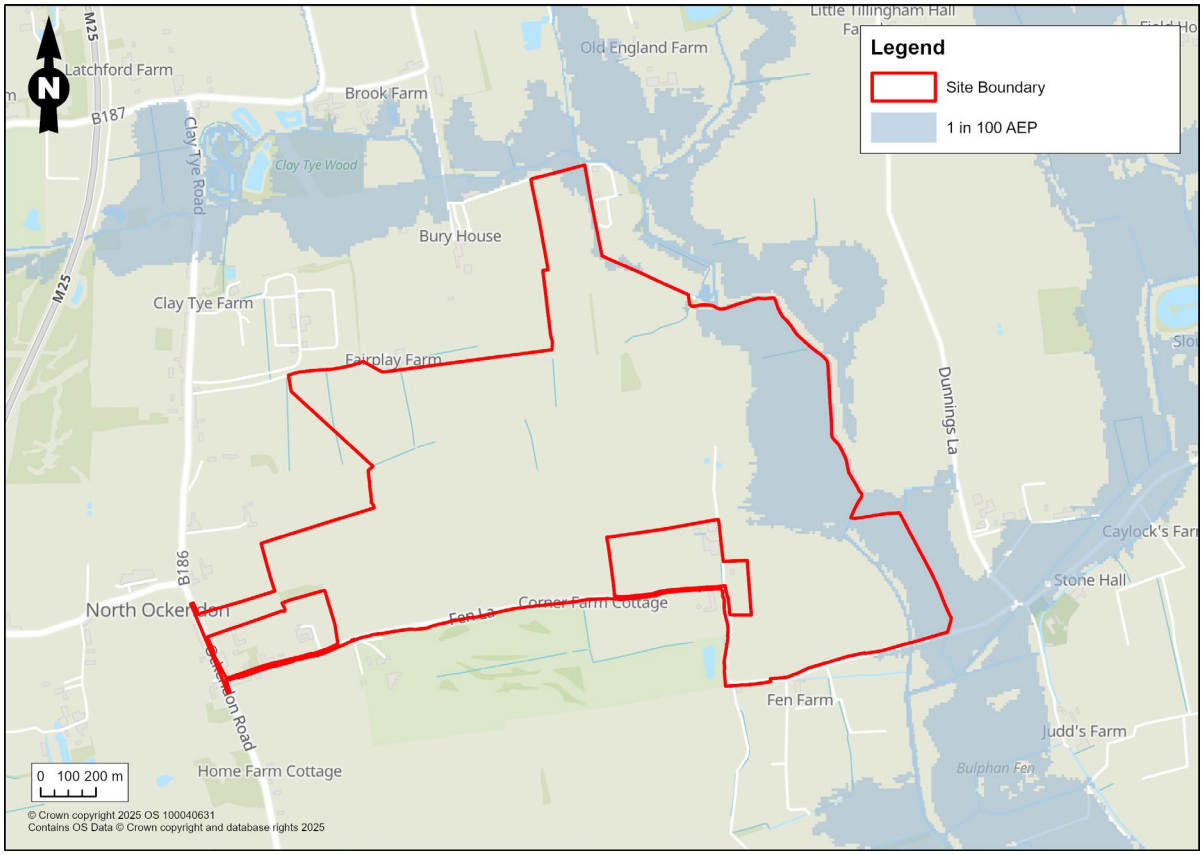

Figure 4.2: Environment Agency Modelled Flood Extent - 1 in 100

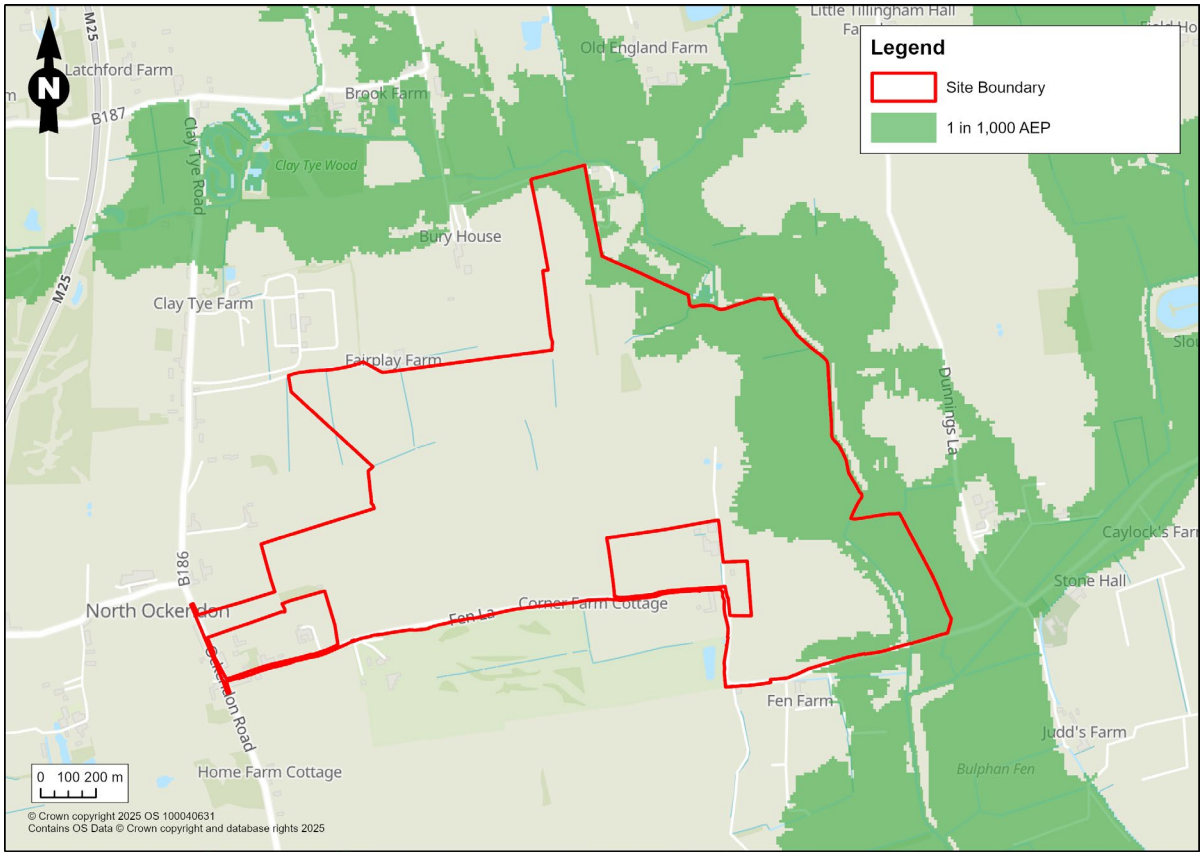

Figure 4.3: Environment Agency Modelled Flood Extent - 1 in 1,000

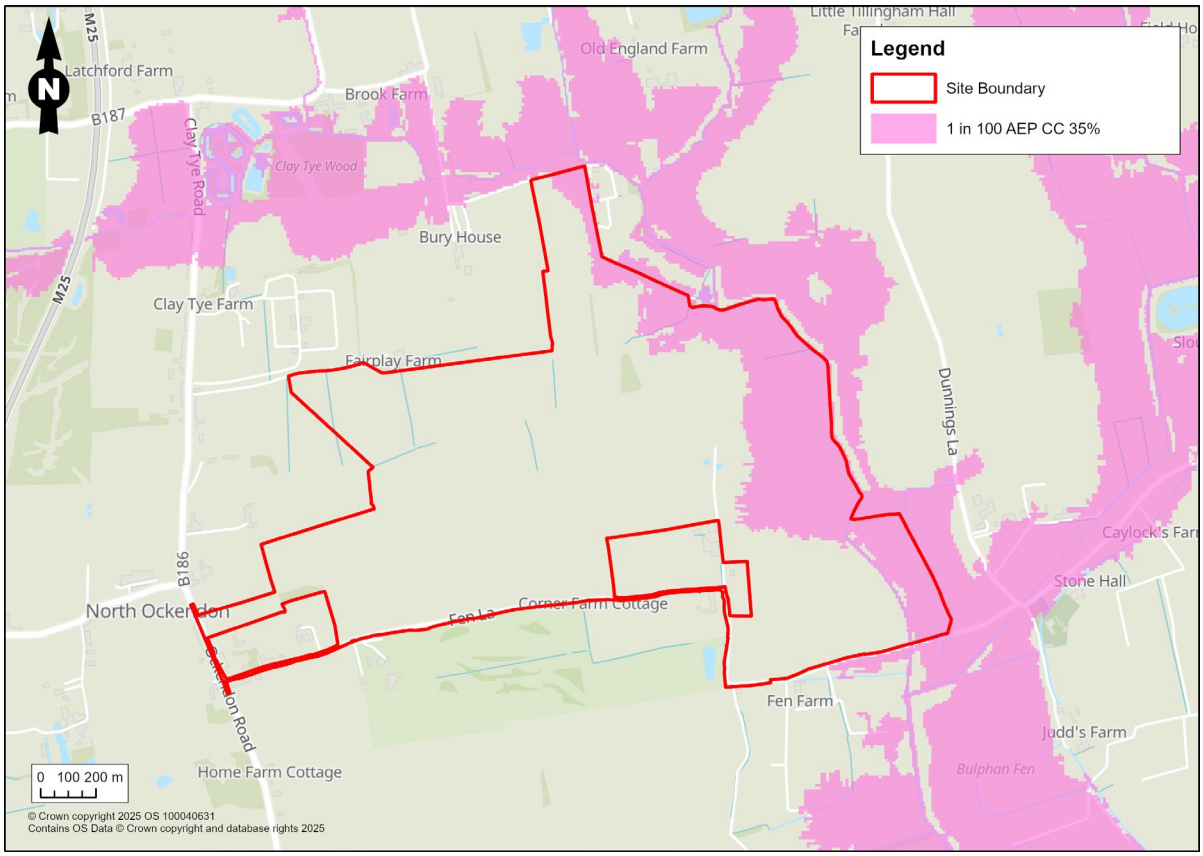

Figure 4.4: Environment Agency 1 in 100 +CC Model

4.3 Surface Water Flood Risk

4.3.1 The EA Flood Map for Surface Water delineates from pluvial sources (i.e., flooding caused by rainwater exceeding the capacity of infiltration to the ground or a drainage system) into the four following categories:

- Very Low: each year, this area has a probability of flooding of less than 1 in 1,000 (<0.1 %);
- Low: each year, this area has a probability of flooding of between 1 in 1,000 (0.1 %) and 1 in 100 (1 %);
- Medium: each year, this area has a probability of flooding of between 1 in 100 (1 %) and 1 in 30 (3.3 %); and
- High: each year, this area has a probability of flooding of greater than 1 in 30 (3.3 %).

4.3.2 As presented in Figure 4.5, 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.

4.3.3 The majority of the potential surface water flow paths through the centre of the site, as shown in Figure 4.5, appear to originate and remain within the site boundary, indicating they are generated on-site rather than from external sources. This reflects the topographical influences of elevations decreasing from west to east. There are flow pathways shown to cross the north and south of the site accepting flows from off-site areas in a west to east direction. However, the EA's mapping does not take account of existing ditches.

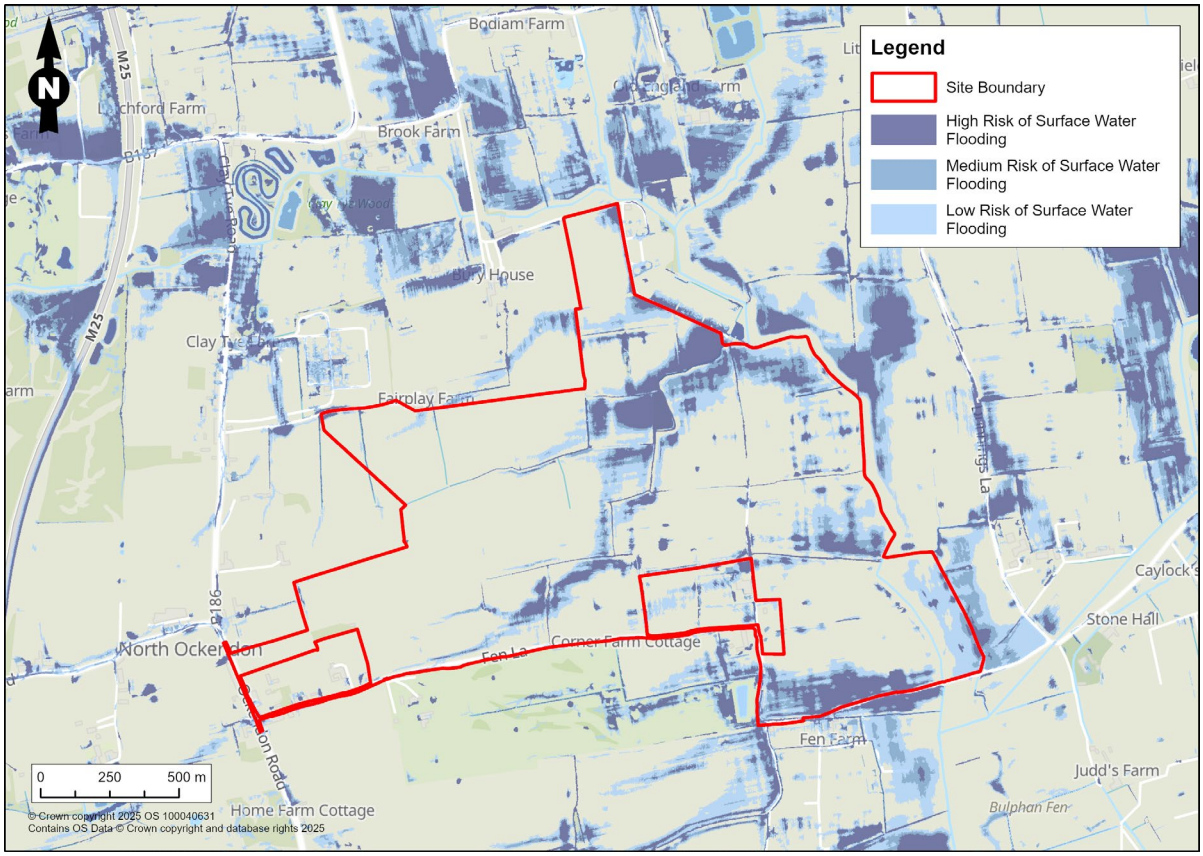

Figure 4.5: Site – Environment Agency Surface Water Flood Map

4.3.4 It is noted that the SLR EcIA, states that a network of arable drainage ditches is present across the survey area, the majority of which held little (<5 cm) water at the time of inspection and were likely to be seasonal in nature (i.e., store water in the wetter months of the year). The size of these drainage ditches is such that their capacity may not be accurately represented in the EA's

surface water flood risk mapping. The conveyance capacity of culverted sections of the ditches (present at farm crossings) would also not be represented. As a result, the EA's mapping is likely to be an overestimate of the overland flow potential.

4.4 Reservoirs, Canal and Other Artificial Sources Risks

4.4.1 As presented in Figure 4.6, the EA's online mapping[9] indicates that the northern and eastern boundary of the site is located in an area at risk of reservoir flooding in the event that they were to fail and release the water held on a 'dry day' when local rivers are at normal levels. However, the mapping only represents the potential consequence of a catastrophic failure of a reservoir and the resultant release of the water retained within the reservoir. The mapping does not indicate the likelihood of such an event, which is considered to be of a very low probability. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensure that reservoirs are inspected regularly, and essential safety work is carried out.

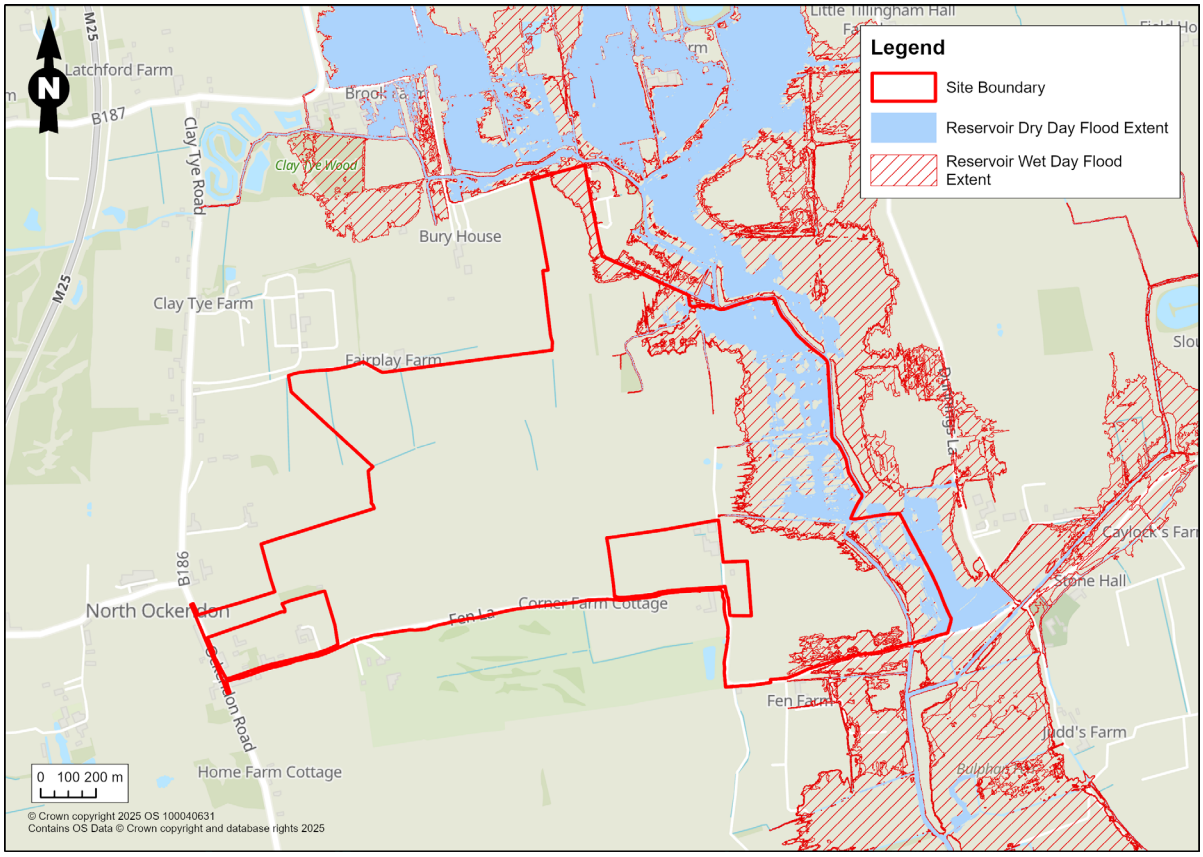

Figure 4.6: Site - Environment Agency Reservoir Flood Map

4.4.2 There are no other artificial sources within the study area of the site, the risk of flooding is therefore considered to be low.

[9] https://www.gov.uk/check-long-term-flood-risk

4.5 Recorded Flooding

4.5.1 According to the EA's published geo-spatial data[10] the eastern half of the site has experienced historic flooding in September 1968 due to the channel capacity being exceeded, the extent of which is presented in Figure 4.7.

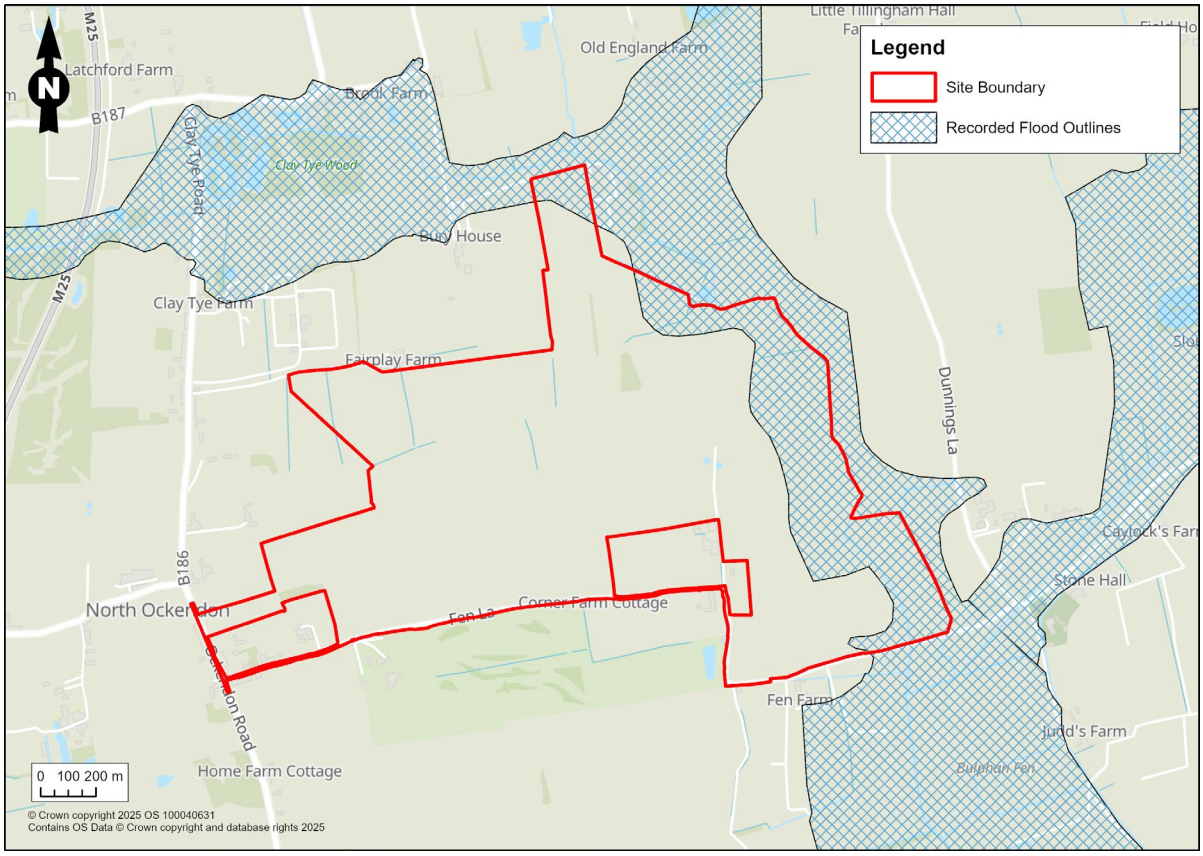

Figure 4.7: Site - Environment Agency Recorded Flooding

[10] https://environment.data.gov.uk/

5. FLOOD RISK ASSESSMENT

5.1 Proposed Development

5.1.1 The proposed development has been set out in the 'Introduction' section of this report and has not been duplicated here.

5.1.2 It is of relevance to flood risk that the proposed development infrastructure corridors, defined as areas within the development that accommodate essential services and utilities, and build zones would not include basements or occupied below ground areas, which could be at greater risk of flooding.

5.2 Fluvial/Tidal Flood Risk

Risk to Proposed Development

5.2.1 In respect of recorded flooding, none of the build zones or infrastructure corridors are recorded by the EA as having flooded historically which suggests that the build zones are at low flood risk. The build zones have also been sited such that they are outside of the predicted flood extent for a climate change adjusted 1 in 100 annual probability event (even if an enhanced 35% climate change allowance is considered) and also a 1 in 1,000 annual probability event for the present-day scenario, as derived from the 2019 Mott MacDonald modelling provided by the EA (as presented in Figure 5.1).

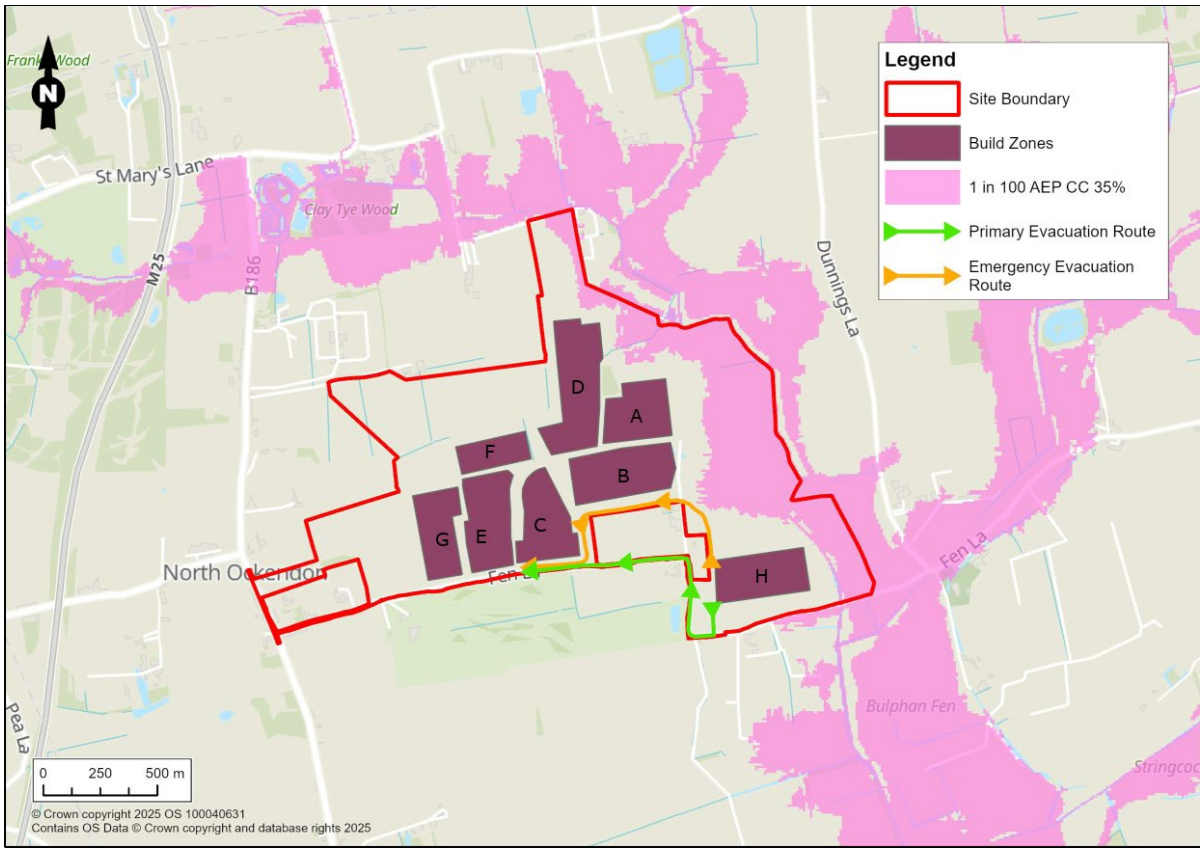

Figure 5.1: Proposed Build Zones - Environment Agency 1 in 100 +35%CC

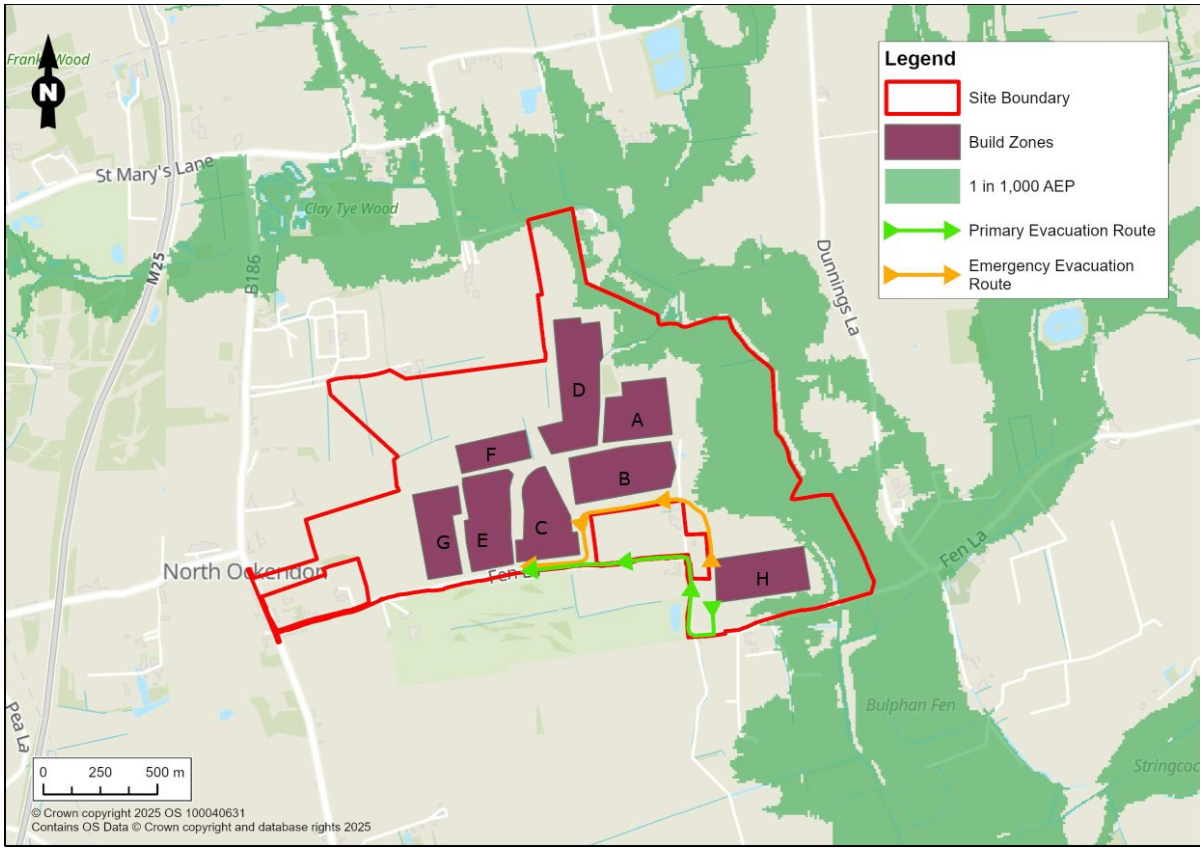

Figure 5.2: Proposed Build Zones - Environment Agency 1 in 1,000

5.2.2 The 1 in 100 plus 25% climate chance annual probability event is shown to extend minimally into the proposed mound area to the north of Build Zone A. The flood extent representation is pixelated, resulting in three pixels extending into the mound area. This pixelation may lead to an overestimation of the flood extent. Therefore, to more accurately assess the potential flood depths in this area, peak modelled flood levels (as provided by the EA) have been compared with ground level data derived from the latest available LiDAR data. The assessed flood depth extending into the mound area has been determined to be 0.04 m. This limited and highly localised encroachment is not considered significant and does not extend into the proposed build zones. On this basis, the build zones are concluded to be appropriately located outside of areas at risk of fluvial flooding.

5.2.3 The access roads to Build Zone A-G are outside of Flood Zones 2 and 3 and provide a reliable and dry means of evacuation, ensuring continuous and safe access during a fluvial flood event.

5.2.4 A short section of the alternative emergency access route to the north of Build Zone H passes close to Flood Zone 3; however, it is shown to be immediately outside the modelled flood extent in a 1 in 100 annual probability event (including a 25% allowance for climate change). In addition, this route is only to be used in the event of an emergency affecting the primary access road (such as a fire), the probability of which is considered to be very low and highly unlikely to occur simultaneously with a flood event.

Change in Off-Site Flood Risk

5.2.5 As the build zones and infrastructure corridors have also been sited such that they are outside of the predicted flood extent for a climate change adjusted 1 in 100 annual probability event and also a 1 in 1,000 annual probability event, ground level changes within the build zones would not, therefore, have an effect on flood risks.

5.2.6 The current government guidance on climate change within flood risk assessments[11] requires that, for assessment of off-site impacts and calculated floodplain storage compensation, the 'central' allowance be used in most cases and the 'higher central' allowance only be used "when the affected area contains essential infrastructure". The areas of fluvial floodplain at the site do not represent essential infrastructure. Therefore the 'central' allowance of a 17 % increase in peak flows is required for assessment of effects for the 2080s in the South Essex Management Catchment. However, a 17% climate change allowance has not been included within the EA's hydraulic modelling of the Mardyke. The closest modelled scenario is a greater 25% increase in peak flows. Whilst mound zone 7 and 9 depicted within Figure 5.3 suggests some very minimal overlap between the outer limit of potential raised areas and the maximum flood extent during this event (1 in 100 +25%), this is the maximum extent only and the overlap is considered inconsequential in the context of the wider floodplain area. It is also noted that the mounds presented in Figure 5.3 may not need to be constructed to the full extent shown on the plan, further reducing the potential for interaction with flood events. The flood extents are presented on a 5m grid resolution, and it is only the outer pixels within the flood extent grid which overlap to depths of less than 0.1m. Given this flood extent exceeds the required climate change central allowance, it is considered that the mounds in this area would not lead to any perceptible change in the wider floodplain.

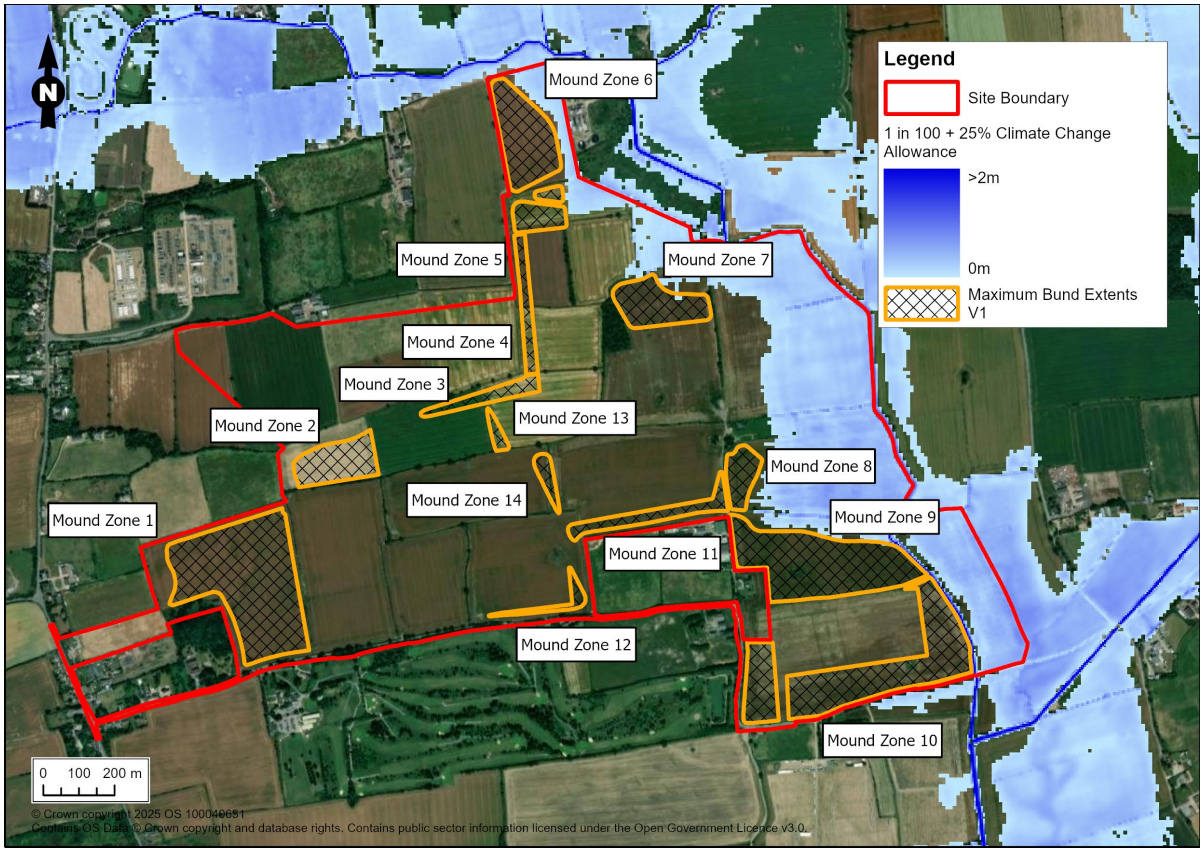

Figure 5.3: Maximum Bunding and Environment Agency 1 in 100 +25%CC

5.2.7 It is also proposed that new ditches would be constructed within the floodplain in order to provide biodiversity improvements by introducing new habitat features. These are not likely to be permanent water bodies and the construction of these would not be likely to lead to an appreciable change in the floodplain capacity. However, in order to ensure that there is no loss of floodplain volume, the excavated materials or soils from the new ditches would be moved to a

[11] https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3084

mound zone outside of the predicted flood extent during the climate change adjusted 1 in 100 annual probability event.

5.3 Surface Water Flood Risk

5.3.1 Surface water runoff generated within the build zones and site-wide strategic infrastructure would be collected into a network of pipes, ditches, and swales which would be installed across the site to collect surface water runoff from the build zones. Existing drainage ditches would be maintained and enhanced as far as possible to retain the natural drainage paths that already exist for the runoff in the local area, the capacity of which is not accounted for in the EA mapping (as noted in paragraph 4.3.4). The existing surface water flood risk in relation to the proposed build zones is presented in Figure 5.4. Where existing ditches are to be replaced, new drainage features (including swales) would be installed to serve the new development. Surface water would then convey runoff away from the build zones towards three proposed attenuation ponds to the east of the build zones before being discharged to the Mardyke along the eastern boundary of the site as is currently the case.

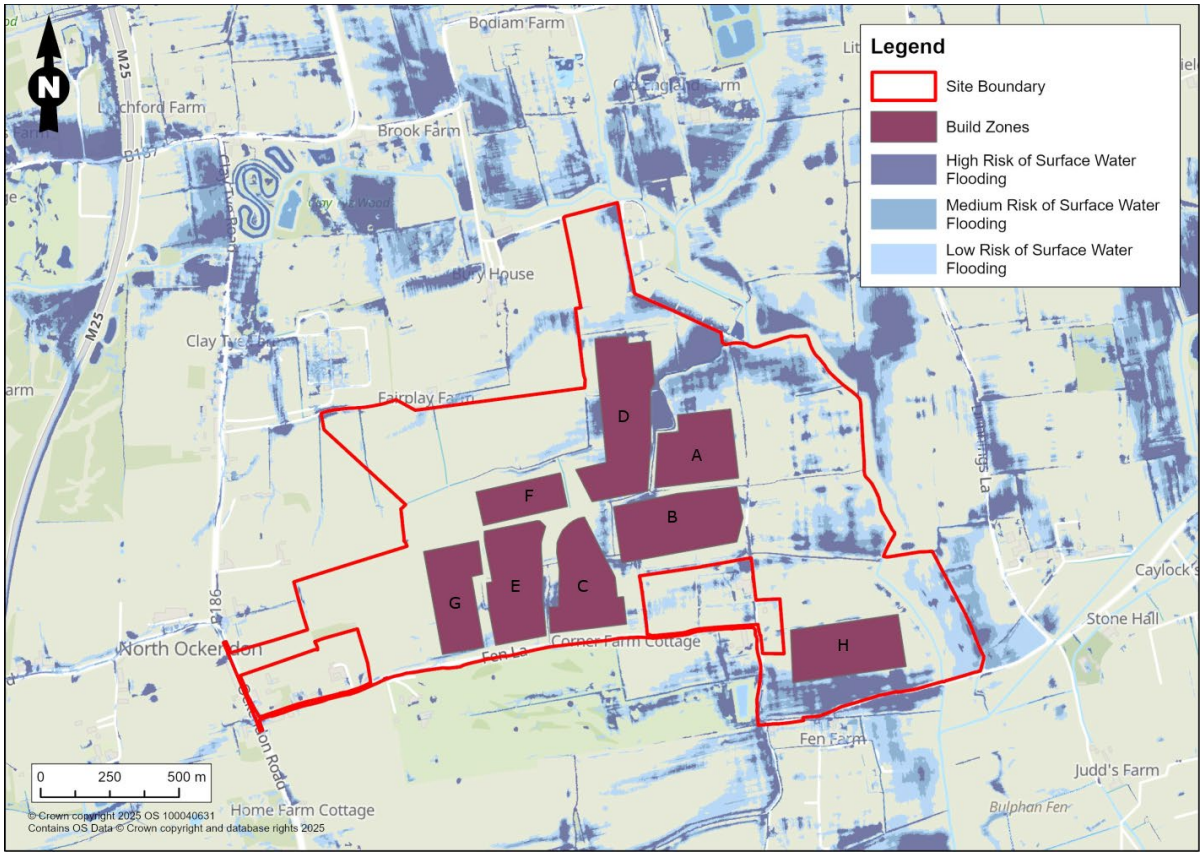

Figure 5.4: EA Mapping of Surface Water Flood Risk and Proposed Build Zones

5.3.2 Further mitigation would include the designing of site levels such that surface water would actively drain towards site wide drainage infrastructure, ensuring buildings and entrance thresholds are raised above the general adjacent ground level so that water would flow around the buildings within build zones and not through them.

5.3.3 A Drainage and SuDS Strategy has been prepared by Curtins in November 2025[12]. The background technical document has advised the preparation of the LDO. The strategy provides drainage parameters for the build zones and more detailed networks for the access roads and strategic

[12] CURTINS, November 2025, East Havering Data Centre Campus Drainage & SuDS Strategy, Ref: 086318-CUR-XX-XX-RP-C-92000 Revision: P19

infrastructure across the site. The site-wide strategic network would drain via swales and provide attenuation for all areas not included in a build zone. It would also provide the conveyance route for discharges from each build zone, with a capacity allowance included to receive discharge at an equivalent greenfield rate from Build Zones A, B, C, E, F and G. Discharge from Build Zones D and H, would be allowed to drain freely to the adjacent basins. The attenuation volume would be managed by the basin rather than on the plot in order to achieve gravity discharge. This avoids attenuation being required within Build Zones D and H, which would otherwise require tanks or basins at an elevation which would need to be pumped to reach the ponds.

5.3.4 Reduction of discharge from each build zone would be achieved through the use of on-plot attenuation, preferably in the form of above-ground green infrastructure although below ground tanks are likely to be required in places, the specification and detailed design of these would be in accordance with CIRIA 753: The SuDS Manual, CIRIA 768: Guidance on the construction of SuDS, and DEFRA's Non-statutory standards for the design, maintenance and operation of surface water drainage systems in England[13]. These measures would be developed by the plot operators design team following requirements mandated in the East Havering Data Centre Campus Design Code (the 'Design Code').

5.3.5 The majority of the site is underlain by Clay and Alluvium and therefore on-site infiltration of surface water drainage has been discounted. The proposed surface water network would discharge the site's surface water runoff into the River Mardyke on the site's eastern boundary. The discharge would be limited to a greenfield runoff rate and discharged via three outfalls. The total site discharge rate is equal to Qbar (mean annual flow event) for the total drained catchment areas. The per hectare greenfield runoff rate for the site is 3.62 l/s.

5.3.6 Rainwater harvesting is proposed for horticultural uses, the data centres, visitor centre and campus management facilities. The harvested water is proposed to be stored in above or below-ground rainwater storage tanks for data centre use and within a reservoir specifically for irrigation purposes to serve Build Zone H. Rainwater harvesting would be used to reduce the rates and volumes of runoff during typical rainfall events. However, the attenuation potential of rainwater harvesting measures has not been relied upon within the drainage strategy for management of runoff during extreme rainfall events as it cannot be guaranteed that the harvesting systems would offer sufficient capacity in advance of a specific storm event.

5.3.7 In addition to the above, a wetland area would be incorporated into the ecology park in the eastern extent of the site. The combination of the new wetland, new ditches and the three attenuation ponds would provide an overall increase in the flood water storage capacity on-site. As well as providing water quality benefits, the swales, ponds and wetlands would also provide ecological and amenity benefits.

5.3.8 As the site is within a groundwater protection zone, surface water would be treated prior to discharge to the River Mardyke. The Drainage Strategy requires each individual build zone to ensure that surface water is well treated, prior to discharge into the main system to ensure the site wide drainage system is kept clean and working at peak efficiency. This would be controlled through the LDO via the requirements mandated in the Design Code.

5.4 Other Sources

As presented in Figure 5.5, the EA's online mapping[14] suggests that the eastern extent of the site, adjacent to Build Zones D and H, is in an area with a potential flood risk associated with reservoir

1. [13] DEFRA, June 2025, National standards for sustainable drainage systems. Available at: https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems

[14] Environment Agency. (2021). *Reservoir Flood Extents (Individual)*. Available at: https://environment.data.gov.uk/dataset/2c8553c9-aa45-4666-9824-8ce0c7faf6a9 (Accessed 12 June 2025).

failure occurring during a 'Wet Day' scenario. This is associated with the Cherry Orchard reservoir located approximately 3 km north of the site. This shows the flood extent in the event that the reservoir were to fail and release the water held on a 'Wet Day' when local rivers had already overflowed their banks.

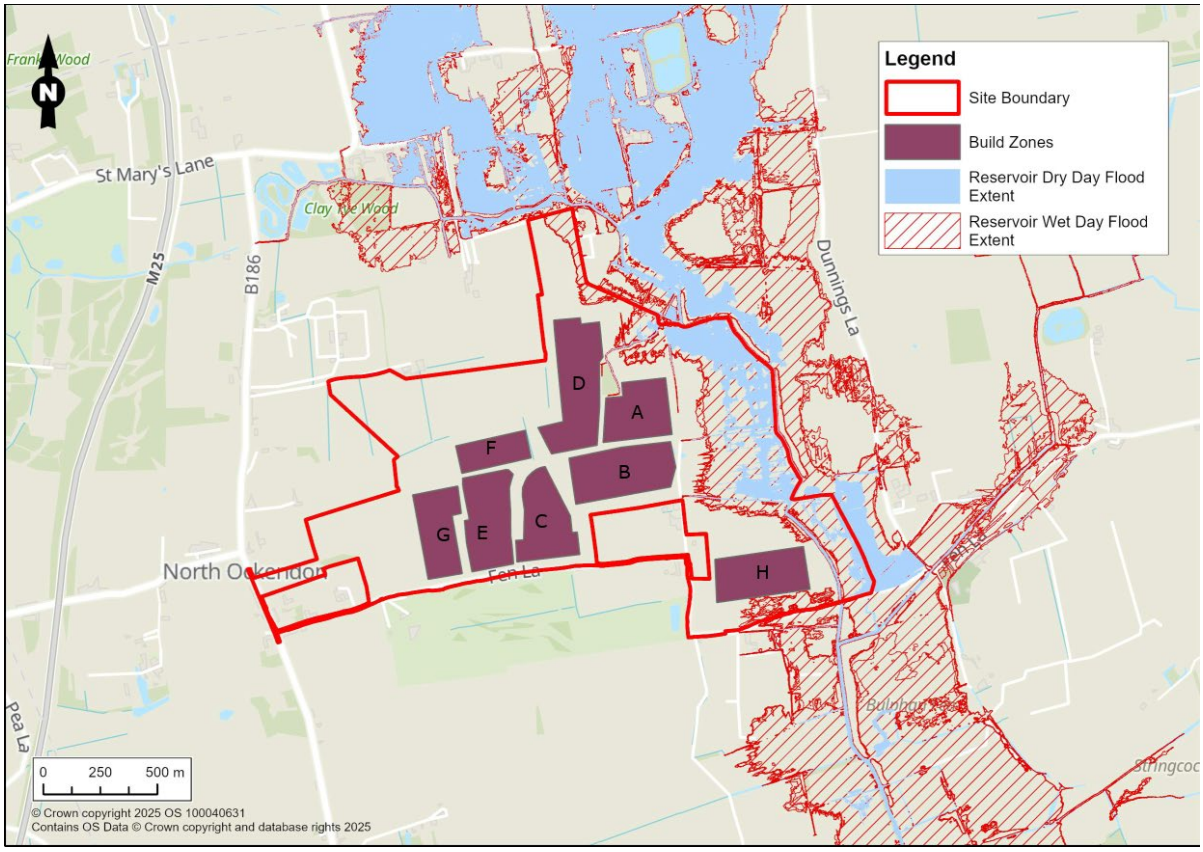

Figure 5.5: EA Reservoir Flood Map and Proposed Build Zones

It is noted that the mapping only represents the potential consequence of a catastrophic failure of a reservoir and the resultant release of the water retained within the reservoir. The EA state that "*each scenario represents a prediction of a credible worst case scenario; however it's unlikely that any actual flood would be this large. The data gives no indication of the likelihood or probability of reservoir flooding*".

The mapping, therefore, does not indicate that an event is likely to occur. The likelihood of such an event is considered to be of a very low probability. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers.

5.4.1 It is also noted that flood extents are not included for smaller reservoirs or for reservoirs commissioned after the reservoir modelling programme began in October 2016. The proposed new reservoir in the south-east of the site would serve horticultural uses, and is not included within the modelling used to inform the EA's online mapping. This reservoir would be constructed within an area where surrounding ground is to be raised by 2m. The reservoir would extend both 2 m below the raised surrounding ground and 2 m above it as a result of raised embankments. The new reservoir would exceed 25,000 m^3 in volume and would, therefore require registration with the EA in advance of construction[15]. A qualified and approved engineer would need to be appointed as a 'panel engineer' and this role would be required to design and supervise the

[15] GOV.uk (2024) Reservoirs: owner and operator requirements https://www.gov.uk/guidance/reservoirs-owner-and-operator-requirements

construction of the reservoir, and also to inspect, produce a report and make safety recommendations. The regulation of the reservoir by the EA would seek to minimise any flood risks associated with an unlikely failure event.

5.4.2 The Drainage and SuDS strategy prepared by CURTINS[16], details that in the event the design flood event (1 in 100 plus 40% climate change allowance) is exceeded during an extreme storm event, overland flows would route towards the east of the site, directed towards the River Mardyke. The Drainage and SuDS strategy sets out that the design of external levels would direct overland flow away from buildings.

5.5 Flood Risk Vulnerability and Development Suitability

5.5.1 According to Table 2 (Flood Risk Vulnerability Classification) in the Planning Practice Guidance to NPPF[17], General Industry buildings and Heated Horticulture are classified as 'Less Vulnerable'. Table 3 (Flood Risk Vulnerability and Flood Zone Compatibility) in the Planning Practice Guidance to NPPF states that 'Less Vulnerable' developments are appropriate to locate in Flood Zones 1, 2 and 3a.

5.5.2 Non-residential uses such as the visitors centre and campus management are classified as 'More Vulnerable'. Non-residential uses on site are located outside of the 1 in 1,000 AEP event which is equivalent to Flood Zone 1. Table 3 of the Planning Practice Guidance to NPPF states that 'More Vulnerable' developments are appropriate to locate in Flood Zone 1.

5.5.3 Electrical infrastructure is classified as 'Essential Infrastructure'. Table 3 of the Planning Practice Guidance to NPPF states that 'Essential Infrastructure' is appropriate to locate in Flood Zones 1 and 2. Therefore, in accordance with the NPPF the development would be suitable for the Build Zone locations (Flood Zone 1) and the Exception Test is not required for the proposed development. On this basis, the proposed development is considered to be acceptable in flood risk terms.

5.6 Sequential Test

5.6.1 The Sequential Test aims to steer development to areas with the lowest probability of flooding. In accordance with this test, the proposed build zones would be located such that they would seek to avoid development within Flood Zones 2 and 3. The boundary of Flood Zone 2 would only reach the south-eastern corner of Build Zone H. As soft landscaping is proposed around the perimeter of Build Zone H and the extent of Flood Zone 2 overlapping the landscaped area of the Build Zone is minimal (less than 10 m^2), flood risk in this area is not considered to trigger the requirement for a Sequential Test (built footprints and the eastern access route are not affected).

[16] CURTINS, November 2025, East Havering Data Centre Campus Drainage & SuDS Strategy, Ref: 086318-CUR-XX-XX-RP-C-92000 Revision: P19
[17] GOV.uk (2014) Planning Practice guidance: Flood Risk and Coastal Change https://www.gov.uk/guidance/flood-risk-and-coastal-change

6. SUMMARY AND CONCLUSION

6.0.1 The proposed development comprises a data centre campus including data centres, horticultural buildings, a visitor centre, district heating centre, campus management facilities. Additionally, the development includes the establishment of an ecology park which serves as a separate element to the data centre campus.

6.0.2 The site topography generally slopes down from west to east, with a fall from approximately 40 m AOD near the western boundary to approximately 4 m AOD at the eastern boundary. Most of the change in elevation is in the far western portion of the site, with the majority of the central and eastern parts relatively level at approximately 5 to 10 m AOD.

6.0.3 The site is situated adjacent to the Mardyke, which flows south along the north-east and crosses the south-east corner of the site. There is also a network of arable drainage ditches present across the site which discharge to the Mardyke. Most of the ditches were identified in the Ecological Impact Assessment (EcIA) of the site prepared by SLR in 2025 to hold little (<5 cm) to no water and were likely to be seasonal in nature (i.e., store water in the wetter months of the year). Where water was present, water was found only in deeper areas or more lower lying areas of the ditch line, rather than a continuous stretch of water. The majority of the site is within Flood Zone 1 (Low probability of fluvial or tidal flooding). Whilst, 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), the build zones have been sited such that they are outside of the predicted flood extent for a climate change adjusted 1 in 100 annual probability event and also a 1 in 1,000 annual probability event for the present-day scenario, as derived from the 2019 Mott MacDonald modelling provided by the EA. The areas in the floodplain in the east are to be occupied by a proposed Ecology Park. Whilst some ground raising is proposed outside of the build zones, the proposed mounds have been located to avoid impacts on floodplain capacity. All excavated material from proposed ditches in the ecology park would be placed in mounds outside of the flood extent.

6.0.4 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. It is proposed that surface water flows across the site would be accommodated within the proposed development by ensuring that, where possible, existing drainage ditches are maintained and enhanced, or diverted where required to avoid build zones; natural drainage paths that already exist for the runoff in the local area are retained; and by installing new drainage features to serve the new development.

6.0.5 Surface water runoff generated within the build zones and site-wide strategic infrastructure would be collected into a network of pipes, ditches, and a swale installed along the primary access road to collect surface water runoff from the build zones. The swale would replace the existing network of ditches where they are to be lost, and would then convey runoff towards three proposed attenuation ponds to the east of the build zones before being discharged to the Mardyke along the eastern boundary of the site.

6.0.6 Further mitigation would include the designing of site levels such that surface water would actively drain towards site wide drainage infrastructure, ensuring buildings and accesses are raised above the general ground level so that water would flow around the buildings and not through them.

6.0.7 A new reservoir is proposed in the south-east of the site to serve horticulture uses. It is anticipated that the new reservoir would exceed 25,000 m^3 in volume and would, therefore require registration with the EA in advance of construction. A qualified civil engineer would need to be appointed as a 'panel engineer' and this role would be required to design and supervise the

construction of the reservoir, and also to inspect, produce a report and make safety recommendations.

6.0.8 Based on the findings of this FRA, and in particular the proposed maintenance and enhancement of the existing drainage ditches which cross the site towards the east, it is concluded that potential flood risk would be appropriately managed over the lifetime of the proposed development, taking climate change into account.

6.0.9 Accordingly, the proposed development is considered to be acceptable in flood risk terms and there would no increased flood risk to downstream receptors.