



St Asaph PV Farm - Flood Consequence Assessment & Surface Water Drainage Strategy

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Basis of Report

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Executive Summary

SLR Consulting Limited (SLR) has prepared this Flood Consequence Assessment and Surface Water Drainage Strategy on behalf of Anesco Ltd to support a pre-application submission for a proposed construction, operation and decommissioning of a ground mounted photovoltaic solar farm, together with associated equipment, infrastructure and ancillary works at St Asaph, Cefnmeiriadog, Denbighshire, Wales, LL17 0HF (the site). A summary of key findings from this report are provided below.

Subject	Element	Findings
Site Flood Risk	Tidal	The site is remote from the coast and tidal flooding is not considered to pose a risk to the site.
	Fluvial	The Flood Maps for Planning indicates the site lies wholly in Flood Zone 1.
	Groundwater	Groundwater levels are not expected above approximately 3m below ground level and are considered unlikely to emerge at the surface. The flood risk at the site is considered very low.
	Surface Water	There are three un-named three watercourses in the vicinity of the site. Flood risk from surface water and small watercourses indicates no areas of elevated flood risk at the site except for some small flow paths intersecting with access tracks and the cable route. This risk to the development is therefore low.
	Sewers and Artificial Sources	Welsh Water do not have any mains or sewerage assets within the vicinity of the site. Therefore, the flood risk at the site is considered very low.
Site Details	Topography	Topographic survey has confirmed LiDAR for the site that indicates that the wider topography is dominated by the presence of local watercourses, with steep slopes rising towards the southwestern of the site.
	Hydrology	No existing drainage systems other than drainage ditches were observed across the site. Other surface water features observed included; a slurry pond at the southern access point into the fields, a pond along the watercourse at the northwestern boundary of the western field and a pond within Tyn-y-Coed forest to the east.
	Geology	British Geology Survey (BGS) mapping indicates that the site is underlain by Diamicton deposits. Diamicton is described as 'A type of siliciclastic sediment and sedimentary rock.' Diamicton has a low infiltration rate, which at this site is considered to preclude the use of infiltration SuDS.
Planning Requirements	Acceptability Criteria	As the site lies wholly in Flood Zone 1, the acceptability criteria is considered passed.
Mitigation measures	Design Flood Event	The design flood event (DFE) is the 1 % AEP event. A climate change allowance has been considered for peak rainfall intensity (30%) at the development site with no anticipated adverse impact.
	Finished Floor Levels	The site is at low risk of tidal, fluvial, and surface water flooding and there is no necessity to raise finished floor levels from the original design.



Subject	Element	Findings
	Safe access and egress	Safe access and egress to the site under adverse conditions may be provided with attendance with a 4x4 vehicle.
	Floodplain compensation	Not Required.
	Surface water drainage strategy	Runoff from the hardstanding area will be collected, treated and conveyed towards an attenuation swale through a conveyance swale. Discharge of surface water runoff from the swale will be controlled using a hydrobrake to a maximum rate of 1l/s. Flows from the hydrobrake will outfall into a watercourse. This method successfully offset the pollution hazard indices to satisfy the Simple Index Method.
	Residual Risk	Exceedance flood events in excess of the design standard indicates runoff will revert to the pre-existing regime with flows overtopping the swale and flowing to the watercourse.
Conclusion		This Flood Consequence Assessment and Surface Water Drainage Strategy concludes that the requirements of national, regional, and local planning policy can be achieved at the site given the nature of development proposed.



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Acronyms and Abbreviations

AOD	Above Ordnance Datum
BGL	Below Ground Level
DNO	Distribution Network Operator
FCA	Flood Consequence Assessment
LDP	Local Development Plan
NGR	National Grid Reference
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
PV	Photo Voltaic
SAB	Sustainable Drainage Approving Body
SWDS	Surface Water Drainage Strategy
TAN15	Technical Advice Note 15



1.0 Introduction

1.1 Terms of Reference

SLR Consulting Limited (SLR) has been appointed by Anesco Ltd (the client) to produce a Flood Consequence Assessment (FCA) & Surface Water Drainage Strategy (SWDS) for the proposed St Asaph Photo Voltaic (PV) Farm at Cefnmeiriadog, Denbighshire, Wales, LL17 0HF (the site).

This document, an FCA & SWDS, has been prepared in support of a Full Planning Application for the Proposed Development of a PV Farm at the site and records the findings of a site walkover and assessment carried out in January 2022. The project has been subject to layout and red line boundary iterations since then.

This FCA & SWDS has been prepared in accordance with guidance presented within the Planning Policy Wales (PPW)¹, Technical Advice Note 15² (TAN15) and taking due account of current best practice documents relating to assessment of flood risk published by the British Standards Institution BS8533³ under the direction of a Technical Director of SLR who specialises in flood risk and associated planning matters.

1.2 Site Location

The site is centred on National Grid Reference (NGR) SJ02300 72873 and covers a total area of 33.54 ha. Situated to the southwest of St Asaph, Denbighshire, the site comprises two parcels of land (Area 1 and 2) separated by the Llwyn Penwyn Road.

A site location plan is included below in **Figure 1-1**.

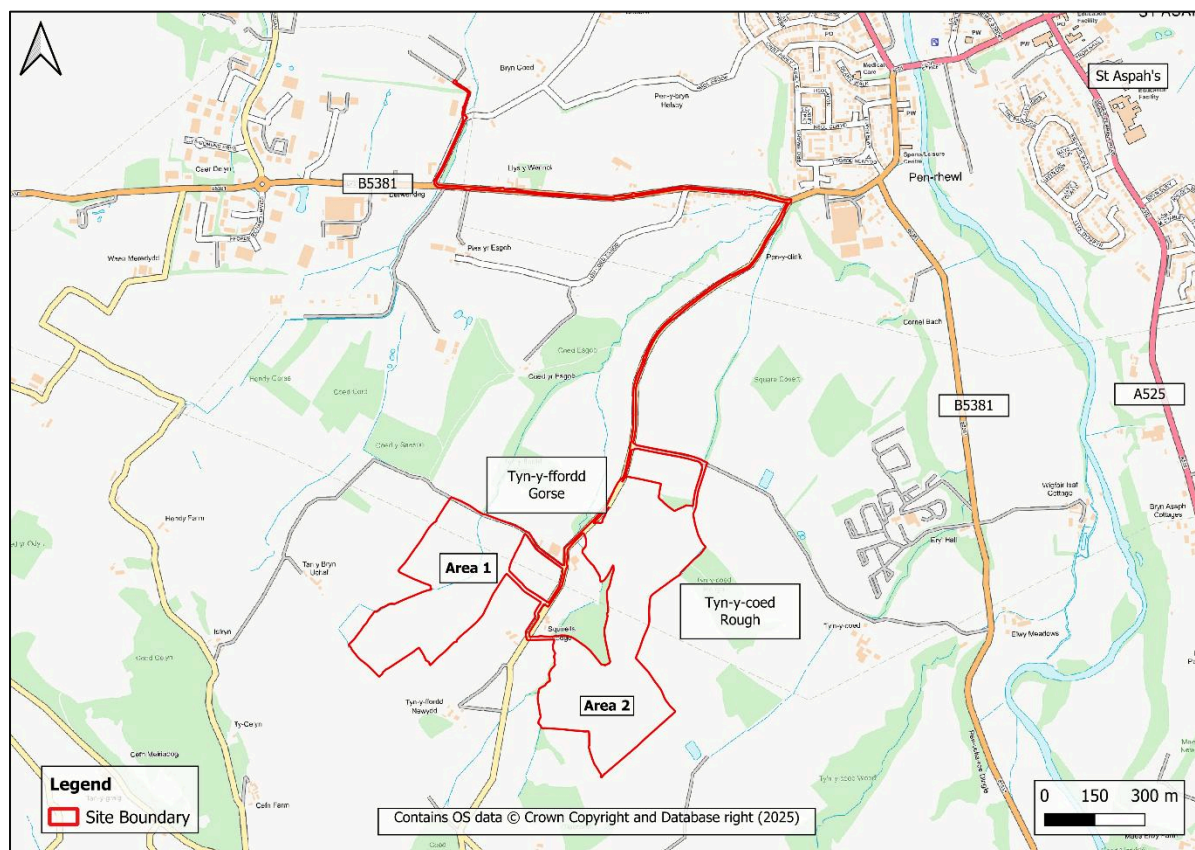
1 Planning Policy Wales, Edition 12. (Updated July 2024)

2 Technical Advice Note 15: Development and Flood Risk to Planning Policy Wales (March 2025)

3 BS8533:2017, Assessing and managing flood risk in development: Code of Practice (December 2017)



Figure 1-1: Site Location Plan



As shown on **Figure 1-1**, Area 1 is located west of Llwyn Penwyn Road and is currently undeveloped and comprises arable land. Area 1 is generally bounded arable land and is accessed from the east off Llwyn Penwyn.

Area 2, as shown on **Figure 1-1**, is located to the east of Llwyn Penwyn Road and is currently undeveloped. This area is delimited by the Pig-y-fran on the west and by the Tyn-y-coed Rough on the east. This area is accessed to the north by Llwyn Road.

1.3 Background and Aims

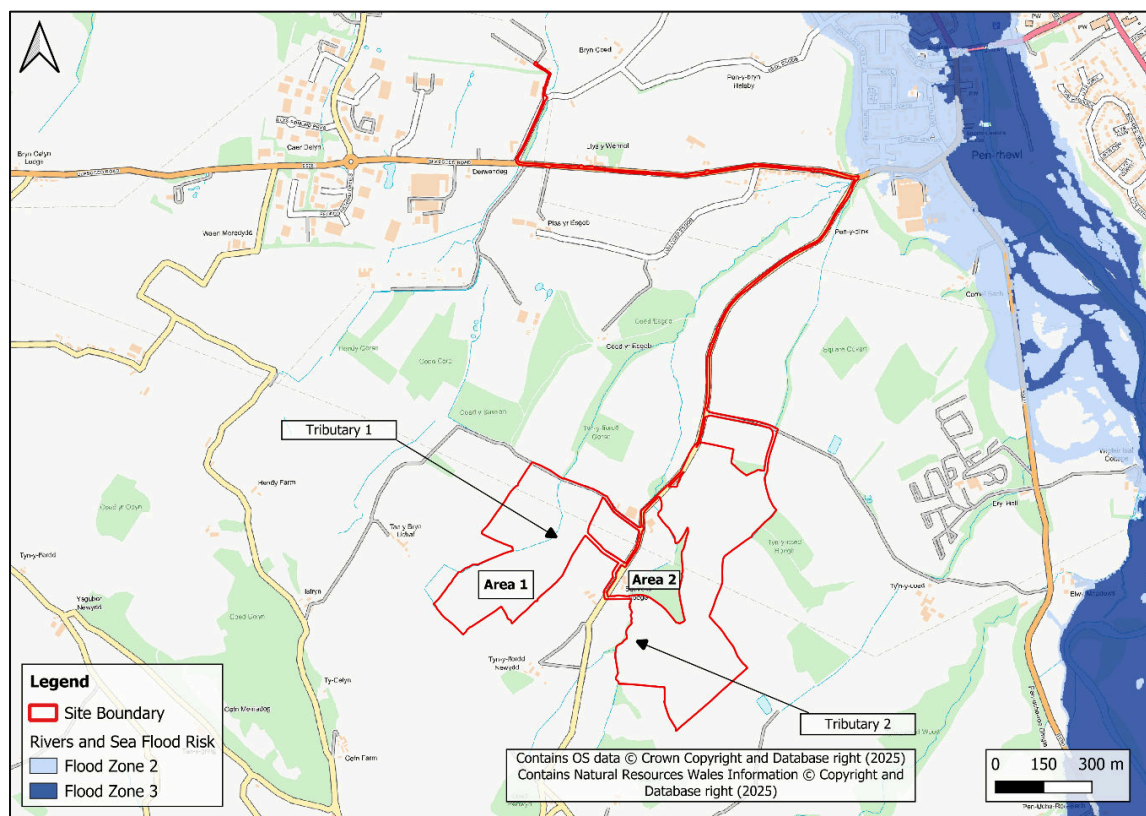
With reference to Natural Resources Wales (NRW) Flood Maps for Planning⁴, the site lies entirely within an area with less than 1 in 1000 (0.1%) (plus climate change) chance of fluvial or coastal/tidal flooding in a given year (Flood Zone 1).

An extract of the Flood Maps for Planning is provided in **Figure 1-2**.

4 Natural Resources Wales (2025) Flood map for planning (March 2026). Natural Resources Wales / Flood map for planning



Figure 1-2: Extract of the Flood Maps for Planning from Rivers and Sea



With reference to the Planning Policy Wales⁵ and its associated Technical Advice Note 15² (TAN15), the Justification Test is not applicable and there is no need to consider flood risk further.

TAN15 states that developments, change of use or conversions are acceptable in principle when located in Flood Zone 1. However, developments that may affect the course of surface water must be accompanied by an FCA as outlined in Sections 6 TAN15.

1.4 Administrative Context

The site is under the planning jurisdiction of Denbighshire County Council, who are responsible for the outcome of this application. Denbighshire County Council are also the Sustainable Drainage Systems (SuDS) Approving Body (SAB) for the area who deal with issues relating to localised flood risk and drainage.

1.5 Best Practice

This report has been prepared in accordance with the advice and requirements prescribed in the current version of TAN15² relating to the management of flood risk in development published by the Construction Industry Research and Information Association (CIRIA)⁶ and the Welsh Government Statutory National Standards for Sustainable Drainage Systems.

⁵ Planning Policy Wales (Edition 11, February 2021)

⁶ CIRIA Report C624, Development and flood risk – guidance for the construction industry (October 2004)



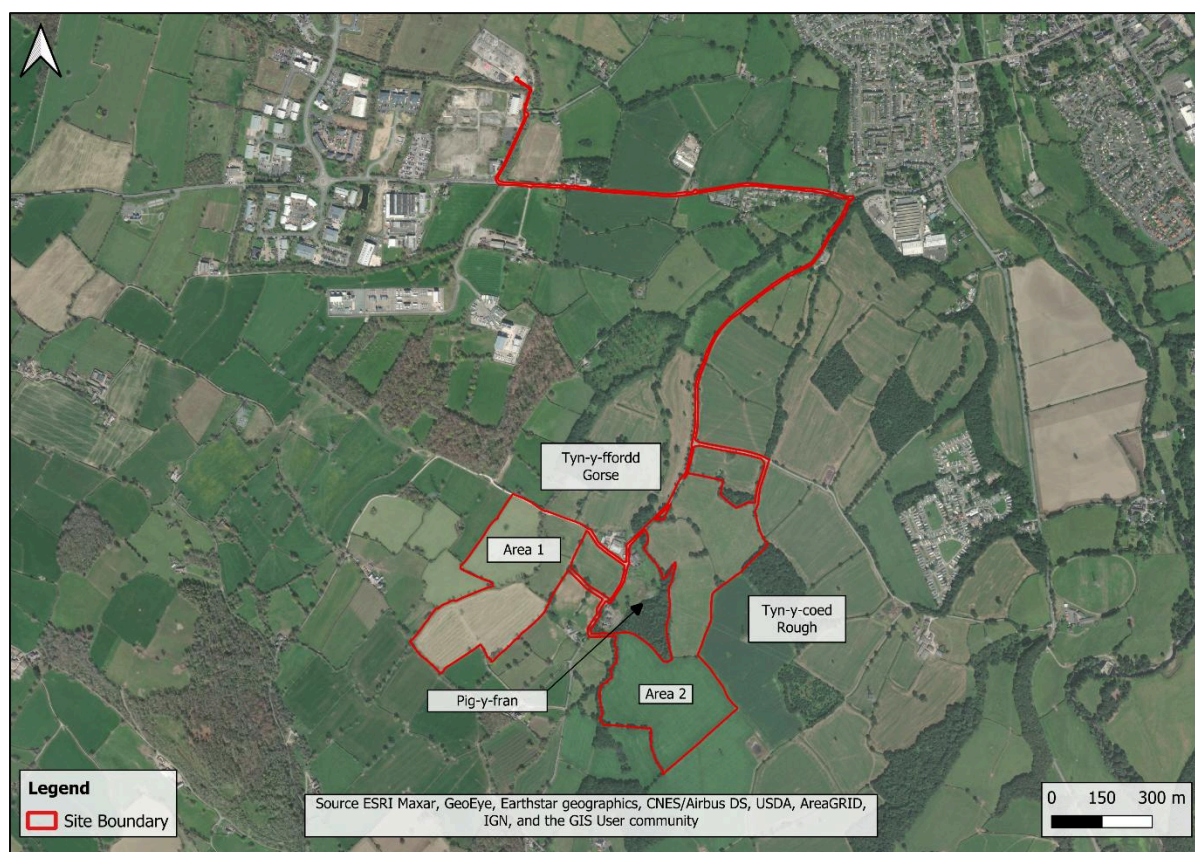
2.0 Site Details

2.1 Existing Site Description

A site walkover was carried out on 06/01/2022 to assess hydrological features across the site and to identify any potential hydrological and drainage issues prior to development. As a result of intermittent rainfall prior to and during the visit, hydrological features were helpfully more clearly defined.

For clarity, the land comprising the site is divided in Area 1, Area 2 and cable route as shown in Figure 2-1 below.

Figure 2-1: Satellite Imagery of the Site



2.1.1 Area 1

Land comprising the site to the west of Llwyn Penwyn Road, as shown in Figure 2-1, is designated as Area 1.

Area 1 is estimated to be c.13.21ha of land and consists of three grassland areas, grouped as a series of adjacent fields. These areas are served by a concrete access track, that runs west from the road allowing for easy access.

2.1.2 Area 2

Land defined in Figure 2-1 as Area 2 (east of Llwyn Penwyn Road) comprised three adjacent agricultural fields, measuring c.20.33 hectares (ha). Access to Area 2 is via the northernmost end of the eastern field.



2.1.3 Cable Route

The entire proposed cable route which will be located underground extends approximately 1.6 km north from Areas 1 and 2 along Llwyn Penwyn Road. The route then turns west, continuing for 1.1 km along Glascoed Road, before heading north again under Cwtir Lane for 0.4 km to reach St. Asaph's substation.

The cable route follows an existing highway from the main site to St. Asaph's substation.

2.2 Topography

Aerial photogrammetric data (LiDAR) topographic data for the site and immediate locality has been downloaded from the National Resources Wales (NRW) open data website⁷ and is contained in Figure 2-2. Figure 2-2 provides bare earth elevation data using a Digital Terrain Model (DTM) and thus excludes built features and vegetation.

The LiDAR presented in Figure 2-2 indicates that the wider topography is dominated by the presence of local watercourses, with steep slopes rising towards the southwestern of the site and the presence of two river valleys flowing from south-west to north-east. Figure 2-2 presents the data for the two areas of the site.

LiDAR shows that ground elevations across Area 1 generally fall towards an un-named watercourse (Tributary 1) from approximately 68.32m Above Ordnance Datum (AOD) in the south west to 50.38m AOD along the northernmost end of Tributary 1. Refer to Figure 2-3 below.

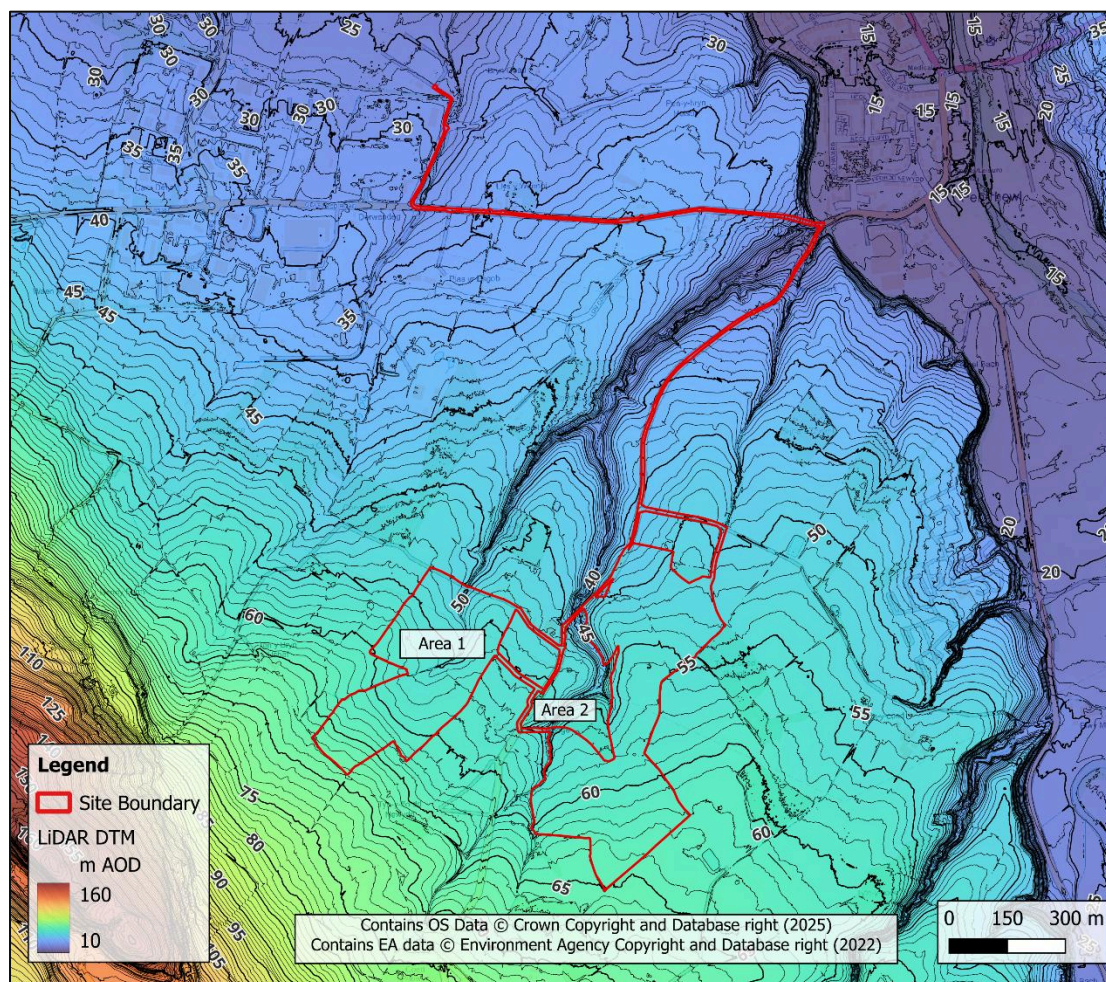
Excluding the access road, across Area 2, ground elevations generally fall towards Tributary 2 (Figure 2-3) from approximately 65.08m AOD to 46.39m AOD at the northernmost corner of the site. Ground elevations along the access road of Area 2 falls from 51.85m AOD to 46.15 m AOD in a general northerly direction.

The proposed cable route elevations fall generally in a north easterly direction from around 56.68 m AOD from the main site (Area 1 and 2). The route descends to a minimum elevation of 17.93 m AOD when reaching Glascoed Road. From this point, the elevation rises to approximately 31.09 m AOD before the route realigns northward along Cwtir Lane, terminating at St. Asaph's substation at an elevation of 25.79 metres AOD.

7 Natural Resources Wales, Lle geoportal (accessed March 2026)
<http://lle.gov.wales/Catalogue/Item/LidarCompositeDataset/?lang=en>



Figure 2-2: 2m DTM LiDAR plot of the site



2.3 Hydrology

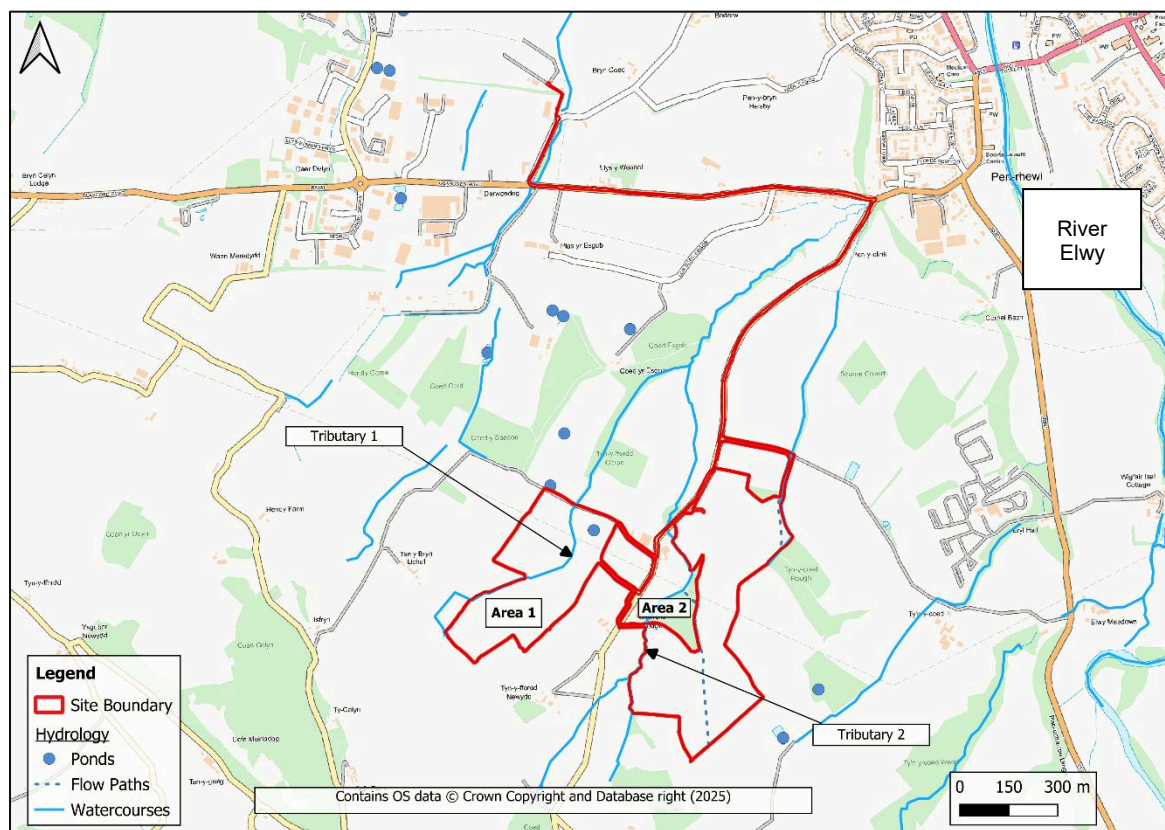
The River Elwy is situated approximately 750m east of the site at its closest point. River depths are recorded at St Asaph Station, located 2.5km north east, and fluctuate annually between 0.98m to 3.90m⁸.

LiDAR⁶ data indicates that St Asaph Station is set at an elevation of 10.33m AOD. The river at its maximum annual recorded level will be, consequently, at 14.23 m AOD based on the data reported above, significantly below the elevation of the site. The watercourses present in the vicinity of the site (Tributary 1 and Tributary 2) flow to the north, and discharge to the River Elwy.

8 River levels, rainfall and sea data, Natural Resources Wales (accessed March 2026), <https://rivers-and-seas.naturalresources.wales/Station/4188?>



Figure 2-3: Local Hydrology



2.3.1 Area 1

Drainage ditches were present along the field boundaries during the site walkover. However, as local gradients fall west towards the watercourse (Tributary 1), most incidental rainfall would flow overland towards this regardless. Refer to Figure 2-3: . Soils were slightly waterlogged at the time of the site visit due to rainfall.

Other surface water features across these areas included a pond at the southernmost field within the northern area and a pond at the northeastern field within Area 1. No existing drainage systems were observed across either field.

2.3.2 Area 2

Land at these fields were observed to gently undulate across some areas (see Figure 2-3:), which occasionally creates shallow sumps for surface water to collect within Flow Path1 and Flow Path 2 as shown in Figure 2-3. Soils at the site however appeared very loamy and were heavily saturated.

A drainage ditch was present at the eastern border of the two northern field of Area 2 and were observed to be in good condition, holding flowing water. This was similar for the western field, but no clear ditches were observed at the northern border, where ground was heavily saturated. However, at the northwestern boundary of the western field, topography declined at a much steeper rate towards an un-named watercourse, Tributary 2, which flowed along the field boundary to the northeast.

2.3.3 Overall Site

No existing drainage systems other than drainage ditches were observed across either area of the main site (Area 1 and 2); however, potential underground utilities were observed at a



concrete structure at the northern side of the boundary between the two fields. Other surface water features observed included; a slurry pond at the southern access point into the fields, a pond along the watercourse at the north western boundary of the western field and a pond within Tyn-y-Coed forest to the east as shown in Figure 2-3: .

2.4 Drainage Regime

As the existing site comprises of undeveloped greenfield land and drains to drainage ditches, and expected to 'drain' via a combination of infiltration into the subsoil with any excess flow conveyed overland following local topographic gradients towards Tributaries 1 and 2, and into the River Elwy.

2.5 Geological and Hydrogeological Context

2.5.1 Geology

British Geology Survey (BGS) mapping⁹ indicates that the site is underlain by Superficial Deposits of Diamicton. Diamicton is described¹⁰ as '*A type of siliciclastic sediment and sedimentary rock. Sediments that are poorly sorted and contain a wide range of clast sizes can be given this root name. The strict descriptive definition relates to range of particle size and not to relative abundance of any or all size classes.*'

The BGS mapping shows a series of private boreholes in the vicinity of the site but no access to their records is available. However, there is a series of boreholes in Diamicton along the A55, approximately 2 km north of the site. Boreholes SJ07NW90 and SJ07SW222 logs¹¹ describe the soil as '*stiff brown silty clay*'.

Diamicton is underlain by the Mudstone, Siltstone and Sandstone of the Warwickshire Group. The Warwickshire Group is defined by the BGS¹² as '*Predominantly red, brown or purple-grey sandstone, siltstone and mudstone, some grey strata, coals not common, local conglomerates, localised beds of Spirorbis limestone.*'

2.5.2 Hydrogeology

The Warwickshire Group beneath the site has been designated as a 'Secondary A' Aquifer¹³, defined as "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers*". Aquifer designation for superficial deposits was not available for the area.

Boreholes SJ07NW90 and SJ07SW22¹⁴ extended to 3.75 and 4.7 m below ground level (bgl) and recorded no groundwater.

9 BGS Geology of Britain Viewer (accessed March 2026) available at <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

10 BGS Geology of Britain: Rock Classification Scheme (accessed March 2026), available at https://webapps.bgs.ac.uk/bgsrscs/rcs_details.cfm?code=DMTN

11 BGS Geology of Britain: Borehole Records (accessed March 2026), available at, <https://www.bgs.ac.uk/information-hub/borehole-records/>

12 BGS Geology of Britain (accessed March 2026): Rock Classification Scheme, available at, <https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=WAWK>

13 Magic Map, DEFRA (accessed March 2026), <https://magic.defra.gov.uk/MagicMap.aspx>

14 BGS Geology of Britain: Borehole Records (accessed March 2026), available at, <https://www.bgs.ac.uk/information-hub/borehole-records/>



2.6 Infiltration Potential

With reference to Section 2.5.1, the superficial deposit at the site comprises Diamicton which based on literature review¹⁵, has a low infiltration rate of 3×10^{-6} m/s which is unlikely to provide a sufficient degree of infiltration. Accordingly, no infiltration testing has been undertaken to date and the drainage strategy progressed assuming infiltration SuDS cannot be relied upon.

During the detailed design process infiltration testing to BRE Digest 365 will be undertaken to confirm whether infiltration SuDS can be utilised in the scheme.

¹⁵ CIRIA (2015). Report C753, The SuDS Manual: Table 25.1



3.0 Proposed Development

3.1 Project Description

This FCA has been prepared in support of the proposal for the construction, operation and decommissioning of a ground mounted photovoltaic solar farm, together with associated equipment, infrastructure and ancillary works.

The Proposed Development comprises the installation of solar PV panels and construction of associated infrastructure, including feeder pillars and transformers; customer and Distribution Network Operator (DNO) substation; and ancillary equipment including security fencing and cable routes. Permeable access tracks will be provided where appropriate.

The development masterplan is enclosed as **Appendix 01**.

3.2 Flood Risk Vulnerability

In line with TAN15 Figure 4, the site proposals are classified as 'Renewable energy generation facilities' and is therefore a '*less vulnerable development*'.

3.3 Anticipated Lifetime of Development

In lieu of further information, a 40-year development lifetime is applied unless there is specific justification for considering a shorter period.

3.4 Planning Policy

The Planning Policy Wales⁵ ensures that flood risk is taken into account at all stages in the planning process and that development is sustainable.

This document has been prepared using best practice principals using The SuDS Manual⁶, TAN15² and Statutory standards for Sustainable Drainage Systems¹⁶.

Technical Advice Note 8 (TAN8): Planning for Renewable Energy¹⁷ was published in July 2005 and sets out the Welsh Government planning policy on renewable energy systems. In accordance with TAN8, the Welsh Government in February 2011 additionally published Planning Guidance - Planning Implications of Renewable and Low Carbon Energy¹⁸ which considers the role of solar PV arrays on hydrology and flood risk.

Paragraph 8.4.18 states:

The potential effects of a solar PV array on hydrology and flood risk should be considered. In general, these are unlikely to be significant because the presence of solar arrays will not greatly increase the time for rainwater to reach the ground where it can infiltrate in the usual way and because the panels will typically cover no more than one third of the site area. The effects of the panels, in combination with access tracks, earth works, buildings for inverters, cable trenches and site drainage works will nevertheless need to be assessed. An assessment of existing flood risk at the site should also be undertaken to

16 Statutory standards for sustainable drainage systems (accessed March 2026) – designing, constructing, operating and maintaining surface water drainage systems, Welsh Government, 2018

17 Technical Advice Note 8: Planning for Renewable Energy to Planning Policy Wales (2005) (Accessed March 2026)

18 Planning Guidance- Planning Implications of Renewable and Low Carbon Energy, Welsh Assembly Government (Accessed March 2026), February 2011



consider the need for electrical equipment to be raised off the ground and to ensure that any on site works do not exacerbate flooding elsewhere.

This report, an FCA & SWDS, provides both an assessment of existing flood risk, and where necessary future flood risk, as well as a supportive drainage strategy which covers the fundamental requirements set out in Paragraph 8.4.18.

3.4.1 Denbighshire County Council

The Local Development Plan (2006–2021)¹⁹ (LDP) was adopted in June 2013 and is the development plan for Denbighshire County Council. It provides the basis for decisions, objectives, spatial strategy and vision for the county. A replacement LDP is in development for 2018-2033 but, is yet to be finalised and adopted.

Relevant policies of the 2013 LDP relating to flood risk, drainage matters and in relation to the development context are outlined in Objective 12 and 14 of the annual monitoring process and covered accordingly below:

Overarching Policies

Policy VOE 1 - Key Areas of importance

The policy designates statutory areas requiring protection from development that would adversely affect them. The aims to address flood risk by monitoring development compatibility under this policy by:

“Directing inappropriate development away from the flood plain”

Sustainable Drainage Systems

Policy VOE 6, Water Management

Water management in this context refers to the water consumption conservation; however, the policy explicitly addresses the requirement for Sustainable Drainage Systems:

“The use of Sustainable Drainage Systems (SuDS) to manage surface water flows can also be an important tool in minimising flood risk by increasing permeable surfaces in an area which allows water to seep into the ground rather than running off into the drainage system. The effective use of permeable surfaces, soakaways and water storage areas should be incorporated in all new development where technically possible. SuDS can also reduce the impact of diffuse pollution from runoff and flooding securing environmental, biodiversity and aesthetic benefits. Early consideration of SuDS is required in order that a range of techniques can be considered and developers are encouraged to enter into early discussions with the Council.”

This assessment will demonstrate how the development complies with the LDP in so far as it relates to flood risk and drainage matters.

3.4.2 Development Category

With reference to Section 3.3, the proposed solar farm is considered a ‘less vulnerable development’.

¹⁹ Nope.



With reference to Section 10 of TAN15, all developments in Zone 1 are considered to be acceptable.

3.4.3 Development Acceptability

With reference to Section 11 of TAN15, all new development in Wales should ensure that the following conditions are met:

- No increase in flooding elsewhere
- Occupiers aware of flood risk
- Escape/evacuation routes present
- Flood emergency plans and procedures agreed and in place
- Flood resistant and resilient design
- Acceptable consequences for type of use (*less vulnerable*)

These acceptability criteria are reviewed in Section 5.0.



4.0 Assessment of Flood Risk

4.1 Potential Sources of Flooding

There are a number of potential sources of flooding and these include:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal flooding;
- Flooding from surface water or pluvial flooding;
- Flooding from groundwater;
- Flooding from sewers; and
- Flooding from reservoirs, canals, and other artificial sources.

The flood risk from each of these potential sources is discussed below.

4.1.1 Flooding from Rivers or Fluvial Flooding and from Sea or Tidal Flooding

With reference to the Flood Map for Planning (Figure 1-2), the site and proposed cable route length lies wholly within Flood Zone 1 and is therefore outside an area having less than 0.1% Annual Exceedance Probability (AEP) or less than 1 in 1,000-year annual probability of flooding from fluvial and tidal sources.

Flooding from these sources is very low and not considered further.

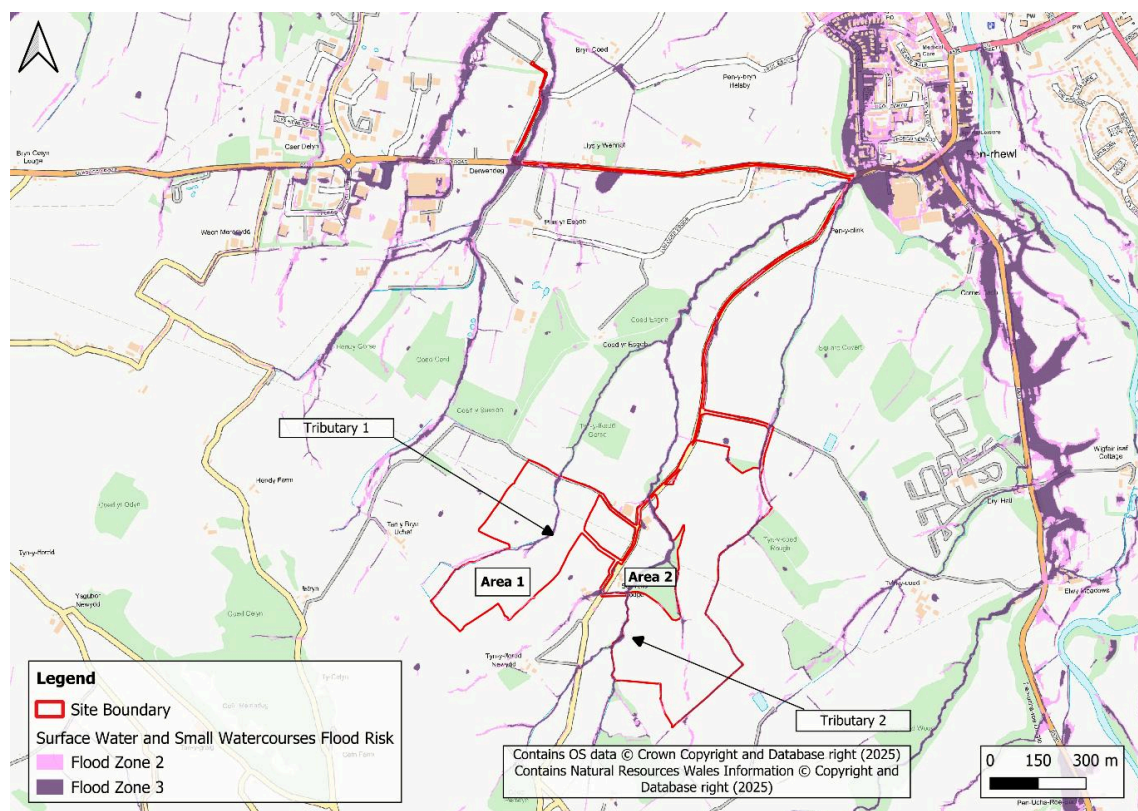
4.1.2 Flooding from Surface Water or Pluvial Flooding

The detailed surface water flood risk maps published by NRW⁴, shows areas potentially at risk of flooding from surface water. The surface water flood risk categories are defined as:

- Low: less than 1 in 100 (1% AEP) but greater than or equal to 1 in 1,000 (0.1% AEP) chance of flooding in any given year;
- Medium: between 1 in 100 (1% AEP) and 1 in 30 (3.3% AEP) chance of flooding in any given year; and
- High: greater than 1 in 30 (3.3% AEP) chance of flooding in any given year.



Figure 4-1: Extract of the NRW Surface Water Flood Map



With reference to Figure 5-1, the areas at risk of flooding within the site are shown to be linear and often extend beyond the site boundary. A comparison of these areas against LiDAR shows flood flow pathways align with topographical valleys.

These areas at risk of flooding are therefore considered to be flow paths. As these flow paths have relatively small upstream catchments, the resulting overland flow and associated flood extent is expected to be limited to no greater than that shown on Figure 5-1.

The risk of flooding from this source is therefore considered low and is not considered further. It should be noted that these conveyance routes will nonetheless be retained as part of the proposed development, thereby maintaining the existing hydrological and hydraulic regime.

During the construction phase, there is a possibility that excavations for the proposed cable may be affected by surface water flooding. However, excavations and installation of the cable is anticipated to be completed within a few months and therefore is not at significant long term flood risk.

4.1.3 Flooding from Groundwater

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels. It is most common in low-lying areas overlain by permeable soils and permeable geology, or in areas with a naturally high-water table.

Groundwater levels are not expected above approximately 3m bgl based on the borehole records as discussed at Section 3.3.2, and given the low permeability of the superficial deposits, would be highly unlikely to emerge at the ground surface.



Flooding from this source is not considered to be significant and therefore not assessed further.

4.1.4 Flooding from Sewers

No mains water pipes or wastewater sewers were recorded in the vicinity of the site during the site visit. Therefore, there is no flood risk to the site from sewers or water mains so is not considered further.

4.1.5 Flooding from Reservoirs, Canals and Other Artificial Sources

There are no reservoirs upgradient of the site and therefore the risk of flooding from this source is negligible. Flooding from Reservoirs, Canals and Other Artificial Sources is negligible and not considered further.

4.1.6 Flooding from Infrastructure Failure

The site is not afforded protection from flood defences, nor are there any sewerage pumping stations or other significant infrastructure within the vicinity of the site which may pose a flood risk.

Flooding from Infrastructure Failure is therefore very low and not considered further.

4.2 Flood Risk Summary

A summary of the potential sources of flooding and the flood risk arising from them is presented in Table 4-1.

Table 4-1: Potential Sources of Flooding

Potential Source of flooding	Significant Flood Risk at the Site (Y/N)
Rivers or Fluvial Flooding	N
Sea or Tidal Flooding	N
Surface Water or Pluvial Flooding	N
Groundwater	N
Sewers	N
Reservoirs, Canals and other Artificial Sources	N
Infrastructure Failure	N

The flood screening assessment indicates that the site is not at significant risk of flooding.

4.3 Flood Risk Classification

The description of the flood zones to control and manage development is described in TAN15 Figure 1 and is summarised below:



Table 4-2: Definition of NRW Flood Map for Planning Flood Zones

Zone	Flooding from river	Flooding from sea	Flooding from surface water and small watercourses
1	Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year		
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.	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 100 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.
3	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change	A greater than 1 in 200 (1%) chance of flooding in a given year, including climate change.	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.
TAN15 Defended Zones	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard).	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200 (plus climate change and freeboard)	Not applicable

Based on the screening study, the entire site lies within Flood Zone 1 and is therefore at very low risk of flooding from any potential sources.



5.0 Climate Change

In September 2021, NRW²⁰ issued updated guidance on the impacts of climate change on flood risk, to be used in flood consequence assessments in support of relevant planning applications. This guidance sets out peak rainfall intensity, sea level, peak river flow, and extreme wave heights are all expected to increase in the future as a result of climate change.

The guidance acknowledges that in relation to certain factors there is considerable uncertainty with respect to the absolute level of change that is likely to occur. As such, in these instances, the guidance provides estimates of possible changes that reflect a range of different emission scenarios.

Concerns relating to offshore wind speed and wave height are only of relevance in contexts that are in direct proximity to the open coast or other large open bodies of water. There are also no associated risks of fluvial flooding from nearby reservoirs or small watercourses. The climate change allowances applicable to the site therefore relate to peak rainfall intensity.

5.1 Peak Rainfall Intensity Allowance

An extract of *Table 2: Change to Extreme Rainfall Intensity* is reproduced as Table 5-1.

Both the central and upper estimates should be assessed to understand the range of impact. The central estimate should be used to inform design levels, whereas where the assessment indicates a significant flood risk for the upper end estimate, the flood consequences assessment will need to provide mitigation measures.

Table 5-1: Change to Extreme Rainfall Intensity (Compared to 1961-90 baseline)

Allowance Category	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	25%	40%	75%
Central	15%	25%	30%

Having reviewed the Upper End and Central Allowances and in line with Table 5-1, the Surface Water Drainage Strategy has been developed to take into account increases in rainfall intensity of 30% over the lifetime of the entire development.

This aligns with the consultation response dated 25/02/2025 from the Lead Local Flood Authority (LLFA) which stated that “*the applicant should provide details of the surface water drainage proposals which should be designed to accommodate the 1 in 100 year plus 30% climate change event with any discharge, for example to a watercourse, restricted to the existing greenfield runoff rates.*”

20 Flood Consequences Assessments: Climate Change allowance. Natural Resources Wales, (Updated September 2021)



5.2 Sea Level Rise Allowances

An extract of *Table 3: Estimated mean sea level rise (in metres) for relevant local authority areas* is reproduced as Table 5-2.

Development proposals should be assessed against the relevant regional 70th percentile presented in Table 3 to inform design levels. The 70th percentile should also be assessed inform mitigation measures, access and egress routes and emergency evacuation plans.

Table 5-2 Estimated mean sea level rise (in metres)*

Local Authority Area	Allowance Percentile	Mean Sea Level Rise (metres) by 2100 *(UKCP18 baseline 1981-2000)	Mean Sea Level Rise (metres) by 2120 *(UKCP18 baseline 1981-2000)
Denbighshire	70 th	0.75	0.90
	95 th	0.95	1.15

*for relevant local authority areas by 2100 and 2120. Allowances are based on RCP8.5 70th and 95th percentiles

The review of tidal flooding at the site will therefore consider the 1.10m uplift associated with the 95th percentile up until 2100. In reality, the anticipated lifetime of development is 40 years (to 2051), and therefore a 0.95m rise is a precautionary approach to assessing tidal flood risk at the site.

The site is located approximately 10 km south of the coast. Extreme tidal levels from Flood Zone B (past evidence of flooding / 0.1% AEP) have been extrapolated from the flood outline using LiDAR datum. The extrapolation indicates an extreme tidal flood level would be at 21.43m AOD and therefore, at least 30m lower than the site.

It is therefore impractical to consider the effects of sea level rise associated with climate change further with regards to flood risk at the site. It is also confirmed the site will remain in Zone A (*considered to be at little or no risk of fluvial or coastal/tidal flooding*) throughout the lifetime of development.

5.3 Peak River Flow Allowances

An extract of Flood Consequences Assessments: Climate Change Allowances²⁰ Table 1 is reproduced as **Table 5-3**.

Both the central and upper estimates should be assessed to understand the range of impact. The central estimate should be used to inform design levels, whereas where the assessment indicates a significant flood risk for the upper end estimate, the flood consequences assessment will need to provide mitigation measures.

Table 5-3 Table 1: Peak River Flow Allowances by River Basin District (using 1961 to 1990 baseline)

West Wales River Basin District	Total Potential Change Anticipated by the 2020s	Total Potential Change Anticipated by the 2050s	Total Potential Change Anticipated by the 2080s
Upper End Estimate	25%	40%	75%



West Wales River Basin District	Total Potential Change Anticipated by the 2020s	Total Potential Change Anticipated by the 2050s	Total Potential Change Anticipated by the 2080s
Central Estimate	15%	25%	30%

As discussed in Sections 2.1.3 and 2.1.3, the catchment of the flow paths and tributaries are relatively small, and the topography falls to c.47m (AOD) towards these features. Consequently, any increase in peak river flow is not expected to have a significant impact on flood risk at the site.



6.0 Surface Water Drainage Strategy

6.1 Sustainable Drainage Systems

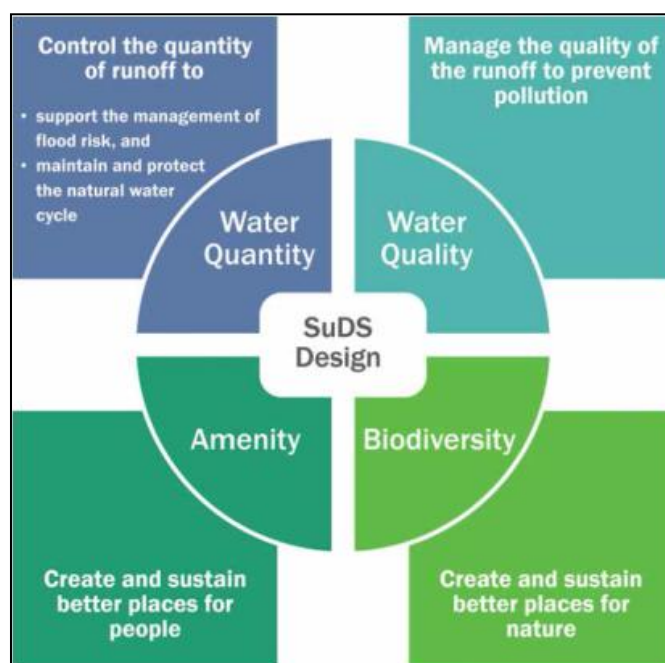
Sustainable drainage systems (SuDS) are required to manage both the rate and volume of runoff and importantly surface water quality.

Surface water drainage provision for new development is subject both to the planning process and, following implementation of Schedule 3 to the Flood and Water Management Act 2010, approval by the SAB.

The current best practice guidance document, The SuDS Manual²¹, promotes sustainable water management through the use of SuDS and is required by the Welsh Government Statutory standards for sustainable drainage systems²². These systems must be approved by Denbighshire County Council acting in its SAB role before construction work begins. The SAB will have a duty to adopt compliant systems so long as it is built and functions in accordance with the approved proposals, including any SAB conditions of approval.

There are four main categories which are referred to as the '*four pillars of SuDS*' as summarised in Figure 6-1.

Figure 6-1: Four Pillars of SuDS (after CIRIA Report C753)



The SuDS Manual identifies a hierarchy of SuDS for managing runoff, which is commonly referred to as a 'management train' and is depicted in Figure 6-2:

- **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).

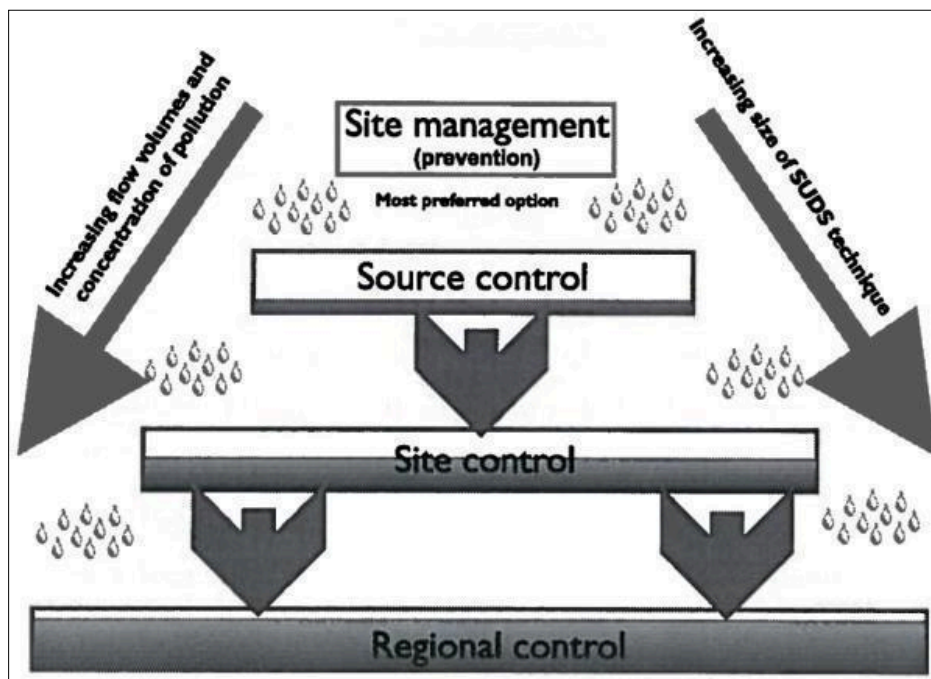
21 CIRIA (2015). Report C753, The SuDS Manual

22 Statutory National Standards for Sustainable Drainage Systems, published on October 2018



- **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).
- **Regional Control** – management of runoff from several sites, typically in a retention pond or wetland.

Figure 6-2: SuDS Management Train



It is generally accepted that the implementation of SuDS, as opposed to conventional drainage systems, provides a number of benefits by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- Reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites;
- Improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;
- Reducing potable water demand through rainwater harvesting; and
- Improving amenity through the provision of public open spaces and wildlife habitat; and replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

In addition to the above, Denbighshire County Council, as the (LLFA) and SAB, promote the use of SuDS as set out in the SuDS Pre-Application.

The SAB requirements are extracted from the Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems¹⁶¹⁶ which have six key themes:

- S1. Surface water runoff destination
- S2. Surface water runoff hydraulic control
- S3. Water Quality



- S4. Amenity
- S5. Biodiversity
- S6. Design of drainage for construction, operation and maintenance

These themes will be used to adopt an achievable drainage strategy at the site.

6.2 Drained Area

The proposed solar panels will intercept precipitation and shed this onto the ground along the lower edge of each array (the 'drip-line'). However, runoff from each solar panel will continue to infiltrate into the underlying soils in much the same way as existing conditions.

Additionally, the grass vegetation that will be permanently maintained between and beneath the solar panel arrays will also ensure that the runoff generated will continue to drain diffusely across the site following the general topography.

Although there will be a small increase in impermeable surface area due to the construction of the substations, inverters and ancillary buildings, the total increase in effective impermeable surface from these elements of the proposed development is not considered to be significant. The runoff from the roofs of these elements will simply be shed to adjacent ground and as such, there would be no material increase in surface water runoff when compared to existing conditions.

Access tracks are proposed to be permeable using single-sized granular material where appropriate.

However, it is proposed that the proposed hardstanding area within Area 1 as shown on Drawing No. C0002452_02 Rev. V4 enclosed at **Appendix 01** will be positively drained.

Section 3.2.7 of The SuDS Manual recommends that the potential increase in the '*impermeability of the contributing catchment through the design life of the drainage system should (...) be taken into account.*'

Section 24.7.2 of The SuDS Manual defines urban creep as:

'any increase in impervious area that is drained to an existing drainage system without planning permission being required, and therefore without any consideration of whether the capacity of the receiving sewerage system can accommodate the increased flow.'

The SuDS Manual recommends that an allowance of 10% is made in respect of urban creep. However, as the proposed development is non-residential, the application of urban creep does not apply.

Based on the proposed development masterplan enclosed within **Appendix 01**, the drained impermeable areas are summarised in Table 6-1.

Table 6-1: Drained Areas

Impermeable Land Use Type	Area (m ²)
	Proposed
Hardstanding Area	400
Total	400



6.3 Proposed Discharge Arrangement

With reference to The SuDS Manual, the hierarchy of preferred disposal options for surface water runoff from development sites in decreasing order of sustainability is as follows:

1. Infiltration to Ground;
2. Discharge to Surface Waters; or
3. Discharge to Sewer.

Table 6-2 summarises the suitability of these disposal methods in the context of the site and the proposed development.

Table 6-2: Suitability of Surface Water Disposal Methods

Surface Water Disposal Method (in Order of Preference)	Suitability Description	Method Suitable? (Y / N)
Infiltration to Ground	With reference to Section 2.5.1, the superficial deposit at the site comprises Diamicton which based on literature review²³, has a low infiltration rate of 3×10^{-6} m/s which is unlikely to provide a sufficient degree of infiltration. No infiltration testing has been undertaken to date. This SWDS has assumed that infiltration is not feasible on site.	N
Discharge to Surface Waters	As discussed in Section 3.4, ground elevations across Area 1 generally fall towards Tributary 1. Surface water runoff from the hardstanding area within Area 1 would therefore discharge to this tributary under gravity. In line with the drainage hierarchy, this method of surface water disposal could be adopted either: (i) as a primary means of discharge should infiltration to ground not be viable; or (ii) as a secondary means of discharge if infiltration rate is insufficient to effectively discharge surface water runoff resulting from the proposed development.	Y
Discharge to Sewer	There is no sewerage infrastructure in the vicinity of the site and therefore this method of surface water disposal is not possible.	N

6.4 Proposed Outline SuDS Strategy

It is proposed to manage surface water runoff from the development via the following 'Source Control', 'Conveyance', and 'Site Control' options as summarised in Table 6-3.

²³

CIRIA (2015). Report C753, The SuDS Manual: Table 25.1



Table 6-3: Summary of Surface Water Management Strategy SuDS Options

SuDS Management Train Mechanism	Application	Potential Suitable SuDS Features
Source Control	For the interception of surface water runoff at the source such as rainfall shedding from the roof areas.	Swale
Conveyance	To convey surface water runoff from 'Source Control' mechanisms to 'Site Control'.	Swale
Site Control	Provides the required surface water attenuation / storage prior to controlled discharge to the water environment.	Swale

'Source Control', 'Conveyance' and 'Site Control' in the form of a piped network and swale are considered to be viable and beneficial (in terms of attenuation requirements and water quality enhancements) and therefore have been integrated into this SWDS.

A conveyance swale, used to provide 'Source Control' and 'Conveyance', will intercept and convey runoff into a swale. The Attenuation swale will act as the 'Site Control' by providing the required attenuation prior to discharge to ground and/or surface water. The swale has been designed to provide sufficient attenuation of runoff within the site boundary for all events up to and including the 1% AEP plus 30% climate change allowance.

Irrespective of the means of discharge of runoff, the swale will be unlined to promote infiltration to ground..

A typical swale detail is provided below in **Figure 6-3**. Whilst not demonstrated in the diagram, the swale will be lined with gravel to encourage infiltration and pollutant filtration. The banks of the swale will be grassed. A 1:3 side slope is adopted to allow for mowing.

Figure 6-3: Swale: Conceptual Design Details



Indicative locations of the proposed swales serving the proposed development are shown in **Drawing 01**.



6.5 Water Quantity Design Standard

6.5.1 Control of Runoff Volume

Section 3.3.1 of The SuDS Manual sets out volume control criteria for:

- Frequent Rainfall Events
- Extreme Rainfall Events

6.5.1.1 Frequent Rainfall Events

The SuDS Manual requires *'the prevention of runoff from the [site] for the majority of small (frequent) rainfall events (or for the initial depth of rainfall for larger events)'*. This is known as interception. The SuDS Manual states that *'Interception of about 5mm is normally achievable.'*

With reference to Section 24.8 of The SuDS Manual:

'Interception can be delivered using one or a combination of processes:

- *Rainwater harvesting*
- *Infiltration*
- *Evapotranspiration using temporary shallow ponding or storage within the soil or upper aggregate layers.'*

As discussed at Section 6.4, the swale will be unlined to promote infiltration to ground. Additionally, Section 17.4.2 of The SuDS Manual states that swales *'deliver Interception because there is usually no runoff from them for the majority of small rainfall events'*.

The SWDS is therefore deemed to provide the necessary interception of the first 5mm of rainfall.

6.5.1.2 Extreme Rainfall Events

For extreme rainfall events, the drainage system should be designed such that *'the volume of runoff from the site (or development) area [does] not exceed the volume of runoff from the equivalent area in its natural undeveloped or "greenfield" state'*.

As summarised in Table 6-2, if infiltration to ground is not feasible or infiltration rate is insufficient to effectively manage runoff, discharge to surface waters will be used.

In line with Section 3.3.1 of The SuDS Manual, it is proposed that *'all the runoff from the site for the 1:100 year [1% AEP] event [to] be discharged at either a rate of $2\text{ls}^{-1}\text{ha}^{-1}$ or the average annual peak flow rate (i.e. the mean annual flood, QBAR), whichever is greater.'*

Table 24.1 Summary of runoff estimation methods of The SuDS Manual recommends the application of the Revitalised Rainfall-Runoff Method (ReFH2) to estimate greenfield runoff rates.

ReFH2 has therefore been used to estimate greenfield runoff rate for the 50% AEP (1 in 2 year) rainfall event as summarised within Table 6-4. It should be noted that QBAR has a return period of approximately 1 in 2.3 years, however, only integers can be inputted into ReFH2. A conservative QBAR peak runoff rate has been estimated assuming a 1 in 2-year return period.



The descriptors for the site extracted from the Flood Estimation Handbook (FEH)²⁴ Web Service were used in the ReFH2 analysis with the AREA set to 1.00ha.

As discussed in Section 6.2, the proposed hardstanding area is 400m², or 0.04ha.

The greenfield runoff rate has therefore been estimated based on the proposed impermeable area of 400m², or 0.04ha, as summarised within Table 6-4.

Full modelled results from ReFH2 are included as **Appendix 03**.

Table 6-4: Greenfield Runoff Rate

AEP (%)	Estimated Greenfield Runoff Rate	
	l/s/ha	l/s/0.04ha
50	5.2	0.2

The discharge rate of 0.2l/s would require a significantly small orifice (c.11mm diameter) that would not be attainable at the site. As discussed in Section 6.3, the site will adopt a swale feature which, naturally, would have some deposition of sediment, vegetation (i.e., leaves) which inherently would regularly cause blockage to an orifice of such a size. The flood risk associated with a blockage occurrence at the site would be significantly greater than a small increase in discharge rate.

In accordance with Section 20.4 of The SuDS Manual, even for below ground (closed) structures, the absolute minimum size should be 20mm. For open attenuation structures such as a swale, where the presence of debris and therefore blockage is likely, a minimum outflow control diameter of 50mm is recommended. The most effective means of controlling flow while reducing the likelihood of blockage is using a Hydrobrake.

Using a Hydrobrake with a diameter of 54mm would control off site discharge to 1ls⁻¹.

6.5.2 Control of Peak Runoff Rate

Section 3.3.2 of The SuDS Manual sets out the peak rate of runoff criteria for:

- Events likely to impact on morphology, ecology or capacity of the receiving surface waters, or the capacity of receiving sewers.
- Extreme events.

6.5.2.1 Events likely to impact on morphology, ecology or capacity of the receiving surface waters, or the capacity of receiving sewers

As discussed in Section 6.5.1, there will be a small but controlled increase (1l/s) in runoff rate to the receiving watercourse associated with the new impermeable area. Significant changes to the hydrological regime, such as an impoundment or uncontrolled / unmanaged impermeable development, would essentially impact the existing morphology and ecology of the receiving surface waters. It is not considered that a relatively small increase in discharge into the receiving ditch would result in any detrimental impacts to the channel.

An assessment of the capacity of Tributary 1 to receive the small increase in discharge would require further investigation. At this stage, it is considered the dimensions of the

24 Flood Estimation Handbook (Centre for Ecology & Hydrology, 1999)



channel, which from LiDAR indicates a depth of 1.8m, is sufficient to accommodate the extra flows.

6.5.2.2 Extreme Events

In line with Section 3.3.2 of The SuDS Manual, the SWDS *'should be designed so that peak runoff rates for extreme rainfall events (...) are constrained to the greenfield runoff rates for the same event'*.

As discussed above at Section 6.5.1, discharge from the site will be restricted to 1l/s as this is the smallest, viable discharge rate possible.

6.6 Water Quantity Design Standard

Both strategies are based on a total contributing area of 0.04ha. Temporary storage volumes were estimated using the Causeway Flow software, an appropriate methodology for planning and master planning purposes. The attenuation volumes required for the proposed development in response to a range of AEP rainfall events up to and including the 1% AEP storm event +30% have been estimated for both strategies.

The analysis indicates that a 75 mm diameter Hydrobrake flow control device would be required to limit the discharge from the attenuation swale to the maximum allowable discharge rate of 1ls⁻¹.

Calculations were made on the assumption that no infiltration is possible on a 'worst case scenario' basis, to demonstrate that the drainage feature can manage the surface water generated by the proposed development. When the site-specific infiltration rate of the soil is confirmed, infiltration to the soil will be encouraged resulting in a possible reduction of the size of the swales.

The conveyance swale will therefore have the following parameters:

- Basal Width: 0.4m
- Top Width: 3.4m
- Depth: 0.5m
- Side Slope: 1:3
- Length: 20m
- Estimated Required Total Volume: 19 m³

The attenuation swale will therefore have the following parameters:

- Basal Width: 1.8m
- Top Width: 4.8m
- Depth: 0.5m
- Side Slope: 1:3
- Length: 6m
- Estimated Required Total Volume: 9.9m³

Details of the analysis are enclosed in **Appendix 04** and summarised in Table 6-5.



Table 6-5: Drainage Performance and Sizing

AEP (%)	Maximum Discharge Achieved (ls ⁻¹)	Maximum Water Depth (m)	Maximum Attenuation Storage Required (m³)
1 + 30%	1	0.488	19.9

6.7 Water Quality Design Standard

The drainage of built development has the potential to reduce water quality through increases in suspended solids, metals and hydrocarbons in the surface water runoff. The risks associated with a number of typically drained surfaces (land uses) are assessed in Section 26 of The SuDS Manual and expressed in Table 26.2 as a potential 'Pollution hazard level'. A review of each of the land uses has been completed with reference to Table 26.2 of the SuDS Manual, to determine the appropriate Pollution Hazard Levels.

It is anticipated that the proposed hardstanding area will be used to site a DNO station and provide vehicular access to this element of the proposed development. As such, with reference to The SuDS Manual, post development surface water runoff generated from the hardstanding area is considered to have a 'Low' Pollution Hazard Level as set out within Table 6-6.

Table 6-6: Pollution Hazard Potential of the Proposed Development

Land Use	Pollution Hazard Level	Pollution Hazard Indices		
		Total Suspended Solids (TSS)	Metals	Hydrocarbons
Low traffic area	Low	0.5	0.4	0.4

As discussed in Table 6-2, surface water runoff from the site will likely discharge to surface waters if future soakage testing indicates that there is no infiltration potential at the site. The indicative SuDS Mitigation Indices for discharge to surface water are summarised in Table 26.3 of The SuDS Manual and included below in Table 6-7 with respect to the proposed SuDS features at the site.

Table 6-7: SuDS Mitigation Indices for Discharge to Surface Water

SuDS Arrangement	Indicative SuDS Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Swale	0.5	0.6	0.6

A comparison of the *Pollution Hazard Indices* and *Mitigation Indices* for the proposed 'Source Control', 'Conveyance', and 'Site Control' measures are provided in Table 6-8.

Table 6-8: SuDS Performance: Water Quality Indices Assessment (Discharge to Surface Water)

Land Use	Index	SuDS Mitigation Indices Comparison		
		Total Suspended Solids (TSS)	Metals	Hydrocarbons
Low traffic area	Hazard	0.5	0.4	0.4



Land Use	Index	SuDS Mitigation Indices Comparison		
		Total Suspended Solids (TSS)	Metals	Hydrocarbons
	Mitigation	0.5	0.6	0.6
	Water Quality Requirement Met? (Y/N)	Y	Y	Y

Table 6-8 shows that the *Mitigation Indices* are greater than the *Pollution Hazard Indices*, and therefore the water quality requirements are considered met.

6.8 Design Exceedance Arrangement

The proposed SWDS also considers residual events, i.e., those in excess of the design rainfall event (1% AEP + 30% climate change).

As discussed in Section 2.1.1, topography across the Area 1 falls to the south towards Tributary 1. Any excess flow from the hardstanding area which cannot be accommodated within the swale would propagate overland following local topography. I.e. excess flow would be directed to Tributary 1. This is depicted on Drawing 01.

6.9 Amenity

The Proposed Development will generate renewable electricity from the proposed solar panels when operational, which will reduce climate impacts from fossil fuel use. The Site is not open to the public; however, the Proposed Development will be designed to minimise visual impacts. To do this, the existing hedgerows and field patterns will be retained as far as possible, and native tree and woodland planting will be introduced post development, to enhance site amenity.

6.10 Biodiversity

The proposed solar panels will be located within existing fields. The existing ecologically valuable habitats within the Site comprise of grassland, hedgerows, trees and small watercourses. The existing hedgerows and watercourses will be retained and maintained post development to improve biodiversity, via a Landscape and Ecological Management Plan.

The proposed swale shall incorporate planting of native grasses, wildflowers, and shrubs, which will create diverse habitats for local wildlife. This vegetation will provide food and shelter for insects, birds, and small mammals, enhancing the ecological value of the site.



7.0 Principal Operation and Maintenance Requirements

At this time, it is envisaged by Anesco that all surface water drainage and pollution control features (swale, hydrobrake and piped network) associated with the site will remain private and be managed by the site operator.

The following section outlines recommended maintenance requirements for the swale, outflow control (Hydrobrake), and piped network of the drainage system for the development.

7.1 Swale and Hydrobrake

The recommended operation and maintenance plan of the swale and hydrobrake is summarised below in Table 7-1.

Table 7-1: Typical Swale and Hydrobrake Maintenance and Operation Requirements

Maintenance Schedule	Required Action	Minimum 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.
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding > 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 slit removal frequencies.	As required or if bare soil is exposed over 10% or more of the swale treatment area
	Remove sedimentation that has become entrained into the hydrobrake outflow	Every 6 months
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plan types to better suit conditions, if required	Annually
	Periodic measuring of the hydrobrake bore size	Every 3 years
	Checking of the hydrobrake for leakage issues	Annually
Remedial Actions	Repair erosion or other damage by re-turfing or reseedling	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.



Maintenance Schedule	Required Action	Minimum Frequency
	Remove and dispose of oils or petrol residues using safe standard practices.	As required.

7.2 Underground Pipe Network

A recommended operation and maintenance plan for the piped drainage network is summarised in Table 7-2.

Table 7-2: Typical Pipe System Operation and Maintenance Requirements

Maintenance Schedule	Required Action	Minimum Frequency
Regular Maintenance	Ensuring drainage intakes are clear of debris / silt	Monthly, or as required
Occasional Maintenance	Clear Gully Pots	6 monthly
	Jet clean sewer lines, gully tails and kerb channels to remove grease, grit, sediment and other debris to ensure conveyance capacity is not compromised.	Every 2 years
Intermittent Maintenance	CCTV survey of sewer lines to identify any defects/signs of performance degradation such as: - Cracked / deteriorating pipes; - Leaking joints/seals at manholes; - High water lines showing regular high stage in pipes (sign of lack of capacity or downstream constraint); and - Suspected infiltration or exfiltration.	Every 2-5 years
Remedial Actions	Repair defects using suitable methods. Effective temporary repairs may be sufficient in short term until scheduled/capital improvements can be made	As required
Monitoring	Record areas of surface ponding / intake bypassing / surcharging (photos, inundated areas, depths) during extreme storm events and investigate the reasoning for this post-storm	As required



8.0 Best Practice Flood Management

8.1 Mitigation Measures

- **Permeable access tracks** - Access tracks within the general PV site are proposed to be permeable using single-sized granular material where appropriate.
- **SuDS scrapes** - All parts of the site layout are to be reviewed at the detailed design stage to incorporate scrapes where appropriate parallel to the solar panels to ensure flood flows are captured and slowed down to then be captured by filter drains.
- **Perpendicular filter drains** – As recommended by the SAB all parts of the site layout are to be reviewed at the detailed design stage to incorporate filter drains perpendicular to the line of solar panels to ensure overland flows are sufficiently captured at frequent intervals and managed. The incorporation of check dams to reduce runoff will also be considered where slopes are significantly.

8.2 Acceptability Criteria

TAN15 Section 11 summarises the acceptability critical for flooding consequences. As discussed in Section 3.4.3 for this development these are as follows:

- ***No increase in flooding elsewhere***

The site is located in Flood Zone 1 from Rivers and Sea and thus has a flood risk less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year.

As identified in Section 5.1.2, there is a flood risk from surface water and small watercourses along the length of the cable route and that there is a possibility that excavations for the proposed cable may be affected by surface water flooding.

A Construction Surface Water Management Plan will therefore be provided to monitoring for weather alerts, dewatering of excavations for safe disposal. When appointed, these measures will be the responsibility of the contractor to ensure that no increase of flood risk occurs during implementation of the cable route.

Ground levels shall be restored following installation to avoid risk of flood risk arising from alterations to the greenfield runoff regime.

- ***Occupiers aware of flood risk***

The development will not be permanently occupied.

- ***Escape/evacuation routes present***

The development will not be occupied; however, the site is almost entirely located in Flood Zone 1 and will be free of flood risk for maintenance crews to during routine inspections.

- ***Flood emergency plans and procedures agreed and in place***

The development will not be occupied. Maintenance activities shall be covered under standard Risk Assessment Method Statements should flood warnings be issued for the local area.

- ***Flood resistant and resilient design***

The development will be supported by a Construction Surface Water Management Plan to ensure flood resistance and resilience measures during construction phases. Management of runoff generated from impermeable areas or intercepted surface water flow paths have been considered under Section 0.



➤ ***Acceptable consequences for type of use***

The 'less vulnerable development' is located in Flood Zone 1 and is therefore suitable for development.

➤ ***The scheme will be flood free for the 1 in 100 annual probability flood event with an appropriate allowance for climate change***

The flood risk screening completed in Section 4.0 concludes that the Site lies within Flood Zone 1 meaning that the flood risk probability is less than 0.1% plus allowances for climate change.

➤ ***That in extreme flood condition the depth of flooding will not exceed 600mm or the velocity of flood water 0.3m/s***

It has been concluded that flood risk to the Site is low and that extreme flood conditions may only occur from Surface Water and Small Water Courses along the permeable access roads. No sensitive infrastructure has been located within these extents and will remain flood free for the lifetime of the development.

The steep regional topography confines these flow pathways to narrow channels or fast moving surface water flows. Should access to the site be necessary, attendance with a 4x4 vehicle shall ensure that personnel are safe from significant hazard.



9.0 Conclusions

SLR Consulting Limited (SLR) has been appointed by Anesco Ltd (the client) to produce a Flood Consequence Assessment (FCA) and Drainage Strategy (SWDS) for the proposed St. Asaph's Photo Voltaic (PV) Farm at Cefnmeiriadog, Denbighshire, Wales, LL17 0HF.

With reference to the indicative *Flood Maps for Planning*⁴ the site lies entirely within an area considered to be at 'little or no risk of fluvial or coastal/tidal flooding' (Flood Zone 1). With reference to the Planning Policy Wales¹ and its associated Technical Advice Note 15² (TAN15), the 'less vulnerable development' is suitable and acceptable to be located at the site.

The site is under the planning jurisdiction of Denbighshire County Council, who are responsible for the outcome of this application and as the SuDS Approving Body (SAB) for the area, they deal with issues relating to localised flood risk and drainage.

This report has been prepared in accordance with the advice and requirements prescribed in current best practice documents relating to the management of flood risk in development published by the Construction Industry Research and Information Association (CIRIA)⁶ and the Welsh Government Statutory National Standards for Sustainable Drainage Systems¹⁶.

Technical information provided in this report on behalf of the Client seeks to demonstrate that a robust and sustainable drainage strategy has been prepared for the site, including residual events. This report has proposed for surface water drainage to discharge to surface waters.

The swales provide all attenuation within a 28.9m³ of storage. A hydrobrake will be used to restrict flows to the smallest viable discharge rate that can be suitably engineered (1l/s) to surface waters.

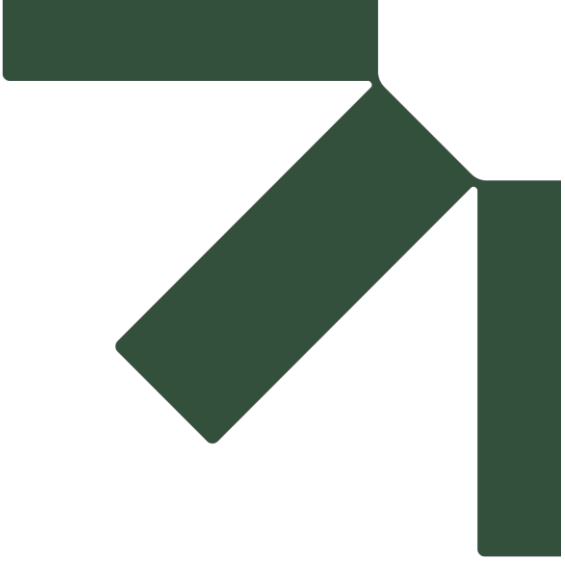
Mmodelling of the swale has been developed to a design standard of the 1% AEP plus a 30% allowance for climate change.

The pollution mitigation effects of the vegetated swale for both groundwater and surface water discharge are sufficient to satisfy the criteria of the Simple Index Method for runoff draining from the proposed hardstanding area.

Residual flood events in excess of the design standard have also been considered, and all events greater than the 1% AEP plus 30% climate change will revert to the pre-existing runoff regime discharging towards Tributary 1.

The surface water drainage strategy presented in this report demonstrates that adequate SuDS space provision is afforded within the development and that the proposed scheme is feasible and compliant to appropriate best practice and regulatory requirements and can be maintained in accordance with best practise.





Drawings

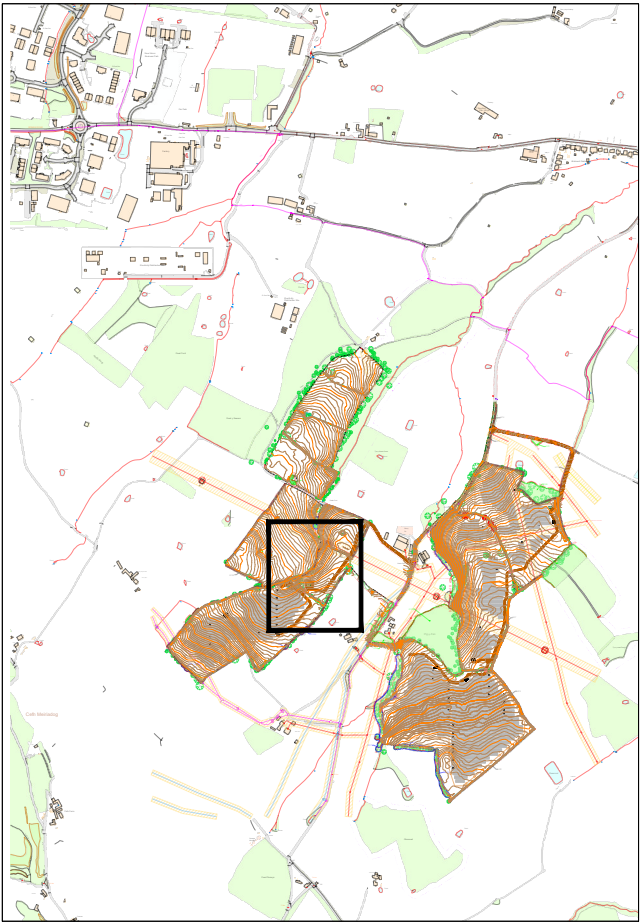
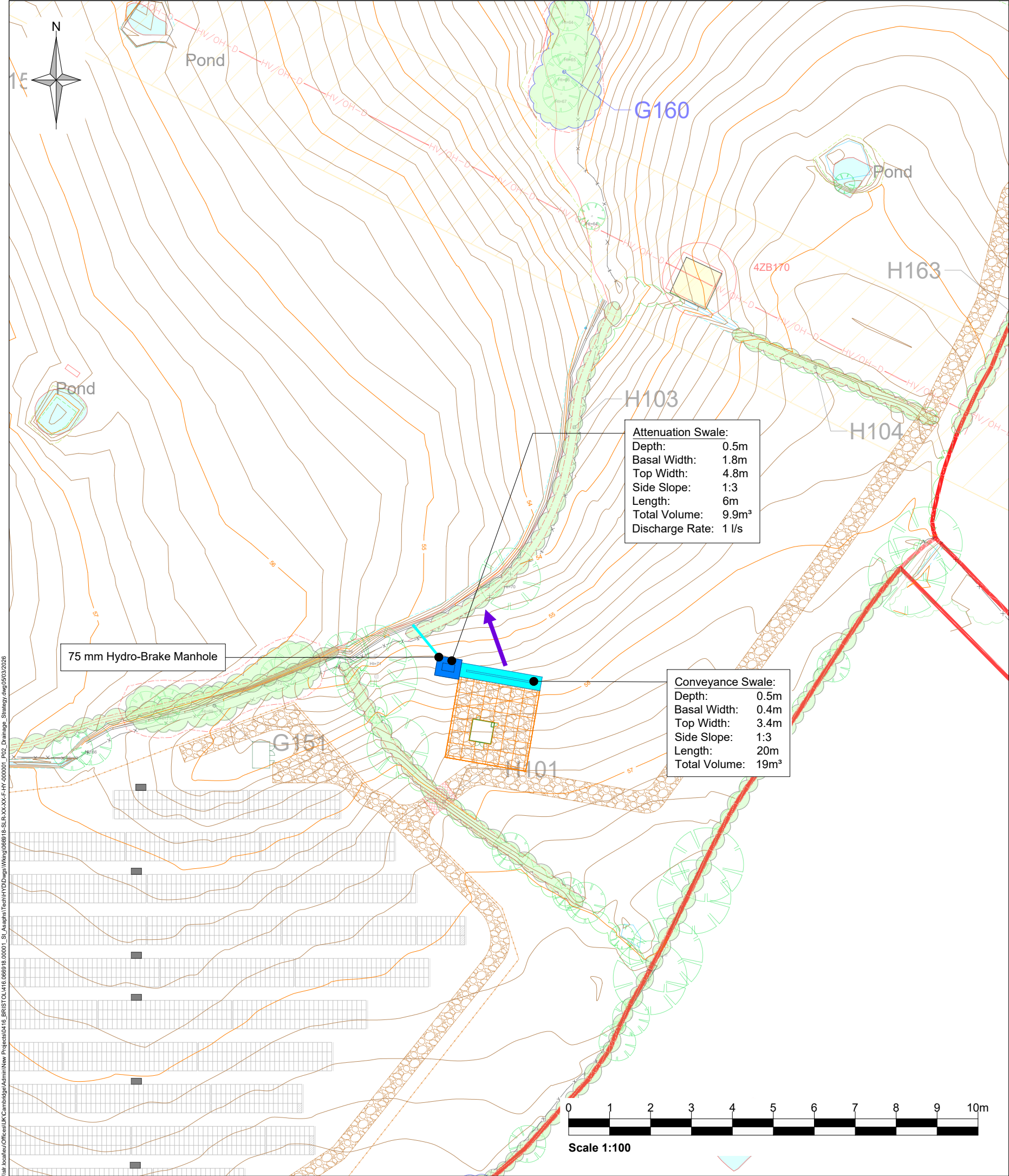
Drawing 01: Conceptual Surface Water Drainage Layout

St Asaph PV Farm - Flood Consequence Assessment & Surface Water Drainage Strategy

Anesco Ltd

SLR Project No.: 416.066918.00001

19 March 2026



Location of Detail Within Wider Site

- Notes:**
1. Drawing is based on client supplied Site Layout Planning drawing, ref: C0002452-02 Rev X, dated: 20/01/2026. Temporary construction phase details have been omitted for the purposes of this drawing.
 2. Drawing to be read in conjunction with all relevant documents.
 3. All levels are shown in meters above Ordnance Datum.
 4. All dimensions are in meters.
 5. Drainage strategy design attenuates surface water runoff for the 1 in 100 year event plus 30 % climate change.
 6. Layout is preliminary only and subject to refinement / additional detail during future design stages.
 7. Pipes and linear drainage channels have not been modelled or sized-subject to detailed design.
 8. Swale has not been 3D modelled based on existing topography.

- Legend:**
- Site Boundary
 - DNO Substation Hardstanding
 - Attenuation Swale
 - Exceedance Route
 - Conveyance Swale

Rev	Amendments	Date	By	Chk	Auth
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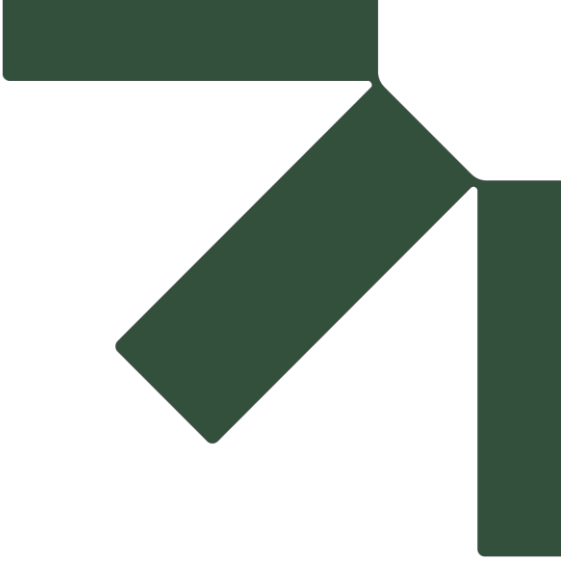
www.slrconsulting.com

Client
Anesco Ltd

Project
St Asaph
Flood Consequence Assessment

Figure Title
Figure 01
Conceptual Surface Water Drainage Strategy

Scale 1:1,000	@ A3	SLR Project No. 416.066918.00001	
Designed	Drawn TS	Checked CB	Authorised KP
Date	Date Feb 2026	Date Feb 2026	Date Feb 2026
Figure Number 066918-SLR-XX-XX-F-HY-000001			Rev. P01



Appendix 01 Pre-app Consultation Response

St Asaph PV Farm - Flood Consequence Assessment & Surface Water Drainage Strategy

Anesco Ltd

SLR Project No.: 416.066918.00001

19 March 2026

Dear Sir / Madam

CAIS / PREAPP/2024/105
APPLICATION:

CYNNIG / Proposed Development of National Significance For A
PROPOSAL: Solar Farm With A Generating Capacity Over 16MW
LLEOLIAD /
LOCATION: Land at Cefn Meiriadog, St Asaph

I write in relation to your enquiry regarding a proposed solar farm with a generating capacity over 16MW. Pre-application advice for an earlier version of the development has been provided previously. Since the production of that advice, the site boundary has been amended to reduce the amount of shading of panels.

Due to the capacity of the proposed solar park, the development would be a Development of National Significance (DNS). Planning applications for DNS proposals are submitted to PEDW for assessment and determined by Welsh Ministers, and accordingly this response is submitted in our capacity as a statutory consultee as the relevant local planning authority.

Please be advised that this response is made at Officer level only and any opinions contained herein are those of the officer concerned and cannot be held as binding on the Council or its elected members.

Input from the following internal/external officers has also been provided to inform this consultation response:

- Denbighshire County Council Lead Local Flood Authority
- Denbighshire County Council Ecologist
- Denbighshire County Council Tree Officer
- Heneb Clwyd-Powys
- Cadw
- National Resources Wales

Further consultations to the above were carried out, however responses have not yet been received at the time of writing. Responses will be forwarded on as received. Responses received at this time will be summarized in the body of this advice. Full extracts will be set out in Appendix 1.

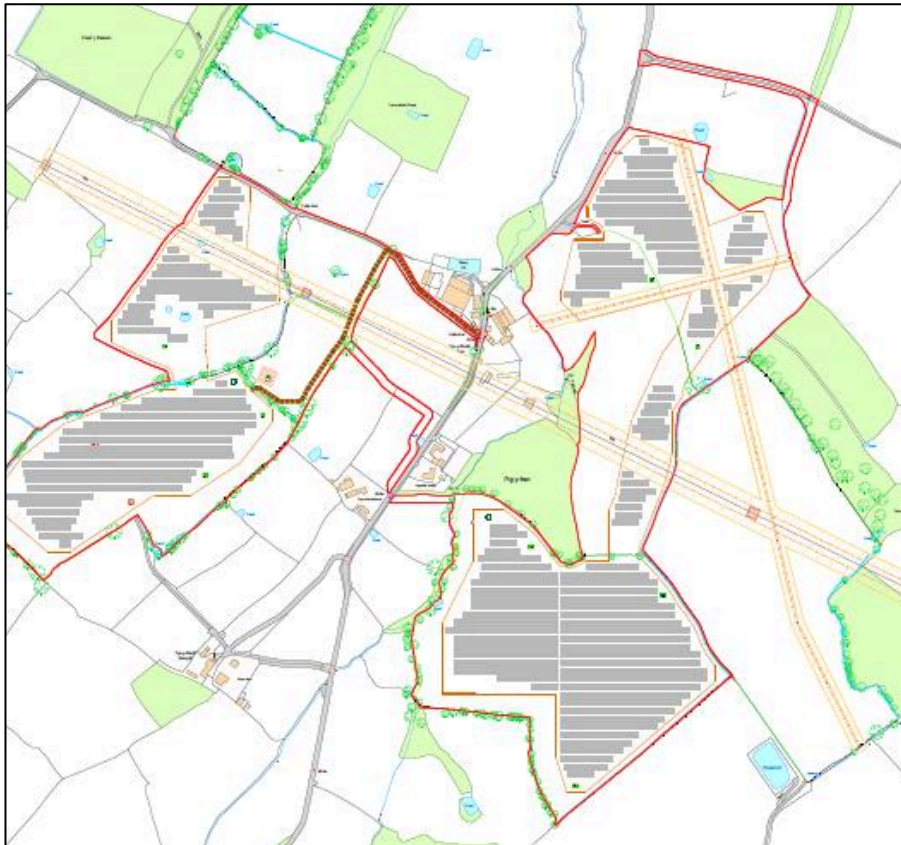
Planning history of the site

APP Ref:	Decision Date	Description of Development
31/2014/1366	01/04/2015	"Construction of additional temporary accesses, access tracks and construction compounds in association with Burbo Bank offshore windfarm onshore works consented under planning permission code no. 31/2013/0400"



Site and Surroundings

The site would be comprised of two main groupings of solar panels either side of a C-class road running north-south between St Asaph and Bont-Newydd. The total site area covers circa 33.52ha. The western block of panels covers circa 13.22ha and the eastern block covers circa 20.32ha. The below image is an extract from the submitted site layout plan.



No indication of the likely cabling route has been provided but it is stated that a link to St Asaph substation would be made.

The site does not fall within any other constraints or allocations set out within the Local Development Plan. The site is not within any Green Wedge / Belt, National Park or National Landscape. The Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB/National Landscape) is located approximately 5km to the east of the site.

The Lower Elwy Valley and Vale of Clwyd Landscapes of Outstanding Historic Interest lie circa 400m south and 4km east at their nearest point respectively.

The site lies within the Vale of Clwyd National Landscape Character Area 11. The area is described as largely rural and agricultural whose patchwork of mixed pastures and arable fields are enclosed with mature and often well-managed hedgerows. The Clwydian Range and Dee Valley National Landscape is located circa 5km east of the site.

There are no areas of Open Access Land or Public Rights of Way within the boundaries

of the site. A number of Rights of Way are in close proximity to the site and have potential visibility of the proposals. Bridleway 208/3 lies is the closest and is due northwest of the site. The proposal site entirely falls within the Development Advice Map (DAM) zone A, meaning it is an area considered to be at little risk or no risk of fluvial or coastal/tidal flooding.

The NRW 'Flood Map for Planning' indicates that the site is within an area at risk of flooding from Rivers or the Sea. The mapping does indicate that the site would be susceptible to some surface water and small watercourses flooding. The NRW 'Flood Map for Planning' is a material consideration and will accompany the forthcoming update to TAN15.

The proposed site lies circa 1.25km north of Coedwigoedd Dyffryn Elwy / Elwy Valley Woods SAC and Coedydd ac Ogofau Elwy a Meirchion SSSI

There are 5 ancient woodlands within 500m of the site the nearest of which is adjacent to the solar site.

The Welsh Government's Predictive Agricultural Land Classification (ALC) Map indicates that the Site is entirely within Grade 3b land. The applicant advises surveys were undertaken which confirmed this.

There are no designated historic assets within the proposal site. There are 12 listed buildings within 1km of the Proposed Development. The Church of St Mary (Grade II) is approximately 900m to the south of the proposals. The Scheduled Monument Bedd-y-Cawr hillfort is located approximately 675m to the southwest. There are no recorded non-designated historic assets within the Site.

There are a number of residential properties adjacent to or within 100m of the application site.

Proposed Development

The proposed solar scheme would generate up to circa 20MW of electricity and would have a connection date in 2027 (subject to grid reforms). The proposal would have a construction phase of circa 4-6 months and an operational period of up to 40 years (per screening opinion request). The proposals do not include any element of energy storage. No indication of the likely cabling route has been provided but it is stated that a link to St Asaph substation would be made circa 1km north of the site.

Construction and operational access to the solar site is proposed to be from the identified C-Road (USRN: 46701519).

Key elements of infrastructure comprised within the proposal includes:

- 31,556 no. Solar Panel modules;
- 50 no. string inverters;
- 8 no. LV Switch/Transformers;
- Security Fencing;
- Customer Substation;

- DNO Substation (3.31m maximum height);
- An underground cable linking the Site to the St Asaph substation
- Internal access tracks made from crushed stone

The maximum height of panels would be 3m above ground level with the bottom of the panels a minimum of 90cm off the ground angled at 15-20 degrees.

There would be temporary hard standing and construction compounds erected for the duration of the construction period.

Planning policy context

All planning applications are assessed against the policies contained in Future Wales: the National Plan 2040 and the adopted Denbighshire Local Development Plan (LDP), together with the guidance contained in Planning Policy Wales (PPW), Technical Advice Notes (TANs), Welsh Government Circulars and adopted Denbighshire Supplementary Planning Guidance Notes (SPGs).

Future Wales forms part of the statutory development plan. Of relevance to this proposal it establishes support for the renewable sector to attract new investment and to reduce carbon emissions. It also recognises that the need to reverse biodiversity decline and assist nature recovery is of imperative importance in its own right.

The relevant **Future Wales** planning policies that would appear to be applicable are as follows:

- Policy 9
- Policy 17
- Policy 18

Planning Policy Wales including paragraphs 5.7.1 - 5.7.7, 5.7.9, 5.7.14 -5.7.15, 5.9.1 and Chapter 6, as updated. PPW is supplemented by Technical Advice Notes (TANs) which provide additional detail on a variety of topics. Of particular relevance to this case are:

- TAN 5: Nature Conservation and Planning (September 2009)
- TAN 6: Planning for Sustainable Rural Communities (July 2010)
- TAN 12: Design (March 2016)
- TAN 15: Development and Flood Risk (July 2004)
- TAN 18: Transport (March 2007)
- TAN 24: The Historic Environment (May 2017)

The relevant planning policies of the Denbighshire County Council **Local Development Plan** that would appear to be applicable for a solar farm development in this location are as follows:

- Policy RD1 – Sustainable development and good standard design
- Policy BSC3 – Securing infrastructure contributions from Development
- Policy PSE 5 – Rural economy
- Policy VOE 1 – Key areas of importance
- Policy VOE 2 – Area of Outstanding Natural Beauty and Area of Outstanding Beauty
- Policy VOE 5 – Conservation of natural resources
- Policy VOE 6 – Water management
- Policy VOE 10 – Renewable energy
- Policy ASA 3 – Parking standards

The Council has adopted a suite of Supplementary Planning Guidance Notes (SPGs) which amplify development plan policies and provide further information and guidance to developers. The following SPGs would apply for a school development in this location:

- Archaeology SPG
- Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB) SPG
- Conservation and Enhancement of Biodiversity SPG
- Parking Requirements in New Developments SPG
- Planning Obligations SPG
- Renewable Energy SPG
- Trees and Landscaping SPG.

The Local Development Plan and Supplementary Planning Guidance Notes can be downloaded from the Council's LDP webpage:

<http://www.denbighldp.co.uk/english/default.htm>

Principle of development:

The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021 has set an amended target of reducing carbon emissions in Wales to net zero by 2050.

Planning Policy Wales provides strategic policy support for renewable energy developments of all scales. At 5.7.14 it states the Welsh Government has set targets for the generation of renewable energy, which includes a target of 70% of electricity consumption in Wales to be generated from renewable energy by 2030.

Future Wales, the National Plan 2040 forms part of the adopted development plan for the County. Future Wales Policy 17 sets out strong support to the principle of developing renewable and low carbon energy from all technologies and at all scales to meet our future energy needs. It states that, in determining planning applications for renewable and low carbon energy development, decision-makers must give significant weight to the need to meet Wales' international commitments and the Welsh Government target to generate 70% of consumed electricity by renewable means by 2030 in order to combat the climate emergency.

Future Wales Policy 18 states proposals for renewable and low carbon energy projects (including repowering) qualifying as Developments of National Significance will be permitted, subject to compliance with the policy criteria.

LDP Policy VOE 10 supports renewable energy proposals where they are located to minimise visual, noise and amenity impacts and demonstrate no unacceptable impact upon the interests of natural conservation, wildlife, natural and cultural heritage, landscape, public health and residential amenity.

The Council's adopted Renewable Energy SPG provides further guidance on solar energy developments. Denbighshire County Council declared a Climate and Ecological Emergency in July 2019 and aim to become a net carbon zero and ecologically positive council by 2030.

The proposal would have strategic benefits in terms of increased renewable energy generation, contribute to the de-carbonisation of the energy supply network and towards combating the climate emergency.

Having regard to the above, the principle of a solar energy farm park of the scale proposed is considered to be in general accord with national and local planning policies.

Landscape character and visual amenity:

Future Wales Policy 18 states that proposals should not have an unacceptable adverse impact on the surrounding landscape (particularly on the setting of National Parks and Areas of Outstanding Natural Beauty).

PPW 12 para 1.22 states that "Planning Applications must be determined in accordance with the adopted plan, unless material considerations indicate otherwise" This relates to Section 38(6) of the Planning and Compulsory Purchase Act 2004.

PPW 12 Section 6.3.3 states 'All the landscapes of Wales are valued for their intrinsic contribution to a sense of place, and local authorities should protect and enhance their special characteristics, whilst paying due regard to the social, economic, environmental and cultural benefits they provide, and to their role in creating valued places.'

LDP Policy VOE 2 requires assessment of the impact of development within or affecting the AONB and AOB, and indicates that this should be resisted where it would cause unacceptable harm to the character and appearance of the landscape and the reasons for designation. This reflects guidance in Planning Policy Wales (PPW 12) which requires planning authorities to give great weight to conserving and enhancing the natural beauty of AONBs, and should have regard to the wildlife, cultural heritage and social and economic well-being of the areas. The special qualities of designated areas should be given weight in the development management process. Proposals in AONBs must be carefully assessed to ensure that their effects on those features which the designation is intended to protect are acceptable. The contribution that development makes to the sustainable management of the designated area must be considered.

Policy VOE10 supports renewable energy developments providing they are located to minimise visual, noise and amenity impacts and demonstrate no unacceptable impact upon the interests of nature conservation, wildlife, natural and cultural heritage, landscape, public health and residential amenity. In areas that are visually sensitive, including the AONB, Conservation Areas, World Heritage Site and Buffer Zone and in close proximity to historic buildings, visually intrusive technologies will not be permitted unless it can be demonstrated that there is no negative impact on the designation or there is an overriding public need for the development.

The Clwydian Range and Dee Valley AONB SPG provides guidance on proposal within or affecting the protected landscape, and Section 8 provided guidance on assessment of setting. At 8.41 it provides a narrative regarding impact of developments on views from within AONB.

Section 8 of the Council's Renewable Energy SPG provides advice and guidance on solar energy development.

National Resources Wales were consulted on the proposals and advise the applicant considers the need for Landscape Assessments in accordance with best practice whilst noting the proximity of the Clwydian and Dee Valley Area of Outstanding Natural Beauty.

At this time a decision on whether the application would require EIA has not yet been taken by PEDW. This advice is therefore offered in lieu of a decision as to whether an EIA which would likely contain a landscape section is required.

It is recommended that the application is supported by a Landscape and Visual Impact Assessment (LVIA). The LVIA should be carried out by a suitable Chartered Landscape Architect in accordance with the Guidelines for Landscape and Visual Assessment (Third Edition). The LVIA should also draw upon Welsh Government LANDMAP data, which is an important tool in assessment of the landscape and which sets out the regional landscape context, to be supplemented by local appraisal and contextual understanding.

The impact of the proposal on the residential visual amenity of residential properties in close proximity to the site should also be assessed, and an assessment of the impact of glint and glare on residential receptors should also be undertaken.

It is not stated whether any visible external lighting is proposed for the operational period.

There is no indication of any proposed soft landscaping on the submitted drawings but it is suggested the proposal should:

- Retain (as far as possible) and managing the existing vegetation on the site encourage improved biodiversity.
- Position panels so as to limit the potential for close range views from sensitive receptors.
- Provide a comprehensive hedgerow improvement strategy, including reinforcement of existing hedgerow field boundaries with an appropriate species rich native planting palette.
- Create native tree belts and native scrub areas within the site
- Provide waterbody enhancement through wildflower meadow wetland seeding across 10m buffers to the ponds, streams and ditches within and adjacent to the site

The above measures would all help assimilate the development into the landscape and respond to policy requirements. Notwithstanding this, introducing a development of this scale and nature into a primarily agricultural landscape would inevitably have lasting adverse effects. Whilst mitigation measures may help to reduce adverse impacts from the proposal the scheme these impacts would conflict with abovementioned policy. These adverse effects would be weighed against the benefits of the proposed development.

A zone of theoretical visibility was included in the submission alongside a couple drawings indicating landscape features and viewpoints. It is recommended that wire-frame drawings or visualisations are used to indicate where within a given image the development would be sites.

With the limited information available it is not possible to provide detailed advice with respect to the scheme. The development would be a prominent development in the open

countryside. There would also be some visibility from the AONB which would need to be considered as part of the application.

Given the proliferation of energy development in the area, it is critical that cumulative effects are carefully considered. Cumulative effects can be the additional changes caused by a proposal in conjunction with other similar developments or the combined effect of a set of developments taken together.

Ecology / Biodiversity:

Future Wales Policy 9 expects development proposals to demonstrate action towards securing the maintenance and enhancement of biodiversity to provide a net benefit, the resilience of ecosystems and green infrastructure assets through innovative, nature-based approaches to site planning and the design of the built environment.

Future Wales Policy 18 requires proposal includes biodiversity enhancement measures to provide a net benefit for biodiversity.

Policy VOE 5 requires due assessment of potential impacts on protected species or designated sites of nature conservation, including mitigation proposals, and suggests that permission should not be granted where proposals are likely to cause significant harm to such interests.

In accordance with national planning policy and the duty under the Environment (Wales) Act 2016, the proposal will need to demonstrate a net biodiversity gain and enhancement measures should be provided.

Planning Policy Wales (Edition 12, 2024) sets out that “planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species (not including non-native invasive species), locally or nationally and must work alongside nature and it must provide a net benefit for biodiversity and improve, or enable the improvement, of the resilience of ecosystems” (Section 6.4.5).

Planning Policy Wales (Edition 12, 2024) also draws attention to the contents of Section 6 of the Environment (Wales) Act 2016, which sets a duty on Local Planning Authorities to demonstrate they have taken all reasonable steps to maintain and enhance biodiversity in the exercise of their functions. It is important that biodiversity and resilience considerations are taken into account at an early stage when considering development proposals (Section 6.4.4).

Taking the above together, PPW12 requires that there are no unacceptable ecological impacts and that a Net Benefit for Biodiversity can be achieved through the “step wise approach (namely Avoid, Minimise, Mitigate, Compensate and Enhance).

In addition, a Green Infrastructure Statement is required with all applications. While there is currently no specific guidance, the Green Infrastructure Statement is seen as an overarching or summary document that pulls together submitted reports including ecology, trees, landscape, drainage, into one document to:

- demonstrate how the “step wise” approach has been followed to establish

Net Benefit for Biodiversity.

- take into account connectivity with the surrounding landscape and impacts of future lighting,
- include the relevant green infrastructure and/or landscape proposals to demonstrate biodiversity net benefit; and

The assessment should be proportionate to the scale of development.

The council's Tree Officer was consulted on the pre-app and raised concern over the security fencing in the western grouping of solar panels. They note that in connecting the two fields the fencing cuts across a hedge and watercourse which might impact upon an existing green corridor. They advise that the applicant consider how the fencing can be altered or engineered such that it doesn't impact on the natural environment.

The council's Ecologist was consulted on the pre-app and provided advice regarding the relevant sections of policy and legislation. The ecologist notes the changes made to the scheme but identifies the proposal may have negative impacts upon the natural environment during construction and operation. The ecologist advises that a preliminary ecological appraisal should be completed and provides advice regarding the scope and content of such a document.

The ecologist adds that due to records of several nocturnal species that a full lighting plan is drafted which would seek to prevent negative impacts. They also advise an Arboricultural Impact Assessment should be completed to define the Root Protection Zones and inform the proposed locations of any underground cables or hardstanding units.

Per the requirements of PPW12, a Green Infrastructure Statement detailing, based on the abovementioned surveys, is required to set out the steps which will be taken to ensure the existing habitat at the site has been maintained and enhanced.

Finally, the ecologist advises a Construction Environment Management Plan and a Long-term Management Plan for the created habitats is provided.

National Resources Wales were consulted on the proposal and advised their records show there may be Great Crested Newts on site and that the site is 870m from the Coedydd and Ogafau Merichion SSSI.

In summary, the proposal will need to apply the step-wise approach to ensure protected and priority species and habitats are not harmed. Further, the scheme must deliver a net benefit to biodiversity. Limited information has been provided by the applicant at this stage regarding any potential enhancements. However, it has been indicated that improvements would relate to species native to the site which is supported. All necessary ecological mitigation, compensation and enhancement measures should be included in the application.

Historic Environment:

Future Wales Policy 18 requires DNS proposals to ensure there are no unacceptable

adverse impacts on statutorily protected built heritage assets.

Local Development Plan Policy VOE1 seeks to protect sites of built heritage from development which would adversely affect them and requires that development proposals should maintain and wherever possible enhance them for their characteristics, local distinctiveness and value to local communities.

PPW 12 Section 6 'Distinctive and Natural Places' refers specifically to the need to ensure the character of historic buildings is safeguarded from alterations, extensions, or demolition that would compromise their special architectural and historic interest.

PPW 12 also recognises the need to conserve archaeological remains. The consideration of archaeological remains and their setting is a material planning consideration in determining planning applications, whether those remains are a scheduled monument or not.

Section 4 of TAN 24 - The Historic Environment sets out similar considerations to be given by a local planning authority to the determination of applications involving archaeological remains, and their settings. It outlines different scenarios obliging consideration of impacts and stresses the need for submissions to include relevant surveys, studies and assessments, and mitigation proposals.

Cadw's Setting of Historic Assets Guidance note is also a material consideration for developments within proximity to historic assets. The guidance recommends that for developments with an area of 1 hectare or more, an assessment of impact on all historic assets within 5km of the site would need to be undertaken.

Cadw were consulted on the pre-application and they held no objection but list the nearby heritage assets. They remark that they concur with the historic environment desk-based assessment completed by SLR which concluded the proposal would not have a significant impact on designated assets.

With respect to undesignated archaeological features Cadw note that the geo-physical survey has shown that apart from post-medieval agricultural features there are no indications that there are archaeological features. They recommend that Heneb is consulted on these results.

Heneb Clwyd-Powys was consulted on the proposal and in reference to previous reports completed in the area and in support of an earlier version of the application advise that an updated archaeological assessment will be necessary including desk-based assessment, additional walkover field survey and geophysical survey of the area recently added to the planned Solar Farm.

Heneb advise that the further information may dictate that further targeted trenching may be necessary. Until additional work is completed, Heneb consider that the archaeological potential of the development site has not been properly investigated and any further work on site should be delayed until the archaeological evaluation is complete in accordance with the PPW12 and TAN24.

There are a number of heritage assets within a 5km radius of the site, including listed buildings, scheduled ancient monuments and Historic Parks and Gardens. The site is also

undeveloped greenfield land and there may be sub-surface archaeological remains within the site which may be disturbed during construction which also need to be assessed.

It is recommended a Heritage Assessment is undertaken. Where harm is identified to the setting of heritage assets or to archaeological features which may be present on the site, any mitigation / compensation measures should be incorporated into the development and clearly identified as mitigation measures.

Insufficient information has been provided at this stage to provide an assessment of the scheme against relevant policy.

Water / drainage / flood risk:

Planning Policy Wales (PPW 12) Section 6.6 identifies flood risk as a material consideration in planning and along with TAN 15 – Development and Flood Risk, which provides a detailed framework within which risks arising from different sources of flooding should be assessed.

The Welsh Government 'Development Advice Map' shows that the site is located within Flood Zone A. The NRW 'Flood Map for Planning' indicates that the site is within an area at risk of flooding from Rivers or the Sea. The mapping does indicate that the site would be susceptible to some surface water and small watercourses flooding (southern most arrays). The NRW 'Flood Map for Planning' is a material consideration and will accompany the forthcoming update to TAN15.

The Lead Local Flood Authority was consulted and advised the applicant should produce a Flood Consequence Assessment with the application. They advise that an Ordinary Watercourse Consent will be required for any works which have potential to obstruct or impede the flow of an ordinary watercourse. Finally with respect to surface water drainage the LLFA advise that the applicant should provide details of the surface water drainage proposals which should be designed to accommodate the 1 in 100 year plus 30% climate change event with any discharge, for example to a watercourse, restricted to the existing greenfield runoff rates.

National Resources Wales was consulted and advises that as the site is within Flood Zone A the justification test from TAN15 is not applicable.

At this stage insufficient information has been provided at this stage to provide an assessment of the scheme against relevant policy.

Access / Highways / Parking:

With respect to transport, Future Wales Policy 18 states proposal should demonstrate there are no unacceptable adverse impacts on the transport network.

Policy ASA 3 requires adequate parking spaces for cars and bicycles in connection with development proposals, and outlines considerations to be given to factors relevant to the application of standards. These policies reflect general principles set out in Planning Policy Wales (PPW 12) and TAN 18 – Transport, in support of sustainable development.

The Parking Standards in New Developments SPG sets out the maximum parking

standards for new developments.

The council consider that a Transport Assessment should be produced with a focus on the construction phase for the site. The assessment would be supported by:

- Detailed design of any new means of permanent or temporary access to the site including any alterations to existing access points should be provided.
- Detailed Construction Traffic Management Plan to be provided, to include delivery routes to site, construction compounds / parking and management of construction and delivery traffic which should demonstrate that the proposals can be safely accommodated within the existing highways network.
- Details of operational traffic movements and onsite parking and turning facilities to be provided.

Early discussions with the Council as the local highway authority should also be entered into with respect to separate highway consents. At this stage insufficient information has been provided at this stage to provide an assessment of the scheme against relevant policy.

Public Rights of Way (PROW):

Policy RD1 requires development considers impacts on the wider Rights of Way Network around the site.

The proposal would not directly impact upon rights of way. The improvement of existing green infrastructure is supported by local and national policy. It is recommended that the applicant engage with the council's Rights of Way team to identify opportunities for enhancement.

Amenity:

With respect to amenity, Future Wales Policy 18 states DNS proposals should demonstrate that there would be no unacceptable adverse visual impacts on nearby communities and individual dwellings (Bullet 2); and there are no unacceptable adverse impacts by way of shadow flicker, noise, reflected light, air quality or electromagnetic disturbance (Bullet 7).

The majority of the proposed development is located in open countryside. However there are a number of residential properties within close proximity to the site, and the proposal would need to demonstrate that the proposal would not adversely impact on residential amenity of these properties. It is advised within the scoping report that a noise impact assessment will be carried out.

It is recommended that the layout is informed by the potential impacts and noise generating equipment is located where possible at a distance from sensitive receptors. At this time limited information regarding noise impacts have been provided. Indeed the applicant indicates that a noise assessment would not be required. The council contest and consider one should be completed.

Reaching across multiple disciplines it is important that the impacts from the construction

phase would be managed. The scoping report advises that a Construction Management Plan would be produced. This document may include:

- work programme and working hours, including timings of deliveries.
- the location and general arrangements of the construction compounds and storage areas and measures to reinstate the land following completion of the works;
- the arrangements for the parking of vehicles of site operatives and visitors;
- the proposed routing of delivery vehicles, and directional signing along public roads where necessary;
- the location of areas designated for the loading, unloading, and storage of plant and materials;
- the location and detailing of fencing, hoardings or other means of enclosure around and within the site;
- pollution prevention and control measures, including measures to mitigate water pollution;
- dust management plan;
- noise management and abatement plan;
- external lighting and measures to reduce light spill and glare;
- the piling methods and measures to mitigate noise and vibration;
- a scheme for recycling/disposing of waste resulting from demolition and construction works;
- measures to remove and prevent the spread of non-native invasive species encountered during the construction phase;
- Communications protocol setting out procedures for communicating with the local community throughout the construction phase, the management of complaints and the role of the community liaison officer.

Other Matters:

Scope of the planning application

Notwithstanding the comments on scoping for the ES and the documents that would support that document, the council consider the following should be submitted with the planning application:

- Planning Statement
- Application Form
- Construction Traffic Management Plan
- Landscape Visual Impact Assessment
- Flood Consequence Assessment
- PAC
- Arboricultural Impact Assessment
- Site Location Plan
- Planning Layout Drawings

- Details Drawings (Fencing, Gates, Elevations of Plant and Machinery)
- Noise Assessment
- Heritage Impact Assessment
- Design and Access Statement
- Archaeological Impact Assessment
- Green Infrastructure Statement
- Ecological Impact Assessment
- Glint and Glare Assessment
- Landscape Concept Plans
- Transport Assessment
- Construction Management Plan
- Agricultural Land Classification Report

Planning obligations and legal agreements:

Compensatory land and / or the provision of a commuted sum may be necessary to off-set harm to protected species or to facilitate mitigation planting on land outside the development boundary. A legal agreement would need to be entered into and the Head of Terms for the Section 106 Agreement would need to be agreed with the Council and other interested parties on a non- prejudicial basis prior to the DNS application being submitted, and a draft Section 106 Agreement should then be submitted with the application. A S106 Agreement may also include vehicle routing and agreements to dedicate permissive routes and/or rights of way.

Community Groups

Per the requirements of Regulation 7 of the Developments of National Significance, the council should provide information of any relevant community groups. The council is not aware of any groups relevant to the proposals at this time.

Other Committed and Emerging Developments

As set out in the response to the Scoping Opinion consultation there are many forthcoming DNS and NSIP Developments in the vicinity of the proposals. These may include the progressing DNS application for the solar farm scheme in Bodelwyddan BESS and Solar Farm; the solar farm located immediately north of the A547 Rhuddlan Road (Kinmel Solar); existing energy infrastructure in the vicinity of the site includes high voltage overhead lines; existing substations to south of Glascoed Road (National Grid Bodelwyddan substation, and its proposed future expansion), Gwynt y Môr offshore windfarm substation and Burbo Bank Extension offshore windfarm substation. Cumulative impact should also consider the proposed consented cabling for the consented Awel y Môr offshore windfarm, and the proposed cabling Mona offshore windfarm currently being considered post examination

Recommendations and Informal, without prejudice Officer Opinion of the proposal

In conclusion, the principle of a solar park of the scale proposed is supported by national and local planning policy, subject to the assessment of site-specific impacts. However, the site is located in an open countryside location and may give rise to impacts on a range of planning considerations as set out above, and therefore comprehensive assessments are required to be carried out and the final design and layout of the proposal needs to be sensitive to its setting and ensure it does not give rise to any unacceptable impacts.

APPENDIX 1

DENBIGHSHIRE ECOLOGIST

<u>Ecology Officer Response</u>	
Application Number	PREAPP/2024/105
Proposal: Development of National Significance For A Solar Farm With A Generating Capacity Over 16mw	
Location: Land At Cefn Meiriadog, Cefn, St Asaph, Denbighshire	
Assessment: Thank you for consulting us on this pre-application planning enquiry. The Environment (Wales) Act 2016 places a duty on every public authority to seek to “<i>maintain and enhance biodiversity</i>” where it is within the proper exercise of their functions. In doing so, public authorities must also seek to “<i>promote the resilience of ecosystems</i>”. Under Section 7 of the Act, the Welsh Government has published a list of the living organisms and types of habitats which, in the Welsh Government’s opinion, are of principal importance for the purpose of conserving biodiversity in Wales. The need for developments to demonstrate that they will provide a net benefit for biodiversity is also clearly set out in Planning Policy Wales 12, which states “<i>development should not cause any significant loss of habitats or populations of species (not including non-native invasive species), locally or nationally and must work alongside nature and it must provide a net benefit for biodiversity and improve, or enable the improvement, of the resilience of ecosystems.</i>”. The amendments to the proposed development to minimise potential environmental impacts is appreciated. The development still has the potential to result in negative impacts on nature conservation during creation and operation of the solar farm including all associated infrastructure works. This may include, but is not limited to: • temporary disturbance to habitat and species during construction. • temporary increase in noise above baseline levels during construction, and permanently during operation. • temporary increase in light above baseline levels during construction, and permanently during operation. • permanent isolation and/or loss of habitat including woodland blocks, ponds, trees and hedgerows. A Preliminary Ecological Appraisal, completed by a suitably qualified and competent ecologist, should be submitted to allow assessment of the ecological features present (or potentially present) within the site and an appropriate buffer area. This must be informed by a desk-top data trawl, including Cofnod data search, and the application of these data to the initial survey and assessment. Any recommendations advised within the report, including any further surveys, should be completed in full to establish the	

presence or otherwise of such species and the extent that they may be affected by the proposed development, and specify suitable approaches in line with the mitigation hierarchy for biodiversity. Loss of habitat should be avoided or minimised by sensitive modification of the site layout during the early stages of design. An assessment of the potential impacts of the proposal on nearby protected sites, including European Protected Sites, should be included. Bat activity surveys are also recommended.

As there are records of several nocturnal animals including European protected species in the locality, careful consideration must be given to timing of works. A full lighting plan, including details of baseline lighting, anticipated light spillage with modelled isolux drawings, and appropriate mitigation measures to ensure no net increase in artificial lighting at night, should be provided to avoid negative impacts on nocturnal wildlife both during and after completion of works. It is recommended that the site retains dark corridors and preserves current commuting and foraging features used by any nocturnal species, established during ecological surveys.

An Arboricultural Impact Assessment should be completed to define the Root Protection Zones and inform the proposed locations of any underground cables or hardstanding units. The stepwise approach (paragraph 6.4.15, Planning Policy Wales, Edition 12) should be followed when designing the site to avoid any negative impacts to the priority woodland habitat and mature trees.

The application will require a Green Infrastructure Statement detailing, based on the surveys, steps which will be taken to ensure the existing habitat at the site has been maintained and enhanced. Planning Policy Wales (Edition 12) 6.4.11 states *'Planning authorities must follow a step wise approach to maintain and enhance biodiversity, build resilient ecological networks and deliver net benefits for biodiversity by ensuring that any adverse environmental effects are firstly avoided, then minimised, mitigated, and as a last resort compensated for. Enhancement must be secured by delivering a biodiversity benefit primarily on site or immediately adjacent to the site, over and above that required to mitigate or compensate for any negative impact.'* Given that the scheme will involve establishment of several blocks of hardstanding, reducing habitat availability and accessibility on site, together with noise and light repellent reducing functionality of retained habitat, the Green Infrastructure Statement should outline how the works will minimise and then compensate for any loss of existing habitat (for instance, by careful design of hardstanding units and underground cabling, and establishment of replacement habitat on or immediately adjacent to the site). A scheme of enhancements should also be provided to ensure a net benefit is secured.

A management plan for newly created habitat is required, of appropriate duration, and identifying the responsible body and funding for the long-term management, to ensure establishment of the replacement habitat. It is advised to discuss habitat management with the county ecologist as early in the scheme design as possible.

A Construction Environmental Management Plan (including surface water management) is also required.

Date: 17/01/2025

DENBIGHSHIRE TREE OFFICER

 <u>Tree Officer Response</u>	
Application Number	PREAPP/2024/105
Proposal: Pre-application enquiry for the proposed Development of National Significance For A Solar Farm With A Generating Capacity Over 16mw	
Location: Land At Cefn Meiriadog, Cefn, St Asaph, Denbighshire	
Comments: Thank you for consulting me on this Pre-app. My only comment at this time would be concerning the security fencing in the Western site. In connecting the 2 fields here the proposed security fence cuts across the hedge and its associated watercourse. This is unfortunate as this hedgeline is potentially a green corridor connecting Tyn Y ffordd Gorse and Coed Celyn, two Ancient semi-natural woodlands. In the interests of achieving NBB, in accordance with PPW12, please consider how the security fence line could be altered or engineered such that it doesn't impede the passage of wildlife along this corridor.	
Date: 22/01/2025	

DENBIGHSHIRE LEAD LOCAL FLOOD AUTHORITY

LLFA Consultation Response

Pre-Planning Application Reference: PREAPP/2024/105 – Pre-application enquiry for the proposed Development of National Significance for a solar farm with a generating capacity of over 16MW.

Sustainable Urban Drainage Approving Body (SAB)

In accordance with the Welsh Government 'Statutory Standards for Sustainable Drainage Systems', *"Schedule 3 to the 2010 Act exempts from the need for SAB approval work requiring development consent as nationally significant project"*.

The Pre-Planning Application Advice Request Letter (dated: 12/12/2024) identifies that the proposed development is to be considered a Development of National Significance (DNS) and will be shown on the associated Welsh Government 'Planning Casework Portal'. Therefore, SAB approval is not required.

Lead Local Flood Authority (LLFA)

Flood Risk

The Welsh Government 'Development Advice Map' shows that the site is located within Flood Zone A.

A review of the NRW 'Flood Map for Planning' indicates that:

- The proposed solar arrays and associated infrastructure (e.g., DNO substations) are situated within Flood Zone 1 on both the NRW 'Flood Map for Planning – Rivers' and NRW 'Flood Map for Planning – Sea'.
- A number of ordinary watercourses are shown to be located within or at the site's boundary, which are shown to be within Flood Zones 2 and 3 on the NRW 'Flood Map for Planning – Surface Water and Small Watercourses'.
- The NRW 'Flood Map for Planning – Surface Water and Small Watercourses' shows the sections of the southern-most solar arrays are to be located within Flood Zones 2 and 3.

The Applicant should submit a Flood Consequences Assessment (FCA) with the application. The FCA should:

- Assess the flood risk to the site from all sources.
- Detail the mitigation measures proposed to ensure the development will be safe for its lifetime and can remain operational during a flood event.

- Assess any potential impact on flood risk elsewhere.
- Detail the locations of any watercourse access crossings (if any). Preference should be given to utilising clear span (bridge) structures for all watercourse crossing and the capacity of the watercourse channel should be retained at the access crossing points.

Ordinary Watercourse Consent (OWC)

Under Section 23 of the Land Drainage Act 1991, an Ordinary Watercourse Consent will be required for any works which have potential to obstruct or impede the flow of an ordinary watercourse.

Surface Water Drainage

The Applicant should provide details of the surface water drainage proposals with the application.

Details should be provided as to how runoff from the solar modules can be managed as to minimise overland flow and erosion risk. Features such as swales or filter drains placed at regular intervals between rows of panels could be considered.

Details of the access track drainage should be provided.

The proposed DNO substation and its associated hardstanding should be served by a formal surface water drainage system. The drainage system should be designed in accordance with the Welsh Government 'Statutory Standards for Sustainable Drainage Systems' and other relevant legislation, guidance, and specifications.

The proposed surface water drainage system for the DNO substation and its associated hardstanding should be designed to accommodate the 1 in 100 year plus 30% climate change event with any discharge, for example to a watercourse, restricted to the existing greenfield runoff rates. Preference should be given to the use of sustainable drainage systems for attenuation storage.

If the Applicant wishes to discuss the LLFA's comments further, please contact the LLFA via landdrainage.consultations@denbighshire.gov.uk.



CADW



Llywodraeth Cymru
Parc Busnes Rhydycar
Merthyr Tudful
CF48 1UZ
cadw.llyw.cymru

Welsh Government
Rhydycar Business Park
Merthyr Tydfil
CF48 1UZ
cadw.gov.wales

Planning
Denbighshire County Council

Sent by email

Eich cyfeirnod
Your reference

PREAPP/2024/105

Ein cyfeirnod
Our reference

Dyddiad
Date

22 January 2025

Llinell uniongyrchol
Direct line

0300 025 6007

Ebost
Email:

Cadwplanning@gov.wales

Dear Sir / Madam,

**Pre-application - Proposed Development of National Significance, Solar Farm,
Land At Cefn Meiriadog, Cefn, St Asaph, Denbighshire, Ref: PREAPP/2024/105**

Thank you for your letter inviting our comments on the information submitted for the above pre-planning application.

Advice

This advice is given in response to a non-statutory pre-planning enquiry in regard to a proposal for the construction, operation and decommissioning of a solar farm on land at Cefn Meiriadog, St Asaph

Having carefully considered the information provided, we have no objection. The national policy and Cadw's role in planning are set out in Annex A.

Assessment

Designated Historic Assets

Within the developer 3km ZTV:

Scheduled Monuments

DE037 Bedd-y-Cawr Hillfort
DE038 Ffynnon Fair (Well), Cefn
DE200 Pysgodlan Moated Site
FL026 St Asaph Bridge
FL027 Pont Dafydd (old)
FL186 First World War Practice Trenches at Bodelwyddan Park

Registered Parks and Gardens:

PGW(C)28(DEN) Plas Heaton
PGW(C)41(DEN) Llannerch Hall
PGW(Gd)54(CON) Kinnel Park

Registered Historic Landscape



HLW (C) 1 Vale of Clwyd
 HLW (C) 4 Lower Elwy Valley

Listed Buildings:

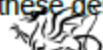
154	Plas-yn-Cefn	II
155	Bont Newydd (partly in Cefnmeiriadog community)	II
174	Former Laundry Block at Plas-yn-Cefn	II
175	Wigfair Isaf	II
176	Dolbelidr	II*
278	Bridge over Former Railway Line at Llannerch Park	II
1065	Plas Heaton	II*
1066	C-shaped Agricultural Complex at Plas Heaton	II
1377	Church of St Margaret (The Marble Church)	II*
1378	Barn to NW of Faenol-broper Farmhouse	II
1381	Gwernigron Farmhouse	II
1382	Gwernigron Dovecote	II*
1383	Bodelwyddan Castle	II*
1431	The Court House	II
1436	St. Asaph Auction Rooms	II
1437	House at St. Asaph Auction Rooms	II
1441	Rose Hill House	II
1442	Southcroft including North Cottage	II
1443	Staverton	II
	Former Coach House, Stables & Outbuildings to	
1444	Staverton & Southcroft	II
1446	Mary Short Memorial Drinking Fountain	II
1447	St. Kentigern & St. Asaph Parish Church	II*
	Railings & Boundary Walls to St. Kentigern & St. Asaph	
1448	Parish Church	II
	Sundial in the Churchyard to St. Kentigern & St. Asaph	
1449	Parish Church	II
1451	Greengrocer's Shop	II
1459	Sundial at Kentigern Hall	II
1460	Cathedral Church of St. Asaph	I
1461	Translator's Memorial	II
1469	The Old Palace	II*
1470	Lodge & Gatepiers at driveway to the Old Palace	II
1471	Tithe Barn House	II
1472	Palace Gardens	II
1473	Glan Elwy	II
1474	The old China Shop, including China House	II
1475	Roe Gau	II
1482	Plas Coch Rest Home (main block only)	II
1483	St. Asaph V.P. School	II
1484	Rossllyn	II
	H.M. Stanley Hospital (front range plus attached cross-	
1485	plan ranges & Chapel only)	II
1487	Esgobty Farmhouse	II*
1489	Dovecote at Esgonty Farm	II
1490	Garden Wall at Esgobty Farm	II



Cadw

1491	Bryn Asaph including Gate House Range	II
1505	Rhyllon Farmhouse	II
1506	Stable Range at Rhyllon Farmhouse	II
19204	Milestone	II
19211	Middle Lodge	II
19215	Milestone	II
	Primary Barn and adjoining Cart Bays to NE of Plas	
19859	Buckley	II
19860	Tal-y-Bryn	II
19924	Church of St Mary	II
19925	Wigfair Hall	II*
19926	Terraces and Forecourt Walls at Wigfair Hall	II
19927	Bont Newydd (partly in Llanefydd community)	II
19928	Telephone Call-box	II
19929	Pentre Meredydd	II
19931	Barn at Pen-ucha-ro-e-bach	II
19934	Former Stable Block at Plas-yn-Cefn	II
19935	Stable and Coachhouse Range at Plas-yn-Cefn	II
19936	Former Carthouse Block at Plas-yn-Cefn	II
	Agricultural Range and adjoining Garden Walls at Plas-	
19937	yn-Cefn	II
19938	L-shaped Barn Range at Plas-yn-Cefn	II
19939	Former Smithy Range at Plas-yn-Cefn	II
19941	Groesffordd Marli Chapel	II
20897	Glascoed Lodge on Bodelwyddan Park Boundary	II
23514	Sundial at Plas Heaton	II
	Carthouse Range at Plas Heaton (with incorporated flat	
23515	to first floor)	II
23516	Stable and Carthouse Range at Plas Heaton	II
23517	Ice House at Plas Heaton	II
	Kitchen Garden Walls including associated Lean-to	
23518	Sheds and adjoining Melon House at Plas Heaton	II
80737	Bodelwyddan Village Hall (former School)	II
80738	Bryn Celyn Lodge on Bodelwyddan Park Boundary	II
80739	Churchyard Wall of St Margaret's	II
80745	Bodelwyddan Vicarage	II
80747	Garden Shelter in Bodelwyddan Castle Garden	II
80752	Obelisk in Bodelwyddan Castle Garden	II
80754	Play House in Bodelwyddan Castle Garden	II
80756	Sundial in Bodelwyddan Castle Walled Garden	II
80757	Terrace wall of main front of Bodelwyddan Castle.	II
80758	Tyddyn-isaf	II
	Wall of Bodelwyddan Castle Garden with Bothy at W	
80759	and Gateway at E	II
87542	Fountain near Marble Church	II

A historic environment desk-based assessment for the proposed development has been produced by SLR. This considers the impact of the proposed development on the above designated historic assets that are inside 3km of the application area. This work concludes that the proposed solar farm will not have a significant impact on these designated historic assets. We concur with this conclusion.





The historic environment desk-based assessment also considers the likelihood that unrecorded archaeological features are located inside the proposed development area and includes the results of a geophysical survey of the area. The geophysical survey has shown that, apart from post-medieval agricultural features, there are no indications that archaeological features are located in the proposed development area. We recommend that Heneb Clwyd Powys are consulted on these results and if there is a need for further investigations to be carried out prior to the submission of any application for this proposed development.

Yours sincerely,

Nichola Smith
Historic Environment Branch

NATIONAL RESOURCES WALES

Ein cyf/Our ref: CAS-272157-C3M9
Eich cyf/Your ref: PREAPP/2024/105

Denbighshire County Council
PO Box 62
Rhuthun
LL15 9AZ

Dyddiad/Date: 22 January 2025

Annwyl Syr/Madam/Dear Sir/Madam,

BWRIAD/PROPOSAL: Pre-application enquiry for the proposed Development of National Significance For A Solar Farm with A Generating Capacity Over 16mw

LLEOLIAD/LOCATION: Land At Cefn Meiriadog, Cefn, St Asaph

Thank you for consulting Cyfoeth Naturiol Cymru / Natural Resources Wales about the above pre-application enquiry, which we received on 13 January 2025.

We have considered your enquiry in relation to our Development Planning [Consultations Topics](#) document (September 2018). We advise the following matters are relevant to your site / proposed development and suggest you consider these further prior to the submission of any planning application:

Flood Risk Management

The site lies within Zone A of the Development Advice Maps (DAM) contained within Technical Advice Note (TAN) 15: Development and Flood Risk (2004).

TAN15 advises for development located in Zone A the justification test is not applicable and surface water requirements apply. The acceptability criteria is for no increase in flooding elsewhere to occur as a result of the development. Given the location of development in Zone A, we advise surface water requirements should be assessed. We note it is for the Local Authority's Land Drainage Department to comment on the suitability of these proposals.

Protected Species

Our records show there may be protected species on the site (Great Crested Newts). We advise liaison with the LPA's ecologist to discuss and agree the scope of any surveys required. We refer you to our [website](#) for further advice.

Landscape

The site is located within 5km of the Clwydian Range and Dee Valley Area of Outstanding Natural Beauty. You are advised to consult with the Local Planning Authority and consider the need for Landscape Assessments in accordance with published best practice guidance. We refer you to our [website](#) for further advice.

Protected Sites

The site lies within 870m of the Coedydd and Ogofau Meirchion SSSI.

Site of Special Scientific Interest

The Wildlife and Countryside Act 1981 (as amended) places a duty on public authorities in exercising their functions, so far as this is likely to affect the flora, fauna, geological or physiographical features of a Site of Special Scientific Interest (SSSI), to take reasonable steps consistent with the proper exercise of their functions to further the conservation and enhancement of those features.

We refer you to our [website](#) for further advice.

Provision of Data

In addition to the above, please note, we can also provide certain data free of charge, as set out in our [Open Data Policy](#). Customers can [access our data via our website](#).

Other Matters

Please note, the view expressed in this letter is a response to a pre-planning enquiry only. We trust these comments will prove helpful, but they should not set a precedent for any future Natural Resources Wales' response to any formal application for planning permission or other legal consent. Such applications shall be assessed on the information submitted and regulations of relevance at that time. The details contained in this letter are based on the information available to date.

As part of our discretionary advice service we can provide further advice relating to land contamination, groundwater and flood risk prior to your planning application being submitted. There is a charge for this service. Further details are available on our [website](#).

If you have any queries on the above, please do not hesitate to contact us.

Yn gywir / Yours faithfully,

Sara Thomas

Cynghorydd - Cynllunio Datblygu/Advisor - Development Planning
Cyfoeth Naturiol Cymru/Natural Resources Wales

E-bost/E-mail: northplanning@cyfoethnaturiolcymru.gov.uk

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.

HENEB CLWYD POWYS

Thank you for the early consultation on the Solar Farm at Cefn Meiriadog, Cefn.

We were involved in an earlier pre-application consultation which also covered much of the area within the current red-line boundary, with exceptions for the area furthest west and central, near Squirrell's Lodge. The earlier enquiry had completed an Environmental Desk-Based Assessment, and a geophysical survey of that applications boundary.

Initial assessment from the earlier reports does suggest limited archaeology within that proposed area, with further evaluation trenching targeted on features mentioned below.

- Small rectilinear feature
- Field boundary ditch
- Circular features

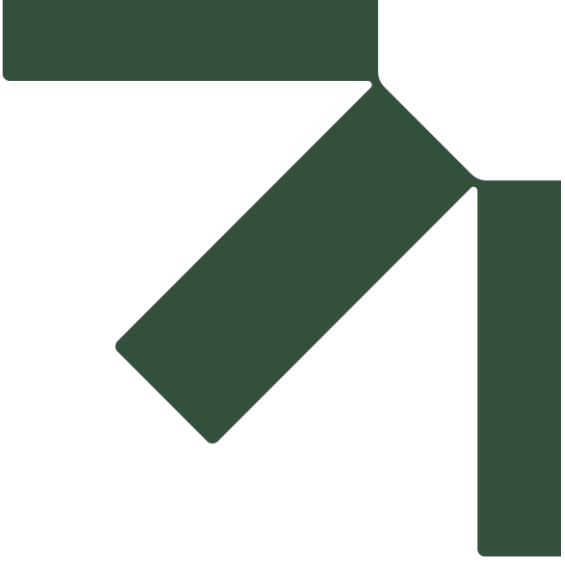
In addition to these, recently available LIDaR data has provided further possible areas of interest.

- Circular features on the central (un-surveyed area)
- Circular depression feature in southern field

Therefore, we would advise that an updated archaeological assessment will be necessary including desk based assessment, additional walkover field survey and geophysical survey of the area recently added to the planned Solar Farm. The additional areas should also be subject to a setting impact survey for designated sites within 2km in accordance with Cadw Best Practice Guidance "Managing the Setting of Historic Assets in Wales".

Following the receipt of this additional information, further evaluation through targeted trenching would be expected and may result in areas of the site being removed from the plan due to previously unknown archaeology being discovered.

Until the additional work has been completed, we would consider that the archaeological potential of the development site has not been properly investigated and any further work on site should be delayed until the archaeological evaluation is complete in accordance with Planning Policy Wales, 6.1.26 and TAN 24, 4. 7.



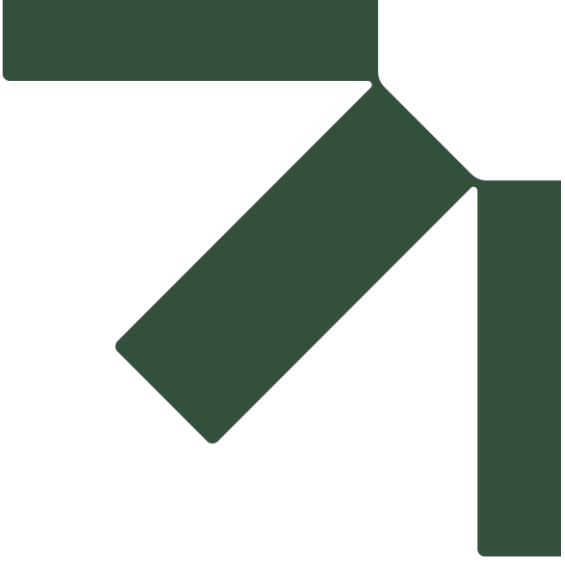
Appendix 02 Development Masterplan

St Asaph PV Farm - Flood Consequence Assessment & Surface Water Drainage Strategy

Anesco Ltd

SLR Project No.: 416.066918.00001

19 March 2026



Appendix 03 Greenfield Runoff Rates

St Asaph PV Farm - Flood Consequence Assessment & Surface Water Drainage Strategy

Anesco Ltd

SLR Project No.: 416.066918.00001

19 March 2026

Anesco Limited

St Asaph's PV Farm

SLR Project No.: 402.065221.00001

21 February 2024

Revision: 01

Standard Operating Procedure and Summary of Results
ReFH2 Greenfield Runoff Analysis

1.0 Introduction and Background

- 1.1 This document sets out the Hydrology and Hydrogeology team's standard procedure for Greenfield Runoff Rate and Greenfield Runoff Volume analysis using the ReFH2 methodology.
- 1.2 References and further reading materials that may help determine which is the most suitable method for each site are outlined at the end of the document.
- 1.3 This document is designed to provide a step-by-step procedure to undertake any greenfield analysis using ReFH2. A summary of the results specific to the project is provided in Section 3.0 and Appended to this report.

2.0 ReFH2 Methodology

2.1 Data Import

- 2.1.1 Import the data file from the FEH Webservice¹. If using Catchment Descriptors, select plot scale equations in ReFH2. However, for greenfield runoff calculations typically

¹ Flood Estimation Handbook Web Service, UK Centre for Ecology & Hydrology, <https://fehweb.ceh.ac.uk/Map>

Point Descriptors are used. Plot scale equations are automatically selected for Point Descriptors.

- 2.1.2 Review if the FEH descriptors are representative of the site, paying particular attention to the underlying geology. If the site is underlain by variable geology, please discuss with the hydrology technical team.

Table 2-1: FEH Descriptors

Descriptor	Value
Point Descriptor	E: 302464 N: 372970
SAAR (mm)	747
PROPWET	0.38
BFIHOST19	0.368
Catchment Description: The catchment is underlain by the Warwickshire group (sandstone, siltstone and mudstone) which has a moderate to low permeability overlain by Diamicton (low permeability deposits). This is reflected in the BFIHOST19 value of 0.368, indicating that the catchment has low permeability.	

2.2 Catchment Area

- 2.2.1 If the catchment area is less than 0.5km² (50ha), in line with SuDS guidance, greenfield runoff calculations should be estimated using an area of 0.5km² and rescaled to the size of the catchment (see Section 2.4). For catchment areas greater than 0.5km², the default catchment area can be used, as no catchment rescaling is required.

Table 2-2: Catchment Scaling Requirements

Catchment / Drained Area	ReFH2 Input
<0.5km ²	0.5km ²
≥0.5km ²	Default catchment area (km ²)

2.3 Rainfall Parameters

- 2.3.1 On the design rainfall event tab, accept all of the initial defaults. Add the required design rainfall events. It recommended that the 1yr, 2yr, 30yr, 100yr and 100yr + climate change events are assessed. Check the Local Lead Flood Authority (LLFA)



guidance on what events are required. Note a 40% climate change allowance is applied by adding a 1.4 climate change factor.

- 2.3.2 Set the areal reduction factor to 1.0 and accept the default seasonality of a winter storm.

Table 2-3: ARF Adjustments

Initial ARF	Adjusted ARF
0.979	1

- 2.3.3 ReFH2 will then adjust the Time to Peak (Tp) and the Baseflow Lag (BL) parameters in accordance with the catchment area of 0.5km² and ARF of 1.0. These model parameters are recorded below.

Table 2-4: Tp and BL for 0.5km² Catchment

Tp (hr)	BL
1.637	30.89

2.4 Rescaling

- 2.4.1 Reconfigure ReFH2 for the actual extent of the development area (<0.5km²) or 0.01km² if the development area is <0.01km². In doing so, the ARF, Tp and BL parameters will automatically be readjusted. Therefore manually overwrite ARF to remain as 1.0 and the Tp and BL parameters to those of the 0.5km² catchment area recorded in Table 2-3.

2.5 Extracting Greenfield Runoff Rates

- 2.5.1 Export peak flows for all return periods to derive greenfield runoff rates and print of the relevant PDF reports for the required rainfall events. Note that this step of the audit trail relates solely to greenfield runoff rates.
- 2.5.2 It is recommended that the project file is saved at this stage and resaved under a different file name for greenfield runoff volume calculations.

2.6 Extracting Greenfield Runoff Volumes

- 2.6.1 The next step is to estimate the allowance greenfield runoff volume that can be discharged (at greenfield rates) during an event. Typically, volumetric control for a development site is assessed using the 1 in 100-year 6-hour duration event. Check the LLFA guidance on which events should be assessed.
- 2.6.2 Reset the recommended duration on the rainfall page to 6 hours and set the timestep to 8mins (45 timesteps). Export the peak flows and direct runoff volumes for all return



periods. This provides greenfield volumes in ML which can be converted to m³ by multiplying by a factor of 1000. Please ensure that the Tp and BL parameters are those for a 0.5km² catchment area recorded in Table 2-4 and ARF is still set to 1.0 once the rainfall parameters have been updated.



3.0 Summary of Results

3.1.1 The following tables summarise the greenfield runoff rates and greenfield runoff volumes results of the ReFH2 analysis. These values will corroborate what is provided within the ReFH2 output reports.

Table 3-1: Greenfield Runoff Rates for 1ha Area

Annual Exceedance Probability	Greenfield Rates (l/s)
100% (1 in 1 year)	4.6
50% (1 in 2 year)	5.2
3.3% (1 in 30 year)	10.8
1.0% (1 in 100 year)	14.1
1.0% + 40 % Climate Change	20.4

Table 3-2: 6-Hour Greenfield Runoff Volumes for 1ha Area

Annual Exceedance Probability	Greenfield Runoff Volume (m ³)
100% (1 in 1 year)	71.6
50% (1 in 2 year)	79.9
3.3% (1 in 30 year)	163.1
1.0% (1 in 100 year)	216.9
1.0% + 40 % Climate Change	322.2



4.0 References and Guidance Documents

- <https://refhdocs.hydrosolutions.co.uk/Drainage-Design-Applications/Greenfield-Runoff-Rates-and-Volumes/>
- CIRIA C753 The SuDS Manual, 2015

5.0 Closure

This document has been prepared by SLR Consulting Limited (SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with **Error! Use the Home tab to apply Cover Client Name to the text that you want to appear here.**the Client as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

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SLR's standard procedure for Greenfield Runoff Rate and Greenfield Runoff Volume analysis using the ReFH2 methodology has been developed using the latest SuDS and ReFH2 guidance.

This report details the methodology applied and results of the Greenfield Runoff Rate and Volume calculations.

Regards,

SLR Consulting Limited

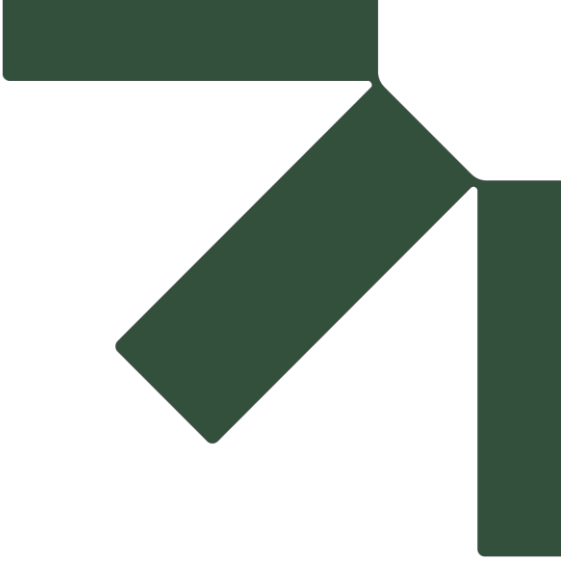
Prepared by:

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Appendix 04 Hydraulic Performance

St Asaph PV Farm - Flood Consequence Assessment & Surface Water Drainage Strategy

Anesco Ltd

SLR Project No.: 416.066918.00001

19 March 2026

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	5.00	55.843		17.995	66.410	0.500
2		55.608		34.800	66.410	0.500
3		55.460		54.776	66.410	0.500
4		55.460	1200	64.684	66.331	0.533

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	20.000	0.013	55.343	55.108	0.235	85.1	500	5.10	50.0
1.001	2	3	6.000	0.030	55.108	54.960	0.148	40.5	500	5.14	50.0
1.002	3	4	5.000	0.030	54.960	54.927	0.033	151.5	150	5.41	50.0

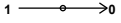
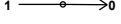
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.455	3281.9	0.0	0.000	0.000	0.000	0.0	0	0.000
1.001	2.513	4145.9	0.0	0.000	0.000	0.000	0.0	0	0.000
1.002	0.303	5.4	0.0	0.350	0.383	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	20.000	85.1	500	Ditch_CC	55.843	55.343	0.000	55.608	55.108	0.000
1.001	6.000	40.5	500	1:3 Swale	55.608	55.108	0.000	55.460	54.960	0.000
1.002	5.000	151.5	150	Circular	55.460	54.960	0.350	55.460	54.927	0.383

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	Junction	2		Junction	
1.001	2	Junction	3		Junction	
1.002	3	Junction	4	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	17.995	66.410	55.843	0.500					
						0	1.000	55.343	500
2	34.800	66.410	55.608	0.500			1	1.000	55.108
						0	1.001	55.108	500
3	54.776	66.410	55.460	0.500			1	1.001	54.960
						0	1.002	54.960	150
4	64.684	66.331	55.460	0.533	1200		1	1.002	54.927
								54.927	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	30	0	0
100	0	0	0
100	30	0	0

Node 4 Offline Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Loop to Node		Sump Available	✓
Invert Level (m)	54.927	Product Number	CTL-SHE-0054-1000-0500-1000
Design Depth (m)	0.500	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	55.366	0.023	5.7	0.0000	0.0000	OK
30 minute winter	2	26	55.140	0.032	4.3	0.0000	0.0000	OK
30 minute winter	3	26	55.140	0.180	4.2	0.0000	0.0000	SURCHARGED
30 minute winter	4	26	55.139	0.212	1.5	0.2394	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	5.7	0.730	0.002	0.1581	
15 minute winter	2	1.001	3	5.7	0.100	0.001	1.3389	
15 minute summer	3	1.002	4	2.6	0.290	0.478	0.0880	
15 minute summer	4	Hydro-Brake®		1.0				2.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	55.380	0.037	13.5	0.0000	0.0000	OK
60 minute winter	2	59	55.306	0.198	6.8	0.0000	0.0000	OK
60 minute winter	3	60	55.306	0.346	4.4	0.0000	0.0000	FLOOD RISK
60 minute winter	4	60	55.305	0.378	1.4	0.4278	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	13.6	0.917	0.004	1.2184	
15 minute winter	2	1.001	3	12.2	0.141	0.003	3.2827	
15 minute winter	3	1.002	4	2.9	0.309	0.539	0.0880	
15 minute summer	4	Hydro-Brake®		1.0				5.2

Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	55.383	0.040	17.6	0.0000	0.0000	OK
120 minute winter	2	112	55.377	0.269	5.6	0.0000	0.0000	OK
120 minute winter	3	112	55.377	0.417	2.9	0.0000	0.0000	FLOOD RISK
120 minute winter	4	112	55.376	0.449	1.2	0.5076	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	17.6	0.985	0.005	1.5892	
15 minute winter	2	1.001	3	15.7	0.145	0.004	4.2760	
15 minute winter	3	1.002	4	2.9	0.326	0.534	0.0880	
15 minute summer	4	Hydro-Brake®		1.0				6.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	55.383	0.040	17.2	0.0000	0.0000	OK
120 minute winter	2	110	55.373	0.265	5.5	0.0000	0.0000	OK
120 minute winter	3	110	55.373	0.413	2.9	0.0000	0.0000	FLOOD RISK
120 minute winter	4	110	55.372	0.445	1.2	0.5034	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	17.2	0.979	0.005	1.5433	
15 minute winter	2	1.001	3	15.3	0.144	0.004	4.1896	
15 minute winter	3	1.002	4	2.8	0.327	0.513	0.0880	
15 minute summer	4	Hydro-Brake®		1.0				6.7

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	108	55.450	0.107	7.2	0.0000	0.0000	OK
120 minute winter	2	118	55.448	0.340	7.7	0.0000	0.0000	OK
120 minute winter	3	118	55.448	0.488	3.3	0.0000	0.0000	FLOOD RISK
120 minute winter	4	116	55.447	0.520	1.2	0.5882	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	22.3	0.987	0.007	2.3565	
15 minute summer	2	1.001	3	18.3	0.132	0.004	4.8364	
15 minute winter	3	1.002	4	3.3	0.322	0.613	0.0880	
120 minute winter	4	Hydro-Brake®		1.0				19.9



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