

Appendix I – Flood Risk Assessment



SPARBERRY HILL SOLAR FARM, LITTLE WYMONDLEY

FLOOD RISK ASSESSMENT

Final Report v1.0
December 2021

Report Title	Sperberry Hill Solar Farm, Little Wymondley Flood Risk Assessment Final Report v1.0
Client	Axis PED
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Contents

Signature Sheet	i
Contents	ii
List of Tables, Figures & Appendices	iii
1 Introduction	1
1.1 Purpose of Report	1
1.2 Structure of the Report	1
1.3 Relevant Documents	1
2 Site Details and Proposed Development	2
2.1 Site Location	2
2.2 Existing and Proposed Development	2
2.3 Surface Waterbodies in the Vicinity of the Site	2
2.4 Ground Conditions	3
2.5 Site Levels	3
2.6 Access and Egress	3
2.7 Flood Zone Designation	4
3 Planning Policy and Guidance	6
3.1 National Planning Policy and Guidance	6
3.2 Local Planning Policy and Guidance	6
3.3 Legislation Originating from the European Union	8
3.4 Environmental Permitting and Land Drainage Consent	9
4 Review of Flood Risk	10
4.1 Sequential Test and Exception Test	10
4.2 Historical Records of Flooding	10
4.3 Fluvial Flood Risk	10
4.4 Flood Risk from Surface Water and Small Watercourses	10
4.5 Flood Risk from Reservoirs, Canals and Other Artificial Sources	12
4.6 Flood Risk from Groundwater	12
5 Flood Risk Mitigation Measures	14
5.1 Overland Flow Pathways	14
5.2 Soft Landscaping	14
5.3 Channel Conveyance	14
6 Surface Water Management	15
7 Summary and Recommendations	16

List of Tables

Table 1: Maintenance Requirements..... 15

List of Figures

Figure 1: Site Location and Location of Surface Waterbodies 2

Figure 4: Digital Terrain Model from LiDAR Data 4

Figure 5: Flood Map for Planning..... 5

Figure 6: Flood Risk from Surface Water 10

Figure 7: Flood Risk from Surface Water - Depth 11

Figure 8: Flood Risk from Surface Water - Velocity 12

Figure 9: JBA Groundwater Flood Risk Indicator Map 13

List of Appendices

Appendix A: Development Proposal

1 INTRODUCTION

1.1 Purpose of Report

Weetwood Services Ltd ('Weetwood') has been instructed by Axis PED to prepare a Flood Risk Assessment (FRA) report to accompany a full planning application for the proposed development of land to the south of Wymondley Substation, Hertfordshire ("the site") for use as a solar farm.

The assessment has been undertaken in accordance with the requirements of the revised National Planning Policy Framework (NPPF) updated on 27 July 2021 and the Planning Practice Guidance (PPG) updated on 24 June 2021.

1.2 Structure of the Report

The report is structured as follows:

- Section 1** Introduction and report structure
- Section 2** Provides background information relating to the development site
- Section 3** Presents national and local flood risk and drainage planning policy
- Section 4** Assesses the potential sources of flooding to the development site
- Section 5** Presents flood risk mitigation measures based on the findings of the assessment
- Section 6** Addresses the effect of the proposed development on surface water runoff
- Section 7** Presents a summary of key findings and the recommendations

1.3 Relevant Documents

The assessment has been informed by the following documents:

- Strategic Flood Risk Assessment, North Hertfordshire Council, July 2008
- Strategic Flood Risk Assessment Update, North Hertfordshire Council, September 2016

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 Site Location

The approximately 32.75 hectare (ha) site is located between the villages of Little Wymondley, St Ippolyts, and Little Almshoe. Approximately 2 km to the west of Stevenage. The site comprises of two parcels of land separated by a single-track lane (Little Almshoe Lane), as shown in **Figure 1**. The eastern parcel is approximately 17.5 ha, whilst the western parcel is approximately 15.25 ha. The centre of the site is at Ordnance Survey National Grid Reference TL 205 264.

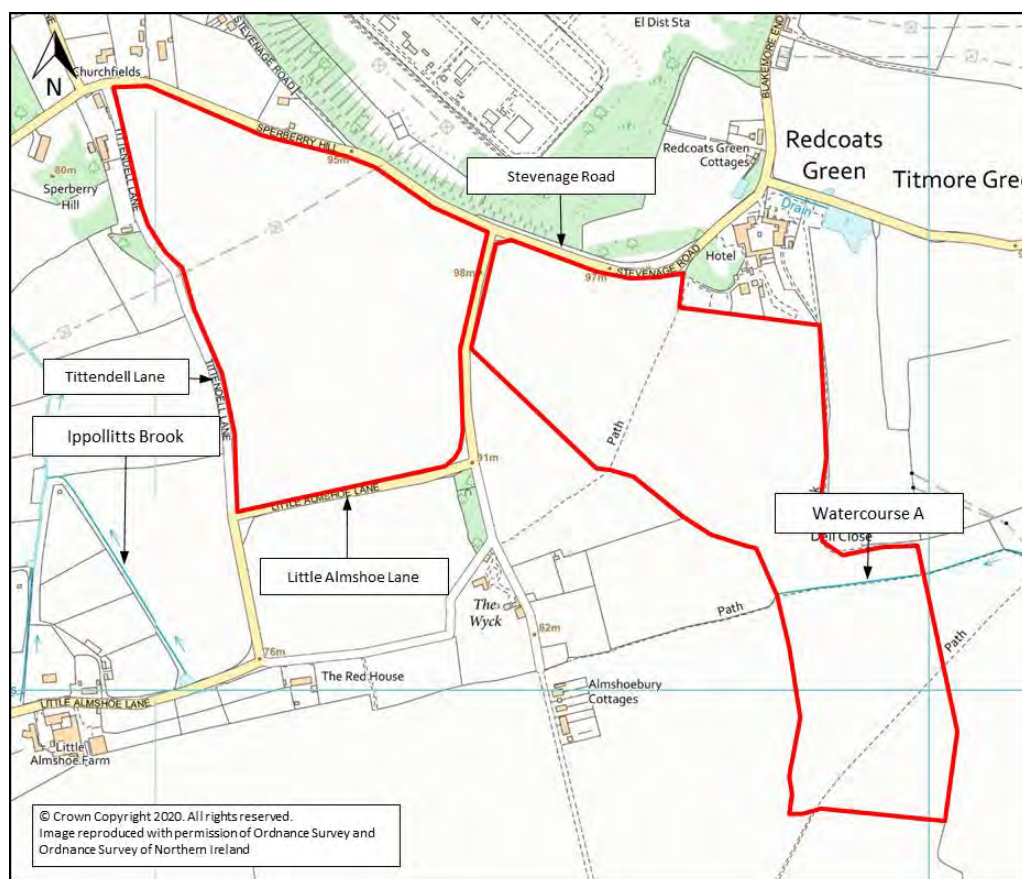


Figure 1: Site Location and Location of Surface Waterbodies

2.2 Existing and Proposed Development

The present land use at the site is agricultural.

The proposals are for the development of a solar farm and associated infrastructure. The proposed layout is presented in **Appendix A**.

The PPG does not specifically classify the flood risk vulnerability of solar farms. However, it is reasonable to assume that solar farms are Less Vulnerable to flood risk.

2.3 Surface Waterbodies in the Vicinity of the Site

Watercourse A flows in a westerly direction, through the southern half of the eastern parcel as illustrated in **Figure 1**. Ippollitts Brook is located approximately 200 m west of the site and flows in a northerly direction. These are classified as ordinary watercourses.

2.4 Ground Conditions

According to the Soilsdapes soils dataset produced by the Cranfield Soil and AgriFood Institute¹, soil conditions at the site and within the surrounding area are slightly acid loamy and clayey with slightly impeded drainage.

The National Geoscience Data Centre's Single Onshore Borehole Index holds records of two boreholes within the vicinity of the site. The most proximate borehole record², located approximately 100 m west of the western parcel boundary, indicates strata comprising sandy clay between a depth of 0.3 m below ground level (bgl) and 0.8 m bgl. This is underlain by sandy clays alongside chalk fragments to a depth of 3.7 m bgl, and till with chalk recorded to a depth of 7.4 m bgl. Silty sand with cobbles and chalk is then recorded to a depth of 10.7 m bgl. The second borehole record³, located approximately 250 m south-west of the western parcel, indicates strata comprising flinty clay between 0.4 and 1.9 m bgl, which is underlain by chalk beyond 1.9 m bgl to a recorded depth of 3.0 m bgl.

British Geological Survey mapping of surface geology⁴ indicates the underlying bedrock formation comprises Holywell Nodular Chalk Formation and New Pit Chalk Formation. This is overlain by Glaciofluvial Deposits, Mid Pleistocene superficial deposits in the western parcel of land and Lowestoft Formation superficial deposits in the eastern parcel.

According to the MAGIC website⁵ the Lowestoft Formation superficial deposit is classified as a principal aquifer. Whereas, the Mid Pleistocene superficial deposits, as well as the Holywell Nodular Chalk and New Pit Chalk Bedrocks Formation bedrock are classified as both Secondary A and Secondary (undifferentiated) aquifers.

The western boundary of the western parcel of land and the southern half of the eastern parcel are shown to be located within a Zone 3 groundwater source protection zone.

2.5 Site Levels

LiDAR data has been used to develop a digital terrain model of the site and surrounding area as illustrated in **Figure 2**. Site levels in the western parcel range between 82.1 to 97.6 m AOD, with site levels in the eastern parcel ranging between 87.0 and 98.0 m AOD. Levels are generally shown to fall from north to south.

2.6 Access and Egress

The primary access to the site will be provided by Stevenage Road which runs along the northern boundary of the site. Secondary access will be available via Little Almshoe Lane which bisects the western and eastern parcels. Both Stevenage Road and Little Almshoe Lane run alongside the site boundary at an approximate ground level of 94.0 to 98.0 m AOD.

¹ www.landis.org.uk/soilsdapes/

² <https://www.bgs.ac.uk/products/onshore/SOBI.html>, Ref: TL12NE228

³ <https://www.bgs.ac.uk/products/onshore/SOBI.html>, Ref: TL22NW310

⁴ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

⁵ <https://magic.defra.gov.uk/MagicMap.aspx>

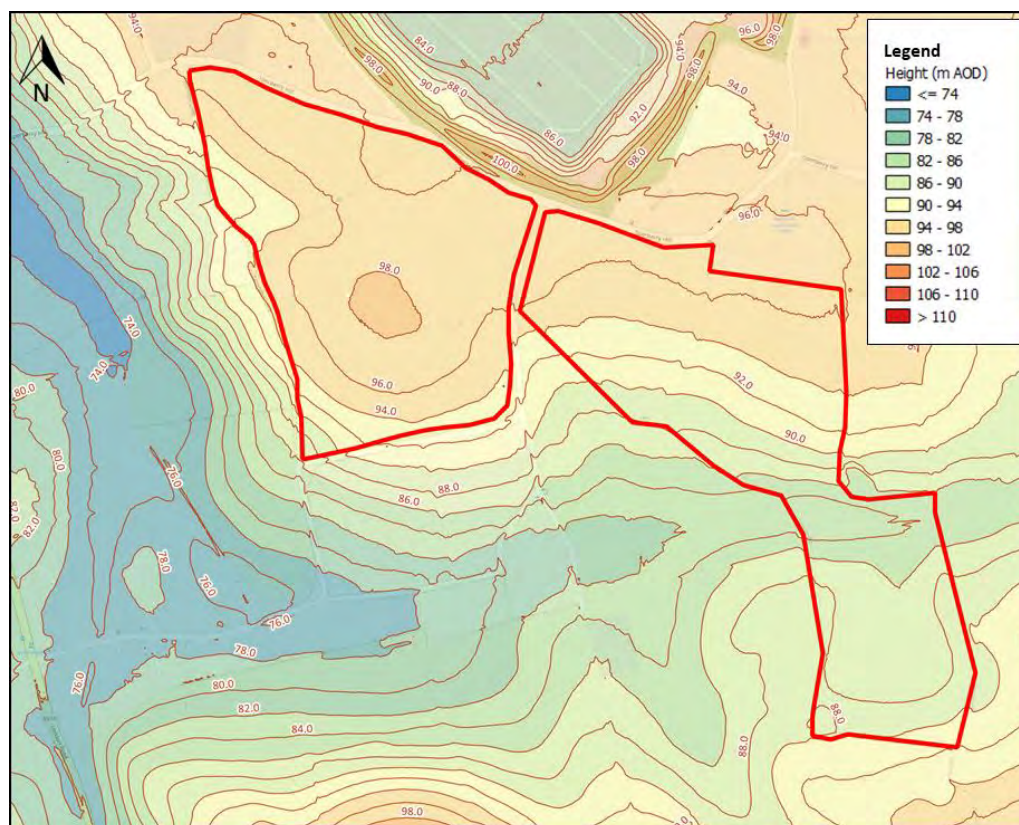


Figure 2: Digital Terrain Model from LiDAR Data

2.7 Flood Zone Designation

The Environment Agency Flood Map for Planning (Rivers and Sea) ⁶ (Figure 3) indicates the site is located in flood zone 1. Table 1 of the NPPG defines flood zones as follows⁷:

- Flood zone 1: Low Probability. Land having a less than 1 in 1,000 annual probabilities of river or sea flooding
- Flood zone 2: Medium Probability. Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding
- Flood zone 3a: High Probability. Land having a 1 in 100 or greater annual probability of river flooding or a 1 in 200 or greater annual probability of sea flooding
- Flood zone 3b: Functional Floodplain. Land where water has to flow or be stored in times of flood.

The flood zones shown on the flood map in the vicinity of the site are defined by the predicted extent of flooding during the present day 1 in 100 (non-tidal rivers), 1 in 200 (tidal rivers and sea) and 1 in 1,000 (rivers and sea) annual exceedance probability (AEP) events. The zones do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

⁶ <https://flood-map-for-planning.service.gov.uk/>

⁷ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables>

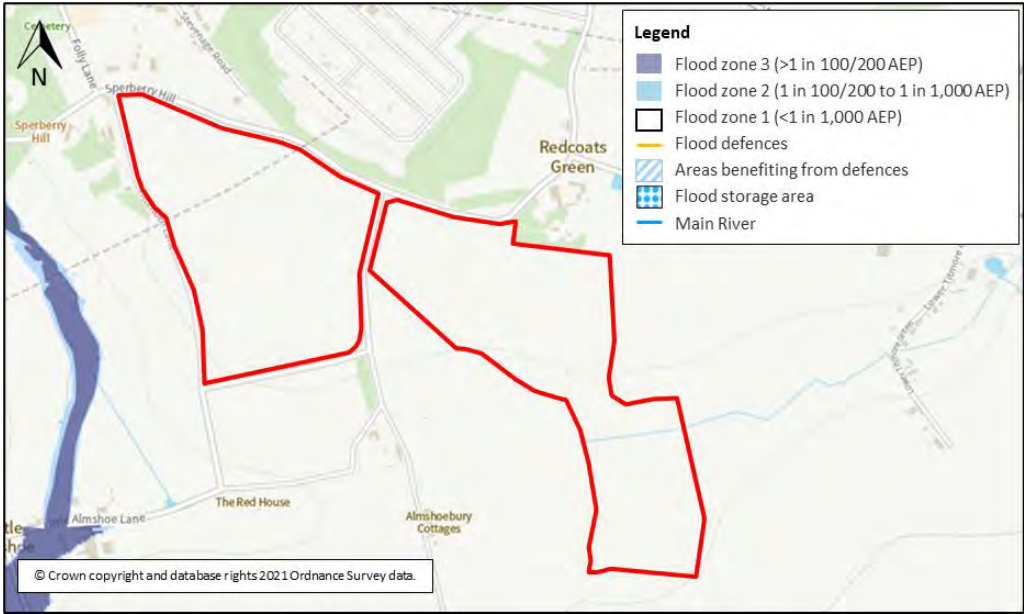


Figure 3: Flood Map for Planning
Source: gov.uk website; Accessed: October 2021

3 PLANNING POLICY AND GUIDANCE

3.1 National Planning Policy and Guidance

The NPPF sets out government's planning policies for England and how these are expected to be applied. The NPPF seeks to ensure that flood risk is taken into account at all stages in the planning process and is appropriately addressed.

Footnote 55 of the NPPF states that a site-specific flood risk assessment should be provided for all development in flood zones 2 and 3 [whilst] in flood zone 1, an assessment should accompany all proposals involving: sites of 1 ha or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

NPPF paragraph 159 states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk but accepts that where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere. The policy of seeking to direct development away from areas at highest risk of flooding is implemented through the application of the sequential test (NPPF paragraph 161).

Paragraph 162 of the NPPF states that if it is not possible for a development to be located in zones with a lower risk of flooding, taking into account wider sustainable development objectives, the exception test may have to be applied. The need for the exception test will depend on the flood zone of the site and the vulnerability of the development proposed (as set out in Annex 3 of NPPF and NPPG Tables 2 and 3).

NPPF paragraph 164 states that application of the exception test for development proposals at the application stage should be informed by a site-specific flood risk assessment. For the test to be passed it should be demonstrated that: the development would provide wider sustainability benefits to the community that outweigh the flood risk; and 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.

NPPF Paragraph 165 states that both elements of the exception test should be satisfied for development to be permitted.

NPPF paragraph 167 states that development should only be allowed in areas at risk of flooding if it incorporates sustainable drainage systems (SuDS) unless there is clear evidence that this would be inappropriate. NPPF paragraph 169 states that applications for major developments should incorporate sustainable drainage systems to appropriate operational standards and with maintenance arrangements in place unless there is clear evidence that this would be inappropriate.

Non-statutory technical standards for sustainable drainage published by DEFRA in March 2015 set out how surface water runoff generated during the present day 1 in 30 and 1 in 100 AEP rainfall events and for events exceeding the present day 1 in 100 AEP event should be managed, how peak runoff rates should be restricted and how runoff volumes should be controlled.

3.2 Local Planning Policy and Guidance

3.2.1 North Hertfordshire District Local Plan (April 1996)

The North Hertfordshire Local Plan was adopted in April 1996. The following policy is relevant in respect of flood risk and drainage:

Policy 50: Flooding

The Council will not normally permit development proposals which would be likely to result in a significant risk of flooding. For works necessary to prevent an increase in flooding and possibly some distance away from the development, the impact on nature conservation, landscape and recreation will be considered.

Land adjacent to a watercourse is liable to flood under certain conditions. Development on flood plains can put people and property at risk from flooding, reduce the capacity of the flood plain to store water and impede water flow. Also, development may worsen the risk of flooding downstream because the additional impermeable surfaces (such as roofs, roads and car parks) result in increased and rapid run-off. The Council will liaise and consult with the National Rivers Authority (NRA - Thames and Anglian Regions) and, where appropriate, seek measures to prevent an increase in the risk of damage to the river environment.

3.2.2 North Hertfordshire District Council, Local Plan 2011-2031 (October 2016)

This North Hertfordshire District Council Local Plan was submitted in October 2016 and sets out the strategic vision and spatial strategy for the district over the period 2011 to 2031.

The following policies are relevant in respect of flood risk and drainage:

Policy NE7: Reducing flood risk

Planning permission for development proposals will be granted where (as applicable):

- A. *The sequential and exception tests as set out in the NPPF have been applied using the Strategic Flood Risk Assessment (SFRA) and Environment Agency flood maps;*
- B. *A [Flood Risk Assessment] has been prepared in accordance with national guidance;*
- C. *A reduction in flood risk will be managed through flood resistant, resilient design and construction;*
- D. *It will be located, designed and laid out to ensure the risk of flooding is minimised whilst not increasing flood risk elsewhere;*
- E. *Flood protection and mitigation measures which may be necessary do not have an unacceptable impact on nature conservation, heritage assets, landscape and recreation; and*
- F. *Overland flow routes and flood storage areas are protected from all development other than that which is “water compatible” and this must be designed and constructed to remain operational and safe for users during flood events, resulting in no net loss of flood plain storage and not impeding water flows or increasing flood risk elsewhere.*

Policy NE8: Sustainable Drainage Systems

Planning permission for development will only be granted where:

- A. *The most sustainable drainage solution is used to reduce the risk of surface water flooding, enhance biodiversity, water quality and provide amenity benefits.*
- B. *It aims to mimic the natural drainage patterns and processes as far as possible.*
- C. *Drainage solutions follow the SuDS hierarchy; and*
- D. *Developers have consulted with the Lead Local Flood Authority at the earliest possible opportunity, to ensure SuDS are incorporated at the design stage.*

Policy SP11: Natural Resources and Sustainability

This Plan seeks to meet the challenges of climate change and flooding. We will:

- A. *Support proposals for renewable and low carbon energy development in appropriate locations;*
- B. *Take a risk-based approach to development and flood risk, directing development to areas at lowest risk in accordance with the NPPF and*
- C. *ensuring the provision of [SuDS] and other appropriate measures;*
- D. *Support the principles of the Water Framework Directive and seek to protect, enhance and manage the water environment; and*
- E. *Give consideration to the potential or actual impact of land contamination and support proposals that involve the remediation of contaminated land.*

3.2.3 Wymondley Parish Neighbourhood Plan 2015-2031 (June 2016)

The policies within the Wymondley Parish Neighbourhood Plan were developed to cover key issues impacting the Wymondley Parish, to improve the health, well-being and social cohesion of the local community now and in the future.

The following policies are relevant in respect of flood risk and drainage:

Policy FR1: Flood Risk

Development proposals which would result in an increase in flood risk will not be supported. Development within 12m of a watercourse should be supported by any required Flood Risk Assessment and adequate information to assess the potential impact of the proposal on flooding both on and off site.

8.19 When considering development in an area such as Wymondley Parish, where the flood risk is high and there are major implications for residents and business arising from inadequate drainage and other Flood Prevention Measures, we believe it is essential that proposals comprehensively assess issues such as water run-off down roadways – and include adequate provision for their management and control.

8.20 There is currently no legislative requirement in England and Wales for designers and planners to consider, in an urban context, the interaction between drainage and roads – and ensure that adequate measures are taken to protect roads' structural integrity and address related issues. In Scotland, however, regulators, enforcement agencies, and other stakeholders have seen the light and through partnership working have produced practical guidance on the application of [SUDS] to road design – a key factor in achieving sustainable long-term environmental and social improvements.

8.21 When taken as part of a holistic flood risk and water management process, incorporating Strategic Flood Risk Assessments (SFRAs) and Surface Water Management Plans (SWMPs), SUDS help create a vital tool for local organisations to develop a shared understanding of, and ability to manage, local flood risk. This includes setting out priorities for action, maintenance needs and links into Local Development Frameworks and Emergency Plans.

Policy FR2: Flood Risk Management

We believe an integrated, risk-based approach to flood risk management is the way forward, and strongly support the inclusion of [SUDS] in any development proposal.

8.23 Until now, it has been demonstrably apparent that our planning system has stratified responsibilities to such an extent that project planners are absolved of any responsibility to address infrastructure problems and costs arising from implementation of their plans. We are hopeful that the recently introduced concept of "locality", (which allows communities and people most affected by planning and development decisions to have their say at Neighbourhood Plan level), will ensure that, from the beginning, adequate infrastructures are discussed, planned and implemented.

3.3 Legislation Originating from the European Union

The Water Framework Directive (WFD) provides a legal framework for the protection, improvement and sustainable use of inland surface waters, groundwater, transitional waters, and coastal waters across England, and seeks to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters
- Achieve at least 'good' status for all waterbodies by 2015
- Promote the sustainable use of water as a natural resource
- Conserve habitats and species that depend directly on water
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- Contribute to mitigating the effects of floods and droughts.

The WFD applies to any proposed development which has the potential to impact on a waterbody. Where this is the case, the Environment Agency may require evidence demonstrating that the proposed development does not compromise the aims of the WFD.

3.4 Environmental Permitting and Land Drainage Consent

Under the Environmental Permitting (England and Wales) Regulations 2016 an Environmental Permit for Flood Risk Activities⁸ is required from the Environment Agency for any permanent or temporary works, including works:

- In, over or under a designated main river
- Within 8 m of the top of bank of a designated main river or of the landward toe of a flood defence (16 m if it is a tidal main river or a sea defence).

In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities. A permit is separate to and in addition to any planning permission granted.

Land drainage consent may be required from the lead local flood authority or drainage board for work to an ordinary watercourse.

Undertaking activities controlled by local byelaws also requires the relevant consent.

⁸ <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

4 REVIEW OF FLOOD RISK

4.1 Sequential Test and Exception Test

The site is located within flood zone 1. As such the proposals satisfy the requirements of the sequential test and the exception test need not be applied. Nevertheless, the proposals are still required to meet the requirements for site specific flood risk assessments.

4.2 Historical Records of Flooding

The Environment Agency historic flood map⁹ indicates there are no records of historic flooding at the site.

4.3 Fluvial Flood Risk

According to the Flood Map for Planning (**Figure 3**) both the site and the access routes are located within flood zone 1 and are at a negligible risk of flooding from rivers. (The risk of flooding from smaller watercourses is considered in **Section 4.4**).

4.4 Flood Risk from Surface Water and Small Watercourses

For the purposes of this assessment, the Flood Risk from Surface Water mapping is considered to provide an indication of flood risk from surface water and from the smaller watercourses in the vicinity of the site.

Overall, the Flood Risk from Surface Water map (**Figure 4**^{Error! Reference source not found.}) indicates that the majority of the site is at very low risk of flooding from surface water.

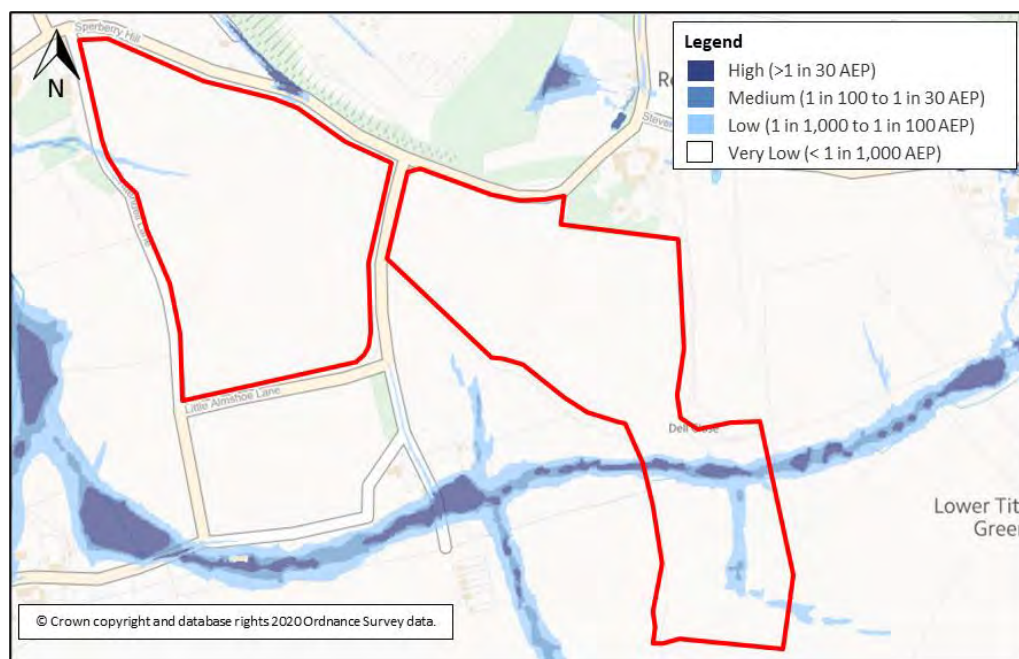


Figure 4: Flood Risk from Surface Water

Source: gov.uk website; Accessed: October 2021

However, there is a small area within the north-west of the western parcel of land, which is shown to be at low risk and an area of low to high risk in the southern half of the eastern parcel associated with Watercourse A.

⁹ <https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map>

The anticipated depth and velocity of floodwater within the area in the western parcel is shown to be less than 300 mm and 0.25 m/s respectively (refer to **Figure 5** and **Figure 6**). LiDAR data also indicates that surface water would be directed off site in a westerly direction towards Ippollitts Brook.

Flood depths within the area in the eastern parcel are typically shown to be less than 300 mm for all events, with some areas between 300-900 mm, whilst velocities may exceed 0.25 m/s. However, floodwaters are largely contained within the immediate vicinity of Watercourse A.

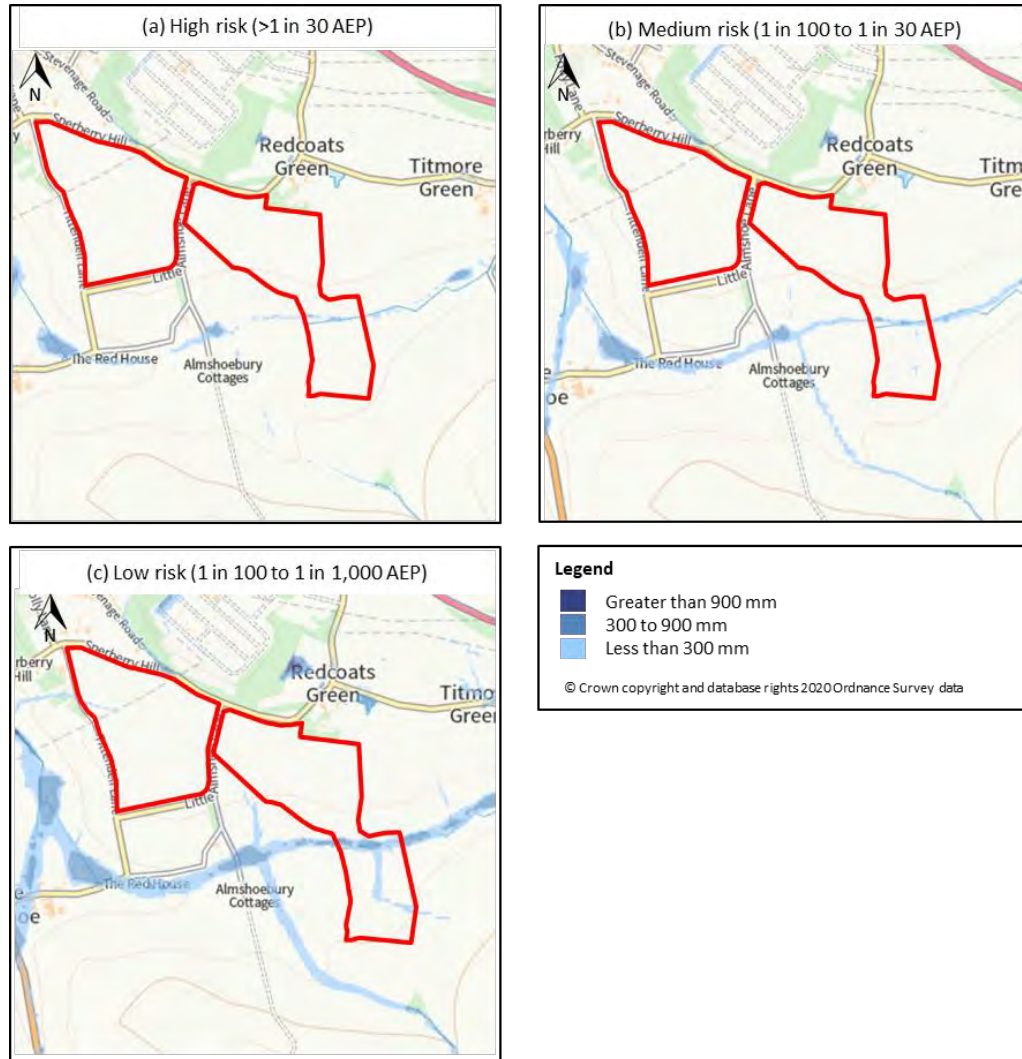


Figure 5: Flood Risk from Surface Water - Depth

Source: gov.uk website; Accessed: October 2021

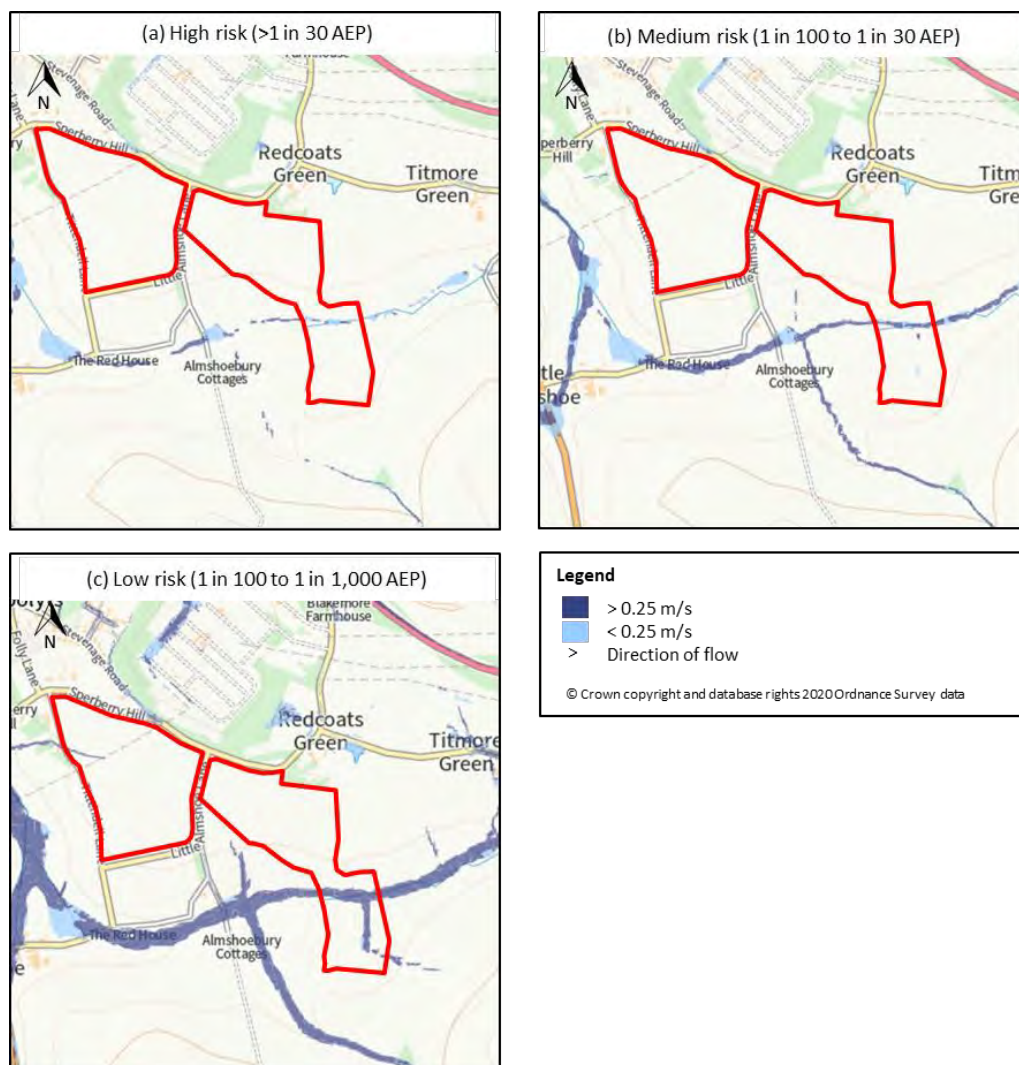


Figure 6: Flood Risk from Surface Water - Velocity

Source: gov.uk website; Accessed: October 2021

4.5 Flood Risk from Reservoirs, Canals and Other Artificial Sources

There are no canals or other impounded waterbodies located within the immediate vicinity of the site. The Flood Risk from Reservoirs map indicates that the site is not at risk of flooding from such sources. The site is therefore not assessed to be at risk of flooding from reservoirs, canals or other artificial sources.

4.6 Flood Risk from Groundwater

The JBA Groundwater Flood Risk Indicator map (**Figure 7**) indicates that the site is at low/negligible to medium risk of groundwater flooding. As illustrated in **Figure 2**, the topography of the site falls to the south/south-west toward each of the respective watercourses. It would therefore be reasonable to assume that any emerging groundwater would not accumulate to a significant depth at the site. Therefore, it is expected that the risk of groundwater flooding is low.

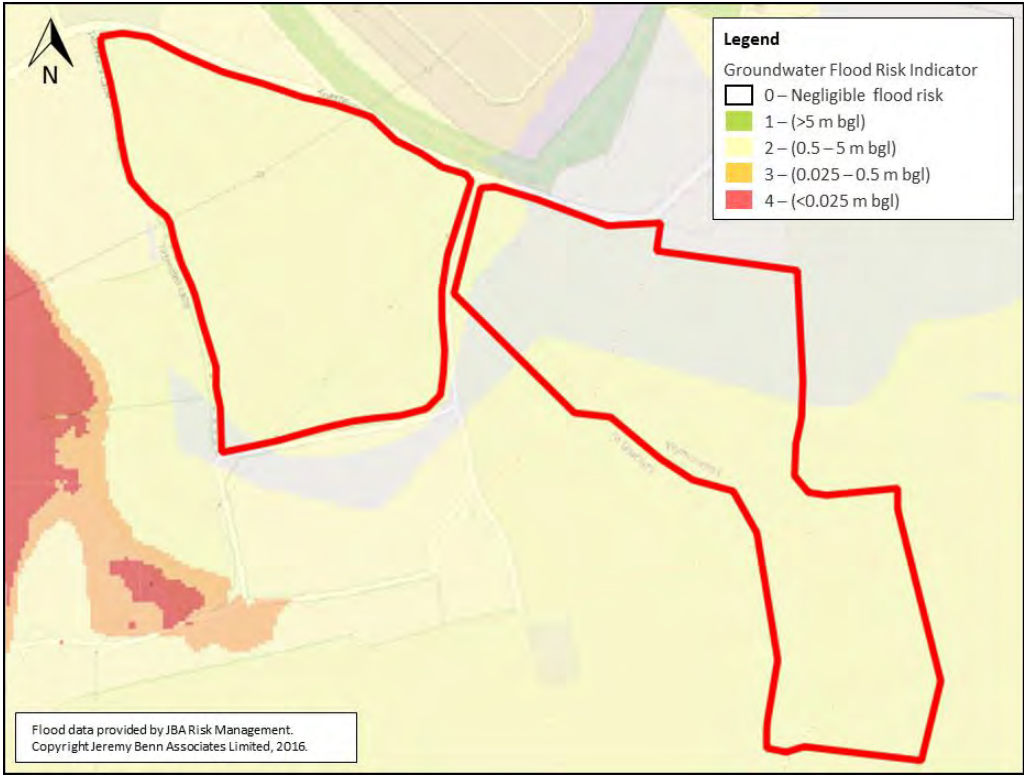


Figure 7: JBA Groundwater Flood Risk Indicator Map
Source: Blue Sky Maps; Accessed: October 2021

5 FLOOD RISK MITIGATION MEASURES

The residual risk of flooding to the proposed development from surface water and groundwater will be mitigated through the implementation of the measures proposed within the following section of this report.

5.1 Overland Flow Pathways

Flood pathways associated with surface water runoff or runoff associated with small watercourses/drainage ditches should not be obstructed by the following: inverter/transformer stations, storage buildings, control buildings, switchgear buildings and battery storage containers. The photovoltaic panels would not obstruct overland flow pathways and no restrictions should be applied to the siting of the panels.

5.2 Soft Landscaping

The solar panels have the potential to concentrate runoff under the drip line. It is recommended that the area under the solar panels should be seeded with a suitable grass mix to prevent rilling and an increase in surface water run-off rates.

5.3 Channel Conveyance

Existing drainage ditches should be retained. Any new crossings should maintain existing conveyance capacity.

6 SURFACE WATER MANAGEMENT

Surface water runoff at the site would infiltrate as ground conditions allow and otherwise runoff in accordance with topography (generally in a southerly/south-westerly direction).

In accordance with the PPG, surface water runoff should be disposed of according to the following hierarchy: Into the ground (infiltration); To a surface water body; To a surface water sewer, highway drain, or another drainage system; To a combined sewer.

Rainwater falling on the solar panels will drain between the gaps between adjacent panels and infiltrate into the ground as per the existing regime. It is likely that runoff will be distributed across the entirety of the site and avoid large volumes of runoff being concentrated towards the bottom edges of the solar panels.

The proposed buildings and other site infrastructure are distributed across the site and have relatively small roof / impermeable areas. It is recommended that to encourage infiltration that any maintenance tracks be constructed from a permeable aggregate. It is also recommended that an infiltration trench is implemented alongside one edge of each building / hardstanding area on the opposite edge to the maintenance track. These measures will promote infiltration of runoff from the building roofs and other impermeable surfaces.

The CIRIA SuDS manual identifies commercial roofs as having a low pollution hazard level, as such minimal treatment measures would be required to treat the quality of the water. In regard to this, infiltration trenches provide a high level of water quality treatment via the settlement of pollutants in the clean stone material, providing sufficient mitigation against potential pollutants.

As detailed in **Section 2.4** the site is underlain by soils with slightly impeded drainage. However, infiltration tests have not been undertaken at this stage. Such tests may be undertaken at the detailed design stage.

An indicative maintenance schedule is presented in **Table 1**.

Table 1: Maintenance Requirements

Schedule	Required action	Frequency
Infiltration Trench		
Regular maintenance	Remove litter and debris	Monthly, or reduced frequency as required depending on time of year or based on site-specific observations of clogging or manufacturer's recommendations.
	Manage other vegetation and remove nuisance plants	
Occasional maintenance	Reseed areas of poor vegetation growth	As required (approximately every 6 months)
	Grass cutting at a recommended height of 100 – 150 mm	
Monitoring	Initial inspection	Monthly for three months after installation

7 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Axis PED Ltd and relates to the proposed development of circa 34 ha of land south of Little Wymondley, Hertfordshire for use as a solar farm.

According to the Flood Map for Planning the proposed development is located outside the 1 in 1,000 AEP flood outline and is therefore defined by the NPPF as being situated within flood zone 1.

As the site is in flood zone 1, the sequential test is deemed to have been addressed and the exception test need not be addressed.

The flood map for planning shows the site to be at low risk of flooding from rivers. The majority of the site is at a very low risk from surface water/small watercourses, with the exception of two overland flow pathways where the risk is assessed to be low to high. The site is assessed to be at a negligible risk of flooding from reservoirs, canals or other artificial sources, and at a low risk of groundwater flooding.

This report has demonstrated that the proposed development may be completed in accordance with the requirements of planning policy subject to the following:

- Flood pathways associated with surface water runoff or runoff associated with small watercourses should not be obstructed by any buildings/hardstanding areas or associated infrastructure.
- Existing drainage ditches should be retained. Any new crossings should maintain existing conveyance capacity.
- The area under the drip line of the solar panels should be seeded with a suitable grass mix.
- The proposed maintenance track should be constructed from permeable aggregate.
- Infiltration trenches should be implemented to promote surface water runoff generated by the relatively small roof areas and other impermeable surfaces.

APPENDIX A

Development Proposal



- Application Site
- Deer / Stock Fence
- Photovoltaic Panels
- String Inverter
- Transformer Station
- Battery Container
- Battery Transformer Unit
- Other Building (Labelled)
- Existing Access Track Temporarily Upgraded
- Proposed Access Track
- Existing Vegetation
- Proposed Woodland
- Proposed Hedgerow
- Proposed Low Maintenance Pasture
- Proposed Species-Rich Grassland
- Proposed Compound Areas

Sperberry Hill Solar Array

Figure 1

Illustrative Landscape Proposals

Scale 1:5,000 @A3	Date February 2022
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Flood Risk Assessments
Flood Consequences Assessments
Surface Water Drainage
Foul Water Drainage
Environmental Impact Assessments
River Realignment and Restoration
Water Framework Directive Assessments
Environmental Permit and Land Drainage Applications
Sequential, Justification and Exception Tests
Utility Assessments
Expert Witness and Planning Appeals
Discharge of Planning Conditions

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