

LAND TO THE NORTH AND EAST OF GREAT WYMONDLEY,
HERTFORDSHIRE (PRIORY FARM SOLAR ARRAY)

FLOOD RISK ASSESSMENT

Final Report v1.3
May 2022

Report Title **Land to the North and East of Great Wymondley, Hertfordshire
(Prior Farm Solar Array)**
Flood Risk Assessment
Final Report v1.3

Client Axis PED

Date of issue 30 May 2022

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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 detailed planning application for the proposed development of land to the east of Great Wymondley, Hertfordshire 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 Planning Practice Guidance (PPG) updated on 20 August 2021.

1.2 About This Version of the Report

This version of the report responds to matters raised by the Environment Agency in its consultation letter dated 20 January 2022. Specifically, the assessment has been revised to include the grid connection route to Wymondley Substation (principally **Section 4.3**, with other sections of the report updated to reference the grid connection).

A detailed strategy for managing surface water runoff from the developed site has been developed in response to matters raised by the Hertfordshire County Council (lead local flood authority) in its consultation response letter dated 14 February 2022. The strategy is presented in a Technical Note prepared by Weetwood (doc. ref: 5208/TN/Final/v1.1/2022-05-30; Issue date 30 May 2022).

1.3 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, the development proposals, ground conditions, existing site access arrangements and the flood zone designation
- Section 3** Presents national and local flood risk and drainage planning policy
- Section 4** Assesses the potential sources of flooding and presents measures to mitigate flood risk
- Section 5** Addresses the effect of the proposed development on surface water runoff
- Section 6** Presents a summary of key findings and the recommendations

1.4 Relevant Documents

The assessment has been informed by the following documents:

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

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development comprises of a solar panel and associated buildings element (“the main site”) and the proposed route of the connection to the National Grid (“the grid connection”).

The main site is an approximately 85.2 hectare (ha) greenfield site located between the villages of Great Wymondley, Little Wymondley, and Graveley. Hitchin is approximately 3.5 km to the west and Stevenage is approximately 4.6 km to the south. The main site comprises of two parcels separated by Graveley Lane. The northern parcel is approximately 44.9 ha, and the southern parcel approximately 40.3 ha. The centre of the site is at OS NGR TL222284.

The proposed point of connection to the main electricity grid is at the Wymondley Substation located approximately 1.8 km south-west of the main site.

The main site and grid connection are shown in **Figure 1** below.

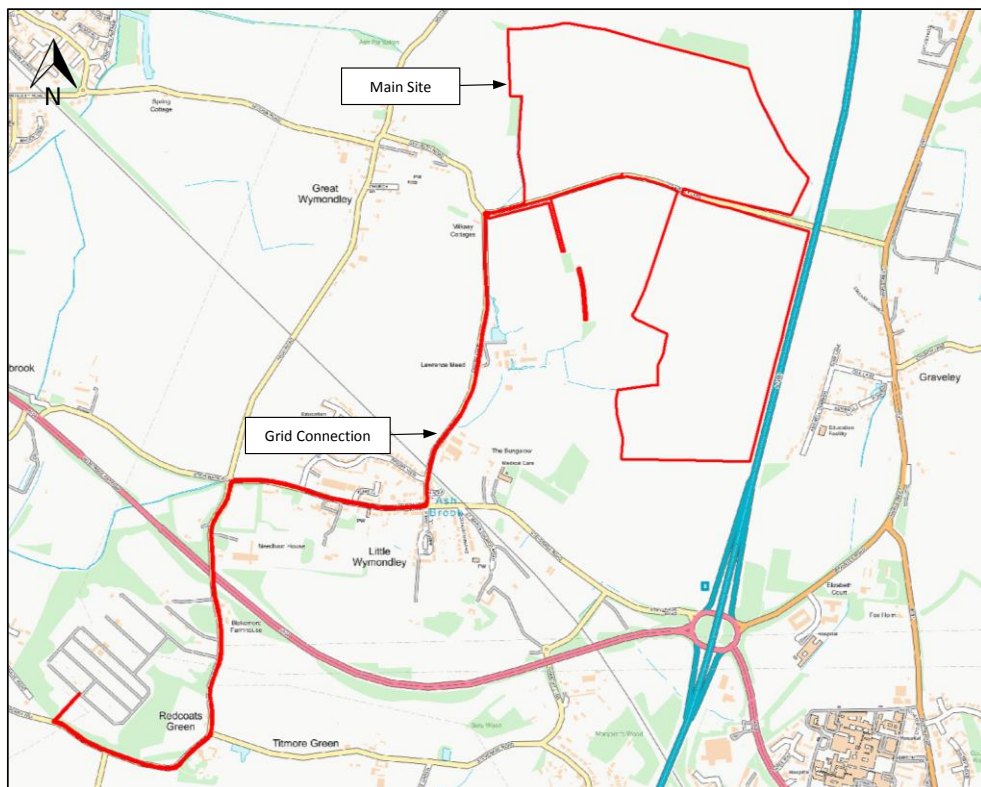


Figure 1: Site Location

2.2 Existing and Proposed Development

The site currently comprises of agricultural land.

The proposals for the main site comprise of solar panels and associated infrastructure comprising circa 1 no. switchgear building, 22 no inverter/transformer stations; 22 no. battery storage containers; 1 no. storage building; 1 no. control building, and access tracks. The main site is access from Graveley Lane.

Connection to the national grid would be at Wymondley substation, approximately 1.8 km south-west of the southern parcel. The proposed layout is presented in **Appendix A**.

Table 2 of the PPG does not specifically classify the flood risk vulnerability of solar farms. However, it is reasonable to presume that solar farms are Less Vulnerable to flood risk. The grid connection is considered to be Essential Infrastructure.

2.3 Waterbodies in the Vicinity of the Site

There are a number of small watercourses/drains in the vicinity of the main site which drain in a westerly/southerly direction (**Figure 2**). Ash Brook, an ordinary watercourse, flows in a westerly direction through Little Wymondley adjacent to Stevenage Road.

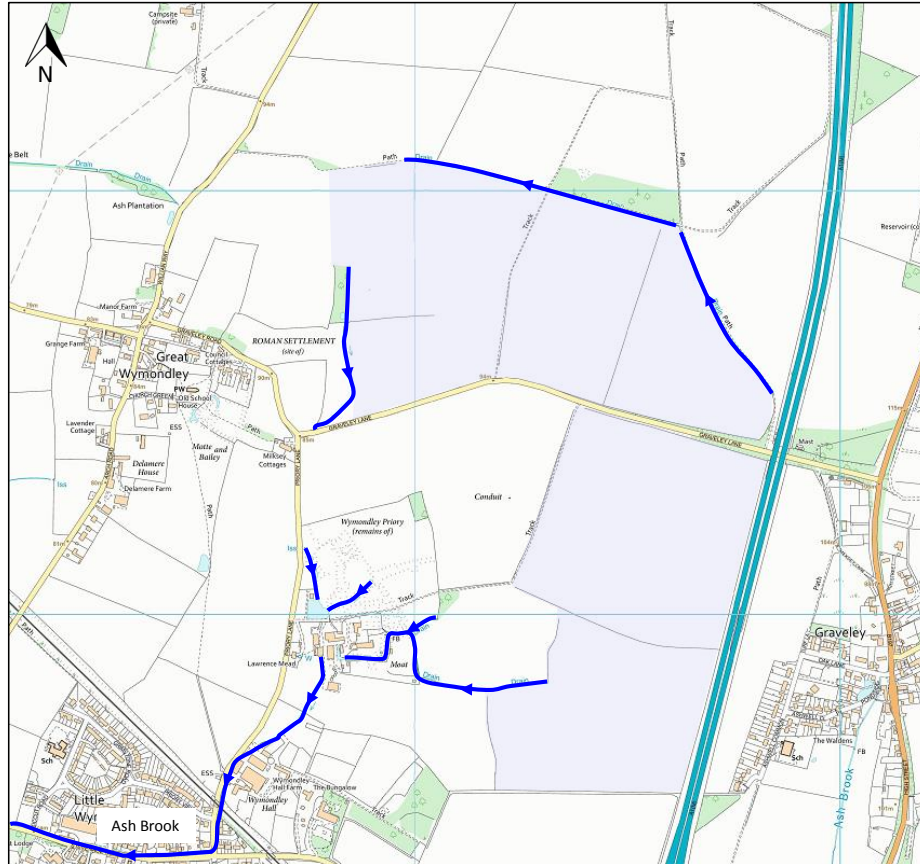


Figure 2: Location of Surface Waterbodies

2.4 Ground Conditions

According to the Soilsmap soils dataset produced by the Cranfield Soil and AgriFood Institute¹, soil conditions at the site and within the surrounding area are lime-rich loamy and clayey soils with impeded drainage.

British Geological Survey mapping of surface geology² indicates a complex arrangement of superficial deposit across the site, predominantly comprising of clay, silt, sand and gravel, with chalk in places, underlain by chalk bedrock (Holywell Nodular and New Pit Chalk Formation).

The National Geoscience Data Centre's Single Onshore Borehole Index³ indicates a number of borehole records located along the eastern boundary of the site. These largely indicate stiff sandy silty clays to a depth of approximately 4.0 m bgl, sandy silt with clay and medium gravel to a depth of 5.2 m bgl, underlain by chalky sand with gravel to a depth of 7.6 m bgl. Along the eastern boundary, stiff sandy clay with chalk is indicated to a depth of approximately 1.0 m bgl, underlain by hard white chalk to a depth of 12.2 m bgl.

¹ www.landis.org.uk/soilsmap/

² <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

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

According to the MAGIC website⁴ the superficial deposits are largely classified as a Secondary aquifer whilst the chalk bedrock is classified as a Principal aquifer. The entire northern parcel and part of the southern parcel is indicated to be located within a groundwater source protection zone 3 (total catchment).

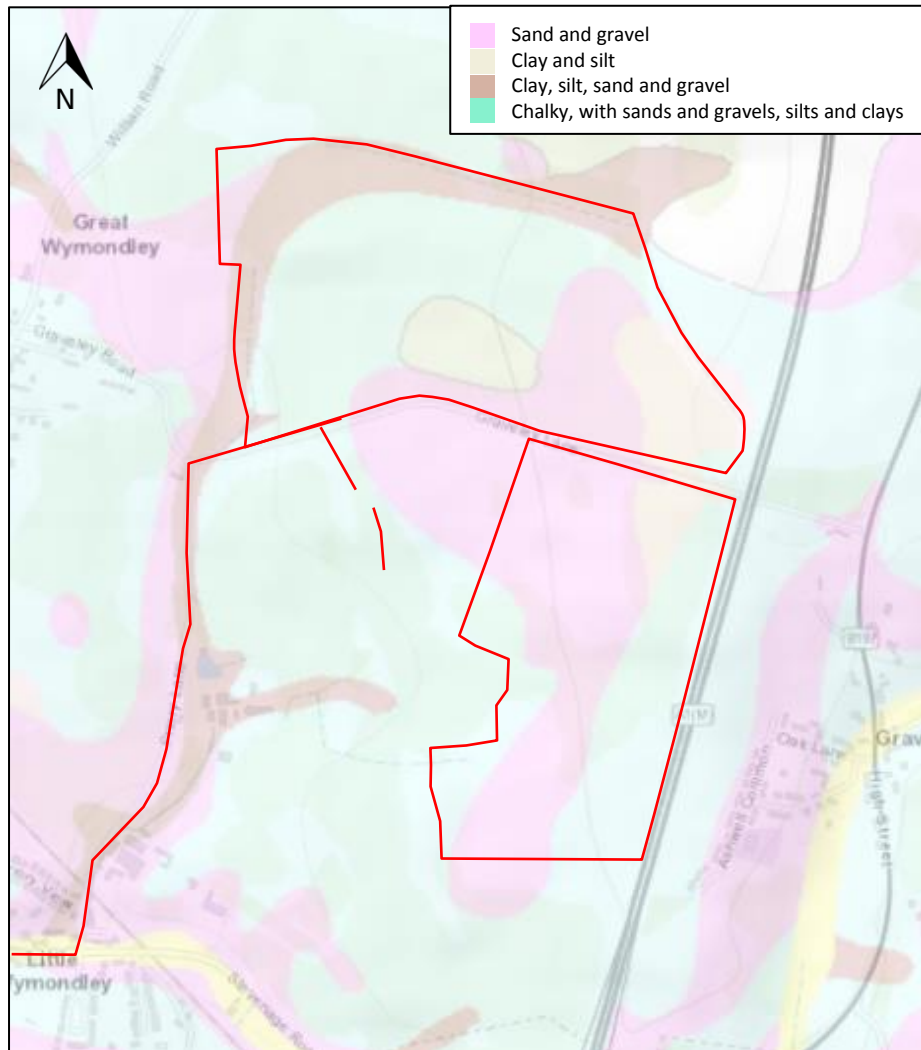


Figure 3: Superficial Deposits
Source: BGS website

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 4**. Site levels in the northern parcel range between 87.4 to 112.3 m AOD with site levels in the southern parcel between 91.0 to 113.1 m AOD. Ground levels along Graveley Lane are between 85.39 and 106.4 m AOD, falling towards the west.

The grid connection to the south-west of the main site falls to a level of 73.75 m AOD before rising to 94.78 m AOD at Wymondley Substation.

⁴ <https://magic.defra.gov.uk/MagicMap.aspx>

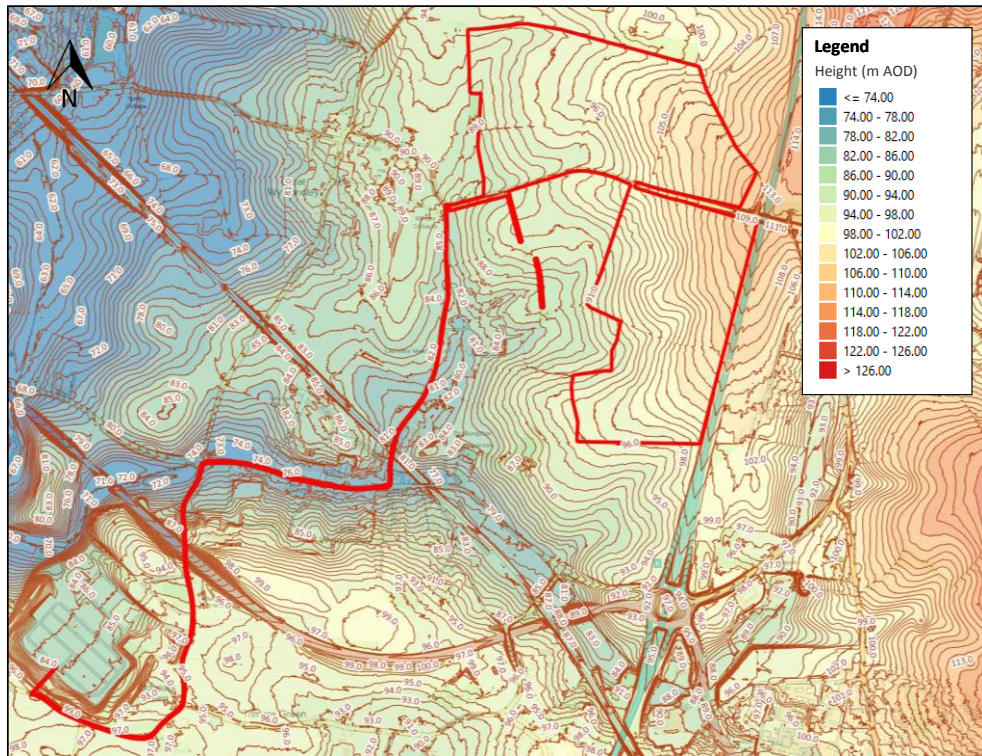


Figure 4: Digital Terrain Model from LiDAR Data

3 PLANNING POLICY AND GUIDANCE

3.1 National Planning Policy and Policy Guidance

The thrust of national planning policy, as articulated in the NPPF is that inappropriate development in areas at risk of flooding should be avoided where possible, as summarised below:

- Inappropriate development in areas at risk of flooding should be avoided and that development should be directed away from areas at highest risk (whether existing or future), but where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere (NPPF para. 159).
- The policy of seeking to steer development to areas with the lowest risk of flooding, from any source, is implemented through the application of the flood risk sequential test. Development should not be allocated or permitted if there are reasonably available sites, appropriate for the proposed development in areas with a lower risk of flooding. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding (NPPF para. 162).
- If it is not possible for 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 test will depend on the potential vulnerability of the site and of the vulnerability of the development proposed (as set out in Annex 3 of NPPF; also PPG Table 2 and Table 3) (NPPF para. 163). For example, the exception test need not be applied for less vulnerable development in any flood zone, or for more vulnerable development in flood zones 1 or 2.
- Where the exception test must be applied, application of the 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: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; (b) 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 para. 164). Both elements of the test should be satisfied for the development to be permitted (NPPF para. 165).
- Development should not increase flood risk elsewhere (NPPF para. 167).
- Where appropriate, planning applications should be supported by a site-specific flood risk assessment, and development should only be allowed in areas at risk of flooding where the flood risk assessment (and the sequential and exception tests, as required), demonstrate that: 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) the development incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d) any residual (flood) risk can be safely managed; and e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan (NPPF para.167).
- NPPF para. 167 references Footnote 55. The footnote 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 para. 167).
- Applications for some minor development and changes of use should not be subject to the sequential or exception tests (NPPF para. 168). The exceptions are stated in Footnote 56.

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

The North Hertfordshire Local Plan (1996) provides planning policies for the area's development, to promote improved social, community and leisure services for local communities, and to require the highest possible standards in services and design. Policy 50 - Flooding states that the Council will not normally permit development proposals which would be likely to result in a significant risk of flooding and that, the Council will seek measures to prevent an increase in the risk of damage to the river environment arising from development. However, this is not a saved policy and as such no longer forms part of the Development Plan, with the NPPF taking precedence.

The Local Plan 2011-2031 (2016) will replace the 1996 Local Plan and will provide planning policies for managed growth of North Hertfordshire over the next 20 years. The emerging plan is at an advanced stage and the following policies are relevant in respect of flood risk and drainage:

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 ensuring the provision of Sustainable Drainage Systems (SuDS) and other appropriate measures*
- c. Support the principles of the Water Framework Directive to protect, enhance and manage the water environment; and*
- d. Give consideration to the potential or actual impact of land contamination and support proposals that involve the remediation of contaminated land.*

Policy NE7: Reducing flood risk

Planning permission for development proposals will be granted where:

- 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 FRA 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 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 proposals will be granted where:

- a. The most sustainable drainage solution is used 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.*

3.3 Water Framework Directive

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

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.

4 REVIEW OF FLOOD RISK

4.1 Historical Records of Flooding

There are no records of historic flooding of the site in the Environment Agency recorded flood outlines database⁵.

4.2 Flood Risk from Rivers (and the Sea)

The Environment Agency Flood Map for Planning (Rivers and Sea)⁶ (Figure 5) indicates that the main site is located in flood zone 1. The grid connection route is located in flood zone 1 with the exception of a circa 700 m length along Stevenage Road in Little Wymondley located in flood zone 3.

Table 1 of the PPG defines flood zones as follows⁷:

- Flood zone 1: Low Probability. Land having a less than 1 in 1,000 annual probability of river flooding
- Flood zone 2: Medium Probability. Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding
- Flood zone 3a: High Probability. Land having a 1 in 100 or greater annual probability of river 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 and 1 in 1,000 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.

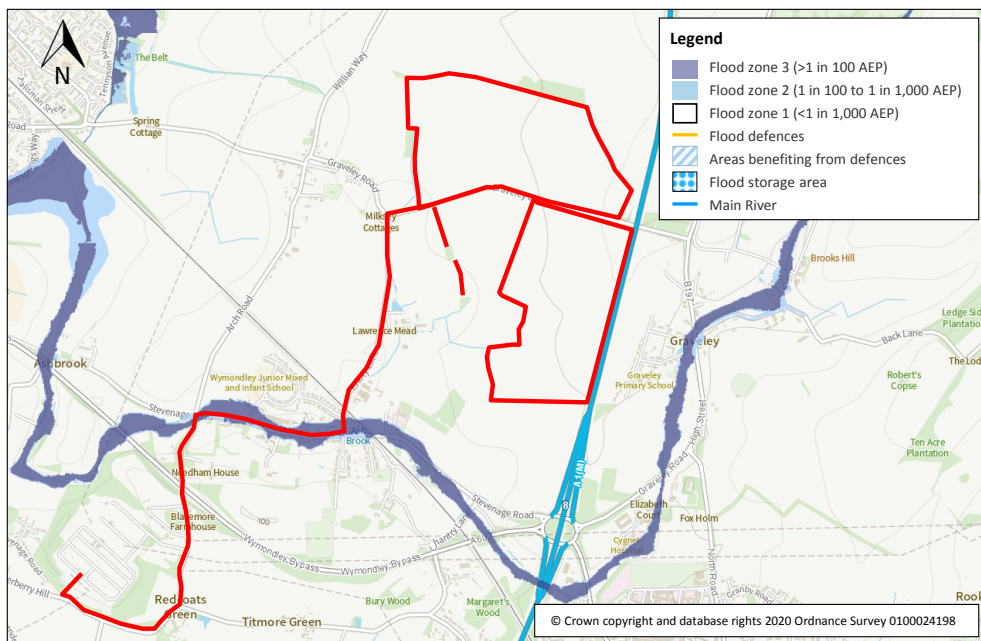


Figure 5: Flood Map for Planning
Source: gov.uk website; Accessed: February 2022

⁵ <https://data.gov.uk/dataset/d4efcd04-ed83-456e-b249-a408c95f44a1/recorded-flood-extents>

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>

The grid connection comprises underground cables. As such they would not be affected by flooding, nor increase flood risk. During installation, the cables would be laid along trenches located in the highway. Relatively small extents of trenches would be excavated with re-instatement generally occurring on the same day. No spoil would be stored along Stevenage Road. As such, the construction works would not increase flood risk elsewhere.

4.3 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 and drains in the vicinity of the site.

Overall, the Flood Risk from Surface Water map (**Figure 6**) indicates that the majority of the site is at Very Low risk of surface water flooding and flooding from small watercourses although the map, and the flood depth and velocity maps presented on **Figure 7** do indicate the potential presence of four separate flood pathways:

- Pathway A: Along the northern/western boundary of the northern parcel: This appears to be associated with the drainage ditches that run along the northern and western boundaries of the northern parcel and local topography. The pathway continues beyond the site boundary in a southerly direction across Gravelly Lane and along Priory Lane. The extent and depth of flooding is assessed to be relatively insignificant during the 1 in 30 and 1 in 100 AEP storm events and only becomes significant during the extreme (1 in 1000 AEP) storm event.
- Pathway B: Along the western part of the southern boundary of the northern parcel: Again, associated with a localised valley. This pathway is not present for the 1 in 30 AEP event becoming more significant during the extreme (1 in 1000 AEP) storm event.
- Pathways C: Two pathways across the central western part of the southern parcel: Again, associated with localised topography. These pathways are only indicated during the extreme (1 in 1000 AEP) storm event.

In all cases, the maximum depth of flooding is indicated to be almost entirely in the range 0-300 mm, with topography preventing the accumulation of floodwater to a greater depth. It is concluded the risk of surface water flooding is assessed to be Very Low, increasing to Low/Medium along the pathways highlighted above.

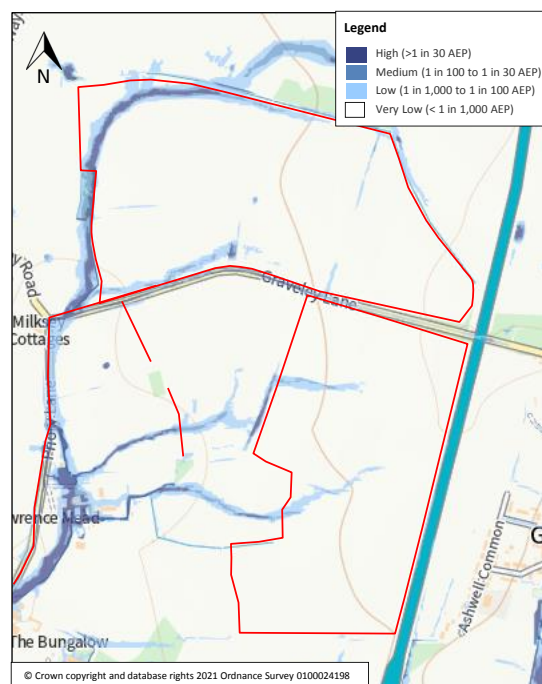
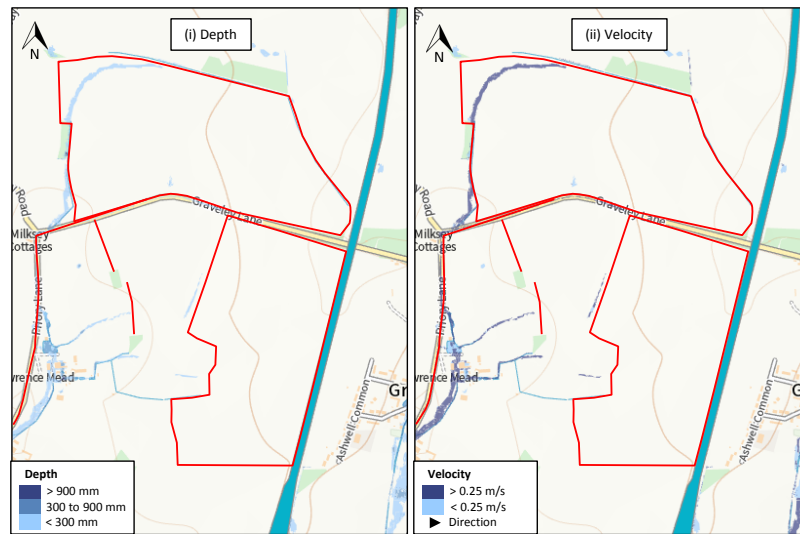
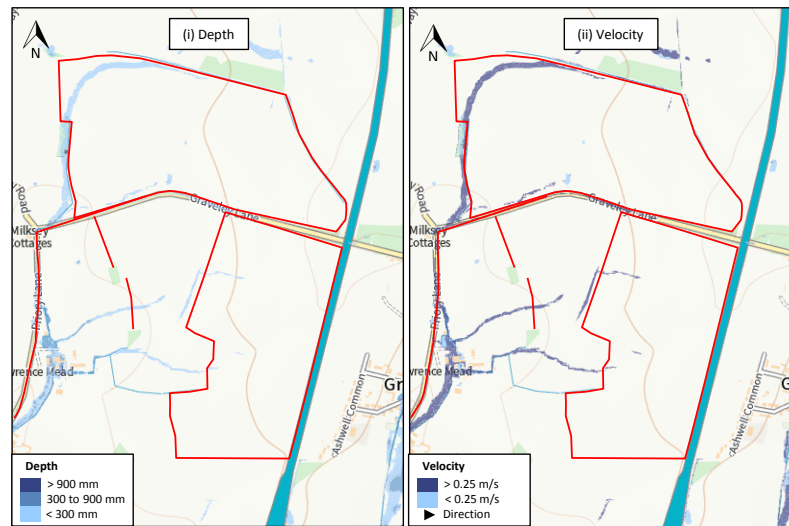


Figure 6: Flood Risk from Surface Water (Extent)

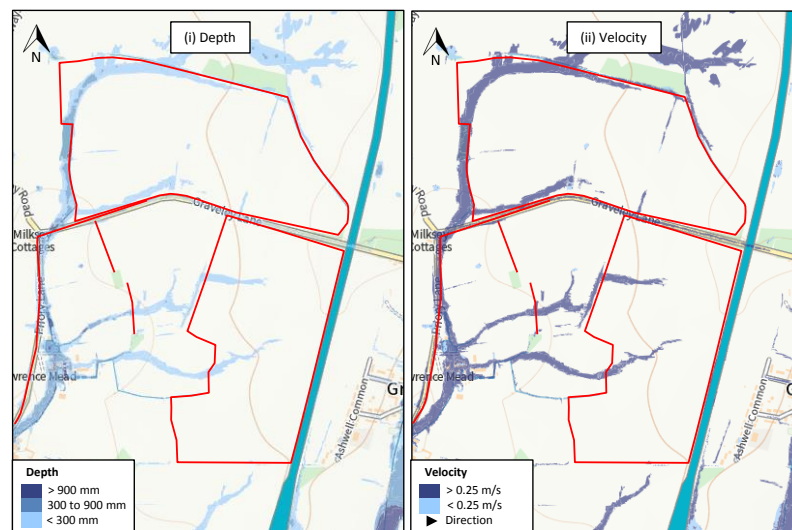
Source: gov.uk website; Accessed: February 2022



(a) High risk/low severity storm event (1 in 30 AEP)



(b) Medium risk/medium severity storm event (1 in 100 AEP)



(c) Low risk/high severity storm event (1 in 1000 AEP)

Figure 7: Flood Risk from Surface Water (Depth and Velocity)

Source: gov.uk website; Accessed: February 2022

4.4 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.

4.5 Flood Risk from Groundwater

The British Geological Survey Groundwater Flooding Hazard map (not shown) indicates that the site is at a Negligible risk of groundwater flooding.

4.6 Flood Risk Mitigation Measures

The risk of flooding to the proposed development from surface water sources will be mitigated through the implementation of the following measures:

- 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.
- The solar panels have the potential to concentrate runoff under the drip line. The area under the drip line would be seeded with a suitable grass mix to prevent rilling and an increase in surface water runoff rates.
- Existing drainage ditches would be retained. Any new crossings should maintain existing conveyance capacity.

4.7 Sequential Test

The main site is located within flood zone 1. As such the proposals satisfy the requirements of the sequential test.

5 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Axis PED and relates to the proposed development of circa 85.2 ha of land east of Great Wymondley, Hertfordshire for use as a solar farm.

The proposals are for the development of solar farm and associated infrastructure comprising circa 1 no. switchgear building, 22 no inverter/transformer stations; 22 no. battery storage containers; 1 no. storage building; 1 no. control building; and access tracks. Connection to the grid would be at Wymondley substation, approximately 2 km south-west of the main site.

According to the Flood Map for Planning the application site is located in flood zone 1, i.e. at a Low risk of river flooding. The majority of the site is at Very Low risk of flooding from surface water/small watercourses/drainage ditches, with the exception of a small number of localised overland flow pathways, where the risk is assessed to be Low/Medium. 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.

Part of the grid connection route is indicated to be in flood zone 3. However, all cabling is underground and would not be affected by flood risk nor increase flood risk.

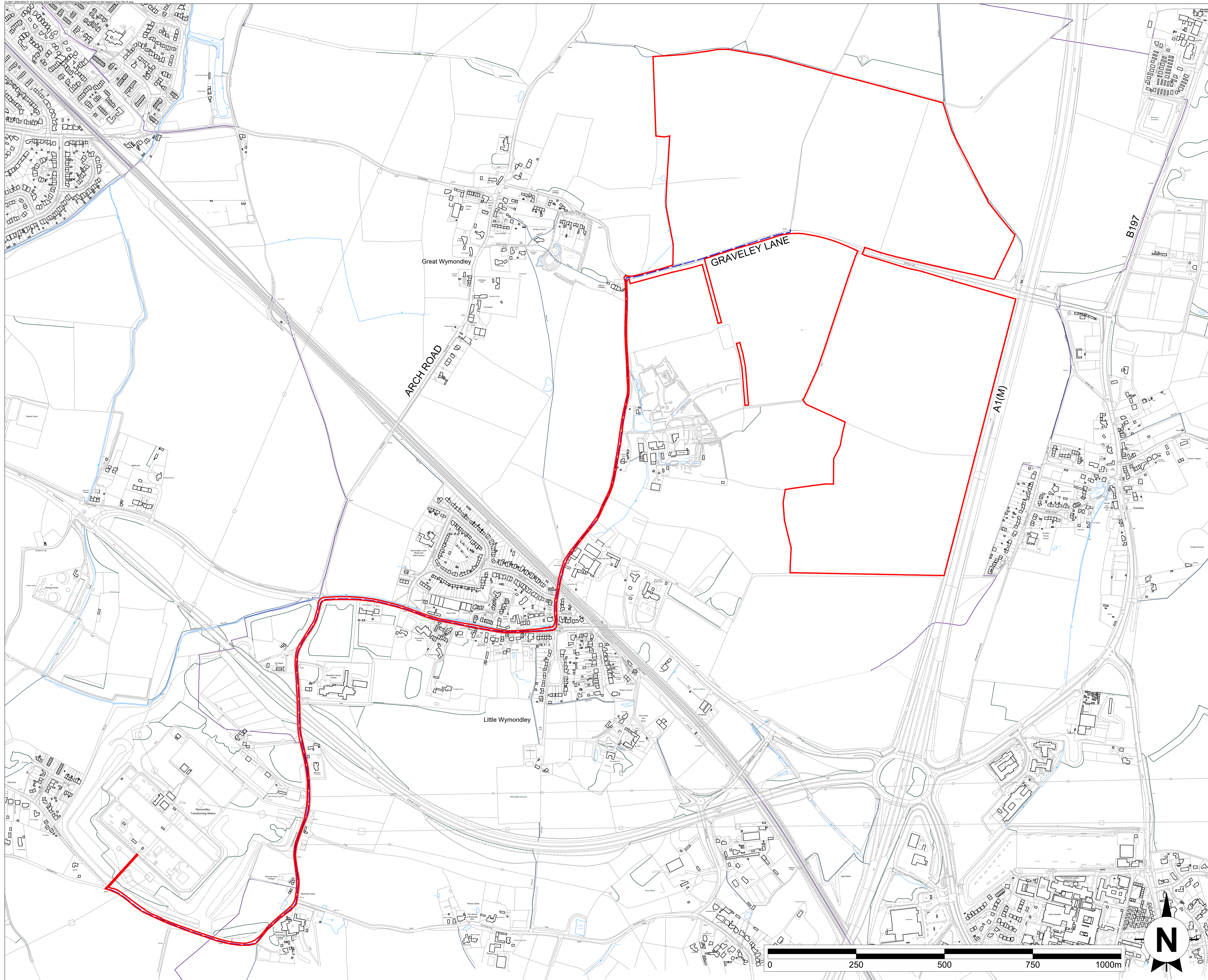
The proposals therefore satisfy the requirements of the flood risk sequential test.

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/drainage ditches should not be obstructed by the following: inverter/transformer stations, storage buildings, control buildings, switchgear buildings and battery storage containers.
- Existing drainage ditches should be retained. Any new crossings should maintain existing conveyance capacity.
- Ground under the drip line to be seeded with a suitable grass mix to prevent rilling and an increase in surface water run-off rates.

APPENDIX A

Proposed Layout



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Revision History		Date
A	Updated red line	10-11-21
B	Updated scale	14-12-21

- Application Boundary (880,080m²)
- Cable Route

Chester Office: Well House, Eames Breton Chester CH4 9DH	South Manchester Office: Canalside House 76 Water Lane Wilmslow SK9 5BB	axis
0844 8700 007 - www.axisped.co.uk		
client: AGR		
project: PRIORY FARM SOLAR ARRAY		
drawing title: STATUTORY PLAN		
date: October 2021	drawn by: SM	checked: FR
drawing number: 3004-01-002		
status: --		
scale(s): 1:5000@A1	rev: B	
planning environment design		

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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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