



Pennant Walters Ltd

GLANLLYNFI GARTH WIND FARM

Appendix 10A - Flood Consequence Assessment
& Outline Drainage Statement





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TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. UK0045637.5484

OUR REF. NO. UK0045637.5484 – FCA & ODS – GLANLLYNFI GARTH

DATE: JULY 2026

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Pennant Walters Ltd

GLANLLYNFI GARTH WIND FARM

Appendix 10A - Flood Consequence Assessment & Outline
Drainage Statement

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for comment			
Date	07/07/2026			
Prepared by	J Lloyd/ R Palmer			
Checked by	V Mohun			
Authorised by				
Project number	UK0045637.5484			
Report number	UK0045637.5484 - FCA – GLANLLYNFI GARTH			

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1 INTRODUCTION

1.1 APPOINTMENT AND BRIEF

- 1.1.1. WSP UK Ltd (WSP) has been commissioned by Pennant Walters Ltd ('the Applicant') to prepare a Flood Consequence Assessment (FCA) and Outline Drainage Statement (ODS) to accompany an application for Development of National Significance (DNS) consent for the proposed Glanllynfi Garth Wind Farm development ('the Proposed Development') located near Maesteg, Bridgend County Borough.
- 1.1.2. This FCA and ODS have been produced in accordance with Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN15, 2025)¹, Planning Policy Wales (PPW)², the Statutory Standards for Sustainable Drainage Systems (SuDS) in Wales³ and relevant local and national flood risk and surface water drainage policy and guidance.
- 1.1.3. The Proposed Development comprises a wind farm development across two land parcels, referred to as the Northern Array (Pwll-yr-lwrch) and Southern Array (Cynhordy). Further details of the Proposed Development and associated infrastructure are provided in Section 3.2 of this report.

1.2 SCOPE AND METHODOLOGY

SCOPE

- 1.2.1. The FCA considers the potential risk of flooding to and from the Proposed Development from all relevant sources during its operational lifetime, including the potential effects of climate change.
- 1.2.2. The assessment adopts a source-pathway-receptor approach to identify potential flood risk to the Proposed Development and surrounding receptors. Where the risk of flooding has been identified, appropriate flood risk management and mitigation measures are considered to ensure that the Proposed Development remains acceptable from a flood risk perspective over its operational lifetime.
- 1.2.3. The ODS demonstrates how surface water runoff arising from the Proposed Development would be managed over the lifetime of the development, taking climate change into account. This ODS accompanies the Environment Statement (ES) and also provides information required to support a future pre-Suds Approval Body (pre-SAB) application with the Local Authority.
- 1.2.4. In particular, this ODS provides information on pre-development runoff rates, surface water storage requirements, water quality and pollution control measures. The ODS also identifies maintenance activities required to support the long-term performance of the drainage network, SuDS elements and pollution control measures.

METHODOLOGY

- 1.2.5. This FCA uses a source-pathway-receptor approach for assessing flood risk:

¹ <https://www.gov.wales/sites/default/files/publications/2025-03/technical-advice-note-15-development-flooding-and-coastal-erosion.pdf>

² <https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf>

³ <https://www.gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf>

- Source – the origin of potential flood risk, such as rainfall, watercourses, tidal influences, groundwater, or infrastructure failure (i.e. defence breach);
- Pathway – the route by which a flood source may affect receptors (e.g. overtopping of embankments, and surface flow routes); and
- Receptor – people, property or assets that may be affected by identified flood mechanisms.

- 1.2.6. The flood sources assessed in the FCA include flooding from fluvial, tidal / coastal, surface water, groundwater, sewer and drainage infrastructure and artificial sources, such as reservoirs and canals.
- 1.2.7. The receptors assessed within the FCA include the Proposed Development infrastructure, maintenance personnel, site users, adjacent land, nearby highways, existing watercourses, drainage infrastructure and surrounding residential and commercial receptors that may be affected by flooding.
- 1.2.8. The following sources of information have been reviewed in support of this report:
- British Geological Survey (BGS) Geoindex (Onshore) Viewer (2026)⁴;
 - British Geological Survey (BGS) Geology Viewer (2026)⁵;
 - DataMapWales (2026)⁶;
 - Defra Magic Map (2026)⁷;
 - Flood Map for Planning (Natural Resources Wales, 2026)⁸;
 - Google Maps (Aerial Imagery) (2026)⁹;
 - Landis Soilscales (2026)¹⁰;
 - Mapcarta – The Open Map (2026)¹¹;
 - Ordnance Survey Mapping (2026)¹²; and
 - UK Grid Reference Finder (2026)¹³.
- 1.2.9. The methodology for developing the ODS is outlined in Section 7 of this report.

⁴ [GeoIndex - British Geological Survey](#)

⁵ [BGS Geology Viewer \(BETA\)](#)

⁶ [New map | DataMapWales](#)

⁷ [Magic Map Application](#)

⁸ [Flood Map for Planning](#)

⁹ [Google Maps](#)

¹⁰ [LandIS - Land Information System - Soilscales soil types viewer](#)

¹¹ [Mapcarta - The Open Map](#)

¹² [Detailed maps & routes to explore across the UK | OS Maps](#)

¹³ [Grid Reference Finder](#)

1.3 ADVISORY INFORMATION AND LIMITATIONS

- 1.3.1. The information presented in this report is provided for the purpose of the FCA and ODS as commissioned by the Applicant. Its suitability for other purposes contained herein are limited by the availability of background information and by the intended use of the Proposed Development.
- 1.3.2. Third-party information has been used in the preparation of this report, which WSP, by necessity assumes is correct at the time of writing. Whilst reasonable checks have been undertaken, WSP accepts no liability for inaccuracies within third-party data.
- 1.3.3. This FCA and ODS have been prepared using the best available information at the time of writing, including Natural Resources Wales flood mapping, DataMapWales datasets, Ordnance Survey mapping, publicly available topographical information, development design information provided by the Applicant, stakeholder consultation responses and other relevant third-party datasets. Should the site layout or drainage strategy be amended during the post-consent detailed design stage, the conclusions and recommendations of this report may require review.
- 1.3.4. The FCA has been undertaken primarily as a desk-based assessment. Site visits have been undertaken by the wider project team; however, a flood risk-specific site walkover has not been undertaken. Where relevant, site information provided by the wider project team has been reviewed and incorporated into the assessment.
- 1.3.5. Surface water management for the construction phase of the Proposed Development is outside the scope of this report but is considered in the Draft Outline Construction Environmental Management Plan (CEMP) in **Appendix 4A**.
- 1.3.6. The Proposed Development will not include any welfare facilities during the operational phase; therefore, provision for a foul drainage strategy has not been included as part of the ODS.
- 1.3.7. An assessment of the existing forestry access tracks (as defined within **Chapter 4: Development Description** of the ES) has not been included within this report. While further upgrades to the forestry access track may be required, at this stage, detailed surveys are currently being undertaken to inform the design of any required improvements. This included the access route to the northern array from the north and the track between the northern and southern array. These aspects will not be considered within this report.
- 1.3.8. At this stage, no site-specific topography survey has been acquired for review. The topography assessment has therefore been undertaken using the latest publicly available LiDAR/DTM data.

2 THE PROPOSED DEVELOPMENT

- 2.1.1. The Proposed Development comprises the construction and operation of Glanllynfi Garth Wind Farm, located approximately 1km east of Maesteg within Bridgend County Borough, South Wales. The Site comprises two land parcels referred to throughout this report as the Northern Array (Pwll-yr-lwrch) and Southern Array (Cynhordy). A detailed description of the Proposed Development is provided in **Chapter 4: Development Description** of the Environmental Statement, with only a summary of the key development components provided below.
- 2.1.2. The Proposed Development will comprise:
- Up to eight wind turbines with a maximum blade tip height of 180 m;
 - Turbine foundations;
 - Crane hardstanding areas;
 - Internal access tracks and upgrades to existing access tracks;
 - Underground electrical cabling;
 - Transformer compounds and substations;
 - Temporary construction compounds and site offices;
 - Overhead line connections to the agreed Point of Connection (PoC) with National Grid Electricity Distribution (NGED); and
 - Associated drainage and ancillary infrastructure.
- 2.1.3. The Site will utilise existing access tracks associated with the operational Pen y Cymoedd Wind Farm and Llynfi Afan Wind Farm, with upgrades undertaken where required. The northern access route to the Site follows an existing operational access track and is therefore not considered further within this report. Likewise, the link between the Northern and Southern Arrays is not considered. This assessment focuses on the proposed infrastructure associated with the Site, including new access tracks and upgrades where required. Construction activities are anticipated to include the formation of turbine foundations, crane hardstanding areas, access tracks, electrical infrastructure and associated site compounds.
- 2.1.4. **Table 2.1** summarises the main characteristics of the Proposed Development.

Table 2.1 – Indicative Turbine grid reference and turbine dimensions

Turbine	OSGB coordinates (m)		Hub height	Rotor diameter	Tip height
	X	Y			
T1	286782	193133	105m	150m	180m
T2	287425	192976	105m	150m	180m
T3	286685	192693	105m	150m	180m
T4	288422	189841	105m	150m	180m
T5	289446	189945	105m	150m	180m
T6	288914	190379	105m	150m	180m
T7	288694	189429	105m	150m	180m
T8	287380	192525	105m	150m	180m

2.1.5. A Development Layout Plan is presented in **Figure 10A.1** within **Annex 10A.A**.

2.2 DEVELOPMENT LIFESPAN

- 2.2.1. The Proposed Development is anticipated to have an operational lifespan of approximately 30 years, as confirmed within the WSP EIA Scoping Report (Report Reference: UK0044022.9334, dated Feb 2026)¹⁴. At the end of the operational period, the wind farm will either be decommissioned, subject to the relevant planning approvals, or an application may be submitted for repowering or extension of the operational life.
- 2.2.2. For the purposes of this report, it is assumed that the Proposed Development will be operational for 30 years before being decommissioned. Flood risk considerations have therefore been assessed over the lifetime of the development, including allowances for the anticipated effects of climate change.

2.3 VULNERABILITY OF FLOODING

- 2.3.1. In accordance with Figure 4 of Technical Advice Note 15 (TAN15)¹⁵, the Proposed Development is considered to comprise renewable energy infrastructure and associated ancillary development, including wind turbines, substations, access tracks and electrical infrastructure.
- 2.3.2. The Proposed Development is therefore classified as **Less Vulnerable Development** for the purposes of TAN15.

¹⁴ [Glanllynfi Garth Scoping Report Final Issue.pdf](#)

¹⁵ [Technical Advice Note 15: Development, flooding and coastal erosion](#)

- 2.3.3. The Site is not located within a TAN15 Defended Flood Zone. Review of NRW Flood Map for Planning and DataMapWales mapping indicates that the majority of the Site lie with Flood Zone 1. However, isolated areas within the Northern and Southern Arrays extents, coincide with Flood Zone 2 and Flood Zone 3 associated with surface water and small watercourse flooding.
- 2.3.4. As the Site exceeds 1ha and contains areas affected by TAN15 flood mapping, the FCA has been undertaken to demonstrate that flood risk to the Proposed Development and third parties can be appropriately managed throughout the operational phase of the development.

3 SITE BACKGROUND

3.1 SITE LOCATION

- 3.1.1. The Site is located approximately 1km east of Maesteg within Bridgend County Borough, South Wales. The Site comprises two separate land parcels situated within an upland moorland environment between Maesteg, Blaengwynfi and Cynhordy.
- 3.1.2. The land parcels are referred to throughout this report as:
 - Northern Array (Pwll-yr-lwrch) – centred on National Grid Reference SS 87102 92887;
 - Southern Array (Cynhordy) – centred on National Grid Reference SS 88988 89854.
- 3.1.3. A site location and Proposed Development boundary are provided in **Figure 10A.1** in Annex 10A.A.
- 3.1.4. Further site layout figures are shown in figures noted within Chapter 4 of the ES, including **Figure 10A.2: Site Layout, Figure 10A.3: Northern Array Site Layout** and **Figure 10A.4: Southern Array Site Layout**).

3.2 SITE DESCRIPTION

- 3.2.1. The land parcels comprise a mix of semi-improved grassland, marshy grassland and heathland. The Nant Cwmdy valley is located between the two land parcels with coniferous forests located towards the upper parts of the valley and deciduous woodland in the southern part of the valley. There are also extensive coniferous forests to the north (Caerau Forest) and east (Garw Forest) of the Site.
- 3.2.2. Access to the Site will utilise a combination of existing forestry tracks and new or upgraded access tracks, where required. Existing forestry tracks currently serve the operational Pen Y Cymoedd Wind Farm and Llynfi Afan Wind Farm. From the A4061, the access tracks travel south through Pen Y Cymoedd Wind Farm, cross the A4107 and continue through the Llynfi Afan Wind Farm to the Site.
- 3.2.3. **Table 3-1** below summarises the land uses surrounding the Site.

Table 3-1 – Surrounding Land Uses

Direction	Description
North	Upland moorland, forestry and the settlement of Blaengwynfi beyond the northern extent of the Northern Array.
East	Predominantly upland moorland, forestry plantations and wind farm infrastructure associated with existing operational wind energy developments. Also located to the east is The Garw Valley where the villages of Blaengarw and Pontycymer are situated.
South	Open moorland, forestry and the Cynhordy area surrounding the Southern Array.
West	The settlements of Maesteg, Garth, Caerau and associated residential, transport and community land uses within the Llynfi Valley.

- 3.2.4. There are no residential properties within the Site boundary however there are several residential properties within close proximity to the two land parcels. The nearest settlement to the Site is

Maesteg, located approximately 1km west of the Northern Array and approximately 1.5km west of the Southern Array respectively.

3.3 TOPOGRAPHY

- 3.3.1. At this stage, there is no site-specific topography survey available for review. The topography assessment has therefore been undertaken using available LiDAR/DTM data. This is considered suitable for providing an overview of the Site's general elevation, slope direction and local topographic setting. However, the findings will be reviewed and updated if a site-specific topographic survey becomes available.
- 3.3.2. A review of the 1m DTM derived from LiDAR data collected in 2020 indicates that the ground levels vary across the Site, with each array generally situated at high elevation and generally sloping towards the south.
- 3.3.3. The Northern Array has the highest elevation of the two land areas, with the majority area situated at above 400m AOD. The highest elevation shown across this land parcel is 425m AOD with elevations dipping in the northwest corner of this land area to 284m AOD.
- 3.3.4. The Southern Array shows more diverse ground levels throughout the land parcel, showing ground levels around 348m AOD in the north of this land area, falling towards approximately 147m AOD in the south.
- 3.3.5. The general topography mapping indicates that surface water runoff is likely to follow the topography of the existing fields towards lower-lying areas and localised flow routes. This will be considered when accessing the surface water flood risk throughout Section 5.3 in this report.
- 3.3.6. The 1m DTM LiDAR data is shown in Figure 10A.5 within Annex 10A.B.

3.4 GEOLOGY AND HYDROGEOLOGY

- 3.4.1. The published geological and hydrogeological characteristics of the Site has been reviewed using data from the BGS and other public datasets. A summary is provided in **Table 3-2** below.

Table 3-2 – Geological and Hydrogeology Summary

Geology	Geological Description	Source
Bedrock Geology	The Site is underlain by several bedrock units, including the Rhondda Member, Llynfi Member, South Wales Upper Coal Measures Formation and South Wales Middle Coal Measures Formation. These units comprise sequences of sandstone, together with interbedded mudstone, siltstone and sandstone, reflecting deposition within fluvial and deltaic environments associated with the Coal Measures.	BGS Geology Viewer (2026)
Superficial Geology	No superficial deposits are recorded beneath the majority of the Site on the BGS Geology Viewer. However, areas of superficial cover are present locally, including deposits of Alluvium comprising clay, silt, sand and gravel, as well as Devensian Till, typically consisting of Diamicton. Areas of peat have also been identified within the vicinity of the Site.	BGS Geology Viewer (2026)

Geology	Geological Description	Source
	The implications of these ground conditions for the proposed drainage strategy are discussed within the Outline Drainage Statement in Section 7 of this report.	
Borehole Records	BGS borehole records indicate variable ground conditions across the Site. Historical boreholes record sequences of sandstone, mudstone, siltstone, shale and local coal seams, consistent with the mapped Coal Measures geology. No groundwater strike information is currently available from the published borehole records. Further consideration of ground conditions and their implications for drainage design is provided within the Outline Drainage Statement in Section 7 of this report.	BGS GeoIndex (onshore) (2026)
Soil Type	LandIS Soilscales mapping indicates that the Southern Array is underlain by a mixture of two soil types including that of a freely draining acidic loamy soils over rocks, as well as very acidic loamy upland soils with a wet peaty surface. These soils are typically loamy to peaty in texture, with freely draining to surface wetness characteristics, low to very low fertility, and drainage to local groundwater, river and stream networks. The Northern Array is predominantly underlain by very acid loamy upland soils with a wet peaty surface, characterised by peaty textures, surface wetness, very low fertility, and drainage primarily to the local stream network.	Landis Soilscales (2026)
Aquifer Designation	NRW / GeoIndex mapping indicates that the Site is underlain by bedrock aquifers classified as Secondary A. No superficial aquifers are mapped for the site extents.	NRW / BGS Geoindex Aquifer Designation Wales (2026)
Groundwater Vulnerability	NRW / GeoIndex mapping indicates that the Southern Array lies within areas of high and medium groundwater vulnerability, whereas the Northern Array lies within an area of medium groundwater vulnerability.	NRW / BGS Geoindex Groundwater Vulnerability Wales (2026)
WFD Groundwater Body	The Site lies within the Swansea Carboniferous Coal Measures WFD groundwater body. The groundwater body is recorded as having Poor overall status under Cycle 2.	NRW / DataMapWales WFD Groundwater Bodies Cycle 2 (2026)

3.5 EXISTING SEWERS AND DRAINAGE INFRASTRUCTURE

- 3.5.1. Given the existing agricultural land use, it is possible that private drainage features, field drains, ditches or informal drainage routes are present within or adjacent to the Site boundary. These features may not be fully identified on statutory utility plans and should be confirmed before detailed design and site works where necessary.

DRAINAGE INFRASTRUCTURE

- 3.5.2. Existing drainage infrastructure within the Site is limited to local drainage features associated with forestry access tracks and natural drainage pathways. These features of small watercourses and field ditches convey surface water to the surrounding watercourse network and will be retained and integrated into the detailed drainage design where practicable.

HIGHWAY DRAINAGE

- 3.5.3. A review of highway drainage features has been undertaken using publicly available imagery. Google Street View imagery at the site access points on the A4107 (image capture: September 2022) and A4061 (image capture: June 2022) was reviewed. Given the remote location of the Site, no formal highway drainage features, such as gullies or linear drainage channels, were readily identifiable within the available imagery. The surrounding highway verges appear to provide informal pathways for surface water runoff; however, the presence and condition of any local drainage features cannot be confirmed from the imagery alone. The internal access tracks are not visible via Google Street View (2026).

SEWERS

- 3.5.4. Consultation was undertaken with Dŵr Cymru Welsh Water (DCWW) to identify public sewer assets and associated drainage constraints within the vicinity of the Proposed Development. DCWW confirmed that there are no recorded below-ground assets (BGA), including public sewer infrastructure, within the vicinity of the site and that no assets appear to be located within the red line boundary. Consequently, no associated easements have been identified.
- 3.5.5. DCWW also confirmed that there are no reported drainage constraints, capacity issues or infrastructure limitations that may affect the Proposed Development. No planned infrastructure improvement schemes or existing sewer flood risk management schemes were identified within the area reviewed.

3.6 EXISTING WATERCOURSES

- 3.6.1. A review of the OS OpenMap (2026) indicates that localised flow routes are present within and adjacent to the Site. These mapped areas broadly correspond with lower-lying land, field boundaries, ditches and existing drainage corridors, as shown in Figure 10A.6 within Annex 10A.B
- 3.6.2. No statutory main rivers are located within the site boundary. The nearest statutory main river is the Afon Garw, located approximately 640m east of the Southern Array and situated approximately 198m lower in elevation than the site boundary.
- 3.6.3. The nearest coastline is Port Talbot Beach, located approximately 11.6km east of the Site.
- 3.6.4. No formal flood defences are present on or in the vicinity of the Site. As the Site is located inland, it is not influenced by tidal or coastal flooding.

NORTHERN ARRAY

- 3.6.5. The watercourses within the Northern Array generally follow the existing topography. The Nant Cwm-du originates at approximately 400m AOD in the eastern part of the Northern Array and flows southwards, descending to approximately 340m AOD where it exits the site boundary. Similarly, the Nant Gwyn Bach, located in the northern part of the Northern Array, follows the existing topography northwest, decreasing in elevation from approximately 404m AOD to 380m AOD as it leaves the site boundary.
- 3.6.6. The Proposed Development has been designed to retain existing drainage pathways where practicable, with runoff from the Northern Array continuing to discharge to the existing receiving watercourses within the same catchments.

SOUTHERN ARRAY

- 3.6.7. The watercourse within the Southern Array site boundary is called the Nant Cedfyw and generally follows the existing topography. The Nant Cedfyw originates at approximately 300m AOD in the central part of the Southern Array and flows southwards, descending to approximately 159m AOD where it exits the site boundary.
- 3.6.8. The Nant y Fforest is located approximately 65m immediately north of the Southern Array site boundary. This sits approximately 10m AOD below the elevation of the site boundary.

FORESTRY ACCESS TRACK

- 3.6.9. Existing forestry access tracks intersect some of these watercourses via existing crossings, including that of the Nant Cwm-du, which flows in a west to east direction, following the sloping terrain. Existing watercourse crossings associated with forestry infrastructure will be utilised where practicable, with any new crossings designed to maintain existing flow conveyance and channel continuity. The Proposed Development will aim to preserve the existing drainage catchments, ensuring runoff generated within each catchment continues to discharge to the same receiving watercourse.

4 CONSULTATION, POLICY AND GUIDANCE

4.1 STAKEHOLDER CONSULTATION

- 4.1.1. Consultation has been undertaken with key stakeholders, namely Natural Resources Wales (NRW), Bridgend County Borough Council, in its role as Lead Local Flood Authority (LLFA) and Dŵr Cymru Welsh Water (DCWW) to inform this report.
- 4.1.2. A summary of the correspondence is provided in **Table 4-1** below. A copy of the consultation responses and meeting minutes is included in Annex 10A.C of this report.

Table 4-1 – Consultation Responses Summary

Stakeholder	Consultation Summary
NRW	A flood risk enquiry was issued to NRW on 04 June 2026 requesting information relating to historic flooding, groundwater flood risk, identified watercourses, flood risk management assets, flood studies and flood mapping associated with the Site. A response was received from NRW on 10 June 2026 confirming that the site lies outside NRW's fluvial and tidal flood outlines shown on the NRW Flood Map and, therefore, NRW holds no relevant flood risk data for the site.
LLFA / SAB	A flood risk enquiry was issued to Bridgend County Borough Council, acting as the LLFA, on 15 June 2026 requesting information relating to local flood risk, historic flood incidents, ordinary watercourses, drainage infrastructure and any planned flood alleviation schemes affecting the Site. At the time of writing, no response had been received.
DCWW	A flood risk enquiry was issued to DCWW on 04 June 2026 requesting information relating to historic sewer flooding incidents, existing drainage assets, infrastructure constraints, expected easements, planned improvement works and sewer flood risk management schemes associated with the Site. A response was received from DCWW on 08 July 2026 confirming that there are no recorded sewer flooding incidents within the area requested and no known flood risk associated with or planned for the area. DCWW also confirmed that there appear to be no assets within the Site red line boundary, no recorded easements, and no reported drainage constraints, capacity issues or infrastructure limitations that may affect the Proposed Development. No planned infrastructure improvement schemes or existing sewer flood risk management schemes were identified.

4.2 LEGISLATION, POLICY AND GUIDANCE

- 4.2.1. This report has been informed by, and refers to where appropriate, the following legislation, policy and guidance documents.

LEGISLATION

- Environmental Act (Wales) (2016)¹⁶;

¹⁶ [Environment \(Wales\) Act 2016](#)

- Flood and Water Management Act (2010)¹⁷;
- Land Drainage Act (1991)¹⁸;
- The Environmental Permitting (England and Wales) Regulations (2016)¹⁹;
- The Flood Risk Regulations (2009)²⁰;
- The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations (2018)²¹;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017)²²;
- Water Industry Act (1991)²³;
- Water Resources Act (1991)²⁴; and
- Well-being of Future Generations (Wales) Act (2015)²⁵.

NATIONAL POLICIES AND GUIDANCE

- Planning Policy Wales, Edition 12 (2024)²⁶;
- Technical Advice Note 15: Development, flooding and coastal erosion (2025)²⁷; and
- Welsh Government Sustainable Drainage (SuDs) Statutory guidance (2019)²⁸.

LOCAL/REGIONAL POLICIES AND GUIDANCE

- Bridgend County Borough Council Preliminary Flood risk assessment report (2017)²⁹;
- Bridgend Flood Risk Management Plan – Local Floor Risk Investigation Areas (2016)³⁰; and
- Natural Resources Wales Flood Risk Management Plan: South Central Wales Place (2023)³¹.

¹⁷ [Flood and Water Management Act 2010](#)

¹⁸ [Land Drainage Act 1991](#)

¹⁹ [The Environmental Permitting \(England and Wales\) Regulations 2016](#)

²⁰ [The Flood Risk Regulations 2009](#)

²¹ [The Sustainable Drainage \(Approval and Adoption Procedure\) \(Wales\) Regulations 2018](#)

²² [The Water Environment \(Water Framework Directive\) \(England and Wales\) Regulations 2017](#)

²³ [Water Industry Act 1991](#)

²⁴ [Water Resources Act 1991](#)

²⁵ [Well-being of Future Generations \(Wales\) Act 2015](#)

²⁶ [Planning Policy Wales - Edition 12](#)

²⁷ [Technical Advice Note 15: Development, flooding and coastal erosion](#)

²⁸ [Sustainable test Drainage \(SuDS\) Statutory Guidance](#)

²⁹ [Preliminary Flood Risk Assessment 2017 review](#)

³⁰ [bridgend-flood-risk-management-plan.pdf](#)

³¹ [Natural Resources Wales Flood Risk Management Plan: South Central Wales Place](#)

DRAINAGE AND SUDS GUIDANCE

- CIRIA SuDS Manual (C753) (2015)³²;
- Statutory Standards for Sustainable Drainage Systems (SuDS), Welsh Government (2018)³³.

4.3 CLIMATE CHANGE GUIDANCE

- 4.3.1. The Welsh Government updated its climate change allowances for Flood Consequence Assessments in March 2026. The guidance provides allowances for peak river flows, rainfall uplifts, sea level rise and wave action, and should be applied to relevant planning applications submitted from 1 April 2026.
- 4.3.2. The climate change allowances are based on UK Climate Projections (2018) and provide allowances for peak river flows, rainfall uplifts, sea level rise and wave action. The allowances should be used to assess the potential effects of climate change on flood risk over the lifetime of the Proposed Development.
- 4.3.3. For development management proposals, TAN15 requires site-specific FCAs in flood risk areas to consider a range of climate change scenarios, including upper end estimates. The minimum expectation is to consider the design event using the central estimate and undertake sensitivity testing under the upper estimate where relevant.

PEAK RIVER FLOW

- 4.3.4. Peak river flow allowances are provided for the three River Basin Districts in Wales and are used to assess the potential impact of climate change on fluvial flood risk. The central allowance is generally used to inform the design event, while the upper allowance should be used to test sensitivity and inform mitigation, resilience and access/egress requirements. Given the Proposed Development is classified as less vulnerable development, the central allowance is considered appropriate for assessing the design event, with the upper allowance considered as a sensitivity test. The 2080s epoch has been adopted to assess the potential effects of climate change over the lifetime of the Proposed Development.
- 4.3.5. The current allowances for peak river flow for the West Wales River Basin District are summarised in **Table 4-2** below:

Table 4-2 - West Wales River Basin Peak River Flow Allowances

Epoch	Central	Upper
2020s (Present day to 2039)	10%	20%
2050s (2040 to 2069)	20%	40%
2080s (2070 to 2125)	35%	70%

³² [The SuDS Manual C753F](#)

³³ [statutory-national-standards-for-sustainable-drainage-systems.pdf](#)

RAINFALL UPLIFT ALLOWANCES

- 4.3.6. Rainfall uplift allowances apply across Wales and are used where rainfall is applied directly to hydraulic models, drainage assessments, small catchment assessments, surface water assessments or urban drainage systems. The Welsh Government guidance states that drainage systems should be designed to ensure there is no increase in site runoff when assessed against the upper rainfall allowance.
- 4.3.7. The latest allowances for rainfall uplift are summarised in **Table 4-3** below:

Table 4-3 - Rainfall Uplifts for Wales

Epoch	Central	Upper
2050s (Present day- 2060)	20%	35%
2070s (2061-2125)	30%	40%

- 4.3.8. For the Proposed Development, the central rainfall uplift allowance of 30% for the 2070s epoch is considered applicable based on the anticipated development lifetime. The 30% climate change allowance has therefore been adopted to inform the ODS. The upper allowance of 40% should be considered as a sensitivity test where relevant.

TECHNICAL ADVICE NOTE 15 (TAN15)

- 4.3.9. Technical Advice Note 15 (TAN15): Development, Flooding and Coastal Erosion (2025) provides the Welsh Government's framework for assessing flood risk associated with development. TAN15 requires the consideration of flood risk from rivers, the sea, surface water and groundwater, and promotes a risk-based approach to development that seeks to avoid increasing flood risk to people and property.
- 4.3.10. TAN15 promotes the use of SuDS to manage surface water runoff and requires development proposals to mimic natural drainage processes where practicable by reducing runoff at source, attenuating flows and ensuring there is no increase in flood risk on or off-site.
- 4.3.11. For qualifying developments, TAN15 also sets out the requirements for a Drainage Statement, including demonstration of compliance with the statutory SuDS standards and details of the proposed surface water drainage measures.

FLOOD AND WATER MANAGEMENT ACT 2010

- 4.3.12. Under Schedule 3 of the Flood and Water Management Act 2010, qualifying developments in Wales require approval from the SAB prior to construction. Bridgend County Borough Council, acting as the LLFA, is the designated SAB for the Site and is responsible for approving surface water drainage proposals.

STATUTORY STANDARDS FOR SUSTAINABLE DRAINAGE SYSTEMS (SUDS), WELSH GOVERNMENT (2018)

- 4.3.13. The Welsh Government Statutory Standards for Sustainable Drainage Systems establish the requirements for the design, approval and adoption of SuDS in Wales. The standards seek to ensure that drainage systems effectively manage runoff quantity, runoff quality, amenity, biodiversity and long-term operation and maintenance throughout the lifetime of the development.

CIRIA SUDS MANUAL (C753)

- 4.3.14. The CIRIA SuDS Manual (C753) represents current industry best practice for the planning, design, construction and maintenance of sustainable drainage systems. The guidance supports the delivery of multi-functional drainage systems that provide effective runoff management while delivering wider environmental and ecological benefits.

5 OVERVIEW OF FLOOD RISK

5.1 INTRODUCTION

- 5.1.1. This section provides an assessment of flood risk to and from the Proposed Development from all potential sources of flooding, in line with the TAN15 and Planning Policy Wales. Flood mapping relevant to the Proposed Development is presented throughout this section and is also included in Annex 10A.D.

5.2 HISTORICAL FLOOD RISK

- 5.2.1. A consultation request was issued on 04 June 2026 to Bridgend County Borough Council as the LLFA requesting historical flood information. At the time of writing, no response has been received.
- 5.2.2. A review of the NRW Flood Map for Planning – Recorded Flood Extents (2026) indicates that there are no recorded flood extents or historic flood map records within the Site boundary or the immediate surrounding area, as shown in **Annex 10A.D.**
- 5.2.3. A review of Bridgend County Borough Council Preliminary Flood Risk Assessment Report (2017) was also reviewed, which showed no evidence of historic surface water flooding, fluvial flooding, or sewer flooding within the site boundary or in the immediate surrounding areas. The closest recorded flood event was approximately 1.5km west of the Southern Array, caused by surface water runoff from the hillside. As these properties sit 184m below the elevation of the Site boundary, the Proposed Development is not anticipated to be adversely affected.
- 5.2.4. Based on the available published mapping and local council documents, there is no evidence of recorded historical flooding affecting the site. However, this should be reviewed and updated following receipt of any further LLFA flood specific information.

5.3 SURFACE WATER FLOOD RISK

- 5.3.1. Surface water flooding occurs when rainfall is unable to infiltrate into the ground or enter drainage systems, resulting in overland flow across the land surface. Small watercourse flooding may also occur where minor watercourses, ditches or field drainage features exceed capacity during rainfall events.
- 5.3.2. For surface water and small watercourses, the NRW Flood Map for Planning (2026) identifies:

FLOOD ZONE 1

- Areas with less than 0.1% annual probability of flooding from surface water and small watercourses, equivalent to less than 1 in 1,000 chance of flooding in any given year, including the effects of climate change.

FLOOD ZONE 2

- Areas with between a 0.1% and 1% annual probability of flooding, equivalent to between a 1 in 1,000 and 1 in 100 chance of flooding in any given year, including the effects of climate change.

FLOOD ZONE 3

- Areas with greater than a 1% annual probability of flooding, equivalent to greater than a 1 in 100 chance of flooding in any given year, including the effects of climate change.

- 5.3.3. The NRW Flood Map for Planning (2026) identifies areas at risk of flooding from surface water and small watercourses. The mapping indicates that areas of surface water and small watercourse flood risk are present within and adjacent to the site. These areas are generally localised and are mainly associated with lower-lying drainage corridors, field boundaries and existing flow routes.
- 5.3.4. The existing topography indicates that surface water runoff is likely to follow existing field slopes towards lower-lying areas, drainage ditches and localised flow routes. The mapped surface water and small watercourse Flood Zones broadly correspond with these lower-lying drainage corridors and field boundaries, as shown in **Annex 10A.D**.
- 5.3.5. **Figure 10A.6** shows the highest risk areas are associated with mapped drainage corridors, lower-lying areas, existing ditches and localised flow routes.
- 5.3.6. The proposed layout shown in **Figure 10A.1** indicates that, where practicable, the principal infrastructure has been located outside areas identified as being at greatest risk of surface water and small watercourse flooding. Where the proposed infrastructure crosses mapped small watercourses or flow routes, these locations will require appropriate consideration and design of these crossings to maintain existing flow paths and minimise flood risk.
- 5.3.7. On the basis of the available NRW mapping and topographic information, the risk of flooding from surface water and small watercourses is considered to be **low to medium** locally.
- 5.3.8. This risk will be managed through the proposed layout, SuDS features, maintenance of existing drainage features as presented in Section 6 of this report.
- 5.3.9. The increase in surface water flood risk due to an increase in the hardstanding areas will be in accordance with the measures outlined in the ODS, as discussed in Section 7 of this report.

5.4 FLUVIAL FLOOD RISK

- 5.4.1. Fluvial flooding occurs when water levels in rivers, streams or watercourses exceed channel capacity and flood the surrounding land. For the purposes of this assessment, fluvial flood risk has been reviewed using the NRW Flood Map for Planning (2026), available site information and the topography setting of the site.
- 5.4.2. The NRW Flood Map for Planning (2026) identifies areas of flood risk as follows:
 - Flood Zone 1 comprises land assessed as having a low probability of flooding and is located outside the mapped Flood Zone 2 and Flood Zone 3 extents;
 - Flood Zone 2 comprises of areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from rivers each year, including the effects of climate change;
 - Flood Zone 3 comprises land with more than 1% (1 in 100) chance of flooding from rivers each year, including the effects of climate change.
- 5.4.3. No statutory main rivers are located within the site boundary. The nearest statutory main river is Afon Garw, located approximately 640m east of the southern parcel site area and situated approximately 198m below the elevation of the site.
- 5.4.4. The topography of the site indicates that the site is formed of sloping agricultural land, with surface water expected to follow existing topography towards local low points and flow routes. Based on the NRW mapping and topographical mapping, principal fluvial flood risk consideration is not considered to be flooding from a statutory main river, but from smaller watercourses and localised surface water

flow routes. Therefore, the risk from flooding from fluvial sources is currently considered **very low** and therefore no mitigation measures are proposed.

5.5 COASTAL FLOOD RISK

- 5.5.1. Coastal flooding can occur when high sea levels, storm surge and/or wave action result in inundation of coastal land.
- 5.5.2. For flooding from the sea, the NRW Flood Map for Planning (2026) identifies:
 - Flood Zone 2: Areas with between 0.1% and 0.5% annual probability of flooding, equivalent to between a 1 in 1000 and 1 in 200 chance of flooding in any given year, including the effects of climate change.
 - Flood Zone 3: Areas with greater than a 0.5% annual probability of flooding, equivalent to greater than a 1 in 200 chance of flooding in any given year, including the effects of climate change
- 5.5.3. A review of available mapping indicates that there is no coast located within or immediately adjacent to the site boundary. The nearest coastline is Port Talbot Beach, located approximately 11.6km east of the site.
- 5.5.4. Given the significant distance between the site and the coast, together with the absence of any tidal influence within or adjacent to the site, the risk of coastal flooding is considered to be **negligible**, this has not been considered further within this assessment and no mitigation measures are required.

5.6 GROUNDWATER FLOOD RISK

- 5.6.1. Groundwater flooding can occur when groundwater levels rise above ground level or enter below ground structures, excavations or drainage systems. Groundwater flood risk is influenced by geology, soil permeability, groundwaters, aquifer characteristics and local topography.
- 5.6.2. Bridgend County Borough Council identifies groundwater as a potential source of flood risk; however, historic evidence indicates that groundwater flooding has not resulted in significant impacts within the County Borough.
- 5.6.3. NRW Geoindex mapping indicates that the site lies within areas of medium to high groundwater susceptibility, particularly across the Southern Array. This suggests that the underlying strata are sufficiently permeable to allow groundwater movement and that the site may be sensitive to rising groundwater levels under certain conditions.
- 5.6.4. In combination with site conditions, including areas of wet and peaty soils, there is potential for localised groundwater emergence or saturation, particularly in lower-lying areas or during prolonged periods of rainfall.
- 5.6.5. Site-specific groundwater monitoring data is not available at this stage for review. However, based on the available national and local datasets, and in the context of limited historic groundwater flooding recorded by the Local Authority, the risk of groundwater flooding is considered to be **low**. This will be reviewed should further ground investigation, groundwater or drainage information become available.

5.7 FLOOD RISK FROM SEWERS AND DRAINAGE INFRASTRUCTURE

SEWERS

- 5.7.1. Consultation with DCWW confirmed that there are no recorded sewer flooding incidents within the area reviewed and no known flood risk associated with the public sewer network. DCWW also confirmed that no assets appear to be located within the site red line boundary and no drainage constraints, capacity issues or infrastructure limitations have been reported.
- 5.7.2. On this basis, no viable public sewer flooding source or pathway to the Proposed Development infrastructure or surrounding receptors has been identified. The risk of flooding from public sewers is therefore considered to be **negligible** and no specific flood risk management measures are required.

DRAINAGE INFRASTRUCTURE

- 5.7.3. The Site is currently drained by a network of natural drainage features, including ordinary watercourses, drainage ditches and trackside drainage associated with the existing forestry access tracks. These features convey surface water through the site and ultimately discharge to the surrounding watercourse network. The development is proposed, where practicable, to retain these existing drainage pathways, with any required crossings designed to maintain hydraulic connectivity and minimise changes to the existing drainage regime. The risk from these sources is similar to the risk from small watercourses and considered to be between **low and medium**.

HIGHWAY DRAINAGE

- 5.7.4. Access to the Site will primarily utilise the existing forestry access track network, with localised upgrades and new sections of access track provided where required. Consequently, interaction with the public highway drainage network will be limited. Where the Proposed Development connects to the public highway, appropriate drainage measures will be incorporated to ensure surface water runoff is effectively managed and that flood risk to the surrounding highway network or adjacent land is not increased.
- 5.7.5. A review of available Google Street View imagery of the A4107 and A4061 indicates the presence of existing highway drainage infrastructure, including roadside drainage channels and gullies. The available imagery does not indicate any obvious evidence of drainage failure or historic highway flooding in the vicinity of the Site.
- 5.7.6. Given the elevation difference from the Site and the surrounding highway the risk of flooding associated with highway drainage is considered to be **very low** and no mitigation measures are proposed.

5.8 FLOOD RISK FROM ARTIFICIAL SOURCES

RESERVOIRS

- 5.8.1. Reservoir flooding can occur as a result of overtopping or structural failure of a reservoir, lake or impounded waterbody. Although the probability of reservoir failure is generally low, the potential consequences can be significant and therefore been considered as part of this report.
- 5.8.2. As shown in **Annex 10A.D**, NRW Flood Map for Planning (2026) has been reviewed and indicates that the Site is not located within a mapped reservoir flood extent.

- 5.8.3. On this basis, the risk of flooding from reservoirs is considered **negligible** and has not been considered further within this assessment.

CANALS

- 5.8.4. Canal flooding can occur as a result of overtopping, embankment failure, blockage or operational issues associated with canal infrastructure.
- 5.8.5. A review of available mapping indicates that there are no canals located within or immediately adjacent to the site boundary. The nearest canal is the Neath and Tennant Canal, located approximately 9.4km northwest of the Site.
- 5.8.6. Given the significant distance between the Site and the nearest canal, and the absence of any canal infrastructure within or adjacent to the Site, the risk of flooding from canals is considered to be **negligible** and has not been considered further within this assessment.

5.9 SUMMARY OF FLOOD RISK

- 5.9.1. **Table 5-1** below provides a summary of flood risk to the Proposed Development.

Table 5-1 – Summary of Flood Risk to Receptors

Flood Source	Overall Risk to Receptors	Risk Management Measures Required?	Summary
Surface Water and Small Watercourses	Low to medium	Yes	Localised mapped flow routes intersect parts of the site.
Fluvial Flooding	Very Low	No	No significant fluvial flood risk identified to the Proposed Development or surrounding receptors.
Coastal Flooding	Negligible	No	The Site is located sufficiently inland and is at no risk of tidal flooding.
Groundwater Flooding	Low	No	Localised groundwater emergence may occur; however, no significant risk to the Proposed Development or surrounding receptors has been identified.
Sewers	Negligible	No	DCWW confirmed no recorded sewer flooding incidents or known public sewer flood risk within the area reviewed. No viable sewer flooding pathway to the Proposed Development infrastructure or surrounding receptors has been identified.
Drainage Infrastructure	Low to medium	Yes	Localised mapped flow routes intersect parts of the site.
Highway Drainage	Very Low	Yes	Existing forestry access tracks will be utilised where practicable, with drainage provided for new or upgraded access sections to ensure no

			increase in flood risk to the surrounding highway network or adjacent land.
Reservoir Flooding	Negligible	No	The Site lies outside the mapped reservoir inundation extent.
Canal Flooding	Negligible	No	No canals are located within or adjacent to the Site.

6 FLOOD RISK MANAGEMENT MEASURES

- 6.1.1. The following measures are proposed to ensure there is no increase in flood risk to the Proposed Development, surrounding land and existing flood risk receptors throughout the operational lifetime.

6.2 FLOOD RISK AVOIDANCE, MITIGATION AND RESILIENCE MEASURES

SURFACE WATER AND SMALL WATERCOURSES

- 6.2.1. The development is proposed, where practicable, to avoid areas identified as being at greatest risk from surface water and ordinary watercourse flooding. The layout has sought to minimise interaction with mapped drainage corridors whilst maintaining the existing hydrological catchments.
- 6.2.2. Where crossings of ordinary watercourses or mapped drainage corridors are required, these will be designed to maintain existing hydraulic connectivity and existing flow paths, ensuring flood risk to the Proposed Development and downstream receptors is not increased.

DRAINAGE INFRASTRUCTURE

- 6.2.3. Existing drainage infrastructure, including ordinary watercourses, drainage ditches and drainage features associated with the existing forestry access track network, will be retained wherever practicable. Where modifications are required for example where there are new watercourse crossings, drainage infrastructure will be designed to maintain the existing drainage regime and hydraulic connectivity.
- 6.2.4. Routine inspection and maintenance of the operational drainage infrastructure will ensure the drainage network continues to function effectively throughout the operational lifetime of the Proposed Development.
- 6.2.5. Surface water runoff generated by the Proposed Development will be managed in accordance with the Outline Drainage Statement (ODS), incorporating Sustainable Drainage Systems (SuDS) where appropriate. The drainage design will manage runoff in accordance with the SAB requirements and relevant Welsh Government climate change allowances to ensure there is no increase in flood risk to the Proposed Development, surrounding land or existing flood risk receptors. This is presented in Section 7 of this report.

HIGHWAY DRAINAGE

- 6.2.6. The Proposed Development will primarily utilise the existing forestry access track network, with localised upgrades and new sections of access track provided where required. Appropriate highway drainage measures will be incorporated where the Proposed Development interfaces with the public highway to ensure surface water runoff is appropriately managed.
- 6.2.7. The ODS has been developed to ensure runoff generated by the Proposed Development does not increase flood risk to the surrounding highway network, adjacent land or existing flood risk receptors during the operational phase.

6.3 SAFE ACCESS AND EGRESS

- 6.3.1. Throughout the operational lifetime of the Proposed Development, access will primarily be provided via the existing forestry access track network, with localised upgrades and new sections

incorporated where required. The use of existing access infrastructure minimises interaction with areas of identified flood risk.

- 6.3.2. Where access routes cross ordinary watercourses or localised surface water flow paths, appropriately designed crossings will maintain existing hydraulic connectivity and ensure flood risk to the access network is not increased.

7 OUTLINE DRAINAGE STATEMENT

- 7.1.1. The Proposed Development will introduce areas of impermeable surfacing associated with turbine foundations, crane hardstanding areas, the substation compound and access tracks. In the absence of mitigation, these features would increase both the rate and volume of surface water runoff, with potential downstream impacts on receiving watercourses.
- 7.1.2. This Outline Drainage Statement sets out the principles for managing surface water runoff generated by the Proposed Development in a sustainable manner, ensuring no increase in flood risk on-site or elsewhere, and maintaining existing hydrological conditions as far as practicable.
- 7.1.3. The need for sustainable surface water management is set out in TAN15, Statutory Standards for Sustainable Drainage Systems (SuDS)³⁴ and Defra Non-Statutory Technical Standards for Sustainable Drainage Systems³⁵.

7.2 DRAINAGE STRATEGY PRINCIPLES

- 7.2.1. As defined by Statutory Standards for Sustainable Drainage Systems (SuDS)¹⁰ there are two types of Standards. Standard S1 is a Hierarchy Standard while S2 to S6 are Fixed Standards. The Hierarchy Standard gives criteria for prioritising the choice of runoff destination. The Fixed Standards give design standards which state the minimum design criteria that all SuDS should satisfy, and standards which state how SuDS should be built, maintained and operated.
- 7.2.2. The ODS is provided as part of a local validation requirement and demonstrate how the Standards will be met in the site design. This is outlined in this section of report.

7.3 DRAINAGE HIERARCHY (STANDARD 1 - SURFACE WATER RUNOFF DESTINATION)

- 7.3.1. Statutory Standards for Sustainable Drainage Systems (SuDS) considers the following drainage hierarchy / priority level approach that should be used in drainage strategies:
 - Priority Level 1: Surface water runoff is collected for use;
 - Priority Level 2: Surface water runoff is infiltrated to ground;
 - Priority Level 3: Surface water runoff is discharged to a surface water body;
 - Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system; and
 - Priority Level 5: Surface water runoff is discharged to a combined sewer.

³⁴ Statutory Standards for Sustainable Drainage Systems (SuDS), Welsh Government, 2018
<https://www.gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf> (Accessed October 2024).

³⁵

Defra. 2015. Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems. (Online) Available from:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf (Accessed October 2024).

7.4 GROUND CONDITIONS AND INFILTRATION POTENTIAL

- 7.4.1. Based on available geological information, as discussed in Section 2.4, the site is underlain by superficial deposits comprising Devensian Till (Diamicton), which is typically cohesive, clay-rich and characterised by low permeability. These materials are generally associated with limited infiltration potential and a tendency to generate overland flow during rainfall events.
- 7.4.2. The underlying bedrock comprises a sequence of sandstones and mudstones associated with the Llynfi Member and South Wales Middle Coal Measures Formation. While sandstone units may exhibit some secondary permeability through fracturing, the presence of interbedded mudstones significantly restricts vertical permeability across the wider site. As a result, groundwater movement is expected to be limited and predominantly controlled by shallow soils and surface pathways rather than deep infiltration.
- 7.4.3. Published BGS borehole records indicate variable geological conditions across the Site. Within the southern array, the nearest borehole (SS88NE59), located approximately 570 m south of the site at a significantly lower elevation, records interbedded sandstone, siltstone, shale and thin coal seams associated with the South Wales Coal Measures. Historical boreholes within the northern array (SS89SE7, SS89SE8 and SS89SE9), located within the site boundary, similarly record sequences of sandstone, shale, fireclay and coal. The available BGS borehole records do not include published groundwater strike or groundwater level information.
- 7.4.4. This geological context indicates that, at a site-wide scale, infiltration is unlikely to represent a reliable primary drainage mechanism. However, due to potential variability in ground conditions, localised infiltration may be feasible in discrete areas, particularly where sandstone is closer to surface or where superficial deposits are thinner. The potential for infiltration-based SuDS will therefore be confirmed at detailed design stage following site investigation and BRE365 infiltration testing.
- 7.4.5. Isolated pockets of peat have been identified at in BGS mapping at the site and will be avoided through design. Given the sensitivity of peat to hydrological disturbance, the surface water drainage proposals have been developed to ensure that infiltration is not promoted in these areas and that existing drainage pathways are maintained to avoid peat degradation or instability. At the time of writing, detailed Phase 1 peat surveys have taken place on site (see **Appendix 11B: Phase 1 Soil and Peat Survey Report**). These show little interaction between site infrastructure and potential areas of peat and peaty soils, and no peat soils were identified on site. The drainage proposals are therefore considered unlikely to impact existing peat on site and hydrological process associated.
- 7.4.6. However, some 'Zones of Interest' were identified within the Northern Array within the vicinity of the track, which may require additional detailed surveys. These Zones of Interest are areas identified for further assessment, where soils have been classified as peaty soils, or where the presence of organic-rich soils has been inferred based on the results of the surveys. Based on this, the drainage design may be adjusted pending the outcomes of any further site specific peat surveys, or any adjustments to the layout as a result of any additional identified areas of peat.
- 7.4.7. Based on the impermeable geology and peat presence in some small areas of the site, infiltration is therefore not recommended as a means for surface water disposal. Surface water runoff is currently expected to naturally be conveyed via shallow overland flow routes and existing drainage features, and therefore surface water drainage into the local watercourse networks is deemed the most practical and natural solution for the site. The proximity of the watercourses and the local

topography support a gravity-fed connection from all drained areas at greenfield runoff rates, eliminating the need for pumping.

- 7.4.8. Given the upland nature of the site, the presence of multiple drainage catchments and the distributed nature of the Proposed Development, a decentralised drainage approach will be adopted. Surface water runoff will be managed locally within each catchment and discharged to the nearest receiving watercourse, ensuring that flows remain within their existing hydrological regime.
- 7.4.9. A watershed catchment analysis has been carried out for the site using LiDAR data. Based on the Proposed Development layout, the site can be four principal catchments:
- Afon Garw.
 - Nant Cwm-du.
 - Nant Cedfyw.
 - Nant Gwyn Bach.
- 7.4.10. Nant Selsig Basin and Afon Afan Basin are large basins to the north of the arrays, which largely contain the forestry access track.
- 7.4.11. The above catchments are shown in **Annex 10A.E**, in relation to the Proposed Development, along with other minor catchments identified within the site vicinity.
- 7.4.12. As part of the ODS design, all water should mimic existing conditions and therefore should remain within the same basin and catchment as it is currently wherever possible. This will ensure that peat conditions and water supplies to peat basins will remain consistent. This also ensures water quantity to any watercourse and/or Private Water Supplies will remain unaffected.
- 7.4.13. All runoff generated within each catchment will therefore be retained and discharged within that same catchment. This approach ensures that baseline hydrological connectivity is maintained and that there is no artificial transfer of flows between catchments, maintaining and mimicking existing conditions.

7.5 GREENFIELD RUNOFF AND CATCHMENT-BASED ASSESSMENT

- 7.5.1. The site is almost entirely greenfield, with the presence of some existing surfaced access tracks. Existing greenfield rates of surface water runoff should be maintained in future via the provision of appropriate SuDS.
- 7.5.2. Estimations of existing peak flows have been calculated using the UK SuDS website³⁶ and their greenfield runoff rate estimation, utilising the FEH-2022-point rainfall data³⁷. This has initially been done for 1ha. The results are summarised in **Table 7-1**, and in **Annex 10A.F**.

Table 7-1 - Existing Greenfield Runoff Rates

Parameter	Value
Area	1 ha / 0.01km ²

³⁶ <https://www.uksuds.com/tools/members/greenfield-runoff-rate-estimation-members>

³⁷ <https://fehweb.ceh.ac.uk/Map>

Parameter	Value
BFIHOST	0.369
BFIHOST19scaled	0.273
SAAR9120 (Standard Annual Average Rainfall 1991-2020)	2414mm
Greenfield Runoff Rates	Value
Q _{BAR} (1 in 2 year)	30.8 l/s/ha
1 in 1 year	27.1 l/s/ha
1 in 30 year	54.9 l/s/ha
1 in 100 year	67.2 l/s/ha

- 7.5.3. The greenfield rate for 1ha can then be scaled up to reflect the relevant hardstanding area within each catchment. This ODS only considers proposed new hardstanding area, rather than the wider entire Site boundary. The existing greenfield areas that will remain unaltered are therefore excluded from any further calculations. It is also considered that greenfield areas upslope from proposed works would naturally be intercepted without requirement for consideration within attenuation calculations.

7.6 STORAGE ESTIMATIONS (STANDARD 2 – SURFACE WATER RUNOFF HYDRAULIC CONTROL)

- 7.6.1. The creation of new hardstanding surfaces associated with the buildings, foundations and crane pads within the Proposed Development area has the potential to increase surface water runoff rates, volumes and pathways. Appropriate management of surface water will therefore be necessary to ensure risks on-site and off-site (down-gradient) third party receptors are appropriately addressed. Since post-development runoff flows will be restricted, on site attenuation will be required.
- 7.6.2. The storage estimations supporting this ODS have considered the 1% AEP (1 in 100-year) event as the design standard, including allowances for climate change of 40% covering the lifetime of the Proposed Development.
- 7.6.3. As noted previously, the Proposed Development has been divided into principal catchment-based drainage areas corresponding to the Nant Cwm du, Nant Cedfyw and Nant Gwyn Bach catchments, with each catchment discharged at its relevant greenfield rate. Storage will therefore be required in each catchment.
- 7.6.4. The level of new hardstanding area for each catchment will dictate the greenfield runoff rate calculated and the level of storage required. This has been calculated based on the below factors:
- The total area of hardstanding at each turbine location including the turbine foundations and the crane pad will be to the turbine manufacturer's requirements, approximately 2,200m².
 - The internal access tracks would comprise of newly formed stoned tracks. The track construction will be approximately (~) 5m wide. At this stage all array tracks have been considered as new hardstanding tracks for the purposes of this report and for a 'worst case' scenario. An

assessment of the Forestry access track outside of the arrays has not been undertaken at this stage as the design is yet to be determined.

- The substation buildings (approximately 14m x 10m each) would be single storey buildings which will house metering, protection and control equipment, storage and welfare facilities. The substation buildings would be traditional blockwork construction and faced in stone with a slate roof.

- 7.6.5. In the Northern Array, three turbines and associated access tracks are shown to be within the Nant Cwm-du catchment; therefore, surface water management for the Northern Array will be implemented within this particular catchment. The compound and substation, along with T1 will be considered within Nant Gwyn Bach catchment, along with the adjacent access track. Although some of the compound is outside the catchment it is considered the closest and most suitable discharge route. LiDAR data suggests discharge will potentially be available close to the access track where a natural channel can be seen.
- 7.6.6. At the Southern Array, T5 and T6 along with the compound and access tracks will discharge to the Nant Cedfyw to the south. T8 and T7 are located slightly outside the catchment and will discharge to the Cwm-du basin via small channels that appear to be located to the south of the turbines.
- 7.6.7. The catchments and elements are shown in Annex 10A.G.
- 7.6.8. The characteristics within each catchment have then been used to calculate the greenfield runoff rate, using the hardstanding factors noted above. The calculations have used FEH data and HR Wallingford website³¹. The calculations are shown in **Table 7-2**.

Table 7-2 - Catchment-Based Impermeable Area and Discharge Rates

Catchment	Included aspects	Impermeable Area (m ²)	Total Area (ha)	Greenfield Runoff Rate (l/s)
Gwyn Bach (Northern Array)	▪ One Turbine ▪ 900m New Track ▪ Construction Compound ▪ Substation	▪ 2,200 ▪ 4,500 ▪ 8,000 ▪ 1,300	16,000m ² (1.6ha)	30.8 x 1.6 = <u>49.3 l/s</u>
Cwm-du, (Northern Array)	▪ Three Turbines ▪ 1300m New Track	▪ 6,600 ▪ 6,500	13,100m ² (1.31ha)	30.8 x 1.31 = <u>40.4 l/s</u>
Cwm-du (Southern Array)	▪ Two Turbines ▪ 650m New Track	▪ 4,400 ▪ 3,250	7,650 m ² (0.77ha)	30.8 x 0.77 = <u>23.7 l/s</u>
Cedfyw (Southern Array)	▪ Two Turbines ▪ 1400m New Track ▪ Construction Compound ▪ Substation	▪ 4,400 ▪ 7,000 ▪ 4,500 ▪ 1,300	17,200m ² (1.72ha)	30.8 x 1.72 = <u>53.0 l/s</u>

- 7.6.11. The proposed attenuation features will use soft-engineering approaches to flow control rather than use any proprietary systems. The estimated storage will be achieved within the site boundary and

mostly will be distributed along access tracks in form of swales and attenuation basins as outlined further in this ODS. The indicative proposed SuDS solutions for each design element are **Annex 10A.G**.

- 7.6.12. Wherever possible, considerations for temporary drainage solutions during the construction phase will take account of the proposed drainage arrangements for the operational phase. This could allow for the drainage network to be reused where needed and reduce the impact to existing site conditions. Details of construction stage drainage are provided in the Outline CEMP Proposed Development in compliance with local authority requirements.
- 7.6.13. Following the above confirmation of discharge rates, the volume of storage can be estimated. The storage estimations were undertaken HR Wallingford website Storage Estimation Tool³⁸ and results are provided in **Annex 10A.G**. Details are summarised in **Table 7-3** below:

Table 7-3 – Storage Volume Estimations (Causeway Flow)

Catchment	Area	Greenfield Q_{BAR} Rate (l/s)	Indicative Storage Volume Required for 100 Year Plus 40% CC (m³)
Gwyn Bach (Northern Array)	16,000m ² (1.6ha)	<u>49.3 l/s</u>	1,494
Cwm-du, (Northern Array)	13,100m ² (1.31ha)	<u>40.4 l/s</u>	1,214
Cwm-du (Southern Array)	7,650 m ² (0.77ha)	<u>23.7 l/s</u>	705
Cedfyw (Southern Array)	17,200m ² (1.72ha)	<u>53.0 l/s</u>	1,609

- 7.6.14. These volumes likely represent a conservative estimate based on a precautionary assessment in excess of the actual impermeable area likely to be constructed at the site.
- 7.6.15. Following the above each aspect of the Proposed Development will be treated suitably within its catchment. The proposed approach for each element is set out in the following sections.

TURBINES

- 7.6.16. Each turbine location will comprise a hardstanding area of approximately 2,200m², which will generate increased runoff compared to baseline conditions.

³⁸ <https://www.uksuds.com/tools/members/surface-water-storage-volume-estimation-member>

- 7.6.17. Runoff from turbine hardstanding areas will be intercepted at source using filter drains or swales located downslope of each turbine. These features will provide initial water quality treatment and convey flows to localised attenuation features before discharge to the nearest open watercourse.
- 7.6.18. Where required, additional attenuation will be provided through shallow detention basins, swales with check dams, or extended filter drain systems positioned adjacent to access tracks leading to these turbines. These features will be designed to:
- attenuate flows to greenfield rates;
 - reduce flow velocities; and
 - promote sediment settlement.
- 7.6.19. SuDS features will be located outside of peat areas and positioned to allow maintenance access via the proposed track network.
- 7.6.20. Water will be conveyed from each turbine to the local catchment discharge point into the relevant watercourse. Conveyance will be via filter drains or swales adjacent to proposed tracks.

SUBSTATION COMPOUND

- 7.6.21. The substation compounds will comprise both impermeable and permeable surfaces, including the control building and transformer infrastructure where required.
- 7.6.22. Surface water runoff will be managed through a combination of:
- filter drains;
 - controlled swales; and
 - localised features such as attenuation basins.
- 7.6.23. Where required, the drainage system will incorporate pollution control measures, including bunding, oil interceptors and controlled discharge systems to manage runoff from high-risk areas.
- 7.6.24. In addition, provision will be made for containment of firewater runoff in the event of an emergency, with appropriate control mechanisms (e.g. penstock valves) to prevent uncontrolled discharge to the environment.
- 7.6.25. A temporary compound is included within proposed construction phase plans which require temporary drainage measures. These measures are included within the Outline CEMP for the Proposed Development to account for potential temporary increases in surface water flows.
- 7.6.26. As above, once collected water will then be conveyed to the local catchment discharge point into the relevant watercourse. Conveyance will be via filter drains or swales adjacent to proposed tracks.

ACCESS TRACKS

- 7.6.27. Approximately 9.4km of access tracks would be required for the Proposed Development, including approximately 5.3km of upgraded tracks and 4.1km of new access tracks. Further details of the tracks and the drainage provisions would be ascertained during the detailed drainage design stage.

- 7.6.28. Of the 9.4km, around 4.5 km of access tracks will be constructed within the array. While some of this will be in the form of reused or upgraded tracks, they are considered to consist of entirely new sections for the purpose of this report.
- 7.6.29. The tracks will be surfaced with compacted stone and will not form fully impermeable surfaces; however, they are expected to generate runoff during rainfall events due to compaction and gradient. New access tracks will be considered entirely hardstanding and impermeable for the purposes of this report to consider a worst case scenario. Further refinements can be made at detailed design stage and the SAB officer's recommendations at pre-SAB stage.
- 7.6.30. As noted above, drainage would be located alongside access tracks to accommodate any excess surface water runoff from track surfaces, while also acting to convey water from turbines and substations. Open channels will be installed on the downslope of the tracks and fitted with check dams where required to manage runoff from the tracks. These channels can be combined with wider site drainage SuDS features such as swales, offline attenuation basins, filter drains, where required, to collectively help attenuate, treat and drain runoff from the tracks.
- 7.6.31. Where permitted by topography, break out channels could be installed to facilitate the discharge of any excess flows over vegetated areas. Suitably sized cross drains would be installed below new tracks ensure the continued conveyance of surface water to downslope area.
- 7.6.32. Track gradients will be limited to less than 8%, which will assist in controlling runoff velocities and reducing erosion risk. However, it is expected that gradients will vary across the Proposed Development site, therefore it will be necessary to use check dams within the channels to slow down the flows to mitigate risk of erosion.

7.7 SUDS COMPONENTS

- 7.7.1. The following SuDS components are anticipated to form part of the drainage network:
- Swales and vegetated channels.
 - Filter drains.
 - Check dams.
 - Attenuation basins.
 - Overland flow breakout areas.
- 7.7.2. These features will be distributed across the site and designed to integrate with the natural topography and drainage regime.
- 7.7.3. Following conveyance within swales/ filter drains adjacent to tracks, it is proposed that ditches may be utilised to further convey water to the nearest suitable channel to allow for an onwards connection into the wider watercourse network. Further surveys of topography and channel conditions may be required to ascertain suitable locations for ditches and final discharge locations.
- 7.7.4. Potential basin locations have been indicated on a conceptual drainage strategy layout sketch drawing in **Annex 10A.H**. The location and sizing are, at this stage, indicative and demonstrates the feasibility of managing surface water runoff rates in line with the SAB requirements.
- 7.7.5. The concept sketch shows basins located near the end of potential catchment drainage layouts and are indicatively sized to store the maximum storage required within each catchment at a depth of

1m, although the actual sizing is likely to be reduced following further assessment and design of storage available within conveyance features such as swales. Based on the site boundary size, and the greenfield nature of the site, the inclusion of basins and space requirements are not considered to be an issue.

7.8 STANDARD 3 – WATER QUALITY

ASSESSMENT OF THE POLLUTION HAZARD LEVEL

- 7.8.1. The SuDS Manual (CIRIA C753, November 2015) sets out a common approach to managing the quality of surface water runoff. It describes risks posed by surface water runoff to the receiving environment as a function of:
- The pollution hazard at a particular site (i.e. the pollution source);
 - The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels (i.e. the pollutant pathway); and
 - The sensitivity of the receiving environment (the environment receptor).
- 7.8.2. The simple index approach assesses SuDS components to determine whether selected arrangements of SuDS components and corresponding treatment trains provide a total pollution mitigation index at least equal to, or greater than, the pollution hazard index.
- 7.8.3. The proposed land uses requiring surface water drainage to discharge to watercourse network are as follows:
- Roof areas of buildings;
 - Roads (access tracks and internal tracks) and vehicle turning points;
 - Wind turbine hardstanding areas;
 - 2 no. substation compounds (one for each array)
- 7.8.4. Table 26.2 of the SuDS Manual assigns pollution hazard indices for different land use classification, which is presented below.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

- 7.8.5. Within the site, it is assumed that the access roads can be categorised as “Low Traffic Roads (General Access Roads)” according to **Table 26.2**, as they would have fewer than 300 traffic movements. Therefore, pollution hazard level of this catchment is classified as Low. It is not anticipated that any heavy pollution or significant oil/hydrocarbon content will be present on site from this aspect.
- 7.8.6. The roof of the onsite building will be considered as “Other Roofs” and therefore has a **Low** pollution hazard level.
- 7.8.7. The wind turbines are assumed to have little traffic and no storage of equipment/ chemicals and therefore can be conservatively also classed as a “Low Traffic Road”, with a **Low** pollution hazard.
- 7.8.8. The substation compound could be considered as an “industrial sites” with **High** pollution hazard. At this stage there is little information available on the type of the electrical components proposed for the substation. As a worst case scenario, it has been assumed to comprise of oil filled transformers where potential leaks to the water environment are possible. In general, these transformers are designed and operated to meet stringent environmental standards relating to the detection and containment of oil and hydrocarbon spillages at source. These include housing the transformers in bunds with automatic penstock and shut off valves when there are oil/hydrocarbon spillages. These transformers are fitted to downstream oil interceptors which further help improve the surface water runoff quality. In addition to regular inspections and maintenance, sensors help to monitor and detect issues with these units and raise alarms for operator attendance where needed.

- 7.8.9. Table 26.3 of SuDS Manual C753 gives the mitigation indices that refer to performance in pollutant removal by different treatment options / SuDS features. Those are outlined in **Table 7-4** below.
- 7.8.10. The mitigation indices stated in Table 26.3 of the SuDS Manual are halved for any interventions after the primary SuDS element, as required by the SuDS Manual.

Table 7-4 – Pollution Control Performance of SuDS Components

	Description	Pollution Hazard Level	Pollution Mitigation Indices		
			Total Suspended Solids (TSS)	Metals	Hydrocarbons
Land use pollution hazard index* for Access tracks and Wind turbine	Non-residential car parking with infrequent changes i.e. < 300 traffic movements/day	Low	0.5 (minimum)	0.4 (minimum)	0.4 (minimum)
SuDS component – Access tracks and wind turbines	Swale, filter drains, attenuation basins	-	0.5	0.6	0.6
Sufficient mitigation?		-	Sufficient	Sufficient	Sufficient
Land use pollution hazard index* for Substation compound	Industrial site	High	0.8	0.8	0.9
	Oil containment and interceptors*	-	0.8*	0.8*	0.8*
Secondary component *0.5	Swale (and possible filter drains, attenuation basins)		0.25	0.3	0.3
Sufficient mitigation?		-	Sufficient	Sufficient	Sufficient

*Assumed ACO QuadraCeptor proprietary treatment unit or other oil interceptors with similar mitigation indices/specifications

7.9 STANDARD 4 – AMENITY

- 7.9.1. As parts of the Site will comprise of high voltage electrical transmission facilities, the site and substation are proposed for industrial end uses and will be unmanned. There is no intention to enhance the amenity value of these parts of the Site in order to maintain the high security character of the site.

- 7.9.2. The swales and basins in the wider parts of the site will create opportunities for seasonal water features, which contribute to the aesthetic and environmental value of the Site, supporting both hydrological function and public amenity.

7.10 STANDARD 5 – BIODIVERSITY

- 7.10.1. The proposed SuDS features, including swales and detention basins in the wider areas of the Site will be designed to fulfil SAB requirements for biodiversity benefits. These features will create varied habitats that support a range of flora and fauna, enhancing local biodiversity. The naturalised areas around swales and attenuation basins will provide suitable environments for native plant species, attracting pollinators, amphibians and other wildlife. By integrating these biodiverse habitats, the SuDS will not only contribute to ecological resilience but also support the wider site's overall environmental value. These biodiversity elements of the drainage systems will be developed in collaboration with the landscape architects and ecologists.

7.11 EXCEEDANCE AND OVERLAND FLOW

- 7.11.1. The drainage system will be designed to accommodate rainfall events up to the 1 in 100-year event plus climate change.
- 7.11.2. Flows exceeding this capacity will be managed through overland exceedance routes, which will follow existing topographic flow paths and direct water away from infrastructure and sensitive areas. It is considered that any flows exceeding the drainage capacity will be no worse than current exceedance surface run off for previous events.
- 7.11.3. The use of shallow, distributed SuDS features ensures that exceedance flows can be safely conveyed without significant risk of damage or erosion.
- 7.11.4. Given the wide extents of the Northern Array and Southern Array, any exceedance from the Proposed Development beyond the design capacity of the drainage features will be managed within the extents of the site boundary with no impacts to third parties.

7.12 STANDARD 6 – DESIGN OF DRAINAGE FOR CONSTRUCTION, OPERATION AND MAINTENANCE

CONSTRUCTION

- 7.12.1. Calculations of potential surface water attenuation volume requirements, and conceptual assessment of indicative locations for SuDS implementation have been carried out for the operational phase of the Proposed Development to inform future final design plans. Consideration of surface water drainage during construction works are set out within the Outline CEMP and are not considered further in this report.
- 7.12.2. Details of surface water drainage design including hydraulic calculations and construction details will be provided at detailed design to support the full SAB approval.
- 7.12.3. Where practicable, permanent drainage infrastructure will be installed early in the construction programme to reduce disturbance and minimise reworking.

OPERATION AND MAINTENANCE

General Requirements

- 7.12.4. Regular inspection and maintenance are required to ensure the effective long-term operation of SuDS and the drainage network, including filter drains, pipework, chambers and associated flow control components. These requirements are detailed in the SuDS Manual C753. A SuDS maintenance inspection checklist in accordance with the SuDS Manual is provided in Annex 10A.I.
- 7.12.5. The surface water drainage network and any SuDS features maintenance will be confirmed at the SAB stage.
- 7.12.6. Maintenance activities will be made available in the site-specific Operation and Maintenance (O&M) Manual to ensure adequate maintenance is provided during its lifetime.
- 7.12.7. Access provision for maintenance will be made available at all times to the appointed contractor.

GENERAL MAINTENANCE OF DRAINAGE NETWORK ELEMENTS

Pipes and pipework

- Routine inspection to identify blockages, siltation, root ingress, structural defects or misconnections.
- Cleaning of pipework using water jetting or vacuum techniques where silt or debris accumulation is observed.
- Removal of obstructions to maintain hydraulic capacity and prevent surcharging.
- Repair or replacement of damaged pipe sections where defects are identified.
- Verification that gradients, joints and connections remain intact and operational.

Manholes and inspection chambers

- Visual inspection from ground level to check for debris, sediment build-up, standing water or signs of surcharge.
- Inspection of covers, frames and locking mechanisms to ensure safe and secure access.
- Cleaning of chambers where sediment accumulation is identified, by competent contractors.
- Monitoring for structural damage, infiltration or leakage.
- Confined space entry will be avoided unless undertaken by suitably qualified personnel.

Catch pits / catchpits / silt traps

- Regular inspection for accumulation of silt, debris, oils or floating material.
- Emptying and cleaning using vacuumation or jetting to maintain sediment storage capacity.
- Reinstatement of silt buckets or sumps following cleaning.
- Increased inspection frequency following heavy rainfall events.
- Safe disposal of removed material in accordance with waste regulations.

Gullies, channels and surface drainage features

- Removal of debris, litter and leaf fall from inlets and gratings.
- Flushing or jetting of gullies and channels to prevent blockage.
- Inspection of gratings, joints and concrete surrounds for damage or misalignment.

- Repair or replacement of damaged components as required.
- Monitoring for evidence of ponding or reduced conveyance.

Flow control devices and attenuation controls

- Routine inspection to ensure devices are free from silt, debris and obstructions.
- Cleaning of flow control units to maintain design discharge rates.
- Inspection of chambers housing flow controls for sediment accumulation.
- Repair or replacement of damaged or malfunctioning components.

GENERAL MAINTENANCE OF SUDS ELEMENTS

Maintenance requirements for swales

- 7.12.8. The general maintenance obligations associated with swales are included in Table 17.1 of the SuDS Manual. They include regular surface inspections for silting, removal of litter and managing vegetation and the inspection of inlets, outlets and overflows for silting/blockages.

Maintenance requirements for proprietary treatment systems

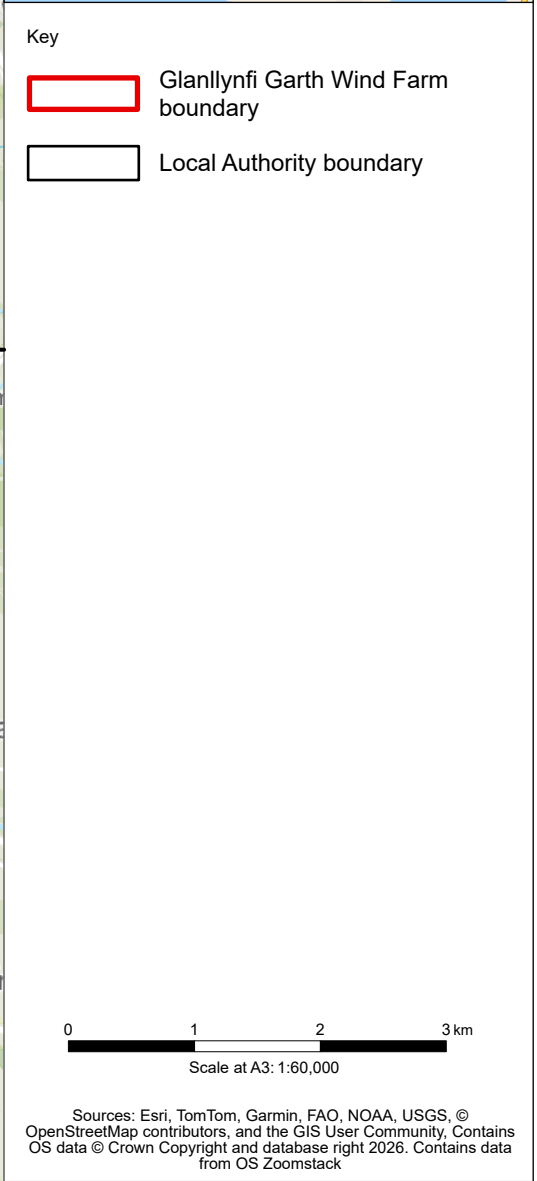
- 7.12.9. The general maintenance obligations associated with the proposed proprietary treatment systems (e.g. oil separators, filtration systems, penstock valves and flow controls) are included in Table 14.2 of the SuDS Manual. They will include the following activities:
- Routine inspection of inlets, outlets, chambers and internal components for blockages, sediment accumulation, oil build-up, damage or reduced performance.
 - Removal of litter, debris, silt, oil, grease and other retained materials.
 - Replacement or cleaning of filter media where provided.
 - Confirmation that moving parts, shut-off devices, valves and flow controls remain operational.
 - Regular testing of alarm systems, automatic shut-off devices or penstocks, where fitted, with prompt rectification of any defects.
 - Removal and disposal of maintenance wastes by an appropriately licensed contractor.
 - Maintenance in accordance with the manufacturer's recommendations.
- 7.12.10. In addition to the general maintenance requirements set out in the SuDS Manual, all proposed SuDS components will be inspected and maintained in accordance with the relevant manufacturer's recommendations, where applicable.

8 CONCLUSIONS

- 8.1.1. This report has assessed the potential risk of flooding to and from the Proposed Development during its operational lifetime, taking account of all relevant sources of flooding, including historical flooding, surface water and ordinary watercourses, fluvial, coastal, groundwater, sewers, drainage infrastructure, highway drainage, reservoirs and canals.
- 8.1.2. The assessment concludes that the majority of the site is located within fluvial Flood Zone 1 and is generally at **low risk** of flooding. The main flood risk to the Proposed Development and surrounding receptors arises from localised surface water flow routes and ordinary watercourses. These pathways have been considered within the site layout, with infrastructure located outside higher risk areas where practicable. Where crossings are required, appropriate drainage design will maintain existing hydraulic connectivity and minimise changes to the existing drainage regime.
- 8.1.3. Flood risk from all other sources, including fluvial, coastal, groundwater, public sewers, reservoirs and canals, is considered to be **very low or negligible** and is not anticipated to pose a significant constraint to the Proposed Development or increase flood risk to surrounding receptors.
- 8.1.4. The ODS has demonstrated that the increase in surface water runoff due to the Proposed Development can be managed on site by mimicking the existing surface water drainage regime and in compliance with the SAB requirements. The SUDS features will be finalised following the Pre-SAB response during the detail design phase.
- 8.1.5. The FCA and ODS should therefore be considered by the Planning Authority as sufficient for the purposes of supporting this Proposed Development.

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Annex 10A.A- Site Plans



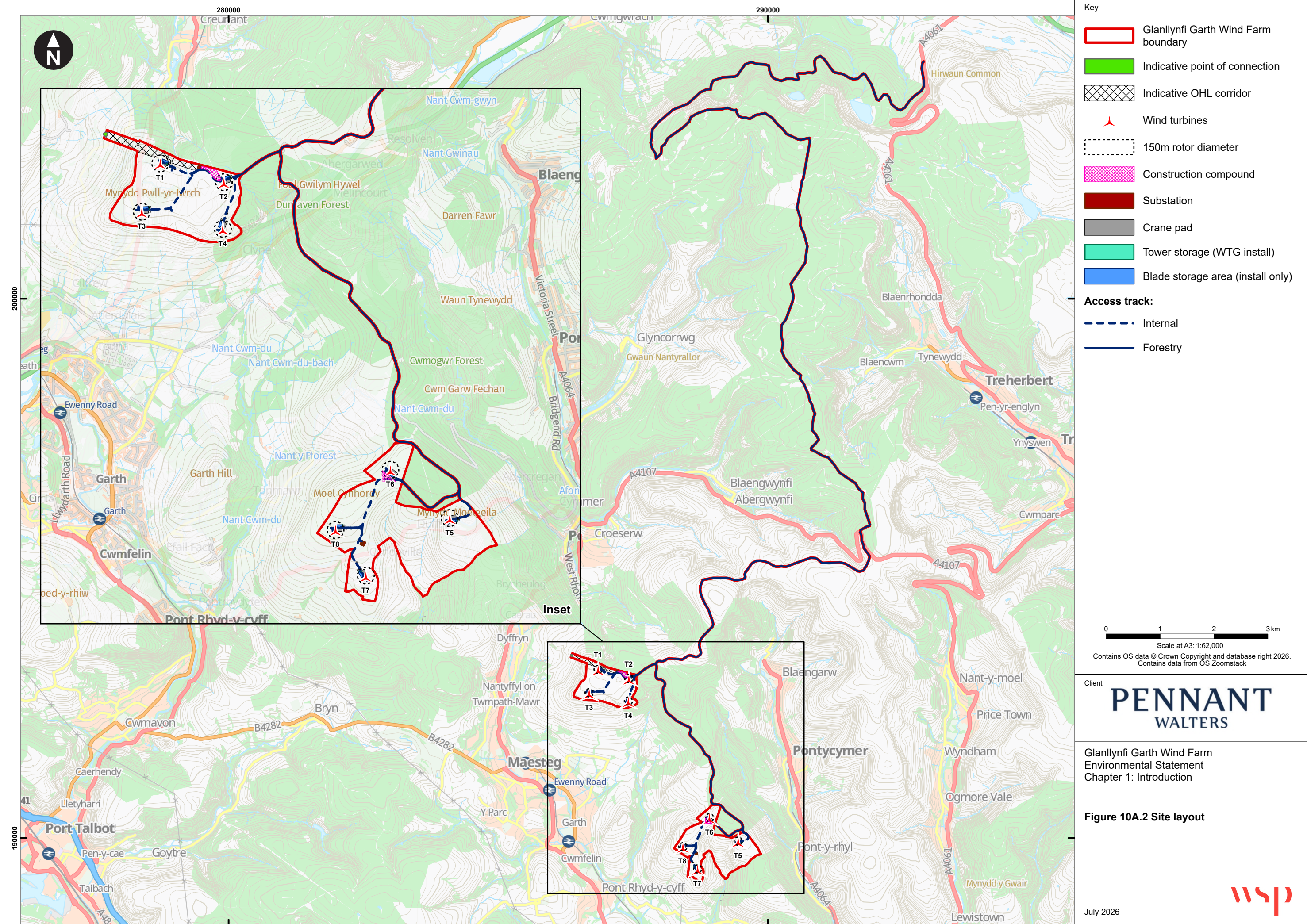
Glanllynfi Garth Wind Farm
Environmental Statement
Chapter 1: Introduction

Figure 10A.1 Site location

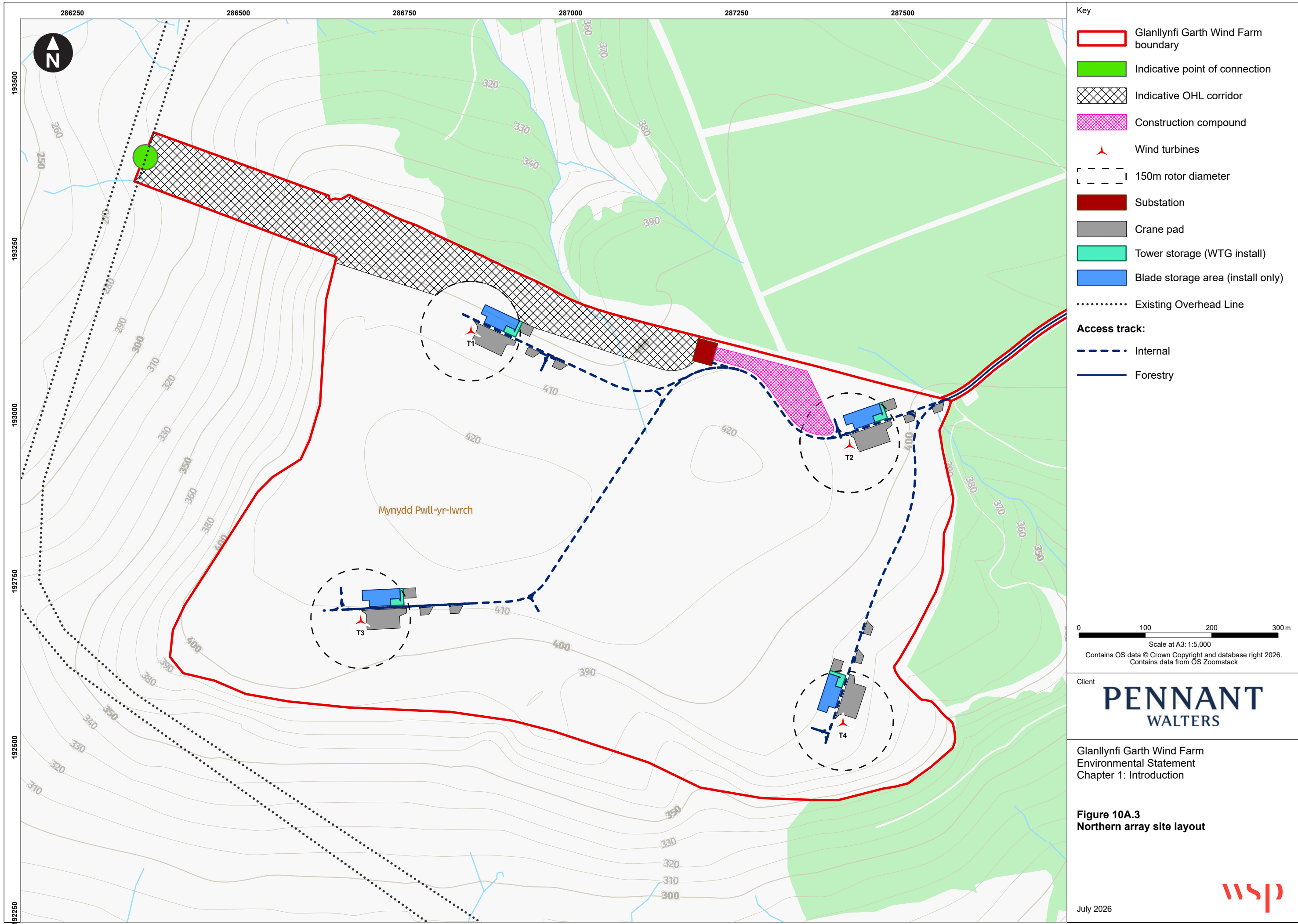
June 2026

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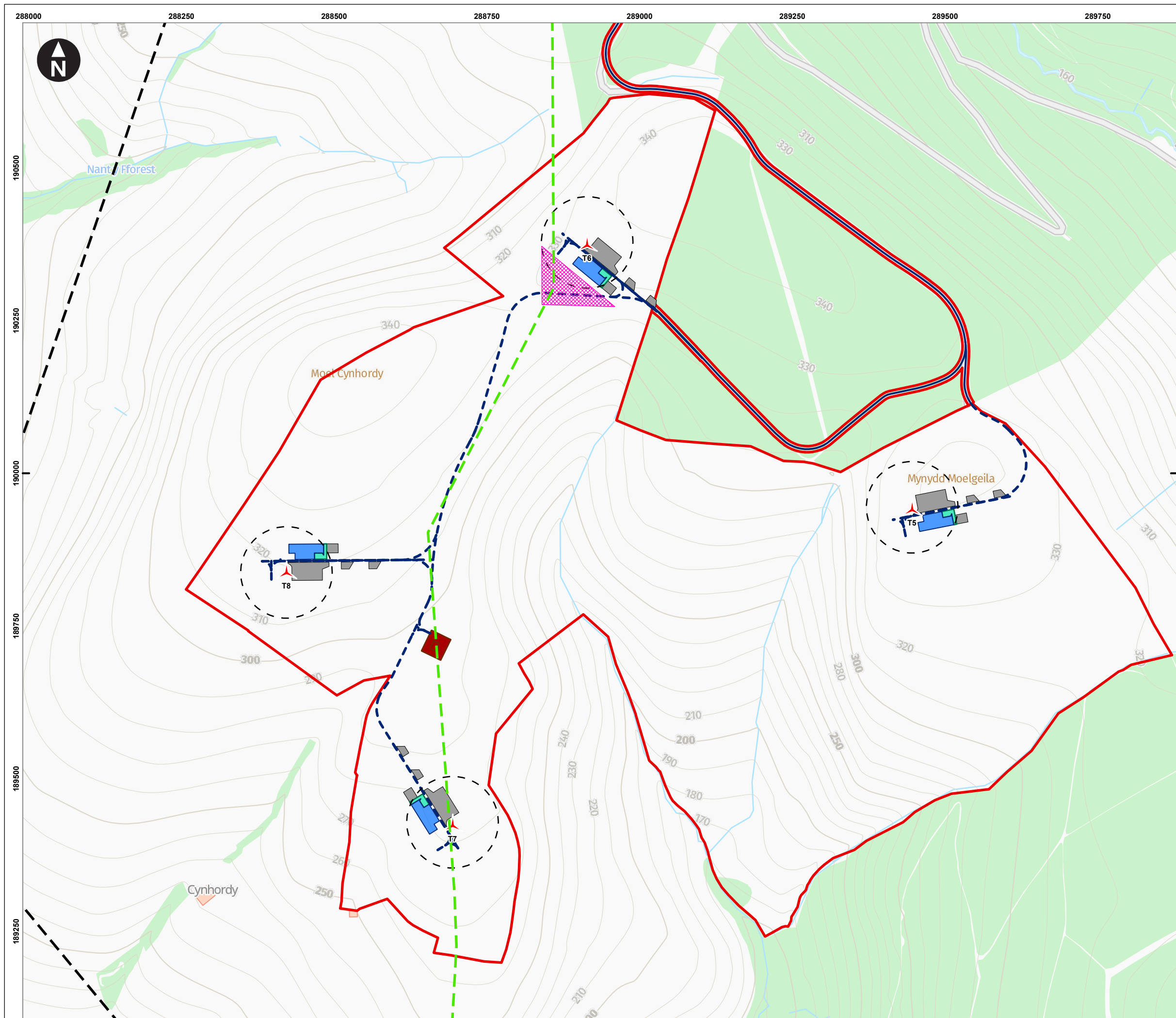
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Key

- Glanllynfi Garth Wind Farm boundary
- Construction compound
- Existing Overhead Line
- Existing Overhead Line (Indicative point of connection)
- 150m rotor diameter
- Wind turbines
- Substation
- Crane pad
- Tower storage (WTG install)
- Blade storage area (install only)

Access track:

- Internal
- Forestry

0 100 200 300 m

Scale at A3: 1:6,000

Contains OS data © Crown Copyright and database right 2026.
Contains data from OS Zoomstack

Client

**PENNANT
WALTERS**

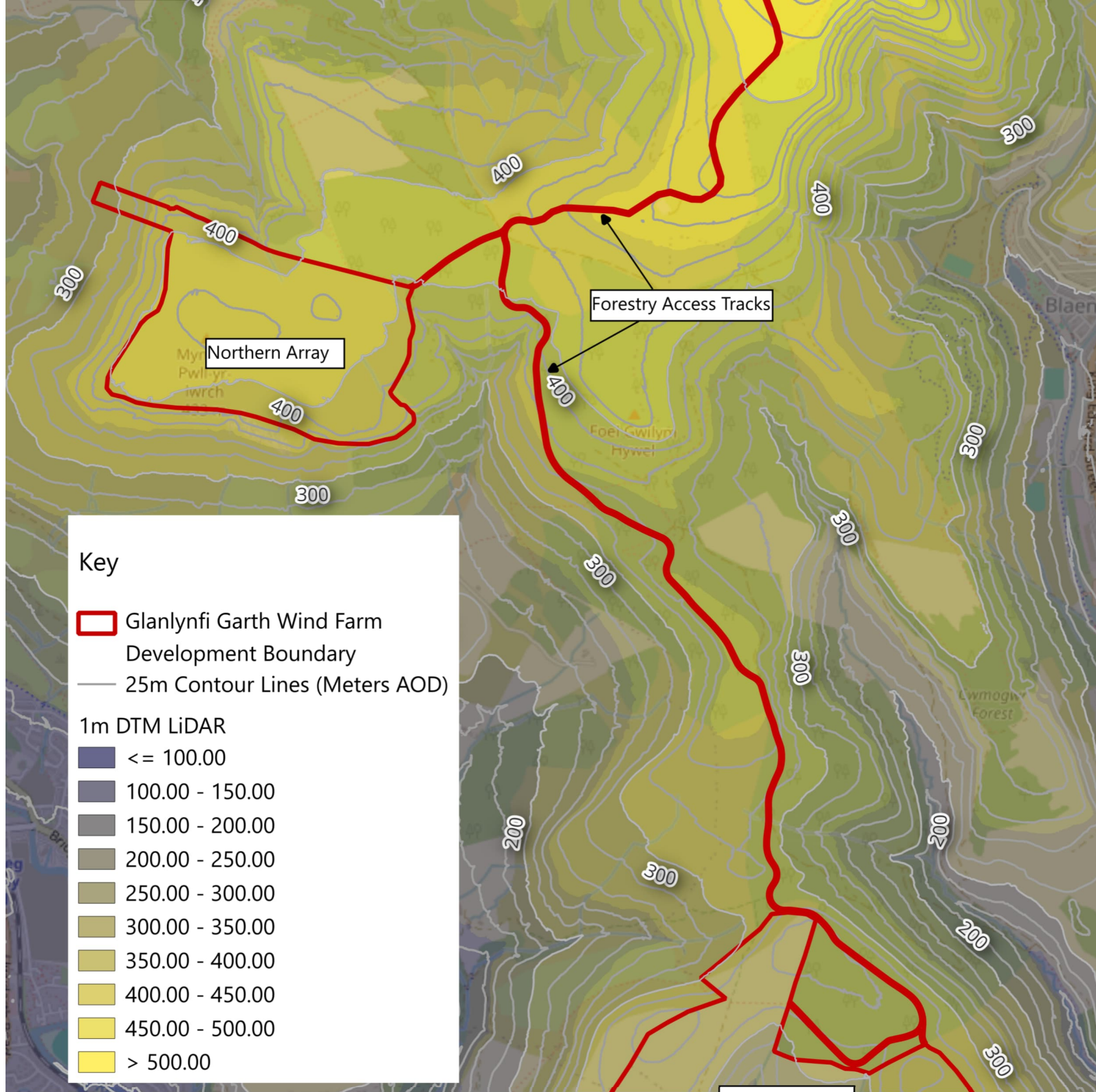
Glanllynfi Garth Wind Farm
Environmental Statement
Chapter 1: Introduction

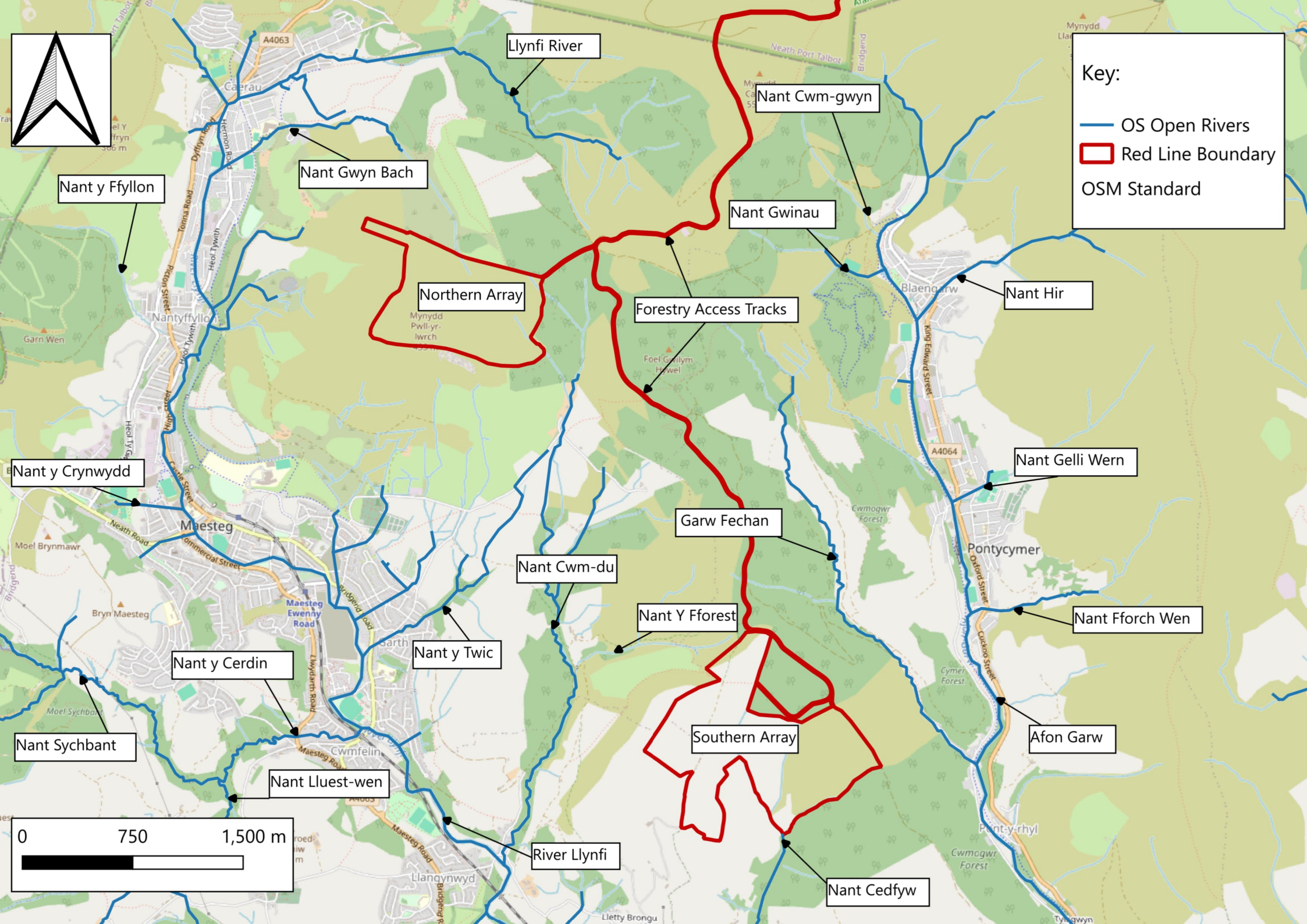
Figure 10A.4
Southern array site layout

July 2026

wsp

Annex 10A.B– Site Setting and Watercourses





Annex 10A.C

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Consultation Response



EIR/2839/2026 Response

From Environmental Information Requests <EnvironmentalInformationRequests@dwrcymru.com>

Date Wed 08/07/2026 15:15

To Lloyd, Jack <Jack.Lloyd@wsp.com>

Our Reference: EIR/2839/2026

Dear Jack Lloyd,

Request for information

We write further to your request for information dated 4th June 2026, which we have been considering under the Environmental Information Regulations 2004.

We can confirm that Dŵr Cymru Welsh Water does hold the information you have requested as follows:

To assist with preparation of the Flood Consequence Assessment, we would be grateful if Dwr Cymru Welsh Water could provide any available information relating to:

- 1. Are there any records of historic flooding associated with public sewers or Dwr Cymru Welsh Water Assets within 500m of the red line boundary?**

We have checked the searches in this request and can confirm we have zero records of flooding incidents in the area requested and therefore no flood risks associated or planned for this area.

- 2. Are there any records of any assets within the red line boundary that may be affected by the proposed development?**

Plans showing the extent of any assets in the area is a chargeable service provided by our Planned Sales Team within Developer Services. Please visit our website via the following links to complete the online requests:

[Maps of water mains and sewers | Dŵr Cymru Welsh Water](#)
[Pre-planning | Dŵr Cymru Welsh Water](#)

- 3. Are there any easement requirements associated with existing DCWW assets within the red line boundary?**

From the information provided there appear to be no assets within the red line boundary of the plan provided, so there are no easements recorded.

- 4. Are there any known drainage constraints, capacity issues or infrastructure limitations that may affect the proposed development?**

We have had no reports of drainage constraints, capacity issues or infrastructure limitations that may affect the proposed development.

- 5. Are there any planned infrastructure upgrades, maintenance works or drainage improvement schemes within 500m of the red line boundary?**

In respect of the 500m and specified grid references provided there are no recorded DCWW BGA assets in the vicinity. We also do not have any improvement schemes as part of DWMP Cycle 1 within the specified area.

- 6. Details of any existing or proposed sewer flood risk management schemes?**

We do not hold any sewer flood risk management schemes from DWMP Cycle 1. As part of DWMP cycle 2 we will be undertaking a sewer flood risk assessment. This is currently ongoing and do not have the results to share at this time.

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

If you are dissatisfied with the handling of your request, you have the right to request an internal review. Internal review requests should be submitted within 40 working days of the date of receipt of this response, either by emailing EnvironmentalInformationRequests@dwrcymru.com or by writing to the Environmental Information Requests team at Linea, Fortran Road, St Mellons, Cardiff CF3 0LT.

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

Yours faithfully,

Dŵr Cymru Welsh Water

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EIR/2839/2026 Acknowledgement

From Environmental Information Requests <EnvironmentalInformationRequests@dwrcymru.com>

Date Sat 06/06/2026 19:11

To Lloyd, Jack <Jack.Lloyd@wsp.com>

Dear Jack Lloyd

Request for information

We refer to your request for information, which was received on 4th June 2026.

We are dealing with your request as one made under the Environmental Information Regulations 2004 ("the Regulations").

In accordance with the Regulations, we will respond to your request within 20 working days of the date of receipt.

For completeness, we advise that the Information Commissioner's Office states that the time period for responding should be calculated from the day after the request is received.

In the meantime, if you have any queries, please contact us on email

EnvironmentalInformationRequests@dwrcymru.com

We have assigned reference **EIR/2839/2026** to your request. Please kindly note this in all correspondence with us regarding this matter.

Yours sincerely,

Dŵr Cymru Welsh Water

From: Lloyd, Jack <Jack.Lloyd@wsp.com>

Sent: 04 June 2026 15:00

To: Environmental Information Requests <EnvironmentalInformationRequests@dwrcymru.com>; Services Developer <developer.services@dwrcymru.com>

Subject: Glanllynfi Garth Information Request

***** External Mail *****

Dear Sir/Madam,

WSP has been appointed by Pennant Walters Ltd to prepare a Flood Consequences Assessment (FCA) for the proposed Glanllynfi Garth Wind Farm development near Maesteg, Bridgend.

Please find attached the site location and plan within the technical note, along with the information we are seeking from Dwr Cymru Welsh Water to help inform our assessment. We would be grateful if you could review the attached information and provide any relevant information available for the site and surrounding area.

Should you require any further information, please do not hesitate to contact.

Many thanks for your assistance.

Kind regards,

Jack

Jack Lloyd

Graduate Consultant

BSc (Hons)

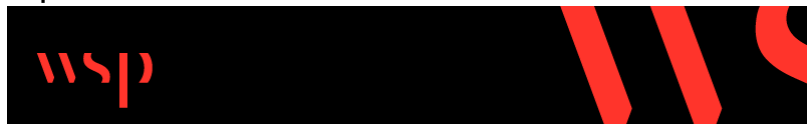
T+ 44 197 843 5653

Opus House,
Yale Business Village
Wrexham Technology Park
LL13 7YL

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Outlook

ATI-30024a P5&6, Glanllynfi Garth Wind Farm, Maesteg

From Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>

Date Wed 10/06/2026 14:32

To Lloyd, Jack <Jack.Lloyd@wsp.com>

Dear jack,

Further to your recent email, please note that as this property/site lies outside of our fluvial and tidal flood outlines within NRW's flood map, therefore we have no data for this.

Yn gywir/ Yours sincerely

Enw / Name Michelle Lewis

Teitl swydd / Job title Data Licensing Officer

Cyswllt Cyfoeth / Customer Hub

Adran / Department Customer, Communications and Commercial

Rhif ffôn / Phone number 07917243096

Dyddiau gweithio (os yn berthnasol) / Working days Mon-Fri

Yn Ardystiedig o ran Llythrennedd Carbon/Certified Carbon Literate



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.



**Cyfoeth
Naturiol
Cymru
Natural
Resources
Wales**

**Byd natur a phobl
yn ffynnu gyda'n gilydd**

**Nature and people
thriving together**



**cyfoethnaturiol.cymru
naturalresources.wales**

From: Lloyd, Jack <Jack.Lloyd@wsp.com>

Sent: 04 June 2026 15:07

To: Enquiries <enquiries@cyfoethnaturiolcymru.gov.uk>; Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>

Subject: Glanllynfi Garth Information Request

You don't often get email from jack.lloyd@wsp.com. [Learn why this is important](#)

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

Caution: This email originated from outside of the organisation. Do not click links, open attachments or scan QR Codes unless you recognise the sender and know the content is safe.

Dear Sir/Madam,

WSP has been appointed by Pennant Walters Ltd to prepare a Flood Consequences Assessment (FCA) for the proposed Glanllynfi Garth Wind Farm development near Maesteg, Bridgend.

Please find attached the site location and plan within the technical note, along with the information we are seeking from Natural Resources Wales to help inform our assessment. We would be grateful if you could review the attached information and provide any relevant information available for the site and surrounding area.

Should you require any further information, please do not hesitate to contact.

Many thanks for your assistance.

Kind regards,
Jack

Jack Lloyd

Graduate Consultant
BSc (Hons)

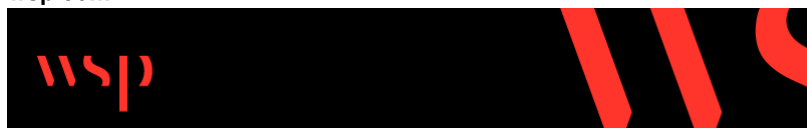
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Annex 10A.D

– Flood Risk

Mapping

Flood Map for Planning - Detail
River Flood Zones

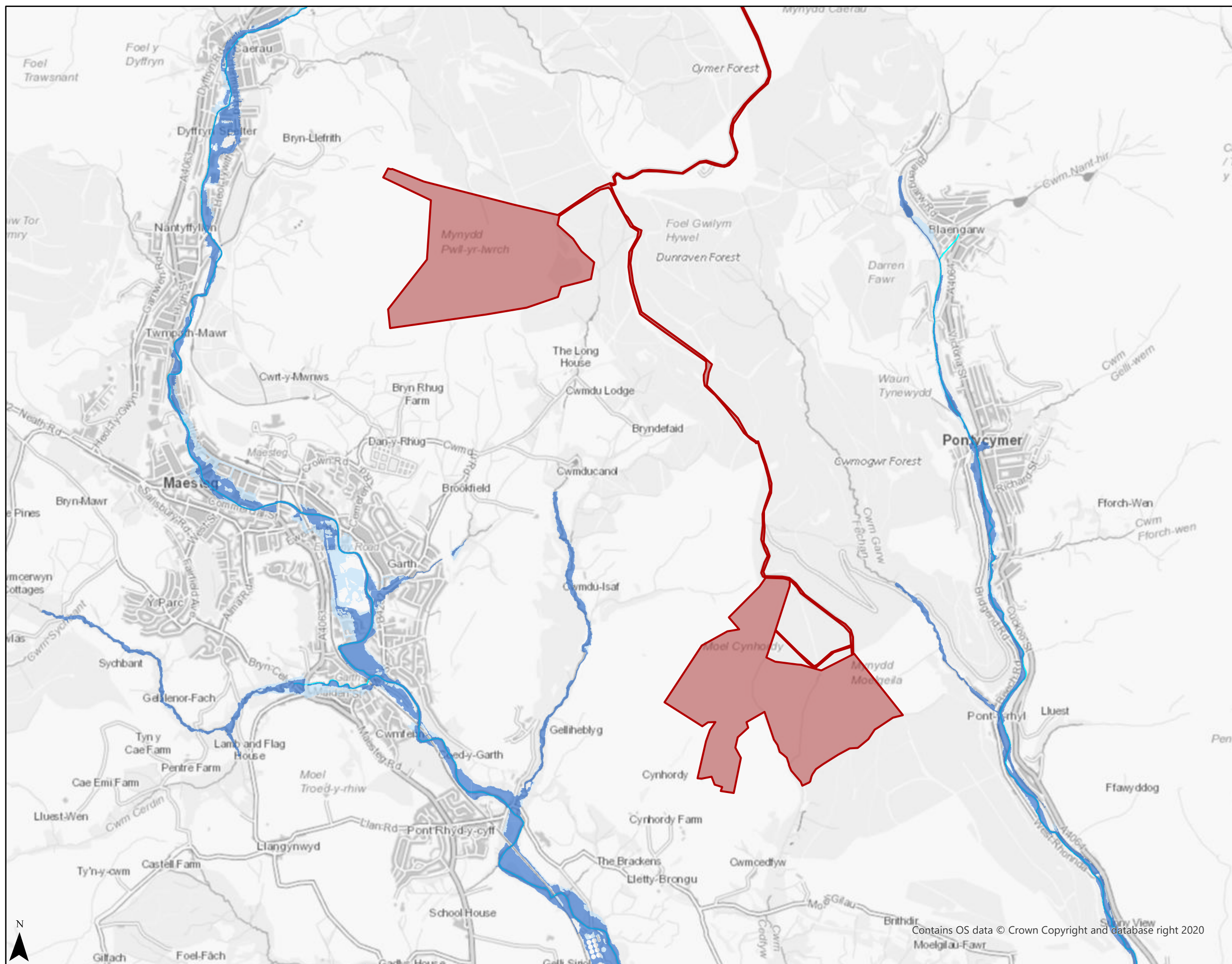
Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Rivers

- Flood Zone 3
- Flood Zone 2
- Main Rivers



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Scale at A3: 1:25,000

Date: 16/06/2026

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<https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en>

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British National Grid

Flood Map for Planning - Detail
Sea Flood Zones

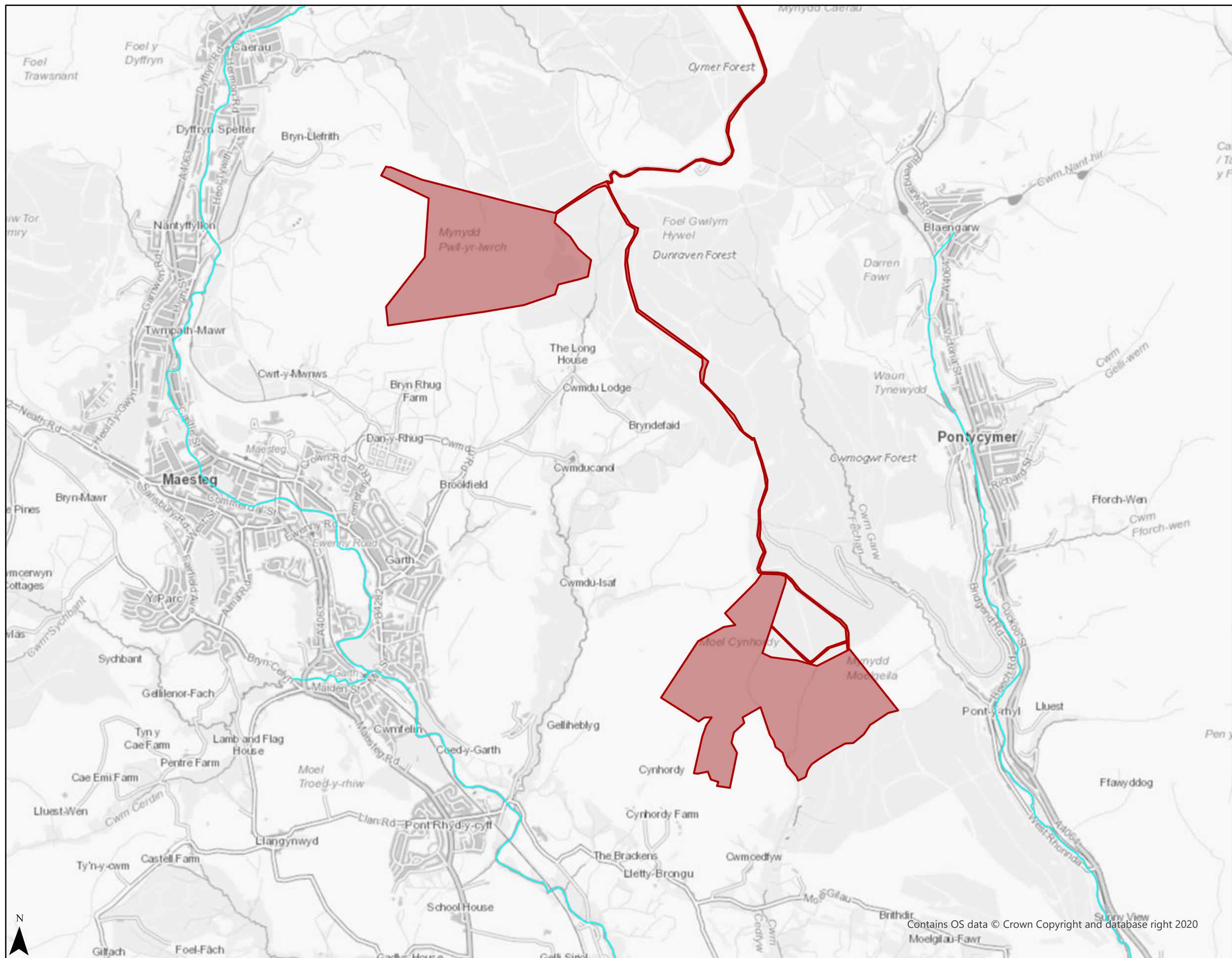
Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Sea

- Flood Zone 3
- Flood Zone 2
- Main Rivers



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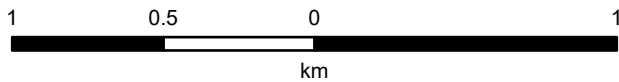
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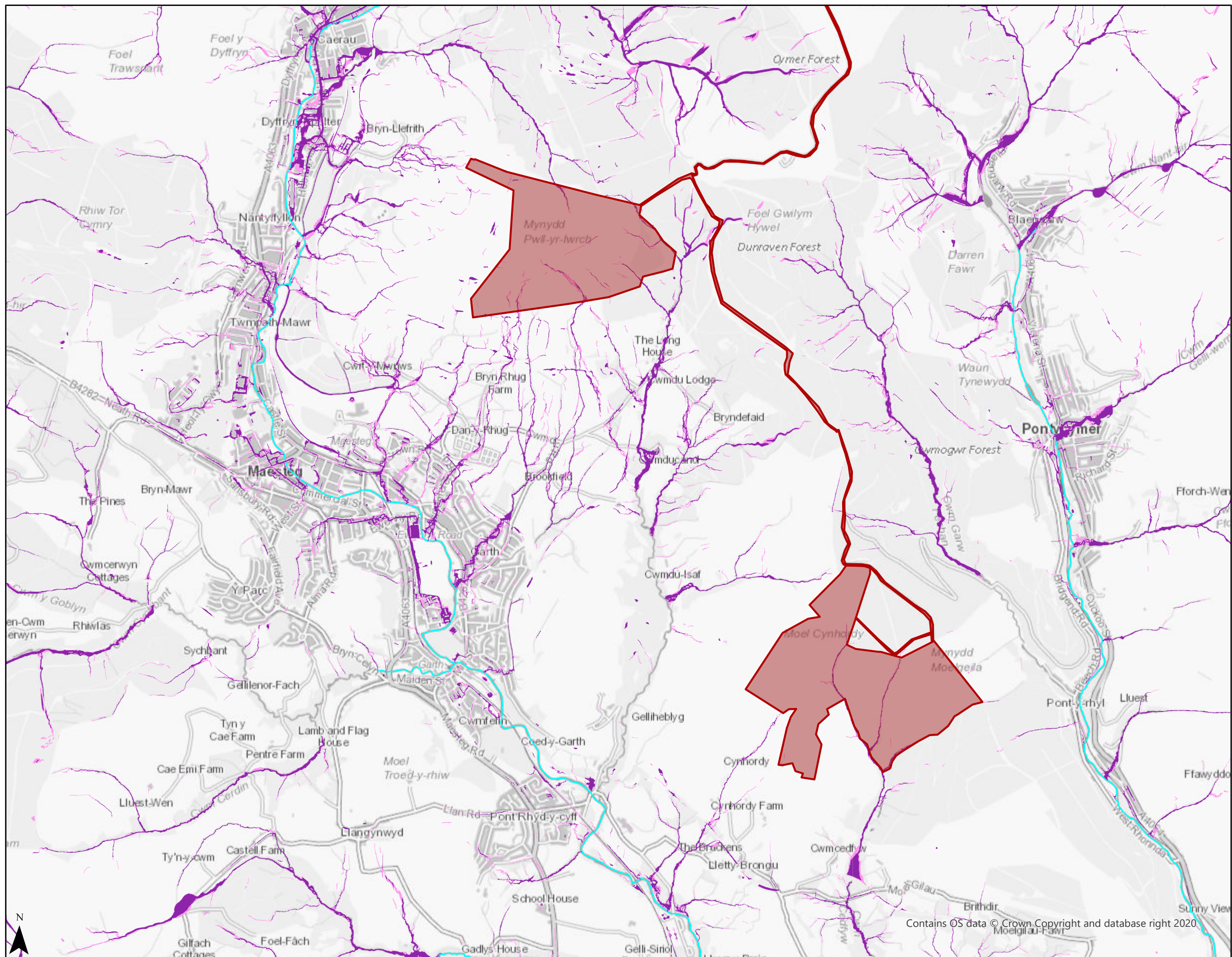
British National Grid

Flood Map for Planning - Detail
Surface Water and Small Watercourse

Legend

Surface Water and Small Watercourses

-  Flood Zone 3
-  Flood Zone 2
-  Main Rivers



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Flood Map for Planning - Detail
Historic Flood Extents

Legend

TAN15 Defended Zones

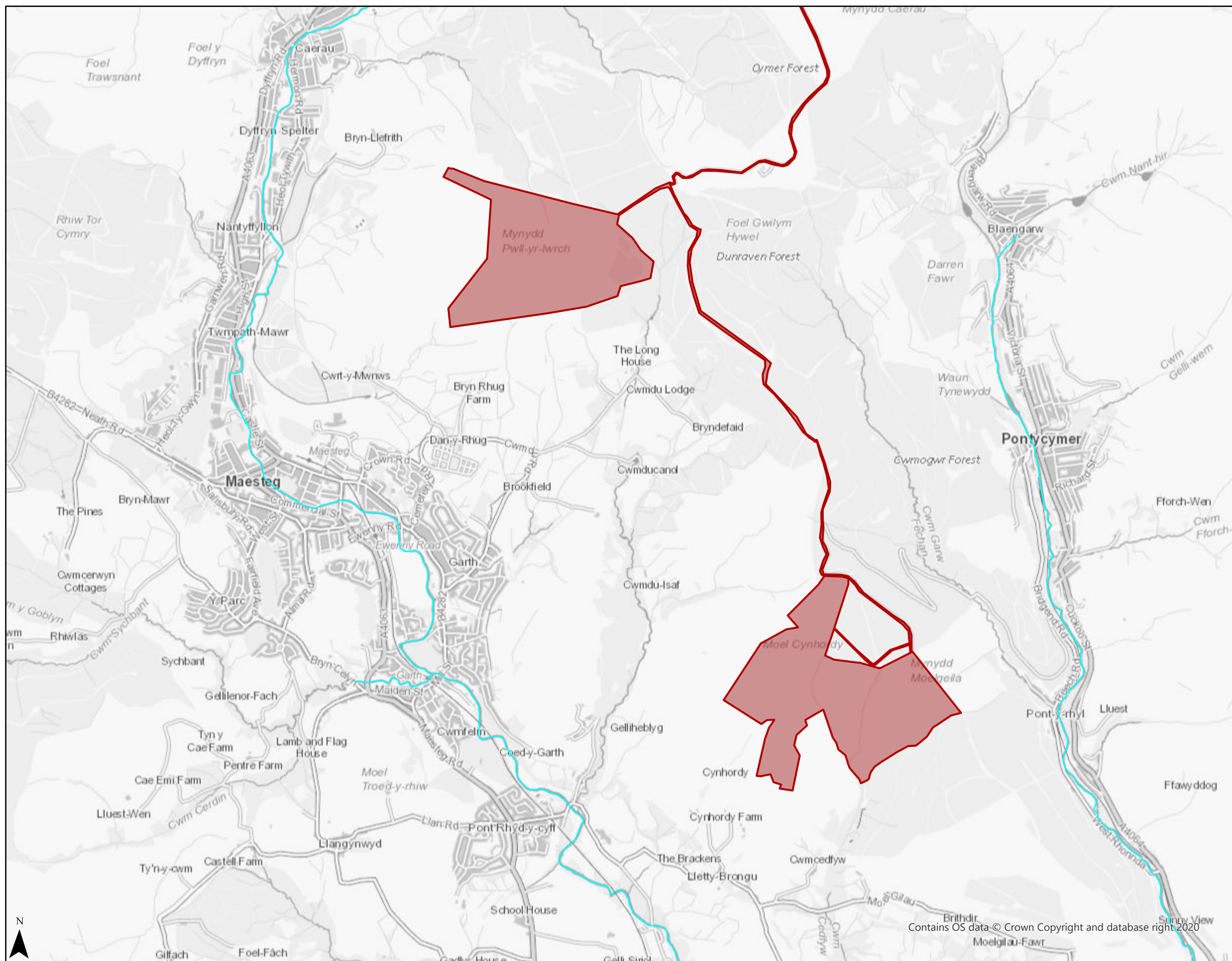
Rivers

Sea

Rivers and Sea

Recorded Flood Extents

Main Rivers



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Scale at A3: 1:25,000

Date: 16/06/2026

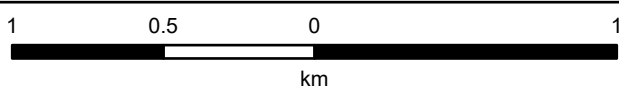
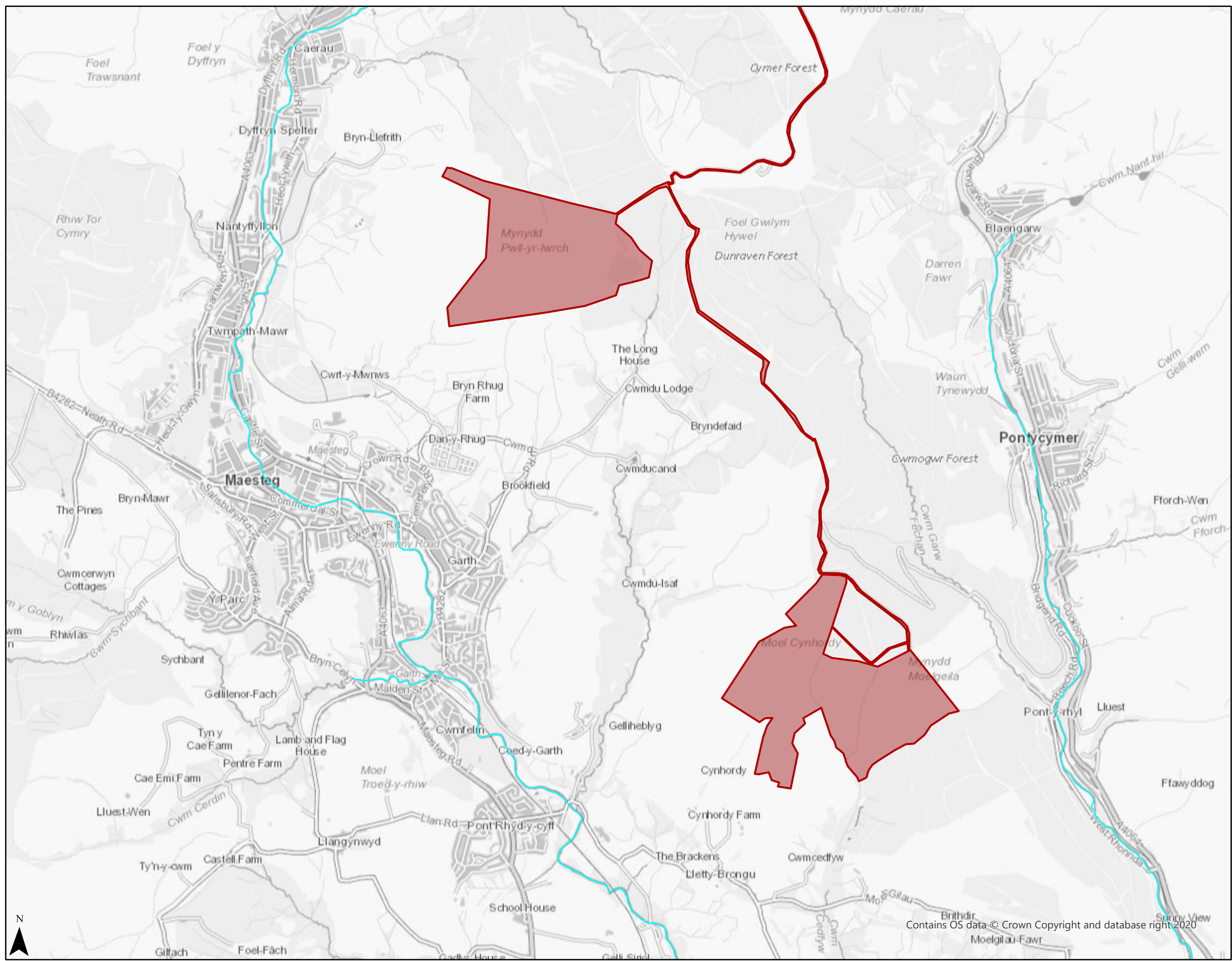
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Flood Map for Planning - Detail
Flood Risk from Reservoirs

- Legend
- TAN15 Defended Zones
- Rivers
 - Sea
 - Rivers and Sea
 - Flood Risk from Reservoirs
 - Main Rivers



British National Grid

Disclaimer
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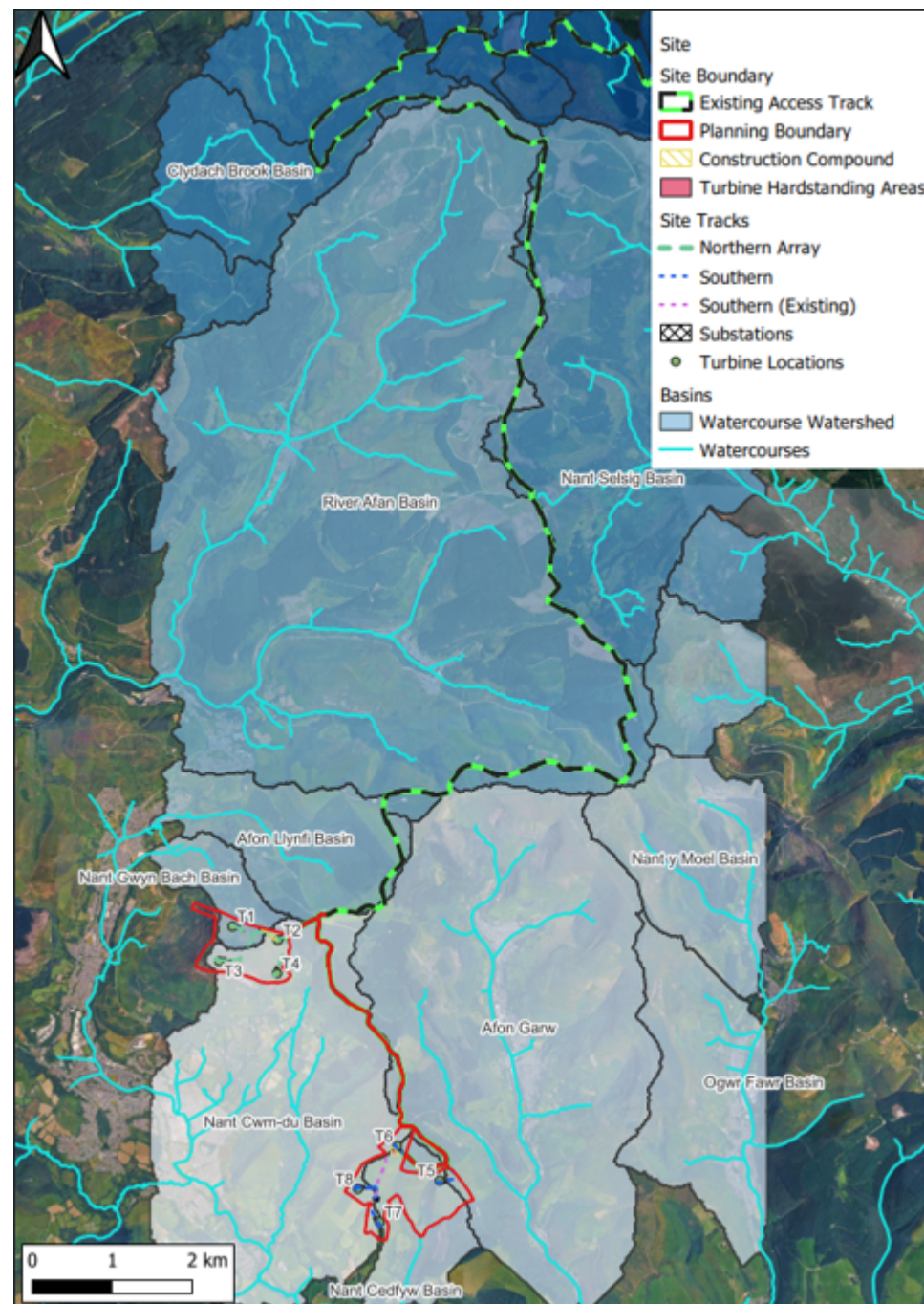
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Scale at A3: 1:25,000

Date: 16/06/2026

Annex 10A.E – Proposed Development and Watercourse Basin



Annex 10A.F –Greenfield Runoff Rate Estimates



Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (<https://www.uksuds.com/>)

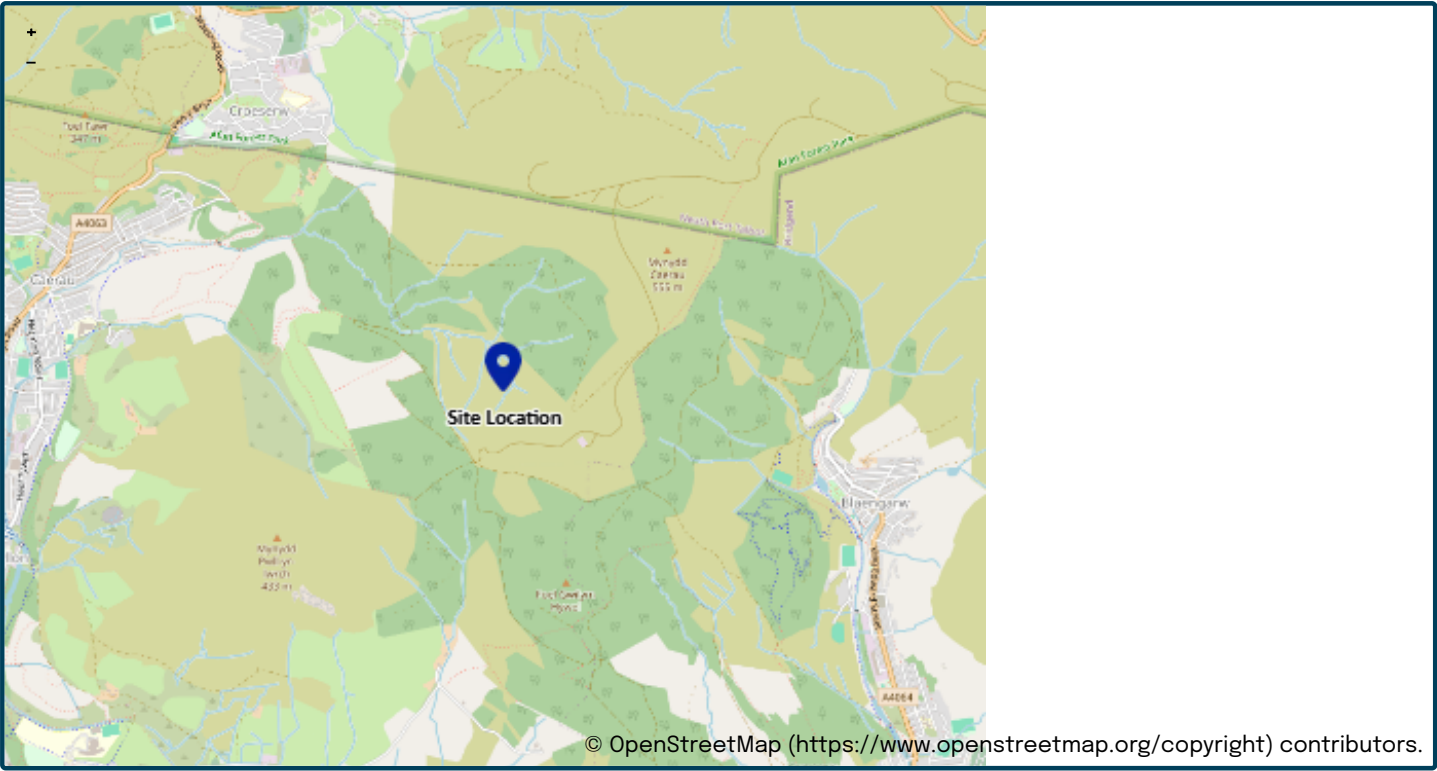
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	16/06/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name	
Site location	



Site easting (British National Grid)	288090
Site northing (British National Grid)	193509

Site details

Total site area (ha)	1	ha
----------------------	--------------------------------	----

Greenfield runoff

Method

Method

FEH statistical (2025)

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	2414	mm
BFIHOST19scaled	0.273	
QMed-QBar conversion	1.075	1.075
QMed (l/s)	28.7 l/s	
QBar (FEH statistical 2025) (l/s)	30.8 l/s	

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	9	9
1 year growth factor	0.88	
2 year growth factor	0.93	
10 year growth factor	1.42	
30 year growth factor	1.78	
100 year growth factor	2.18	
200 year growth factor	2.46	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	27.1	l/s
Flow rate 2 year (l/s)	28.7	l/s
Flow rate 10 years (l/s)	43.8	l/s
Flow rate 30 years (l/s)	54.9	l/s
Flow rate 100 years (l/s)	67.2	l/s
Flow rate 200 years (l/s)	75.8	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Annex 10A.G - Surface Water Storage Volume Estimations

Gwyn Bach (Northern Array)



Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (<https://www.uksuds.com/>)

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

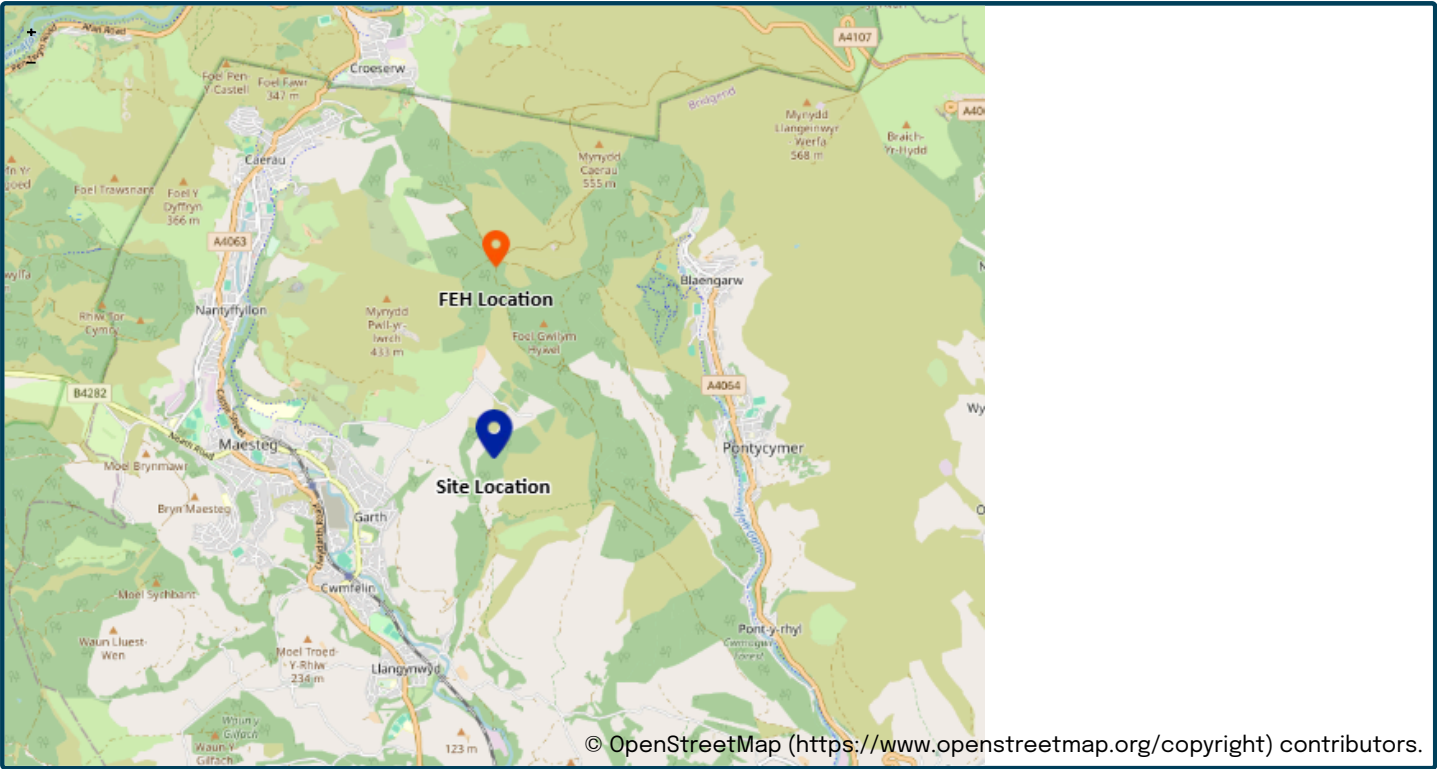
Date	29/06/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name

GG

Site location



Site easting (British National Grid)

287854

Site northing (British National Grid)

190905

Site areas

Total site area (ha)

1.6

ha

Roof area

Total roof area (ha)

Contributing roof area (ha)

Non-contributing roof area (ha)

0

ha

Paved area

Total paved area (ha)

1.6

ha

Contributing paved area (ha)

1.6

ha

Non-contributing paved area (ha)

0

ha

Grass / vegetated area

Total grass / vegetated area (ha)

Contributing grass / vegetated area (ha)

Non-contributing grass / vegetated area (ha)

0

ha

Total area

Total contributing area (ha)

1.6

ha

Contributing areas with urban creep allowance

Urban creep allowance factor

+0% (no creep)

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	1	m
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site

Greenfield

Specify the method

FEH statistical (2025)

FEH statistical (2025)

My value

SAAR9120 (mm)

2414

mm

Map/default value

BFIHOST19scaled

0.273

QMed (l/s)

45.9

l/s

1.075

QMed-QBar conversion

1.075

Total area for greenfield runoff calculation (ha)

1.6

ha

1.6

QBar (l/s)

49.3

l/s

Hydrological region

9

9

Return period (years)

Qbar (1:2.3 years)

Growth curve factor

1

Final discharge rate

Runoff calculation method

FEH statistical (2025)

Design flow rate (l/s)

49.3

l/s

Blockage risk

Specify the method

Flow rate

Minimum discharge flow rate to prevent blockage

1l/s

My value

Design orifice diameter (mm)

156

mm

Calculated value

156

Flow rate of orifice (l/s)

48.86

l/s

Rainfall and runoff

Rainfall input type

FEH22 CSV file

FEH_Point_Rainfall_FEH22_AM_287920_192789.csv

Distance from FEH location to site (km)

1.9

km

Climate change allowance factor

140%

Model results

- **Maximum discharge flow rate:** 48.9 (l/s)
- **Outflow orifice diameter:** 156 (mm)
- **Storage base length:** 61 (m)
- **Storage base width:** 20 (m)
- **Storage base area:** 1239 (m²)
- **Storage total volume:** 1494 (m³)
- **Storage total water volume:** 1494 (m³)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m ³)	Max storage volume (m ³)
1	900	31.6	0.46	627	627
2	720	33.8	0.52	707	707
10	720	41.0	0.72	1030	1030
30	720	44.7	0.85	1232	1232
<u>100</u>	<u>900</u>	<u>48.9</u>	<u>1.00</u>	<u>1494</u>	<u>1494</u>
200	1080	52.1	1.12	1716	1716

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m³ value, unless storage volumes are less than 10 m³, in which case, storage volumes are provided to 1 decimal place.

Disclaimer

This report was produced using the surface water storage volume design tool (2.2.3) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com/) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate surface water storage volumes for the whole site based on a limiting discharge rate from the site. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

HR Wallingford are not responsible for any rainfall data shared that is subject to licensing terms imposed by UK Centre for Ecology & Hydrology's Flood Estimation Handbook web service (<https://fehweb.ceh.ac.uk/Home/Terms>) (<https://fehweb.ceh.ac.uk/Home/Terms>)).

Gwyn Bach (Northern Array)



Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (<https://www.uksuds.com/>)

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	29/06/2026
Calculated by	
Reference	
Model version	2.2.3

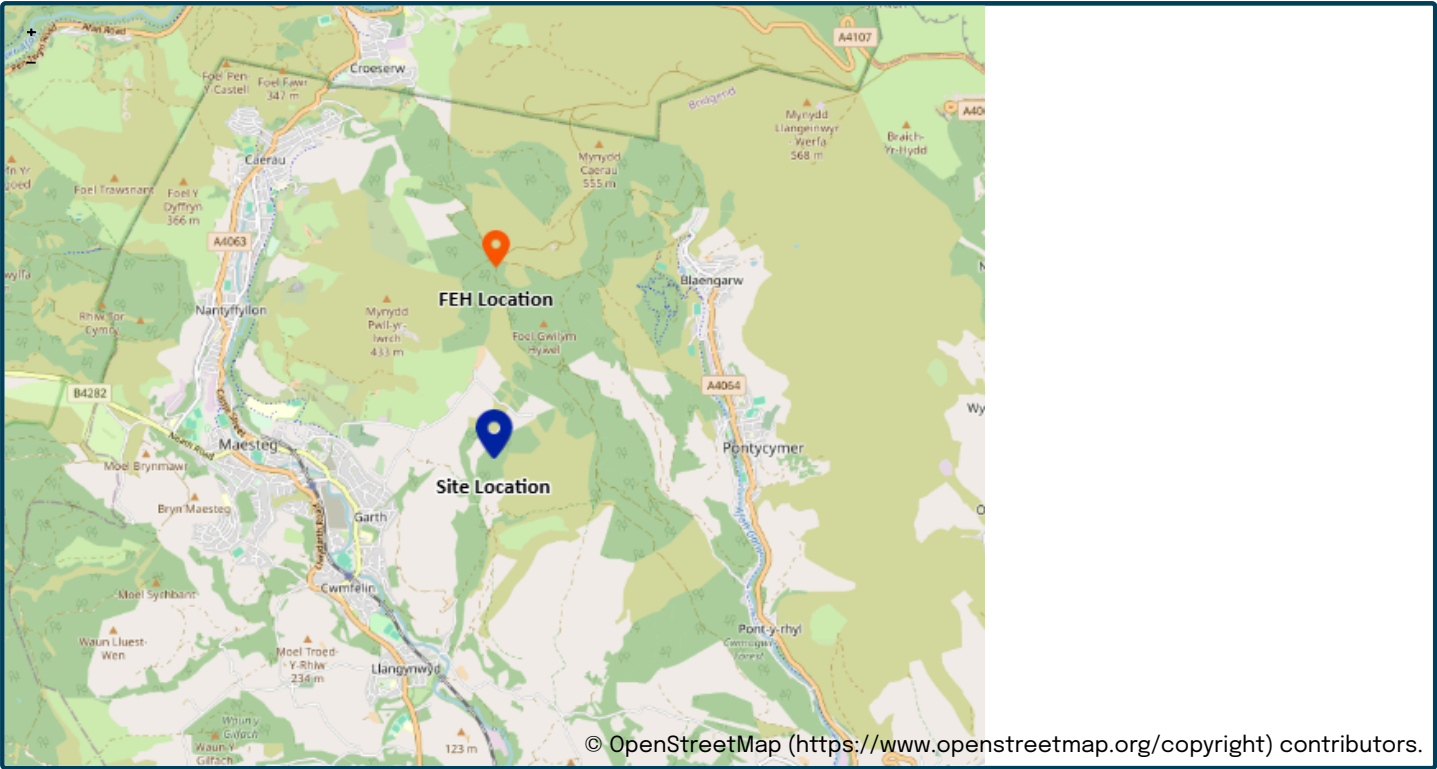
Location

Site name

GG	
----	--

Site location

--	--



Site easting (British National Grid)

287854	
--------	--

Site northing (British National Grid)

190905	
--------	--

Site areas

Total site area (ha)	1.31	ha
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Roof area

Total roof area (ha)		ha
Contributing roof area (ha)		ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	1.31	ha
Contributing paved area (ha)	1.31	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)		ha
Contributing grass / vegetated area (ha)		ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	1.31	ha
------------------------------	-----------------	----

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)
------------------------------	---------------------------

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	1	m
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site

Greenfield

Specify the method

FEH statistical (2025)

FEH statistical (2025)

SAAR9120 (mm)

My value

2414

mm

Map/default value

BFIHOST19scaled

0.273

QMed (l/s)

37.6

l/s

QMed-QBar conversion

1.075

1.075

Total area for greenfield runoff calculation (ha)

1.31

ha

1.31

QBar (l/s)

40.4

l/s

Hydrological region

9

9

Return period (years)

Qbar (1:2.3 years)

Growth curve factor

1

Final discharge rate

Runoff calculation method

FEH statistical (2025)

Design flow rate (l/s)

40.4

l/s

Blockage risk

Specify the method

Flow rate

Minimum discharge flow rate to prevent blockage

1l/s

My value

141

mm

Calculated value

141

Design orifice diameter (mm)

40.08

l/s

Rainfall and runoff

Rainfall input type

FEH22 CSV file

FEH_Point_Rainfall_FEH22_AM_287920_192789.csv

Distance from FEH location to site (km)

1.9

km

Climate change allowance factor

140%

Model results

- **Maximum discharge flow rate:** 40.1 (l/s)
- **Outflow orifice diameter:** 141 (mm)
- **Storage base length:** 54 (m)
- **Storage base width:** 18 (m)
- **Storage base area:** 986 (m²)
- **Storage total volume:** 1214 (m³)
- **Storage total water volume:** 1214 (m³)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m ³)	Max storage volume (m ³)
1	720	26.1	0.46	504	504
2	720	27.8	0.52	571	571
10	720	33.7	0.73	835	835
30	720	36.7	0.85	1000	1000
<u>100</u>	<u>900</u>	<u>40.1</u>	<u>1.00</u>	<u>1214</u>	<u>1214</u>
200	1080	42.6	1.12	1395	1395

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m³ value, unless storage volumes are less than 10 m³, in which case, storage volumes are provided to 1 decimal place.

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Gwyn Bach (Northern Array)



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Project details

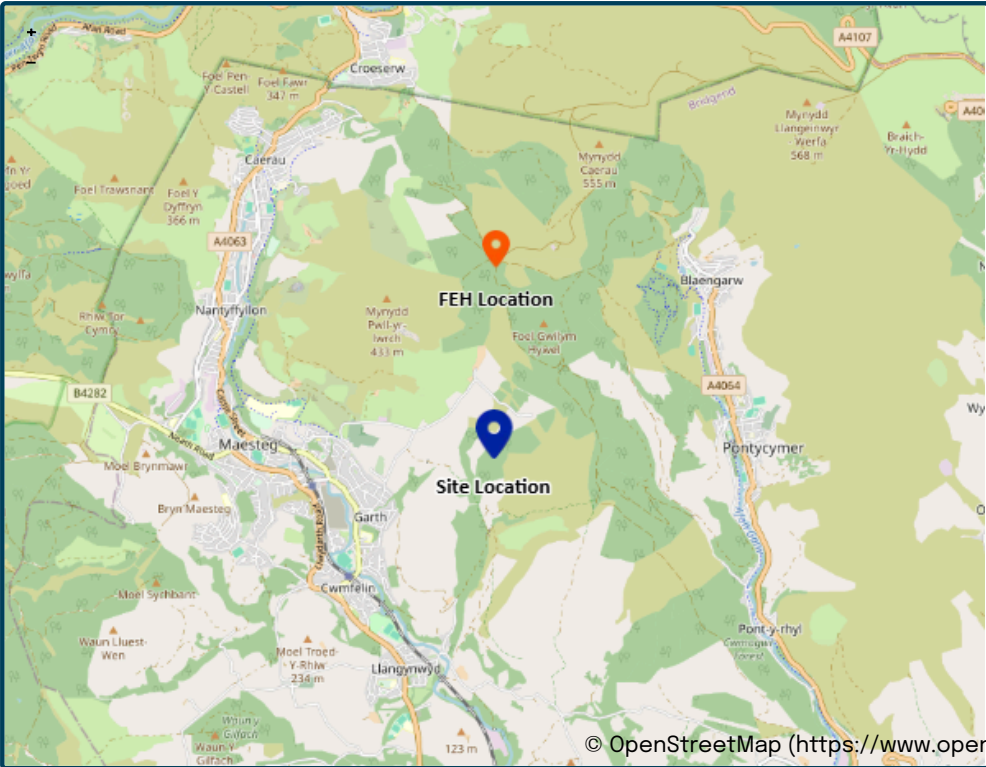
Date	29/06/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name

GG

Site location



Site easting (British National Grid)

287854

Site northing (British National Grid)

190905

Site areas

Total site area (ha)	0.77	ha
----------------------	-----------------	----

Roof area

Total roof area (ha)		ha
Contributing roof area (ha)		ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	0.77	ha
Contributing paved area (ha)	0.77	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)		ha
Contributing grass / vegetated area (ha)		ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	0.77	ha
------------------------------	-----------------	----

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)
------------------------------	---------------------------

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	1	m
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site

Greenfield

Specify the method

FEH statistical (2025)

FEH statistical (2025)

My value

SAAR9120 (mm)

2414

mm

BFIHOST19scaled

0.273

QMed (l/s)

22.1

l/s

QMed-QBar conversion

1.075

1.075

Total area for greenfield runoff calculation (ha)

0.77

ha

0.77

QBar (l/s)

23.7

l/s

Hydrological region

9

9

Return period (years)

Qbar (1:2.3 years)

Growth curve factor

1

Map/default value

Final discharge rate

Runoff calculation method

FEH statistical (2025)

Design flow rate (l/s)

23.7

l/s

Blockage risk

Specify the method

Flow rate

Minimum discharge flow rate to prevent blockage

1l/s

My value

Design orifice diameter (mm)

107

mm

Flow rate of orifice (l/s)

23.29

l/s

Calculated value

107

Rainfall and runoff

Rainfall input type

FEH22 CSV file

FEH_Point_Rainfall_FEH22_AM_287920_192789.csv

Distance from FEH location to site (km)

1.9

km

Climate change allowance factor

140%

Model results

- **Maximum discharge flow rate:** 23.3 (l/s)
- **Outflow orifice diameter:** 107 (mm)
- **Storage base length:** 40 (m)
- **Storage base width:** 13 (m)
- **Storage base area:** 534 (m²)
- **Storage total volume:** 705 (m³)
- **Storage total water volume:** 705 (m³)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m³)	Max storage volume (m³)
1	720	15.4	0.47	287	287
2	720	16.4	0.52	326	326
10	720	19.7	0.73	481	481
30	720	21.4	0.85	579	579
<u>100</u>	<u>900</u>	<u>23.3</u>	<u>1.00</u>	<u>705</u>	<u>705</u>
200	1080	24.7	1.12	812	812

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m³ value, unless storage volumes are less than 10 m³, in which case, storage volumes are provided to 1 decimal place.

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Cedfyw (Southern Array)



Surface water storage volume design tool

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Project details

Date	29/06/2026
Calculated by	
Reference	
Model version	2.2.3

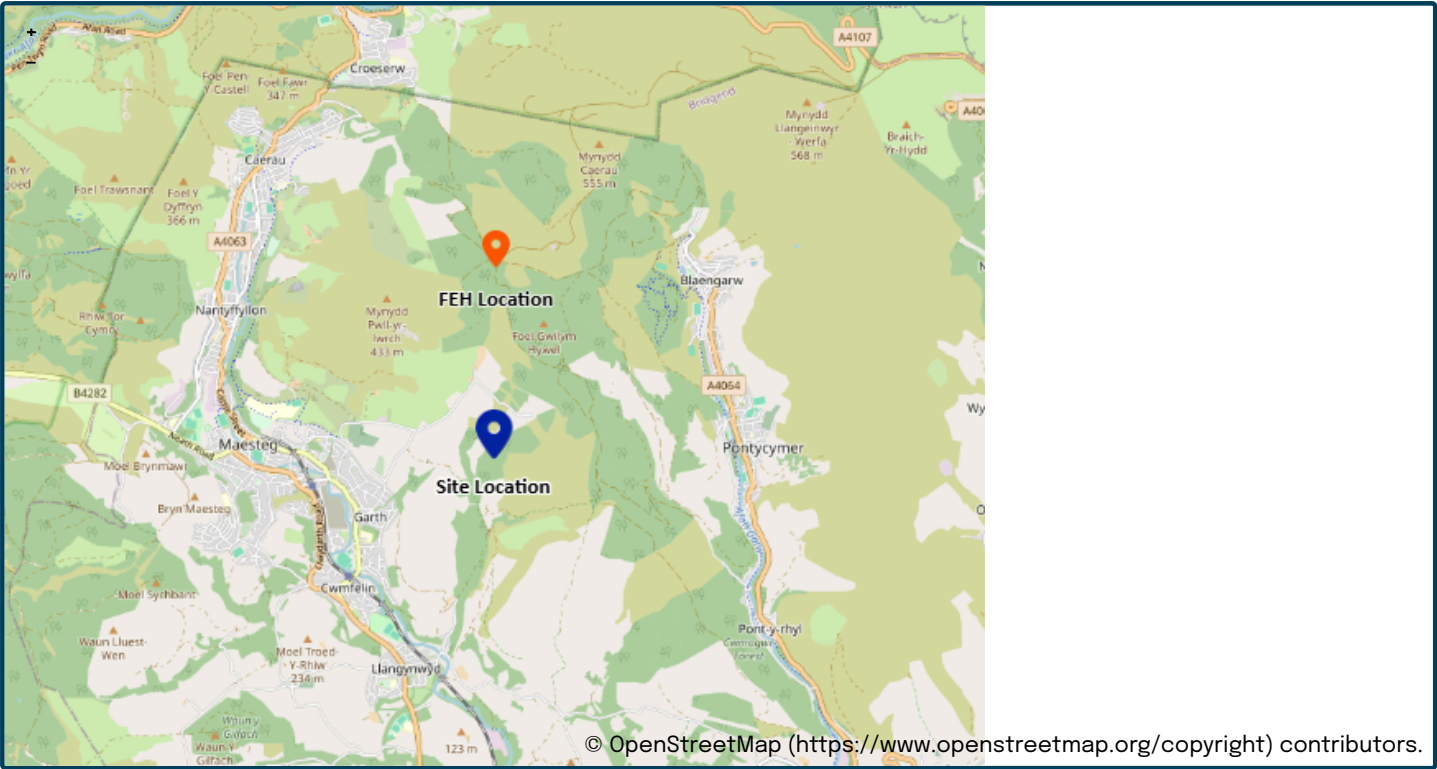
Location

Site name

GG	
----	--

Site location

--	--



Site easting (British National Grid)

287854	
--------	--

Site northing (British National Grid)

190905	
--------	--

Site areas

Total site area (ha)	1.72	ha
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Roof area

Total roof area (ha)		ha
----------------------	-------------	----

Contributing roof area (ha)		ha
-----------------------------	-------------	----

Non-contributing roof area (ha)	0	ha
---------------------------------	--------------	----

Paved area

Total paved area (ha)	1.72	ha
-----------------------	-----------------	----

Contributing paved area (ha)	1.72	ha
------------------------------	-----------------	----

Non-contributing paved area (ha)	0	ha
----------------------------------	--------------	----

Grass / vegetated area

Total grass / vegetated area (ha)		ha
-----------------------------------	-------------	----

Contributing grass / vegetated area (ha)		ha
--	-------------	----

Non-contributing grass / vegetated area (ha)	0	ha
--	--------------	----

Total area

Total contributing area (ha)	1.72	ha
------------------------------	-----------------	----

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)
------------------------------	---------------------------

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (m)	1	m
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site

Greenfield

Specify the method

FEH statistical (2025)

FEH statistical (2025)

My value

SAAR9120 (mm)

2414

mm

BFIHOST19scaled

0.273

QMed (l/s)

49.3

l/s

QMed-QBar conversion

1.075

1.075

Total area for greenfield runoff calculation (ha)

1.72

ha

1.72

QBar (l/s)

53

l/s

Hydrological region

9

9

Return period (years)

Qbar (1:2.3 years)

Growth curve factor

1

Map/default value

Final discharge rate

Runoff calculation method

FEH statistical (2025)

Design flow rate (l/s)

53

l/s

Blockage risk

Specify the method

Flow rate

Minimum discharge flow rate to prevent blockage

1l/s

My value

Design orifice diameter (mm)

162

mm

Flow rate of orifice (l/s)

52.61

l/s

Calculated value

162

Rainfall and runoff

Rainfall input type

FEH22 CSV file

FEH_Point_Rainfall_FEH22_AM_287920_192789.csv

Distance from FEH location to site (km)

1.9

km

Climate change allowance factor

140%

Model results

- **Maximum discharge flow rate:** 52.6 (l/s)
- **Outflow orifice diameter:** 162 (mm)
- **Storage base length:** 63 (m)
- **Storage base width:** 21 (m)
- **Storage base area:** 1343 (m²)
- **Storage total volume:** 1609 (m³)
- **Storage total water volume:** 1609 (m³)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m ³)	Max storage volume (m ³)
1	900	34.0	0.46	678	678
2	720	36.3	0.52	764	764
10	720	44.1	0.72	1110	1110
30	720	48.1	0.85	1327	1327
<u>100</u>	<u>900</u>	<u>52.6</u>	<u>1.00</u>	<u>1609</u>	<u>1609</u>
200	1080	56.1	1.12	1847	1847

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m³ value, unless storage volumes are less than 10 m³, in which case, storage volumes are provided to 1 decimal place.

Disclaimer

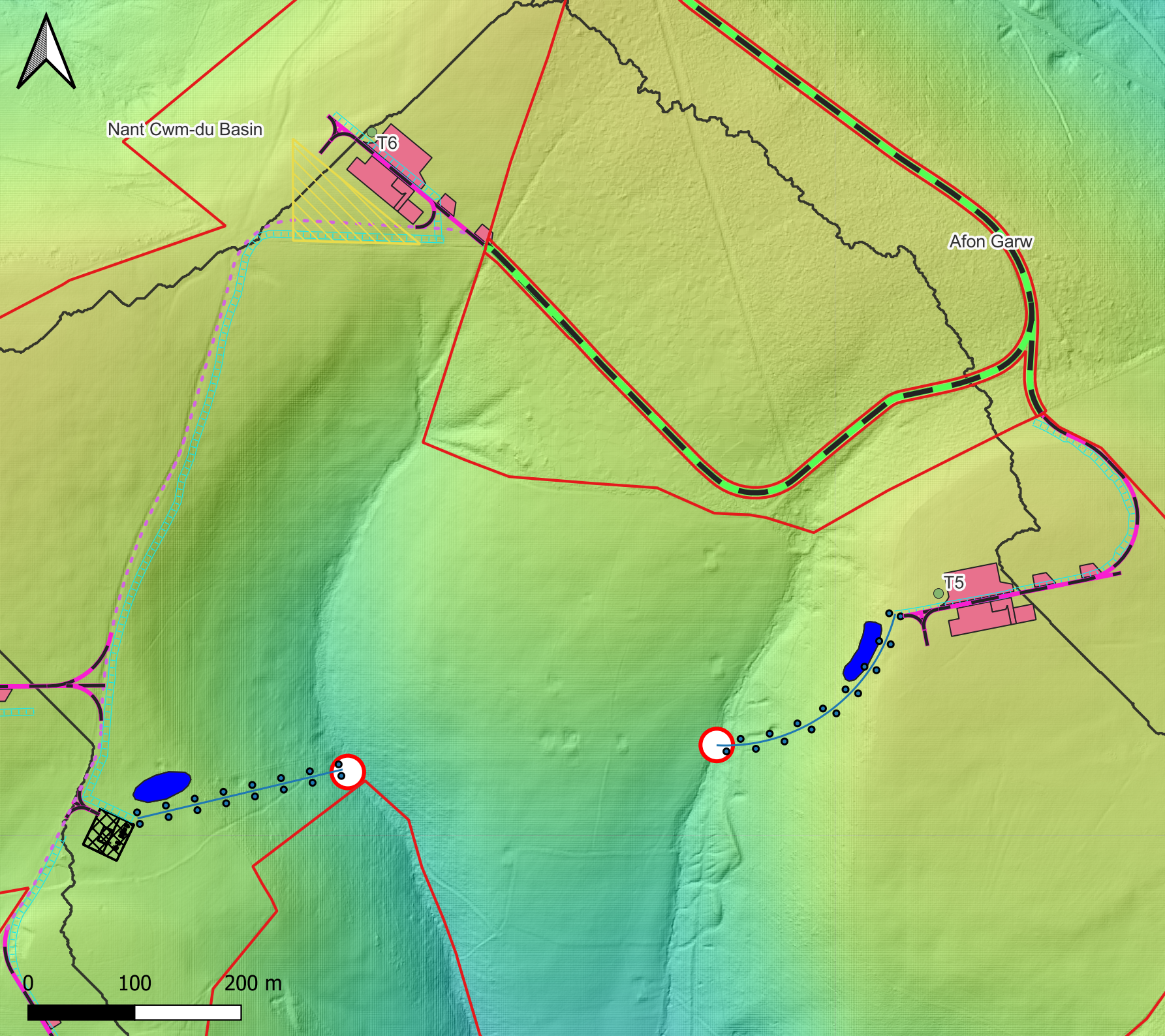
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Annex 10A.H

Drainage

Layout



Key

- Potential Construction Compound
- Turbine
- Substations
- Turbine Hardstanding Areas
- Site Boundary
- Watercourses
- Proposed Tracks**
 - Proposed Northern Array Tracks
 - Outside Array, Forestry Access Track
 - Proposed Southern Array Tracks
 - Existing Southern Array Tracks
- Proposed Drainage**
 - Indicative Conveyance Ditch
 - Indicative Swale/Filter Drain
 - Basin
 - Indicative Discharge Location

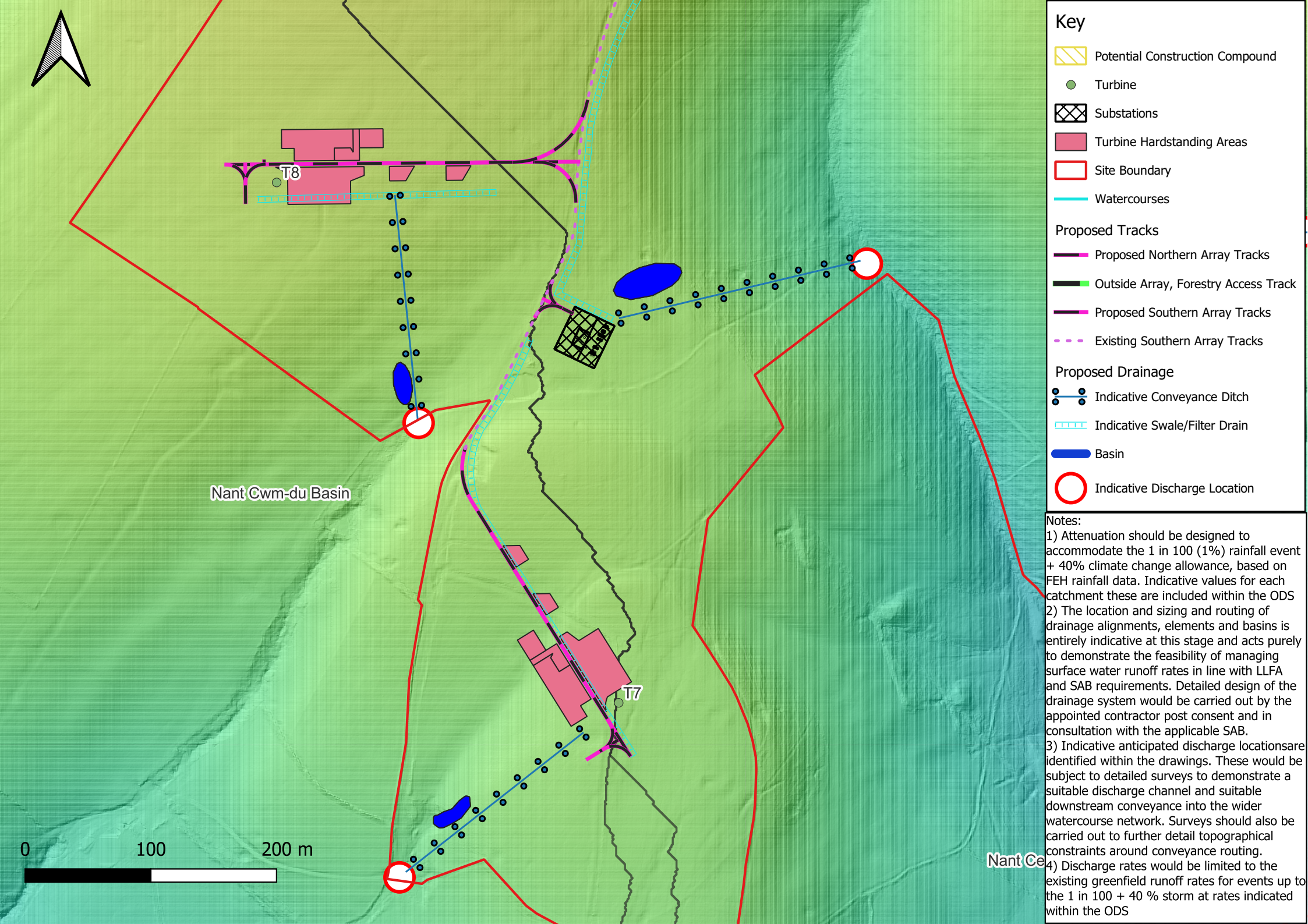
Notes:

1) Attenuation should be designed to accommodate the 1 in 100 (1%) rainfall event + 40% climate change allowance, based on FEH rainfall data. Indicative values for each catchment these are included within the ODS

2) The location and sizing and routing of drainage alignments, elements and basins is entirely indicative at this stage and acts purely to demonstrate the feasibility of managing surface water runoff rates in line with LLFA and SAB requirements. Detailed design of the drainage system would be carried out by the appointed contractor post consent and in consultation with the applicable SAB.

3) Indicative anticipated discharge locations are identified within the drawings. These would be subject to detailed surveys to demonstrate a suitable discharge channel and suitable downstream conveyance into the wider watercourse network. Surveys should also be carried out to further detail topographical constraints around conveyance routing.

4) Discharge rates would be limited to the existing greenfield runoff rates for events up to the 1 in 100 + 40 % storm at rates indicated within the ODS



Key

- Potential Construction Compound
- Turbine
- Substations
- Turbine Hardstanding Areas
- Site Boundary
- Watercourses
- Proposed Tracks**
 - Proposed Northern Array Tracks
 - Outside Array, Forestry Access Track
 - Proposed Southern Array Tracks
 - Existing Southern Array Tracks
- Proposed Drainage**
 - Indicative Conveyance Ditch
 - Indicative Swale/Filter Drain
 - Basin
 - Indicative Discharge Location

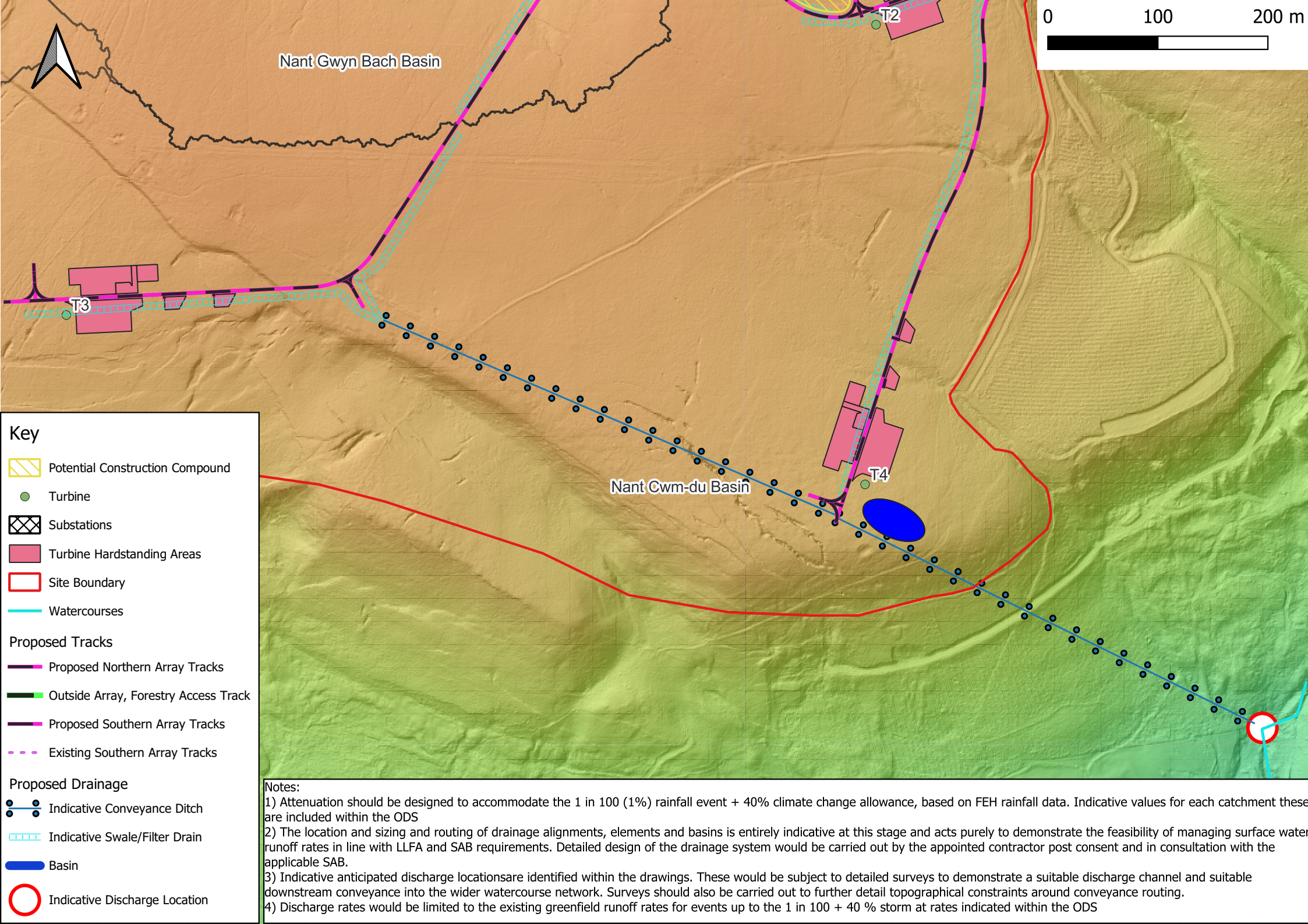
Notes:

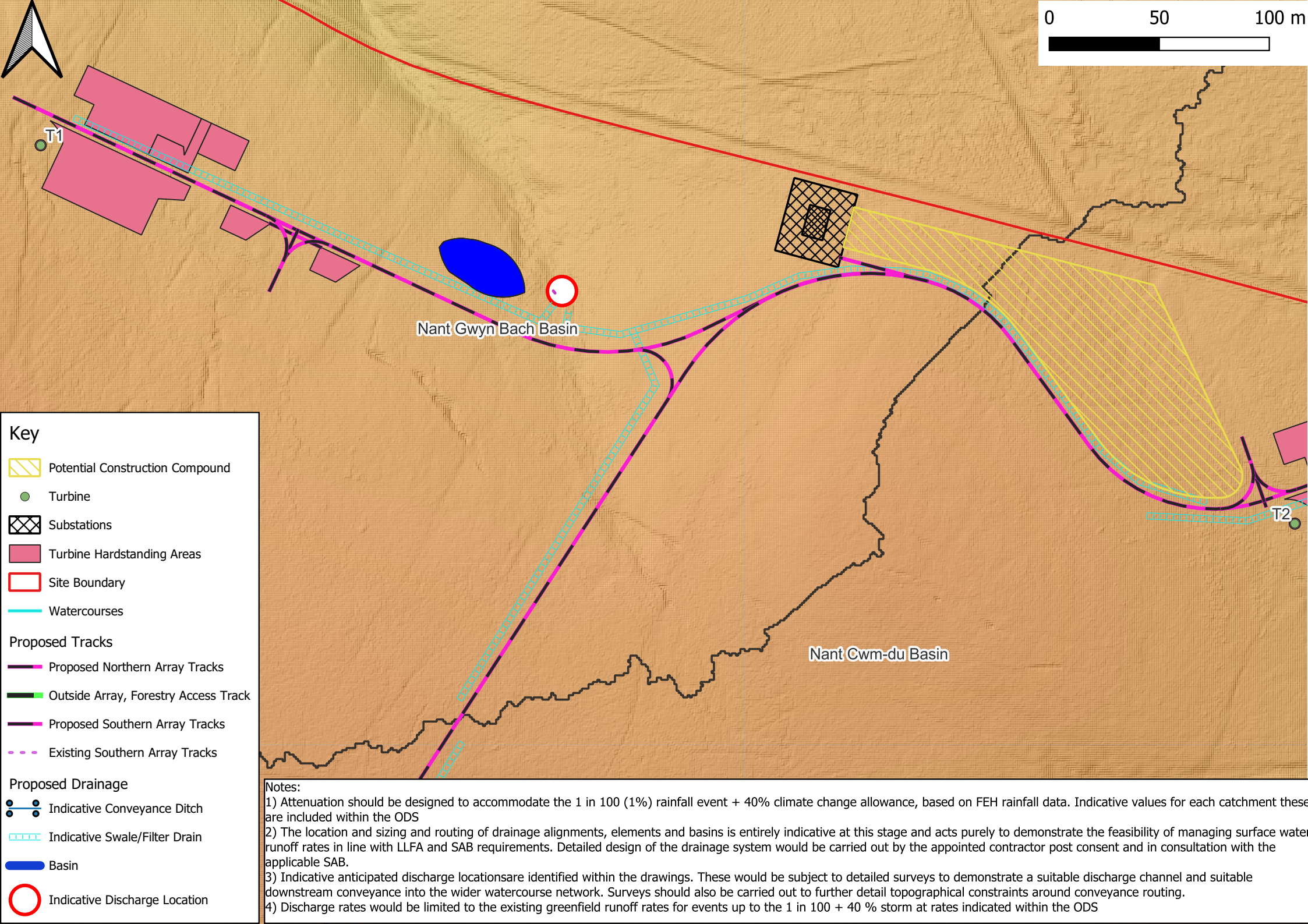
1) Attenuation should be designed to accommodate the 1 in 100 (1%) rainfall event + 40% climate change allowance, based on FEH rainfall data. Indicative values for each catchment these are included within the ODS

2) The location and sizing and routing of drainage alignments, elements and basins is entirely indicative at this stage and acts purely to demonstrate the feasibility of managing surface water runoff rates in line with LLFA and SAB requirements. Detailed design of the drainage system would be carried out by the appointed contractor post consent and in consultation with the applicable SAB.

3) Indicative anticipated discharge locations are identified within the drawings. These would be subject to detailed surveys to demonstrate a suitable discharge channel and suitable downstream conveyance into the wider watercourse network. Surveys should also be carried out to further detail topographical constraints around conveyance routing.

4) Discharge rates would be limited to the existing greenfield runoff rates for events up to the 1 in 100 + 40 % storm at rates indicated within the ODS





Annex 10A.I - Maintenance Checklist

Table 1: SuDS Maintenance Inspection Checklist

GENERAL INFORMATION			
Site ID			
Site Location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved Drawing Reference(s)	
Inspection frequency		Approved Specification Reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

	Inspection date				Inspection date			
	Details	Y/N	Action required	Date Completed	Details	Y/N	Action required	Date Completed
GENERAL INSPECTION ITEMS								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (e.g. rutting, spreading of blocks or signs of ponding water)?								

	Inspection date				Inspection date			
	Details	Y/N	Action required	Date Completed	Details	Y/N	Action required	Date Completed
SILT/SEDIMENT ACCUMULATION								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent Is removal required? If yes, state waste disposal requirements and confirm all waste management requirements have been complied with (consult Environment Agency or SEPA).								
Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground (e.g. under-drained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
SYSTEM BLOCKAGES / LITTER BUILD UP								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging/blockage of outlets or drainage paths?								
VEGETATION								

	Inspection date				Inspection date			
	Details	Y/N	Action required	Date Completed	Details	Y/N	Action required	Date Completed
Is the vegetation condition satisfactory (density, weed growth, coverage etc.)? (Check against approved planting regime.)								
Does any part of the system require weeding / pruning / mowing? (Check against maintenance frequency stated in approved design.)								
Is there any evidence of invasive species becoming established? If yes, state action required.								
INFRASTRUCTURE								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (e.g. wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow controls?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								
OTHER OBSERVATIONS								
Information appended (e.g. photos)								

	Inspection date				Inspection date			
	Details	Y/N	Action required	Date Completed	Details	Y/N	Action required	Date Completed
SUITABILITY OF CURRENT MAINTENANCE REGIME								
Continue as current								
Increase maintenance								
Decrease maintenance								
NEXT INSPECTION								
Proposed date for next inspection								



Opus House
Yale Business Village
Wrexham Technology Park
Wrexham

wsp.com

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