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MILFORD ROAD WASTEWATER TREATMENT WORKS FLOOD RISK ASSESSMENT

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Appendix 1

Proposed Site Layout

LIST OF ABBREVIATIONS

Above Ordnance Datum	AOD
Agricultural Land Classification	ALC
Annual Exceedance Probability	AEP
Area Benefitting from Defences	ABD
British Geological Survey	BGS
Construction Environmental Management Plan	CEMP
Digital Terrain Modelling	DTM
Environmental Agency	EA
Environmental Impact Assessment Report	EIAR
Flood Risk Assessment	FRA
Lead Local Flood Authority	LLFA
Light Detection and Ranging	LiDAR
Local Planning Authority	LPA
Metres	m
National Planning Policy Framework	NPPF
National Grid Reference	NGR
Internal Drainage Board	IDB
PV	Photovoltaic
Standard of Protection	SoP
Strategic Flood Risk Assessment	SFRA
Sustainable Drainage Systems	SuDS
Technical Appendix	TA

1. EXECUTIVE SUMMARY

Ramboll UK Limited (Ramboll) has been commissioned by Downing Renewable Developments LLP (the 'Applicant') to undertake a Flood Risk Assessment (FRA) to support a planning application for the construction and operation of a solar farm with associated infrastructure (the 'Proposed Development') located on land at Milford Road Wastewater Treatment Works (WTW), Pennington, Lymington (the 'Site').

Under the National Planning Policy Framework (NPPF)¹, an FRA is required where a development is within Flood Zones 2 or 3 and/or exceeds 1 hectare (ha) in area. The Site is located within Flood Zone 1 and is approximately 1.80 ha in area. Therefore, this FRA is provided to support the planning application for the construction and operation of the Site.

According to the EA's fluvial and tidal flood map for planning, the whole Site is located in Flood Zone 1 (Low Probability). This zone comprises land assessed as having a less than 1 in 1,000 Annual Exceedance Probability (AEP) of flooding from rivers or the sea (<0.1% in any year). The site is located within an area assessed by the EA to be at a very low probability of surface water flooding.

As the PV panel array would be raised, and further cabling and infrastructure would not be vulnerable to flooding, the Proposed Development is not considered vulnerable to minor flooding and no further mitigation would be required at the Site.

There remains the potential that the development of a solar infrastructure compound area could lead to increased rates of surface water runoff. However, no impermeable surfacing is proposed at the Site and runoff from PV panels would be to the underlying grassed surface. Therefore, the Proposed Development would not increase flood risk elsewhere.

The Site is located within Flood Zone 1 and would be designed such that no increase in flood risk would occur elsewhere. Therefore, the Proposed Development is considered appropriate in flood risk terms under the NPPF.

¹ GOV.UK, National Planning Policy Framework, September 2023 [online]. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>. Accessed October 2023.

2. INTRODUCTION

2.1 Appointment and Brief

Ramboll UK Limited (Ramboll) has been commissioned by Downing Renewable Developments LLP (the 'Applicant') to undertake a Flood Risk Assessment (FRA) to support the planning application for the construction and operation of a solar farm with associated infrastructure (the 'Proposed Development') located on land at Milford Road Water Treatment Works (WTW), Pennington, Lymington (the 'Site').

Under the National Planning Policy Framework (NPPF)², an FRA is required where a development is within Flood Zones 2 or 3 and/or exceeds 1 hectare (ha) in area. The Site is located within Flood Zone 1 and is approximately 1.80 ha in area.

2.2 Scope and Objectives

This FRA considers the risks of various sources of flooding to the Site and the consequent risk of flooding to downstream receptors (such as people, property, habitats, infrastructure and statutory sites) from the Proposed Development as a result of changes in surface water runoff. A comparison is made between the current situation and the future environment following completion of the Proposed Development.

This FRA has been carried out in accordance with the NPPF. It is to be used to assist the Local Planning Authority (LPA) and relevant statutory consultees when considering the flooding issues of the Proposed Development, as part of the planning application.

This report provides the following information:

1. A review of flood risks to the Site based upon flood data and maps provided by the Environment Agency (EA) and the relevant Strategic Flood Risk Assessment (SFRA);
2. An assessment of flood risk from all sources including tidal, fluvial, pluvial, groundwater and infrastructure failure to the Proposed Development;
3. An assessment of the compatibility of the Proposed Development for its location based on flood risk and its proposed usage;
4. An assessment of the impact of the Proposed Development in terms of surface water runoff; and
5. Proposals to mitigate any residual flood risks to the development.

2.3 General Limitations and Reliance

In preparation of the report, Ramboll has relied upon publicly-available information, information provided by the client and information provided by third parties. Accordingly, the conclusions reached in this report are valid only to the extent that the information provided to Ramboll was accurate and complete.

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

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

² GOV.UK, National Planning Policy Framework, September 2023 [online]. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>. Accessed October 2023.

3. SITE DESCRIPTION

3.1 Application Site Description

The Site is located approximately 1.6 km northwest of The Solent and approximately 720 m south of the A337 Milford Road. The Site is centred at National Grid Reference (NGR) 431081, 093280 and is currently unused greenfield land.

The surrounding area is predominantly rural, with an existing unnamed solar farm located immediately to the south. Another solar farm (West Solent Solar Farm) is located approximately 370 m east of the Site. Milford Road WTW is located approximately 40 m west of the site. Avon Water is located approximately 250 m west of the Site. Further unused greenfield land is located to the north.

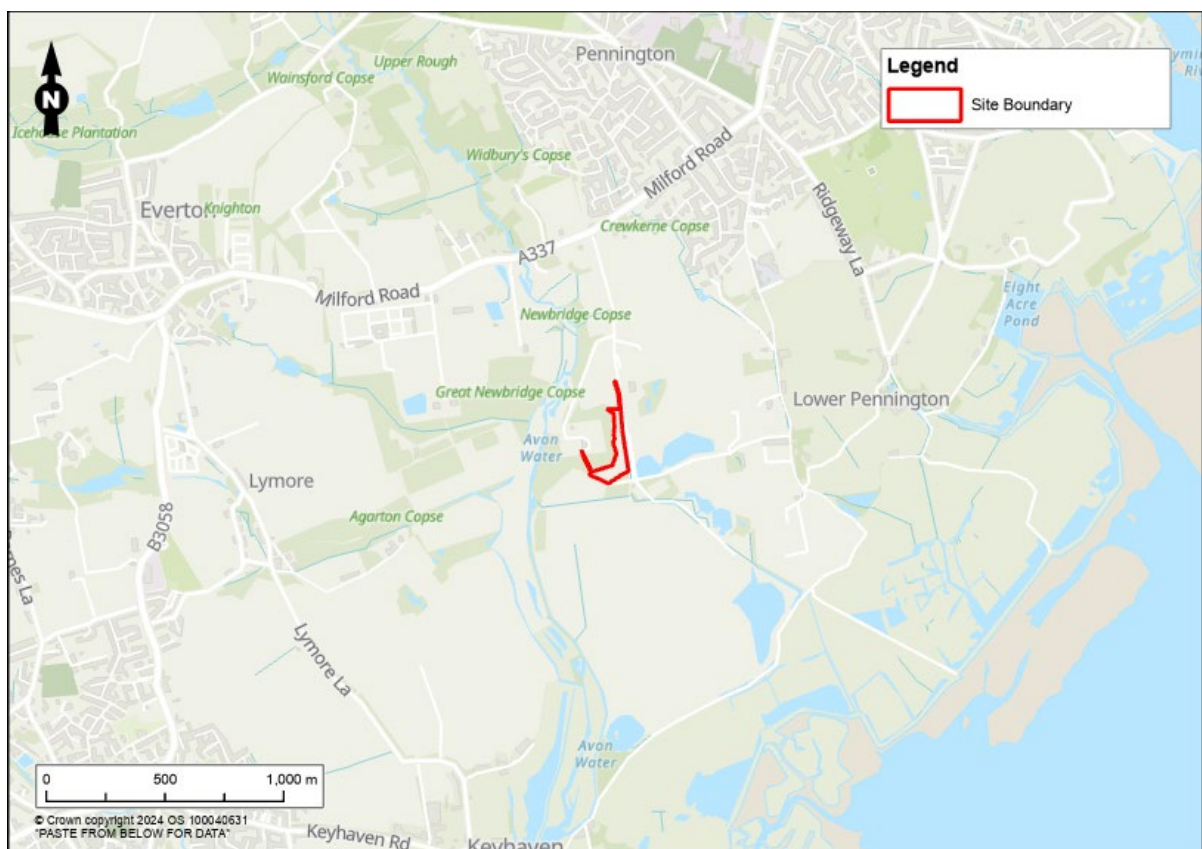


Figure 1: Site Location Plan

3.2 Proposed Development

The Proposed Development would comprise solar panels with a maximum height of 3 m, along with associated infrastructure (Appendix 1: Proposed Site Plan). The detailed design of the Proposed Development is ongoing but the solar farm would comprise the following elements:

- A 860 kW solar panel array over the majority of the Site, mounted on stilts to an elevation of approximately 0.6 m above ground elevations;
- Boundary fencing;
- Undergrounded cabling; which would lead to
- An off-site grid connection.

No hardstanding areas are proposed for access or maintenance. A temporary construction compound would be installed at the Site over an area of approximately 30 m x 30m.

Once operational, the Site would be fenced, secured and personnel would only be on-site for occasional maintenance. Those elements of the development which would be below or close to ground level would all be constructed to be resilient to contact with water.

It should be noted that the plans in Appendix 1 do not constitute a detailed design layout for the Site and could be subject to alteration, within the parameters for which planning consent is sought, were the application successful.

4. REVIEW OF BASELINE DATA

4.1 Hydrological Setting

The Avon Water is located approximately 250 m west of the Site, flowing from north to south. The Avon Water is classified as an EA Main River. A number of field drains are located in close proximity to the Site with the nearest being adjacent to the Site boundary alongside Milford Road. Another is located approximately 70 m south of the Site. A number of ponds are located close to the Site with the nearest being two adjoining ponds located approximately 30 m to the east.

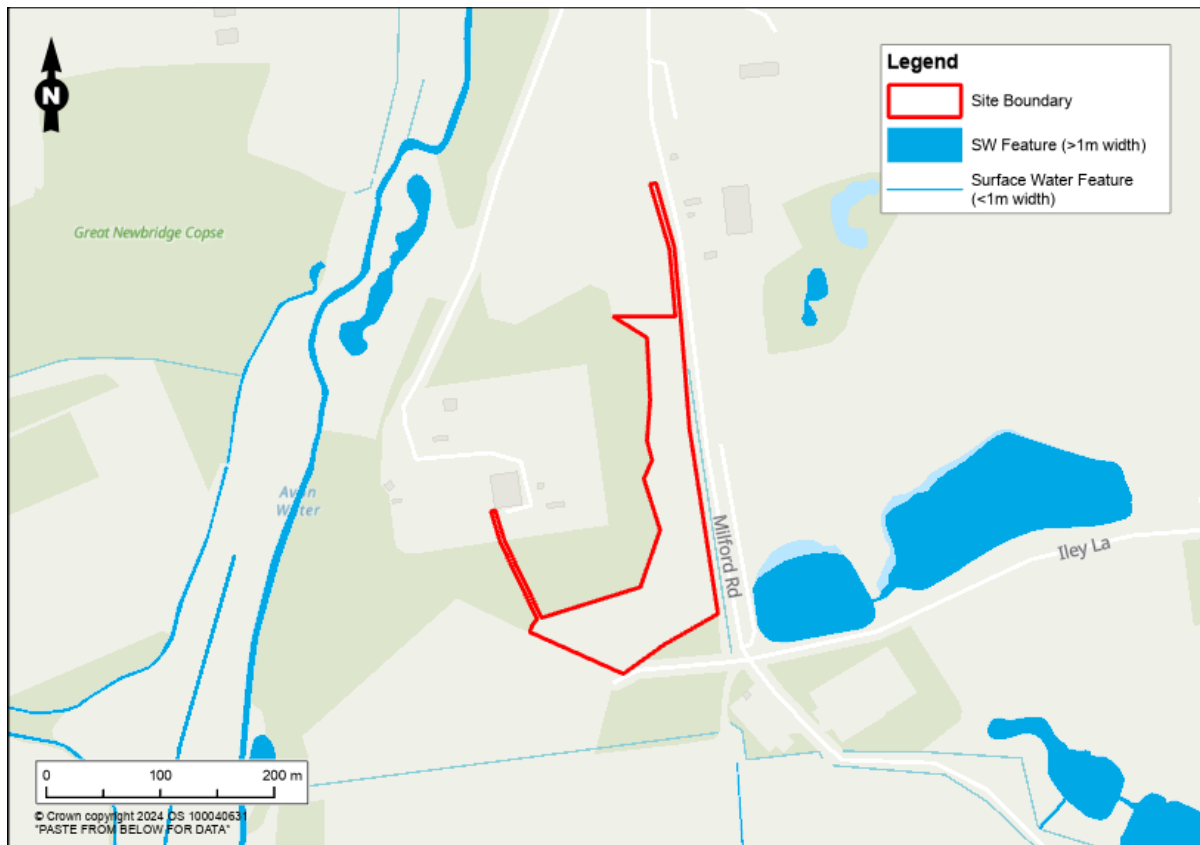


Figure 2: Hydrological Setting

4.2 Geological Setting

According to the British Geological Survey (BGS) Geology Viewer³, the Site is directly underlain by superficial deposits of sand and gravel (River Terrace Deposits), further underlain by bedrock geology comprising the Headon Beds and Osbourne Beds (clay, silt and sand).

4.3 Hydrogeological Setting

According to BGS GeoIndex Onshore Hydrogeology data⁴, the underlying geology forms part of the Solent Group and is classified as a Low productivity aquifer. The Site is not located within a groundwater Source Protection Zone.

³ BGS Geology Viewer [online]. Available at: <https://geologyviewer.bgs.ac.uk>. Accessed October 2023.

⁴ BGS British Geological Survey, GeoIndex Onshore [online]. Available at: <https://mapapps2.bgs.ac.uk/geoindex/home.html>. Accessed October 2023.

4.4 Site Topography

LiDAR (Light Detection and Ranging) aerial topographic survey data⁵ have been obtained from the DEFRA Data services Platform for the Site and its surrounds. Digital Terrain Modelling (DTM) is available for the Site at a 1 m horizontal resolution and shows that the Site typically follows a northwest to southeast sloping pattern. Elevations range from approximately 10.0 m AOD (Above Ordnance Datum) in the northwest corner of the Site to approximately 5.0 m AOD in the southeast corner of the Site.

Elevations are typically around 7.8 m AOD along the western boundary with an area of higher terrain present in the central southern part of the Site between approximately 8.8 m AOD – 9.2 m AOD. Elevations fall away steadily toward the south and southeast corners of the Site.

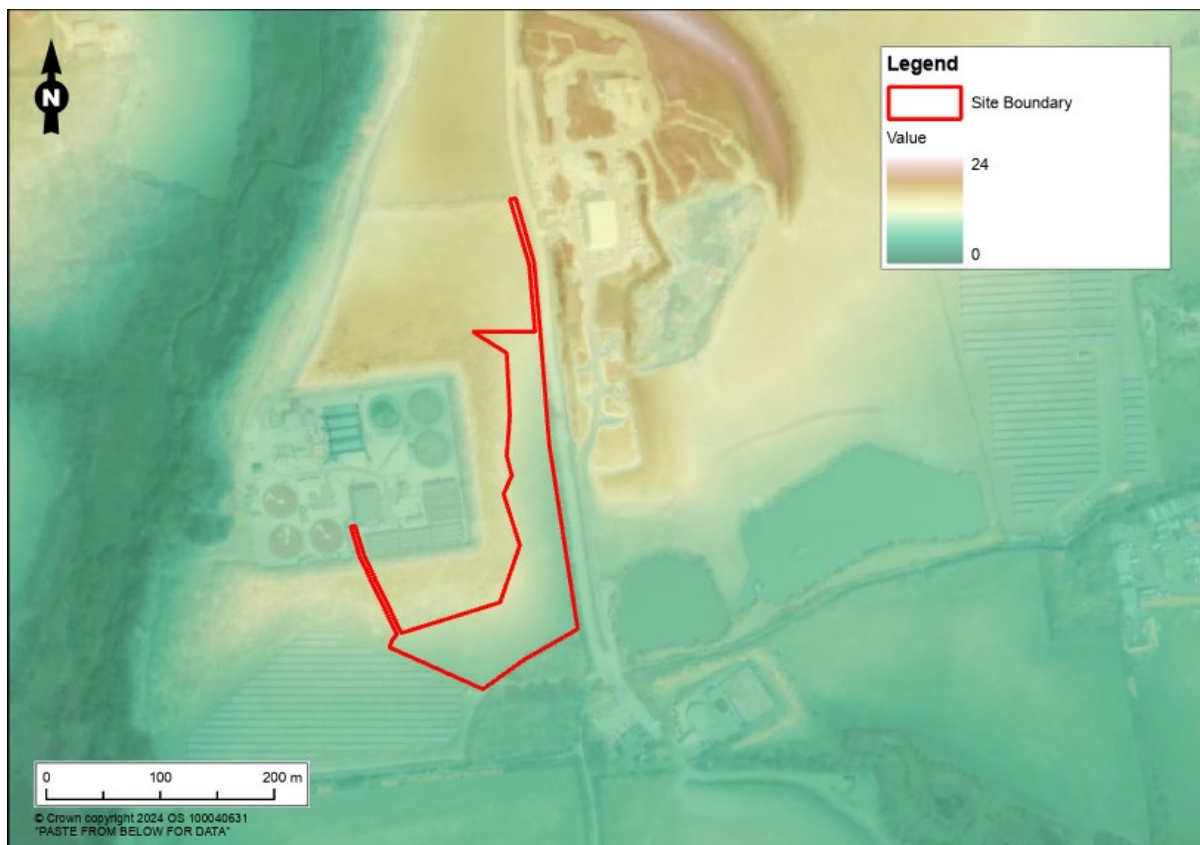


Figure 3: LiDAR Topography

4.5 Fluvial and Tidal Flood Risk

EA Flood Map for Planning

According to the EA's fluvial and tidal Flood Map for Planning⁶, the entire Site is located in Flood Zone 1 (Low Probability). This zone comprises land assessed as having a less than 1 in 1,000 Annual Exceedance Probability (AEP) of flooding from rivers or the sea (<0.1% in any year). Flood Zone designations specifically ignore the presence of flood defences.

⁵ Department for Environment Food & Rural Affairs, LIDAR Composite DTM 2022 – 1m [online]. Available at: <https://environment.data.gov.uk/dataset/13787b9a-26a4-4775-8523-806d13af58fc>. Accessed October 2023.

⁶ GOV.UK, Flood map for planning [online]. Available at: <https://flood-map-for-planning.service.gov.uk>. Accessed October 2023.

According to EA Coastal Design Sea Levels⁷, the maximum projected tidal level from the Solent Water Body is approximately 2.5 m AOD, significantly below the lowest elevation on-site (5.0 m AOD). Based on cumulative per-year sea level rises (using a 2018 baseline) for the south-east river basin district a sea level rise of 1.10 m is predicted over the 100 year epoch to 2125. Therefore, sea levels would remain below on-site ground elevations over the next 100 years.



Figure 4: EA Flood Map for Planning

4.6 Flood Defences

The Site is not directly protected by any formal flood defences. According to EA Spatial Flood Defences⁸, the nearest recorded assets are coastal defences located approximately 1.2 km south-east of the Site. These are recorded by the EA as an Embankment constructed to a 1 in 200-Year Standard of Protection (SoP).

4.7 Surface Water and Sewer Drainage Flood Risk

The EA has undertaken national-scale modelling of potential surface water flood risks (i.e., those associated with extreme rainfall events and associated overland flow rather than flooding from rivers or the sea). Such risks are categorised as High, Medium, Low or Very Low as follows:

- High – Greater than a 1 in 30 (3.33%) AEP;
- Medium – Between a 1 in 30 and 1 in 100 (3.33% to 1%) AEP;

⁷ data.gov.uk, Coastal Design Sea Levels – Coastal Flood Boundary Extreme Sea Levels, 2018 [online]. Available at: <https://www.data.gov.uk/dataset/73834283-7dc4-488a-9583-a920072d9a9d/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018>. Accessed October 2023.

⁸ Department for Environment Food & Rural Affairs, AIMS Spatial Flood Defences [online]. Available at: <https://environment.data.gov.uk/dataset/8e5be50f-d465-11e4-ba9a-f0def148f590>. Accessed October 2023.

- Low – Between a 1 in 100 and a 1 in 1,000 (1% to 0.1%) AEP; and
- Very Low – Less than a 1 in 1,000 (0.1%) AEP.

According to the EA Risk of Flooding from Surface Water (RoFSW) map⁹, the whole of the Site is shown to be at a Very Low risk of surface water flooding. There is, however, areas of High, Medium, and Low risk located adjacent to the Site's eastern boundary within the channel of an unnamed drain.

It should be noted that the EA's mapping of surface water flood risk does not consider specific drainage assets such as sewers and drains which might exist on or adjacent to the Site. Likewise, surface water drainage networks are typically designed to accommodate a 1 in 30 (3.33%) AEP rainfall event. It is, therefore, possible that potential risks are overestimated.

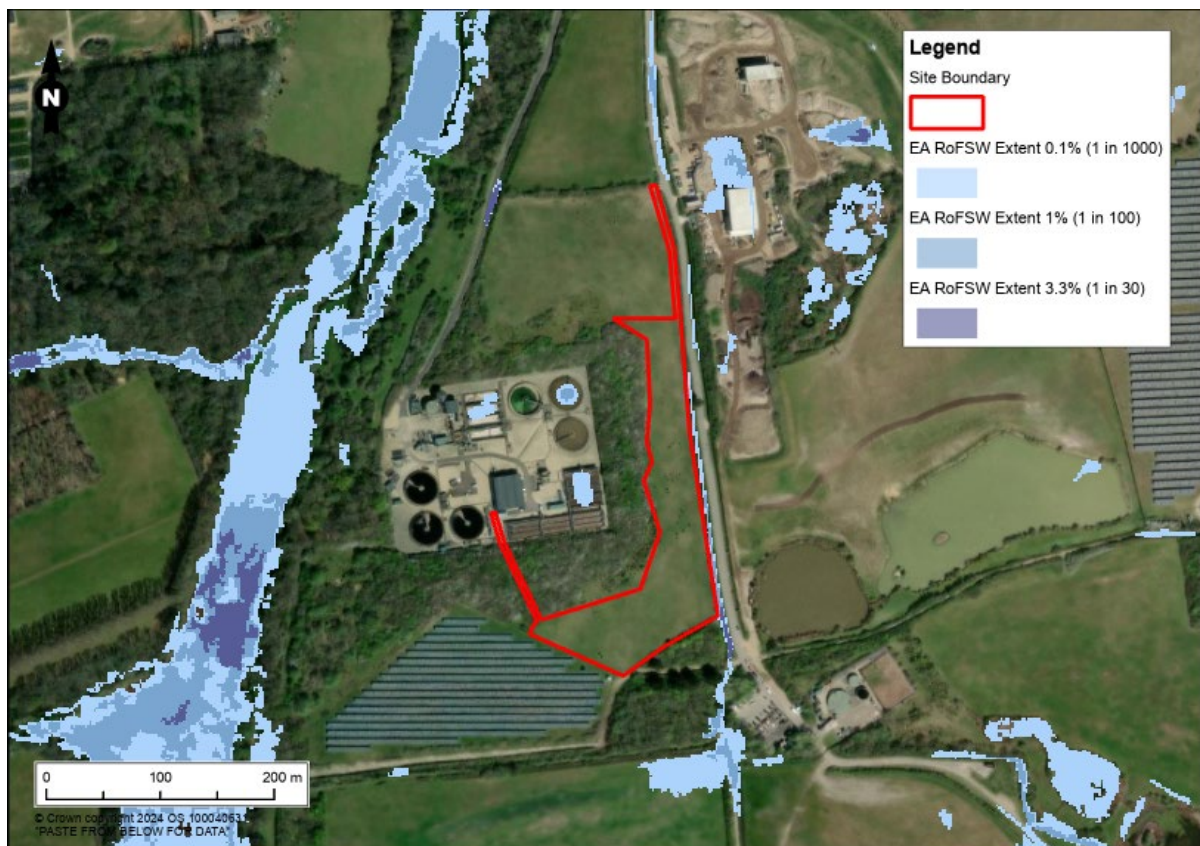


Figure 5: EA Risk of Flooding From Surface Water

4.8 Groundwater Flood Risk

Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land and/or infrastructure below ground. Groundwater floods may emerge from either point or diffuse locations. They tend to be long in duration, developing over weeks or months and prevailing for days or weeks.

Although the Site slopes towards the east and south-east, external to the redline boundary, topography typically slopes down toward either the Avon Water (from east to west) or towards the sea (to the south). Groundwater flow direction is therefore likely to also be from east to west or towards the south and groundwater will be in some degree of hydraulic continuity with the Avon

⁹ GOV.UK, Check your long term flood risk [online]. Available at: <https://check-long-term-flood-risk.service.gov.uk/map>. Accessed October 2023.

Water. Furthermore, Site geology is assessed by the BGS to be of Low productivity. The Low productivity of the underlying geology, along with the external topography, indicates that the emergence of groundwater leading to flooding at the Site is unlikely.

4.9 Risk from Reservoirs, Canals, and other Artificial Sources

EA mapping of reservoir flood extents⁹ shows that the Site is not within an area that could be at risk of flooding due to the failure of a reservoir dam. There are no other artificial sources of flooding identified that could present a risk of flooding at the Site.

4.10 Historic Flooding

According to the EA's online geospatial data regarding historical flooding events¹⁰, there are no records of historical flooding having occurred at the Site, the nearest of which is located approximately 370 m south-west of the Site from November 2000.

4.11 Flood Risk Summary

Table 5.1 shows what should be considered in the assessment of flood risk to any proposed development at the Site:

Table 4.1: Flood Risk Summary

Sources of Flooding	High	Medium	Low	Comments
Fluvial			X	The Site is located in Flood Zone 1.
Surface Water			X	The Site is located in an area considered to be at a Very Low risk of flooding from surface water.
Groundwater			X	The Site is at a Low risk of groundwater flooding.
Reservoirs/Artificial Sources			X	The Site is at a Low risk of reservoir flooding.

¹⁰ Department for Environment Food & Rural Affairs, Recorded Flood Outlines [online]. Available at: <https://environment.data.gov.uk/dataset/8c75e700-d465-11e4-8b5b-f0def148f590>. Accessed October 2023.

5. ASSESSMENT OF FLOOD RISK

5.1 Flood Risk Vulnerability

According to Annex 3 of the NPPF (Flood Risk Vulnerability Classification)¹¹, solar farms are classified as Essential Infrastructure. The NPPF guidance states that Essential Infrastructure is appropriate development within Flood Zone 1.

The solar farm shall be constructed such that solar panels are raised from the ground on stilts and underground cabling would be sealed and waterproofed, and therefore not vulnerable to flooding.

5.2 Sequential Test

The Sequential Test is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. Where it is not possible to exclusively locate all development in low-risk areas, the Sequential Test should go on to compare reasonably available sites:

- Within medium risk areas; and
- Then, only where there are no reasonably available Sites in low and medium risk areas, within high-risk areas.

The Site is located within Flood Zone 1 (Low risk) and is identified by EA RoFSW mapping to be at a very low risk of surface water flooding. The Site is therefore a suitable location for development under the NPPF.

5.3 Mitigation Measures

PV arrays would be installed at the Site through the use of an integral stand design and would be situated 0.6 m above ground levels. In the unlikely event of exceedance of capacity of the surrounding drainage network, raising of the solar panels would provide suitable mitigation for any residual flood risk. The panels themselves are also weatherproofed to a degree such that they are resilient to contact with water.

5.4 Management of Residual Risk

Taking into account the mitigation measures set out above, there are no residual risks of flooding identified at the Site.

¹¹ GOV.uk (2022) National Planning Policy Framework, Annex 3: Flood risk vulnerability classification <https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification>

6. IMPACT OF DEVELOPMENT ON SURFACE WATER RUNOFF

6.1 Introduction

As the Site is in excess of 1 ha there is a requirement under the NPPF to demonstrate that the Proposed Development will not have an adverse impact on flood risk to areas outside of the Site boundary, through the development of a Surface Water Management Strategy.

Assessment of the potential for alterations in surface water runoff rates shall take into account paragraph 169 of the NPPF such that implementation of Sustainable Drainage Systems (SuDS) at the Site would:

- Take account of advice from the lead local flood authority (LLFA);
- Have appropriate proposed minimum operational standards;
- Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
- Where possible, provide multifunctional benefits.

6.2 Impact on Surface Water Runoff Rates

The Proposed Development would comprise a PV panel array, fencing and undergrounded grid connection from the Site. Grid connection would be provided off-site. No further infrastructure is proposed at the Site and no access tracks or hardstanding areas are proposed.

While detailed specification for the proposed panel array would be provided at a later date, it is envisaged that the panels would be mounted on a stilt construction and spaced such that surface water runoff would fall to ground at the lower edge of each panel.

Grassland planting would be established on areas below and around the panels and maintained to prevent shading or obstruction of the panels. The seeding of the area with an appropriate native grassland and wildflower mix, together with a schedule for cutting would ensure that a strong root structure becomes established below the panels and that erosion of soils would not occur in line with the base of panels where runoff would be concentrated during periods of heavy rainfall. A temporary construction compound at the Site (Appendix 1) would extend to less than 0.1 ha and would be surfaced with permeable materials (e.g. Type 3 aggregate).

There would be no increase in surface water runoff rates at the Site (greenfield runoff rates would be maintained) and the planting of the area with a grassland seed mix would ensure that groundcover at the Site would be maintained year round, increasing interception rates and reducing the potential for the mobilisation of sediments from the Site to watercourses.

6.3 Surface Water Management

As the Site would not lead to an alteration in runoff rates, and as such would not lead to any potential increase in flood risk in areas outside of the Site boundary, no SuDS measures would be implemented and there is no requirement to alter the existing surface water regime.

7. CONCLUSIONS

The Proposed Development would comprise solar panels, together with associated infrastructure. Whilst the detailed design of the Proposed Development is ongoing, the solar farm would comprise the following elements:

- A solar panel array over the majority of the Site, mounted on stilts to an elevation of approximately 0.6m above ground elevations;
- Boundary fencing;
- Undergrounded cabling; which would lead to
- An off-site grid connection.

No hardstanding areas are proposed for access or maintenance. A temporary construction compound would be installed at the Site over an area of approximately 0.1 ha, which would be decommissioned once the Site became operational.

According to the EA's fluvial and tidal flood map for planning, the whole Site is located in Flood Zone 1 (Low Probability). This zone comprises land assessed as having a less than 1 in 1,000 AEP of flooding from rivers or the sea (<0.1% in any year).

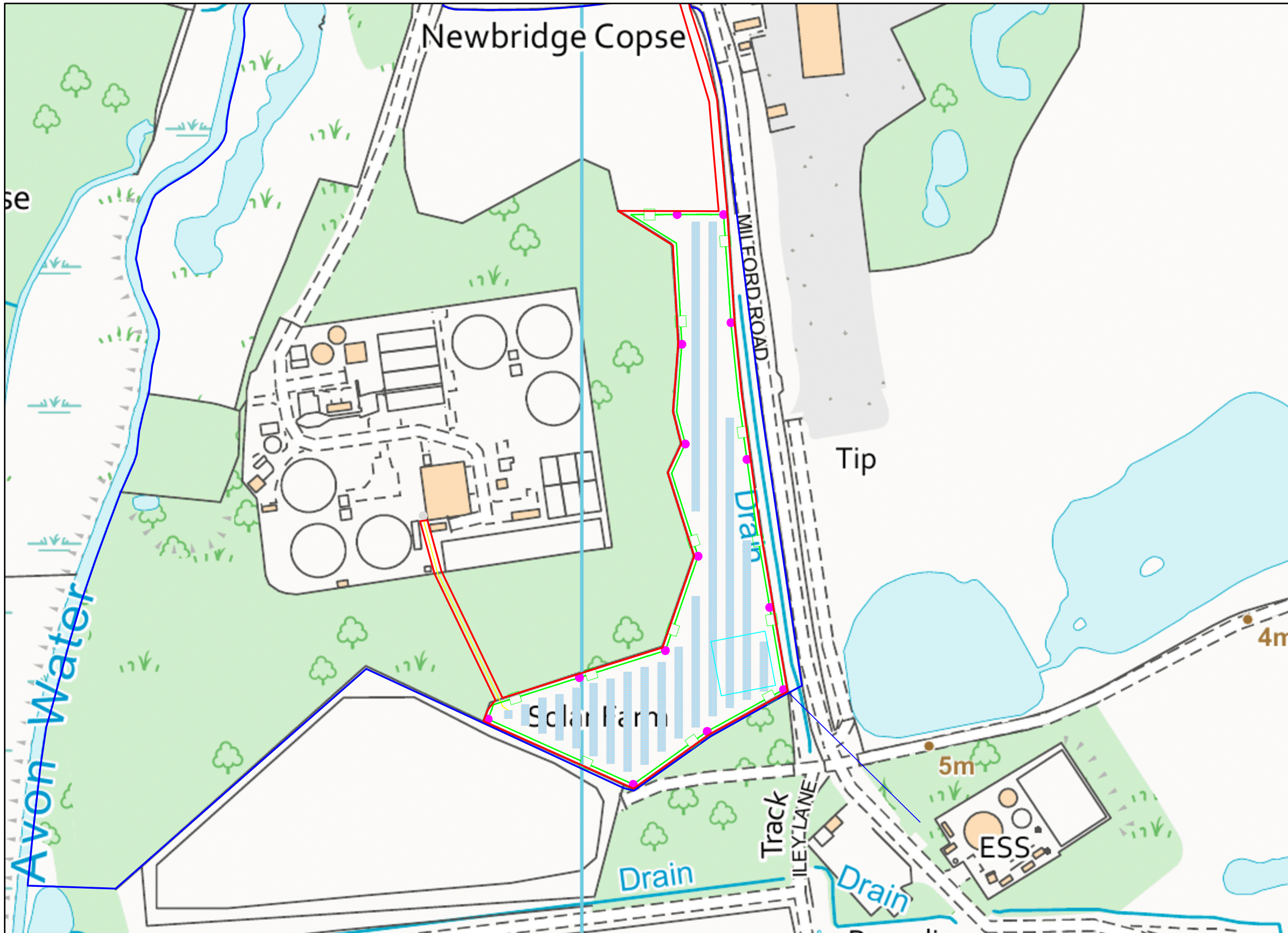
The site is located within an area assessed to be of a very low probability (<1 in 1,000 (0.1%) AEP) of surface water flooding.

As the PV panel array would be raised and further cabling and infrastructure would not be vulnerable to flooding, the Proposed Development is not considered vulnerable to minor flooding and no further mitigation would be required at the Site.

There is the potential that the development of a solar infrastructure compound area could lead to increased rates of surface water runoff from the Site. However, no impermeable surfacing is proposed and runoff from PV panels would be to the underlying grassed surface. Therefore, the Proposed Development would not increase flood risk elsewhere.

The Site is located within Flood Zone 1 and would be designed such that no increase in flood risk would occur elsewhere. Therefore, the Proposed Development is considered appropriate in flood risk terms under the NPPF.

APPENDIX 1 PROPOSED SITE LAYOUT



NOTES

Inverter Location is situated on back of Solar PV Modules

KEY:

- SOLAR PV MODULE
- DEER FENCE
- CABLE ROUTE
- SITE BOUNDARY
- LANDOWNERSHIP BOUNDARY
- CCTV
- TEMPORARY CONSTRUCTION COMPOUND
- GATE
- GRID CONNECTION

DECLARED NET CAPACITY = 650kW AC
 TOTAL INSTALLED CAPACITY = 850kW DC



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NOTES

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