Rosefield Solar Farm

Environmental Statement

Volume 4
Appendix 16.1: Flood Risk Assessment
(Tracked)

EN010158/APP/6.4.4~~3~~
Revision 4~~3~~
Deadline 3~~2~~
~~April~~ May 2026
Rosefield Energyfarm Limited

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009

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Rosefield Solar Farm

1. Introduction

1.1. Introduction

1.1.1. This document has been updated at Deadline 32 in response to further engagement with the Environment Agency in relation to floodplain compensation and comparison of the Environment Agency flood modelling and the Applicant's detailed flood modelling. , fencing design and sensitivity testing of the Claydon Brook. The document references have not been updated from the original submission. Please refer to the **Guide to the Application [EN010158/APP/1.2.78]** for the list of current versions of documents.

1.1.2. This document has been updated at Procedural deadline A in response to the post-acceptance Section 51 advice and further engagement with the Environment Agency. The document references have not been updated from the original submission. Please refer to the **Guide to the Application [EN010158/APP/1.2.5]** for the list of current versions of documents.

1.1.3.1.1.2. This Flood Risk Assessment (FRA) has been prepared on behalf of Rosefield Energyfarm Limited ('the Applicant') in relation to the Development Consent Order (DCO) Application for the construction, operation (including maintenance), and decommissioning of Rosefield Solar Farm (hereafter referred to as the 'Proposed Development').

1.1.4.1.1.3. The purpose of the FRA is to establish the risk associated with the Proposed Development and to propose suitable mitigation, if required, to reduce the flood risk to a more acceptable level. The FRA must demonstrate that the development will be safe for its lifetime (in this case 40 years) taking account of the vulnerability of its users, without increasing flood risk elsewhere.

1.1.5.1.1.4. This document has been produced to assess the flood risk from tidal, fluvial, surface water, groundwater, sewers, reservoirs and artificial sources in line with the Overarching National Policy Statement for Energy (NPS EN-1) **[Ref. 1]**, the National Planning Policy Framework (NPPF**) [Ref. 2]**, and its corresponding Planning Practice Guidance (PPG) **[Ref. 3].**

1.1.6.1.1.5. This assessment has been undertaken in consultation with the relevant authorities, and with reference to data, documents and guidance published by the Environment Agency, the Lead Local Flood Authority (Buckinghamshire Council), the Local Planning Authority (Buckinghamshire Council), the Water Authority (Anglian Water) and the Buckingham and River Ouzel Internal Drainage Board.

~~1.1.7.~~1.1.6. Several conference calls and meetings have been undertaken with the consultees listed above, to agree parameters set out in this Flood Risk Assessment. These discussions and agreements are detailed in the **Environmental Statement (ES) Volume 2, Chapter 16: Water [EN010158/APP/6.2]**.

~~1.1.8.~~1.1.7. Additionally, wider consultation has been undertaken as part of the pre-application phase, with responses detailed in the **Consultation Report [EN010158/APP/5.1]**.

1.2. Context

1.2.1. This document forms a technical appendix to **ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]**.

1.2.1. This document is supported by the following figures presented in **ES Volume 3 [EN010158/APP/6.3]**:

- **Figure 16.1: Watercourses**;
- **Figure 16.2: Environment Agency Flood Zones**;
- **Figure 16.3: Environment Agency Risk of Surface Water Flooding**;
- **Figure 16.4: Fluvial Modelling of Claydon Brook Tributary**;
- **Figure 16.5: Pluvial Modelling of Claydon Brook Tributary**; and
- **Figure 16.6: WFD Waterbodies and Catchments**.

~~1.2.2.~~1.2.1. This document is supported by the following technical appendix presented in **ES Volume 4 [EN010158/APP/6.4]**:

- **Appendix 16.2: Water Framework Directive (WFD) Waterbodies Stage 1 Screening Assessment**

~~1.2.3.~~1.2.2. This document is also supported by the following documents:

- **Outline Construction Environmental Management Plan (Outline CEMP) [EN010158/APP/7.2]**;
- **Outline Operational Environmental Management Plan (Outline OEMP) [EN010158/APP/7.3]**;
- **Outline Decommissioning Environmental Management Plan (Outline DEMP) [EN010158/APP/7.4]**; and
- **Outline Drainage Strategy [EN010158/APP/7.11]**.

~~1.2.4.~~1.2.3. This document should also be read in conjunction with the following Environmental Statement assessment chapter(s):

- **Chapter 7: Biodiversity [EN010158/APP/6.2]**;

- **Chapter 11: Land and Groundwater [EN010158/APP/6.2]**;
- **Chapter 12: Soil [EN010158/APP/6.2]**; and
- **Chapter 17: Cumulative Effects [EN010158/APP/6.2]**.

1.3. Legislation and Planning Policy

1.3.1. This assessment has been undertaken with regard to the following legislation, planning policy and guidance.

Legislation

- The Land Drainage Act 1991 sets out the responsibilities of Local Authorities and Drainage Boards in relation to land drainage. It requires that a watercourse is maintained by its owner in such a condition that the free flow of water is not impeded **[Ref. 4]**;
- The Flood and Water Management Act 2010 aims to improve flood risk management in England and Wales and ensures that flood risk responsibilities are better defined. It encourages more sustainable forms of drainage in new developments and allows for the creation of Lead Local Flood Authorities who have responsibilities for co-ordinating the management of flood risk from local sources **[Ref. 5]**;
- The Water Resources Act 1991 focuses on the management of water resources, water quality and flood defence. The Act includes a definition of 'Main Rivers' **[Ref. 6]**;
- The Flood Directive 2007/60/EC **[Ref. 7]**, which is transposed into legislation for England via the Retained EU Law (Revocation and Reform) Act 2023 **[Ref. 8]**; and
- The Environment Act 2021 includes laws that relate to environmental protection including nature protection, water quality and clean air. It offers new powers to set new binding targets, including for air quality, water, biodiversity, and waste reduction **[Ref. 9]**.

National Planning Policy

- Overarching National Policy Statement for Energy (NPS EN-1) (2023) – Section 5.8 Flood Risk outlines the requirements in relation to flood risk and flood risk management, and the requirements for surface water drainage. Specifically Section 5.8.15 outlines the minimum requirements for Flood Risk Assessments. **[Ref. 1]**;
- National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (2023) – Section 2.10 gives specific consideration to solar development, specifically in relation to the layout and design which should consider the mitigation of flood risk **[Ref. 10]**;

- National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (2023) – Section 2.3 details issues relating climate change and outlines the considerations required in relation to flood risk **[Ref. 11]**; and
- National Planning Policy Framework (NPPF) (2024) **[Ref. 2]**. Section 14 'Meeting the challenge of climate change, flooding and coastal change' sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.
- Planning Policy Guidance (PPG) **[Ref. 3]**.

Local Planning Policy

- Vale of Aylesbury Local Plan (VALP) 2013 – 2033 (Adopted September 2021), specifically Policy I4 'Flooding' requires developments to be supported by a Flood Risk Assessment which demonstrates that the development will be safe from flooding for its lifetime, without increasing flood risk elsewhere and will explore opportunities to reduce flood risk overall. Where relevant, proposals must pass the Sequential Test and, where appropriate, the Exceptions Test. All development will be required to design and use sustainable drainage systems (SuDS) for the effective management of surface water run-off on site. Policy I5 'Water resources and wastewater infrastructure' seeks to improve water quality, ensure adequate water resources, promote sustainability in water use and ensure wastewater collection and treatment has sufficient capacity **[Ref. 12]**.
- Local Plan for Buckinghamshire: Draft vision and Objectives for 2040, specifically Objective 1 'Natural and built environment' aims to conserve and enhance Buckinghamshire's valued natural, historic, and built environments, to ensure they are protected from inappropriate development. The Local Plan will look to improve water quality in our rivers and watercourses, prioritising our chalk streams. Objective 2 'Mitigating/adapting to climate change' aims to ensure the delivery of sustainable development, mitigating climate change and adapting to the impacts on Buckinghamshire's environment. Objective 6 'Infrastructure' aims to ensure the right infrastructure required to support communities is provided in the right place and at the right time, and make best use of existing facilities **[Ref. 13].**

Guidance

1.3.2. The assessment of impacts and identification of appropriate mitigation is based on experience of similar projects and professional judgement. Reference is made to the following guidance/best practice:

- Flood Risk and Coastal Change National Planning Practice Guidance (Department for Levelling Up, Housing and Communities, 2022) **[Ref. 14]**;
- Flood Risk Assessments: climate change allowances (Environment Agency, 2022) **[Ref. 15]**;
- Design Manual for Roads and Bridges (DMRB) LA 113 Road Drainage and the Water Environment (National Highways 2020) **[Ref. 16]**;
- The CIRIA SuDS Manual C753 **[Ref. 17]**;
- Defra's Non-Statutory National Standards for Sustainable Drainage Systems **[Ref. 18]**; and
- Environment Agency 'Flood risk assessment: flood zones 1, 2, 3 and 3b' guidance **[Ref. 19]**.
- Bucks Council SPD Watercourse Advice Note - Aylesbury Vale Area Note for Planners, Designers and Developers **[Ref. 20]**.

1.4. Data Sources

1.4.1. The following data sources have been used to understand the existing water and flood risk baseline conditions:

- Environment Agency flood mapping datasets including fluvial/tidal Flood Map for Planning, Surface Water Flood Risk mapping and Reservoir flood risk mapping **[Ref. 21]**;
- The British Geological Survey (BGS) Geology Mapping **[Ref. 22]**;
- Defra's MAGIC Maps **[Ref. 23]**;
- Fluvial and pluvial modelled outputs produced for the East Claydon BESS Development of the Claydon Brook Tributary (**ES Volume 4, Appendix 16.3, Annex A: Flood Risk Assessment produced for East Claydon BESS Development [EN010158/APP/6.4]**);
- Ordnance Survey (OS) Mapping **[Ref. 24]**;
- Environment Agency National Light Detection and Ranging (LiDAR) Programme **[Ref 25]**;
- Buckinghamshire Council Local Flood Risk Management Strategy **[Ref 26]**; and
- The Buckinghamshire Council Preliminary Flood Risk Assessment **[Ref 27]**

1.5. Stakeholder engagement

1.5.1. **Section 16.3** of **ES Volume 2, Chapter 16: Water [EN010158/APP/6.2]** provides a summary of stakeholder engagement activities undertaken.

Further engagement undertaken is detailed within the **Consultation Report [EN010158/APP/5.1]**.

2. Existing Site

2.1. The Order Limits

2.1.1. The extent of the Order Limits are shown in **Location, Order Limits and Grid Coordinate Plans [EN010158/APP/2.1]** and the Proposed Development is described in full in **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1]** and shown spatially on the **Works Plans [EN010158/APP/2.3].**

2.2. Current Land Use

2.2.1. The Site comprises four parcels of land (Parcel 1, 1a, 2 and 3), the Interconnecting Cable Corridor, the Grid Connection Cable Corridor, the National Grid East Claydon Substation, and associated access. These parcels and cable corridors are outlined in **ES Volume 3, Figure 1.2: Order Limits [EN010158/APP/6.3]**.

2.2.2. The Site is located within the administrative boundary of Buckinghamshire Council. The settlements of Calvert, Middle Claydon, Botolph Claydon, East Claydon and Hogshaw lie within 1.5km of parts of the Order Limits. Further afield (within 3km of the Order Limits) lie the settlements of Steeple Claydon, Edgecott, Shipton Lee, Quainton, Granborough and Winslow.

2.2.3. National Grid East Claydon Substation is the closest major infrastructure, located within the Order Limits and adjacent to Parcel 3 in the northeast of the Site. Traversing from this substation are three overhead power lines (400 Kilovolt (kV) transmission line), carried by lattice pylons passing through Parcel 3 to the east and south.

2.2.4. A High Speed 2 (HS2) works area is located in close proximity to the western edge of Parcels 1 and 1a, and southern edge of Parcel 2. It is approximately 100m from Parcel 1 and 1a and less than 500m from Parcel 2. This section of HS2 is currently under construction. Permanent HS2 mitigation planting is located directly adjacent to the western edge of Parcel 1 and to the north and south of Parcel 1a, with a small section of mitigation planting intersecting Parcel 1a, as outlined in **ES Volume 3, Figure 2.1: Environmental Features Plan [EN010158/APP/6.3]**.

2.2.5. The East West Rail railway line, which is currently under construction, is located approximately 850m north of Parcel 1 at its closest point and runs west to east.

2.2.6. The land within the Order Limits predominantly consists of agricultural fields and pastureland interspersed with hedgerows, ditches, woodland blocks and farm access tracks. The hedgerows within the Site range from dense tall vegetation with sporadic shrubs and trees present. The fields are bordered by a mix of hedgerows, trees and ditches.

2.3. The Proposed Development

2.3.1. The Proposed Development comprises the construction, operation (including maintenance), and decommissioning of solar photovoltaic ('PV') development and energy storage, together with associated infrastructure and an underground cable connection to the National Grid East Claydon Substation.

2.3.2. The Proposed Development would include a generating station with a total exporting capacity exceeding 50 megawatts ('MW'). The agreed grid connection for the Proposed Development would allow the export and import of up to 500MW of electricity to the grid.

2.3.3. The location of the Proposed Development is shown on **ES Volume 3, Figure 1.1: Location Plan [EN010158/APP/6.3]**. The Proposed Development would be located within the Order Limits (the land shown on the **Works Plans [EN010158/APP/2.3]** within which the Proposed Development can be carried out). The Order Limits plan is provided as **ES Volume 3, Figure 1.2: Order Limits [EN010158/APP/6.3]**. Land within the Order Limits is known as the 'Site'.

2.3.4. Further detail on the Proposed Development and the construction, operation (including maintenance), and decommissioning phases can be located in **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1]**.

2.4. Topography

2.4.1. Parcels 1 and 1a are gently undulating with the highest point being Knowl Hill at around 116 meters Above Ordnance Datum (AOD) as shown on **ES Volume 3, Figure 2.3: Topography Plan [EN010158/APP/6.3]**. The rest of Parcel 1 is at an elevation of 80-90m AOD and Parcel 1a at an elevation of 79-84m AOD. Parcel 2 is located on a low ridge crest at 136m AOD and Parcel 3 is located on relatively flat ground at 90-94m AOD on the north east of the ridge. **ES Volume 3, Figure 2.3: Topography Plan [EN010158/APP/6.3]** provides further detail on the topography of the Internal Access Corridors, Interconnecting Cable Corridors and Grid Connection Cable Corridor.

2.4.2. The Site is located on a watershed between two river catchments. The northern section of the Site drains north/north east towards the Padbury Brook and the Claydon Brook that form part of the wider Great Ouse catchment which generally drains to the north east. The southern section of the Site drains towards the River Ray to the south/south west and forms part of the wider River Thames catchment which drains to the south/south east. The upstream section of the River Ray flowing through the south east area of Parcel 1a is known as the Muxwell Brook.

2.4.3. High level analysis of Defra’s ground survey data (provided as Light Detection and Ranging survey data) within QGIS has been reproduced below as **Figure 2.1**

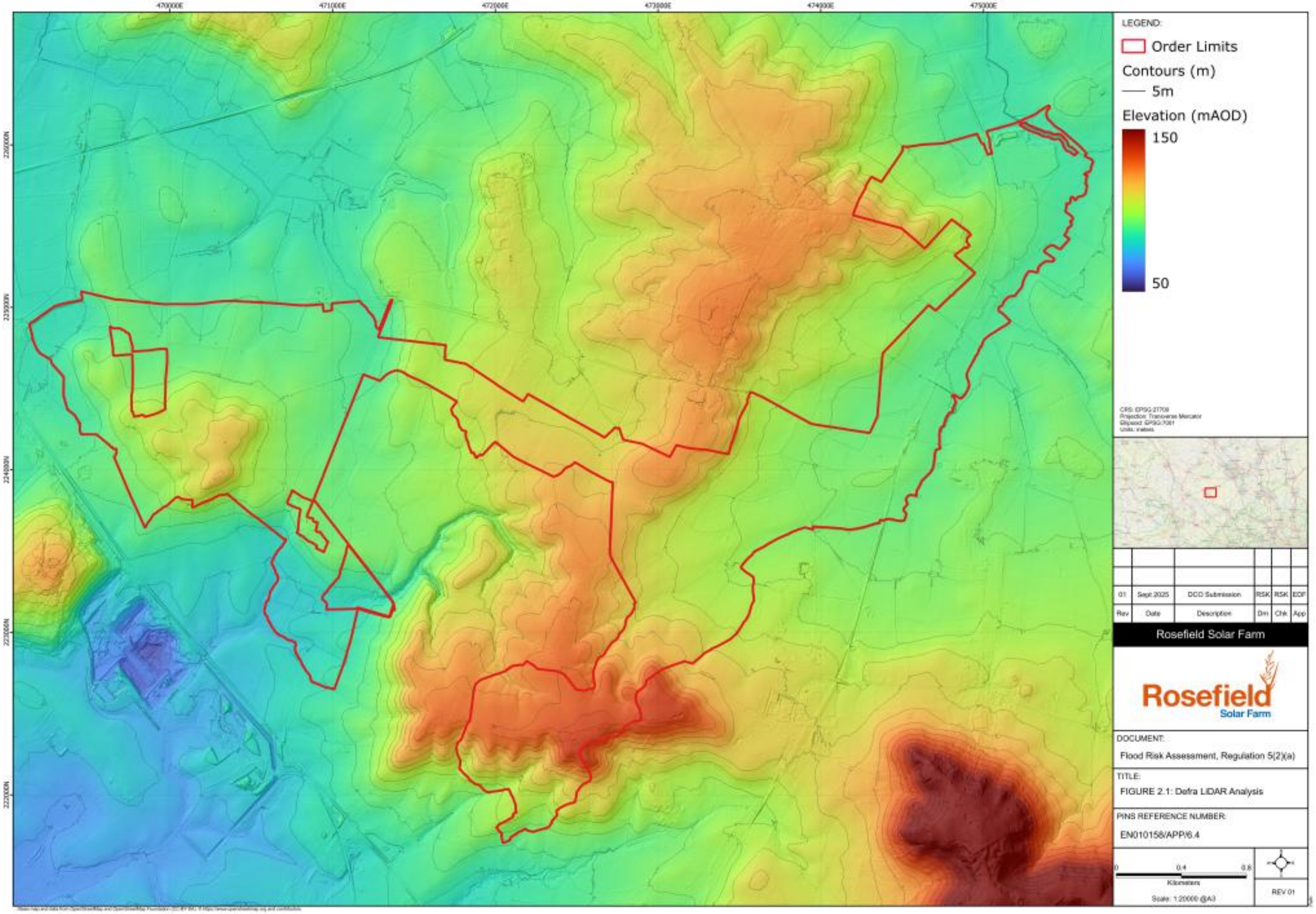

Figure 2.1 : QGIS LiDAR Analysis (Defra)

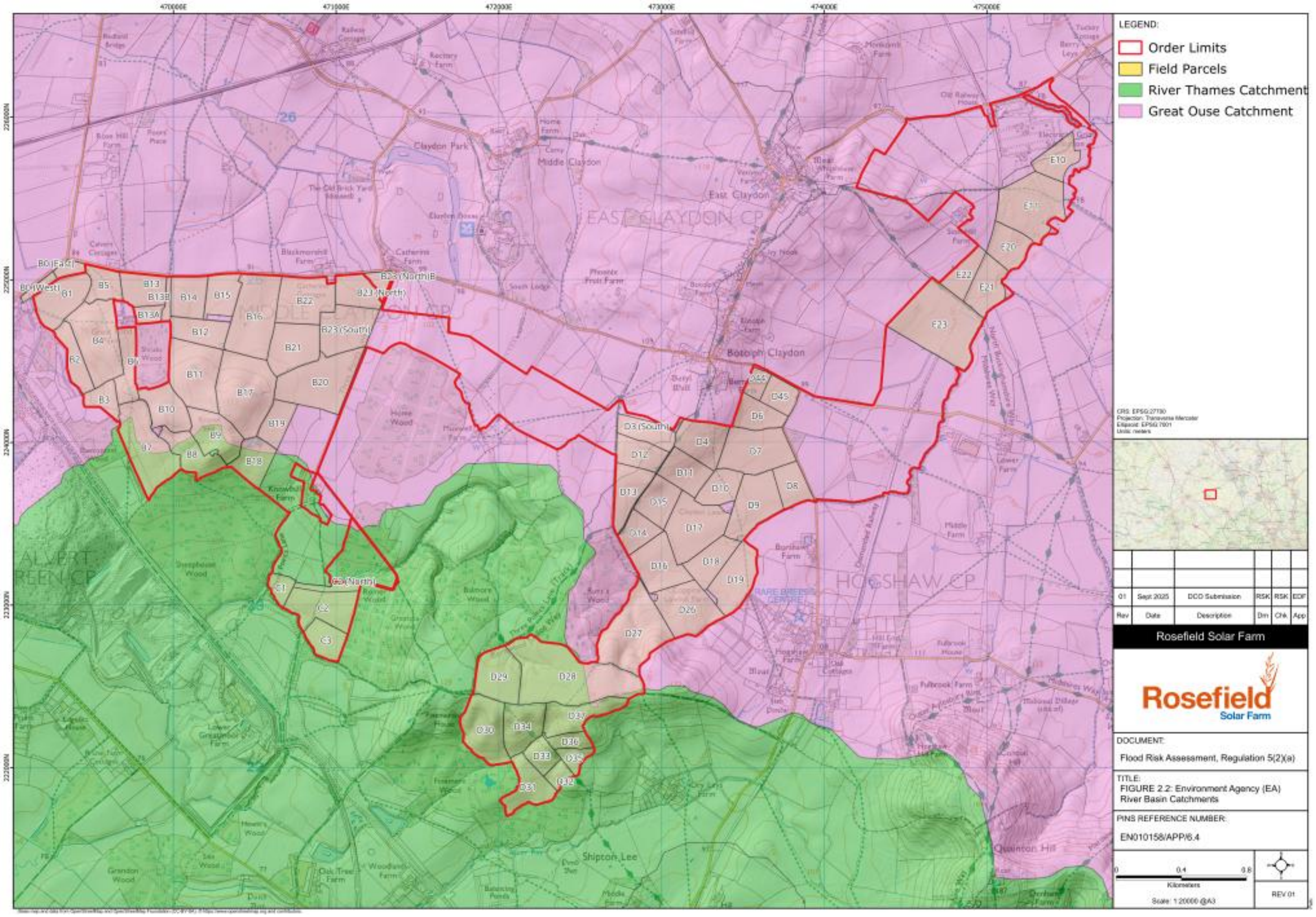

Figure 2.2: Mapping of River Catchments (Defra)

2.5. Existing Drainage

2.5.1. Given the rural setting of the Proposed Development, runoff is likely to be conveyed across undeveloped agricultural land via overland (and subsurface) flow at greenfield rates towards the existing surface watercourses and field drains, or infiltrate directly into the ground should ground conditions permit.

2.5.2. **Figure 2.2** has been produced using layers from Defra's Catchment Explore and highlights the sections of the Site belonging to the two river catchments, Great Ouse and River Thames.

2.5.3. The on-site drainage pathways flow to the north, east, south and west from a central high point in Parcel 1 on Knowl Hill, with the majority of Parcel 1 draining to the north. Parcel 1a slopes from east to west/south west. Parcel 2 can be split into two sub areas, the northern area generally sloping to the north west, north and north east, with the southern area draining generally to the south/south west. Parcel 3 drains west to east toward the Claydon Brook Tributary watercourse located on the eastern boundary of the Order Limits.

2.6. Geology

2.6.1. Based on published geological records for the area (British Geological Survey online mapping):

- The majority of the Site is not underlain by superficial geology. There are small pockets of Glaciofluvial Deposits (Sand and Gravel), Glacial Deposits (Clay, Sand and Silt) and Till (Diamicton) throughout the Site and areas of Alluvium (Clay, Sand, Silt and Gravel) and River Terrace Deposits (Sand and Gravel) around the Claydon Brook and Claydon Brook Tributary to the north.
- The bedrock geology of the Site consists of areas of West Walton Formation (Mudstone) and Weymouth Member (Mudstone) in the south and eastern areas; and Stewartby Member (Mudstone) and Peterborough Member (Mudstone) in the northern and western regions.

2.6.2. BGS borehole logs have been reviewed for geological information, with a sample of these described in **Table 2.1.** A more detailed description of the geology of the Site is provided in **ES Volume 2, Chapter 11: Land and Groundwater [EN010158/APP/6.2]**.

Table 2.1: BGS Borehole Records

BGS Borehole Ref	Location in relation to Site	Geology Recorded	Groundwater Recorded
SP72SW25	Located to the south of the Site along the proposed East West Railway development.	- Topsoil to 0.1m BGL. - Made Ground to 1.20m BGL. - Oxford Clay to 2.70m BGL.	Not indicated
SP62SE39	Located to the west of the Site along the proposed East West Railway development.	- Topsoil to 0.05m BGL. - Glacial Deposits to 3.00m BGL. - Oxford Clay to 8.00m BGL.	Not indicated
SP72SW28	Located in the centre of the Site.	- Topsoil to 0.1m BGL. - Oxford Clay to 4.60m BGL.	Not indicated
SP72NW184	Located to the north of the Site.	- Sand and Gravel to 8.00m BGL. - Clay to 65.00m BGL.	3.0mBGL

BGS Borehole Ref	Location in relation to Site	Geology Recorded	Groundwater Recorded
		- Limestone to 75.00m BGL. - Mudstone to 96.00m BGL.	

2.6.3. The BGS borehole logs confirm the underlying geology to be Sand, Silt Gravel and Clay over multiple Mudstone bedrock formations.

2.7. Hydrology

2.7.1. The Environment Agency's web-based mapping **[Ref. 28]** indicates that the nearest Environment Agency Main River is the River Ray, located 200m to the south of Parcel 2 directly south of Finemere Wood, and a tributary of the River Ray located 400m to the south west of Parcel 1a, and directly south of Sheephouse Wood.

2.7.2. Buckingham Council mapping also identifies a number of Ordinary Watercourses crossing the Site, as shown in **ES Volume 3, Figure 16.1: Watercourses [EN010158/APP/6.3]**. The Environment Agency categorise these watercourses as primary, secondary and tertiary rivers. Primary watercourses consist of Main Rivers and major Ordinary Watercourses, secondary watercourses consist of smaller Ordinary Watercourses, and tertiary watercourses comprise drainage ditches and Ordinary Watercourses receiving limited flows. Mapping of these watercourses has been reproduced as **Figure 2.4**.

2.7.3. There are several unnamed watercourses that form the headwaters of the Padbury Brook (in the north west), the Claydon Brook (in the north/north east) and the River Ray (to the south). These features are all classified as Ordinary Watercourses and would therefore be under the jurisdiction of the Buckinghamshire Council as the Lead Local Flood Authority or the Buckingham & River Ouzel Internal Drainage Board. The area covered by the Buckingham & River Ouzel Internal Drainage Board has been reproduced in the mapping in **Figure 2.3**.

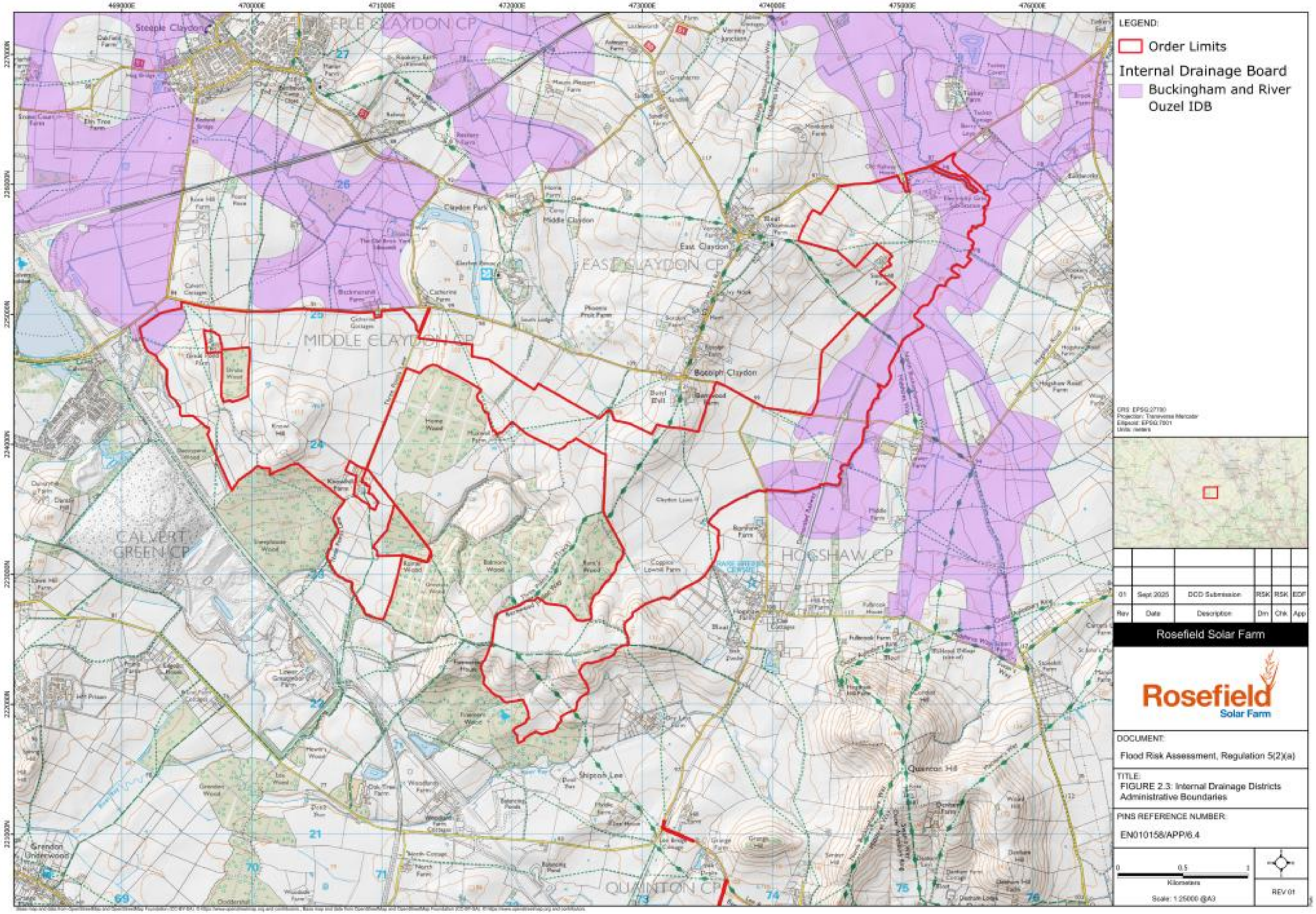

Figure 2.3: Internal Drainage Districts Administrative Boundaries

2.7.4. A Site visit, conducted in May 2025, also noted a number of drainage ditches located within hedgerows of field boundaries throughout the Site. Some of these connect into the wider drainage and watercourse network, others act as informal soakaway features (presumably receiving field drainage) with no observed onward connections. Many of these drainage features (including the upper reaches of the Muxwell Brook) were noted as dry during the Site visit, which was undertaken on a dry sunny day. It was noted that the preceding weeks were also mainly dry.

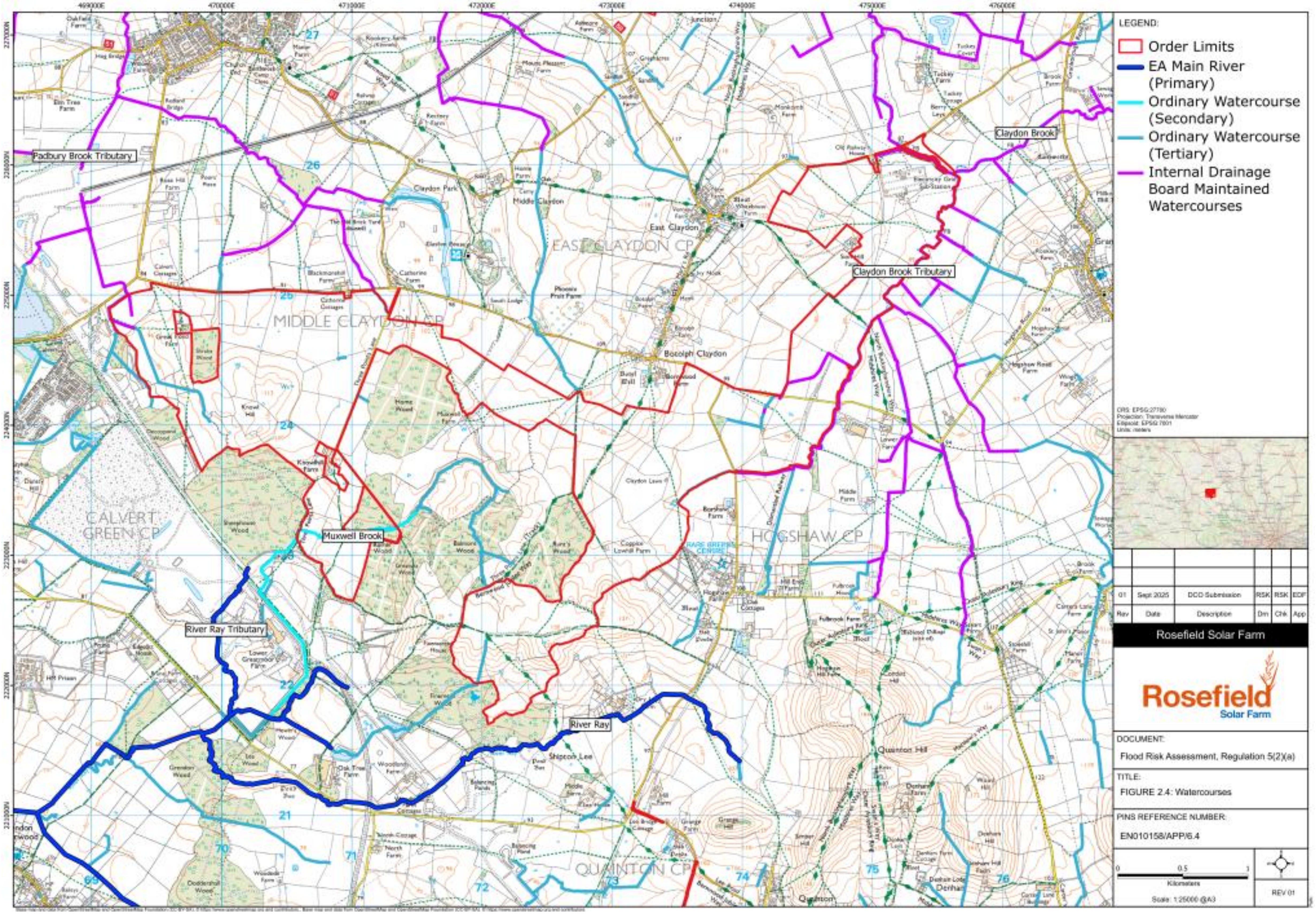

Figure 2.4: Watercourses within the vicinity of the Site

2.8. Hydrogeology

2.8.1. Hydrogeological information was obtained from the online Defra MAGIC Maps service. These maps indicate that the Glaciofluvial Deposits, Glacial Deposits and Till are classified as Secondary (Undifferentiated) superficial aquifers, whilst the Alluvium and River Terrace Deposits are classified as a Secondary A superficial aquifer. The West Walton Formation, Weymouth Member, Stewartby Member and Peterborough Member Mudstone bedrock geology are classified as Unproductive.

2.8.2. Defra's MAGIC maps confirm that the Site is not located within a groundwater Source Protection Zone. MAGIC Maps does indicate that the Site is located within a Surface Water Drinking Water Safeguarding Zone, but not within 1km of Surface Water Drinking Water Protection Zone.

2.8.3. It is likely that isolated pockets of groundwater are beneath the Site within bands of permeable deposits (superficial sands and gravels and/or permeable bands within the Mudstone) rather than a continuous shallow groundwater body. However, it is acknowledged that the BGS borehole logs do not provide sufficient Site coverage to draw firm conclusions. A Preliminary Ground Investigation has been undertaken (in January 2025) that included a number of Window Sample and Trial Pit locations, including two Infiltration Tests undertaken within Parcel 1. The infiltration testing results indicate that infiltration drainage will not be feasible due to the slow soakage rates encountered. It is also noted that the predominant subsoil and superficial geology across the site is Clay, and where pockets of Sand are present, these are generally thin in nature and clay rich. Where present, shallow groundwater is likely to flow locally towards the Ordinary Watercourses within the vicinity of the Site.

3. Flood Risk

3.1. Criteria

3.1.1. In accordance with the NPPF **[Ref. 2]**, NPS EN-1 **[Ref. 1]** and advice from the Environment Agency **[Ref. 18]**, an assessment of the risk associated with various flooding sources is required along with consideration of the effects of climate change over the design life of the development.

3.1.2. The EA's most recent climate change guidance, published in May 2022 **[Ref. 15]**, has been referenced in order to identify the appropriate peak river flow and rainfall intensity allowances for the scheme. The appropriate allowance for peak river flow is based on the location of the site in the country, the lifetime of development, the relevant flood zone and the vulnerability of the proposed end use.

3.1.3. The flood risk elements that need to be considered for any site are defined in BS 8533 'Assessing and managing flood risk in development Code of practice' **[Ref. 29]** as the "Forms of Flooding" and are listed as:

- Flooding from rivers (fluvial flood risk);
- Flooding from the sea (tidal flood risk);
- Flooding from the land;
- Flooding from groundwater;
- Flooding from sewers (sewer and drain exceedance, pumping station failure etc); and
- Flooding from reservoirs, canals and other artificial structures.

3.1.4. The following section reviews each of these in respect of the subject Site.

3.2. Fluvial Flood Risk

Environment Agency Mapping

3.2.1. The latest Environment Agency published Flood Zone map (2025) is presented as **Figure 3.1** and in **ES Volume 3, Figure 16.2: Environment Agency Flood Zones [EN010158/APP/6.3]** and indicates that the majority of the Site is located within Flood Zone 1, which represents a less than 1 in 1000 year annual probability of flooding from fluvial and tidal sources.

3.2.2. There are areas of Flood Zone 2 and Flood Zone 3 within the Order Limits associated with the Claydon Brook Tributary that flows adjacent to the eastern boundary of Parcel 3, and the Claydon Brook in the north east corner of the Site. Flood Zone 2 represents between a 1 in 100 and 1 in

1000 year annual probability of fluvial flooding and 1 in 200 and 1 in 1000 year annual probability of tidal flooding; whilst Flood Zone 3 represents a greater than 1 in 100 year annual probability of fluvial flooding and 1 in 200 year annual probability of tidal flooding.

3.2.3. There is a small area of Flood Zone 2 and Flood Zone 3 located at the centre of the northern extent of the Order Limits and an area of Flood Zone 2 and Flood Zone 3 surrounding the Muxwell Brook in the south western area of the Site. Based on the Proposed Development location in the **Works Plans [EN010158/APP/2.3]**, only Biodiversity Net Gain enhancements will be located within the area surrounding Muxwell Brook in the south west corner of the Site (Parcel 1a); and only a underground cable connection and adjacent permeable gravel access track will be located in the central area of the northern Site extent to connect Parcel 1 and Parcel 3. As such, it is considered that the areas of Flood Zone located within the area of proposed Internal Access Corridor between Parcel 1 and Parcel 1a of the Site will not pose a flood risk to the Proposed Development.

3.2.4. The Environment Agency were contacted as part of this assessment. They advised that the Flood Zones within this area were determined by the national scale generalised model, JFlow. JFlow modelling is a national scale model where detailed hydraulic models are not available and generally considered to be lower accuracy, broad-scale mapping due to the age of models (c. 2004) and 5m grid sizing. Additional hydraulic modelling has been carried out and is detailed further below.

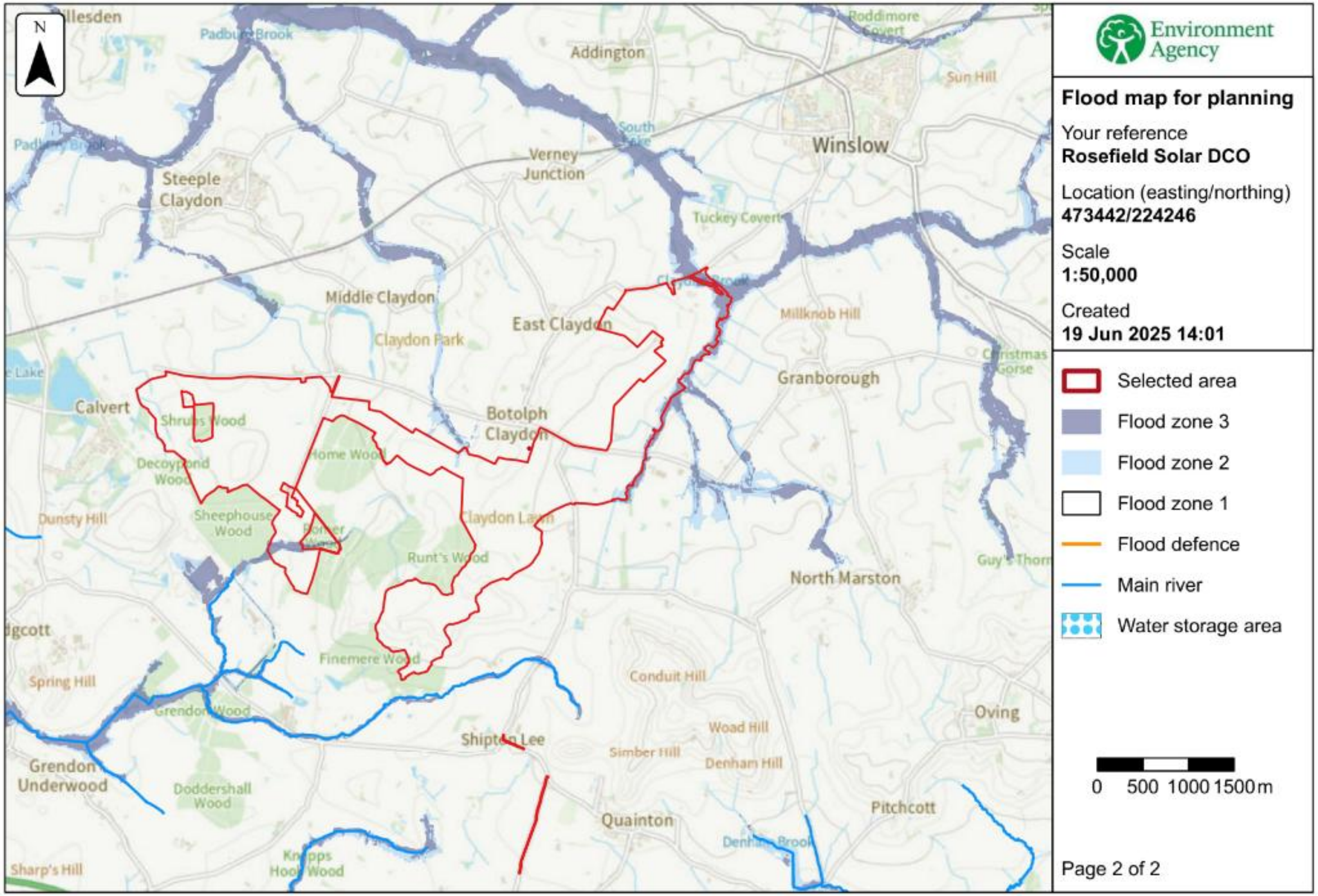

Figure 3.1: Environment Agency 'Flood Map for Planning'

Hydraulic Modelling

3.2.5. Hydraulic modelling of fluvial flood risk was undertaken in 2024 for the East Claydon BESS Development located immediately to the east of the Claydon Brook Tributary. The modelling outputs shown on in **ES Volume 3, Figure 16.4: Fluvial Modelling of Claydon Brook Tributary [EN010158/APP/6.3]** and show that the modelled fluvial extents, including the appropriate climate change allowances and is reproduced as **Figure 3.2** below.

3.2.6. The Fluvial Modelling was undertaken in 2024, with a subsequent update in 2025, which utilises the most up to date climate change allowances. The 2024 model has been accepted by the Environment Agency for the East Claydon BESS scheme and deemed suitable for use in this assessment. It is therefore considered to be the most up to date and relevant information available for the purposes of Flood Risk Assessment. Whereas the Buckinghamshire Council Strategic Flood Risk Assessment utilises the 1 in 20 year modelled flood level to define the Functional Floodplain (3b), the Fluvial Modelling adopts a precautionary approach and in line with the latest Environment Agency guidance, uses the 1 in 30 year modelled flood level to define the Functional Floodplain.

3.2.7. Mapping of the functional floodplains within the Site has been reproduced below as **Figure 3.3** using the modelled 1 in 30 year fluvial extent.

Rosefield Solar Farm

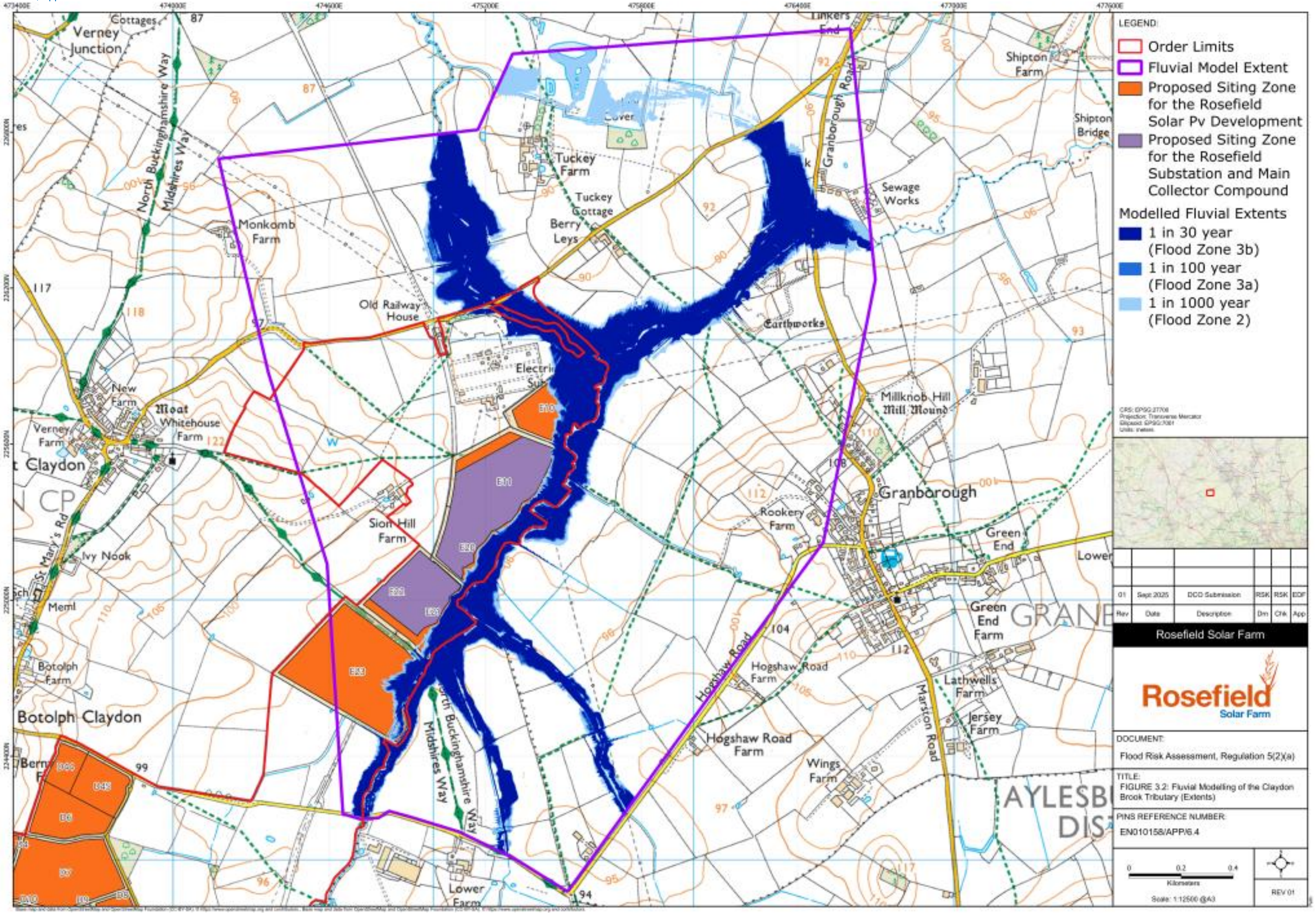

Figure 3.2: Fluvial Modelling of Claydon Brook Tributary

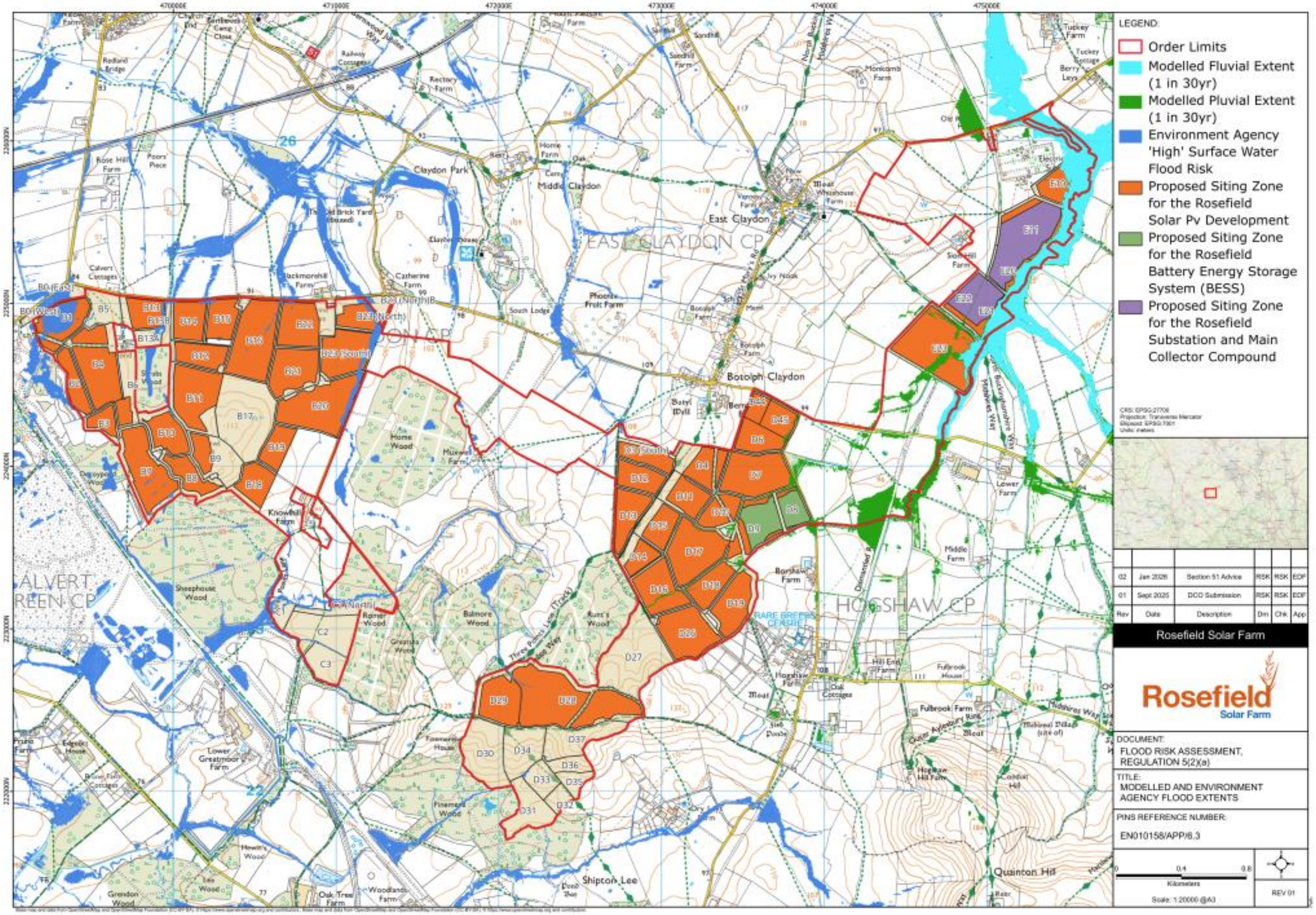

Figure 3.3: Functional Flood Zone Mapping (note includes all pluvial flood risk mapping)

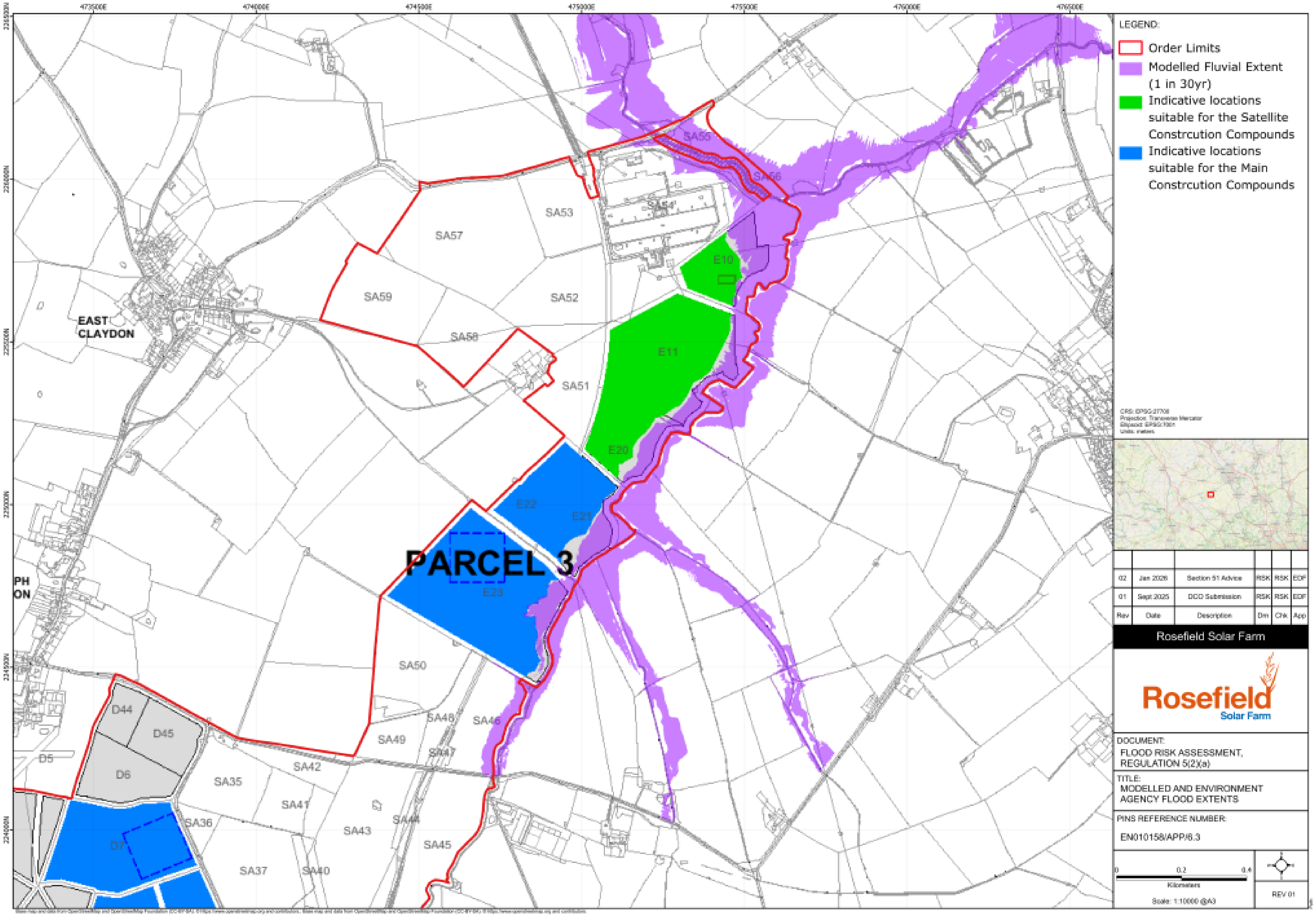

Figure 3.4: Functional Flood Zone Mapping (note includes indicative construction compounds)

3.2.8. As part of the East Claydon BESS Development modelling, flood water depth outputs were produced. Mapping of modelled flood depths during the 1 in 100 year plus 30% climate change storm have been reproduced as **Figure 3.5**. The model outputs indicate that during the 1 in 30 year event, fluvial flood depths within the Site boundary are generally between 100mm and 550mm; whilst during the 1 in 100 year event depths were generally between 150mm and 600mm and depths during the 1 in 1000 year event ranged from 250mm – 800mm. **Table 3.1** indicates the modelled flood heights for modelled events for each of the land parcels within Parcel 3 and **Table 3.2** indicates the maximum flood depths.

Table 3.1: Claydon Brook Tributary Flood Levels in Parcel 3

Parcel Ref	1 in 30 year Flood Level (mAOD)	1 in 100 year Flood Level (mAOD)	1 in 100 + cc% year Flood Level (mAOD)	1 in 1000 year Flood Level (mAOD)
E23	89.4 - 90.2	89.4 - 90.2	89.6 - 90.2	89.6 - 90.2
E21	89.0 - 89.4	89.0 - 89.4	89.2 - 89.6	89.2 - 89.6
E20	88.8 – 89.0	88.8 – 89.0	88.8 - 89.2	89.0 - 89.2
E11	88.0 - 88.8	88.0 - 88.8	88.0 - 88.8	88.2 – 89.0
E10	87.4 – 88.0	87.6 – 88.0	87.6 – 88.0	87.6 - 88.2

Table 3.2: Claydon Brook Tributary Flood Depths in Parcel 3

Parcel Ref	1 in 30 year Flood Depth (mm)	1 in 100 year Flood Depth (mm)	1 in 100 + cc% year Flood Depth (mm)	1 in 1000 year Flood Depth (mm)
E23	Up to 400mm	Up to 425mm	Up to 460mm	Up to 500mm
E21	Up to 750mm	Up to 775mm	Up to 820mm	Up to 850mm
E20	Up to 735mm	Up to 810mm	Up to 875mm	Up to 950mm
E11	Up to 740mm	Up to 770mm	Up to 830mm	Up to 870mm
E10	Up to 350mm	Up to 415mm	Up to 500mm	Up to 600mm

3.2.9. There are a number of Ordinary Watercourses within and around the Site (**Figure 2.4**). These watercourses have not been modelled by the Environment Agency due to the contributing catchment being less than $3km^2$ and therefore, have no associated Flood Zones on the Flood Map for Planning. Given that the Site is located on a watershed between two river catchments (River Ouse and River Thames), these watercourses will have limited upstream catchments and therefore, will receive limited upstream inflows, meaning it is unlikely that fluvial flooding will extend significantly out of bank due to the relatively small flows. The Environment Agency surface water flood maps (RoFSW) can be used as a proxy for fluvial flood risk (see **Section 3.4**).

3.2.10. The RoFSW mapping has been used to identify areas potentially affected by shallow overland flow paths and localised flooding associated with intense rainfall events. In the absence of detailed hydraulic models for minor Ordinary Watercourses in the vicinity of the Site, the RoFSW outputs provide a precautionary representation of flood extents that, in this location, are equal to or exceed the anticipated floodplain associated with these small watercourses. As such, the RoFSW mapping does not underestimate risk but instead captures a broader range of potential flooding mechanisms, including exceedance, surcharging, and flow routing that may not be fully represented in simplified fluvial assessments. Following discussions with the Environment Agency (dated 16.01.2026), where the RoFSW mapping has been used as a proxy for fluvial flood risk, this will be defined as fluvial flood risk for the purpose of the assessment.

~~3.2.10.~~3.2.11. Further analysis of the comparison between the detailed hydraulic modelling of Claydon Brook, the site specific pluvial modelling and the Environment Agency RoFSW datasets has been undertaken by the Applicant to assess the suitability of the use of the RoFSW dataset as a proxy for fluvial flood risk. **Figures 3.5** and **Figure 3.6** illustrate the comparison between the flood extendts during the 1 in 1000 year scenarios, with **Figure 3.7** and **Table 3.3** providing further evidence for the suitability of the use of the RoFSW dataset as a proxy.

~~3.2.11.~~3.2.12. Fluvial flooding is likely to increase as a result of climate change. A greater intensity and frequency of precipitation is likely to raise river levels and increase the likelihood of a river overtopping its banks. Climate change guidance for river modelling was updated by the Environment Agency in May 2022 **[Ref. 15]**. The Environment Agency guidance and NPS EN-1 **[Ref. 1]** advocate a conservative approach to consideration of climate change for nationally significant infrastructure projects using a 'credible maximum climate change scenario'. As part of the East Claydon BESS Development Flood Risk Assessment, modelling was undertaken for the 1 in 100 year plus 30% climate change storm event, equivalent to the 2050s 'Upper' scenario. Mapping of the modelled flood depths during this scenario has been reproduced as **Figure 3.5**

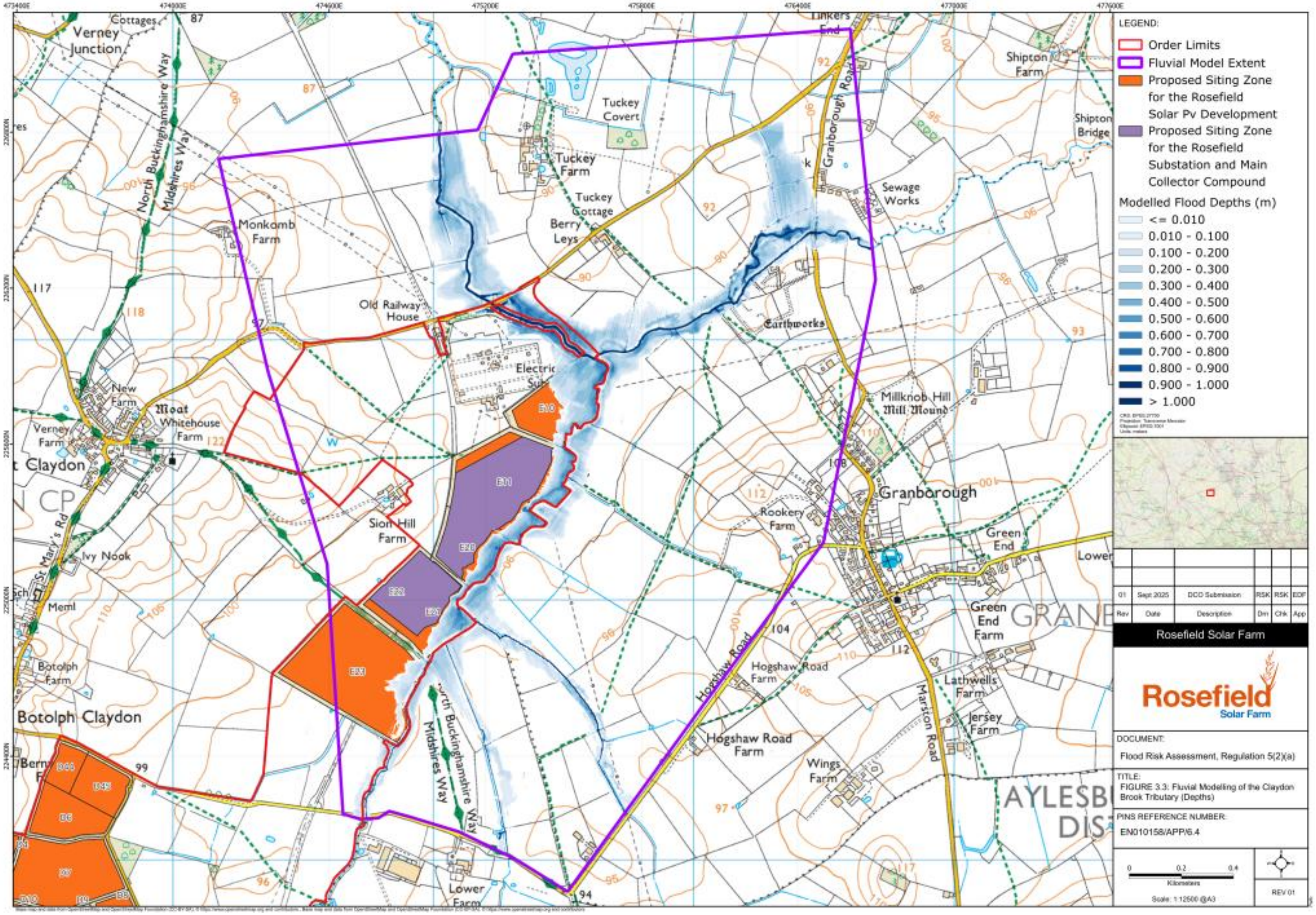

Figure 3.5: Q100cc (Upper 30% climate change) Modelled Fluvial Flood Depths (m)

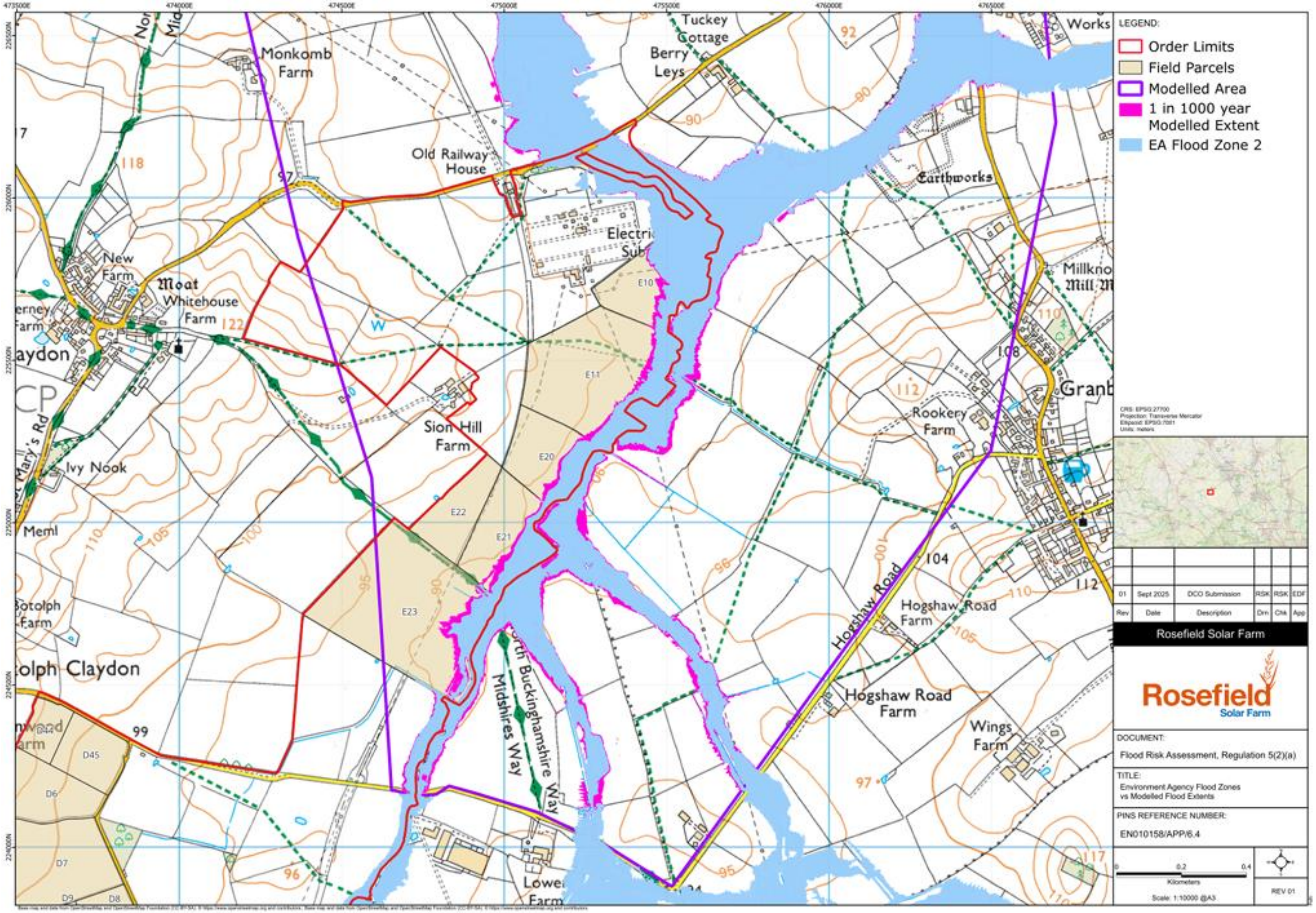

Figure 3.6: Environment Agency Flood Zone 2 and Modelled Q1000 Fluvial Extent Comparison

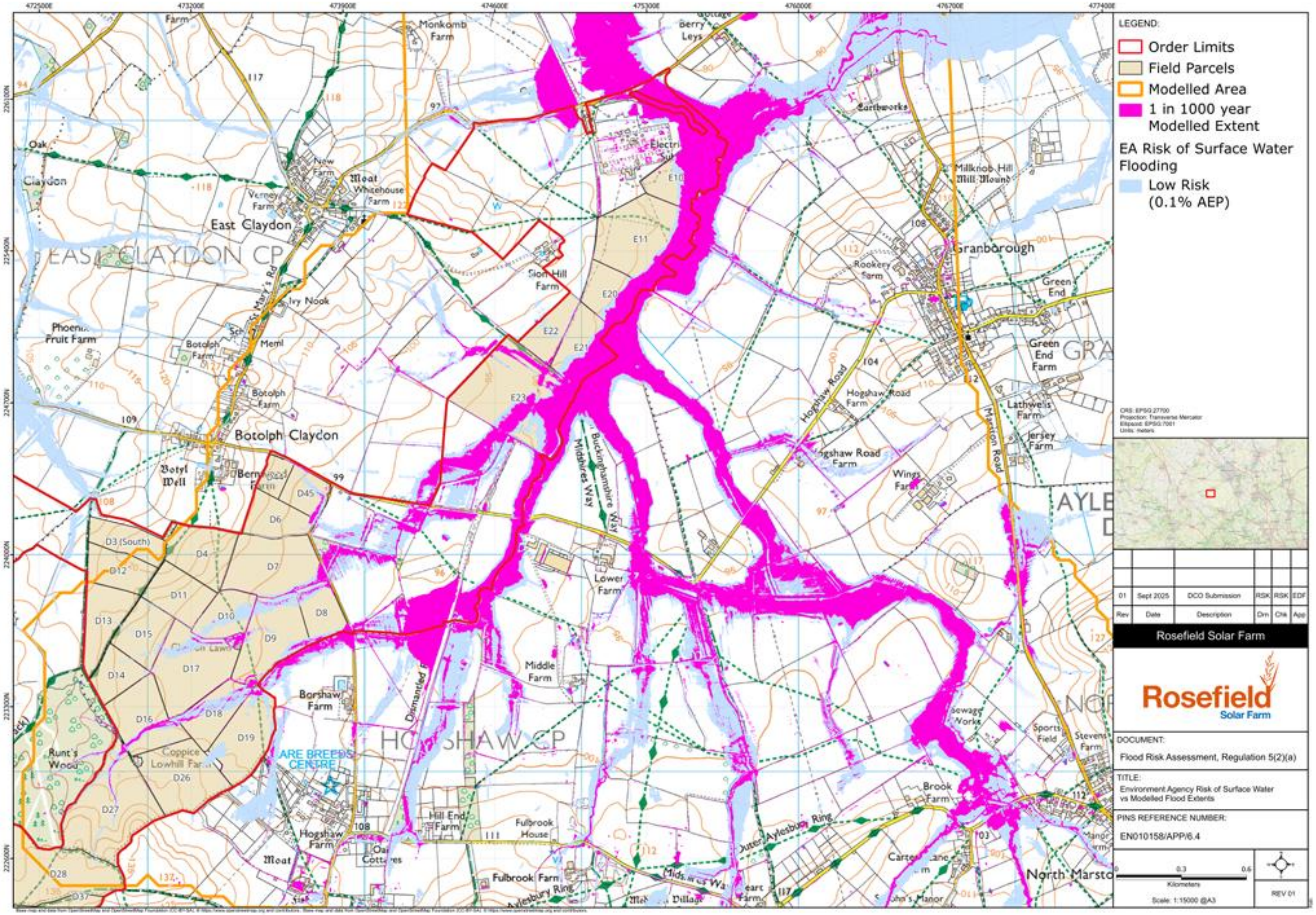
LEGEND:
Order Limits
Field Parcels
Modelled Area
1 in 1000 year Modelled Extent
EA Risk of Surface Water Flooding
Low Risk (0.1% AEP)
01
Sept 2025
DCO Submission
RSK
RSK
EDF
Rev
Date
Description
Drn
Chk
App
Rosefield Solar Farm
Rosefield Solar Farm
DOCUMENT:
Flood Risk Assessment, Regulation 5(2)(a)
TITLE:
Environment Agency Risk of Surface Water vs Modelled Flood Extents
PINS REFERENCE NUMBER:
EN010158/APP/6.4
Kilometers
Scale: 1:15000 @A3
REV 01
East Claydon
Botolph Claydon
Granborough
North Marston
Hogshaw Road
Marston Road
Buckinghamshire Way
Midshires Way
Outer Aylesbury Ring

Figure 3.7: Environment Agency 'Low' Risk of Surface Water and Modelled Q1000 Pluvial Extent Comparison

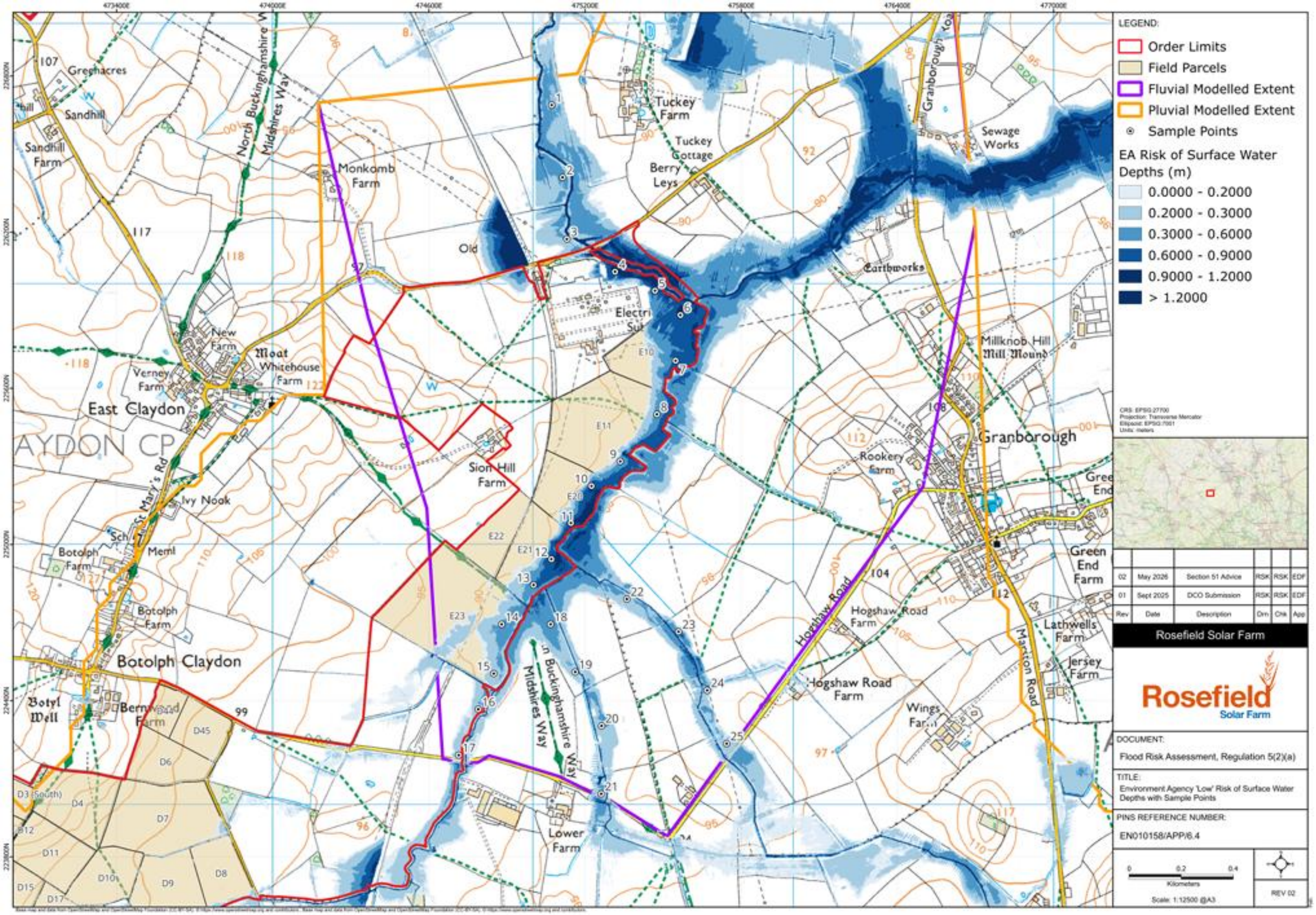
LEGEND:
Order Limits
Field Parcels
Fluvial Modelled Extent
Pluvial Modelled Extent
Sample Points
EA Risk of Surface Water Depths (m)
0.0000 - 0.2000
0.2000 - 0.3000
0.3000 - 0.6000
0.6000 - 0.9000
0.9000 - 1.2000
> 1.2000
02 | May 2026 | Section 51 Advice | RSK | RSK | EDF
01 | Sept 2025 | DCO Submission | RSK | RSK | EDF
Rev | Date | Description | Drn | Chk | App
Rosefield Solar Farm
Rosefield Solar Farm
DOCUMENT:
Flood Risk Assessment, Regulation 5(2)(a)
TITLE:
Environment Agency 'Low' Risk of Surface Water Depths with Sample Points
PINS REFERENCE NUMBER:
EN010158/APP/6.4
Kilometers
Scale: 1:12500 @A3
REV 02
East Claydon
Botolph Claydon
Granborough
Tuckey Farm
Monkomb Farm
Sion Hill Farm
Hogshaw Road Farm
Lower Farm

Figure 3.8: Environment Agency 'Low' Risk of Surface Water Depths with Sample Points

Table 3.3: Environment Agency 'Low' Risk of Surface Water Depths and Modelled Q1000 Depths Comparison

Node Reference	EA 'Low' RofFSW Depths	Modelled 0.1% AEP Pluvial Depths	Modelled 0.1% AEP Fluvial Depths
1	Up to 600mm	0.659477	0.551659
2	Up to 600mm	0.529678	0.435226
3	Up to 600mm	0.505615	0.433868
4	Up to 900mm	0.764450	0.641434
5	Up to 900mm	0.437233	0.307480
6	Up to 900mm	0.778748	0.652290
7	Up to 900mm	0.561539	0.423721
8	Up to 600mm	0.532745	0.385475
9	Up to 600mm	0.400970	0.257942
10	Up to 900mm	0.776436	0.554939
11	Up to 900mm	0.807930	0.565765
12	Up to 900mm	0.776245	0.570740
13	Up to 600mm	0.461472	0.242828
14	Up to 300mm	0.375587	0.195564
15	Up to 300mm	0.207870	0.106491
16	Up to 300mm	0.278358	0.215240
17	Up to 300mm	0.307030	0.260239
18	Up to 600mm	0.458801	0.266182
19	Up to 300mm	0.319374	0.164925
20	Up to 300mm	0.289886	0.162186
21	Up to 600mm	0.387665	0.248383
22	Up to 300mm	0.334564	0.271736

Node Reference	EA 'Low' RofFSW Depths	Modelled 0.1% AEP Pluvial Depths	Modelled 0.1% AEP Fluvial Depths
23	Up to 600mm	0.540337	0.442383
24	Up to 600mm	0.405914	0.317436
25	Up to 300mm	0.291595	0.207115

3.2.13. **Figure 3.5** indicates that the extents of the 1 in 100 year plus 30% climate change flood event are similar to that of the 1 in 100 year event. The depths of flooding experienced on Site are also similar to the 1 in 100 year event with depths generally ranging between 150mm – 600mm in Parcel 3.

3.2.14. **Figure 3.6** and **Figure 3.7** indicate that the Environment Agency's Flood Zone 2 extents are slightly smaller in size than the modelled 1 in 1000 year fluvial extents, whilst the Environment Agency's 'Low' Risk of Surface Water Flooding extents are larger in size than the modelled 1 in 1000 year pluvial extents.

~~3.2.12.~~3.2.15. **Table 3.3** indicates that the modelled 1 in 1000 year depths at the sample locations indicated in **Figure 3.8** for both the pluvial and fluvial models are sufficiently similar to the Environment Agency's 'Low' Risk of Surface Water Depths classifications that it is considered that using the Environment Agency's RoFSW mapping as proxy where detailed modelled information is not available is reasonable across the Site.

~~3.2.13.~~3.2.16. The resultant fluvial flood risk for the majority of the Site is classified as Flood Zone 1, **low risk** (defined by the Environment Agency as less than a 0.1% chance of flooding each year), whilst the areas deemed to be within Flood Zone 2 are considered to be **medium risk** (between a 0.1% and 1% chance of flooding from rivers or 0.1% to 0.5% from the sea each year), and areas of Flood Zone 3a and Flood Zone 3b as **high risk** (greater than a 1% chance of flooding from rivers or 0.5% from the sea each year).

Credible Maximum Scenario

~~3.2.14.~~3.2.17. National Policy Statement EN-1 states that Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario.

~~3.2.15.~~3.2.18. Consideration has been given to the Credible Maximum Scenario. The construction and operational phases of the Proposed Development are anticipated to occur predominantly within the 2050s epoch; therefore, the 30% increase in fluvial flows associated with the 2050s Upper End climate change allowance has been applied. Based on the anticipated operational lifespan of the solar farm of approximately 40 years and associated grid connection timescales, only the decommissioning phase is expected to extend into the 2080s epoch and is anticipated to be completed within approximately 12 months. As such, only limited works would occur during the 2080s, and the application of the 2050s Upper End climate change allowance is considered appropriate for defining the Credible Maximum Scenario.

~~3.2.16.~~3.2.19. Following consultation with the Environment Agency, further sensitivity testing has been undertaken to assess the mapped differences between the 1 in 100 year, 1 in 100 year plus 11% climate change, 1 in 100 year plus 30% climate change, and 1 in 1000 year flood extents. Where components of the Proposed Development are located within the mapped and modelled flood extents, the differences in flood depth and extent are minimal and are therefore not considered sensitive to changes in flood flows. Mapping of this has been reproduced as **Figure 3.~~6~~9**.

~~3.2.17.~~3.2.20. Accordingly, the 30% uplift in fluvial flood flows, together with the 1 in 1000 year pluvial and fluvial flood extents and associated depths, is considered to represent the Credible Maximum Scenario for the Proposed Development, consistent with the approach set out in EN-1. The extents of these Credible Maximum flood scenarios have been reproduced below as **Figure 3.~~6~~10**.

~~3.2.18.~~3.2.21. A sensitivity check on the hydrology used in the Claydon Brook Modelling has shown that the Q1000 inflows into the modelling is comparable to the Q100 plus 58% climate change allowance. **Table 3.~~3~~ 4** below shows the comparison in flows.

Table 3.~~3~~4: Claydon Brook Tributary Flow comparison

Catchment Name - Method	3.3% AEP Peak Flow (m^3/s)	1% AEP Peak Flow (m^3/s)	1% + 11% CC AEP Peak Flow (m^3/s)	1% + 30% CC AEP Peak Flow (m^3/s)	0.1% AEP Peak Flow (m3/s)	1% + 58% CC AEP Peak Flow (m^3/s)
L01 - ReFH2	15.13	18.94	21.02	24.62	30.03	29.93
L01 - WINFAP	10.95	14.59	16.19	18.97	24.42	23.05

L01 Fluvial Distributed Model PO (L01_DS)	20.75	26.1	29.01	33.93	41.13	41.24
L01 Pluvial Distributed Model PO (L01_DS)	27.48	37.51	51.17	48.76	65.99	59.27
L01 sum of inflows max	21.21	26.65	29.58	34.65	41.92	42.11
L02 - ReFH2	22	27.35	30.36	35.56	44.85	43.21
L02 - WINFAP	22.46	28.36	31.48	36.87	40.50	44.81
S01 – ReFH2	5.21	6.54	7.26	8.50	10.29	10.33
S02 – ReFH2	3.97	4.99	5.54	6.49	7.85	7.88
S03 – ReFH2	6.62	8.32	9.23	10.82	13.08	13.15
I01– ReFH2	5.41	6.8	7.55	8.84	10.70	10.74

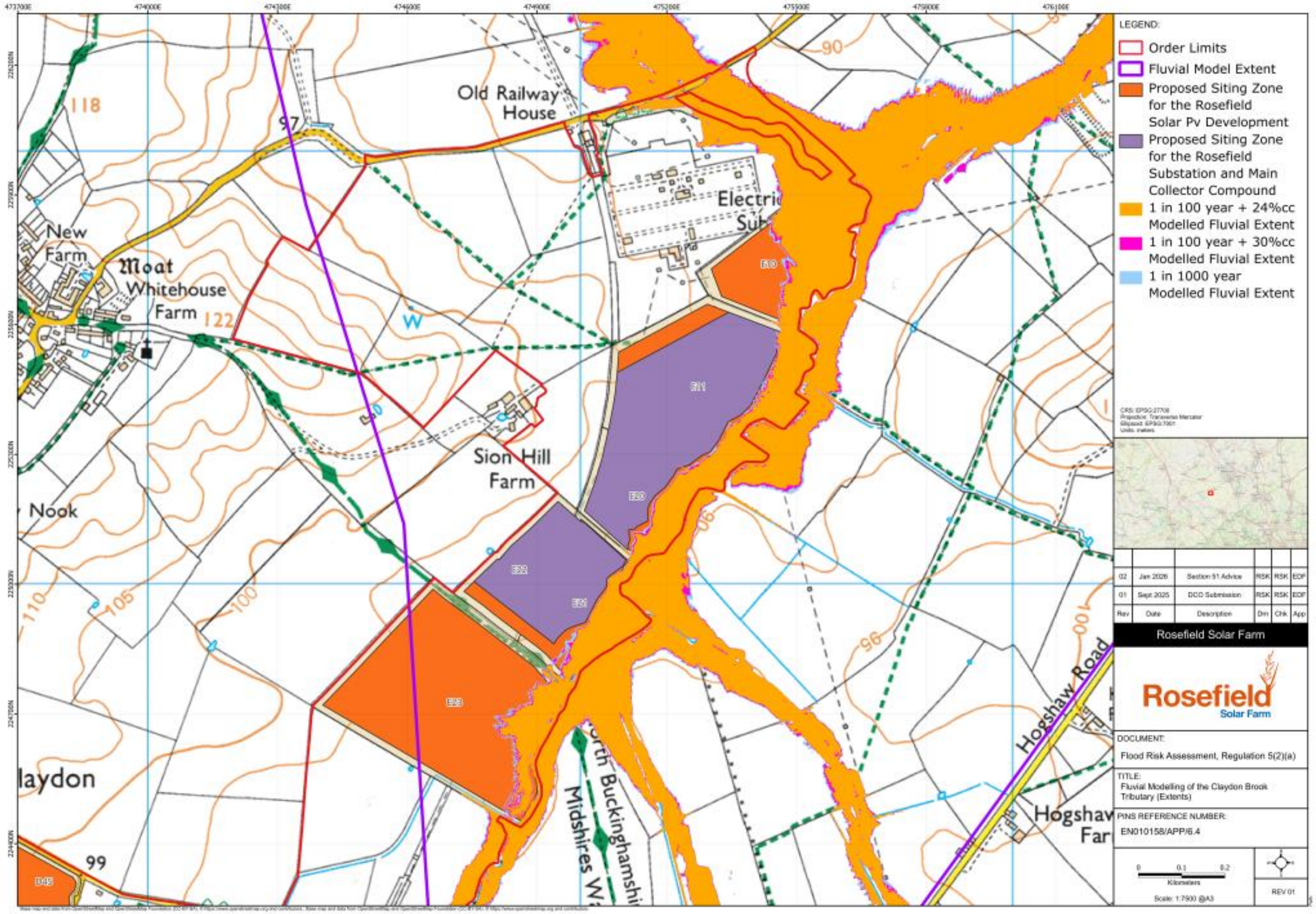

Figure 3.69: Modelled Fluvial Extents Comparison (Credible Maximum Scenario) sensitivity testing

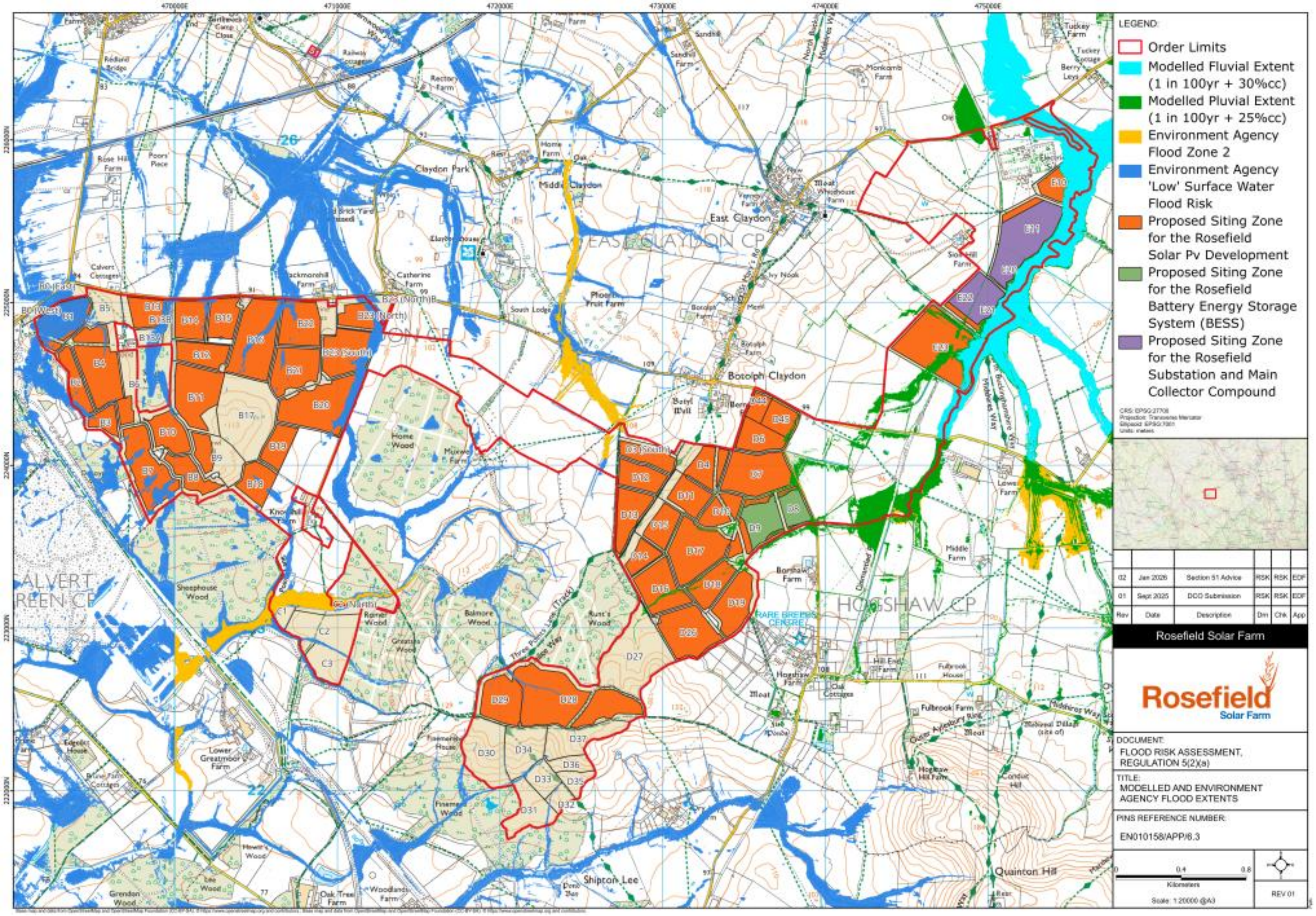

Figure 3.~~7~~10: Credible Maximum Flood Extents

3.3. Tidal Flood Risk

3.3.1. This Site is not considered to be at risk of flooding from tidal sources due to its inland location.

3.3.2. The resultant tidal flood risk is **very low.**

3.4. Surface Water (Pluvial) Flood Risk

3.4.1. If intense rain is unable to soak into the ground or be carried through man-made drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse. Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff can occur. Excess surface water flows from the Site are believed to drain naturally to the local water features, either by overland flow or through infiltration.

3.4.2. The Environment Agency's Surface Water Flood Risk Mapping (2025) for the Site is outlined in **Figure 3.8 11** and **ES Volume 3, Figure 16.3: Environment Agency Risk of Surface Water Flooding [EN010158/APP/6.3]**. Areas of surface water flood risk are shown on the Environment Agency's mapping, most notably along the channels of the Ordinary Watercourses in the eastern and western areas of the Site and within the woodland areas to the south.

3.4.3. This mapping (**Figure 3.811**) indicates the majority of the Site is at 'very low' risk of surface water flooding, representing a less than 1 in 1000 year annual probability of surface water flooding, with areas of 'low' (between 0.1% and 1.0% annual probability), 'medium' (between 1.0% and 3.3% annual probability) and 'high' (greater than 3.3% annual probability) surface water risk identified at various locations across the Site.

3.4.4. In Parcel 1, the majority of the surface water risk is unlikely to exceed 300mm in depth, with the exception of an area in the far north western corner, which has a 'low' risk of reaching up to 600mm in depth. The depths of surface water in Parcels 1a and 2 are unlikely to exceed 300mm, whilst the depths in Parcel 3 have a 'high' risk of reaching up to 600mm in depth, particularly in the areas close to the Claydon Brook Tributary that correspond to the areas of fluvial flood risk described in **Section 3.2**.

3.4.5. As with the fluvial modelling, outputs have been obtained from the site-specific surface water flood risk modelling undertaken for the East Claydon BESS Development. The modelling outputs have been reproduced as **Figure 3.9 12** and generally illustrate a reduction in pluvial flood extents compared to the Environment Agency flood risk mapping in **Figure 3.811**. This is likely a result of the increased accuracy of local scale modelling compared to the Environment Agency's national scale model.

3.4.6. The East Claydon BESS Development modelling does not extend across the entire Site but does encompass the entire eastern drainage catchment corresponding to Parcel 3. The modelled depths during the 1 in 30 year event on Site are generally between 50mm – 250mm, whilst depths during the 1 in 100 year and 1 in 1000 year present day scenarios range from 100mm – 300mm and 150mm – 450mm.

Rosefield Solar Farm

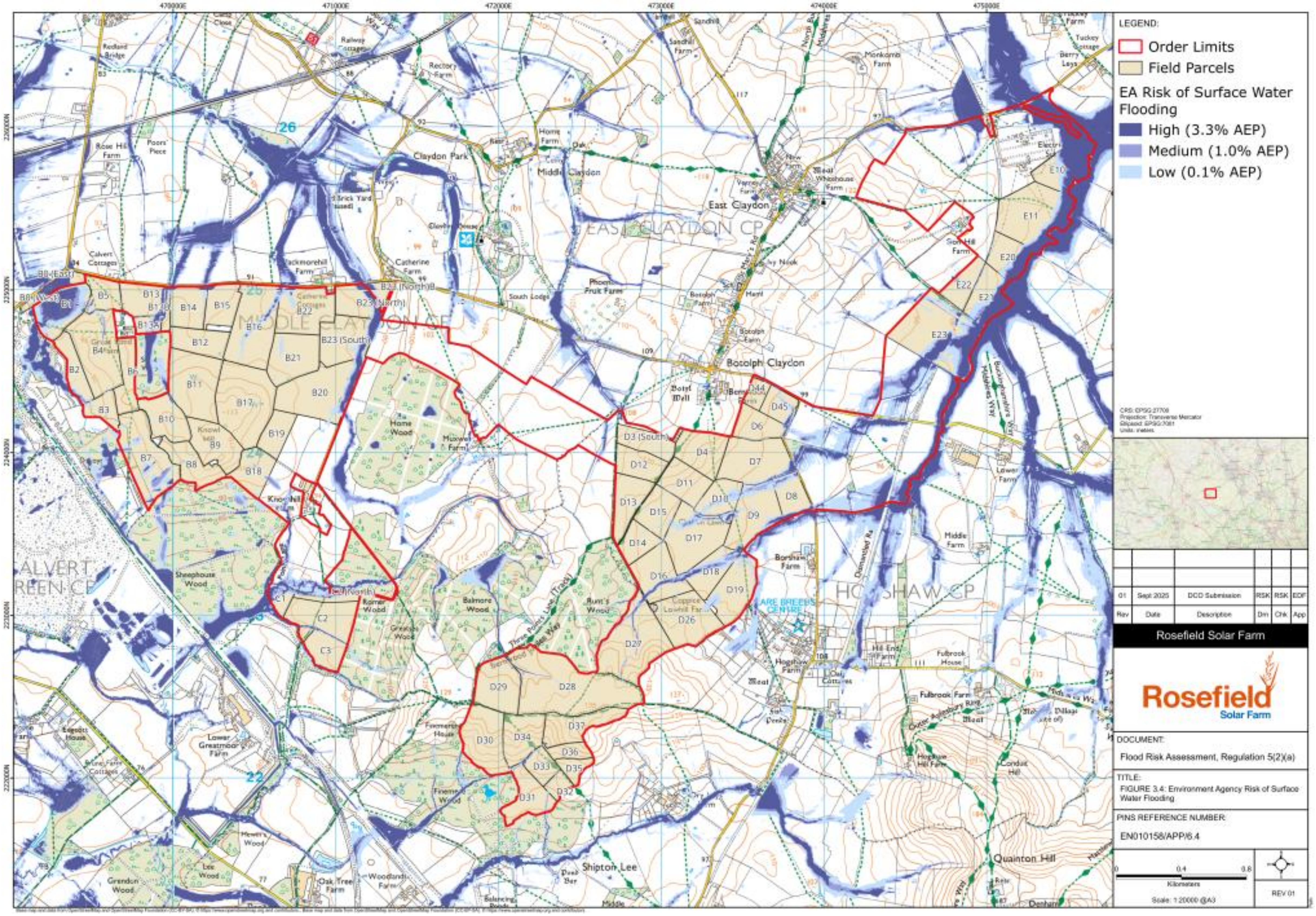

Figure 3.811: Environment Agency Risk of Surface Water Flooding

Rosefield Solar Farm

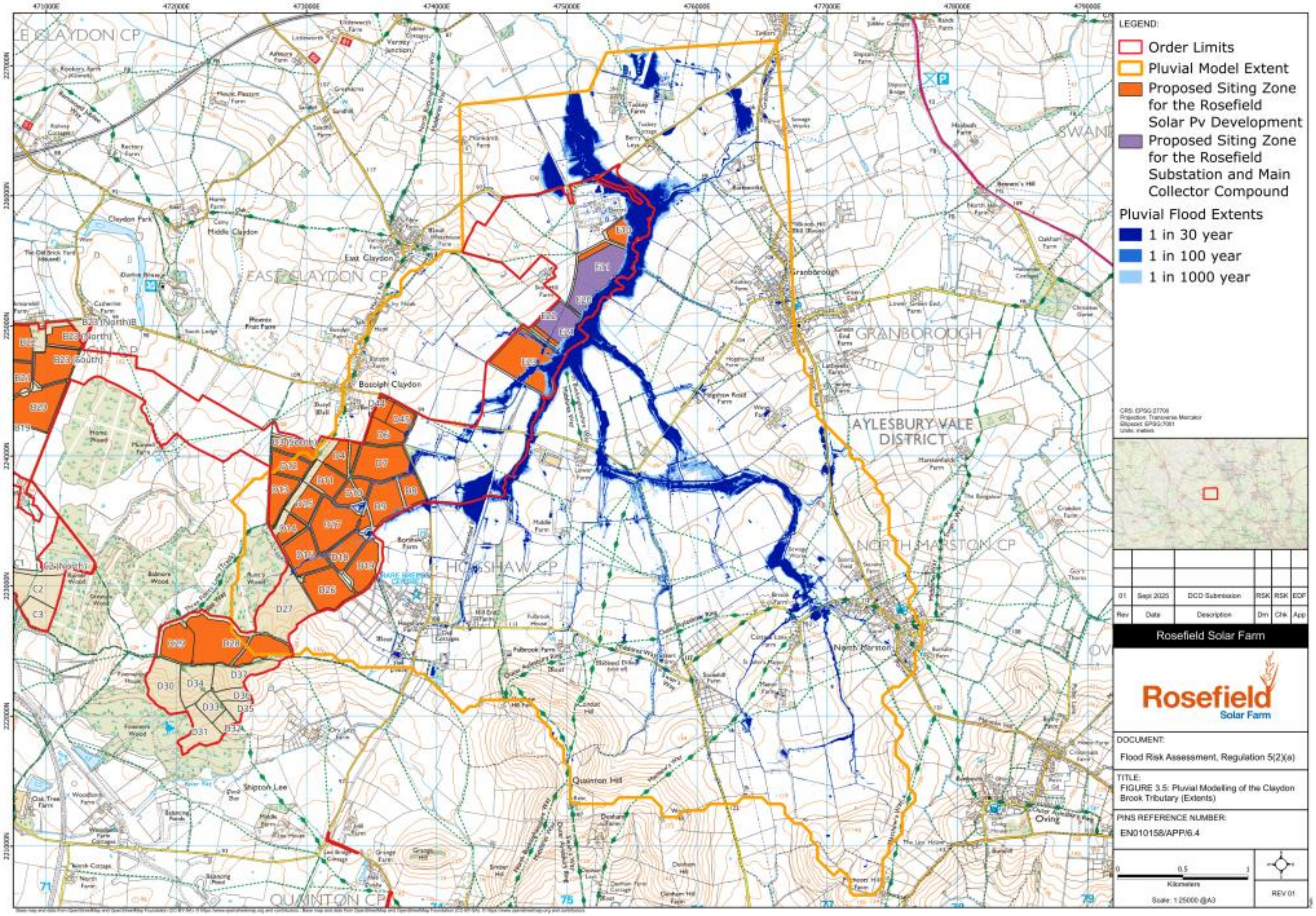

Figure 3.~~9~~12: Pluvial Modelling of Claydon Brook Tributary

3.4.7. Surface water flooding is likely to increase as a result of climate change in a similar ratio to fluvial flooding. Increased intensity and frequency of precipitation is likely to lead to reduced infiltration and increased overland flow. Climate change guidance was updated by the Environment Agency in May 2022. As part of the East Claydon BESS Development, modelling was undertaken for the 1 in 100 year plus 25% climate change storm event. Mapping of the modelled depths during this scenario has been reproduced as **Figure 3.~~10~~13**.

3.4.8. It is noted that the RoFSW Environment Agency mapping reflects the central allowance for the 2050s epoch; however, the methodology incorporates nationally consistent rainfall inputs, conservative assumptions on infiltration, and does not account for site-specific drainage improvements or attenuation measures. This results in an inherently precautionary output, particularly for rural catchments where fluvial responses are typically constrained by channel capacity and local topography. The RoFSW mapping has been used to represent a reasonable and, in this case, conservative proxy for flood risk from minor Ordinary Watercourses, including the effects of climate change.

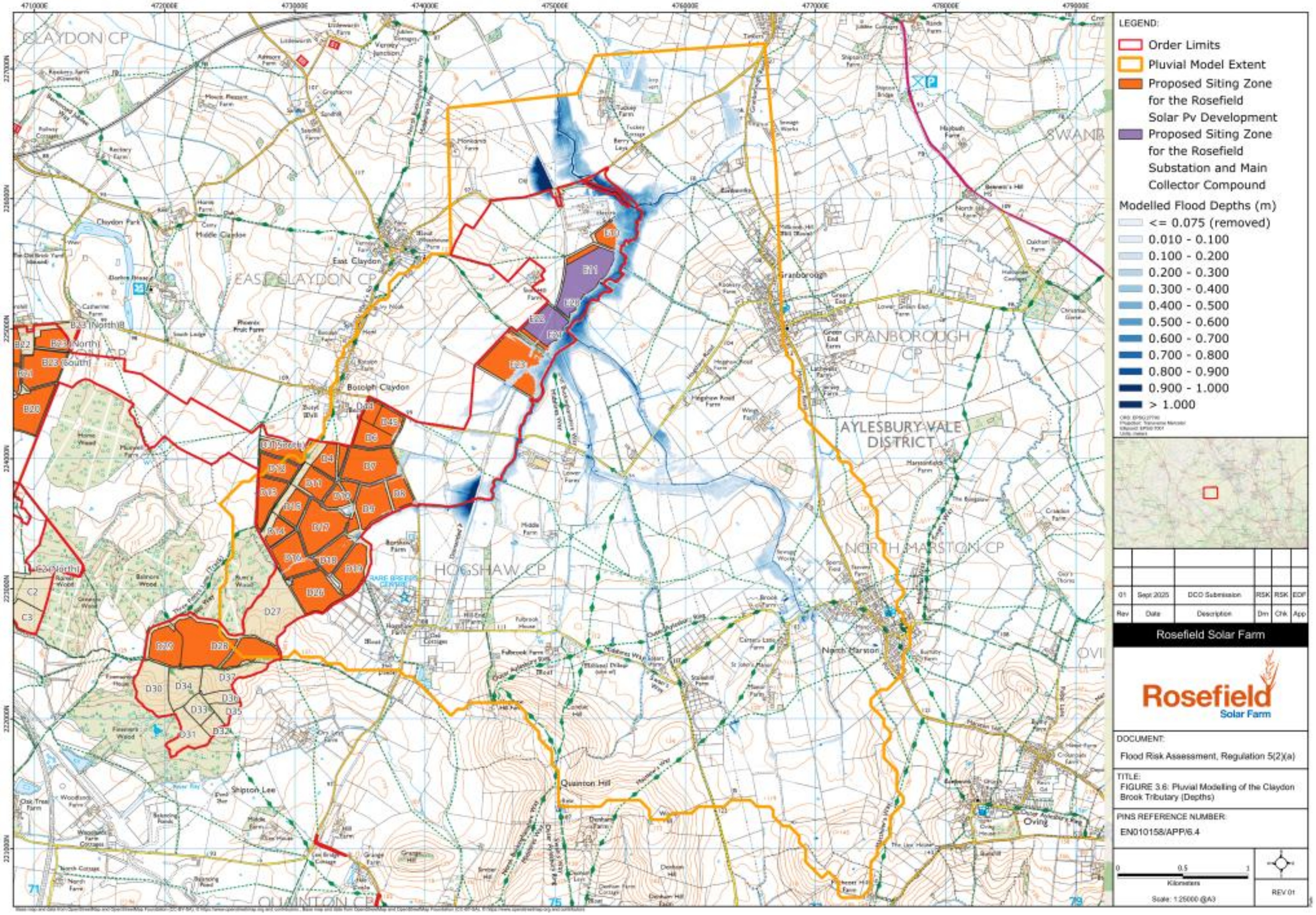

Figure 3.~~10~~13: Q100cc Modelled Pluvial Flood Depths (m)

3.4.9. **Figure 3.~~10~~ 13** indicates that during the 1 in 100 year plus 25% climate change storm surface water depths within the eastern extent of the Site are typically between 100mm – 500mm, with the section of ponding where the headwaters of the Claydon Brook Tributary back up against a road that reaches up to 1.2m in depth.

3.4.10. The overall flood risk from pluvial sources is **very low** for the majority of the Site and **low to medium to high** for the limited sections of some surface water flow paths the locations of which are clearly indicated on **Figures 3.~~8~~11-3.~~10~~13**.

3.5. Groundwater Flood Risk

3.5.1. Groundwater flooding tends to occur after long periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

3.5.2. The Site is underlain by a bedrock geology of Mudstone. There are small areas of Glaciofluvial Deposits (Sand and Gravel), Glacial Deposits (Clay, Sand and Silt) and Till (Diamicton) throughout the Site and areas of Alluvium (Clay, Sand, Silt and Gravel) and River Terrace Deposits (Sand and Gravel) around the Claydon Brook and Claydon Brook Tributary to the north. The presence of partially permeable geological deposits, mixed with impermeable Mudstone, may result in potentially shallow and possibly perched groundwater in places. The presence of an Ordinary Watercourses flowing within the Site may also exacerbate groundwater flooding issues locally.

3.5.3. The Buckinghamshire Council Preliminary Flood Risk Assessment **[Ref 27]** states that the *"two forms of groundwater flooding most prevalent in Buckinghamshire are: the rise of groundwater levels to extreme high levels in permeable consolidated aquifers (primarily Chalk) in response to prolonged above average rainfall; and the rise of groundwater levels in permeable superficial deposits which are in hydraulic continuity with high water levels in adjacent rivers."*

3.5.4. Based on the Site's location in relation to significant waterbodies and the underlying geology, it is considered unlikely that Site would experience groundwater emergence due to permeable bedrock geology. Parcel 3 would have some localised residual groundwater flood risk associated with the Claydon Brook Tributary however, the areas of risk would not likely extend beyond the identified fluvial and pluvial flood risk areas. Groundwater levels within this area of the Site are likely to correspond with water levels within this watercourse.

3.5.5. Climate change could increase the risk of groundwater flooding as a result of increased precipitation filtering into the groundwater body. This is less likely to cause a significant change to flood risk than from other sources, since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk as a result of climate change is likely to be low.

3.5.6. The overall groundwater flood risk is **low.**

3.6. Sewer Flood Risk

3.6.1. Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its conveyance capacity, the system becomes blocked, or it cannot discharge due to a high water level in the receiving watercourse. When exceeded, the surcharged pipe work could lead to flooding from backed up manholes and gully connections.

3.6.2. Water related infrastructure records are referenced from a Fusion (Combined Utilities) Plan provided for the Site, which illustrates only limited water infrastructure crossing the Site (see **ES Volume 3, Figure 5.1: Desk-Based Study of Existing Utilities [EN010158/APP/6.3]**). It is considered unlikely that sewers or water supply pipes will be a significant source of flood risk to the Proposed Development given the primarily rural nature of the existing Site use.

3.6.3. Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption **[Ref. 30]**. One of the design parameters is that sewer systems be designed such that no flooding of any part of the Site occurs in a 1 in 30 year rainfall event. By definition, a 1 in 100 year event could exceed the capacity of the surrounding sewer network as well as any proposed drainage system. When exceeded, the surcharged pipe work could lead to flooding from backed up manholes and gully connections.

3.6.4. The welfare facilities at the BESS compound are proposed to discharge foul water waste to package treatment works, indicating there will be no proposed sewers through the Site besides localised surface water drainage systems and foul water package treatment works and as such the flood risk from sewers will remain very low.

3.6.5. Climate change is likely to result in an increase in flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of local sewer flooding but would not be significant in terms of the Proposed Development.

3.6.6. The overall sewer flood risk is **very low**.

3.7. Reservoir Flood Risk

3.7.1. Flood events can occur from a sudden release of large volumes of water from reservoirs. The Environment Agency reservoir flood map (reproduced as **Figure 3.~~11~~14**) shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is unlikely that any actual flood would be this large.

3.7.2. The Environment Agency mapping was updated in 2021 to demonstrate the potential maximum extent of flooding for two scenarios - a "dry day scenario" in which river levels are "normal", and a "wet day scenario" where the flooding from the reservoir coincides with flooding from rivers.

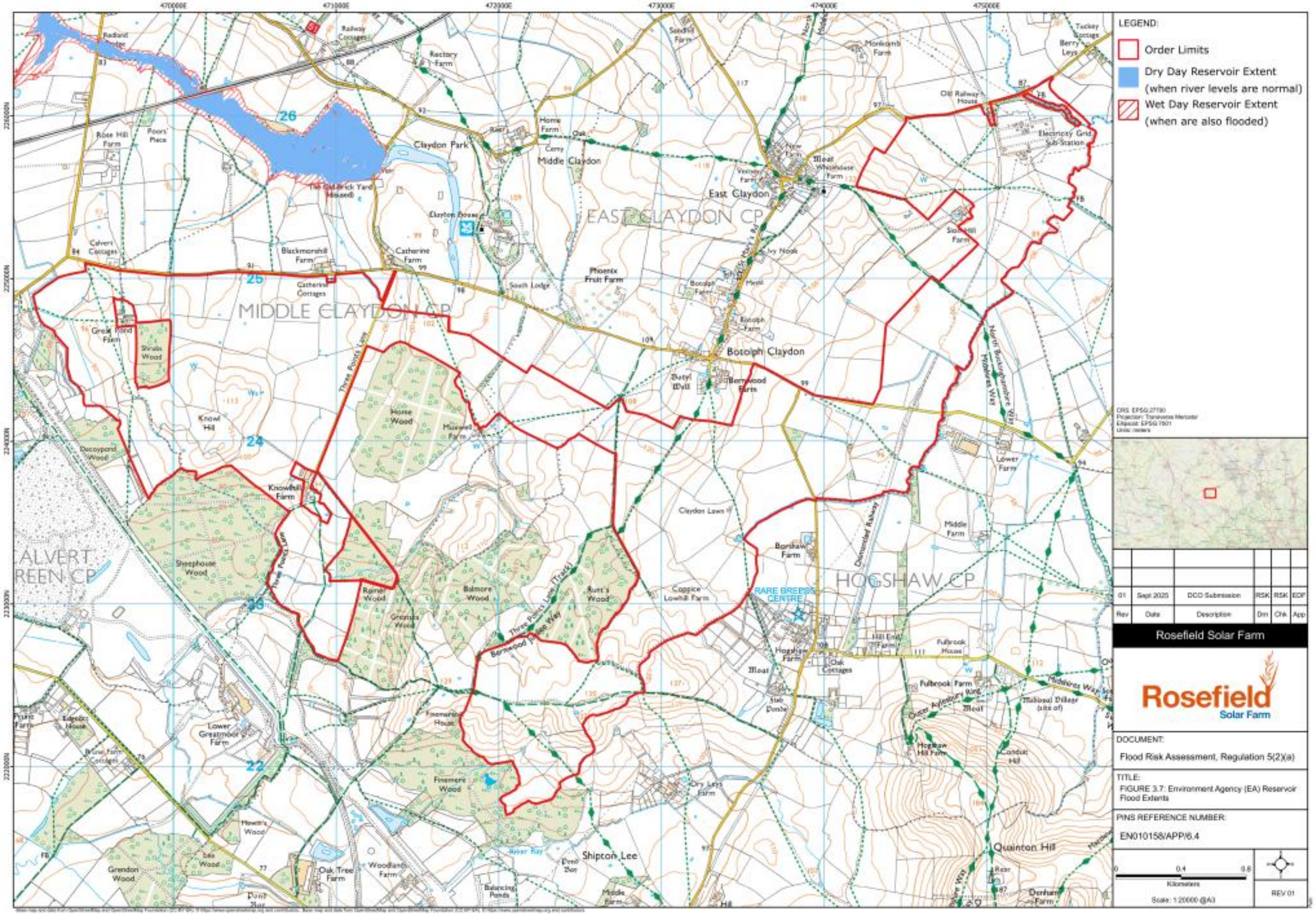

Figure 3.~~11~~14: Environment Agency Reservoir Flood Extents

3.7.3. The map shows that the Site is not located within an area of reservoir flood risk when river levels are normal and should a peak fluvial event occur at the same time as a reservoir failure. Reservoir flooding is extremely unlikely and there has been no loss of life in the UK from reservoir flooding since 1925. Since then, reservoir safety legislation has been introduced to ensure reservoirs are maintained.

3.7.4. Reservoirs can be managed over time, controlling inflow/outflow of water and therefore, there is the capacity to control the effects of climate change. Increased rainfall has the potential to increase base flow but this should be minimal. It is unlikely that there will be a substantial change to the risk of flooding for this Site as a result of climate change.

3.7.5. The resultant flood risk is **very low.**

3.8. Other Sources of Flood Risk

Canals

3.8.1. There are no Canal & River Trust owned canals within the Order Limits.

Artificial Features

3.8.2. Land Drains that are identified during the construction phase, will either be replaced or diverted as required ensuring any impacts are localised and limited in extent due to the size of these features as set out in the **Outline Construction Environmental Management Plan (CEMP) [EN010158/APP/7.2]**.

3.8.3. No other artificial features with the potential to result in a flood risk to the Site have been identified.

3.8.4. The resultant flood risk from 'artificial features' sources is **very low.**

3.9. Historic Flood Risk

3.9.1. The Buckinghamshire County Council Preliminary Flood Risk Assessment (2011) **[Ref. 27]** includes tables in the Appendices that reference recorded historical flood events. None of these recorded flood events are located within the Order Limits with the closest recorded incident located at East Claydon.

3.10. Flood Risk from Development

3.10.1. The Proposed Development will mainly consist of Solar PV modules, but will also have areas for BESS units, Rosefield Substation, Transformers, Collector Compounds and green and blue infrastructure (as described in **ES Volume 1, Chapter 3: Proposed Development Description**

[EN010158/APP/6.1]). The majority of the Site is located within Flood Zone 1 and is not considered at significant flood risk from all other sources. There are some locations in the east of the Site that are deemed to be within Flood Zones 2 and 3 and areas with pluvial overland flow paths. Only raised Solar PV modules will be placed here and be designed to not increase the flood risk elsewhere. As set out on the **Works Plans [EN010158/APP/2.3]** (sheets 6 and 7). Solar PV modules have been designed to be set at the following heights:

- 1800mm above existing ground levels in areas of fluvial flood risk.
- 800mm above ground levels elsewhere.

3.10.2. No raising of ground levels is proposed associated with the proposed Solar PV modules that will be within the floodplain and due to the relatively small cross sectional area of the panel supports into the ground it is deemed to be a negligible displacement of flood water.

3.10.3. The PV panels will be supported on C section galvanised steel posts driven into the ground which are estimated to be less than 0.5% of the panel area. Based on the design flood event (1 in 100 including allowances for climate change) from all sources, the total area of PV panels in areas at risk of flooding quates to 253,935m^2. Assuming an average depth of flood water of 250mm (considered to be a very conservative assumption given the modelled flood depths and the assumption that the PV panels will cover 100% of the area and excludes the spacing between the rows of panels), the total volume of displaced water across the site equates to 317.4m^3. which is considered negligible across the whole site area and would not give rise to off-site impacts or increased flood risk.

3.10.4. There are no inverter cabins to be located within the Flood Zone 3, there may be string inverters mounted on Solar PV modules within the Flood Zone 3; however, these will be raised above the estimated flood depths.

3.10.5. According to the principles of the Building Research Establishment (BRE) planning guidance **[Ref. 31]** for the development of large-scale ground mounted Solar PV systems, in general Solar PV modules do not increase the impermeable area of a Site and it is generally considered that they do not contribute to an increase in surface water runoff from the Site. Solar PV modules will not increase runoff rates as surface water runoff will discharge from the panel onto the vegetated strip between rows. Water will then infiltrate to the soils and/or flow overland replicating the greenfield situation. The Solar PV modules will not increase the impermeable area across the Site; therefore, no formal drainage is required for the areas of Solar PV development. However, a pragmatic approach has been developed to promote infiltration and provide storage areas across the Site. This will involve the management and maintenance of vegetated and grassed areas surrounding the panels (particularly at the low edge) and the design of gravel subbase for the on-site units i.e. cabinets/containers/structures. These features will intercept and attenuate runoff, promoting natural infiltration across the Site.

3.10.6. Rosefield Substation and the BESS units will result in an increase in impermeable area as the current land use changes from agricultural. Within the **Outline Drainage Strategy [EN010158/APP/7.11]**, a number of Sustainable Drainage Systems features are incorporated, including basins and swales in order to attenuate additional runoff generated from the BESS and Rosefield Substation compound areas and discharge to the Claydon Brook Tributary around the units at a rate of 4.0l/s/ha. The Proposed Development will incorporate various areas of green infrastructure.

3.10.7. Other factors to note are that fencing around the Proposed Development will be permeable, therefore flooding will be able to freely flow through fencing and not increase flood risk elsewhere. Fencing installed around the Solar PV development will be standard deer-proof fencing which is formed of wooden and/or metal posts and wire mesh, up to 2.5m in height (AGL) (see **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1.2] [REP1-034]**). The wire will be similar to high-tensile, galvanised steel wire that is commonly used for agricultural use. Indicatively, the wire will either be a standard wire netting as used in forestry or have a smaller mesh at the bottom, close to the ground at around 75mmx75mm. The mesh can be larger higher up the fence. Post distances will be around 3-5m as is common for stability, with a maximum distance between posts of 10m. Posts may be closer together when gates or tensioners are required. Further detail on fencing will be provided at detailed design stage. Following a flood event, visual inspections along the fencing will be undertaken to identify any blockage which, if identified, will be cleared and any remedial works undertaken. This is secured in Table 3.8 of the **Outline CEMP [EN010158/APP/7.2.3]**.

3.10.8. The overall flood risk from the Proposed Development is **low.**

Table 3.~~3~~5: Summary of potential impacts on flood risk due to the development

Flood impact	Narrative	Impact
Changes in flood conveyance	Minor impacts on conveyance possible from solar PV Arrays where located in flow paths. These impacts will be very localised and minor in nature with negligible effect. Other aspects of the Project will be constructed out of the floodplain with no impact on flow paths surfaces.	Negligible

Reduction in floodplain storage	Negligible impact of PV panel stands within the flood zones with no ground raising in areas of flood risk (**Section 4.5**)	Negligible
Increases in surface water runoff	PV panels will not increase runoff rates as surface water runoff will discharge from the panel onto the vegetated strip between rows. Water will then infiltrate to the soils and / or flow overland replicating the greenfield situation. Use of SuDS will ensure that there is no uplift in peak rates or volumes of storm water runoff from the Site.	Negligible

4. Mitigation Measures

4.1. Sequential Approach within Order Limits

4.1.1. The areas of the Site considered to be at flood risk are Parcel 3 of the Site, which is partially located within Flood Zone 3a and 3b, as well as the areas in which pluvial overland flow paths are present within several regions of the Site. The **Planning Statement Appendix 5: Sequential and Exception Tests [EN010158/APP/5.7]** sets out the sequential test in more detail.

4.1.2. As per the **ES Volume 3, Figure 3.5: Zonal Masterplan [EN010158/APP/6.3]**, only Solar PV modules and access tracks/fencing will be placed within the areas of fluvial flood risk and medium to high surface water flood risk in Parcel 3, with all other infrastructure located in Flood Zone 1, as illustrated **Figure 3.2** and **Figure 3.5**. Due to the mitigation proposed, PV panels in areas of increased flood risk will remain above the design flood level and therefore be operational in times of flood.

4.1.3. All of the proposed vulnerable infrastructure i.e. Rosefield Substation and BESS units located within Parcel 3 will be placed outside the Flood Zone 2 and 3 extents, and in areas where the flood risk from all sources is considered to be ‘very low’.

4.1.4. These areas proposed for the vulnerable infrastructure are located a significant distance from the area of Flood Zone 3 and is considered to remain flood free even in the extreme climate change scenario, which is confirmed by the Site specific modelling of the Parcel 3 area.

4.2. Finished Levels

4.2.1. To ensure compliance with the NPPF Exception test, the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. This is achieved by raising the infrastructure located in areas of flood risk. As set out on the **Works Plans [EN010158/APP/2.3]** (sheets 6 and 7) and secured in the **Design Commitments [EN010158/APP/5.9]** Solar PV modules have been designed to be set at the following heights:

- 1800mm above existing ground levels in areas of fluvial flood risk.
- 1500mm above existing ground in Field B1.
- 800mm above ground levels elsewhere.

4.2.2. Given that the deepest present day fluvial flood depth is approximately 550mm, and the majority of surface water flooding across the entire Site does not exceed 300mm, this will provide a minimum freeboard of

1250mm in areas of fluvial flooding and 1500mm in areas of surface water flooding in the present day scenario. The exception to this is the surface water flood risk in Field B1 which has been estimated to be up to 500mm in depth. In this area the leading edge of the Solar PV panels will be raised 1500mm above existing ground levels, to provide the required minimum 600mm of freeboard.

4.2.3. Taking a conservative approach to the consideration of climate change, a 600mm future fluvial flood depth has been proposed as a 'maximum credible scenario' and a 550mm depth for the future pluvial 'maximum credible scenario'. These depths have been informed by the Site specific modelling as included in **Figure 3.~~6~~5**. Given the sensitive equipment will be located above this flood level, the Proposed Development is considered to be resilient to future changes in flood risk over its lifetime.

4.2.4. 'Rosefield Substation, BESS, ITS, Independent Outdoor Equipment (transformer, switchgear and central inverters) and Collector Compounds will be located outside of Flood Zone 2 and 3. This infrastructure will be constructed on level platforms, once the land within the areas has undergone 'cut and fill'. These methods will both raise the vulnerable components above the current ground levels, however, there will be no ground level raising within areas of Flood Zone.

4.3. Overland Flow Paths

4.3.1. Though some areas of the Solar PV modules are within Flood Zone 2 and Flood Zone 3, the Solar PV modules are not anticipated to disrupt the overland flooding pathways, as there are already numerous field boundaries, hedgerows and fences that are located within the floodplain, many of them perpendicular to the river channel and therefore flood flow routes. Additionally, floodplain flow velocities are generally low once remote from the river channel itself. Therefore, the extents and flows within the Flood Zones will remain the same once the Solar PV modules are erected.

4.3.2. As discussed in **Section 3.4**, overland surface water flow paths are identified across the Site. The Proposed Development will only place Solar PV modules in areas where these flow paths are present. These Solar PV modules have been designed to sit 800mm above ground level (1800mm in areas of fluvial flood risk) and will therefore, incorporate the required freeboard and result in minimal disruption to the passage of overland flood flows. No ground level raising will occur in areas of flood zone to ensure no interruption of flow paths or floodplain storage (also see **Section 4.5**).

4.3.3. Perimeter fencing will be designed to be permeable in nature to ensure the effective passage of overland flow through the structure. Fencing installed around the Solar PV development will be standard deer-proof fencing which is formed of wooden and/or metal posts and wire mesh, up to 2.5m in height (AGL) (see **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1.2] [REP1-034]**). The wire will be similar to high-tensile, galvanised steel wire that is commonly used for agricultural use. As an indicative, the wire will either be a standard wire netting as used in forestry or have a smaller mesh at the bottom, close to the ground at around 75mmx75mm. The mesh can be larger higher up the fence. Post distance will be around 3-5m as is common for stability, with a maximum post to post distance of 10m. Posts may be closer together when gates or tensioners are required. Further detail on fencing will be provided at detailed design stage. Following a flood event, visual inspections along the fencing will be undertaken to identify any blockage which, if identified, will be cleared and any remedial works undertaken. This is secured in Table 3.8 of the **Outline CEMP [EN010158/APP/7.2.3]**.

4.3.4. Any additional surface water runoff, up to the 1 in 100 year climate change (2070 epoch) storm generated by the new impermeable areas of the Proposed Development, will be attenuated in areas of Flood Zone 1, and discharged to an appropriate location using Sustainable Drainage Systems and following the drainage hierarchy where possible, as per the **Outline Drainage Strategy [EN010158/APP/7.11]**.

4.4. Easements and Consents

4.4.1. Under the Water Resources Act 1991 and associated bylaws, works in, over, under or adjacent to main rivers require the consent of the Environment Agency and works in, over, under or adjacent to Ordinary Watercourses will require Internal Drainage Board, Local Planning Authority or Lead Local Flood Authority consent. This is to ensure that they neither interfere with the overseeing body's work nor adversely affect the environment, fisheries, wildlife and flood defence in the locality.

4.4.2. There are a number of Ordinary Watercourses within the Order Limits (**Figure 2.3**). It is therefore likely that the Lead Local Flood Authority will require consents for works within the vicinity of these watercourses, they may also require a specific easement either side of the watercourses. Part of Parcel 3, where the Claydon Brook Tributary is located, and the northwest corner of Parcel 1 lie within Buckingham and River Ouzel Internal Drainage Board. They will also likely require consents and easements for works in and around their assets.

4.4.3. The **Design Commitments [EN010158/APP/5.9]** details and secures that Perimeter fencing surrounding the Solar PV development will be offset at least 10m either side from all existing ditches and ordinary watercourses except where access tracks and/or cable routes are required to cross an existing feature. In addition, the fencing installed around the Solar PV development will be standard deer-proof fencing which is formed of wooden and/or metal posts and wire mesh, up to 2.5m in height (AGL) (see **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1.2] [REP1-034]**). The wire will be similar to high-tensile, galvanised steel wire that is commonly used for agricultural use. As an indicative, the wire will either be a standard wire netting as used in forestry or have a smaller mesh at the bottom, close to the ground at around 75mmx75mm. The mesh can be larger higher up the fence. Post distance will be around 3-5m as is common for stability, with a maximum post to post distance of 10m. Posts may be closer together when gate or tensioners are required. Further detail on fencing will be provided at detailed design stage.

4.4.4. During consultations with the Lead Local Flood Authority and Buckingham and River Ouzel Internal Drainage Board, a minimum offset of 10m from ditches and watercourse has been determined as part of the embedded mitigation for the Site. This area will be kept free from all structures.

4.4.5. All proposed formal headwalls for surface water discharge will also require consent from the Lead Local Flood Authority and Buckingham and/or the River Ouzel Internal Drainage Board.

4.5. Floodplain Compensation

4.5.1. The majority of the Site is located outside the 1 in 100 year plus climate change fluvial floodplain, as such floodplain compensatory measures are not deemed necessary within these areas.

4.5.2. For areas within the fluvial floodplain, only Solar PV modules will be placed there (Figure 3.2 and 3.5). These panels have been designed to be elevated 1800mm above ground level and there will be negligible loss of floodplain and no interruption of flood flow paths as a result of the frame supporting the solar PV modules. There are no ground raising requirements in the areas of Solar PV modules. Therefore, floodplain compensation is not considered necessary, however this should be confirmed at detailed design stage through further hydraulic modelling. Further modelling will be undertaken to determine if the Proposed Development would increase flood risk outside of the Order Limits. If there is an increase to flood risk outside of the Order Limits, floodplain compensation will be provided to ensure that there is no increase in flood risk outside of the Order Limits.

4.5.3. To provide an estimate of the likely displaced volumes, and based on the current design, the Solar PV panels will be supported on C section galvanised steel posts driven into the ground which are estimated to be less than 0.5% of the panel area. Based on the design flood event (1 in 100, including allowances for climate change) from all sources, the total area of Solar PV panels in areas at risk of flooding equates to 253,935m^2. Assuming an average depth of flood water of 250mm (considered to be a very conservative assumption given the modelled flood depths and the assumption that the Solar PV panels will cover 100% of the area and excludes the spacing between the rows of panels), the total volume of displaced water across the site equates to approximately 317.4m^3, which is negligible and would not give rise to off-site impacts or increased flood risk. During the detailed design should ballast foundations be required, any excavated material will be removed from the floodplain areas to ensure no net loss of floodplain storage.

The parameters governing the provision of flood compensation are secured within Table 3.9 of the **Outline CEMP [EN010158/APP/7.2.4]**. Flood compensation for any displaced floodplain volume will be provided in accordance with these parameters and delivered in conjunction with the **Outline Drainage Strategy [EN010158/APP/7.11.4]**. The strategy incorporates the use of perimeter swales and associated drainage features, which will be designed not only to manage surface water runoff effectively, but also to provide compensatory floodplain storage to offset any loss of floodplain volume arising from the Proposed Development with full details to be discharged at the detailed design stage in consultation with the Environment Agency.

~~4.5.3.~~4.5.4. ~~The requirement for flood compensation is secured in Table 3.8 of the **Outline CEMP [EN010158/APP/7.2.3]**.~~

4.6. Safe Access/Egress

4.6.1. The majority of the Site is located outside of the 1 in 100 year plus climate change fluvial flood extent and is not identified at being at significant risk from all other sources of flooding.

4.6.2. It is anticipated that up to 24 permanent staff per day would be on-site during the operation (including maintenance) phase, with additional staff attending when required for maintenance, replacement of faulty or end of service life solar equipment, vegetation management activities and cleaning. The rest of the Site has been designed to be unmanned and operated remotely. The Substation is located within an area of 'very low' flood risk from all sources and as such, safe access and egress will be available during a 'design' flood event.

4.6.3. Some areas in Parcel 3 of the Site are located within a fluvial Flood Zone. These areas will generally only be occupied during the construction phase. Based on the **ES Volume 3, Figure 3.9: Indicative Construction and Operational Access [EN010158/APP/6.3]**, all of the indicative primary and secondary access locations are located in areas at 'very low' flood risk from all sources. However, a flood management plan will be included (within the **Outline Operational Environmental Management Plan (Outline OEMP) [EN010158/APP/7.3]**) for Site workers within the areas of fluvial flood risk during the Operational phase and any visitors to those areas of the Site thereafter.

4.7. Flood Management Plan

4.7.1. Since parts of Parcel 3 are considered to be at fluvial flood risk, during the construction phase it is necessary for workers to understand what to do in the event of a fluvial flood event.

4.7.2. Parcel 3 of the Site is not located within an Environment Agency Flood Warning Area. Therefore, should elevated water levels within the Claydon Brook Tributary be observed, Site personnel should evacuate the area, upgradient to the west. A flood risk management plan will be included in the **Outline Construction Environmental Management Plan (Outline CEMP) [EN010158/APP/7.2]**.

4.8. Residual Risks

4.8.1. Residual flood risks stem from any exceedance flow events that exceed the design parameters of the scheme. In terms of fluvial flood risks, sufficient freeboards have been incorporated to ensure that in the event of the design flood event being exceeded, any effects would be localised, short term, and not impact the operation of the site.

4.8.2. The position on the site high in the respective sub catchments ensures that any exceedance events would be unlikely to generate flows much beyond the modelled fluvial floodplains and areas of modelled surface water flood risk.

5. Planning Policy Context

5.1. Overarching National Policy Statement for Energy (NPS EN-1)

5.1.1. Section 5.8 of NPS EN-1 **[Ref. 1]** relates to flood risk for proposed energy infrastructure. The main aims of this planning policy are to ensure that flood risk from all sources is taken into account at all stages of the planning process and during the development, with the goal to steer potential infrastructure to the areas at lowest risk of flooding. It also aims to facilitate the relocation of existing energy infrastructure to more suitable locations in order to combat the effects of climate change.

5.1.2. Section 5.8.15 of NPS EN-1 **[Ref. 1]** also states the minimum requirements for a flood risk assessment (FRA), these are:

- “Be proportionate to the risk and appropriate to the scale, nature and location of the project;
- Consider the risk of flooding arising from the project in addition to the risk of flooding to the project;
- take the impacts of climate change into account, across a range of climate scenarios, clearly stating the development lifetime over which the assessment has been made;
- Be undertaken by competent people, as early as possible in the process of preparing the proposal;
- Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure and exceedance;
- Consider the vulnerability of those using the Site, including arrangements for safe access and escape;
- Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration;
- Identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management;
- Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- Include the assessment of the remaining (known as ‘residual’) risk after risk reduction measures have been taken into account and demonstrate

that these risks can be safely managed, ensuring people will not be exposed to hazardous flooding;

- Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems. Information should include:
    - i. *Describe the existing surface water drainage arrangements for the Site.*
    - ii. *Set out (approximately) the existing rates and volumes of surface water run-off generated by the Site. Detail the proposals for restricting discharge rates.*
    - iii. *Set out proposals for managing and discharging surface water from the Site using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate.*
    - iv. *Demonstrate how the hierarchy of drainage options has been followed.*
    - v. *Explain and justify why the types of SuDS and method of discharge have been selected and why they are considered appropriate.*
    - vi. *Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the Site.*
    - vii. *Describe the multifunctional benefits the sustainable drainage system will provide.*
    - viii. *Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system.*
    - ix. *Explain how run-off from the completed development will be prevented from causing an impact elsewhere.*
    - x. *Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development.*
- Detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere;
- Identify and secure opportunities to reduce the causes and impacts of flooding overall during the period of construction; and

- Be supported by appropriate data and information, including historical information on previous events."

5.2. Overarching National Policy Statement for Energy (EN-3)

5.2.1. Section 2.10 of NPS EN-3 relates to Applicant assessments and impacts of the proposed energy infrastructure. In relation to flood risk and drainage, NPS EN-3 notes the following **[Ref. 10]**:

- "Water management is a critical component of site design for ground mount solar plants. Where previous management of the site has involved intensive agricultural practice, solar sites can deliver significant ecosystem services value in the form of drainage, flood attenuation, natural wetland habitat, and water quality management."
- "Where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not, in general, be significant. "
- "Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended. "
- "Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses."
- "Culverting existing watercourses/drainage ditches should be avoided."
- "Where culverting for access is unavoidable, applicants should demonstrate that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period."

5.3. National Planning Policy Framework

5.3.1. Section 14 of the NPPF **[Ref. 2]** details the overarching requirements relating to flood risk for any development. The key message is that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

5.3.2. In areas at risk of flooding, paragraph 181 of the NPPF requires that the following criteria are met, with the relevant wording from the NPPF as follows:

a. Within the Site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b. The development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c. It incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d. Any residual risk can be safely managed; and

e. Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

5.3.3. The Planning Practice Guidance supports the NPPF and provides further advice regarding the assessment of flood risk and the application of the Sequential and Exception Tests. Detailed consideration of the Sequential and Exception tests is included in the **Planning Statement, Appendix 5: Sequential and Exception Tests [EN010158/APP/5.7].**

Land Use Classification

5.3.4. Table 2 of the PPG **[Ref. 2]** indicates the compatibility of various land uses in each flood zone, dependent on their vulnerability to flooding. **Table 5.1** below is reproduced from Table 2 of the PPG.

5.3.5. The relevant Flood Zone Definitions are as follows:

- Flood Zone 1: areas having a low probability of flooding – less than 0.1% annual probability of river or sea flooding.
- Flood Zone 2: areas having a medium probability of flooding and have an annual probability of river or sea flooding between 0.1% and 1%.
- Flood Zone 3a: areas having a 1% or greater annual probability of river flooding or a 0.5% or greater annual probability of sea flooding.
- Flood Zone 3b: land that has a 3.3% or greater annual probability of flooding.

Table 5.1: Flood risk vulnerability and flood zone ‘compatibility’

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

5.3.6. With reference to Annex 3 of the NPPF **[Ref. 3]**, the Proposed Development, based on its utilities use, is classed as 'essential infrastructure'. This classification of development is appropriate for areas within Flood Zone 1, Flood Zone 2 and Flood Zone 3a and 3b (if the exception test is passed).

Sequential Test

5.3.7. The Sequential Test aims to direct new development to areas with the lowest probability of flooding. The Sequential Test has been considered further within the **Planning Statement, Appendix 5: Sequential and Exception Tests [EN010158/APP/5.7]**.

5.3.8. With regard for the Sequential Test, the Applicant confirms that a two-stage sequential approach to selecting the site and designing the selected site has been undertaken. This process concluded that firstly, there are no suitable and available sites with lower flood risk within a 10km Search Area of the point of connection, and secondly, of the operational elements of the Proposed Development, only Solar PV modules and string inverters are proposed to be located in Flood Zone 2 and 3 areas.

5.3.9. For the below reasons, it has not been possible to locate all operational elements of the Proposed Development at the site level within Flood Zone 1 areas as:

- The immediate flood context surrounding the point of connection into the National Grid East Claydon Substation is heavily constrained; and

- Other environmental considerations (most notably ecological, heritage, landscape and residential amenity considerations) have informed the evolution of the Proposed Development which meant that areas potentially available to the Applicant at lower flood risk were not suitable for solar PV panels.

5.3.10. Further explanation of the Proposed Development's design evolution at the site level is explained in full in **ES Volume 1, Chapter 4: Reasonable Alternatives Considered [EN010158/APP/6.1]**.

5.3.11. It is therefore concluded that the Sequential Test is passed.

Exception Test

5.3.12. In accordance with **Table 5.1**, in order for an 'essential infrastructure' development to be considered acceptable within Flood Zone 3a and 3b, the Exception Test must be passed.

5.3.13. The stipulations of the Exception Test (reproduced from Paragraph 178 within NPPF **[Ref. 3]**), both of which will have to be passed for development to be allocated or permitted, are:

- The development would provide wider sustainability benefits to the community that outweigh flood risk.
  - The Proposed Development will, if consented, provide an essential contribution (in accordance with Paragraph 2.2.1 of NPS EN-1) to meeting the governmental objectives of delivering sustainable development to enable decarbonisation. By doing so, the Proposed Development will help to address the climate change emergency that "affects the well-being of the environment, society and the economy, for both current and future generations" (Paragraph 2.6.2 of NPS EN-1), by ensuring our energy supply is secure, low carbon and low-cost;
  - **ES Volume 2, Chapter 8: Climate Change [EN010158/APP/6.2]** summarises that the Proposed Development, across its predicted lifecycle and taking into account greenhouse gas savings, results in a net total of 3 million tCO2e saved over the lifespan of the Proposed Development (when compared to Combined Cycle Gas Turbine-generated electricity). This effect is reported as being a significant beneficial effect (in EIA terms) for a type of type of infrastructure that is defined as being of an urgent need and of CNP by the Government;
  - Proposed permanent enhancements to connectivity within the local area through the rationalising and enhancement of the network of Public Rights of Way (PRoWs) (as explained in full in **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1]**);

- The creation of three permissive paths as explained in full in **ES Volume 1, Chapter 3: Proposed Development Description [EN010158/APP/6.1]**;
- The provision of biodiversity benefits including: new habitat; the sowing of grassland open fields; scrub and margins with wildflower; the planting of hedgerows and tree belts; the establishment of ecological ponds and wider vegetated cover for foraging and dispersal, to maintain bat flight lines across the landscape, and the provision of winter seed sources for birds (as explained and secured in **Outline Landscape and Ecological Management Plan (Outline LEMP) [EN010158/APP/7.6]**);
- The provision of an **Outline Employment, Skills and Supply Chain Plan [EN010158/APP/7.14]** which, for example, set out a set of core objectives in order to promote access to employment, workforce development and business prosperity; and
- A significant commitment to deliver a minimum net gain of 40% for habitats area units, 17% for hedgerow units, and 10% for watercourse units as secured via Requirement 7 of the **Draft DCO [EN010158/APP/3.1]**.

- The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
  - The proposed mitigation measures will ensure the Site does not increase fluvial and surface water flood risk when infrastructure is placed within areas considered to be at risk.
  - The Proposed Development is designed to be resilient to flood risk for its lifetime, taking into the effects of climate change.
  - The Proposed Development will provide controls on surface water drainage thereby reducing the risk of flooding.
  - The areas of the Site at significant flood risk will be unmanned and monitored remotely, hence minimal vulnerability to users.
  - This Flood Risk Assessment has demonstrated that the above points can be met. The location of the PV panels and associated raising will ensure they are safe and can remain operational during times of flood (including allowances for climate change) without increasing flood risk elsewhere. The site will be largely unmanned and monitored remotely. A SuDs based drainage strategy is propped to ensure no increase in runoff as a result of the development leaves the site **Outline Drainage Strategy [EN010158/APP/7.11]**.

5.4. Local Planning Policy

Vale of Aylesbury Local Plan (2013 – 2033)

5.4.1. The following paragraphs are policies within the Vale of Aylesbury Local Plan that are relevant to the Flood Risk Assessment **[Ref. 12]**.

Policy NE2: River and Stream Corridors States that:

5.4.2. *'Development proposals must not have an adverse impact on the functions and setting of any watercourse and its associated corridor. They should conserve and enhance the biodiversity, landscape and consider the recreational value of the watercourse and its corridor through good design. Opportunities for de-culverting of watercourses should be actively pursued. Planning permission will only be granted for proposals which do not involve the culverting of watercourses, and which do not prejudice future opportunities for de-culverting. Development proposals adjacent to or containing a watercourse shall provide or retain a 10m ecological buffer (unless existing physical constraints prevent) from the top of the watercourse bank and the development and include a long-term landscape and ecological management plan for this buffer.'*

Policy I4: Flooding

Management of flood risk

5.4.3. *In order to minimise the impacts of and from all forms of flood risk the following is required:*

a. Site-specific flood risk assessments (FRAs), informed by the latest version of the SFRA, where the development proposal is over 1ha in size and is in Flood Zone 1, or the development proposal includes land in Flood Zones 2 and 3 (as defined by the latest Environment Agency mapping). A site-specific FRA will also be required where a development proposal affects land in Flood Zone 1 where evidence, in particular the SFRA, indicates there are records of historic flooding or other sources of flooding, e.g. due to critical drainage problems, including from ordinary watercourses and for development sites located within 9m of any water courses (8m in the Environment Agency's Anglian Region)
b. All development proposals must clearly demonstrate that the flood risk sequential test, as set out in the latest version of the SFRA, has been passed and be designed using a sequential approach, and
c. If the sequential test has been satisfied, development proposals, other than those allocated in this Plan, must also satisfy the exception test in all applicable situations as set out in the latest version of the SFRA.

Flood risk assessments

5.4.4. *All development proposals requiring a Flood Risk Assessment in (a) above will assess all sources and forms of flooding, must adhere to the advice in the latest version of the SFRA and will:*

d. Provide level-for-level floodplain compensation, up to the 1% annual probability (1 in 100) flood extent with an appropriate allowance for climate change, and volume-for-volume compensation unless a justified reason has been submitted and agreed which may justify other forms of compensation.

e. Ensure no increase in flood risk on site or elsewhere, such as downstream or upstream receptors, existing development and/or adjacent land, and ensure there will be no increase in fluvial and surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event, with an allowance for climate change (the design storm event).

f. Not flood from surface water up to and including the design storm event, or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event will be safely contained on site.

g. Explore opportunities to reduce flood risk overall, including financial contributions from the developer where appropriate.

h. Ensure development is safe from flooding for its lifetime (and remain operational where necessary) including an assessment of climate change impacts.

i. Ensure development is appropriately flood resistant, resilient and safe and does not damage flood defences but does allow for the maintenance and management of flood defences.

j. Take into account all sources and forms of flooding.

k. Ensure safe access and exits are available for development in accordance with Department for Environment, Food and Rural Affairs (DEFRA) guidance. Access to “safe refuges” or “dry islands” are unlikely to be considered safe as this will further burden the Emergency Service in times of flood.

l. Include detailed modelling of any ordinary watercourses within or adjacent to the site, where appropriate, to define in detail the area at risk of flooding and model the effect of climate change

m. Provide an assessment of residual flood risk.

n. Provide satisfactory Evacuation Management Plans, where necessary, including consultation with the Emergency Services and Emergency Planners.

Sustainable drainage systems (SuDS)

5.4.5. *All development proposals must adhere to the advice in the latest version of the SFRA and will:*

o. Ensure development layouts are informed by drainage strategies incorporating SuDS and complete site specific ground investigations to gain a more local understanding of groundwater flood risk and inform the design of sustainable drainage components.

p. All development will be required to design and use sustainable drainage systems (SuDS) for the effective management of surface water run-off on site, as part of the submitted planning application and not increase flood risk elsewhere, including sewer flooding. All development should adopt exemplar source control SuDS techniques to reduce the risk of flooding due to post-development runoff. SuDS design should follow current best practice (CIRIA Manual 2015 or as replaced) and Buckinghamshire Council guidance on runoff rates and volumes to deliver wider environmental benefits. Where the final discharge point is the public sewerage network the runoff rate should be agreed with the sewerage undertaker.

q. Where site-specific FRAs are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems.

r. In considering SuDS solutions, the need to protect groundwater quality must be taken into account, especially where infiltration techniques are proposed in considering a response to the presence of any contaminated land. The Environment Agency need to be consulted where infiltration is proposed in contaminated land. SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits. Opportunities will be sought to enhance natural river flows and floodplains, increasing their amenity and biodiversity value and a watercourse advice note is being prepared for further guidance.

s. Applicants will be required to provide a management plan to maintain SuDS in new developments, and a contribution will be required for maintenance of the scheme/SuDS.

t. Onsite attenuation options should be tested to ensure that changing the timing of peak flows does not exacerbate flooding downstream, and

u. Only in exceptional circumstances will surface water connections to the combined or surface water system be permitted. Applicants will need to demonstrate in consultation with the sewerage undertaker that there is no feasible alternative and that there will be no detriment to existing users.

5.4.6. *Applicants will be required to liaise with the lead local flood authority, Internal Drainage Boards, and the Environment Agency on any known flood issues, and identify issues from the outset via discussions with statutory bodies.*

Climate change

v. Climate change modelling should be undertaken using the relevant allowances (February 2016) for the type of development and level of risk.

w. Safe access and egress should be demonstrated in the 1 in 100 plus climate change event, and

x. Compensation flood storage would need to be provided for the built footprint as well as any land-raising within the 1 in 100 plus appropriate climate change flood event. This compensation would need to be demonstrated within a Flood Risk Assessment (FRA).

Policy I5: Water Resources and Wastewater Infrastructure

5.4.7. *The council will seek to improve water quality, ensure adequate water resources, promote sustainability in water use and ensure wastewater collection and treatment has sufficient capacity.*

5.4.8. *The baseline position on water resources, quality and supply infrastructure, wastewater collection and treatment work capacity is set out in the Aylesbury Vale Water Cycle Study 2017* ***[Ref. 32]****. On major developments where developments could have an impact on water resources and wastewater infrastructure capacity, early consultation is advised with either Anglian or Thames Water (whichever is appropriate) at the time a planning application is submitted (and evidence of this must be provided) to understand if the baseline position on water resources and wastewater has changed. Development proposals must meet all the following criteria:*

Water quality

a. Water quality will be maintained and enhanced by avoiding adverse effects of development on the water environment. Development proposals will not be permitted which would adversely affect the water quality of surface or underground water bodies (including rivers, canals, lakes, reservoirs, source protection zones and groundwater aquifers) as a result of directly attributable factors.

Water resource availability

b. Development will only be permitted where adequate water resources exist or can be provided without detriment to existing uses. New homes should be built to not exceed the water consumption standard of 110 litres per person per day.

Wastewater treatment

c. Planning applications must demonstrate that adequate capacity is available or can be provided within the foul sewerage network and at wastewater treatment works in time to serve the development.

Phasing

d. Where appropriate, phasing of development will be used to enable the relevant water infrastructure to be put in place in time to serve development. Conditions may be used to secure this phasing.

Rosefield
Solar Farm

6. Outline Surface Water Drainage Strategy

6.1. Scope

6.1.1. This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that would be incorporated as part of the detailed design. This section places particular emphasis on the information provided within the **Outline Drainage Strategy [EN010158/APP/7.11]**.

6.1.2. The list of requirements outlined in Section 5.8.15 of NPS EN-1 **[Ref. 1]** for the surface water drainage strategy has been addressed directly in **Table 6.1** below.

6.1.3. "*Describe the existing surface water drainage arrangements for the Site*": Details of the existing topography, hydrology and presence of existing drainage features have been described in **Section 2** of this report and Sections 2.3, 2.6 and 2.7 of the **Outline Drainage Strategy [EN010158/APP/7.11]**. The **Outline Drainage Strategy [EN010158/APP/7.11]** layout drawings indicate the existing overland flow pathways on Site.

6.1.4. *"Set out (approximately) the existing rates and volumes of surface water run-off generated by the Site. Detail the proposals for restricting discharge rates":* Greenfield runoff rates are outlined in Table 6 of Section 4.6 and Annex E of the **Outline Drainage Strategy [EN010158/APP/7.11]**. The outline drainage strategy document outlines that surface water drainage discharge rates are to be limited to 4.0l/s/ha by the Lead Local Flood Authority and Internal Drainage Board.

6.1.5. *"Set out proposals for managing and discharging surface water from the Site using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate.":* The Solar PV modules will drain freely to the ground as they are not considered as impermeable areas. Internal access tracks will be surfaced with permeable material and will include drainage such as a swale or ditch on the downhill side of the track. However as precautionary mitigation the access tracks which are gravel bound are proposed to have parallel swales which will intercept surface water runoff and will promote attenuation and infiltration. The larger areas of hardstanding associated with the Substation and BESS will be treated separately and are proposed to be designed with formalised surface water drainage systems, indicative dimensions of the attenuation for the 100 year plus 25% climate change rainfall event are outlined in Section 5, 6 and 7, with the related drawings for the Site drainage included as Annex E of the **Outline Drainage Strategy [EN010158/APP/7.11]**.

6.1.6. "*Demonstrate how the hierarchy of drainage options has been followed*": The drainage hierarchy is assessed in Section 4.5 of the **Outline Drainage Strategy [EN010158/APP/7.11]**. The section notes that infiltration testing has been undertaken and confirmed very low infiltration potential, consistent with the presence of clay-rich soils. The Preliminary Site Investigation confirms the presence of Clay rich soils across the site, however, at the detailed design stage, additional infiltration testing can be undertaken to provide a more comprehensive area of coverage. Therefore, given the extensive network of local watercourses and field drainage ditches within and adjacent to the Site; discharge to these features is considered a feasible method of surface water disposal.

6.1.7. *"Explain and justify why the types of SuDS and method of discharge have been selected and why they are considered appropriate."*: In the **Outline Drainage Strategy [EN010158/APP/7.11]**, Section 4 outlines a list of viable SuDS options which are to be considered further for detailed design of the Substation and BESS compound detailed designs. These components include ponds, detention basins, swales, filter drains, filter strips and geocellular storage tanks. The method of discharge from these areas will be to the Claydon Brook Tributary via a flow control device.

6.1.8. *"Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the Site":* Section 5.8 of the **Outline Drainage Strategy [EN010158/APP/7.11]** states that surface water runoff from various catchments within the Site, following the existing topography and natural drainage patterns, directing flows towards the nearby network of watercourses, consistent with the current watershed. Swales, basins and cut-off ditches will be utilised to intercept and attenuate surface water flows within the site. Additional attenuation features, such as ponds, wetlands and bioretention areas, are proposed at Site boundaries in low-lying areas to intercept any offsite runoff and provide ancillary storage benefits. These features are not part of the formal SuDS network but offer supplementary volume retention in the event of exceedance in addition to the total storage proposed within the swales, cutoff ditches and existing watercourses within the Order Limits. The drainage infrastructure has been designed to accommodate the design 1 in 100 year climate change rainstorm with an appropriate allowance for climate change. It will also offer opportunities to enhance other aspects of the design with respect to green infrastructure and Biodiversity Net Gain.

6.1.9. *"Describe the multifunctional benefits the sustainable drainage system will provide."* Section 4.2 of the **Outline Drainage Strategy**

[EN010158/APP/7.11] outlines that SuDS will be used with the aim of reducing flood risk on-site by mimicking natural drainage processes and managing surface water runoff in a more sustainable way. The **Outline Drainage Strategy [EN010158/APP/7.11]** will ensure the four pillars of SuDS (Water Quantity, Water Quality, Amenity, and Biodiversity) are met to deliver multiple benefits to the Site. Section 9 of the **Outline Drainage Strategy [EN010158/APP/7.11]** sets out how the Site will provide water quality benefits to surface water runoff using the Simple Index Approach outlined in the SuDS Manual (CIRIA C753, November 2015).

6.1.10. *"Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system."* As outlined in the **Outline Drainage Strategy [EN010158/APP/7.11]**, infiltration rates were tested for the design of the surface water drainage strategy. The infiltration rates were proven as not a viable means of drainage surface water from the Site. Surface water runoff will therefore, be controlled via attenuation within the Site and a restricted discharge to the local watercourses. To alleviate any flooding concerns associated with the uncertainty of negligible increases in surface water runoff caused by Solar PV modules, it is proposed that perimeter swales downslope of the Solar PV arrays will provide additional surface water attenuation and promote infiltration into the ground. Storage for the 1 in 100-year storm event with allowance for 25% climate change allowance will be provided through a combination of swales, check dams, and integration with ecological mitigation areas, such as existing ponds and drains. Surface water will then be discharged at the agreed rate of 4.0l/s/ha.

6.1.11. "*Explain how run-off from the completed development will be prevented from causing an impact elsewhere*". The run-off from the completed Proposed Development will not cause an impact elsewhere as it is proposed to control surface water runoff via attenuation and restricted discharge rates when discharging to watercourses. The proposed drainage features will also look to promote natural infiltration to ground where feasible. Section 5, 6 and 7 of the **Outline Drainage Strategy [EN010158/APP/7.11]** states that exceedance flows will be routed towards low-lying areas within the Site that are capable of temporarily retaining additional volumes of water. The use of swales and cut off ditches at each subplot level will help slow these exceedance flows before they reach the downstream areas of the Site and before discharge into the local watercourses. These areas include supplementary storage features, such as ponds, wetlands and bioretention areas which are integrated within the wider landscape to support the Proposed Development's overall mitigation and enhancement objectives. These features will be strategically located to intercept off-site runoff and provide ancillary storage. Although not part of the formal SuDS network, they offer additional retention capacity during exceedance events and contribute to the overall resilience of the **Outline Drainage Strategy [EN010158/APP/7.11]**.

6.1.12. *"Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development":* Section 10 of the **Outline Drainage Strategy [EN010158/APP/7.11]** sets out the requirements for management and maintenance of the proposed drainage features. As the surface water drainage strategy is subject to change following detailed design, details of maintenance be confirmed at the time of writing. However, these will be considered as part of the detailed design.

Table 6.1: NPS EN-1 Requirements

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
"Describe the existing surface water drainage arrangements for the Site"	Details of the existing topography, hydrology and presence of existing drainage features have been described in this report.	**Section 2** of this report. **Sections 2.3, 2.6** and **2.7** of the **Outline Drainage Strategy [EN010158/APP/7.11]**. Figure 3.4 of this report indicates the existing overland flow pathways on Site.
"Set out (approximately) the existing rates and volumes of surface water run-off generated by the Site. Detail the proposals for restricting discharge rates"	The outline drainage strategy document outlines in that surface water drainage discharge rates are to be limited to 4.0l/s/ha from by the Lead Local Flood Authority and Internal Drainage Board.	Greenfield runoff rates are outlined in Table 4.1 and Annex E of the **Outline Drainage Strategy [EN010158/APP/7.11].**
"Set out proposals for managing and discharging surface water from the Site using sustainable drainage systems and accounting for the predicted impacts of climate	The Solar PV modules will drain freely to the ground as they are not considered as impermeable areas. Internal access tracks will be surfaced with permeable material and will include drainage such as a swale or ditch on the downhill side of the track. However as	Indicative dimensions of the attenuation for the 100 year plus 25% climate change rainfall event are outlined in the **Outline Drainage Strategy [EN010158/APP/7.11]**.

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate."	precautionary mitigation the access tracks which are gravel bound are proposed to have parallel swales which will intercept surface water runoff and will promote attenuation and infiltration. The larger areas of hardstanding associated with the Substation and BESS will be treated separately and are proposed to be designed with formalised surface water drainage systems.	With the related calculation included as Annex D and drawings for the Site drainage included as Annex E of the **Outline Drainage Strategy [EN010158/APP/7.11]**.
"Demonstrate how the hierarchy of drainage options has been followed"	Infiltration testing has been undertaken and confirmed very low infiltration potential, consistent with the presence of clay-rich soils. The Preliminary Site Investigation confirms the presence of Clay rich soils across the site, however, at the detailed design stage, additional infiltration testing can be undertaken to provide a more comprehensive area of coverage. Therefore, given the extensive network of local watercourses and field drainage ditches within and adjacent to the Site; discharge to these features is considered a feasible method of surface water disposal.	The drainage hierarchy is assessed in Section 4.5 of the **Outline Drainage Strategy [EN010158/APP/7.11]**.
"Explain and justify why the types of SuDS and method of discharge have been selected and why they are considered appropriate."	Viable SuDS options which are to be considered further for detailed design of the Substation and BESS compound detailed designs have been listed. These components include ponds, detention basins, swales, filter	Drainage options including SuDS proposals (Section 4.3) are included in the **Outline Drainage Strategy [EN010158/APP/7.11]**

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
	drains, filter strips and geocellular storage tanks. The method of discharge from these areas will be to the Claydon Brook Tributary via a flow control device.	
"Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the Site"	Surface water runoff from various catchments within the Site, follow the existing topography and natural drainage patterns, directing flowing towards the nearby network of watercourses, consistent with the current watershed. Swales, basins and cut-off ditches will be utilised to intercept and attenuate surface water flows within the site. Additional attenuation features, such as ponds, wetlands and bioretention areas, are proposed at Site boundaries in low-lying areas to intercept any offsite runoff and provide ancillary storage benefits. These features are not part of the formal SuDS network but offer supplementary volume retention in the event of exceedance in addition to the total storage proposed within the swales, cutoff ditches and existing watercourses within the Order Limits. The drainage infrastructure has been designed to accommodate the design 1 in 100 year climate change rainstorm with an appropriate allowance for climate change. It will also offer opportunities to enhance other aspects of the design with respect to green	Drainage options including SuDS proposals (Section 4.3) are included in the **Outline Drainage Strategy [EN010158/APP/7.11]**

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
	infrastructure and Biodiversity Nett Gain.	
"Describe the multifunctional benefits the sustainable drainage system will provide."	SuDS will be used with the aim of reducing flood risk on-site by mimicking natural drainage processes and managing surface water runoff in a more sustainable way. The four pillars of SuDS (Water Quantity, Water Quality, Amenity, and Biodiversity) are met to deliver multiple benefits to the Site. The Site will provide water quality benefits to surface water runoff using the Simple Index Approach outlined in the SuDS Manual (CIRIA C753, November 2015).	Drainage options including SuDS proposals (Section 4.3) are included in the **Outline Drainage Strategy [EN010158/APP/7.11].** Run-off will be managed to closely mimicking natural drainage patterns through the use of various SuDS features, attenuation and flow controls. Water quality is considered in section 8 of the **Outline Drainage Strategy [EN010158/APP/7.11]**
"Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system."	Infiltration rates were tested for the design of the surface water drainage strategy. The infiltration rates were proven as not a viable means of drainage surface water from the Site. Surface water runoff will therefore, be controlled via attenuation within the Site and a restricted discharge to the local watercourses. To alleviate any flooding concerns associated with the uncertainty of negligible increases in surface water runoff caused by Solar PV modules, it is proposed that perimeter swales downslope of the Solar PV arrays will provide additional surface water	Related calculation included as Annex D and drawings for the Site drainage included as Annex E of the **Outline Drainage Strategy [EN010158/APP/7.11]**.

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
	attenuation and promote infiltration into the ground. Storage for the 1 in 100-year storm event with allowance for 25% climate change allowance will be provided through a combination of swales, check dams, and integration with ecological mitigation areas, such as existing ponds and drains. Surface water will then be discharged at the agreed rate of 4.0l/s/ha.	
“***Explain how run-off from the completed development will be prevented from causing an impact elsewhere***”	The run-off from the completed Proposed Development will not cause an impact elsewhere as it is proposed to control surface water runoff via attenuation and restricted discharge rates when discharging to watercourses. The proposed drainage features will also look to promote natural infiltration to ground where feasible. Exceedance flows will be routed towards low-lying areas within the Site that are capable of temporarily retaining additional volumes of water. The use of swales and cut off ditches at each subplot level will help slow these exceedance flows before they reach the downstream areas of the Site and before discharge into the local watercourses. These areas include supplementary storage features, such as ponds, wetlands and bioretention areas which are integrated	**Sections 5, 6** and **7** of the **Outline Drainage Strategy [EN010158/APP/7.11]**

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
	within the wider landscape to support the Proposed Development's overall mitigation and enhancement objectives. These features will be strategically located to intercept off-site runoff and provide ancillary storage. Although not part of the formal SuDS network, they offer additional retention capacity during exceedance events and contribute to the overall resilience.	
"Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development":	Requirements for management and maintenance of the proposed drainage features has been listed. As the surface water drainage strategy is subject to change following detailed design, details of maintenance be confirmed at the time of writing. However, these will be considered as part of the detailed design.	**Section 9** of the **Outline Drainage Strategy [EN010158/APP/7.11]**
no net loss of floodplain storage	For areas within the fluvial floodplain, only Solar PV modules will be placed there. These panels have been designed to be elevated 1800mm above ground level and there will be negligible loss of floodplain and no interruption of flood flow paths as a result of the frame supporting the solar PV modules. There are no ground raising requirements in the areas of Solar PV modules and	Further analysis and calculations would be carried out at detailed design once number Solar PV modules and foundation/support design has progressed.

NPS EN-1 Requirement	How requirement addressed	Supporting Evidence
	the galvanised steel posts driven into the ground occupy a negligible volume of floodplain storage.	
any deflection or constriction of flood flow routes should be safely managed within the Site	PV panels are raised above the flood levels with support infrastructure designed to allow flood flows to pass uninterrupted and occupy a negligible volume of floodplain storage. Any watercourse crossings associated with the Abnormal Indivisible Load Access Track will be clear span bridge(s) or culvert(s), with crossings designed to ensure appropriate flood flows are maintained.	**Design Commitments [EN010158/APP/5.9]**
in flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere	Only PV panels are to be located in the Flood Zone, these will be raised to ensure continued operation during times of flood. During construction and any operational management, a flood a flood management plan will be included (within the **Outline Construction Environmental Management Plan (CEMP) [EN010158/APP/7.2 and Outline Operational Environmental Management Plan (OEMP) [EN010158/APP/7.3**]) for Site workers within the areas of fluvial flood risk during the Operational phase and any visitors to those areas of the Site thereafter.	**Outline Construction Environmental Management Plan (CEMP) [EN010158/APP/7.2 and Outline Operational Environmental Management Plan (OEMP) [EN010158/APP/7.3**

7. Conclusions and Recommendations

7.1.1. This Flood Risk Assessment complies with the NPPF, PPG and NPS EN-1, and demonstrates that flood risk from all sources has been considered in the Proposed Development. It is also consistent with the Local Planning Authority requirements with regard to flood risk.

7.1.2. The majority of the Proposed Development lies in an area designated by the Environment Agency as Flood Zone 1 and is outlined to have a chance of flooding of less than 1 in 1,000 (<0.1%) in any year from fluvial sources. The eastern boundary of Parcel 3 where the Claydon Brook Tributary is present has areas of Flood Zone 2 and Flood Zone 3 (including some areas of Flood Zone 3b) associated with it. There are also small areas of fluvial Flood Zones 2 and 3 in Parcel 1a and in the northern section of Parcel 2. There are also areas of surface water flood risk throughout the Site, but these are not considered to represent a significant risk to the Proposed Development due to the sequential location of infrastructure (and particularly sensitive elements) outside the areas of risk, as well as the proposed raising of Solar PV modules above worse-case anticipated flood levels. The Site is not considered to be at significant flood risk from all other sources.

7.1.3. Detailed consideration of the Sequential and Exception tests is included in the **Planning Statement [EN010158/APP/5.7]**. The Proposed Development is classified as 'essential infrastructure' and therefore considered appropriate within Flood Zone 1 without application of the Exception Test; and within Flood Zone 3a and Flood Zone 3b subject to passing the Exception Test. This was achieved as the Proposed Development will provide wider sustainability benefits as solar farms are a key component in the UK's switch to renewable sources and the achievement of net zero. The development will also be safe for its lifetime and not increase flood risk elsewhere as demonstrated within this report.

7.1.4. This Flood Risk Assessment has considered multiple sources of flooding and concluded the following:

Table 7.1: Flood risk summary

Source	Level of Flood Risk	Mitigation
Fluvial	**Very Low** (Flood Zone 1) to **High** (Flood Zone 3a and 3b)	- More vulnerable equipment to be placed outside of areas at fluvial flood risk. - Solar PV modules designed to sit 1800mm above ground level, this will ensure a

Source	Level of Flood Risk	Mitigation
		freeboard above any potential flood waters for the present-day scenario as well as being above worse-case climate change predictions. - 10m easement distance from all Ordinary Watercourses. - Lead Local Flood Authority and Internal Drainage Board consents will be obtained for all works within the vicinity of watercourses. - Loss of floodplain storage considered to be negligible. - Site will generally be unmanned and monitored remotely. - Safe access and egress will be available during 'design' event.
Tidal	**Very Low**	- No Mitigation Required.
Surface Water	**Very Low** to **High**	- More vulnerable equipment will be placed in areas of reduced surface water flood risk. - Greatest depth of surface water flooding throughout the Site during the 1 in 100 year event is 300mm, all Solar PV modules will therefore have a 600mm freeboard above this. - The modelled pluvial 1.0% + 25% climate change flood depths have been mapped and show flood depths predominately within 150mm and 500mm. All Solar PV modules will therefore have a 600mm freeboard above this.

Source	Level of Flood Risk	Mitigation
		- Vulnerable equipment will be placed on raised concrete bases and make use of regrading of land levels to mitigate against residual surface water ingress. - No overland flow paths will be disrupted meaning no increase in flood risk elsewhere. - The development will incorporate a surface water drainage strategy to accommodate surface water generated on Site. Surface water will be attenuated on-site and discharged directly to an appropriate location and an agreed rate with the Lead Local Flood Authority / Internal Drainage Board. - SuDS will be utilised to control surface water flows, designed to store the volume of water associated with a 1 in 100 year rainfall event (including an allowance for climate change), providing a betterment over the existing scenario.
Groundwater	**Low**	- No Mitigation Required.
Sewer	**Very Low**	- As the design of the Proposed Development progresses, it will be ensured safe easements from any existing sewers are maintained.
Reservoir	**Very Low**	- No Mitigation Required.

Source	Level of Flood Risk	Mitigation
Other	**Very Low**	- Existing land drains to be replaced or diverted as necessary.
Development	**Low**	- No Mitigation Required.

7.1.5. Overall, taking into account the above points, the development of the Site should not be precluded on flood risk grounds.

References

Ref. 1 Department for Energy Security and Net Zero (2023). Overarching National Policy Statement for Energy (EN-1). Available online: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1

Ref. 2 National Planning Policy Framework (NPPF) (2024) – Section 14 'Meeting the challenge of climate change, flooding and coastal change' available online: https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf

Ref. 3 Flood Risk and Coastal Change Practical Planning Guidance (PPG), September 2025. Available online: https://www.gov.uk/guidance/flood-risk-and-coastal-change

Ref. 4 Land Drainage Act 1991. Available online: https://www.legislation.gov.uk/id/ukpga/1991/59

Ref. 5 Flood and Water Management Act 2010 (c. 29). Available online: https://www.legislation.gov.uk/ukpga/2010/29/contents

Ref. 6 Water Resources Act 1991. Available online: https://www.legislation.gov.uk/ukpga/1991/57/contents

Ref. 7 The Floods Directive (Directive 2007/60/EC). Available online: https://eur-lex.europa.eu/eli/dir/2007/60/oj/eng

Ref. 8 Retained EU Law (Revocation and Reform) Act 2023, UK Parliament, (c. 28). Available online: https://www.legislation.gov.uk/ukpga/2023/28

Ref. 9 Environment Act 2021. Available online: https://www.legislation.gov.uk/id/ukpga/2021/30

Ref. 10 Department for Energy Security and Net Zero (2023). National Policy Statement for Renewable Energy Infrastructure (EN-3). Available online: https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3

Ref. 11 Department for Energy Security and Net Zero (2023). National Policy Statement for Electricity Networks Infrastructure (EN-5). Available online: https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5

Ref. 12 Buckinghamshire Council (2021). Vale of Aylesbury Local Plan (VALP) 2013 – 2033 Adopted Plan. Available online: https://buckinghamshire-gov-uk.s3.amazonaws.com/documents/Aylesbury_local_plan_L46JWaT.pdf

Ref. 13 Local Plan for Buckinghamshire: Draft vision and Objectives for 2040. Available online: https://buckinghamshire-gov-uk.s3.amazonaws.com/documents/Draft_vision_and_objectives_2_1.pdf

Ref. 14 Flood Risk and Coastal Change National Planning Practice Guidance (Department for Levelling Up, Housing and Communities, 2022). Available online: https://www.gov.uk/government/collections/planning-practice-guidance

Ref. 15 Flood Risk Assessments: climate change allowances, Environment Agency, 2022. Available online: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Ref. 16 Design Manual for Roads and Bridges LA 113 Road Drainage and the Water Environment (National Highways 2020). Available online: https://www.standardsforhighways.co.uk/tses/attachments/d6388f5f-2694-4986-ac46-b17b62c21727

Ref. 17 The CIRIA SuDS Manual C753. Available online: https://www.susdrain.org/resources/SuDS_Manual.html

Ref. 18 Defra's Non-Statutory National Standards for Sustainable Drainage Systems. Available online: https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds

Ref. 19 Environment Agency 'Flood risk assessment: flood zones 1, 2, 3 and 3b' guidance. Available online: https://www.gov.uk/guidance/flood-risk-assessment-flood-zones-1-2-3-and-3b

Ref. 20 Bucks Council SPD Watercourse Advice Note - Aylesbury Vale Area Note for Planners, Designers and Developers. https://www.buckinghamshire.gov.uk/planning-and-building-control/planning-policy/local-planning-guidance/watercourse-advice-note-aylesbury-vale-area/

Ref. 21 Environment Agency Flood Mapping. Available online: https://flood-map-for-planning.service.gov.uk/

Ref. 22 British Geological Survey Online Geological Mapping. Available online: https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.15207478.1054941605.1660058459-1946525719.1660058459

Ref. 23 Department for Environment, Food and Rural Affairs Online MAGIC Mapping Tool. Available online: https://magic.defra.gov.uk/MagicMap.html

Ref. 24 Ordnance Survey (2020) Street view map [Online], 1:5000, OS VectorMap® Local. Available online: https://explore.osmaps.com/

Ref. 25 Environment Agency National Light Detection and Ranging (LiDAR) Programme. https://environment.data.gov.uk/survey

Ref. 26 Buckinghamshire Council Local Flood Risk Management, Last updated: 1 December 2023. https://media.buckinghamshire.gov.uk/documents/2022-2028_Local_Flood_Risk_Management_Strategy_BC_branding.pdf

Ref. 27 Buckinghamshire County Council Preliminary Flood Risk Assessment (2011). Available online: https://www.buckinghamshire.gov.uk/documents/16140/pfra_prelim_assessment_report_final.pdf

Ref. 28 The Environment Agency's web-based mapping. https://environment.data.gov.uk/dataset/04532375-a198-476e-985e-0579a0a11b47

Ref. 29 British Standards Institution (2017) BS 8533:2017 Assessing and managing flood risk in development. Code of practice. London: BSI Standards Limited. Available online: https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocId=320362

Ref. 30 Water Research Centre (WRc) (2012) Sewers for Adoption: A Design and Construction Guide for Developers. 7th edition. Available online: https://www.water.org.uk/sites/default/files/wp/2018/10/SfA-8-Master-2.pdf

Ref. 31 BRE, 2022. Site layout planning for daylight and sunlight: a guide to good practice (BR 209 2022 edition). Available online: https://files.bregroup.com/solar/KN5524_Planning_Guidance_reduced.pdf

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