Alleston Solar Farm, Pembrokeshire

Flood Consequences Assessment

Reference Number: 3.0.7

October 2024

Alleston Solar Farm

Flood Consequences Assessment

On behalf of **Alleston Clean Energy Limited**

Project Ref: 333100998 | Rev: E | Date: October 2024

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E	04/10/2024	Updated following client comments	AH	LW	PM

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Executive Summary

This Flood Consequence Assessment (FCA) has been prepared by Stantec UK Ltd to accompany a Welsh Development of National Significance (DNS) full planning application for a proposed ground mounted photovoltaic solar farm together with associated equipment, infrastructure, and ancillary works on land at Alleston Farm, Lower Lamphey Road, Lamphey, Pembrokeshire. The site is at Lat/Long 51.664277, -4.8865986.

In accordance with the fundamental objectives of Planning Policy Wales and Technical Advice Note (TAN) 15 (2004), the FCA demonstrates that:

(i) The development is safe

(ii) The development does not increase flood risk; and

(iii) The development does not detrimentally affect third parties.

The Natural Resources Wales (NRW) *Development Advice Map* (DAM) shows the site predominantly lies within Zone A but indicates a small extent of Zone C2 in the northwest site corner. The DAM Zones are described within TAN 15 as follows:

> **Zone A** – Considered to be at little or no risk of fluvial or tidal/coastal flooding.
>
> **Zone C2** - Areas of the floodplain without significant flood defence infrastructure.

The Natural Resources Wales *Flood Map for Planning,* shows the site lies predominantly within Flood Zone 1 with regards to Surface Water and Small Watercourses. A small portion of the site area lies within Flood Zone 2 and Flood Zone 3. The Flood Zones are defined by NRW as follows:

> **Flood Zone 1 –** *Areas with less than a 0.1% (1 in 1000) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.*
>
> **Flood Zone 2 –** *Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.*
>
> **Flood Zone 3 -** *Areas with more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.*

Most proposed development is classified as '*Less Vulnerable'* development with limited proposals (e.g. substation) falling under a '*More Vulnerable'* development classification. A sequential approach has been applied within the development site, with all proposed development located outside of the floodplain. Both vulnerability classes are considered appropriate development within Flood Zone A. All proposed development is also located outside of the Small Watercourse and Surface Water Flood Zone i.e. within Flood Zone 1.

The site is at a negligible risk from all other sources of flooding including sewer, reservoir, tidal and groundwater flooding.

The development proposals result in a minor increase in impermeable area. Infiltration trenches will provide the required attenuation to ensure runoff from the site matches the pre-development greenfield runoff rate. Swales will be constructed to provide sediment removal and ensure water quality in receiving ordinary watercourses is not negatively impacted.

The FCA demonstrates that the proposed development is safe and in accordance with the requirements of national and local planning policy, whilst also ensuring no detrimental increase in flood risk to third-party land because of the development.

1 Introduction

1.1 Scope of Report

1.1.1 This Flood Consequences Assessment (FCA) has been prepared by Stantec UK Ltd ('Stantec') on behalf of our Client, Alleston Clean Energy Limited, to support a Welsh Development of National Significance (DNS) full planning application for a ground mounted photovoltaic solar farm together with associated equipment, infrastructure, and ancillary works, on land at Alleston Farm, Lower Lamphey Road, Lamphey, Pembrokeshire . The site is centred at Lat/Long 51.664277, -4.8865986 with National Grid Reference (NGR) of 200465, 200113 and indicative postcode SA71 5NJ.

1.1.2 This report will assess the flood risk posed to the development from fluvial, tidal, surface water, groundwater, sewers, and reservoirs whilst also providing any recommended mitigation to ensure the safety of the development and no detrimental impacts to third party land.

1.1.3 The report is based on the available flood risk information for the site as detailed in **Section 1.2** and prepared in accordance with the planning policy requirements set out in **Section 2**.

1.2 Sources of Information

1.2.1 This FCA has been prepared based on the following sources of information:

- Natural Resources Wales (NRW) published 'Open Data' datasets available online (see **Appendix A**)
- General PV Layout, ref: SCUKX-ALLES-000-PVL-100.01K, dated 23/08/2024
- NRW Online Development Advice Map1 / Flood Map for Planning and DataMapWales Flood Risk Assessment Wales2
- LiDAR Digital Terrain Model (DTM) data
- Pembrokeshire County Council Local Flood Risk Management Strategy (dated February 2015)
- British Geological Survey (BGS) data
- Welsh Government, Technical Advice Note 15, Development and Flood Risk (2004)
- Pembrokeshire Local Development Plan (adopted November 2013)
- Welsh Government, Guidance for Flood Consequence Assessments: Climate Change Allowances – updated September 2021
- Carmarthenshire & Pembrokeshire Stage 1 Strategic Flood Consequence Assessment (SFCA) – September 2019.

[1] https://naturalresources.wales/flooding/flood-map-for-planning-development-advice-map/?lang=en

[2] https://datamap.gov.wales/layergroups/inspire-nrw:FloodRiskAssessmentWales

1.3 Stakeholder Consultation

1.3.1 Consultation was held between Stantec and Pembrokeshire Sustainable Drainage Systems (SuDS) Approving Body (SAB) on the 16th of November 2023 via Microsoft Teams. The minutes of this meeting are included in **Appendix C**. The key agreements made during the meeting are listed below;

- Pembrokeshire SAB agree solar PV panels do not increase runoff, and therefore, there is no requirement for the provision of surface water attenuation for solar PV panel parcels
- Pembrokeshire SAB advise the construction of swales between proposed solar PV panel parcels and receiving ordinary watercourses to mitigate against sediment pollution, during both the construction and operational phase of the development.
- Pembrokeshire SAB would prefer solar PV panel and associated development is proposed outside of the small watercourse Flood Zone
- Consent is required from Pembrokeshire SAB if any development is proposed within 5m of an ordinary watercourse. This will include reinforcement / improvement of existing and provision of new road access crossings to watercourses.

1.3.2 Further email correspondence held between Stantec and Natural Resources Wales (NRW) and Welsh Water is included in **Appendix C**.

1.4 Caveats and Exclusions

1.4.1 This FCA and outline surface water drainage strategy has been prepared in accordance with Planning Policy Wales, the associated TAN15 (2004) and local planning policy. The approach for flood mitigation is based on the requirements of NRW and Pembrokeshire Council in its role as Lead Local Flood Authority (LLFA) and SuDS Approval Body (SAB).

1.4.2 The conclusions made in this FCA are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals as outlined.

1.4.3 Activities during the construction phase may have an impact on the existing and future flood risk. Thus, an assessment of the risks and appropriate mitigation measures should be identified and managed by the contractor.

1.4.4 The Construction (Design and Management) Regulations (CDM Regulations) will apply to any future development of this site which involves “construction” work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under the CDM Regulations.

2 Planning Policy Context

2.1 National Policy and Guidance

2.1.1 National policy in relation to flood risk is contained within the Planning Policy Wales – 'Development and Flood Risk' and subsequent supporting document - Technical Advice Note (TAN) 15 (2004).

2.1.2 It should be noted that a revised TAN15 (2021) and the supporting Flood Map for Planning was due to come into force in 2023 but has been suspended due to further consultation on the TAN. As such, the 2004 release is still the live planning document. Subsequently the NRW Flood Map for Planning has no official status until the revised TAN15 is implemented but remains the best available data for flood risk and should be used to inform planning advice.

2.1.3 The aims of TAN15 and criteria set out in TAN15 to be considered when proposing new development include:

- New development is directed away from areas at a high risk of flooding (e.g. Zone C)
- The Development Advice Map should be used where appropriate to trigger the required Justification and Consequences Tests
- Managing the consequences of flooding where development can be justified, and the consequences are considered acceptable
- Bear in mind that government resources for flood and coastal defence are directed at reducing risks for existing development and are not available to provide defences in anticipation of future development
- Making provision for future changes in flood risk, for example taking account of climate change, where they can be anticipated
- Ensure no increase in the volume and rate of surface water runoff leaving the site over its intended design lifetime.

2.1.4 For reference, the NRW DAM Zones, as defined in Figure 1 of the TAN15 (Paragraph 4.2), are as follows:

- **Zone A** – Considered to be at little or no risk of fluvial or tidal/coastal flooding.
- **Zone B** – Areas known to have flooded in the past evidenced by sedimentary deposits.
- **Zone C** – Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal).
- **Zone C1** – Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.
- **Zone C2** – Areas of the floodplain without significant flood defence infrastructure.

2.1.5 Flood Consequences Assessments must consider for a range of potential flooding scenarios up to and including the 0.1% Annual Probability (AP) flood.

2.1.6 TAN15 explains that an FCA will help the planning authority determine whether the risk and consequences of flooding are acceptable and can be appropriately managed over the lifetime of development. The assessment can also be used to establish whether appropriate avoidance or mitigation measures could be incorporated within the design of the development.

This ensures that over its' lifetime, development minimises risk to life, damage to property and disruption to people living and working on the site and does not increase flood risk elsewhere.

2.1.7 The impacts of Climate Change must be considered when preparing an FCA. Appendix 2 of TAN15 details projected increases in temperature will result in;

- More frequent storms
- Sea level rise
- Changes of rainfall pattern during the year – wetter winter and drier summers.

2.2 Local Policy and Guidance

Pembrokeshire Local Plan 2013

2.2.1 Local planning policy is contained within the Pembrokeshire Local Development Plan (adopted November 2013), with reference to General Policy 2. Sustainable Drainage which states:

> **Policy GN 2 Sustainable Design**
>
> *'It* [the development] *should incorporates a resource efficient and climate responsive design through location, orientation, density, layout, land use, materials, water conservation and the use of sustainable drainage systems and waste management solutions;'*

Pembrokeshire Stage 1 Strategic Flood Consequence Assessment

2.2.2 The Carmarthenshire & Pembrokeshire Stage 1 Strategic Flood Consequences Assessment (SFCA) was released in September 2019 and forms part of the Local Plan evidence base, to inform future spatial planning and to assist in developing planning policies to address flood risk. Moreover, the document provides an overall understanding of the flood risk within the study area considering all potential sources.

2.2.3 It is essential therefore that the Council can make informed decisions, providing a careful balance between the risk of flooding and other unrelated planning constraints that may place pressure upon *'at risk'* areas. The Stage 1 SFCA provides a broad assessment of flood risk at allocated development sites.

2.2.4 The Stage 1 SFCA includes the outputs of the South of Wales Shoreline Management plan 2m buffer, which assessed the extent of flooding in a 0.1% Annual Probability tidal flood with a 2m sea level rise allowance. The significance of these findings is discussed in **Section 4.2**.

2.2.5 The site is not an allocated development area within the Stage 1 SFCA, and therefore the Stage 1 SFCA provides no further detailed assessment relevant to this FCA and the site.

Pembrokeshire Local Flood Risk Management Strategy

2.2.6 The Pembrokeshire County Council Local Flood Risk Management Strategy (LFRMS) (dated 2015) aims to provide the required flood risk information and data to enable local delivery of local flood risk reduction measures. The LFRMS details the flood risk responsibilities of authorities, companies, and individuals in Pembrokeshire for all flood risk sources.

2.2.7 The LFRMS proposed various measures which can be taken on new development. Relevant measures are included below;

- considering and implementing measures to ensure appropriate development is designed to be safe and resilient to flood risk in the preparation of Local Development Plans and the assessment of all planning applications;
- avoiding inappropriate development in flood risk areas;
- increasing approaches that utilise the natural environment, like adopting soft engineering in place of traditional solutions, managing of the land to reduce storm runoff or creating more wetlands to store water;
- deploying the sustainable drainage systems (SuDS) approach for surface water management for both new and existing developments;

3 Proposed Development Site

3.1 Site Description

3.1.1 The Site (see **Figure 3-1**) encompasses approximately 96 hectares (ha) and comprises of several agricultural fields separated by rows of mature hedgerows.

3.1.2 Alleston Farmhouse, a Grade II Listed building, together with its associated buildings is located within the centre of the Site and is accessed from the north along Lower Lamphey Road and the west along Watery Lane, both unnamed tracks. It is proposed to use the existing northern access from Lower Lamphey Road as the access to the Site.

3.1.3 Some of the eastern fields within the Site are currently used for equestrian activities, which will continue. An area of mature trees and vegetation are located within the south-western region of the Site and run into the central region of the Site, this collection of trees is known as Alleston Wood, there are no plans to remove any of these trees.

3.1.4 In terms of topography, the Site slopes from highpoints in south and west towards the north and east. There are two unnamed watercourses located in the north of the Site, as well as a watercourse running alongside the southwestern boundary.

3.1.5 There are two Public Right of Ways (PRoW) which cross and meet in the centre of the Site. The first PRoW (SP32/52) runs to the western boundary of the Site and is accessible via Watery Lane. This PRoW connects to a bridleway (SP32/68) which borders the west of the Site and runs in a north-south direction, on Watery Lane. The second PRoW (SP32/51) runs in a north-south direction across the northern and southern area of the Site. This PRoW will be diverted to the southwestern edge of the farm's boundary via a Secondary Consent submitted alongside the main application.

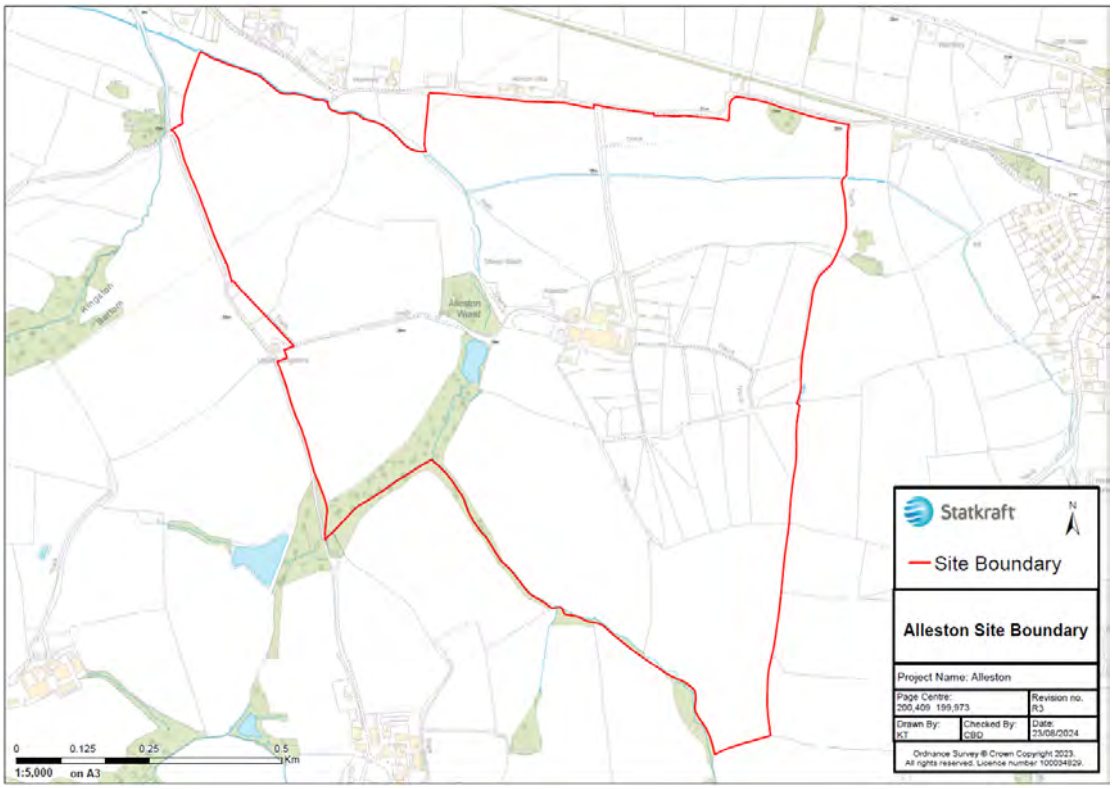


Figure 3-1: Site Location Plan

3.2 Topography

3.2.1 NRW LiDAR survey data (see **Figure 3-2**), indicates a natural drainage channel running south to north through the centre of the site. An ordinary watercourse follows this natural depression (see **Section 3.3**). The site has an elevation range of approximately ~60mAOD to ~10mAOD, and generally slopes south to north. In the south of the site, land slopes east to west and west to east on the eastern and western side of the watercourse respectively. A topographic survey of the site is provided with Drawing entitled ALLESTON LINEWORK ("CAD") (Above Surveying Ltd, Revision 1.0, 6 May 2024).

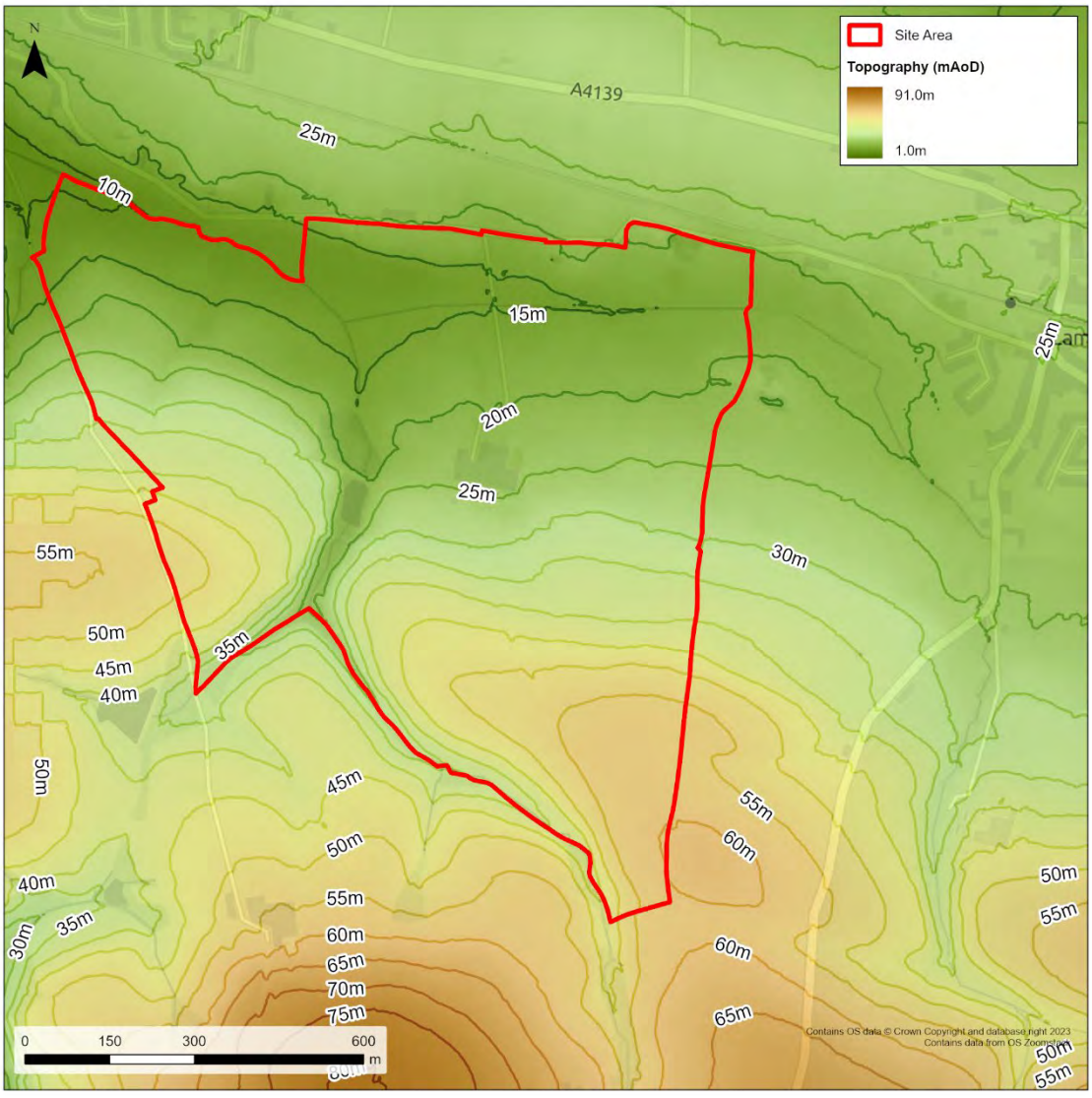


Figure 3-2: Ground Elevation Data

3.3 Hydrological Setting

3.3.1 No NRW designated Main Rivers are present at and surrounding the site, and so are all ordinary watercourses. An unnamed watercourse, for the purposes of this report shall be named the Alleston Brook, runs alongside the southern site boundary flowing southeast to northwest. The Alleston Brook eventually enters the site, flowing in a south to north direction, passing through a pond located in the centre of the site. It flows east to west along the northern boundary of the site, to outfall at the site's north western boundary corner at NGR 199740, 200620.

3.3.2 A tributary of the Alleston Brook enters the site at the south western corner and follows the site boundary before its confluence with the Alleston Brook at NGR 200240, 200350. An additional tributary of Alleston Brook flows from east to west through the north of the site. All watercourses within the site are designated as ordinary watercourses. The confluence of Alleston Brook and its northern tributary is located at approximate NGR 200240, 200350 (see **Figure 3-3**).

3.3.3 Alleston Brook and its northern tributary are both culverted beneath the farm track linking Watery Lane with Lower Lamphey Road via Alleston Farm. The watercourses are also culverted at gates located between field boundaries.

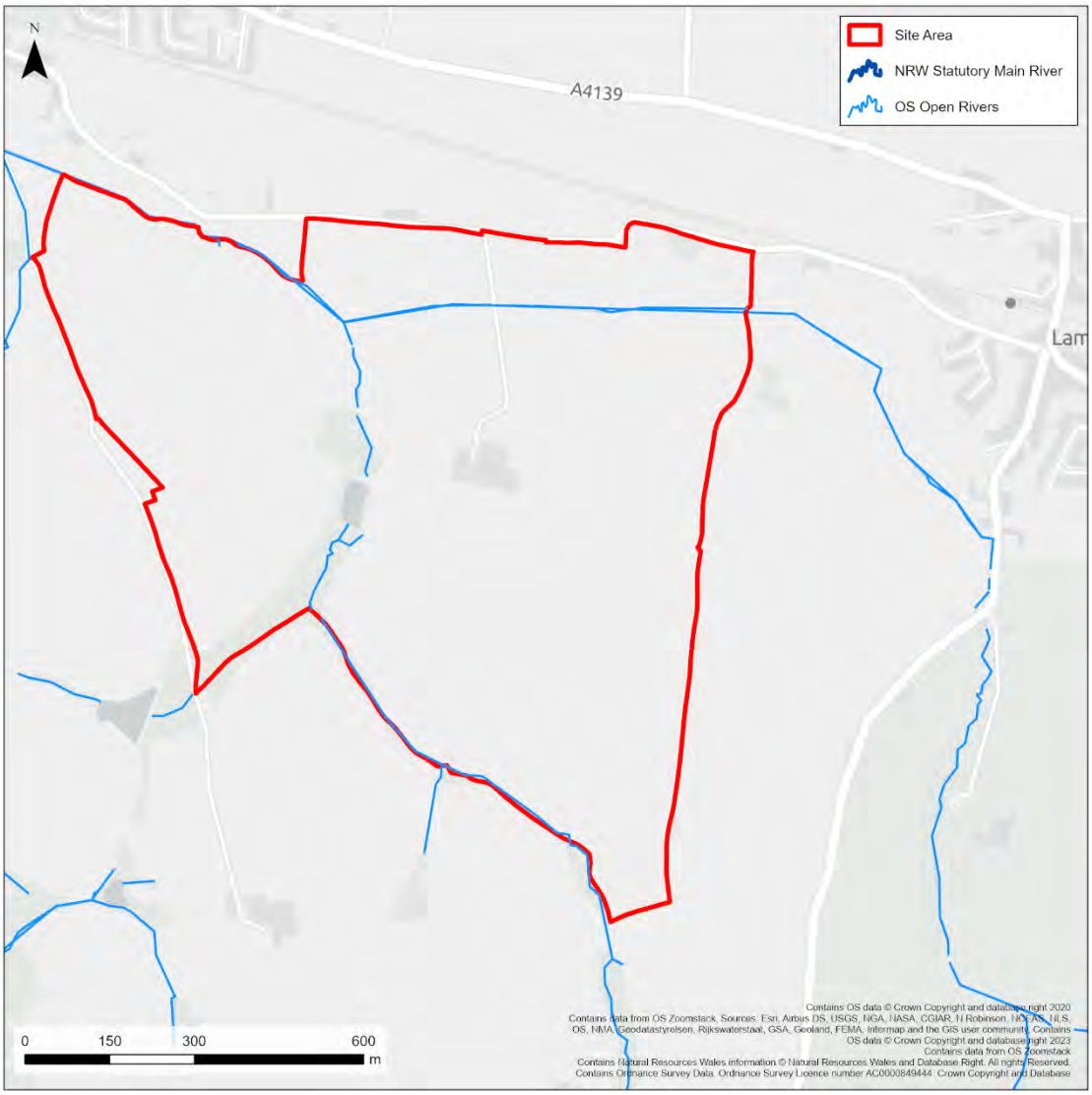


Figure 3-3: Watercourse Locations

3.4 Existing Drainage Arrangements

3.4.1 Runoff generated by the minimal areas of existing hardstanding associated with the agricultural use buildings in the centre of the site, are likely managed by an onsite private drainage system.

3.4.2 Runoff from the existing greenfield land will principally outfall via infiltration. The remaining surface water flows not infiltrating, will outfall to a watercourse following the local topography

of the land (see **Section 3.2**), with the majority of flow discharging to the Alleston Brook and its tributaries (see **Figure 3-3**). A nominal amount of greenfield land in the northwest site corner will outfall to Watery Lane and 3rd party agricultural land, via overland flow.

3.5 Geology and Hydrogeology

3.5.1 The British Geological Survey (BGS) Geology of Britian viewer suggests the site lies on various bedrock types. The bedrock geology has been listed below, starting with bedrock geology at the north of the site and ending with bedrock geology at the south of the site:

- Pembroke Limestone Group – *Limestone*
- Black Rock Subgroup and Gully Oolite Formation – *Limestone*
- Avon Group – *Limestone and mudstone*
- Skrinkle Sandstone Formation – *Sandstone*
- Ridgeway Conglomerate Formation – *Conglomerate*
- Mildford Haven Group – *Argillaceous rocks and sandstone*

3.5.2 The BGS do not have records of superficial material across much of the site area. However, Till – Diamicton is recorded by BGS in areas adjacent to the watercourse passing east to west through the north of the site.

3.5.3 The Limestone bedrock geology in the north of the site is classified as a Principal Aquifer. Sandstone, Argillaceous and Conglomerate bedrock geology in the south of the site is classified as Secondary A Aquifers.

3.5.4 The National Soil Resources Institute (NSRI) Soilscapes viewer indicates that the site lies on '*Freely draining slightly acid but base rich soils*' in the north of the site and '*Freely draining slightly acid loamy soils*' in the south of the site.

3.5.5 The site does not fall within a Source Protection Zone.

3.6 Proposed Development

3.6.1 A Development of National Significance (DNS) application is proposed for the construction, temporary operation, and decommissioning of the solar farm and associated equipment such as inverters, transformer stations, substation, fencing, CCTV, weather monitoring stations and cabling. The solar farm will connect to the grid via a 132kV overhead wooden pole, located within the site. The solar farm Development will have an operational lifespan of 40 years from the date of first export of electricity, after which it will be decommissioned.

3.6.2 The solar photovoltaic (PV) panels will have an anti-reflective coating. They will be ground mounted to a piled frame made of galvanized steel or aluminium. The PV panels will be crystalline silicon. Either monofacial or bifacial modules will be used.

3.6.3 The PV modules will be installed on a fixed tilt structure, facing south. Key features of the installation which should be noted, and which arise from the topography of the Site. Attention is drawn to the following key points:

- The fixed tilt range is 10-25 degrees from the horizontal.
- The spacing between the rows will range from 2.5-5 metres.
- The lowest part of the structure will be about 0.8 metres above ground level.

- The highest point of the structure will range from about 3 metres to a maximum of 3.4 metres above ground level. However, at topographical high points within the Site the highest point of the structure will not be more than 3 metres above ground level.

The variations just described will not be noticeable to viewers looking into the Site.

3.6.4 The mounting posts for the support structure are pile driven into the ground at a depth of 0.5–4.5 metres below ground level, depending on the ground condition, the optimum pile depth will be determined by a survey to be carried out prior to construction.

3.6.5 CCTV cameras will be mounted on posts up to 5m high, and positioned at appropriate intervals to ensure that the entire perimeter fence is monitored. Up to 3 weather stations will be installed to measure performance and these will be up to 5m in height.

3.6.6 The perimeter fencing for the Development will consist of deer type fencing and gates of approximately 2m in height. The fence will be offset by 100mm from the ground to allow passage of small animals and will include mammal gates at appropriate intervals.

3.6.7 Internal tracks to allow vehicular access between fields will be constructed of compacted crushed stone, utilising existing internal gateways/gaps where possible. For single tracks, the width typically ranges between 3.5-4 metres whereas a 2-way track would be up to 6 metres wide.

Substation/HV Compound

3.6.8 A HV substation compound will be located in the centre (~51.665721, -4.8916358) of the Site and will provide the infrastructure to connect the solar farm to the electrical grid via a 132kV overhead line within the Site area. The substation/HV compound, will be surrounded by a palisade fence with an electric fence and additional stock fence. Furthermore, a communication mast is potentially required to service the substation. The mast would not be a prominent feature and details can be provided prior to development commencing, if necessary.

MV Switchgear Room/Edge of Park Switchgear Station

3.6.9 The MV switchgear room accommodates the switchgear panels to protect the equipment and allow safe isolation of the MV electrical circuits.

Monitoring / Control Building

3.6.10 A monitoring cabin/building will be located next to the HV Compound. The cabin will house the telecommunications/control/SCADA and security system equipment (CCTV), to enable 24-hour remote monitoring of the Site to identify any faults and to relay CCTV footage to an external security company.

Temporary construction compounds

3.6.11 There are two construction compounds proposed within the Site, providing an area for temporary storage, unloading of trucks and the necessary parking and welfare facilities for the workers onsite will be installed and subsequently removed once the construction has been completed. One of which will predominantly be used for the substation infrastructure and the other for the whole site, more centrally located.

3.6.12 The road layout would allow sufficient room for deliver vehicles to manoeuvre, unload their cargoes and exit in a forward gear. The compound would provide parking for light vehicles and HGVs undertaking deliveries to unload. A temporary permeable stone surface will be used for the compound.

Storage containers

3.6.13 Two 40ft shipping containers will be installed to provide storage space for the solar farm.

Grid connection

3.6.14 Onsite grid connection will be achieved via a 132kV overhead line (OHL). Alleston Farm will connect to the Pembroke GSP via a tee-in arrangement at or near pole 82 of the Pembroke to Golden Hill 132kV circuit located within the Site. A new 132kV circuit, underground cable (UGC), will be constructed between this point of connection and Alleston Farm.

4 Assessment of Flood Risk

4.1 Fluvial (River) Flood Risk

4.1.1 Fluvial flooding occurs when rivers are unable to cope with the volume of water draining from the surrounding land because of sustained or intense rainfall. The increase in water causes the river water levels to rise above its banks and/or retaining structures and flow across land.

4.1.2 The first phase in identifying whether a site is potentially at risk of fluvial or tidal flooding is to consult the NRW's Development Advice Map (DAM), available on the NRW's website. Based on the NRW DAM, the site is shown to predominantly lie within Zone A, with a very minor extent of Zone C2 located in the northwest site corner (see **Figure 4-1**) (for zone definitions, see **Section 2.1**).

Figure 4-1: NRW Development Advice Map

4.1.3 The NRW FMfP Flood Zones are split between *Rivers & Sea* and *Surface Water & Small Watercourses*.

4.1.4 The NRW FMfP Flood Zones show most of the site is classified as Flood Zone 1 with regards to River and Sea flooding however, there is an extent of Flood Zone 2 and Flood Zone 3 indicated to extend into the northwest site corner.

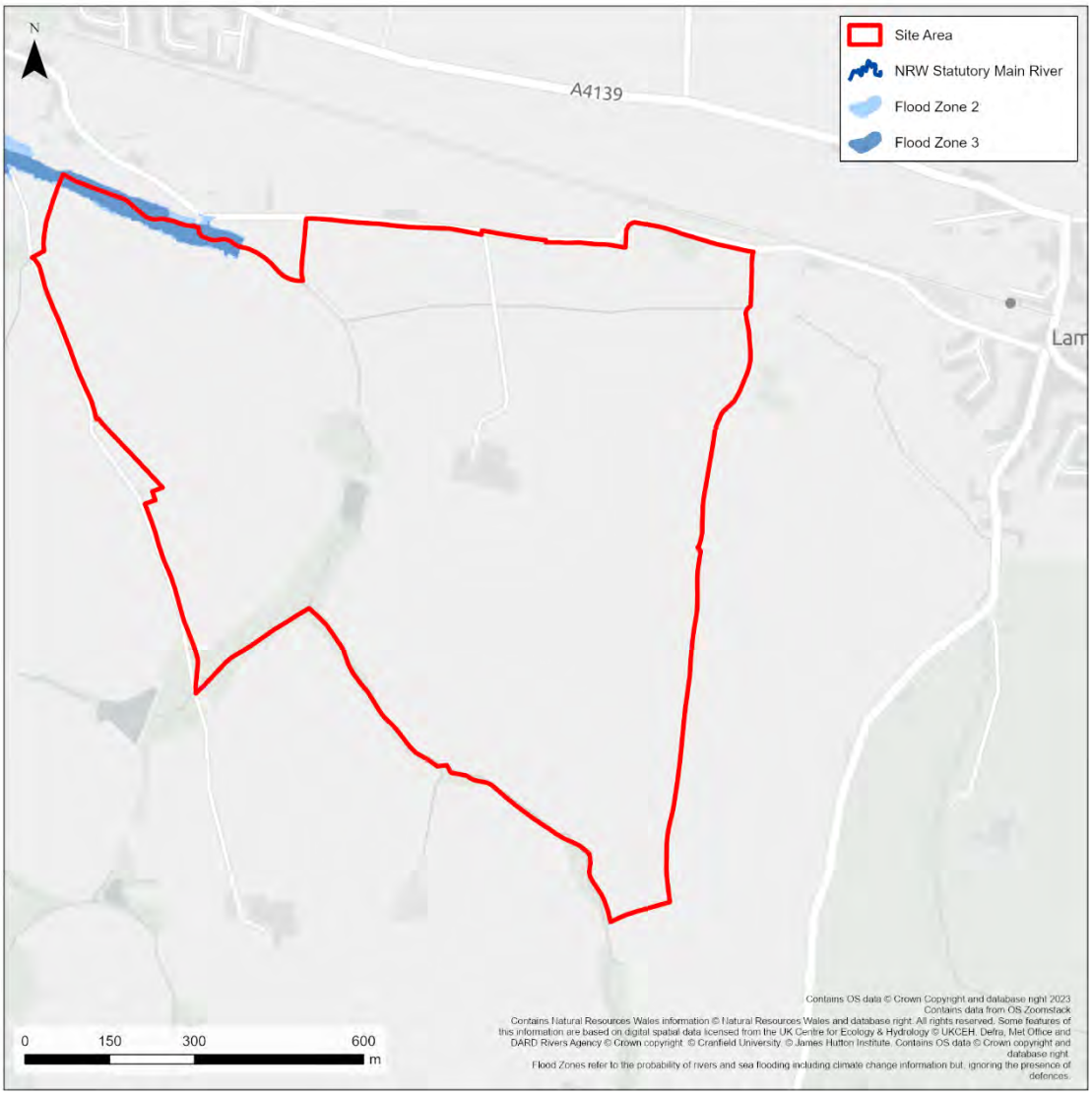


Figure 4-2: NRW Flood Map for Planning – Rivers & Sea

4.1.5 For reference, the NRW's Flood Zones for *'Flooding from rivers'* is defined within Figure 2 of the DRAFT TAN15 (2021) as follows:

- **Flood Zone 1** – Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year
- **Flood Zone 2** – Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change
- **Flood Zone 3** – A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.

4.1.6 The Rivers & Sea Flood Zone extent is limited to the northern site boundary. All other stretches of ordinary watercourse within the site are assessed under the Surface Water &

Small Watercourse Flood Zone. The definition for Flood Zones for Surface Water and Small Watercourses is the same as the definition for '*Flooding from rivers'* Flood Zones.

4.1.7 Similarly, to the Rivers and Sea Flood Zones, the Surface Water & Small Watercourses Flood Zone mapping (see **Figure 4-3**) indicates most of the site lies within Flood Zone 1. However, there are extents of Flood Zones 2 and 3 indicated to impact the northern portions of the site and areas around the Alleston Brook and its' northern tributary. Owing to the generally steep nature of the local topography, the majority of the Flood Zone 2 and 3 extents are limited to the valley floor, running south to north, and lower lying areas immediately adjacent to the Alleston Brook. The exception is a Flood Zone 2 and 3 extent associated with the tributary flowing east to west through the north of the site. The Flood Zone extents suggest water in the tributary is restricted behind a potential culvert under the Alleston Farm access road. The model used to generate Surface Water and Small Watercourse Flood Zone extents does not account for culverts. Therefore, the model suggests water 'backs-up', at the culvert passing beneath Alleston farm track, before spilling over the watercourse's northern bank, creating an overland flow route across the access road and northern parcels of land. The Flood Zone extents indicate this overland flow route to follow local topography west before rejoining the Alleston Brook in the northwest of the site.

4.1.8 Depth mapping indicates most of the flow route to have depths below 600mm however, the area of ponding located immediately east of the farm access track is indicated to have greater depths up to 900mm.

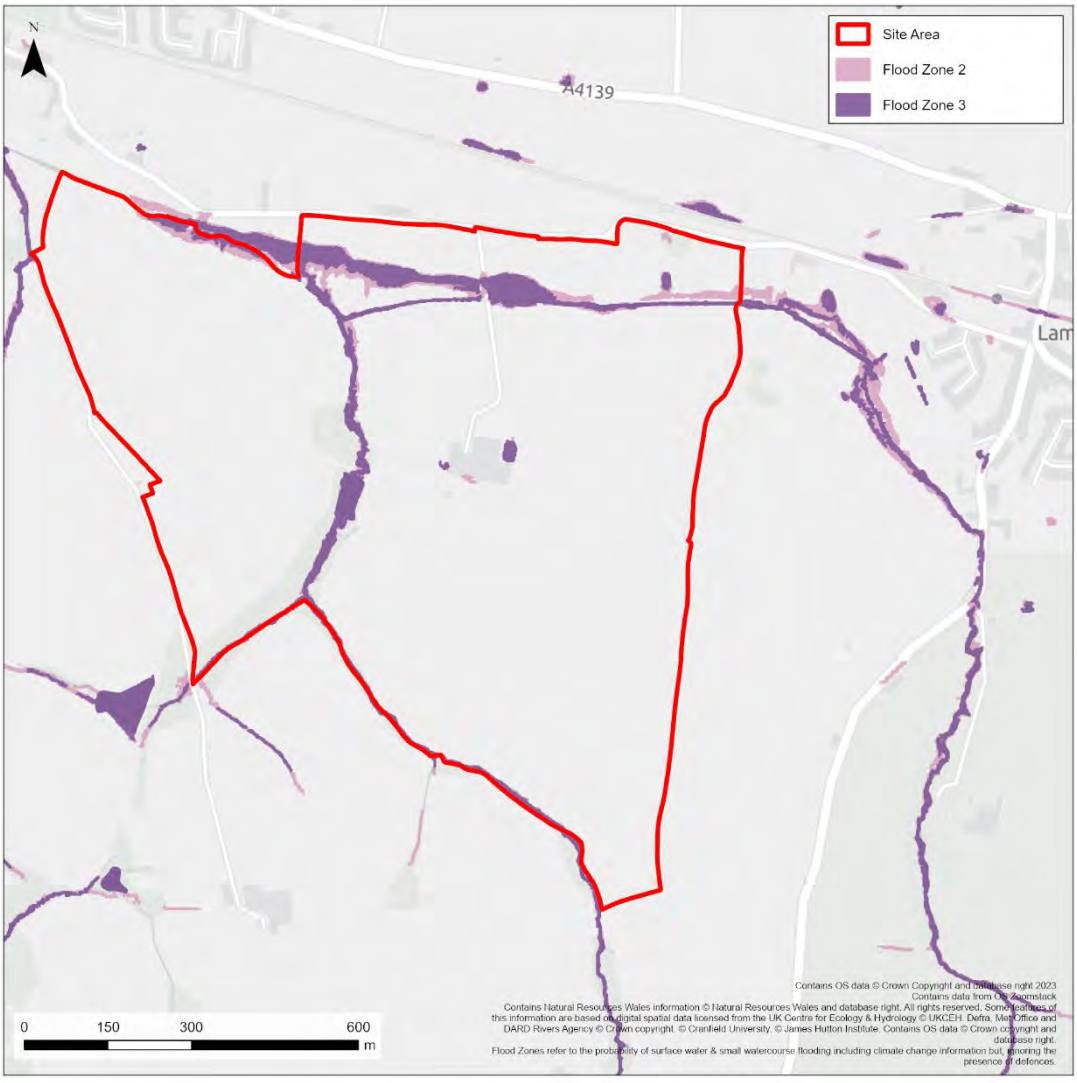


Figure 4-3: NRW Flood Map for Planning – Surface Water and Small Watercourses

Historic Flooding

4.1.9 The NRW 'Recorded Historic Flood Extents' dataset indicates that NRW hold no records of flooding within the vicinity of the site. Correspondence received from NRW on the 6th of November 2023 (see **Appendix** C) confirms that NRW do not hold any records of flooding at the site.

Flood Defences

4.1.10 The NRW Flood Map for Planning[3] indicates that the site does not lie in a TAN15 defended zone and no flood defences are in the vicinity of the site.

4.1.11 Correspondence received from NRW on the 6th of November 2023 (see **Appendix C**), confirms that NRW do not have flood assets in the area, nor do they have plans for any flood alleviation projects.

Climate Change

4.1.12 Projections of future climate change in the UK suggest that short-duration, high-intensity rainfall storms and long-duration rainfall events will become more frequent. This will in-turn increase the magnitude of fluvial, tidal, and surface water flooding. TAN15 recommends that the effects of climate change are incorporated into FCAs.

4.1.13 TAN15 (2004) climate change guidance applies a general 20% increase to peak river flows.

4.1.14 The Flood Map for Planning (see **Figure 4-2** and **Figure 4-3**) displays predicted future flood risk under the central climate change allowance for the given area, as reported in Flood Consequences Assessments: Climate Change Allowances guidance (September 2021), still under consultation. The Flood Map for Planning therefore represent the best available data for the assessment of future fluvial Flood Zones.

Fluvial Flood Risk Summary

4.1.15 Based on the above, most of the site is concluded to be at low risk of flooding from fluvial sources, in the present day, and in the future after consideration of climate change. However, there is an increased risk associated with the Alleston Brook and its tributary, specifically in the northern portions of the site.

4.2 Tidal Flood Risk

4.2.1 Tidal flooding results in the inundation of low-lying areas due to high tides that breach or overtop the flood defence structures. Tidal flooding is generally caused by seasonal high tides, stormy weather conditions results in strong wave action that increase water levels above the norm and storm surges.

4.2.2 The NRW Flood Map for Planning distinguishes between the fluvial and tidal Flood Zone extents. Flood Zone extents encroaching into the northwest site corner (see **Figure 4-2**) are shown to be fluvial sourced, not tidal.

4.2.3 The site is located >9m AOD (see **Section 3.2**). The Pembrokeshire Level 1 SFCA includes the outputs of the South of Wales Shoreline Management plan flood extent mapping of the 0.1% AP tidal flood with a 2m sea level rise. These flood extents do not impact the site (see **Appendix A**). The SFCA notes '*the maximum 0.5% AP or greater extreme tide level plus sea level risk is 6.9m* [mAOD]'.

[3] Flood Map for Planning (naturalresources.wales)

4.2.4 Therefore, the site is concluded to be at low risk of tidal flooding, in the present day and after consideration of climate change.

4.3 Surface Water (Pluvial) Flood Risk

Surface water flooding is caused by the inability of intense or prolonged rainfall to infiltrate into the ground due to the maximum soil infiltration rate or storage capacity being reached. The flows that are generated by such events will flow overland either entering any existing land drainage features or following local topography causing areas to pond and flood.

4.3.1 The NRW *Surface Water* Flood Mapping identifies areas that could be susceptible to surface water flooding in various rainfall events. The latest mapping assesses flooding resulting from severe rainfall events, including an allowance for climate change based on the following scenarios:

- 'High' Risk: 1 in 30 (3.3%) or greater Annual Probability (AP) rainfall event
- 'Medium' Risk: Between a 1 in 100 (1%) and 1 in 30 (3.3%) AP rainfall event
- 'Low' Risk: Between 1 in 1000 (0.1%) and 1 in 100 (1%) AP rainfall event
- 'Very Low' Risk: Lower than 1 in 1000 (0.1%) AP rainfall event.

4.3.2 NRW surface water flood extent mapping (see **Figure 4-4**) indicates that most of the site is at a 'very low' risk of surface water flooding. However, the mapping suggests an area of increased risk, up to high risk, in the northern portions of the site, associated with the tributary of the Alleston Brook.

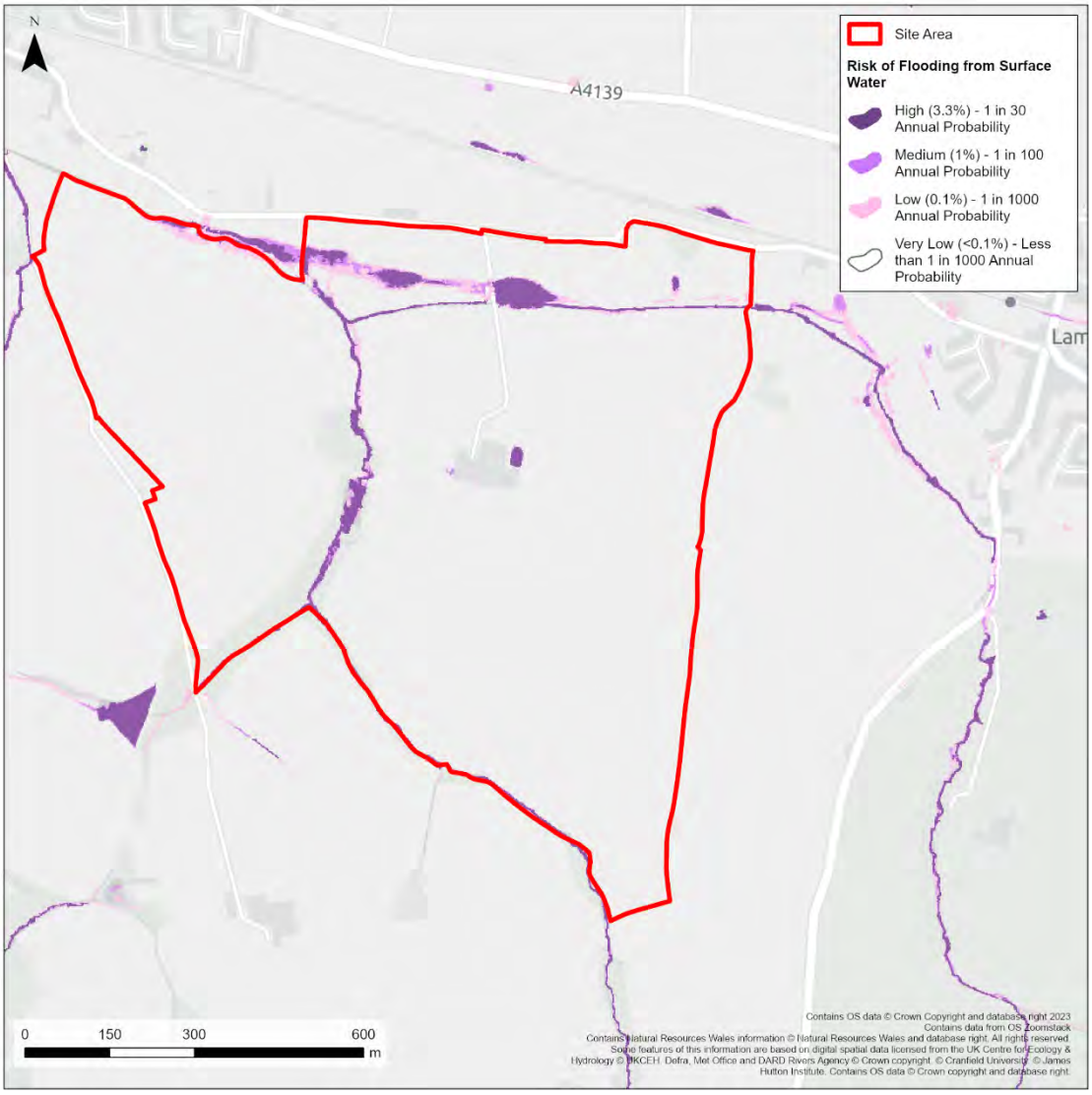


Figure 4-4: NRW Surface Water Flood Risk Extents

4.3.3 In the absence of fluvial Flood Zones across the site, the Flood Zones for Surface Water & Small Watercourses have been used as an indicator of potential fluvial flood risk associated with the ordinary watercourses as the peak flows within these watercourses will be largely fed by local surface water flows. As a result, the areas of overland flow indicated in the north of the site, shown to have connectivity with the tributary, are likely representative of fluvial flooding and have been discussed in **Section 4.1**.

4.3.4 Whilst the key overland flow route in the north is likely an indication of fluvial flooding, there are smaller isolated areas of surface water flooding shown within the site boundary. An area of surface water ponding, indicated to be high risk, exists directly to the east of the agricultural use buildings. This area of ponding is indicated to reach depths of over 1200mm however, it shows no connectivity to the surrounding area and as such is likely an indication of a locally isolated lower lying area.

4.3.5 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure and infiltration, although an adjustment is included in urban areas to account for the impact of

sewerage and a standard infiltration allowance based on soil type. Consequently, the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.

Climate Change

4.3.6 As discussed in **Section 4.1**, projections of future climate change in the UK suggest short-duration, high intensity rainfall storms and long-duration rainfall events will become more frequent, in-turn increasing the magnitude of surface water flooding.

4.3.7 Surface Water Flood Extents, as displayed in the Flood Map for Planning (see **Figure 4-4**), account for climate change, and therefore represent the best available data for the assessment of future surface water flooding.

4.3.8 The predicted increase in rainfall intensity under the upper climate change allowance for the 2050's epoch (2040-2069) is +20%. The associated climate change guidance, '*Flood Consequences Assessments: Climate Change Allowances Guidance, September 2023'* is still under consultation, however, remains the best available source of information. The predicted increase in rainfall intensity is considered in the design of surface water drainage infrastructure in **Section 6**.

Surface Water Flood Risk Summary

4.3.9 The site is concluded to be predominantly at a very low risk of surface water flooding, in the present day and after consideration of climate change.

4.4 Groundwater Flood Risk

4.4.1 Groundwater flooding is the emergence of groundwater at the ground surface. It can occur in a variety of geological settings including valleys in areas underlain by chalk, and in river valleys with thick deposits of alluvium and river gravels. Groundwater flooding happens in response to a combination of already high groundwater levels (usually during mid or late winter) and intense or unusually lengthy storm events.

4.4.2 The site is underlain by Limestone, Mudstone, Sandstone and Conglomerate bedrock geology (see **Section 3.5**). These geologies are classified as Principal and Secondary A aquifers. These aquifer classifications suggest that bedrock geology beneath the site is porous and/or permeable and will store large volumes of groundwater.

4.4.3 However, given the presence of the Alleston Brook and its tributary running through the site it is considered likely that the groundwater table will be in hydraulic connectivity with the water levels of the ordinary watercourses passing through the site, acting as natural drawdown points for groundwater flows. Therefore, if groundwater emergence was to occur, it would likely be, constrained to valley floors or locally lower lying areas, during times of high fluvial flows.

4.4.4 As such the site is concluded to be at low risk of flooding from groundwater sources.

4.5 Reservoir Flood Risk

4.5.1 The NRW Flood Map for Planning provides mapping showing the risk of flooding in the event of a reservoir failure. The site does not lie near a reservoir breach flood extent. Therefore, the risk of flooding from reservoirs is negligible.

4.6 Sewer Flood Risk

4.6.1 Correspondence received from Welsh Water on the 8th of December 2023 confirmed that Welsh Water '*have reviewed their flooding database and have no flooding history with the location or vicinity requested* [the site]'.

4.6.2 Therefore, the risk of sewer flooding is low.

4.7 Other Artificial Sources of Flood Risk

4.7.1 Current guidance and policy outlines that all sources of flood risk should be considered, including flooding from water supplies and other water retaining infrastructures, canals, water (potable) supply etc.

4.7.2 A retaining pond structure is indicated to lie approximately 75m upstream of, and to the southwest of the site, on the southern tributary of the Alleston Brook. In the event of a breach, given the local topography, flood waters would likely be constrained to the valley floor and are unlikely to extend into areas of proposed development.

4.7.3 There are no other artificial sources that would pose a flood risk to the site.

4.8 Flood risk summary

4.8.1 The assessment of flood risk has identified that the site is predominantly at a low risk of flooding.

4.8.2 The majority site is at a low risk of flooding from fluvial (main river and small watercourse) and surface water flooding, however, land in the northern portion of the site is indicated to be at an increased risk of overland flows associated with the northern tributary of the Alleston Brook.

4.8.3 Flood extents associated with the ordinary watercourses passing through the site are mostly constrained to channels and adjacent areas of valley floor due to the steep topography of the site.

4.8.4 The risk of flooding from reservoir breach, tidal, sewer and other artificial sources are negligible. NRW do not hold any records of historic flooding at the site.

5 Proposed Development, Sequential Approach and Justification Test

5.1 Proposed Development

5.1.1 This FCA provides supporting documentation for a Welsh Development of National Significance (DNS) application proposed for the construction, temporary operation, and decommissioning of a solar farm and associated equipment such as inverters, transformer stations, substation, fencing, CCTV, and cabling. Connection to the electricity grid will be via the 132kV overhead pylon which crosses the site. The solar farm development will have an operational lifespan of 40 years, after which it will be decommissioned.

5.2 Flood Risk Vulnerability

5.2.1 Welsh planning policy (specifically TAN15) aims to direct development towards zones at low risk of flooding. This is principally achieved through the Development Advice Maps and the application of the Justification Test as set out in TAN15.

5.2.2 The existing TAN15 (2004) document does not identify solar farms within its development category and vulnerability (Figure 2 of TAN15). However, Figure 3 of the amended TAN15 (2021), classifies *'Renewable energy generation facilities'*, and therefore most of the proposed solar farm development as '*Less Vulnerable Development'*. The transformer stations and DNO/customer HV compound constitute *'Highly Vulnerable Development'*. Whilst the updated TAN15 is not a live document yet, it is considered that the development vulnerabilities are considered appropriate in this instance.

5.3 Justification Test

5.3.1 The site lies almost entirely within Development Advice Map Zone A. All proposed solar PV panels and associated development are to be in Zone A.

5.3.2 A sequential approach has been adopted on site to ensure all proposed solar PV panels and associated infrastructure is constructed outside of areas at risk of fluvial and surface water flooding (see **Section 4**). All proposed development is also located in River & Sea Flood Zone 1, Surface Water & Small Watercourses Flood Zone 1 and outside of mapped surface water flow routes and areas of surface water ponding (see **Appendix D**). Proposed development is in areas significantly raised above the valley floor, mitigating against the residual risk of groundwater flooding. The site is at a negligible risk from all other sources of flooding.

5.3.3 A constraints plan has been created to visualise the application of the Sequential approach on site and has been included in **Appendix D**.

5.3.4 Given the location of development in Zone A and proposed development sequentially located in areas of lowest risk (i.e. Flood Zone 1) from all sources of flooding, the proposals are considered appropriate development at this location, in accordance with Section 9 of TAN15 (2004). As such, successful application of the Justification Test and subsequent Consequences Test is not required in this instance.

5.3.5 The only constraint for development in Flood Zone A, is the requirement to not increase off-site flood risk. This is addressed in **Section 6**.

6 Flood Mitigation Strategy

6.1 Access and Egress

6.1.1 Maintenance/construction workers will access the site via Lower Lamphey Road. Lower Lamphey Road is located entirely within Development Advice Map Zone A, and River and Sea Flood Zone 1. Lower Lamphey Road is also indicated to be at a low risk from all other sources of flooding. As such, safe access and egress is provided during extreme flood events.

6.2 Maintenance Track Design

6.2.1 Maintenance tracks are to be constructed from permeable material, as per the proposed design options provided in **Figure 6-1** giving materials and cross-sections. Option 1 shows approximately 300mm of topsoil will be removed and imported stone/aggregate will fill its place. Proposed access track edges will therefore be at surrounding ground level Option 2 shows approximately 300mm of imported stone/aggregate will be placed above ground level. If Option 1 is adopted, road surface levels will be approximately 30mm above surrounding ground level, to provide a camber of the road surface. If Option 2 is adopted, road surfaces will be raised up to approximately 300mm above surrounding ground levels. All proposed new maintenance/access tracks are located outside of areas identified to be at risk of surface water flooding, with the exemption of utilising existing watercourse crossings.

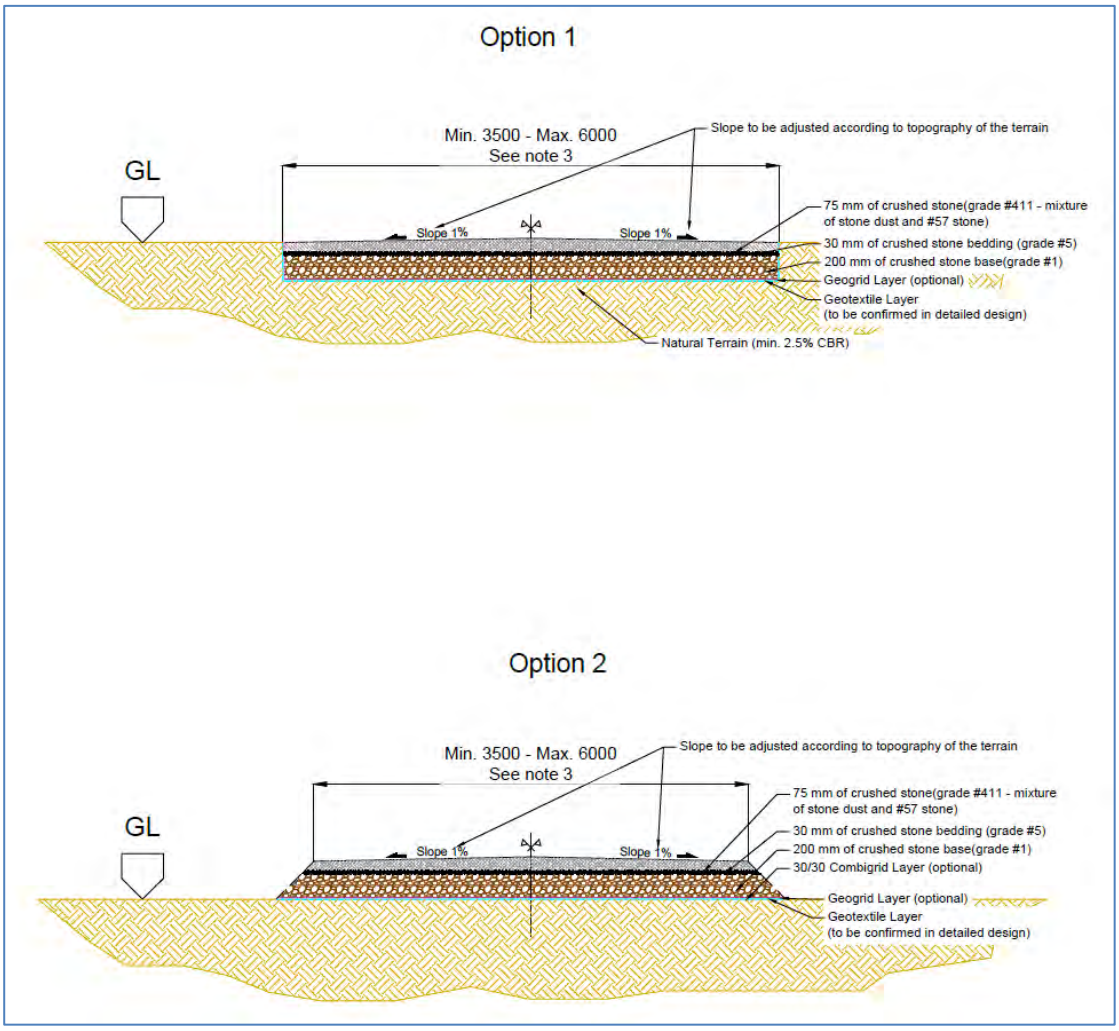


Figure 6-1: Internal track section detail (SCUKX-ALLES-000-MCS-201 (20240531))

6.2.2 Due to the location of proposed tracks in areas of very low surface water flood risk and construction from permeable material with minimal land raising, there is very little potential for obstruction to natural flow paths, erosion, and subsequent diversion of surface water to other areas of proposed development.

6.2.3 Maintenance pavements (see **Appendix G**) will be constructed using permeable materials e.g. reinforced grass or gravel surfaces, resin bound gravel

6.3 Stakeholder Consultation and Surface Water Drainage

6.3.1 Whilst the proposed solar PV panels themselves are constructed from impermeable material, the ground beneath the panels will be retained as grass. Panels will be raised a minimum of 800mm above ground level allowing rainfall to drain off the panels onto the permeable ground beneath. Maintenance tracks will be constructed from permeable material, as detailed above. A study undertaken by the American Society of Civil Engineers investigated the impact of solar farm development on runoff rate. The study concludes solar farm development does not affect runoff rates or volume (L,M,Cook., R, H, McCuen., 2013). In a meeting held with Pembrokeshire SAB on the 16th of November 2023, the SAB agreed that parcels of proposed solar PV panels will not increase runoff. Given the literature findings and views of Pembrokeshire SAB, there is no requirement to provide surface water attenuation for parcels of solar panels (see **Appendix C**).

6.3.2 The HV compound measures approximately 2,065m^2. However, only approximately 350m^2 of the total HV compound area will be impermeable. The impermeable area is comprised of the staff/storage room roof area and separate concrete plinths beneath each individual HV compound infrastructure feature. The remaining area will be constructed of a permeable gravel surface such as 15-20mm stone chips, with an approximate depth of 150mm. All proposed impermeable land is surrounded by gravel, which will intercept flows from impermeable land uses. Therefore, no formal attenuation is required for the HV Compound.

6.3.3 The proposals include transformer stations each with an impermeable area of under 15m^2. Land surrounding these impermeable areas will not be gravelled, and therefore, attenuation will be provided to mitigate the increase in surface water runoff from the transformer stations. Attenuation will be provided by infiltration trenches located to receive roof water from each transformer station, away from trafficked areas to prevent soiling, underground services to prevent unnecessary clashes, and excavation zones. The infiltration trenches have been sized assuming a 10% increase in rainfall intensity (as discussed in **Section 4.3**). Infiltration trenches are to be located at least 3m downstream of the impermeable transformer station surfacing. Between transformer stations and infiltration trenches, filter strips are proposed, with a 2-5% slope and 3m minimum width. Filter strips are uniformly graded and gently sloping strips of grass or other dense vegetation.

6.3.4 The underlying geology noted in **Section 3.5** including freely draining soils, bedrock including limestone and sandstone, and the presence of aquifers indicate potential for infiltration. With the absence of Ground Investigation infiltration rate testing, a conservative approach has been taken, whereby infiltration rates are set as 1×10^{-6} m/s. This rate corresponds to the infiltration rate of a very poor infiltration media – silty, clay, loam soil, as taken from table 25.1 of CIRIA SuDS Manual C753. Infiltration trenches will have the following dimensions; 1m width, 0.5m depth and 7m length. Trenches should be wrapped bottom, sides and 150mm below the top of stone fill with a non-woven geotextile to prevent the ingress of fines. Top of stone should be slightly below surrounding ground level to limit scatter. Stone fill should be clean and free of fines. Infiltration sizing calculations are provided in **Appendix E**.

6.3.5 Email correspondence and discussions held with Pembrokeshire SAB have highlighted that sediment collection swales should be proposed for both the construction and operational phase of the development. This FCA therefore proposes sediment collection swales at Alleston, located between solar PV panel development parcels and receiving ordinary

watercourses passing through the site and located along the southern and northern site boundaries (see **Appendix D**).

6.3.6 Sediment collection swales of dimensions 0.15m depth, 0.2m base width, 1.4m top width and 1 in 4 side slopes, will primarily discharge to ground. In high rainfall events, swales will 'overtop'. Excess water will follow the local topography down to the Alleston Brook and its' tributaries (see Exceedance Flow Route plan in **Appendix D**). No development is proposed within predicted exceedance flow routes. Therefore, secondary discharge is to watercourse. As such, the discharge point from the site will remain at the northwest site corner (as reported in **Section 3.3**) (see **Appendix D**). Leaky dams constructed with permeable material (e.g. rip-rap or timber boards) are proposed every 10-20m to slow the velocity of surface water within the sediment collection swales to mitigate against scour and resultant re-suspension of collected sediments. Leaky dam dimensions are as follows; height 0.1m, base width 0.2m and flow width 1m. Leaky dams will also provide temporary storage. A biodegradable erosion protection mat, such as coir matting with a minimum 400gsm weight, is proposed along the length of the exceedance routes to mitigate against erosion during exceedance events until ground vegetation matures sufficiently to provide such resilience.

6.4 Watercourse Protection

6.4.1 As highlighted by Pembrokeshire SAB in a meeting held on the 16th of November 2023, and through email consultation (see **Appendix C**), no development will be proposed within 5m of the top of bank of any ordinary watercourse shown to pass through the site or along site boundaries (see **Figure 3-3**) (see **Appendix D**). The design has incorporated a 5m buffer from the top bank.

6.4.2 Development proposals (see **Appendix B**) include various new maintenance tracks connecting the existing track passing through the site with the HV Compound in the centre of the site and transformer stations located throughout the solar PV panel development parcels. These tracks will utilize existing crossings, and associated culverts, hence resulting in no new culverting, and subsequent flow restriction of the ordinary watercourses on site.

6.4.3 Upgrades to existing road access culverts/crossings are likely to be required, and new access road crossings are required, to suit the needs of the proposed development provided in **Appendix B.** Any changes being made to the existing culverts or structures would ensure no change in existing flow regime i.e. to prevent restrictions, existing culverts requiring replacement will be provided with larger culverts, with a minimum diameter of 450mm. SAB approval would be obtained prior to any works within 5m of the watercourses.

6.5 Water Quality

6.5.1 Appropriate pollution control measures have been included in the surface water drainage strategy to minimise the risk of contamination or pollution entering the receiving water bodies from surface water runoff from the development.

6.5.2 Surface water generated by impermeable transformer stations, will pass through a filter strip – infiltration trench SuDS treatment train prior to discharge to ground.

6.5.3 Whilst proposed to be constructed from permeable material, pollution runoff from proposed access/maintenance tracks has nonetheless been considered, to ensure a conservative approach is taken when considering potential pollution. For most proposed maintenance/access track surfaces, pollutant runoff would first flow over filter strips, with a minimum width of 3m.

6.5.4 Sediment collection swales are proposed along most of the length of onsite watercourses. Therefore, for most pollutant flows, the next stage of the SuDS treatment train is sediment collection swales, prior to discharge to watercourse, thus providing another level of pollutant removal.

6.5.5 The drainage strategy complies with the requirements of the SuDS Simple Indices Approach as laid out in CIRIA C753 'The SuDS Manual'. Outputs of the Simple Indices Approach assessment are found in **Appendix F**.

6.6 Amenity and Biodiversity

6.6.1 The site will retain and divert the existing Public Rights of Way (PRoW) within the site (see **Appendix B**). A proposed PRoW will be located to the east of Alleston Brook running south to north through the site. This PRoW will run between proposed swales and the Alleston Brook. Thus, the indicated swale routes will serve multiple purposes, including public recreation and visual amenity. The proposed swales will be constructed with 1 in 4 side slopes, grass planting and will be routed to follow the natural topography of the land, thus allowing SuDS to enhance characteristic landscape features.

6.6.2 The indicated swale routes will serve multiple purposes including green infrastructure connectivity and the provision of habitats. Native grass planting within swales will provide habitats for birds and insects (including pollinators), invertebrates and small mammals. The proposed swales can be classified as 'dry swales', which will provide habitats for upland and transition species that can tolerate dry and wet conditions.

6.7 Operation and Maintenance

6.7.1 A separate Stantec report, titled '*Detailed SuDS Asset Operation and Maintenance Plan'*, to be submitted as part of the Full SAB application and appended (see **Appendix G**), outlines the necessary SuDS maintenance activities to be carried out on all proposed SuDS features.

6.7.2 To ensure the ongoing performance of the swale for sediment removal, the proposed sediment removal swale will require regular maintenance over its lifetime. Typically, the maintenance of SuDS features involves removing litter/debris in the system and general landscaping/grass cutting.

6.7.3 The following tables outlines key operation and maintenance requirements for grass swales, infiltration devices and filter strips as taken from The CIRIA SuDS Manual (C753).

Table 6-1: Vegetated Swale Maintenance Activities

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range*	Monthly (during growing season), or as required in the Outline Landscape and Ecological Management Plan (oLEMP)
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets, and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required*
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices.	As required
*Whilst CIRIA guidance recommends mowing should retain grass lengths of 75-150mm across treatment surfaces, longer vegetation lengths are not considered to pose a significant risk to functionality and as such, grass lengths suitable for native grass planting can be adopted.		
** Leaky dams constructed with permeable material (e.g. rip-rap or timber boards) are proposed every 10-20m to slow the velocity of surface water within the sediment collection swales to mitigate against scour and resultant re-suspension of collected sediments.		

Table 6-2: Infiltration Device Maintenance Activities

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris, and trash	Monthly
	Cleaning of any gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
	Inspect for and remove sediment and debris from floor of inspection tube	Annually (or as required)
	Cut grass – around trench	Half yearly: spring (before nesting season) or as required
Remedial actions	Replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile	As required
Monitoring	Check infiltration trench inspection tube to ensure emptying is occurring	Annually

Table 6-3 Filter Strip Maintenance Activities

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris, and trash	Monthly (or as required)
	Cut the grass – to retain grass heights within specified design range	Monthly (during growing season), or as required in the Outline Landscape and Ecological Management Plan (oLEMP)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation, and contamination (e.g. oils)	Monthly (at start, then half yearly)
	Check flow spreader and filter strip surface for even gradients	Monthly (at start, then half yearly)
	Inspect gravel flow spreader upstream of filter strip for clogging	Monthly (at start, then half yearly)
	Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start, then half yearly)
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed >10% of the filter strip area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

6.7.4 Email correspondence received from Pembrokeshire SAB on the 9th of November 2023 states '*any SuDS features on this type of development would not be adopted by the SAB'*. The ongoing management and maintenance of the proposed sediment collection swales will therefore be expected to fall under the responsibility of the relevant site management company.

6.8 SAB Pre-application Submission

6.8.1 Stantec completed a SAB pre-application submission, to Pembrokeshire SAB, on the 23rd of February 2024. On the 8th of March 2024, Pembrokeshire SAB responded to this pre-

application submission, with '*no adverse comments'*. Minor comments raised by Pembrokeshire SAB, including comments regarding proposed maintenance tracks, sediment pollution, HV compound surfacing and culverts, have been addressed throughout this FCA, specifically within **Section 6.3**, **Section 6.4**, and **Section 6.7**.

7 Conclusions

7.1.1 This Flood Consequences Assessment (FCA) has been prepared by Stantec UK Ltd to accompany a Welsh Development of National Significance (DNS) application for a proposed ground mounted photovoltaic solar farm together with associated equipment, infrastructure, and ancillary works. at land at Alleston Farm, Pembrokeshire.

Flood Risk

7.1.2 This FCA concludes that the main sources of flood risk for the site are fluvial and surface water.

7.1.3 The Natural Resources Wales Development Advice Map shows that the site lies predominantly in Zone A (little or no fluvial or tidal risk). A small area of Zone C2 extends into the northwest site corner.

7.1.4 The Natural Resources Wales Flood Map for Planning shows the site lies primarily within Flood Zones 1 (low risk) with regards to Surface Water and Small Watercourses. However, there is an area of Flood Zone 2 and 3 indicated to extend from the tributary of the Alleston Brook in the north of the site and suggest an overland flow route. The Flood Zone 2 and 3 extents associated with the Alleston Brook through the centre of the site are primarily restricted to valley floors owing to the site's topography.

7.1.5 The risk of flooding from tidal, groundwater, reservoir breach and other artificial sources are negligible. Natural Resources Wales do not hold any records of historic flooding at the site.

7.1.6 The development proposals predominantly fall under a '*Less Vulnerable'* classification although the substations and distribution elements of the proposals would be classified as '*Highly Vulnerable'*. A sequential approach has been adopted onsite, whereby, development is proposed in areas of lowest risk and therefore outside of fluvial Zone C2 and outside of Surface Water and Small Watercourse Flood Zone 2 and 3. Development is located above the valley floor and therefore outside of areas at an increased risk of flooding. Both development vulnerability classifications are considered appropriate development in Zone C2 and are at a low risk from all other sources.

Surface Water Attenuation and Water Quality

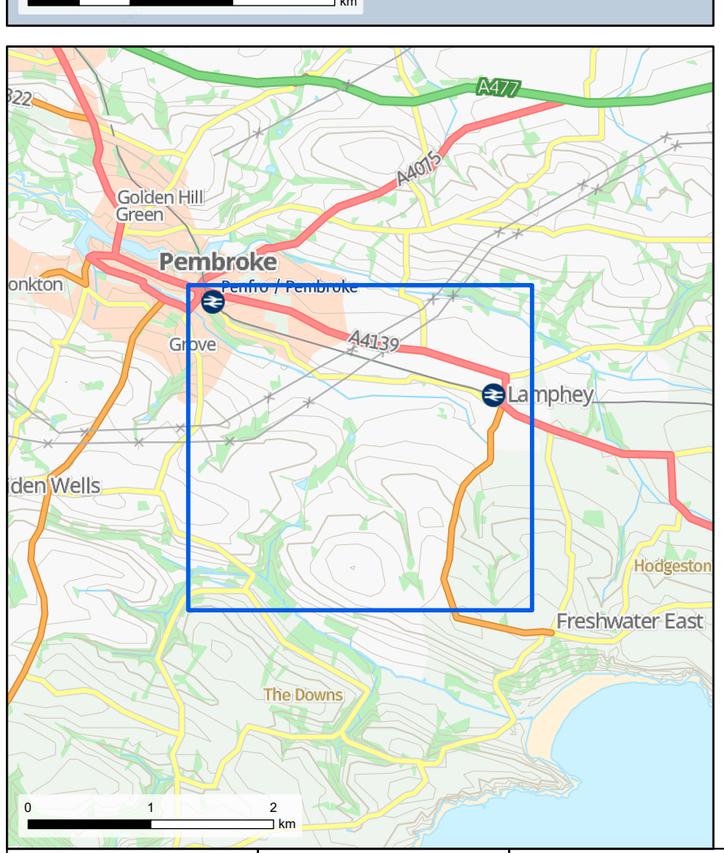
7.1.7 Solar panel development parcels will not increase runoff from the site compared to the pre-development greenfield rate. Proposed swales will provide sediment removal to ensure water quality in receiving water bodies is not negatively affected.

7.1.8 An infiltration trench will be located downstream of each transformer station, to attenuate surface water generated by the minimal area of proposed impermeable development.

Summary

7.1.9 In conclusion, the proposed development is at a low risk of flooding and the development will not increase flood risk elsewhere. It is demonstrated that the proposal complies with Planning Policy Wales – 'Development and Flood Risk' and the subsequent supporting document - Technical Advice Note (TAN) 15 (2004). The development also complies with local planning policy and is an appropriate development at this location.

Appendix A OpenData Flood Maps



Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Site Location

Date: 04/10/2024	
Drawn: LW	Checked: PM
Figure: 01	Rev: E

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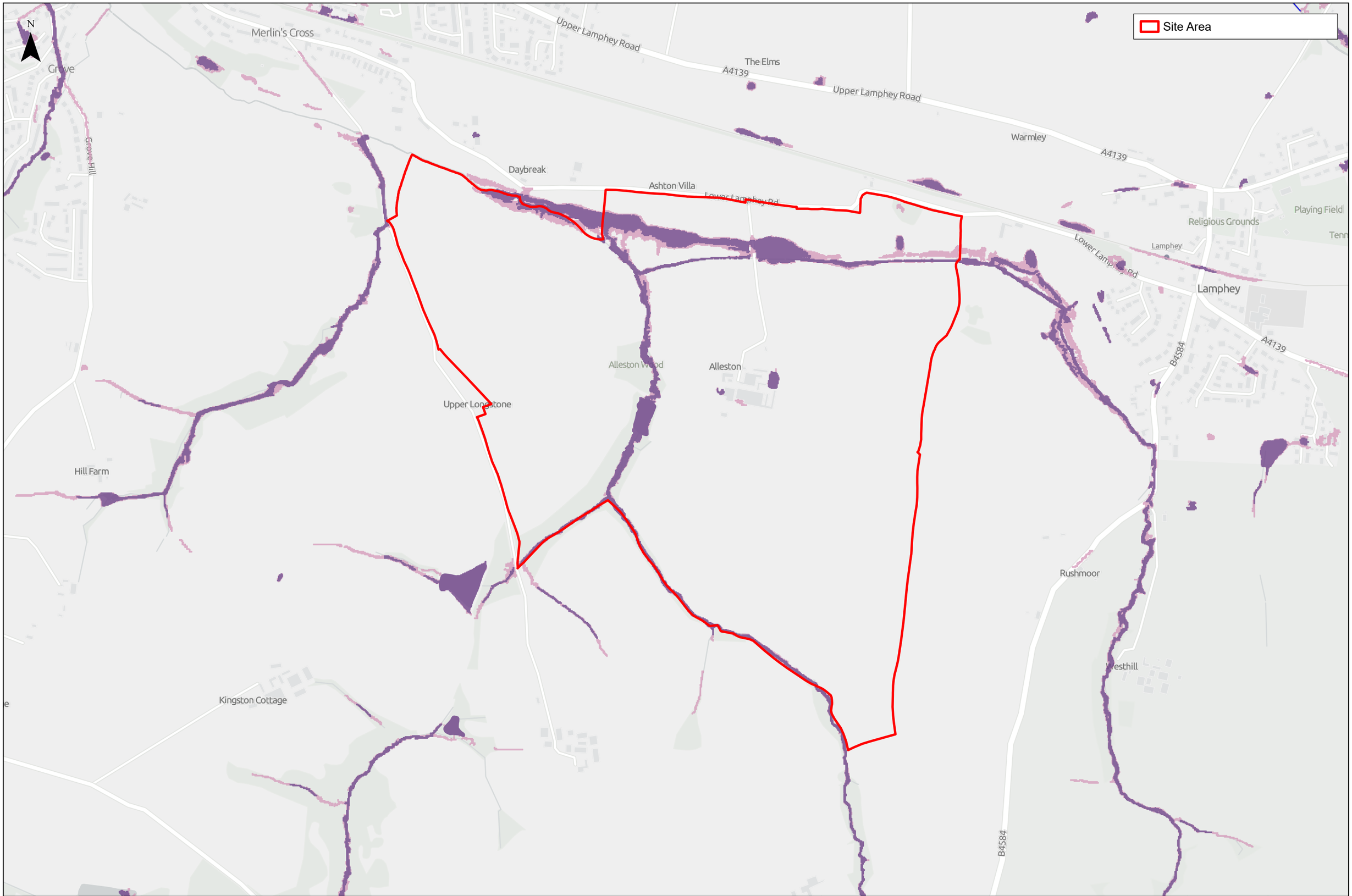

Stantec	Client: Alleston Clean Energy Limited	**ALLESTON SOLAR FARM** Site Location (Detailed)	0 375 750 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack	1:7,500 @ A3	Date: 04/10/2024
				Drawn: LW	Checked: PM
				Figure: 01.1	Rev: E

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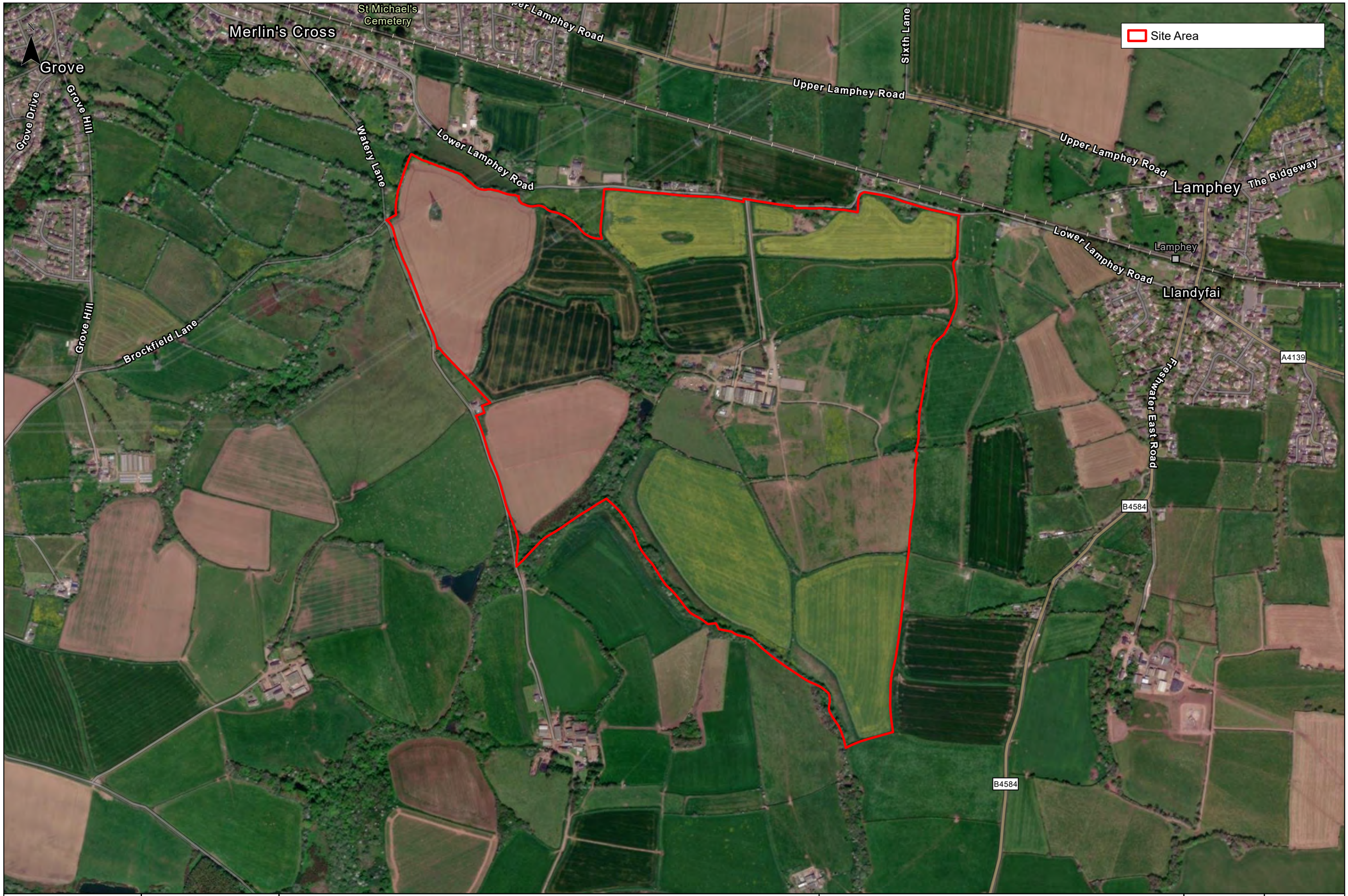

Stantec

Client: Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Site Location - Aerial

0 375 750 m

Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS, Maxar, Microsoft

1:7,500 @ A3	Date: 04/10/2024
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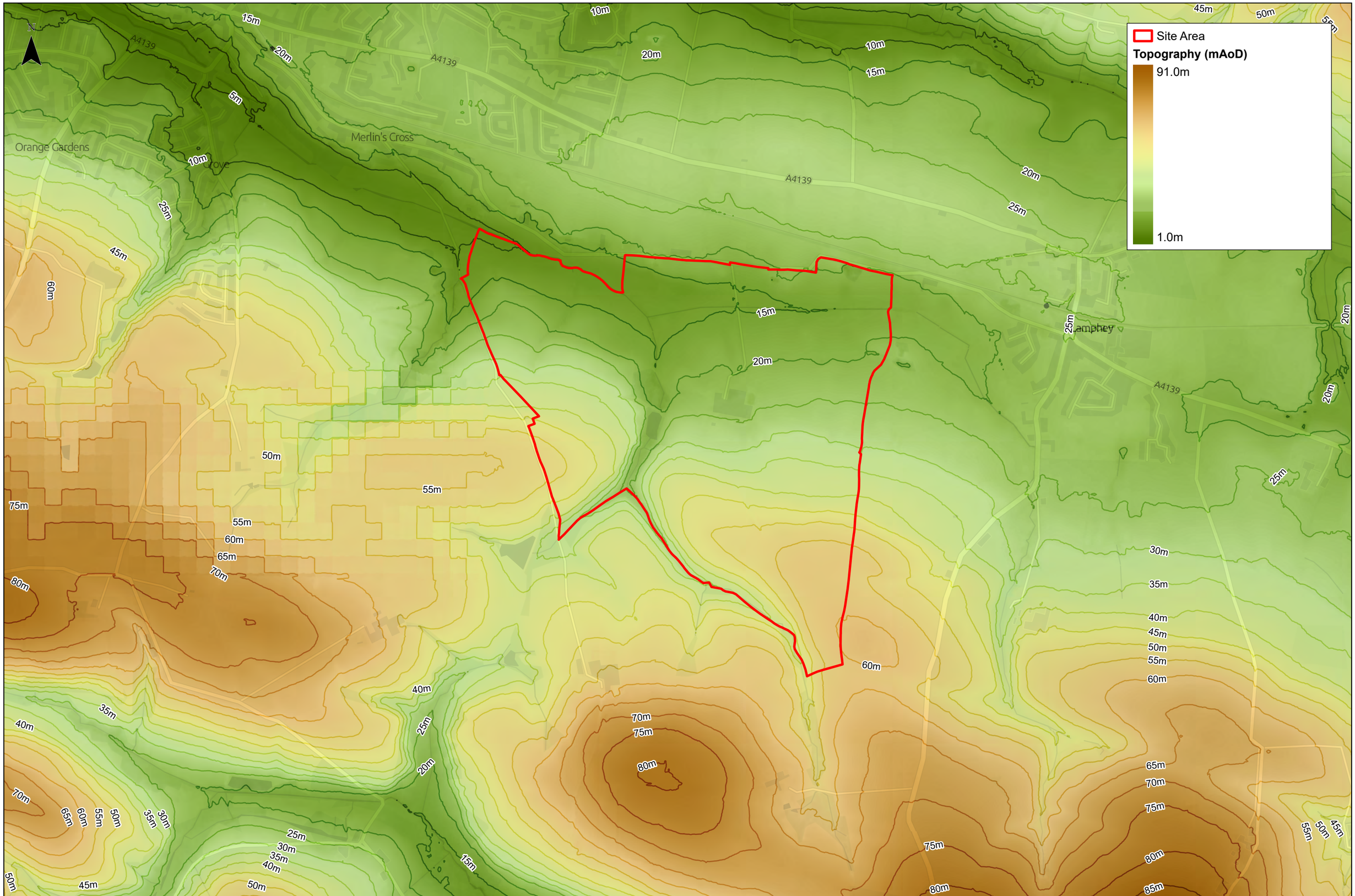

Stantec	Client: Alleston Clean Energy Limited	**ALLESTON SOLAR FARM** Topography	0 500 1,000 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack	1:10,000 @ A3 | Date: 04/10/2024 Drawn: LW | Checked: PM Figure: 03 | Rev: E

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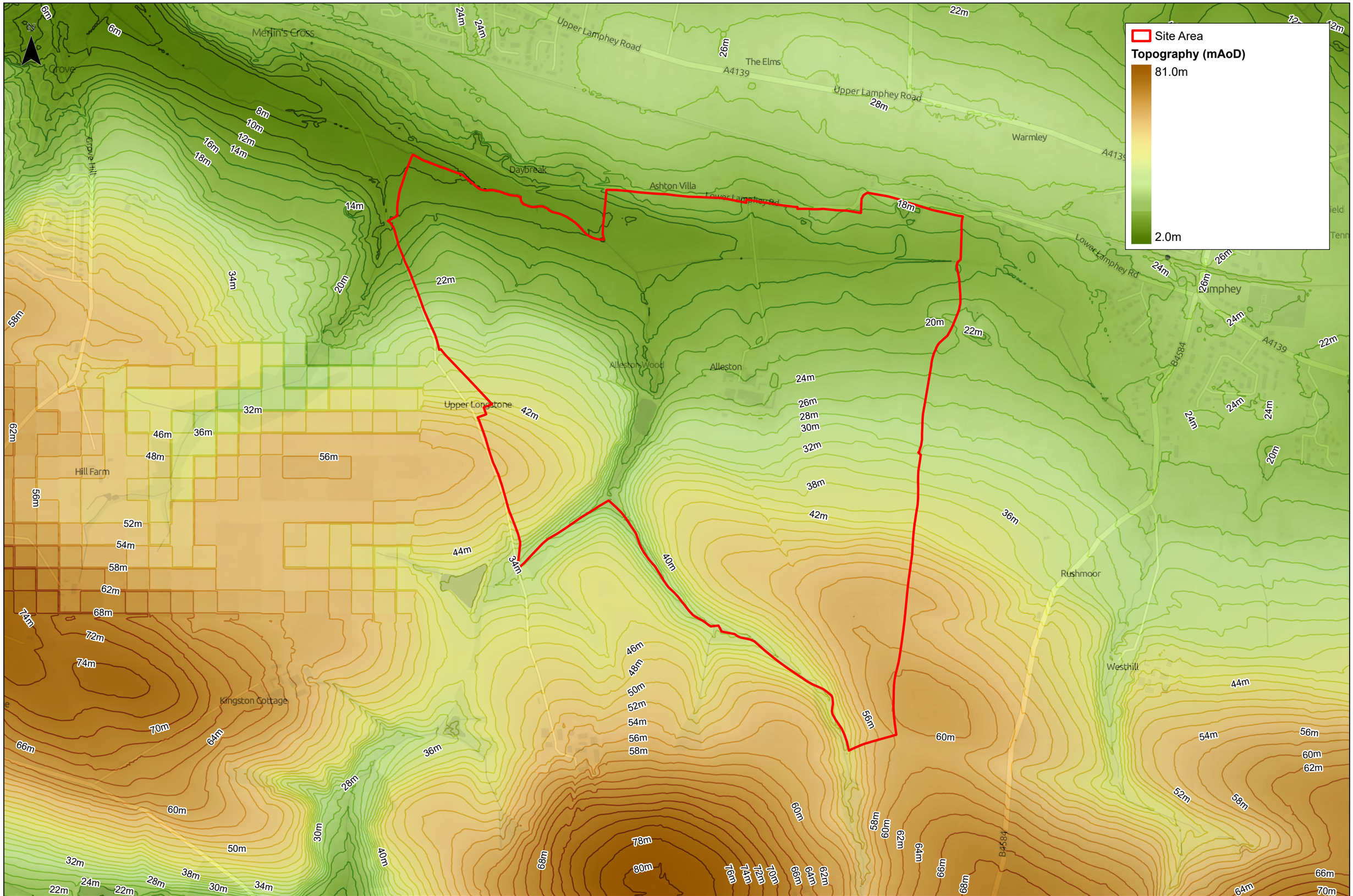

Stantec

Client: Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Topography - Detailed

0 375 750 m

1:7,500 @ A3 | Date: 04/10/2024

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Figure: 03.1 | Rev: E

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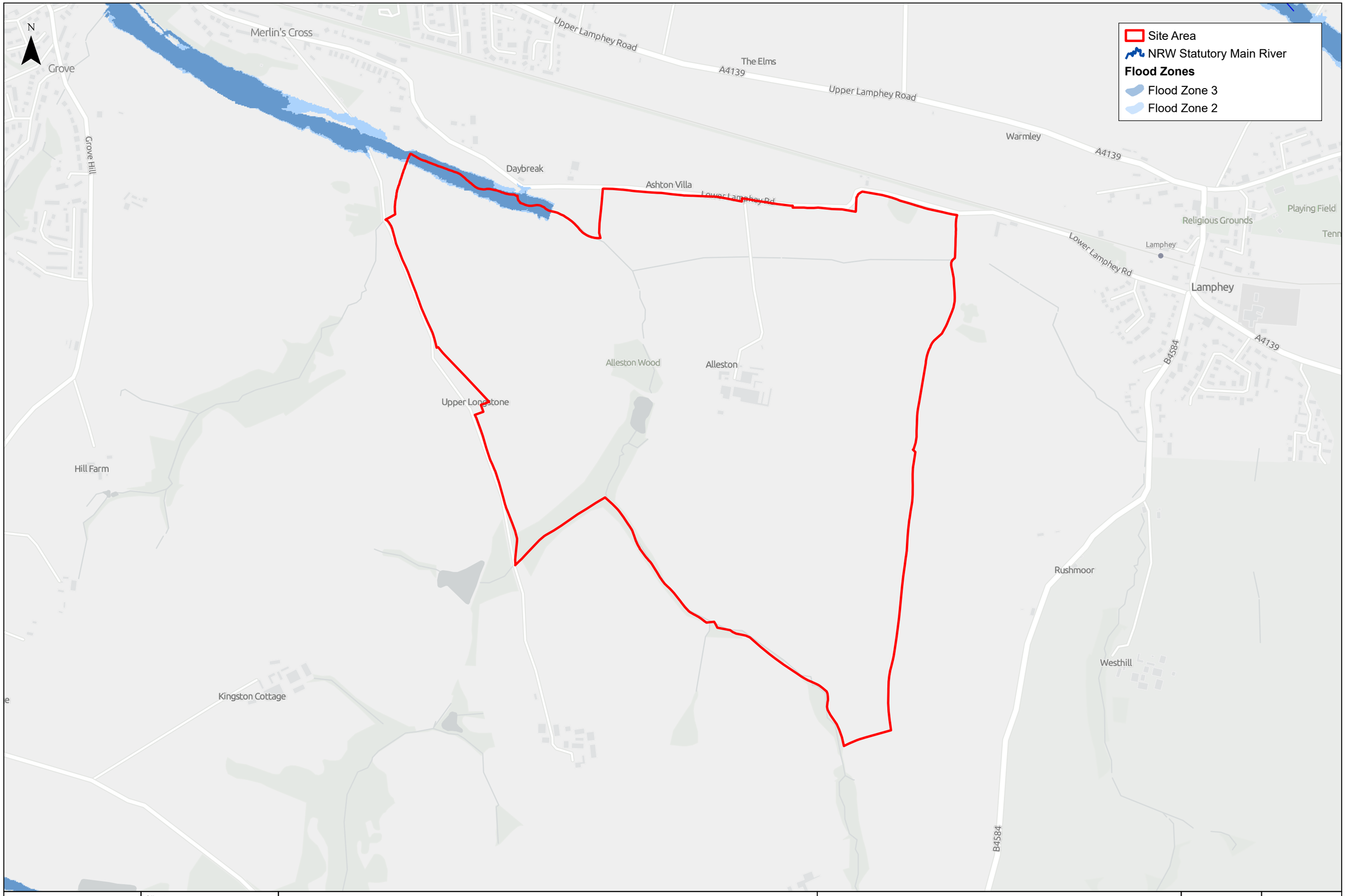

Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Natural Resources Wales Flood Map for Planning
Rivers and Sea Flood Zones

0 375 750 m

Flood Zones refer to the probability of rivers and sea flooding including climate change information but, ignoring the presence of defences.

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Figure: 04	Rev: E

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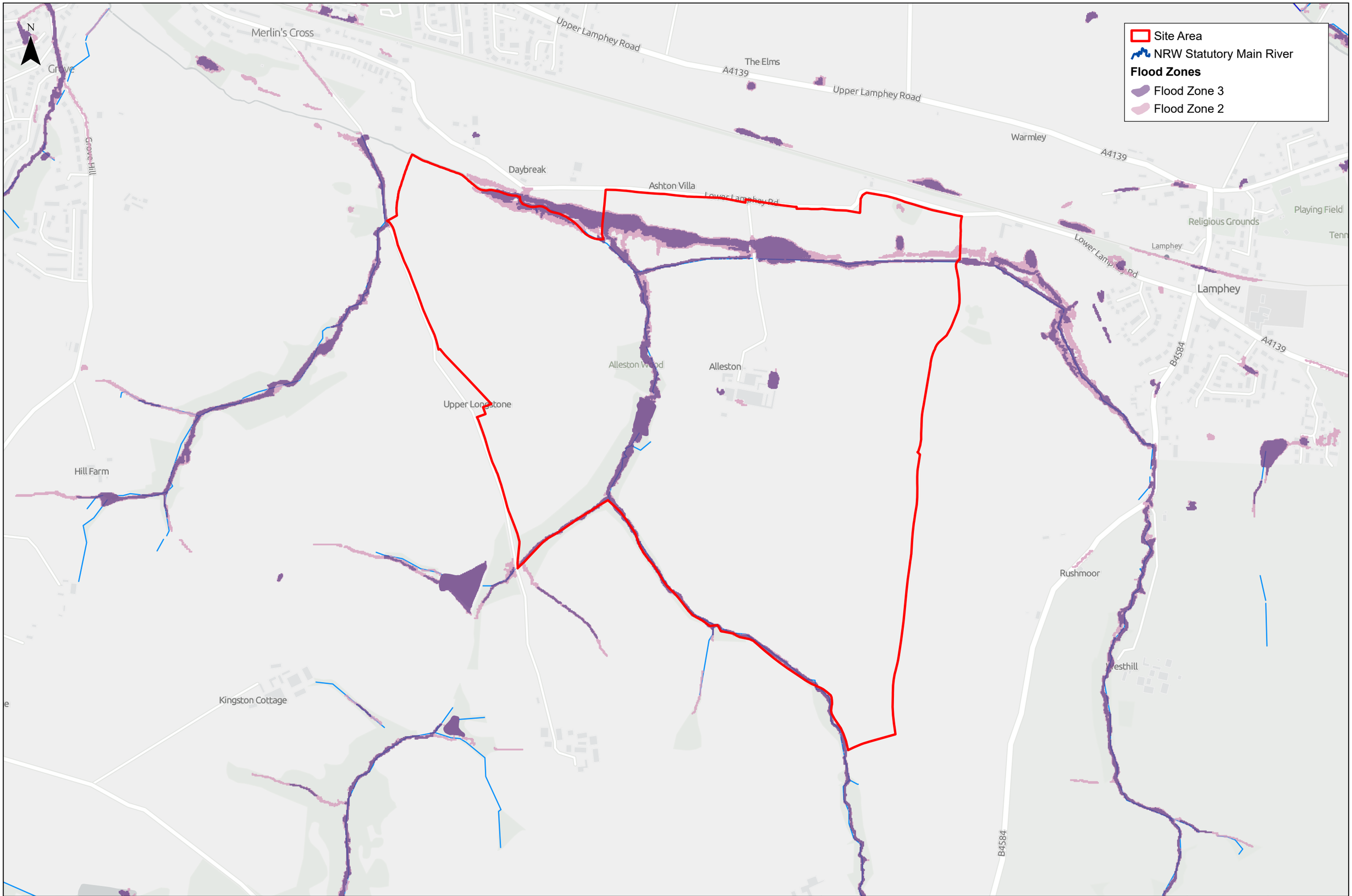

Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Natural Resources Wales Flood Map for Planning
Surface Water and Small Watercourses Flood Zones

0 375 750 m

Flood Zones refer to the probability of surface water & small watercourse flooding including climate change information but, ignoring the presence of defences.

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Figure: 04.1	Rev: E

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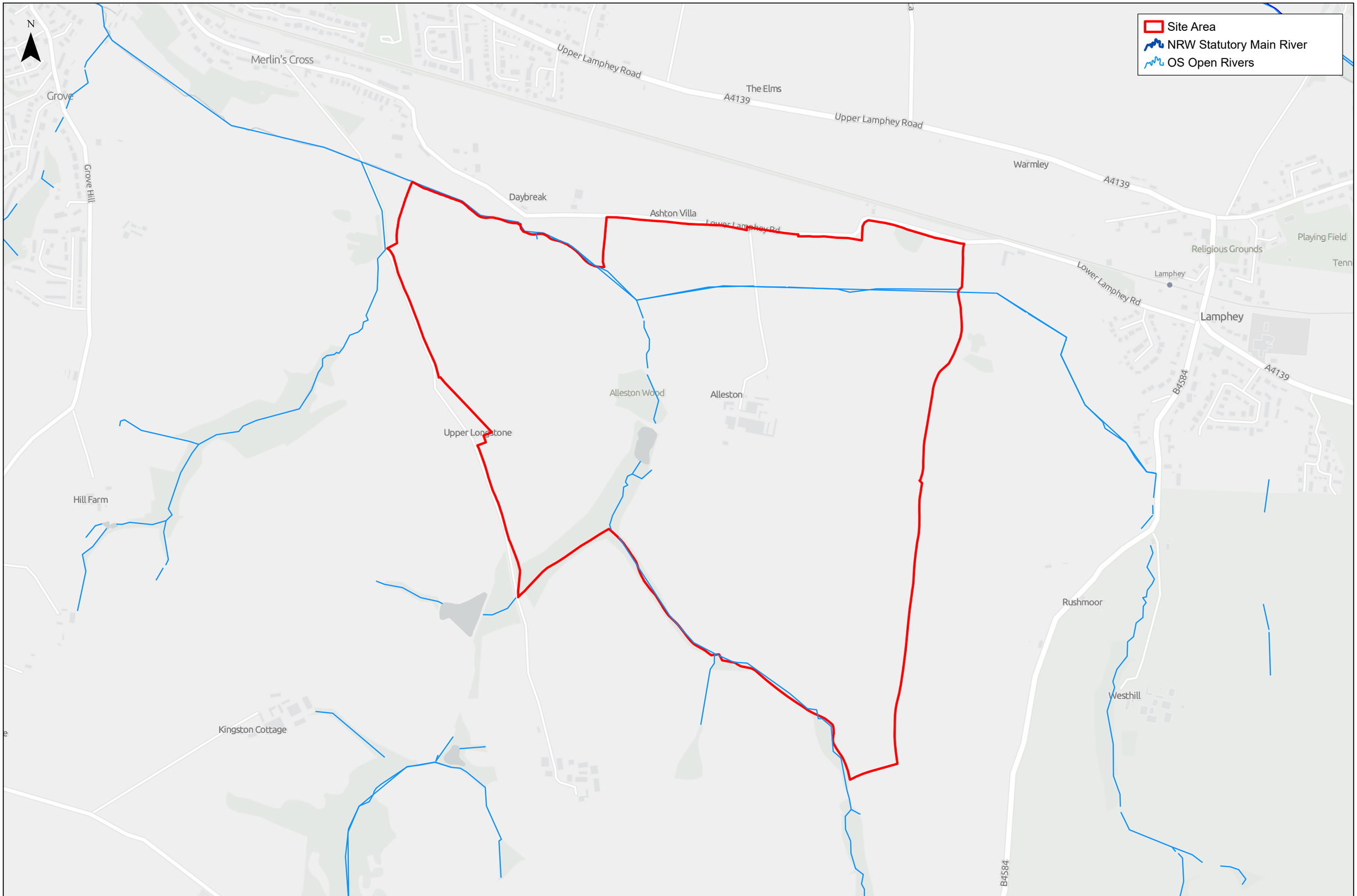

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Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Watercourse Location

0 375 750 m

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Figure: 04.2	Rev: E

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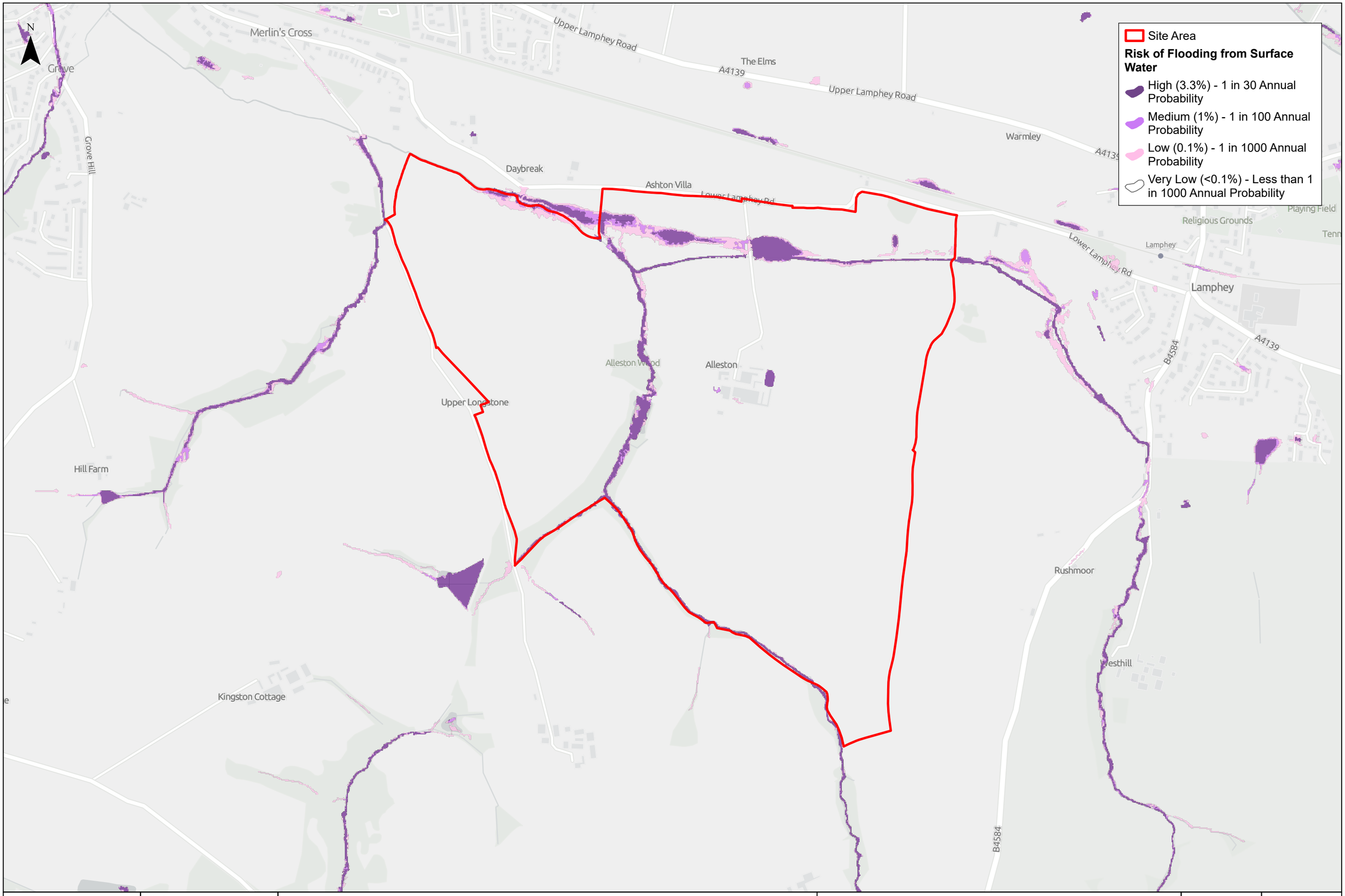

Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

NRW Surface Water Flood Risk

0 375 750 m

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Figure: 05	Rev: E

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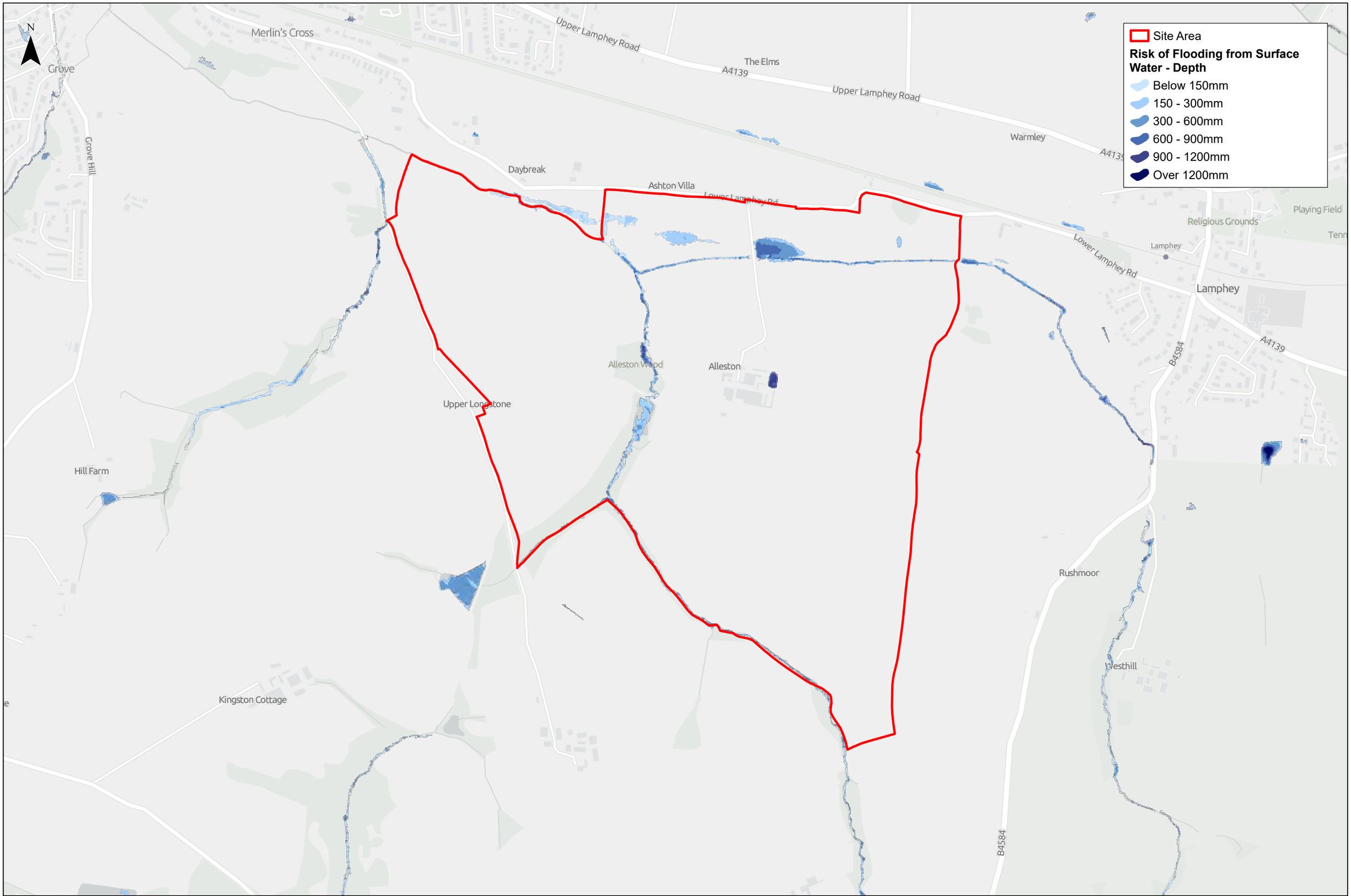

Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

NRW Surface Water Flood Risk - Depth
3.3 Percent Chance

0 375 750 m

1:7,500 @ A3	Date: 04/10/2024
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Figure: 05.1	Rev: E

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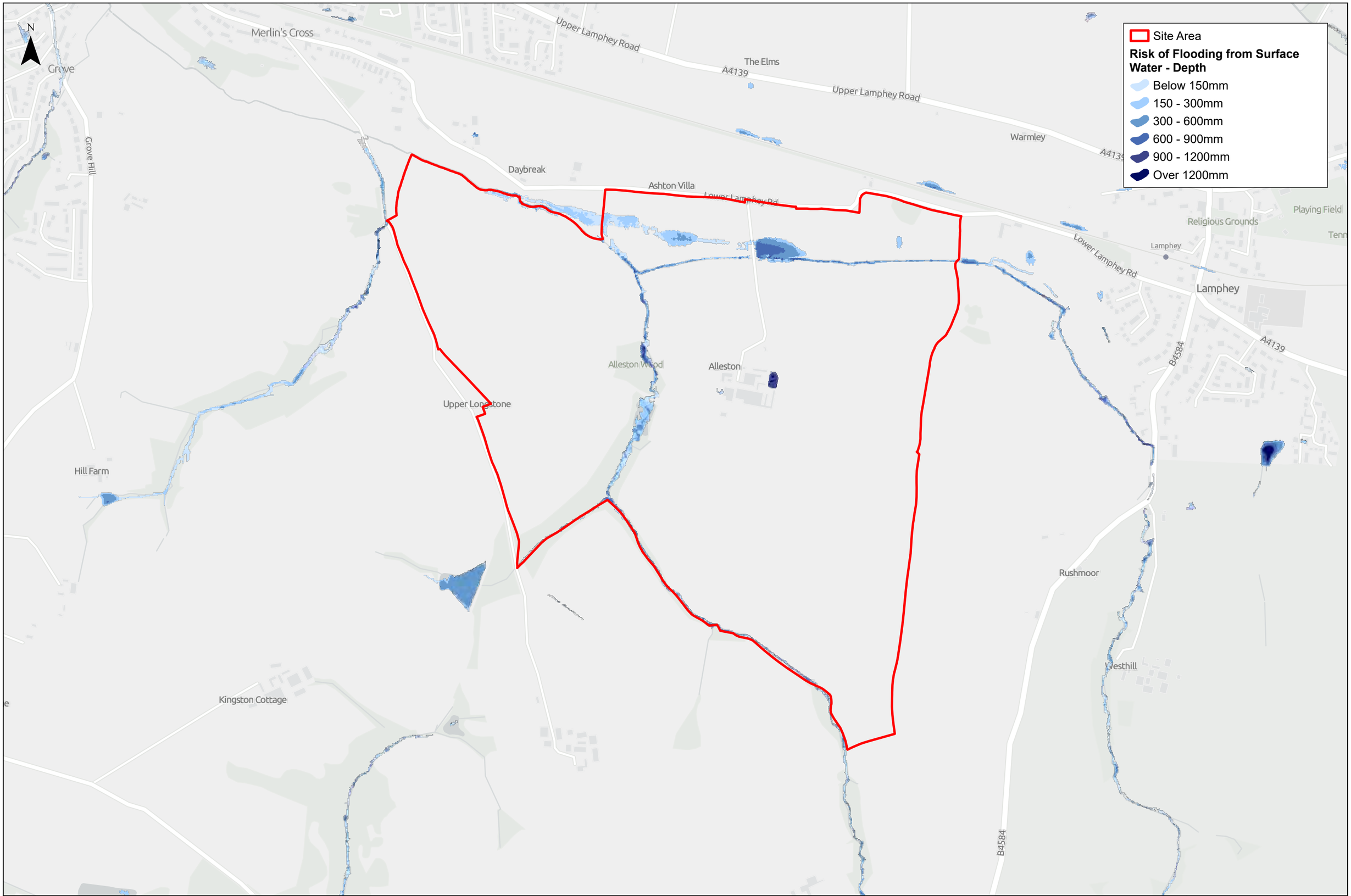

Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

NRW Surface Water Flood Risk - Depth
1.0 Percent Chance

0 375 750 m

1:7,500 @ A3	Date: 04/10/2024
Drawn: LW	Checked: PM
Figure: 05.2	Rev: E

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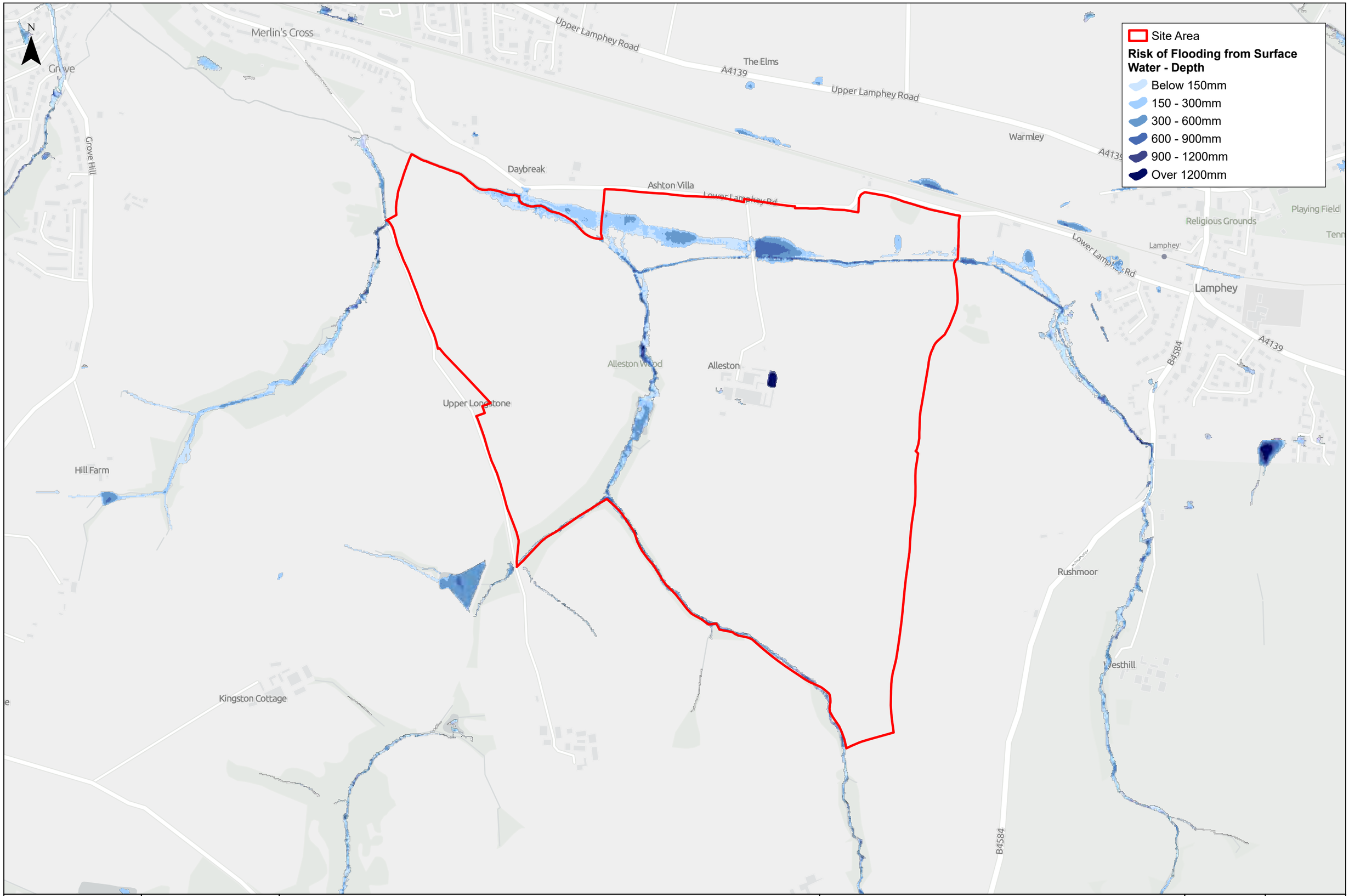

Stantec	Client: Alleston Clean Energy Limited	**ALLESTON SOLAR FARM** NRW Surface Water Flood Risk - Depth 0.1 Percent Chance	0 375 750 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved. Some features of this information are based on digital spatial data licensed from the UK Centre for Ecology & Hydrology © UKCEH, the Environment Agency © EA and Getmapping Plc and Bluesky International Limited [2015]. Defra, Met Office and DARD Rivers Agency © Crown copyright. © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right. Land & Property Services © Crown copyright and database right.	1:7,500 @ A3	Date: 04/10/2024
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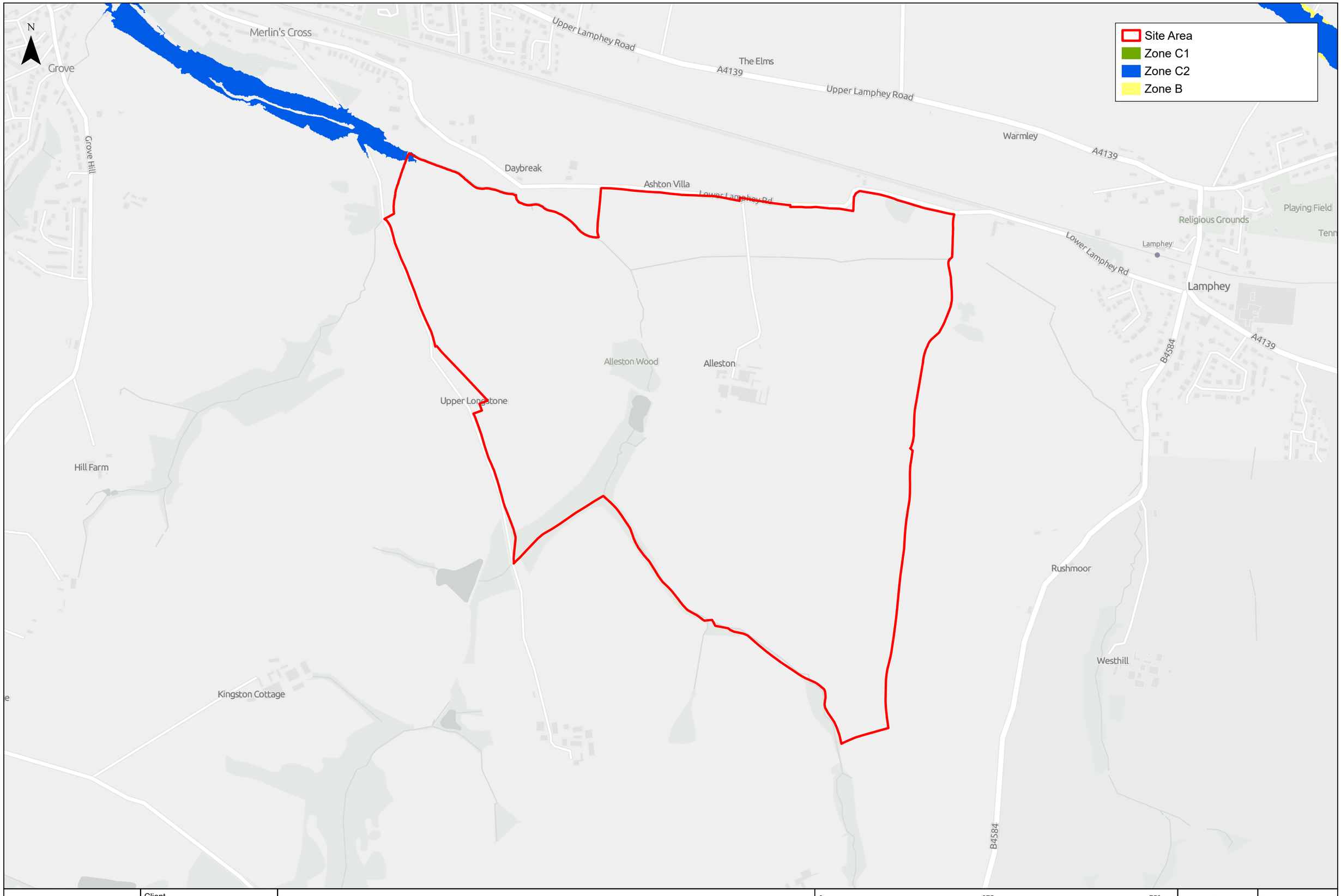

Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

TAN15 Development Advice Map (DAM)

0 375 750 m

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Figure: 06	Rev: E

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Alleston Clean Energy Limited

ALLESTON SOLAR FARM

NRW Ground Water Source Protection Zones (Merged)

0 375 750 m

Source Protection Zones [Merged] have been created as public facing boundaries where individual groundwater bodies within Source Protection Zones (SPZ) have been dissolved, so only the outer boundaries are shown. SPZs are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.

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Stantec

Client

Alleston Clean Energy Limited

ALLESTON SOLAR FARM

NRW Recorded Historic Flood Extents

0 375 750 m

Recorded Flood Extents shows areas that have been recorded to have flooded in the past from rivers, the sea or surface water. The records come from a number of evidence sources including Natural Resources Wales, its predecessors or other Risk Management Authorities.

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Figure: 08	Rev: E

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Project Title **Stage 1 Strategic Flood Consequences Assessment Pembrokeshire and Carmarthenshire County Councils**

Figure Title **Risk Categorisation Candidate Sites Pembrokeshire County Council (PCC) - Climate Change Allowance**

Sheet No. **7 of 10**

N

Legend

- River Network
- Flood Defences
- National Park Boundaries
- Settlement Boundaries
- Surface Water Flood - Extent Estimated 1 in 100 Annual Chance Events with Climate Change
- NRW Flood Map Flood Zone 2
- SMP2 Flood Extent plus 2m Sea Level Rise

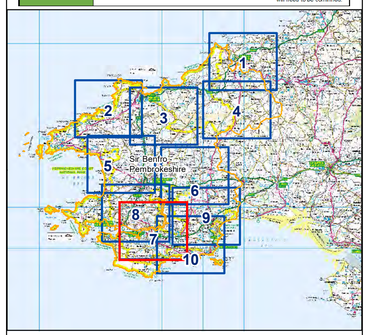
LDP Candidate Sites 2019

- High Risk >50% Site Area Flooded
- Medium High Risk >25% to <50% Site Area Flooded
- Medium Risk >5% to <25% Site Area Flooded
- Low Risk <5% Site Area Flooded

Notes:

1. NRW Flood Zone 2 - Assumed to approximate to 1 in 100 (1%) annual chance event with climate change.
2. The Surface Water Flood Extents are based on NRW's updated Flood Map for Surface Water (uFMfSW)
   For future/ climate change scenario, a broad scale assumption has been made for Stage 1 screening:
   - Current 1 in 1000 (0.1%) annual chance flood outline becomes 1 in 100 (1%) with climate change.
3. Shoreline Management Plan 2 data - Flood extent is current 1 in 1000 (0.1%) tidal event plus 2m Sea Level Rise (SLR). This dataset does not extend north of Nolton Haven on Pembrokeshire's west coast.
4. The maximum 0.5% annual chance or greater extreme tide level plus sea level rise is 6.9m. A coarse 7m contour (not shown) has also been used to screen tide risk for coastal sites - see Stage 1 SFCA Report.

Risk Category	Criteria Description (at least one of the following criteria is met)	Category Overview
HIGH	• Greater than 50% of the site's plan area is: ◇ Within Flood Zone 2 (Note 1) ◇ Within Surface Water flood extent (Note 2) ◇ Within SMP2 – Flood extent with 2m SLR (Note 3) ◇ Below 7m contour at the coast (Note 4) • Known history of flooding on the site.	• The percentage of the site area flooded gives a screening level indication of how much of the site may comply with TAN15 for threshold of flooding criteria (TAN15 A1.14). • Further analytical work will be required to understand the flood risk at the site. • The underlying evidence base may need updating.
MEDIUM HIGH	• Greater than 25% up to 50% of the site's plan area is: ◇ Within Flood Zone 2 (Note 1) ◇ Within Surface Water flood extent (Note 2) ◇ Within SMP2 – Flood extent with 2m SLR (Note 3) ◇ Below 7m contour at the coast (Note 4)	
MEDIUM	• Up to 25% of the site's plan area is: ◇ Within Flood Zone 2 (Note 1) ◇ Within Surface Water flood extent (Note 2) ◇ Within SMP2 – Flood extent with 2m SLR (Note 3) ◇ Below 7m contour at the coast (Note 4)	
LOW	• Less than 5% of the site's plan area is within: ◇ Flood Zone 2 (Note 1) ◇ Surface Water Flood Extent (Note 2) ◇ SMP2 – Flood Extent with 2m SLR (Note 3) ◇ The area below the 7m contour at the coast (Note 4) • No history of flooding in the site.	• Based on criteria description, flood risk in the area is likely to be acceptably managed. • Development likely to proceed subject to agreement by the SuDS Approval Body. • Flood Risk to the site access routes and compliance with TAN15 will need to be confirmed.



Data sources: Ordnance Survey, NRW, Carmarthenshire County Council, Pembrokeshire County Council

0 0.5 1 2 Km

Scale (at A1): 1:25,000

Status:	Drawn:	Checked:	Authorised:
S2	UK/NJ 13/06/2019	LG/DMH 13/06/2019	DBF 13/06/2019

Reference: 5186360-ATK-XX-XX-MP-G-087

Version: **PO3**

Cyngor Sir Gâr Carmarthenshire County Council

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

West Glamorgan House, 12 Orchard St, Swansea, SA1 5AD.
+44 (0) 1792 641172 www.atkinsglobal.com

Project: P:\GBEMC\WGE\Projects\Water\5186360 SFCA Carms Pembs\7 WIP\7_6 CAD_GIS_BIM\01-WP\GMP\RAG Maps\25k_scale\RAYG_CC_25K_PembsCandidateSites.mxd

Appendix B Development Proposals

General PV Layout

Site entrance

Field Entrances

Field Entrances

Temporary Construction Compounds

Point of Connection (POC)

33-132kV Substation

Comms tower

Control room

Field Entrances

Perimeter Fence

Site Boundary

Ancient woodland

Streams

Field Entrances

Existing footpath

Footpath suggested rerouting

0m 50m 100m 150m 200m 250m 300m

REFERENCES

SUMMARY NOTES

1. All dimensions are in 'mm' unless otherwise indicated.
2. Any deviations to be recorded and communicated to Statkraft.
3. The following ecological buffers have been applied:
   - 3.1. 10m from hedgerows and ditches (and other watercourses)
   - 3.2. 20m from ponds and woodland
   - 3.3. 15m from mature trees

SYSTEM SUMMARY

GEOGRAPHICAL COORDINATES	51.66454, -4.88828
LAND OWNERSHIP AREA (GROSS)	96.3 ha
FENCED PV AREA	39.9 ha
MAXIMUM GRID EXPORT CAPACITY	30 MW
PV MODULE TYPE	Crystalline
INVERTER TYPE	String
STRUCTURE TYPE	Fixed

LEGEND

- Overhead Line (OHL)
- Perimeter Fence
- Site Boundary
- Telecommunications Line
- Existing Footpath
- Proposed Footpath
- Maintenance Track
- Existing Roads
- Trees
- Hedgerows
- Transformer Station
- PV Structure
- Gates
- Water Bodies
- Connection route
- CCTV Camera
- Weather station
- Transformer station excavation zone

PROPOSAL ONLY

Key Plan
1:16000

HV substation

PV areas

Site Boundary

Statkraft

Main office in UK
19th Floor,
22 Bishopsgate,
London,
EC2N 4BQ

T +44 (0)20 7549 1000

info@statkraft.com
www.statkraft.com

REV	DATE	DESCRIPTION	DRAWN	APPRV
K	23/08/2024	New NGED substation	PPH	AEP
J	19/07/2024	Minor update	PPH	AEP
I	16/07/2024	Major layout update	PPH	AEP
H	28/06/2024	Revised for archaeological data	PPH	AEP
G	03/06/2024	3P10, revised roads + fences	PPH	CRO

General PV Layout — SCALE 1:3000 A1

SCUKX-ALLES-000-PVL-100.01K — SHEET 1 of 1

Appendix C Stakeholder Correspondence

[redacted]

From: Enquiries <enquiries@cyfoethnaturiolcymru.gov.uk>
Sent: 06 November 2023 15:21
To: [redacted]
Subject: NRW:03570384

You don't often get email from enquiries@cyfoethnaturiolcymru.gov.uk. Learn why this is important

Hi [redacted] i apologize for the late reply, i'm new and have been trying to find the correct team for this query.

I've just had a responce back from the flood team and they said:
"We have no flood assets in this area and therefore no records of flooding and have no plans for any flood alleviation projects."

Hope this helps.

again i would like to apologize for the late reply.

If you have any more questions then please feel free to contact us again, thank you and kind regards.

[redacted]

Cymorth Cyswllt Cyfoeth / Customer Hub Support
Cwsmeriaid, Cyfathrebu a Masnachol / Customer, Communications and Commercial Directorate
Rhif ffôn: [redacted] / Phone number: [redacted]
E-bost / E-mail: enquiries@naturalresourceswales.gov.uk
Cyfoeth Naturiol Cymru / Natural Resources Wales

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.

[redacted]

From: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>
Sent: 15 November 2023 09:06
To: [redacted]
Subject: ATI-26276a-: Data form submission

Good morning,

The flood map in this area is based on a nationally generated model, this was last updated in 2020. FRAW modelling uses LIDAR data to generate flood outlines with assumptions made about the channel capacity. This modelling was carried out for the production of flood extents only and is not suitable for detailed site specific assessments. We do not have any local models covering this site so we are not able to provide any flood products. The extent of the flood risk in the area can be viewed on our website,
https://flood-risk-maps.naturalresources.wales/?locale=en

There are no main rivers in the area. Under the Flood and Water Management Act 2010, Local Authorities as Lead Local Flood Authorities (LLFA) are responsible for managing flood risk from surface water, groundwater and from smaller streams called ordinary watercourses. They manage drainage of local highways under the Highways Act. Their duties include preparing Local Flood Strategies, investigating all significant flooding and maintaining asset registers on defences in their area. We recommend contacting them for further information.

Kind Regards

[redacted]
Swyddog Trwyddedu Data / Data Licensing Officer
Cyswllt Cyfoeth / Customer Hub
Cwsmeriaid, Cyfathrebu a Masnach / Customer, Communications and Commercial Directorate

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

[redacted]

Stantec

From: SAB <sab@pembrokeshire.gov.uk>
Sent: Thursday, November 9, 2023 11:35 AM
To: [redacted]
Cc: [redacted]
Subject: RE: Alleston Solar Farm, Pembroke

Morning [redacted]

Thank you for your enquiry.

Any Suds features on this type of development would not be adopted by the SAB.

Discharges from the site should be restricted to 5l/s.

Any drainage/Suds features should be designed to mimic the natural surface water runoff destination as per pre – development.

Swales can be used to help with water quality where erosion may occur.

With regard to existing ordinary watercourses, silt management control may be required during construction.

ordinary watercourses must not be filled in, culverted, or the flow impeded in any manner, without the prior written consent of Pembrokeshire County Council under Section 23 Land Drainage Act 1991 as amended by the Flood and Water Management Act 2010. Consent is also required to alter a culvert in a manner that would be likely to affect flow of an ordinary watercourse, and for temporary as well as permanent works. The applicant can obtain further details from *Mr Neville Davies, Pembrokeshire County Council, Infrastructure Division, County Hall, Haverfordwest, Pembrokeshire, SA61 1TP Email: ldconsent@pembrokeshire.gov.uk*

Under no circumstances should any structure be built over ordinary watercourses or within a minimum of 3 metres measured each side from the top of bank of any watercourse, or within a minimum of 3 metres measured each side from the outer face of a culvert, without the prior written agreement of the local land drainage authority. This will ensure that access can be maintained for future maintenance.

Any existing watercourses, drains, ditches and outfalls which are disturbed by the proposals shall be suitably intercepted and redirected, to ensure that the existing local drainage network is not adversely affected. The developer must ensure that any necessary consents have been obtained before undertaking such works.

Regards

SAB Team

From: [redacted]
Sent: 30 October 2023 13:16
To: SAB <sab@pembrokeshire.gov.uk>
Subject: Alleston Solar Farm, Pembroke

EXTERNAL EMAIL – Exercise care with links and attachments *E-BOST ALLANOL – Byddwch yn ofalus wrth agor dolenni ac atodiadau.*

Good afternoon,

Stantec has been commissioned to undertake a Flood Risk Assessment and Surface Water Drainage Strategy for the site shown in the attached location plan. The site, at Alleston Farm, Pembroke, will be developed into a solar farm. Alleston Farm, Pembroke is located to the southeast of Pembroke and to the southwest of Lamphey, Pembrokeshire. The site is located to the south of Lower Lamphey Road and to the east of Watery Lane. The site has an approximate grid reference of SS 00271 99976.

The project is at a very early design stage and hence decisions regarding proposed drainage have not yet been made, and as such the pre-application advice form can't yet be completed. We would be very grateful for the following high-level information where available:

- Types of SuDS likely to be acceptable for adoption by the SAB and which policies these must be designed in accordance with.
- Confirm the surface water runoff rate restriction (l/s) that applies to the discharge from the site post-development at this location per ha of impermeable development.
- Confirm the climate change peak rainfall intensity upper end allowance for the design life of the project (updated in September 2021 Climate change allowances and flood consequence assessments | GOV.WALES) should be applied to the proposed Surface Water Drainage Strategy.
- Anything else you feel is relevant/the SAB may be looking for, in the design of a Surface Water Drainage Strategy for a solar farm.

We look forward to your reply at your earliest convenience. Meanwhile, if you have any queries, please do not hesitate to get in touch using the contact details below.

Kind regards,

[redacted]
(he/him)
Graduate Environmental Planner
Taunton
[redacted]

Stantec

MINUTES

Meeting Title:	Alleston Solar Farm Pembrokeshire SAB Design Meeting
Attendees:	Alex Harman (Stantec), David Burgess (Stantec), Angharad Llewelyn (Pembrokeshire SAB), Laura Jackson (Pembrokeshire SAB) and Neville Davies (Pembrokeshire SAB)
Date of Meeting:	16th November 2023
Job Number:	333100437

Item 1. To confirm whether the 5/l/s/ha surface water discharge restriction relates to the total site area or area of impermeable development.

Item 2. To confirm the SAB's views regarding runoff from solar farms.

Item 3. To confirm the SAB's views regarding the ordinary watercourses located onsite.

Item 4. To confirm the SAB's views regarding the risk of surface water and small watercourse flooding onsite.

Item	Subject	Actions
1.	SAB confirmed 5/l/s/ha of impermeable development restriction.	N/A
2.	SAB confirm solar farms don't increase runoff and therefore, there is no requirement for surface water attenuation. SAB confirm swales are required to prevent sediment runoff into ordinary watercourse, both in the construction and operational phase of the development.	Stantec -Feedback to solar farm design team SAB – to provide example solar farm swales
3.	SAB confirm any development within 5m of an ordinary watercourse requires SAB approval. SAB confirm any culverting of ordinary watercourses required for access tracks will require SAB approval.	N/A
4.	The SAB would prefer solar panels be constructed outside of areas indicated to be at risk of small watercourse flooding. If an area of surface water flooding is not associated with a small watercourse, panels may be constructed in these areas as long as modelled flood depths are shallow (i.e. below the 800mm panel height)	Stantec – Feedback to solar farm design team

From: Data Distribution
Sent: 30 October 2023 15:14
To: [redacted]
Subject: Data form submission

Dear [redacted]

Thank you for your email concerning the above. However, we do not produce product 4s. Please see the attached documentation for further information on this.

We can provide if the data is available, the flood model report, (old product 5), which is free of charge. Also, the raw flood model output data, (old product 6), if available, which is also free of charge. You would need the appropriate software to analyse the results, more information on this is in the attached. We could also provide product 7, which is the full flood model, for a fee of £180.00 inclusive of VAT.

Please also accept this as an acknowledgement that your request has been received.

It can take up to 20 working days to supply data that is not available online, therefore if you have any queries on your data request, please contact us.

For further information on what you can expect from us, please visit our website:

Natural Resources Wales / Contact us or call the Customer Hub on 0300 065 3000 (open 9am-5pm, Monday to Friday).

We will therefore be in touch in due course and provide if available, products 5 & 6 and advise on product 7.

Yours sincerely,

Enw / Name[redacted]
Teitl swydd / Job title Data Licensing Officer
Adran / Department Customer, Communications and Commercial
Rhif ffôn / Phone number[redacted]
Dyddiau gweithio (os yn berthnasol) / Working days Mon-Fri

[redacted]

From: Environmental Information Requests <EnvironmentalInformationRequests@dwrcymru.com>
Sent: 08 December 2023 09:20
To: [redacted]
Subject: Request for information

Date: 8 December 2023
Our Reference: EIR/1640/2023

Dear [redacted]

Request for information

Re: South of Upper Lamphey Road

We write further to your request for information dated 10 November 2023, which we have been considering under the Environmental Information Regulations 2004.

We have reviewed our flooding database, and we have no flooding history within the location or vicinity requested.

Turning to your query on specific drainage requirements, we have a dedicated Planning Team within our Developer Services function that can provide advice on the capacity in our infrastructure to accommodate new development.

Our pre-planning service will review the capacity available in our sewerage network, wastewater treatment works and clean water network to accommodate the flows/demand from a proposed development. It will also raise awareness of any of our assets crossing the site which will need to be factored into the layout of your development and provide general advice on surface water drainage.

An application for pre-planning advice can be submitted online via the following address https://developers.dwrcymru.com/en/applications/planning/pre-planning. If you wish to discuss in more detail our Planning Team are contactable on 08009172652 or alternatively by email developer.services@dwrcymru.com.

We hope that this response is clear. Should you have any questions, please contact us by email at EnvironmentalInformationRequests@dwrcymru.com.

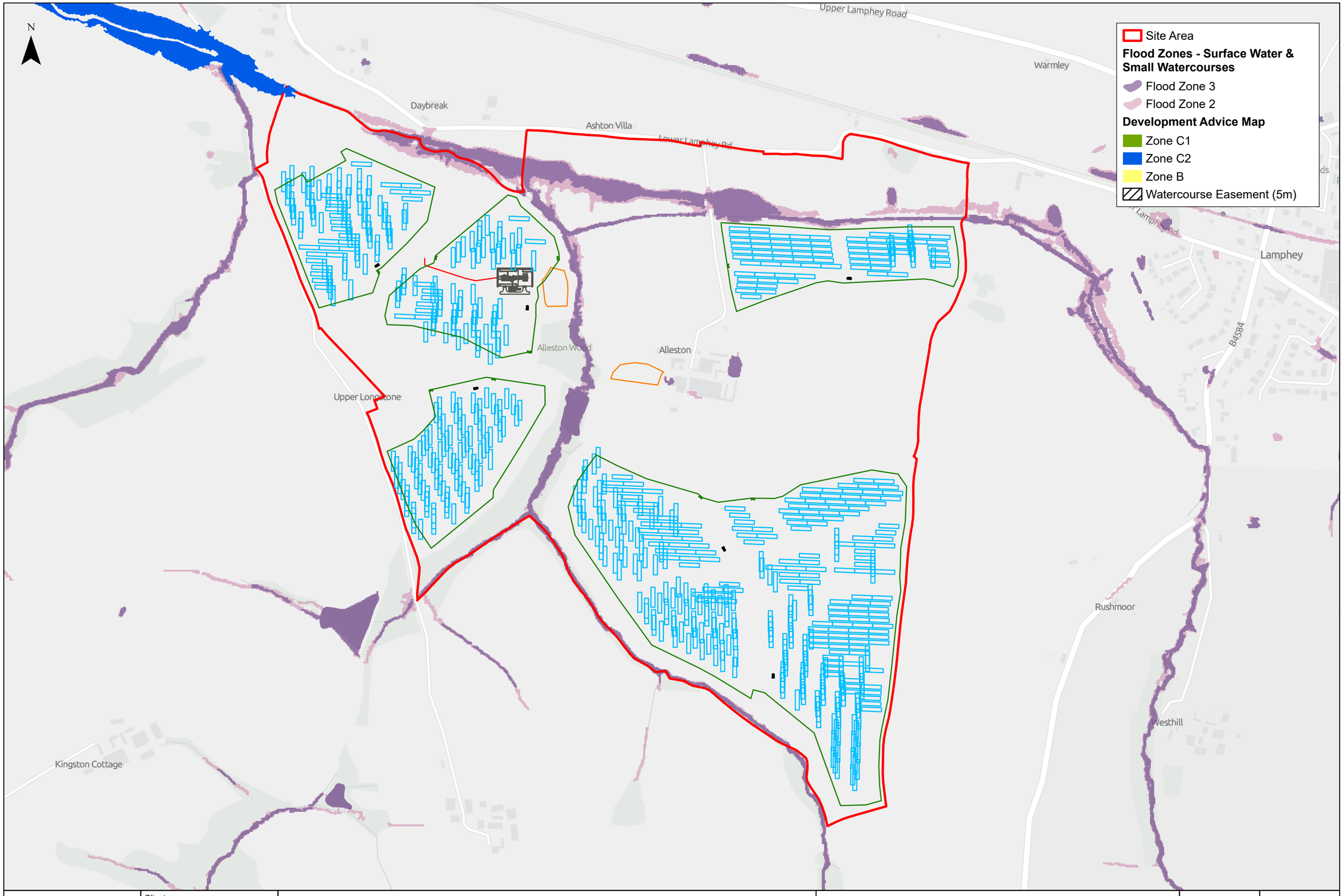
If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within 40 working days of the date of receipt of this response and should be addressed to Company Secretary, Linea, Fortran Road, St Mellons, Cardiff CF3 0LT.

If you are not content with the outcome of the internal review, you have the right to apply directly to the Information Commissioner for a decision.

Yours faithfully

Dŵr Cymru Welsh Water

Appendix D Constraints Plan and Swale Plan



Stantec

Client: Alleston Clean Energy Limited

ALLESTON SOLAR FARM

Preliminary layout and initial flood risk constraints plan

0 300 600 m

Flood Zones refer to the probability of surface water & small watercourse flooding including climate change information but, ignoring the presence of defences.

1:6,000 @ A3	Date: 04/10/2024
Drawn: LW	Checked: PM
Figure: 10	Rev: E

Document Path: \\Bri-vfps-001\bri\Projects\333100437 Alleston Solar Farm\Hydro\GIS\Alleston Solar Farm\Alleston Solar Farm Rev D.aprx

Appendix E Drainage Calculations

InfoDrainage Outputs

DNS Alleston Solar Farm:	Date: 31/01/2024		
	Designed by: AH	Checked by: DB	Approved By: PM
Report Details: Type: Inflows Storm Phase: Phase	Stantec:		

Catchment Area

Type : Catchment Area

Area (ha)	0.001

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

DNS Alleston Solar Farm:	Date: 31/01/2024		
	Designed by: AH	Checked by: DB	Approved By: PM
Report Details: Type: Stormwater Controls Storm Phase: Phase	Stantec:		

Infiltration Trench

Type : Infiltration Trench

Dimensions

Exceedence Level (m)	0.000
Depth (m)	0.500
Base Level (m)	-0.500
Freeboard (mm)	0
Porosity (%)	30
Length (m)	7.000
Long. Slope (1:x)	200.00
Width (m)	1.000
Total Volume (m³)	1.050

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.0036
Side Infiltration Rate (m/hr)	0.0036
Safety Factor	2.0
Conductivity (m/hr)	0.1

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH

Type: FEH

Site Location	GB 200454 200128 SN 00454 00128
Rainfall Version	2013
Data Type	Point
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
30.0	20
100.0	20
10.0	20

Storm Durations

Duration (mins)	Run Time (mins)
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Critical Storm

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow (m^3)
Catchment Area	FEH: 100 years: +20 %: 60 mins: Summer	0.00	0.4	0.552

DNS Alleston Solar Farm:	Date: 31/01/2024		
	Designed by: AH	Checked by: DB	Approved By: PM
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Stantec:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Infiltration Trench	FEH: 100 years: +20 %: 2160 mins: Winter	0.017	-0.017	0.482	0.483	0.0	1.013	0.000	1.398	0.0	0.000	3	OK

DNS Alleston Solar Farm:	Date: 31/01/2024		
	Designed by: AH	Checked by: DB	Approved By: PM
Report Details: Type: Phase Management Storm Phase: Phase	Stantec:		

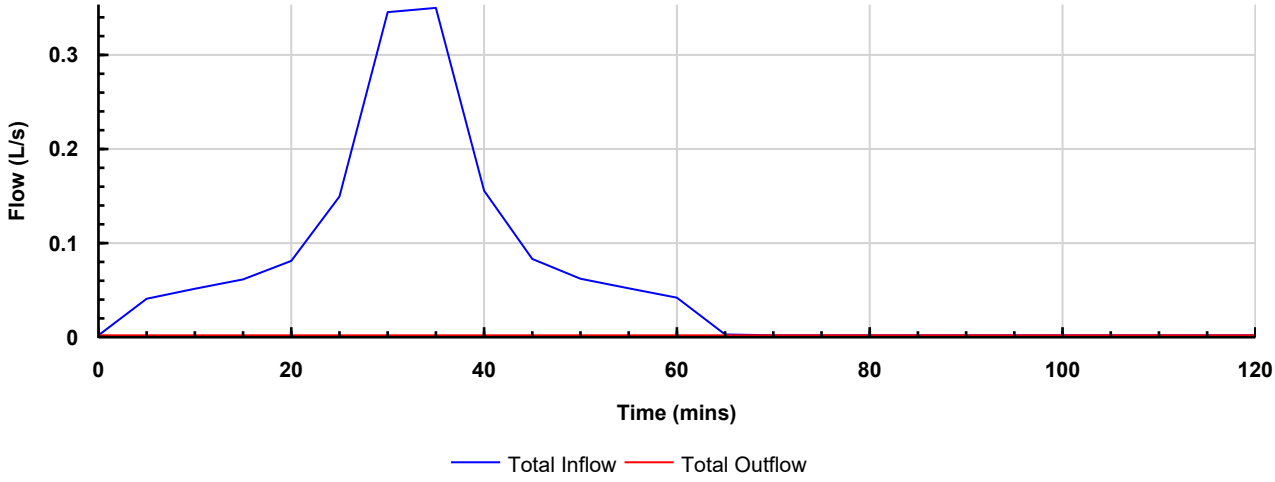
Phase
FEH: 30 years: Increase Rainfall (%): +20: 60 mins: Summer

Tables

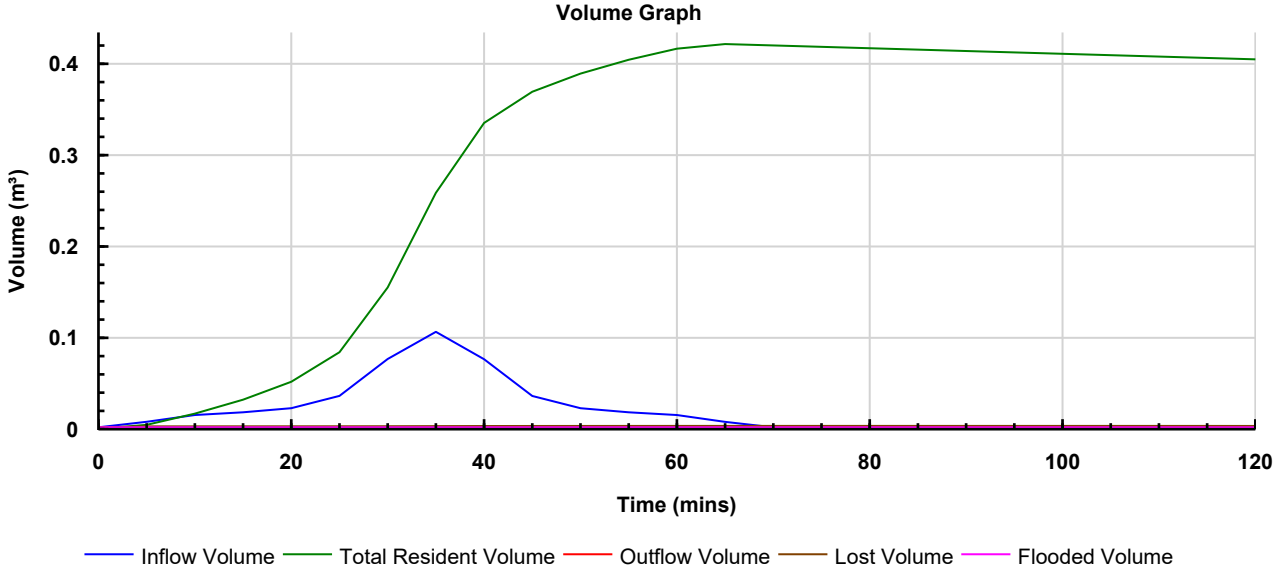
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	0.3	0.438	0.0	0.000

Graphs

Flow Graph



Volume Graph

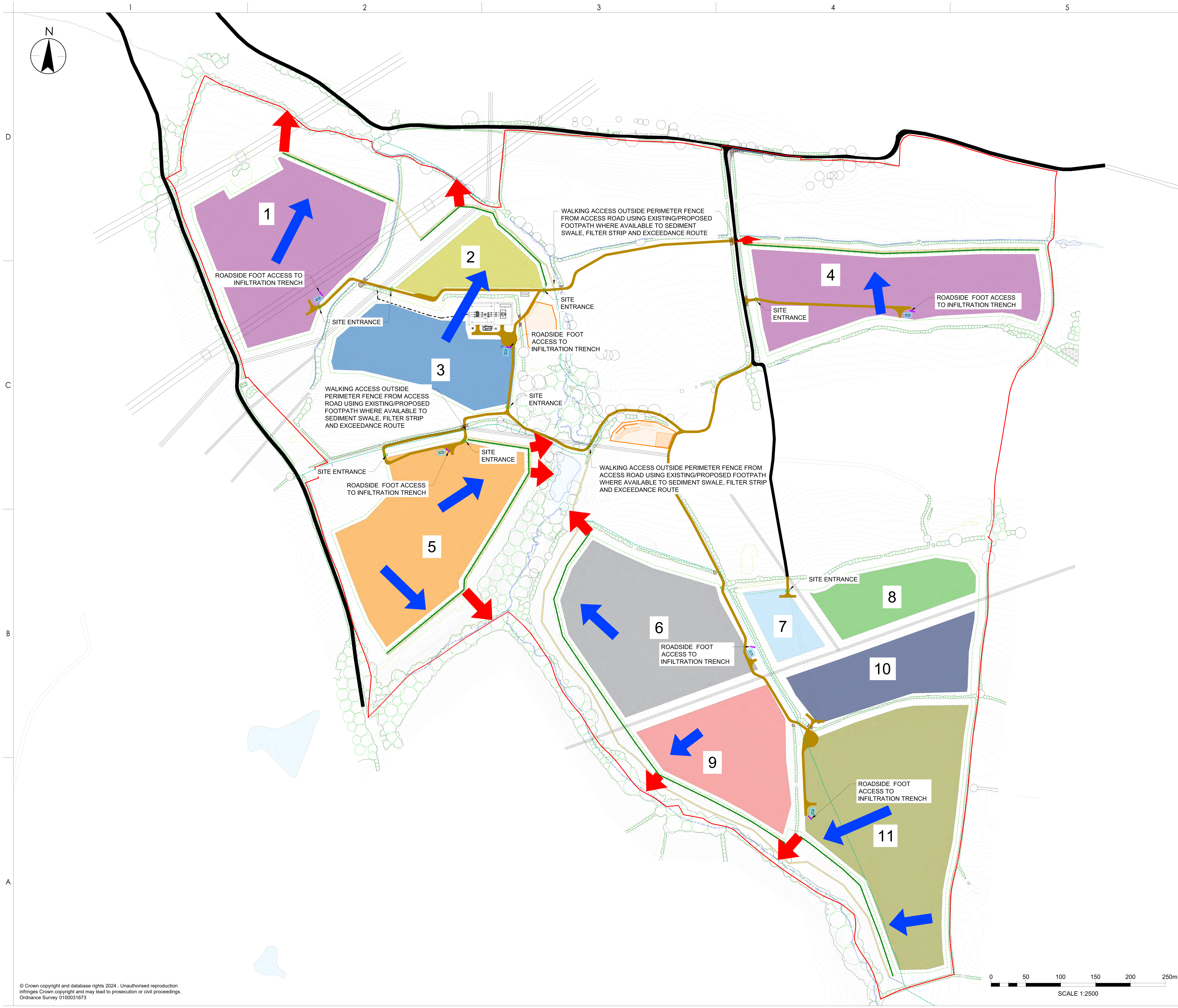


Appendix F Simple Indices Approach

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Filter strip	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Swale	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.65				
Metals	0.7				
Hydrocarbons	0.8				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.65	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.7				
Hydrocarbons	0.8				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Commercial/Industrial roofing: Inert materials				
Pollution Hazard Level	Very low				
Pollution Hazard Indices					
TSS	0.3				
Metals	0.2				
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	Filter strip	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.4				
Metals	0.4				
Hydrocarbons	0.5				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.4	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.4				
Hydrocarbons	0.5				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix G Detailed SuDS Asset Operation and Maintenance Plan



Plotted: 04.10.2024 2024.10.04 12:22:26 PM By: Ryan, Claire
ORIGINAL SHEET - ISOA1 \\bri-vfps-001\bri\projects\333100437 alleston solar farm\hydro\cad\dwgs\333100437-stn-hdg-xx-dr-hy-4102-p04

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Notes

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

DRAWING NOTES:

1. SEE THE FOLLOWING SECTIONS OF THE FLOOD CONSEQUENCE ASSESSMENT REPORT (333100998-STN-HDG-SW-RP-CD-FCA_01_ALLESTON SOLAR FARM FCA):
   - SECTION 6.2 CONSTRUCTION & MATERIALS OF MAINTENANCE ACCESS FOOTWAY, AS PER 'INTERNAL TRACK SECTION DETAIL' (SCUKX-ALLES-000-MCS-201)
   - SECTION 6.3: SIZING AND TYPICAL DETAILS OF FILTER STRIPS, INFILTRATION TRENCHES, SWALES AND LEAKY DAMS
2. DRAWING CONTAINS INFORMATION FROM: SKUKX-ALLES-000-PVL-100.01K (Planning) (1)

KEY:

- RED LINE BOUNDARY
- PROPOSED EXCEEDANCE ROUTE
- PROPOSED INFILTRATION TRENCH WITH UPSTREAM FILTER STRIP (42lin.M)
- PROPOSED SEDIMENT SWALE LOCATION (2179lin.M)
- PROPOSED MAINTENANCE ACCESS FOOTWAY WITH UPSTREAM FILTER STRIP (2426lin.M).

Rev	Description	By	Appd	YYYY.MM.DD
P04	MAINTENANCE ASSESS FOOTWAY & SWALE REVISED.	CR	PM	2024.10.04
P03	UPDATED MASTERPLAN	CR	PM	2024.09.12
P02	UPDATED MASTERPLAN	CR	PM	2024.07.24
P01	FIRST ISSUE FOR PLANNING	AH	AJ	2024.07.08

Issued/Revision

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD
CR	AH	PM	2024.07.08

Issue Status

S2 - FOR INFORMATION

This document is suitable only for the purpose noted above.
Use of this document for any other purpose is not permitted.

Client/Project Logo

Statkraft

Client/Project

STRATKRAFT UK

ALLESTON SOLAR FARM,

PEMBROKESHIRE

Title

PROPOSED SUDS MAINTENANCE

Project No.	A1 Scale
333100437	1:2500

Revision	Drawing No.
P04	**333100437-STN-HDG-XX-DR-HY-4102**