

HYBONT GREEN HYDROGEN PROJECT

Flood Consequence Assessment



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- Appendix A NRW Detailed Flood Data
- Appendix B Climate Change Exercise
- Appendix C Development Plans

1 INTRODUCTION

Project Brief

- 1.1 RPS was commissioned to prepare a Flood Consequence Assessment (FCA) of site's at:
- *Brynmenyn, Bridgend, CF32 9TX; and*
 - *St Bride's Minor, Bryncethin, Bridgend, CF32 9YP*
- 1.2 It is proposed that the sites are to be developed with a new green hydrogen production facility and solar farm development respectively, and will be referred to as Brynmenyn and Bryncethin.
- 1.3 This report should be read in conjunction with the Concept Drainage Strategy.

Assessment Procedure

- 1.4 The aim of the FCA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk.
- 1.5 The report has been produced in accordance with the guidance detailed in the Planning Policy Wales and Technical Advice Note 15 (TAN15): Development and Flood Risk. Reference has also been made to the Bridgend County Borough Council Preliminary Flood Risk Assessment (PFRA) and Local Flood Risk Management Strategy (LFRMS).
- 1.6 This report has been produced in consultation with the Natural Resources Wales (NRW) and the Lead Local Flood Authority (LLFA). The site is not located within an Internal Drainage District (IDD) District.
- 1.7 The desk study was undertaken by reference to information provided / published by the following bodies:
- Natural Resources Wales (NRW);
 - Bridgend County Borough Council (BCBC);
 - British Geological Survey (BGS);
 - Ordnance Survey (OS); and
 - Welsh Water.

2 PLANNING POLICY

National Planning Policy

Technical Advice Note (TAN) 15: Development and Flood Risk

- 2.1 TAN 15 provides technical guidance to supplement the policy set out within Planning Policy Wales in relation to development and flooding. The guidance relates to sustainability principles and provides a framework to allow risks arising from river flooding, coastal flooding and additional run off from developments to be assessed.
- 2.2 In relation to flood risk, TAN 15 indicates that the Assembly has a duty to ensure that development is sustainable and does not create problems for future generations. Managing flooding has an important role to ensure sustainable development by: guiding developments to locations with little or no risk from river, tidal or coastal flooding, managing consequences of flooding where developments can be justified and making provision for climate change.
- 2.3 TAN 15 confirms that each planning authority in Wales must prepare a Development Plan for its area. The development plans provide locational guidance for development, detailed site-specific policies, and identification of proposals for development. Catchment Flood Management Plans aim to take a holistic approach to flood management at a catchment scale and can provide guidance on managing risk to future developments. The information provided in local development plans and catchment flood management plans will aid with the application of the Justification Test.

Requirements of TAN 15

- 2.4 A Flood Consequence Assessment, to support a development application, should be proportionate to the risk and appropriate to the scale, nature and location of the development. The following will need to be considered;
- The consequences of flooding on the development, the consequences of the development on flood risk elsewhere and if appropriate mitigation measures can be incorporated into the design.
 - Mechanisms of flooding, including sources of floodwater, how floodwater enters and flows across a site, height, and speed of floodwaters.
 - Uncertainties in estimating flood events including use of historical records and forecasting.
 - Security of proposed developments over their lifetime and ensuring those using the development have an awareness of the potential risks from flooding.
 - Description of consequences under a range of extreme events including: mechanisms, sources, depths, speed, rate of rise, overland flood routes, velocity, access and egress, impacts on natural heritage, impact on flood risk in surrounding areas.
 - Structural adequacy of defences to contain flows and withstand overtopping and if required the suitability of implementing a buffer zone adjacent to defences.
 - Measures required to ensure flooding is managed to acceptable levels and ensure that the impact upon flood risk elsewhere in the flood plain is managed.

Emerging TAN15

- 2.5 In December 2021, the Welsh Government released a new TAN15 which is due to become adopted policy advice on 1 June 2023. This new national strategy is set to recognise the degrees of flooding in the present day and in the future.
- 2.6 Although the emerging TAN15 is yet to be adopted, reference has been made and the new mapping has been included throughout this FCA.

Planning Policy Wales

2.7 Planning Policy Wales sets out the land use planning policies of the Welsh Government. Chapter 13 ‘Minimising and Managing Environmental Risk and Pollution’ outlines the Welsh Government’s objectives in terms of addressing flood risk.

2.8 Section 13.4 of Planning Policy Wales states:

“Development proposals in areas designed as being of high flood hazard should only be considered where:

New development can be justified in that location, even though it is likely to be at risk from flooding; and

The development proposal would not result in the intensification of existing development which may itself be at risk; and

New development would not increase the potential adverse impacts of a flood event.”

2.9 Planning Policy Wales is supplemented by a series of Technical Advice Notes (TAN). TAN15 provides technical guidance on development and flood risk.

Local Planning Policy

2.10 The Bridgend Local Development was adopted by Bridgend County Borough Council in September 2013.

Local Development Plan

“Policy PLA4 Climate Change and Peak Oil

2.11 *All development proposals will be required to make a positive contribution towards tackling the causes of, and adapting to the impacts of Climate Change and Peak Oil issues. Means of achieving this may include:*

- 1. Having lower carbon energy requirements by reducing energy demand, and promoting energy efficiency;*
- 2. Utilising local materials and supplies wherever feasible;*
- 3. Encouraging the development of renewable energy generation;*
- 4. Having a location and layout which reflects sustainable transport and access principles, thereby reducing the overall need to travel;*
- 5. Having a design, layout and landscaping which:*
 - a. helps wildlife and habitats to adapt to the changing climate;*
 - b. assists cooling of the urban environment, including the use of passive building techniques where appropriate;*
- 6. Using resources more efficiently, and minimising waste water use and pollution;*
- 7. Avoiding or minimising the risk from flooding and/or adapting to the increased risk of flooding, coastal erosion and warmer annual mean temperatures; and*
- 8. Promoting sustainable building methods and drainage systems where appropriate.”*

Preliminary Flood Risk Assessment

2.12 A Preliminary Flood Risk Assessment (PFRA) was produced in 2011. The PFRA is aimed at providing high level overview of flood risk from all sources of flooding within the local area, including

consideration of surface water, groundwater and ordinary watercourses. Relevant information has been referenced throughout this report.

Strategic Flood Consequence Assessment

2.13 A Strategic Flood Consequence Assessment (SFCA) was produced by Capita in August 2010 for BCBC as LLFA. The LFRMS aims to understand the risks of various flooding sources that Bridgend may face, take proactive steps to mitigate these risks, raise awareness across communities and prepare for any such event. Local flood risk is any flood risk that derives from surface runoff, groundwater, or ordinary watercourses. Relevant information has been referenced throughout this report.

Climate Change Allowances

2.14 The Technical Advice Note 15: Development and Flood Risk (TAN15) states that when considering new development proposals, it is necessary to take account of the potential impact of climate change over the lifetime of development. Residential development is assumed to have a lifetime of 100 years while a lifetime of 75 years is assumed for non-residential developments. To ensure future development can provide a safe and secure living and /or working environment throughout its lifetime, national planning policy requires proposals in areas of high flood risk to be accompanied by an assessment of flooding consequences to and from the development, taking into account the impacts of climate change.

2.15 In line with TAN15, the climate change allowances have been informed by latest available information on climate change projections and different scenarios of carbon dioxide (CO2) emissions to the atmosphere. Allowances are provided for different epochs (periods) of time over the next century. This guidance will be reviewed when more up-to-date climate change research is available.

2.16 It is recommended in the Welsh Government guidance (released September 2021) that the central estimate for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a flood consequence assessment (FCA) and to inform design levels.

2.17 Table 1 presents both the central and upper end estimates for climate change associated with peak river flows.

Table 1. Peak river flow allowances for Western Wales (using 1961 to 1990)

Western Wales	Total potential change anticipated for '2020s' (2015- 39)	Total potential change anticipated for '2050s' (2040- 2069)	Total potential change anticipated for the '2080s' (2070-2115)
Upper Estimate	25%	40%	70%
Central Estimate	15%	25%	30%

3 CONSULTATION

Natural Resource Wales

- 3.1 The FCA has been produced in consultation with the Partnership and Strategic Overview Team at the NRW. The NRW provided the Aberkenfig (2014) flood model, which RPS extracted and processed. The information provided by the NRW is included as Appendix A and is summarised in Section 6.

Bridgend County Borough Council

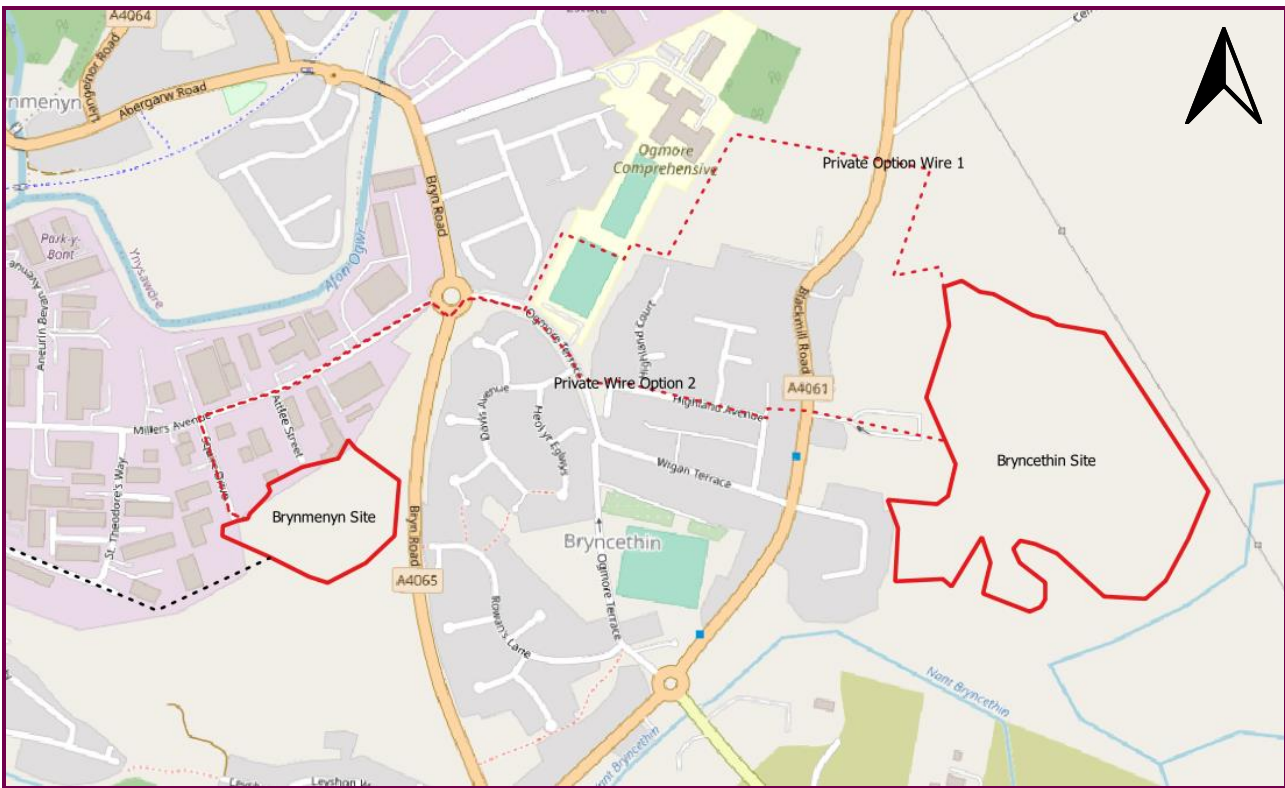
- 3.2 Consultation was undertaken with BCBC relating to SAB. At the time of writing, a response is awaited.

Internal Drainage District

- 3.3 The site is not located within an IDD District.

4 SITE DESCRIPTION

4.1 The sites are located in the village of Bryncethin, approximately 4 km north of Bridgend. The sites are illustrated in Figure 1 below.



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Figure 1. Site Location Plan

Brynmenyn

- 4.2 The Brynmenyn site is located at National Grid Reference SS 90993 84330 and occupies an area of approximately 8.16 hectares (ha).
- 4.3 The site is owned by BCBC and is currently cleared land allocated for employment uses in the Bridgend LDP.

Bryncethin

- 4.4 The Bryncethin site is located at National Grid Reference SS 91836 84390 and occupies an area of approximately 22 hectares (ha).
- 4.5 The site is currently occupied by arable fields. There are overhead power lines that crosscut the eastern portion of the site.
- 4.6 The site appears currently undeveloped, however a Phase 1 Desk Study conducted by Mott MacDonald in July 2022 (reference: 108939-T-RP-0002) states that although there is no evidence of made ground on the site, the site has a mining history and therefore has a complex history of reworking and infilling.

Surrounding Land Uses

- 4.7 The sites are located to the east and west of Bryncethin, where land use is primarily residential. The Brynmenyn site is located immediately south east of Brynmenyn Industrial Estate.

- 4.8 The Blackmill Woodlands Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) is present 930 m north east of the St Bride's Minor site. There are no other designated sensitive areas (e.g. Special Protection Area (SPA)) within close proximity to the sites.

Topography

Brynmenyn

- 4.9 A topographic survey for the Brynmenyn site was completed by Zenith Land Surveys Ltd. in April 2022, reference 21714_A, and indicates that site generally slopes from east to west. The highest elevations of around 67.00 metres above ordnance datum (mAOD) are located in the north east and this falls to around 56.56 mAOD in the north west. In the south land is elevated to around 64.00 mAOD in the south west and 55.99 mAOD in the south east. This also indicates that there is a secondary southern slope of around 11 m.

Bryncethin

- 4.10 A topographic survey for the Bryncethin site was completed by Zenith Land Surveys Ltd. in October 2022, reference 21779_A, and indicates that the site slopes broadly to the south west with the highest elevations all along the site's boundary. The highest elevations are at the north eastern boundary reaching around 94 mAOD. The site then falls quite drastically 79 mAOD in the north eastern areas, and the slopes more gently to the south west corner which is elevated around 76 mAOD. The areas to the west of the site are relatively undulating with a topographical low point of 72.83 mAOD in the centre of the western boundary.

5 HYDROGEOLOGICAL SETTING

Brynmenyn

- 5.1 British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is primarily situated on Diamicton Till. A south-east portion of the site is underlain by Glaciofluvial Deposits comprising sand and gravel. This is wholly underlain by South Wales Middle Coal Measures Formation comprising mudstone, siltstone and sandstone.
- 5.2 No BGS boreholes have been identified on site. Three boreholes to the north west of the site (BGS Reference: SS98SW127, SS98SW126 and SS98SW128) gave no indication of groundwater depths.
- 5.3 The soils are described as 'slowly permeable wet very acid upland soils with a peaty surface' by the National Soils Research Institute.
- 5.4 According to the BGS GeoIndex Aquifer Designation Mapping, the bedrock are classified as a Secondary A Aquifer. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
- 5.5 According to NRW BETA mapping, the western half of the site is identified to have 'Medium to High' groundwater vulnerability and the eastern half the site is classified to have 'Medium to Low' groundwater vulnerability.
- 5.6 NRW online groundwater Source Protection Zone (SPZ) mapping indicates that the site is not located within a groundwater SPZ.

Bryncethin

- 5.7 BGS online mapping (1:50,000 scale) indicates that the majority of the site has no superficial deposits recorded. In regard to bedrock, the southern portion of the site is underlain by South Wales Middle Coal Measures Formation, which consists of mudstone, siltstone and sandstone. The northern portion of the site is underlain by the Llynfi Member which comprises mudstone, siltstone and sandstone.
- 5.8 There are three BGS boreholes located within the site (BGS Reference: SS98SW86, SS98SW11 and SS98SW85). No groundwater depths were mentioned in these boreholes records.
- 5.9 The soils are described as 'slowly permeable wet very acid upland soils with a peaty surface' by the National Soils Research Institute.
- 5.10 According to the BGS GeoIndex Aquifer Designation Mapping, both bedrock strata are classified as a Secondary A Aquifer. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
- 5.11 According to NRW BETA mapping, the site majority of the site is identified to have 'Low' groundwater vulnerability.
- 5.12 NRW online groundwater Source Protection Zone (SPZ) mapping indicates that the site is not located within a groundwater SPZ.

6 PROPOSED DEVELOPMENT

- 6.1 The proposed development is for a green hydrogen production facility and associated infrastructure on land at *Brynmenyn, Bridgend* together with the installation of a solar photovoltaic electricity generating station (solar farm) and associated infrastructure on land at *Bryncethin, Bridgend*.
- 6.2 The sites are to be connected via an electrical wire (part under and part overground).
- 6.3 According to Table 2 in Section 5 of TAN15, the hydrogen production facility (“vulnerable industrial development e.g. power stations, chemical plants, incinerators”) is classified as “Highly Vulnerable” whereby solar farm developments (“[...] utilities infrastructure”) are classified as “Less Vulnerable”.

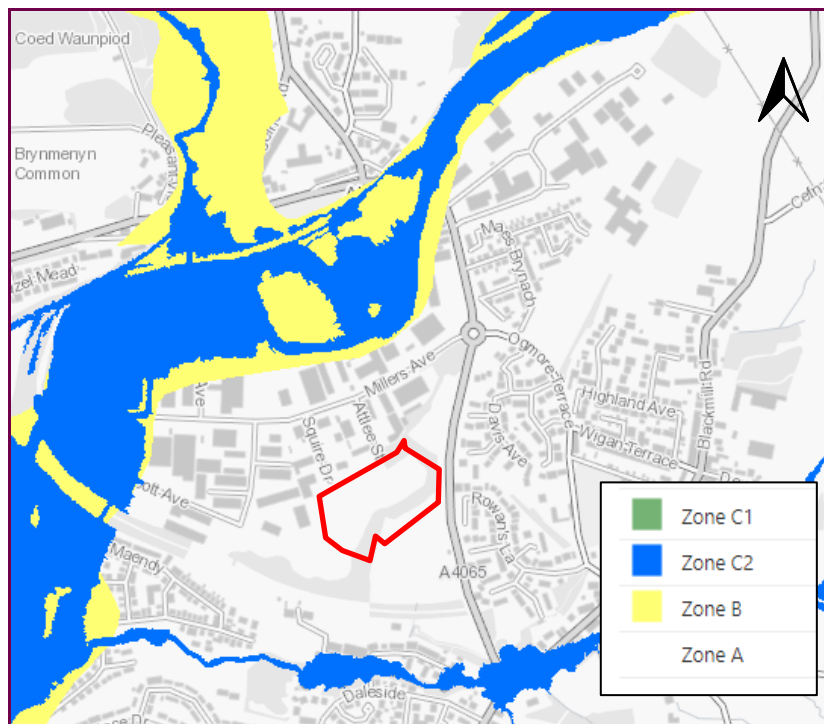
7 BRYNMENYN HYDROLOGICAL SETTING

Nearby Watercourses

- 7.1 The River Ogmore is present approximately 140 m north of the Brynmenyn site and flows west.
- 7.2 No significant artificial watercourses / features (e.g. canals, reservoirs) have been identified within 1km of the site.

Published Flood Zone

- 7.3 The Welsh Assembly Government produces Development Advice Maps (DAM) to accompany TAN 15. These maps show the degree of flood risk which is to be applied to the site for the planning process and thus establish the suitability of the site for development. These maps are based upon the Natural Resource Wales flood maps and similarly they can be modified through the presentation of data (i.e. hydraulic modelling) to illustrate that a site is within a different flood zone. The DAM is presented in Figure 2, below.
- 7.4 The DAM indicates that the Brynmenyn site is located within Zone A. Zone A is described in TAN15 as those areas “considered to be at little or no risk of fluvial or coastal/tidal flooding”.



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Figure 2. NRW Development Advice Map - Brynmenyn

- 7.5 RPS notes that TAN 15 (published in 2004) and TAN 14 (published in 1998) are being replaced by a new TAN 15. The existing documents will both be cancelled, and the current TAN 15 Development Advice Map will be replaced by a new Flood Map for Planning, which is available in advance. These changes will come into effect in June 2023. Although the Flood Map for Planning has no official status for planning purposes until June 2023 the new maps have been referenced and discussed below alongside the current NRW flood mapping.

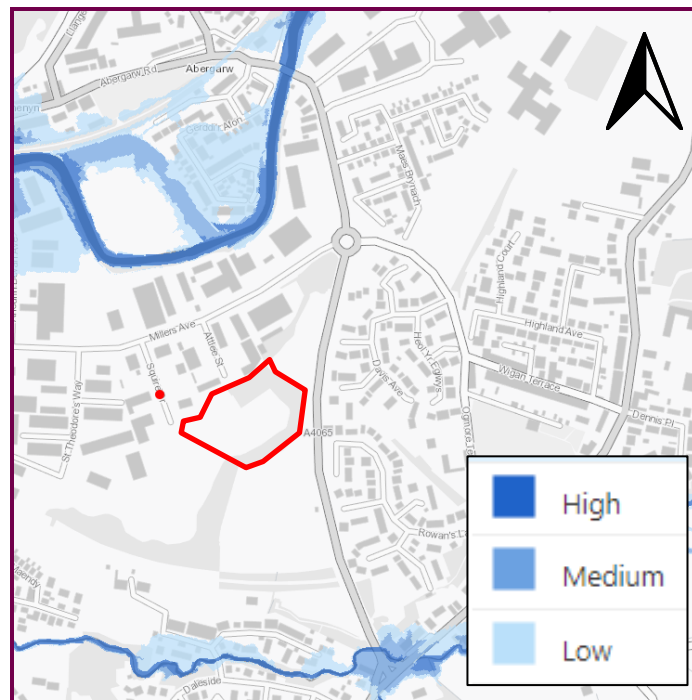
Tidal Flood Risk

7.6 The current NRW Flood Risk from the Sea map indicates that the Brynmenyn site is not considered at risk of sea flooding. Additionally, the new NRW Sea Flood Zones do not encroach the site boundaries.

Fluvial Flood Risk

7.7 The current NRW Flood Risk from River's map is included in Figure 3 below. These Flood classifications take into account the effect of any defences that may be in this area.

7.8 The Flood Risk from River's Map indicates that the Brynmenyn site is not considered to be at fluvial flood risk.



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Figure 3. NRW Flood Risk from River's Map - Brynmenyn

7.9 The new NRW Flood Map for Planning is included as Figure 4. These Flood Zone classifications are synonymous with Environment Agency Flood Zones and take account of the anticipated impacts of climate change.

7.10 The NRW's new Flood Map for Planning (for rivers) identifies that the site is classified as the equivalent as Flood Zone 1, whereby the annual probability of flooding is less than 1 in 1,000 (0.1%).



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Figure 4. NRW Flood Map for Planning (Rivers and the Sea) - Brynmenyn

NRW Flood Modelling

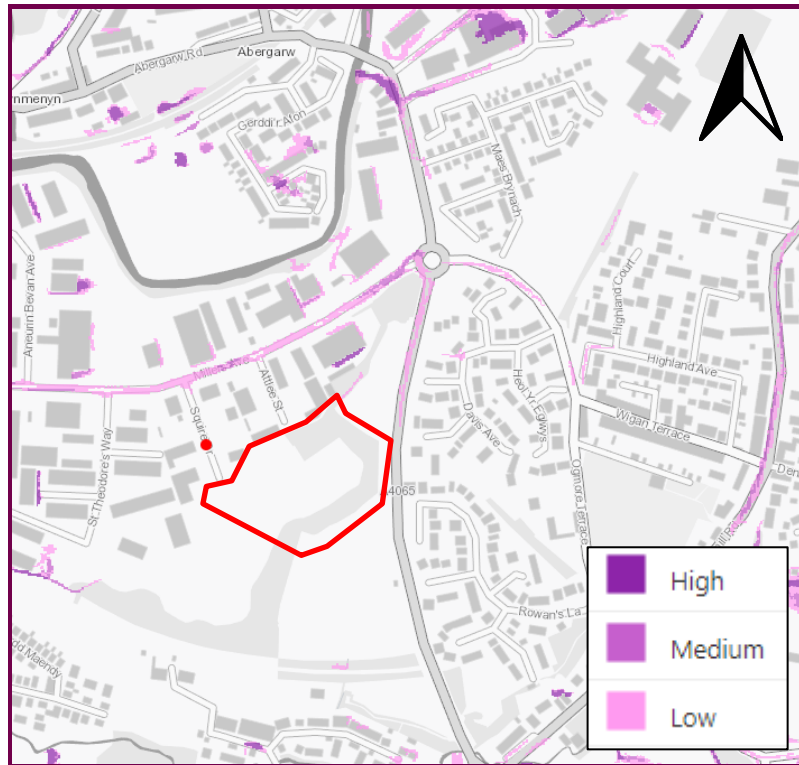
7.11 The NRW has been consulted for additional information relating to the fluvial flood risk to the site. The flood model for Aberkenfig (2014) was provided which RPS extracted and processed. Key information of relevance to this assessment is summarised below and the full mapping outputs are provided in Appendix A.

- For both the defended and undefended scenarios, the site is shown to be outside the flood event for the 1 in 100-year, 1 in 100 plus 20% climate change and 1 in 1,000-year events.

Surface Water Flood Risk

7.12 NRW online surface water flood mapping provides surface water flood extents for the 1 in 30, 1 in 100 and 1 in 1,000-year return periods. The NRW Flood Risk from Surface Water Map is provided in Figure 5.

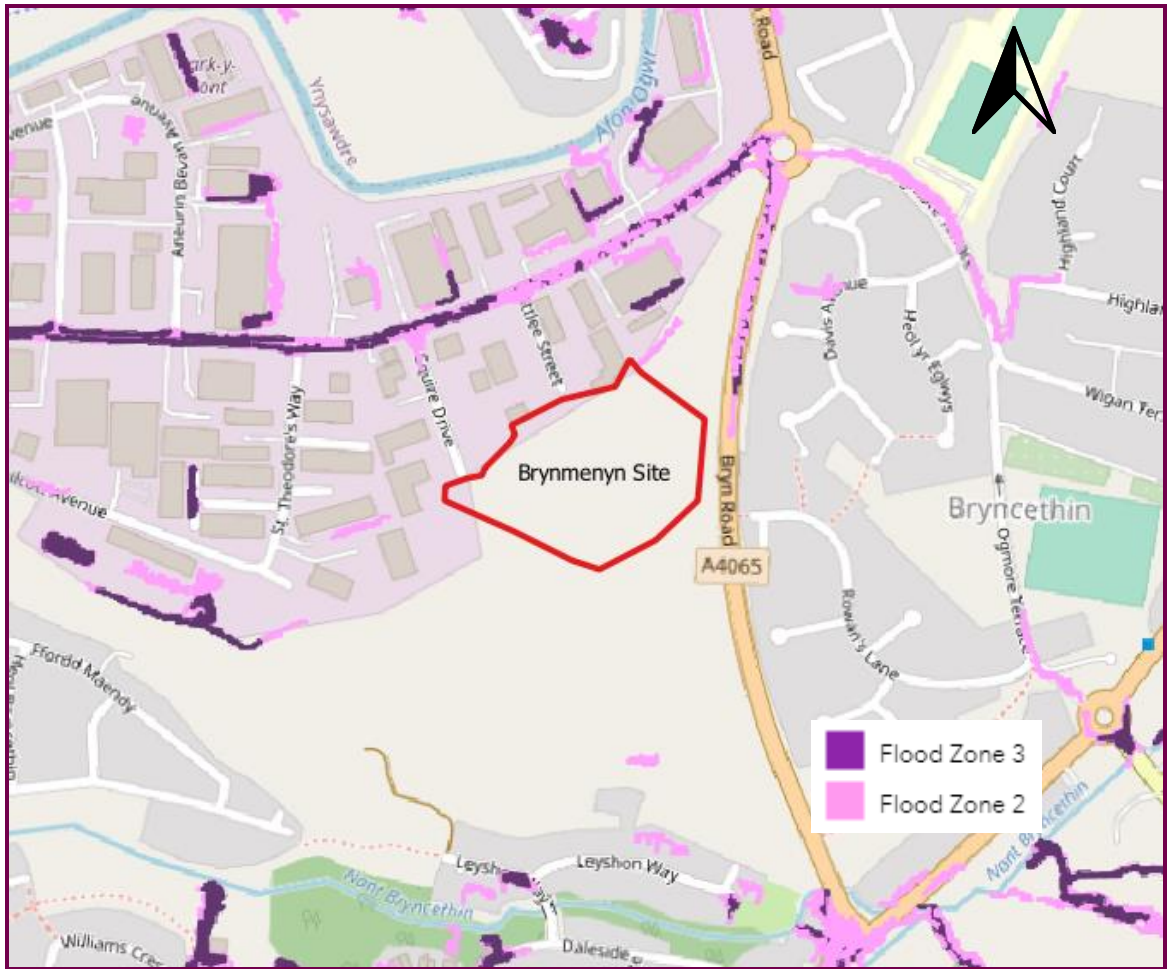
7.13 The Flood Risk from Surface Water and Small Watercourse's Map indicates that the Brynmenyn site is not considered to be at flood risk.



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Figure 5. NRW Surface Water Flood Risk Map - Brynmenyn

- 7.14 RPS notes that this modelling has several limitations, most significantly that it does not accurately represent the drainage capacity in urban areas.
- 7.15 The NRW's new Flood Map for Planning includes Flood Zones for surface water and small watercourses with consideration for climate change and how it will affect flood risk extents over the next century and is provided in Figure 6.
- 7.16 The NRW's new Flood Map identifies that the site is classified as the equivalent as Flood Zone 1, whereby the annual probability of flooding is less than 1 in 1,000 (0.1%).



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Figure 6. NRW Flood Map for Planning (Surface Water) - Brynmenyn

Reservoir Flood Risk

7.17 NRW mapping also indicates that the Brynmenyn site is located within an area potentially at risk from reservoir flooding.

Local Authority Flood Consequence Assessment

7.18 The BCBC SFCA was published in August 2010. It provides an overview of flood risk from various sources within the borough. Information relevant to this assessment is summarised below:

- The River Ogmore is a Main River within BCBC;
- The Council do not hold any historic flood records at the Brynmenyn site;
- NRW's Historic Flood Map identifies no historic flooding has occurred on the Brynmenyn site;
- There are 34 external records of sewer flooding associated with the postcode location 'CF32';
- The Brynmenyn site is not identified to be susceptible to surface water flooding;
- The site does not appear to be located within an area with groundwater flooding susceptibility;
- The risk of reservoir flooding across BCB is low;
- The Brynmenyn site is not located within an area with potential sources of artificial flooding.

8 BRYNMENYN FLOOD RISK ASSESSMENT

8.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial/Tidal Flooding

- 8.2 The DAM indicates that the site is considered to be at little or no risk of fluvial or coastal/tidal flooding.
- 8.3 The NRW Flood Map for Planning also indicates that the site is located within Flood Zone 1. The annual probability of flooding is classified as less than 1 in 1,000.
- 8.4 The SFCA indicates that no historical flood records are held at the Brynmenyn site.
- 8.5 TAN15 details the suitability of different land uses within each flood risk classification. The proposed land use is classified as 'highly vulnerable' and such uses are generally considered appropriate within Zone A.

Flooding from Sewers

- 8.6 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity.
- 8.7 The SFCA states that there are 32 external sewer flooding records held at the 'CF32' postcode location.
- 8.8 No site-specific sewer flood history data was available at the time of writing. In the unlikely event of a sewer surcharging event, water is expected to adhere to the path of least resistance and follow the topography. As the site slopes to the north and Welsh Water assets are located to the north, it is considered that water would not flow towards the development.

Surface Water Flooding (Overland Flow)

- 8.9 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems.
- 8.10 The Flood Risk from Surface Water and Small Watercourse's Map indicates that the Brynmenyn site is not considered to be at flood risk.
- 8.11 Additionally, the NRW's new Flood Map identifies that the site is classified as the equivalent as Flood Zone 1, whereby the annual probability of flooding is less than 1 in 1,000 (0.1%).
- 8.12 Therefore, the risk of surface water flooding to the Brynmenyn site can be considered 'low'.

Proposed Mitigation

- 8.13 Surface water runoff generated as a result of the development is being considered in a separate drainage strategy completed by Mott MacDonald in November 2022.

Groundwater Flooding

- 8.14 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures. BGS mapping indicates that the sites are underlain by Secondary A Aquifers.
- 8.15 The Brynmenyn site does not appear to be located within an area with groundwater flooding susceptibility.
- 8.16 As no basement levels are proposed within the development at either site, the risk of groundwater flooding can be considered significantly reduced.

Other Sources

- 8.17 The site is not located within the reservoir flood risk extent. Additionally, the site is not located within an area with potential sources of artificial flooding as noted by the SFCA.
- 8.18 The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

9 BRYNCETHIN HYDROLOGICAL SETTING

Nearby Watercourses

- 9.1 OS Mapping indicates that the nearest main river is Bryncethin Brook, which is present immediately to the south west of the Bryncethin site. There are tributaries for this Brook within the southern portion of the Bryncethin site. The river flows in a western direction.
- 9.2 No significant artificial watercourses / features (e.g. canals, reservoirs) have been identified within 1km of the site.

Published Flood Zone

- 9.3 The Welsh Assembly Government produces Development Advice Maps (DAM) to accompany TAN 15. These maps show the degree of flood risk which is to be applied to the site for the planning process and thus establish the suitability of the site for development. These maps are based upon the Natural Resource Wales flood maps and similarly they can be modified through the presentation of data (i.e. hydraulic modelling) to illustrate that a site is within a different flood zone. The DAM is presented in Figure 7, below.
- 9.4 The Bryncethin site is primarily located in Zone A, however there are portions of the centre and western site that are located in Zone C2, seemingly associated with the ordinary watercourses in those areas. Land in Zone C2 is described as "areas of the floodplain without significant flood defence infrastructure".

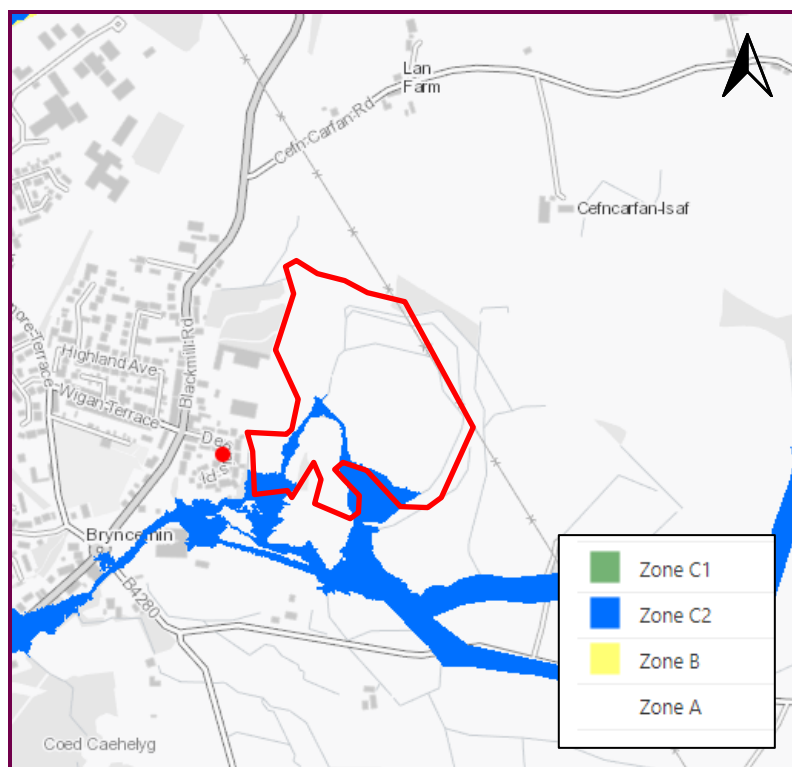


Figure 7. NRW Development Advice Map – Bryncethin

- 9.5 As stated previously, RPS notes that TAN 15 (published in 2004) and TAN 14 (published in 1998) are being replaced by a new TAN 15. The existing documents will both be cancelled, and the current TAN 15 Development Advice Map will be replaced by a new Flood Map for Planning, which is available in advance. These changes will come into effect in June 2023. Although the Flood Map for

Planning has no official status for planning purposes until June 2023 the new maps have been referenced and discussed below alongside the current NRW flood mapping.

Tidal Flood Risk

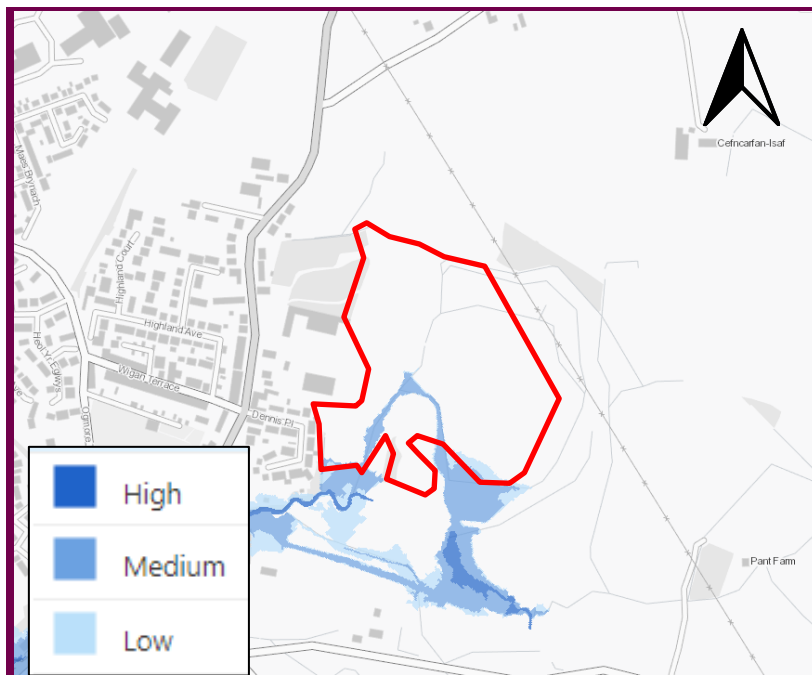
9.6 The current NRW Flood Risk from the Sea map indicates that the Bryncethin site is not considered to be at risk of sea flooding. Additionally, the new NRW Sea Flood Zones do not encroach the site boundaries.

Fluvial Flood Risk

9.7 The current NRW Flood Risk from River’s map is included in Figure 8 below. These Flood classifications take into account the effect of any defences that may be in this area.

9.8 While the Bryncethin site primarily has ‘very low’ risk of fluvial flooding, there is mixed ‘low’ and ‘medium’ risk within the south of the site associated with tributaries of Bryncethin Brook.

- ‘Low’ means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%); and
- ‘Medium’ means that each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).

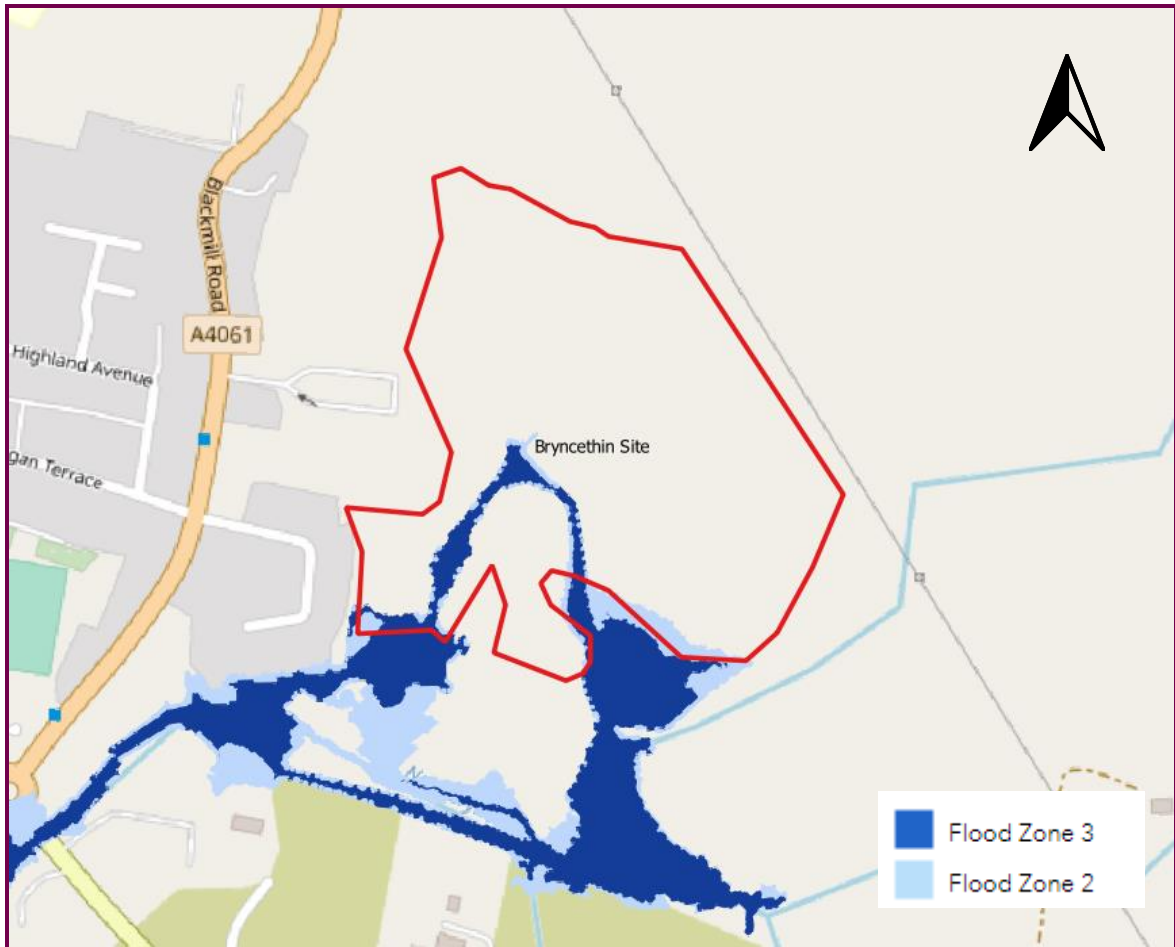


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Figure 8. NRW Flood Risk from River’s Map – Bryncethin

9.9 The new NRW Flood Map for Planning is included as Figure 9. These Flood Zone classifications are synonymous with EA Flood Zones and take account of the anticipated impacts of climate change.

9.10 The Bryncethin site, although it is primarily in Flood Zone 1, there are areas of Flood Zone 2 and Flood Zone 3 that extend into the site and within the southern areas associated with the Bryncethin Brook. Flood Zone 2 correlates with an annual probability of fluvial flooding that is between 1 in 1,000 and 1 in 100 (1%). Flood Zone 3 correlates with an annual probability of flooding that is over 1 in 100.



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Figure 9. NRW Flood Map for Planning (Rivers and the Sea) – Bryncethin

NRW Flood Modelling

9.11 The NRW has been consulted for additional information relating to the fluvial flood risk to the site. The flood model for Aberkenfig (2014) was provided which RPS extracted and processed. Key information of relevance to this assessment is summarised below and the full mapping outputs are provided in Appendix A.

- As the Bryncethin site is identified by NRW DAM to be located in Zone C2 whereby land is "without significant flood defence infrastructure", the undefended flood levels were used to inform this FCA.
- The Aberkenfig (2014) model provided the flood extents for the 1 in 100-year, 1 in 100-year plus 20% Climate Change and 1 in 1,000-year events.
- For the 1 in 100-year fluvial flood event:
 - The flood extent follows the distribution of watercourses on site. A peak flood level of 75.95 mAOD is expected in the southern portion of the site and flood depths are estimated to be between 0.25 m and 1.00 m. The flood level falls to 73.04 mAOD towards the centre of the site and 71.13 mAOD in the south west. The northern and eastern portion of the site remains unaffected.
- For the 1 in 100-year plus 20% Climate Change fluvial flood event:
 - The flood extent follows the distribution of watercourses on site. A peak flood level of 76.05 mAOD is expected in the southern portion of the site and flood depths are estimated to be

between 0.25 m and 1.00 m. The flood level falls to 73.11 mAOD towards the centre of the site and 71.16 mAOD in the south west. The northern and eastern portion of the site remains unaffected.

- For the 1 in 1000-year fluvial flood event:
 - The flood extent follows the distribution of watercourses on site. A peak flood level of 76.19 mAOD is expected in the southern portion of the site and flood depths are estimated to be between 0.25 m and 1.00 m. The flood level falls to 73.23 mAOD towards the centre of the site and 71.19 mAOD in the south west. The northern and eastern portion of the site remains unaffected.

9.12 Due to the age and purpose of the modelling, it does not contain exact equivalent scenarios to those which are required for a 2022 FCA. Since the production of the modelling (in 2014) the Climate Change uplift magnitudes have been subject to revision. Guidance released in September 2021 recommends a 30% climate change allowance to be applied whereas the Aberkenfig (2014) model provides a 20% climate change allowance. Therefore, an exercise has been undertaken to calculate the approximate the fluvial flood level for the 1 in 100-year plus 30% climate change event for on-site nodes. The incremental exercise has been provided in full in Appendix B, and relevant nodes have been summarised in Table 2 below.

Table 2. Calculated 1 in 100-year + 30% Climate Change Flood Levels (mAOD)

		Aberkenfig (2014) Model Output Provided by Incremental Exercise for a NRW 2022 FCA		
Location	Node ID	1 in 100-year event	1 in 100-year + 20% CC*	1 in 100-year plus 30% CC*
South	7	75.95	76.05	76.11
	25	75.72	75.79	75.83
Centre	24	75.10	75.19	75.24
	18	73.08	73.13	73.15
	34	73.04	73.11	73.15
South / West	23	72.55	72.64	72.68
	13	72.28	72.33	72.36
	26	71.98	72.06	72.10

CC = Climate change allowance

- In the south of the site, a maximum flood level of 76.11 mAOD has been calculated for the 1 in 100-year plus 30% climate change event. The topographic survey shows that this is associated with a ditch elevated to around 75.19 mAOD, correlating to a flood depth of around 0.92 m. However, land in this area is elevated higher than this level (to 76 mAOD and above) on either side of the ditch and therefore water can be considered isolated to the ditch.

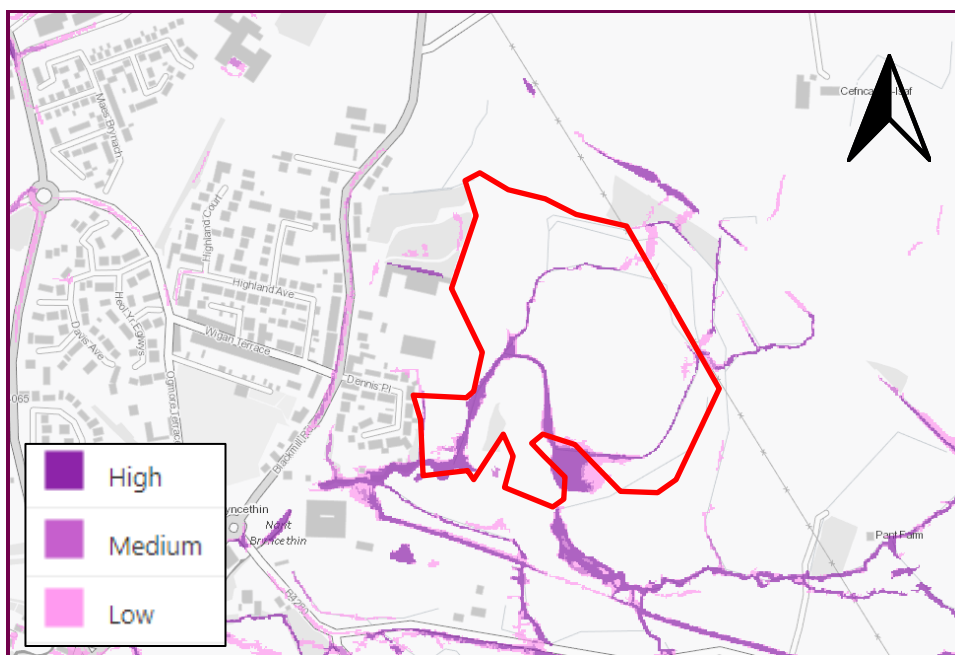
- Within the centre of the site the calculated flood level for the 1 in 100-year plus 30% climate change event is around 75.24 mAOD. The topographic survey shows that land in this area is elevated at around 75.04 mAOD, indicating potential flood depths of 0.20 m.
- In the south west of the site a maximum flood level of 72.68 mAOD has been calculated for the 1 in 100-year plus 30% climate change event. The topographic survey shows that land in this area is elevated higher than this level (to around 76 mAOD and above) and therefore can be considered out of the flood extent.
- It should be noted that the built development is proposed to be located outside of these areas identified to be at fluvial flood risk. These identified areas are proposed to remain as soft landscaping.

Surface Water Flood Risk

9.13 NRW online surface water flood mapping provides surface water flood extents for the 1 in 30, 1 in 100 and 1 in 1,000-year return periods. The NRW Flood Risk from Surface Water Map is provided in Figure 10.

9.14 While the Bryncethin site primarily has ‘very low’ risk of surface water flooding, there is mixed ‘low’, ‘medium’ and ‘high’ risk associated with tributaries of Bryncethin Brook.

- ‘Low’ means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%);
- ‘Medium’ means that each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%); and
- ‘High’ means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).



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Figure 10. NRW Surface Water Flood Risk Map – Bryncethin

9.15 RPS notes that this modelling has several limitations, most significantly that it does not accurately represent the drainage capacity in urban areas.

- 9.16 The NRW's new Flood Map for Planning includes Flood Zones for surface water and small watercourses with consideration for climate change and how it will affect flood risk extents over the next century and is provided in Figure 11.
- 9.17 The Bryncethin site, although it is primarily in Flood Zone 1, there are two flow paths identified as Flood Zone 2 and Flood Zone 3 that travel from the northern boundary, join through the centre of the site and then flow towards the Bryncethin Brook to the south. Additionally, there is a Flood Zone 3 flow path along the south-eastern site boundary. Flood Zone 2 correlates with an annual probability of surface water flooding that is between 1 in 1,000 and 1 in 100 (1%). Flood Zone 3 correlates with an annual probability of flooding that is over 1 in 100.



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Figure 11. NRW Flood Map for Planning (Surface Water) – Bryncethin

Reservoir Flood Risk

- 9.18 NRW mapping also indicates that neither site is located within an area potentially at risk from reservoir flooding.

Local Authority Flood Consequence Assessment

- 9.19 The BCBC SFCA was published in August 2010. It provides an overview of flood risk from various sources within the borough. Information relevant to this assessment is summarised below:
 - The River Ogmore is a Main River within BCBC;
 - The Council do not hold any historic flood records at the Bryncethin site;
 - NRW's Historic Flood Map identifies no historic flooding has occurred on the Bryncethin site;
 - There are 34 external records of sewer flooding associated with the postcode location 'CF32';

- The southern areas of the Bryncethin site is identified to have 'more' susceptibility to surface water flooding.
- The site does not appear to be located within an area with groundwater flooding susceptibility;
- The risk of reservoir flooding across BCB is low;
- The site is not located within an area with potential sources of artificial flooding.

10 BRYNCETHIN FLOOD RISK ASSESSMENT

10.1 The key sources of flooding that could potentially impact the site are discussed below:

Tidal Flooding

10.2 Although the Bryncethin site is located within the DAM Zone C2, the current NRW Flood Risk from the Sea map indicates that the site is not considered to be at risk of sea flooding. Additionally, the new NRW Sea Flood Zones do not encroach the site boundaries.

10.3 Therefore, this flood risk is associated with fluvial flooding, which has been discussed below.

Fluvial Flooding

10.4 The DAM illustrates that northern portion of the Bryncethin site is located in Zone A, whereby there is little fluvial/ coastal flood risk. The southern portion of the site is located in Zone C2.

10.5 NRW Flood Risk from River's map classifies these areas of Zone C2 as mixed 'low', 'medium' and 'high' risk.

10.6 The new NRW Flood Map for Planning, which takes into consideration the effects of climate change, states that these areas are classified as Flood Zone 2 and Flood Zone 3.

10.7 Modelled flood levels for the 1 in 100-year, 1 in 100-year plus 20% climate change event and 1 in 1,000-year event were provided the NRW. The mapping shows fluvial flooding to remain limited to the south / south western portions of the site. The 1 in 100-year plus 30% climate change event flood levels were calculated in an incremental exercise, producing a maximum flood level of 76.11 m AOD.

10.8 Although there are areas of identified flood risk in the south / south western portions of the site - no built development of the proposed solar farm is located within an area of identified fluvial flood risk. Therefore, the development can be considered outside of the fluvial flood extent. The areas of identified flood risk are proposed to remain as soft landscaping, and consequently will not have an effect on the floodplain.

10.9 Additionally, a route of safe access and egress in the north of the site remains available all modelled events.

10.10 The SFCA indicates that no historical flood records are held at the Bryncethin site.

10.11 TAN15 details the suitability of different land uses within each flood risk classification. The proposed land use is classified as 'less vulnerable' and therefore the Justification Test is required. This has been addressed in Section 11.

Flooding from Sewers

10.12 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity.

10.13 The SFCA states that there are 32 external sewer flooding records held at the 'CF32' postcode location.

10.14 No site-specific sewer flood history data was available at the time of writing. In the unlikely event of a sewer surcharging event, water is expected to adhere to the path of least resistance and follow the topography.

Surface Water Flooding (Overland Flow)

- 10.15 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems.
- 10.16 The Flood Risk from Surface Water and Small Watercourse's Map indicates that the Bryncethin site has mixed 'low', 'medium' and 'high' flood risk.
- 10.17 The new NRW Flood Map for Planning, which takes into consideration the effects of climate change, states that the site has areas that are classified as Flood Zone 2 and Flood Zone 3.
- 10.18 Because of the nature of the proposed development, the solar panels will be situated on ground mounted frames and will be raised above surrounding ground. As such, the development is unlikely to cause an obstruction to any flow paths, nor will the panels themselves be at risk of being submerged from the overland flow.

Proposed Mitigation

- 10.19 Surface water runoff generated as a result of the development is being considered in a separate drainage strategy completed by Mott MacDonald in November 2022.

Groundwater Flooding

- 10.20 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures. BGS mapping indicates that the sites are underlain by Secondary A Aquifers.
- 10.21 The Bryncethin site does not appear to be located within an area with groundwater flooding susceptibility.
- 10.22 As no basement levels are proposed within the development at either site, the risk of groundwater flooding can be considered significantly reduced.

Other Sources

- 10.23 The site is not located within the reservoir flood risk extent. Additionally, the site is not located within an area with potential sources of artificial flooding as noted by the SFCA.
- 10.24 The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

11 FLOOD RISK VULNERABILITY CLASSIFICATION

Vulnerability Classification

- 11.1 In accordance with TAN 15, the proposed development is classified as 'Highly Vulnerable' development in flood risk terms.

Table 3. Flood Risk Vulnerability and Zone Compatibility

Flood Risk classification	Emergency Services	Highly Vulnerable	Less Vulnerable	Other
Zone A	Yes	Yes	Yes	Yes
Zone B	Yes	Yes	Yes	Yes
Zone C1	Justification test required	Justification test required	Justification test required	Justification test required
Zone C2	No	No	Justification test required	Acceptability of consequences

Key: **Yes**: Development is appropriate, **No**: Development should not be permitted

Justification Test

- 11.2 The aim of the Justification Test is to steer new development towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding would be less of an issue. For developments in Zone C, the Justification Test is required. TAN15 states development will only be justified if it can be demonstrated that:
- Its location in Zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or
 - Its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;
- And**
- It concurs with the aim of PPW and meets the definition of previously developed land; and
 - The potential consequences of a flooding event for the particular type of development have been considered.
- 11.3 As the 'highly vulnerable' development at the Brynmenyn site is located in Zone A, it is considered appropriate under TAN15 and the implementation of the Justification Test is not required.
- 11.4 Whilst the 'less vulnerable' development at the Bryncethin site is primarily located in Zone A, there are portions of the site that are located in Zone C2, thus application of the Justification Test has been considered below.
- 11.5 With reference to point b, the proposed development has the potential for significant beneficial economic effects at a local level in relation to employment opportunities and the purchasing of local services by construction works.
- 11.6 With reference to point c, a Phase 1 Desk Study conducted by Mott MacDonald states that the site has a mining history and has a history of reworking and infilling. Therefore, this site was previously developed.

- 11.7 At this stage, the potential consequences of flooding have been considered as per the requirement of point d. Although there are portions of the site within the modelled flood extents, as no built development is proposed in an area of flood risk, the development can be considered safe. Additionally, because of the nature of the proposed development, the solar panels will be situated on ground mounted frames and will be raised above surrounding ground. As such, the development is unlikely to cause an obstruction to any flow paths, nor will the panels themselves be at risk of being submerged from the overland flow.
- 11.8 The Bryncethin site is therefore considered to pass the Justification Test.

12 SUMMARY AND CONCLUSIONS

- 12.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in TAN15. Reference has also been made to the SFCA and the PFRA and following consultation with NRW.
- 12.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in Table 4.

Table 4. Proposed mitigation

Source of Flooding	Comment	Overall Flood Risk		
		L	M	H
Fluvial	Brynmenyn Not considered to be at significant risk.			
	Bryncethin Although the site has mixed 'low' to 'high' risk areas, the built development is proposed outside of the modelled flood extent. The solar panels will be raised off the ground level.	✓		
Tidal	Brynmenyn Not considered to be at significant risk.	✓		
Sewers	Bryncethin Not considered to be at significant risk.	✓		
Surface Water	Brynmenyn Not considered to be at significant risk.			
	Bryncethin Although the site has mixed 'low' to 'high' risk areas, the built development is proposed outside of the modelled flood extent. The solar panels will be raised off the ground level.	✓		
Groundwater	Brynmenyn Not considered to be at significant risk.	✓		
Other Sources (e.g. reservoirs, water mains)	Bryncethin Not considered to be at significant risk.	✓		

- 12.3 The Brynmenyn site is located in Zone A and is outside of all modelled flood extents. No other sources of flood risks were identified.
- 12.4 The Bryncethin site has areas located Zone C2, however all built development is within Zone A. No other significant sources of flood risks were identified.
- 12.5 It has been demonstrated that the development passes the Justification Test.
- 12.6 Separate drainage strategies prepared by Mott MacDonald in November 2022 ensure that each site can attenuate surface water up to and including the in 100 year + 40% climate change rainfall event. Overall, it can be demonstrated that the development will have positive effects of flood risk and surface water management.



APPENDICES

Appendix A

NRW Detailed Flood Data



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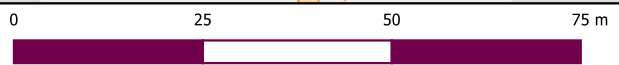
Brynmenyn Site

Flood Depth (m)

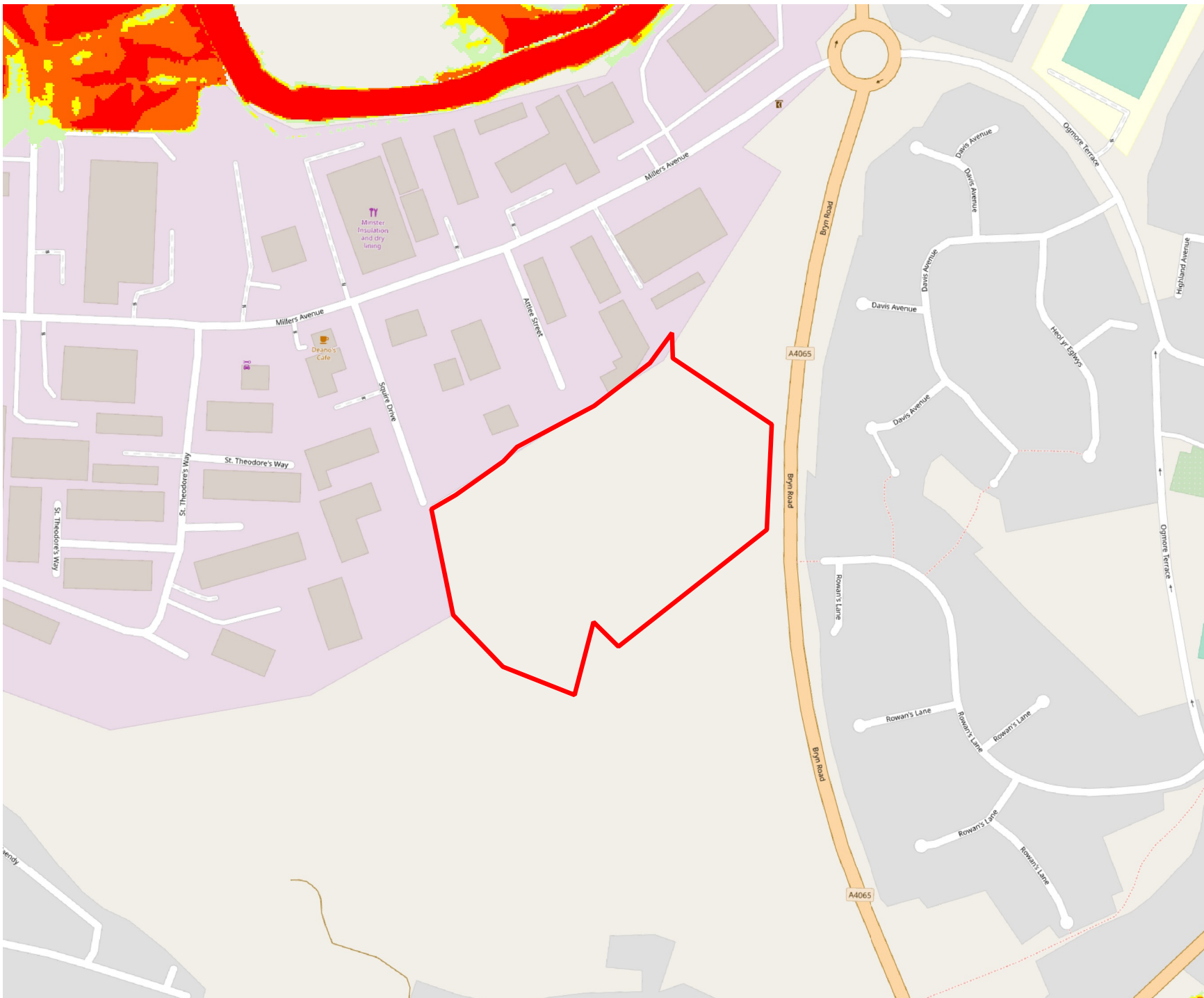
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- > 2.50

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Client: Marubeni		
Title: Undefended 1 in 1000-year Flood Depth Map		
Site: Brynmenyn		
Date: 04-11-2022		
Scale: 1:3000	Size: A3	
Job Ref: HLEF84951	Rev: A	
Drawn JC	Checked LS	Approved JM

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- Brynmenyn Site
- <0.75
- 0.75 to 1.25
- 1.25 to 2.00
- > 2.0

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 London, EC4A 4AB
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 W: rpsgroup.com

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Site: Brynmenyn

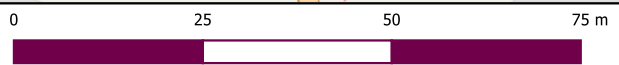
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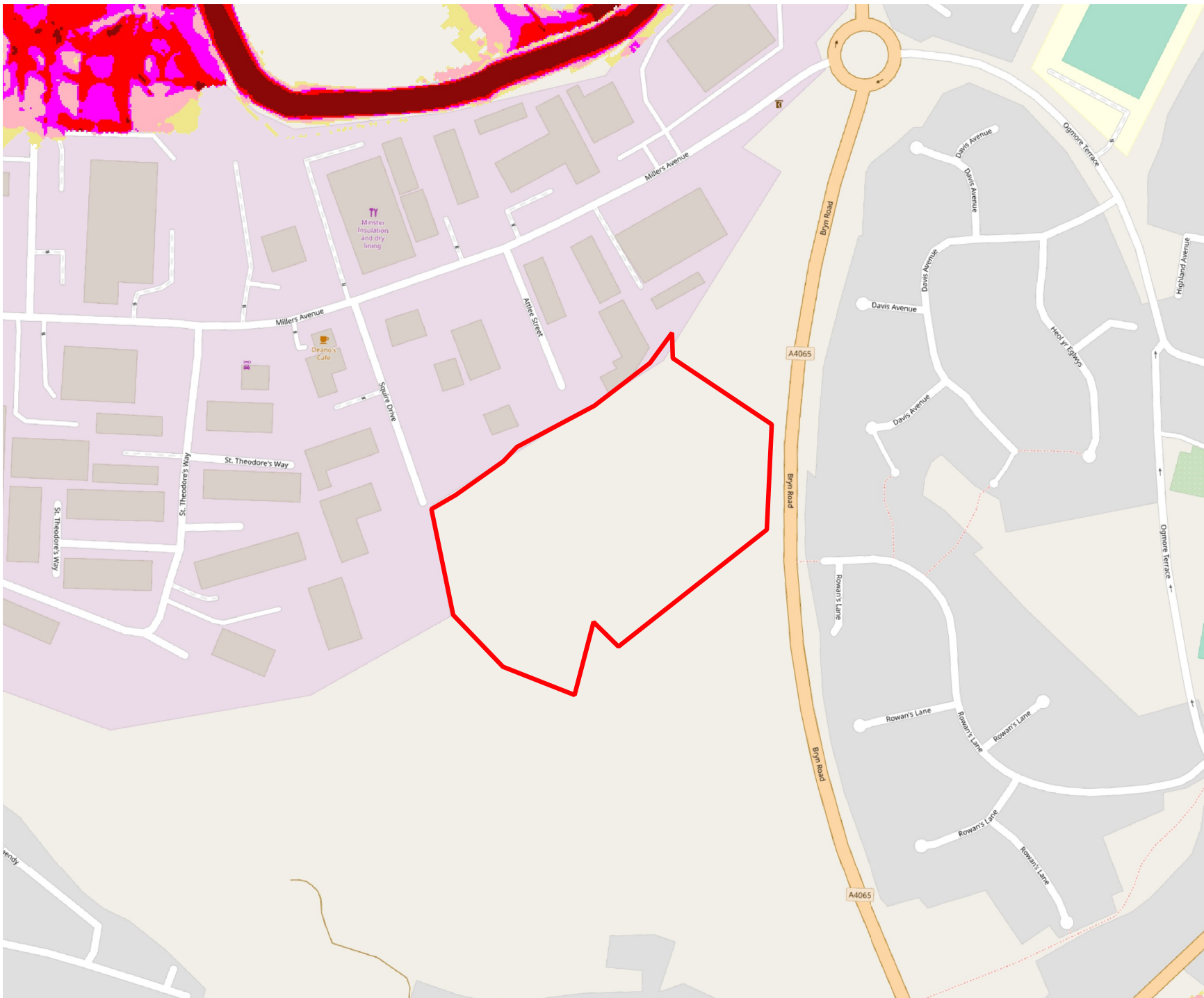
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Drawn JC	Checked LS	Approved JM
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Legend

Brynmenyn Site

Flood Velocity (m/s)

- <math>< 0.3</math>
- 0.3 to 1.00
- 1.00 to 1.50
- 1.50 to 2.5
- > 2.50

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Client: Marubeni
 Title: Undefended 1 in 1000-year
 Flood Velocity Map

Site: Brynmenyn

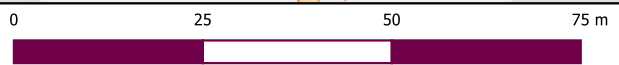
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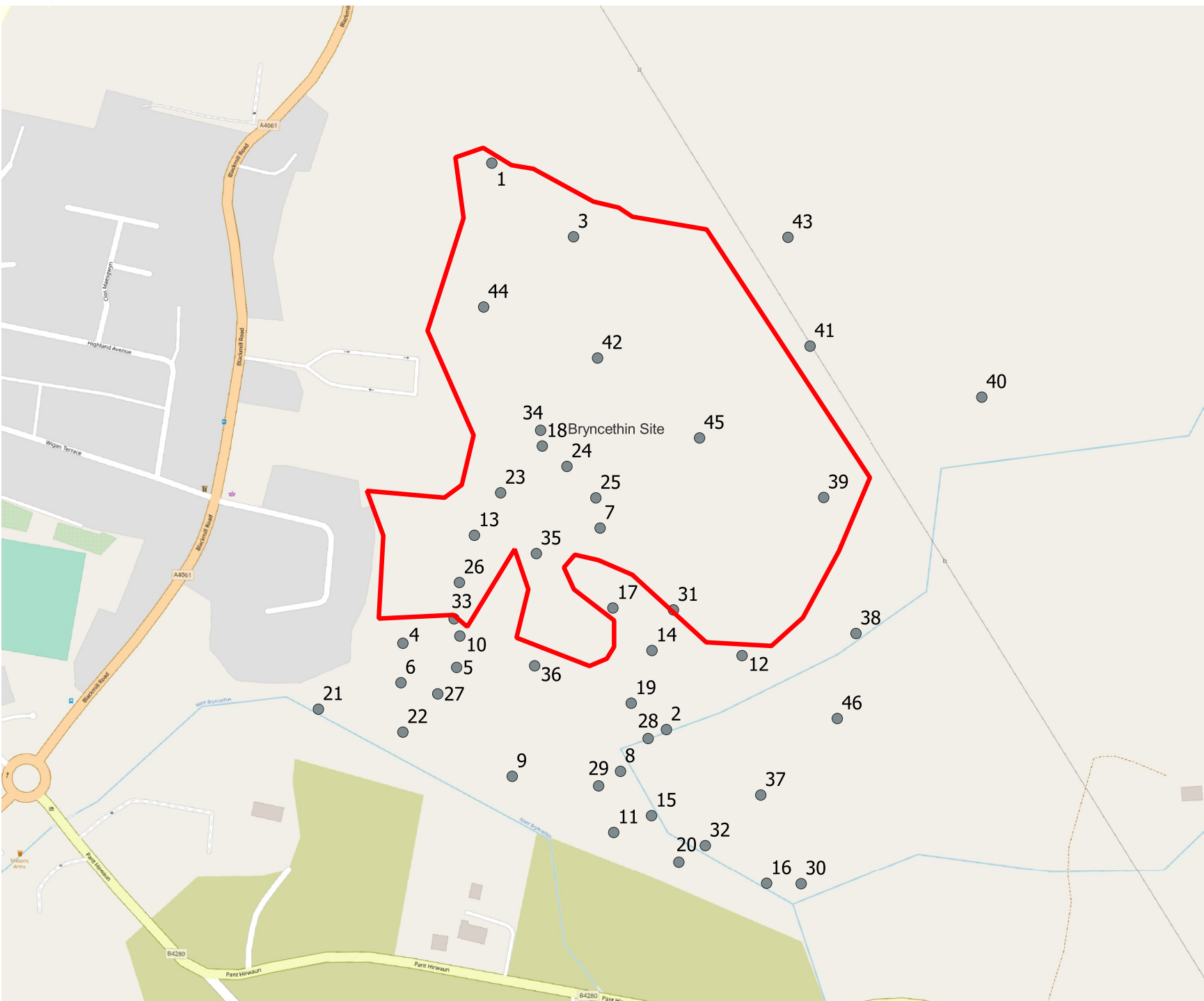
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Drawn JC	Checked LS	Approved JM
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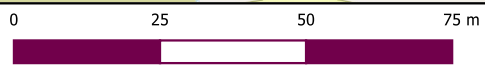
- ### Legend
- Bryncethin Site
 - Nodes

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 London, EC4A 4AB
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 W: rpsgroup.com

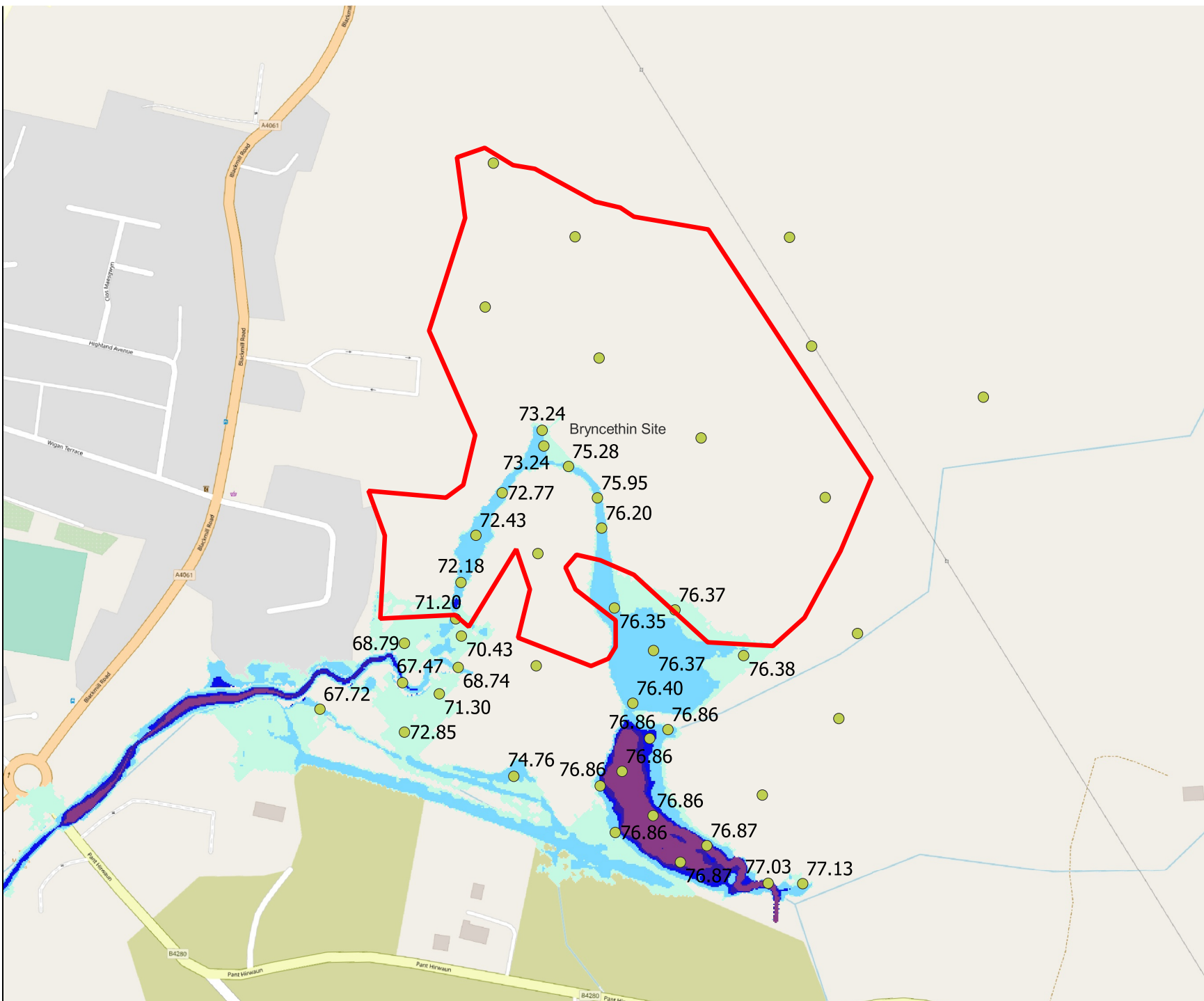
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Job Ref: HLEF84951	Rev: A	
Drawn JC	Checked LS	Approved JM

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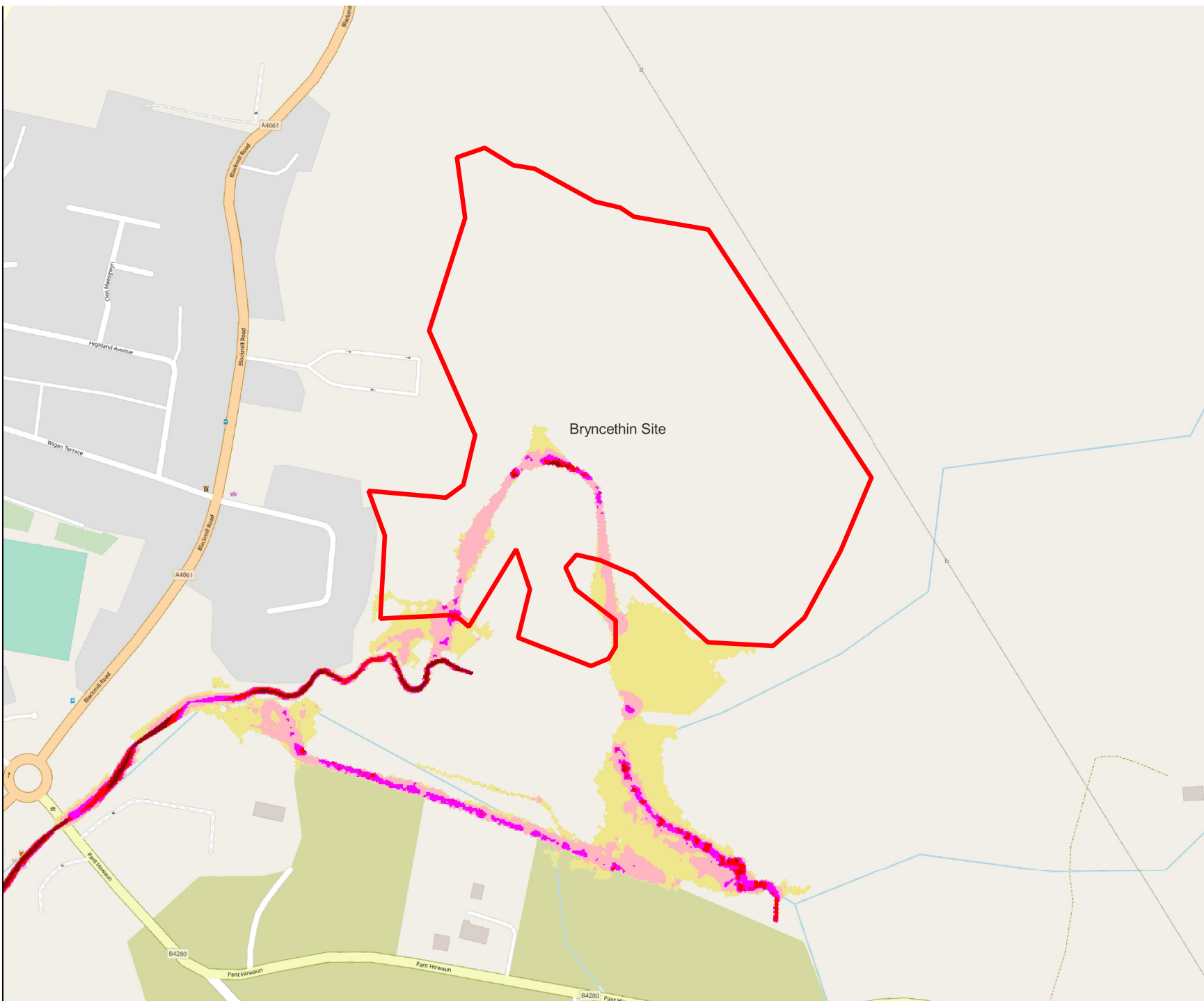
Legend

- Bryncethin Site
- Flood Level (mAOD)

Flood Depths (m)

- <0.25
- 0.25 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- > 2.50

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Title: Undefended 1 in 1000-year Flood Depth Map		
Site: Bryncethin		
Date: 16-11-2022		
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Job Ref: HLEF84951	Rev: A	
Drawn JC	Checked LS	Approved JM



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Legend

- Bryncethin Site
- Flood Velocity (m/s)**
- <0.3
- 0.3 to 1.00
- 1.00 to 1.50
- 1.50 to 2.5
- > 2.50

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 London, EC4A 4AB
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 W: rpsgroup.com

Client: Marubeni
 Title: Undefended 1 in 100-year
 Flood Velocity Map

Site: Bryncethin

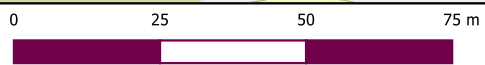
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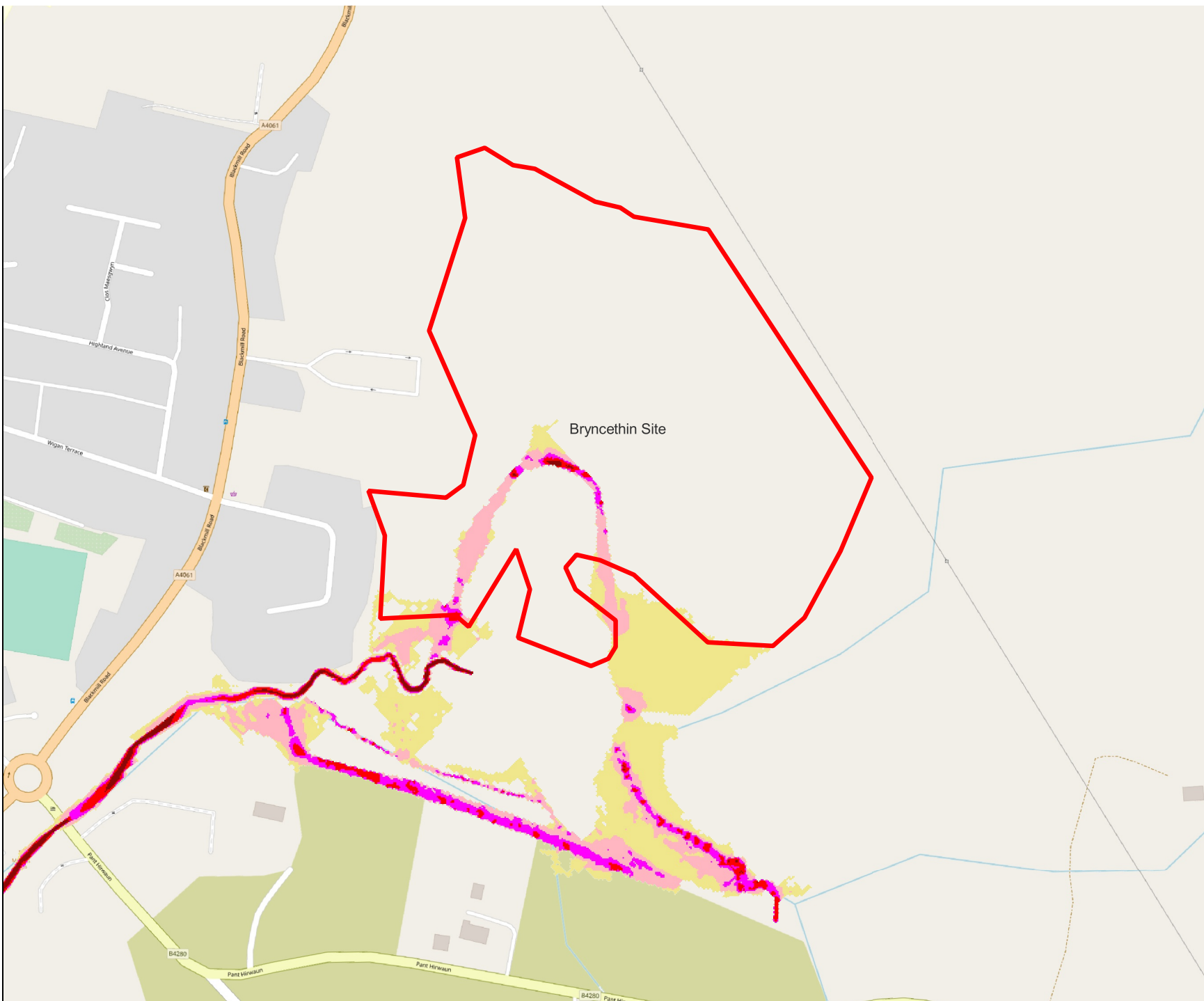
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Drawn JC	Checked LS	Approved JM
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Legend

Bryncethin Site

Flood Velocity (m/s)

- <0.3
- 0.3 to 1.00
- 1.00 to 1.50
- 1.50 to 2.5
- > 2.50



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London, EC4A 4AB
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W: rpsgroup.com

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Title: Undefended 1 in 100-year + 20% CC Flood Velocity Map

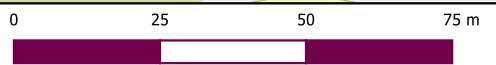
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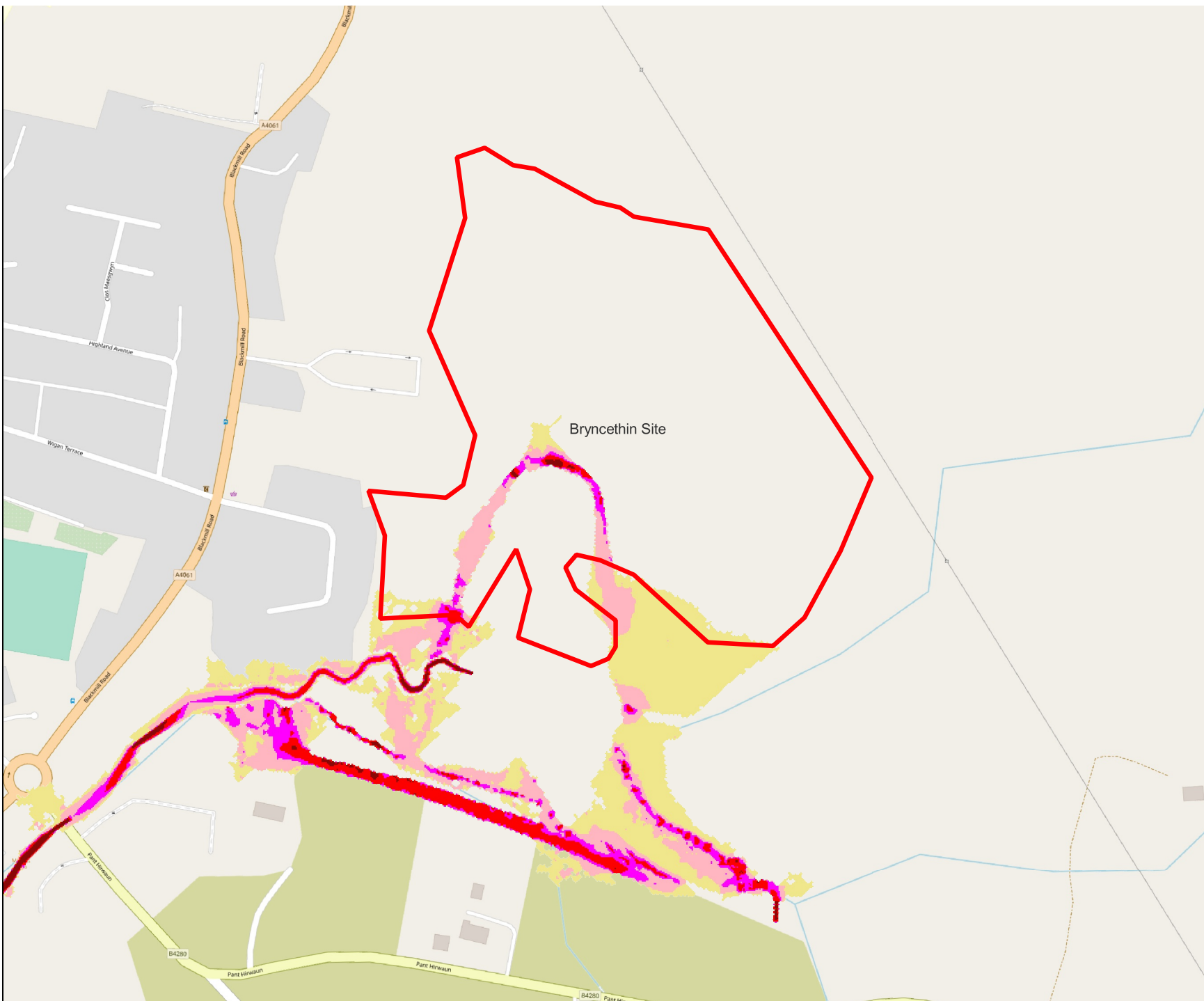
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2. If received electronically it is the recipients responsibility to print to the correct scale. Only written dimensions should be used.

Legend

Bryncethin Site

Flood Velocity (m/s)

- <0.3
- 0.3 to 1.00
- 1.00 to 1.50
- 1.50 to 2.5
- > 2.50

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20 Farringdon Street
 London, EC4A 4AB
 T: 020 7280 3300
 W: rpsgroup.com

Client: Marubeni

Title: Undefended 1 in 1000-year
 Flood Velocity Map

Site: Bryncethin

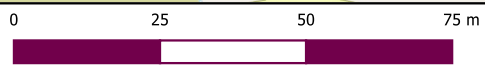
Date: 16-11-2022

Scale: 1:3880	Size: A3
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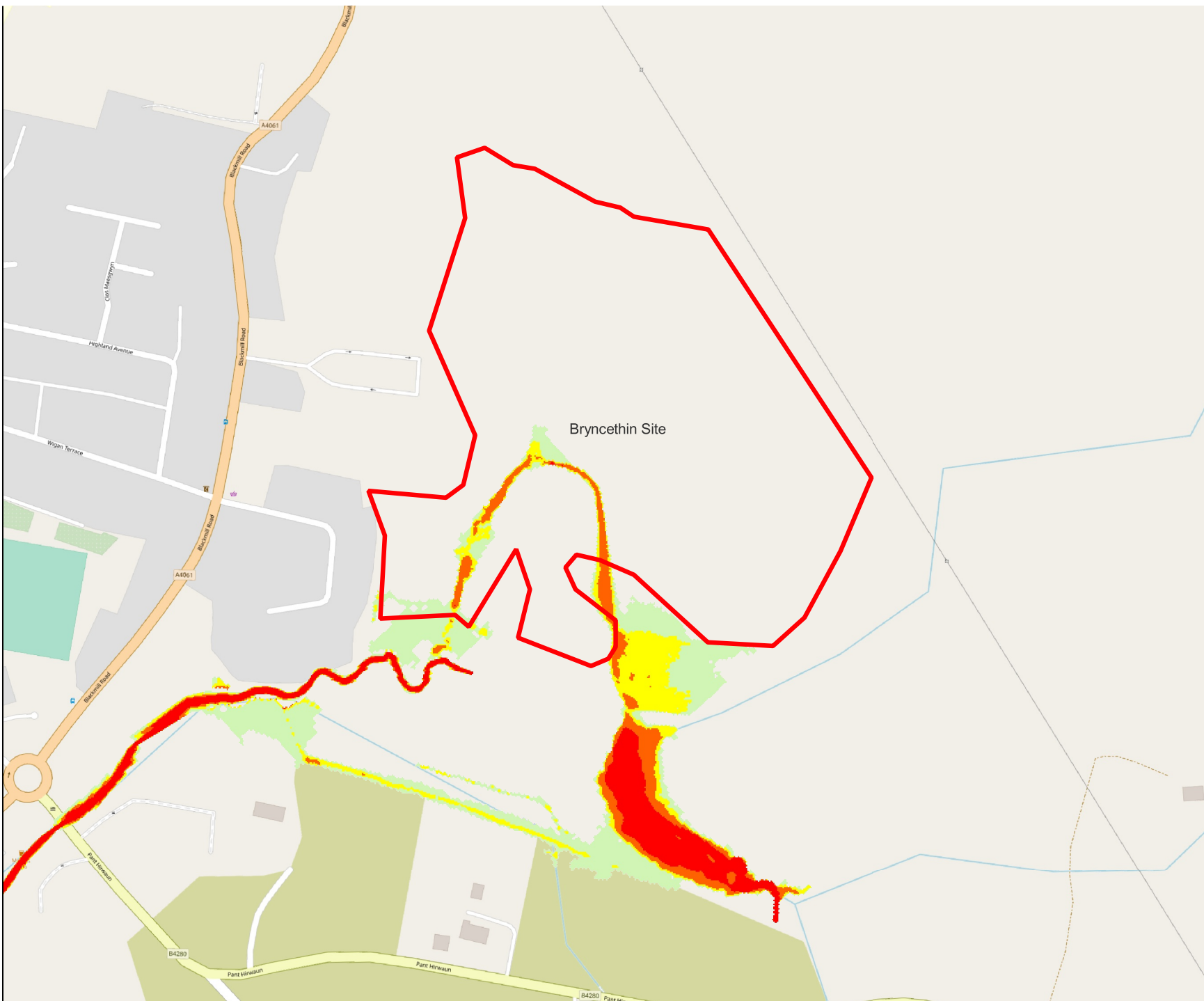
Job Ref: HLEF84951	Rev: A
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Drawn JC	Checked LS	Approved JM
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Legend

Bryncethin Site

Flood Hazard

- <0.75
- 0.75 to 1.25
- 1.25 to 2.00
- > 2.0

rps MAKING COMPLEX EASY
 20 Farringdon Street
 London, EC4A 4AB
 T: 020 7280 3300
 W: rpsgroup.com

Client: Marubeni
 Title: Undefended 1 in 100-year
 Flood Hazard Map

Site: Bryncethin

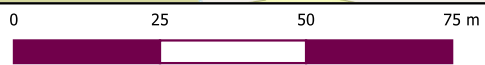
Date: 16-11-2022

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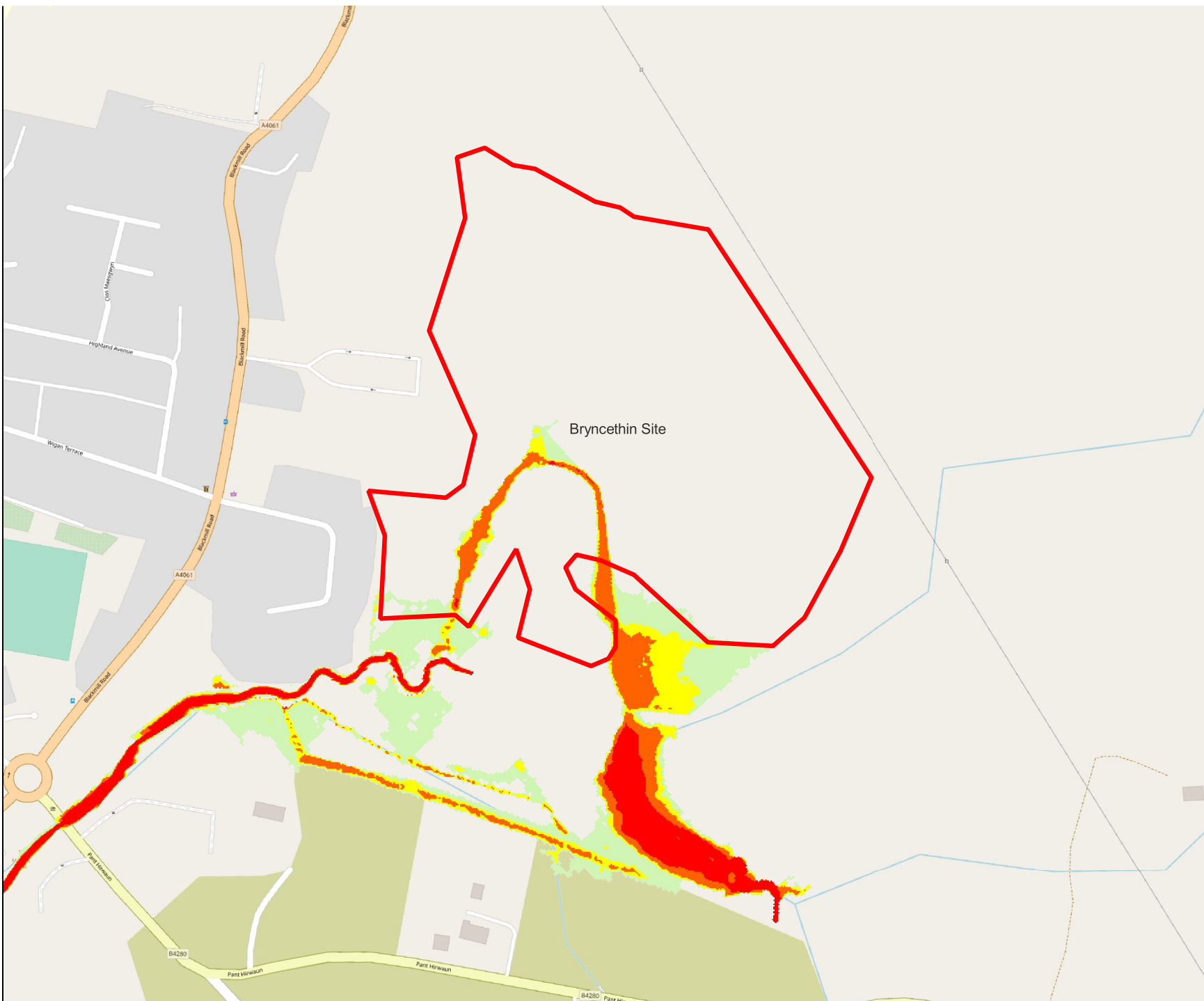
Job Ref: HLEF84951	Rev: A
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Drawn JC	Checked LS	Approved JM
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Legend

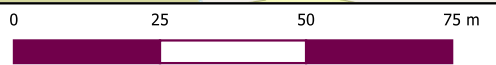
Bryncethin Site

Flood Hazard

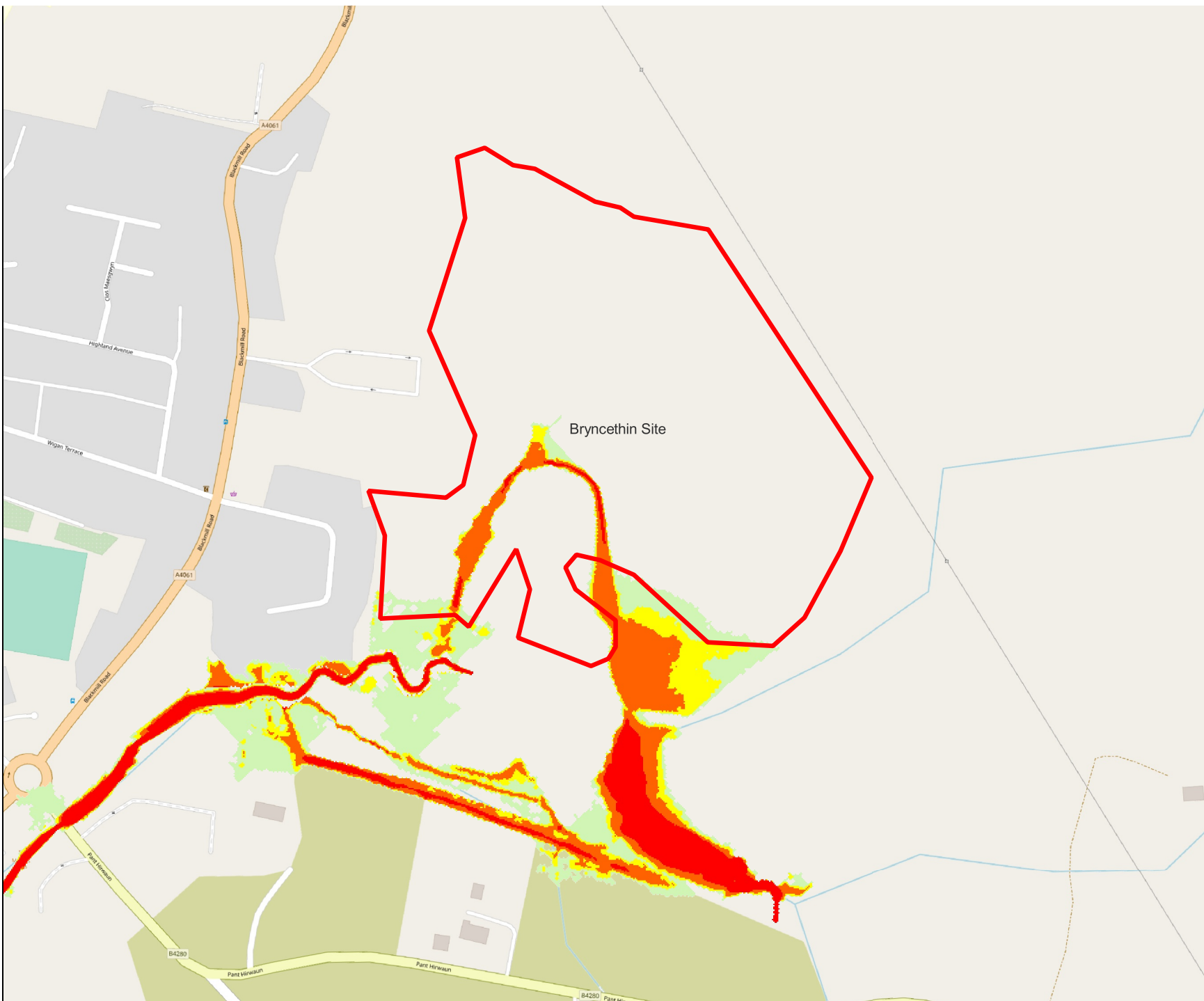
- <0.75
- 0.75 to 1.25
- 1.25 to 2.00
- > 2.0

	20 Farringdon Street London, EC4A 4AB T: 020 7280 3300 W: rpsgroup.com	
Client: Marubeni		
Title: Undefended 1 in 100-year + 20% CC Flood Hazard Map		
Site: Bryncethin		
Date: 16-11-2022		
Scale: 1:3880	Size: A3	
Job Ref: HLEF84951	Rev: A	
Drawn JC	Checked LS	Approved JM

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Legend

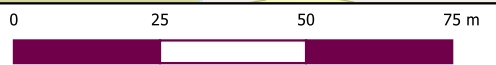
- Bryncethin Site

Flood Hazard

- <0.75
- 0.75 to 1.25
- 1.25 to 2.00
- > 2.0

		20 Farringdon Street London, EC4A 4AB T: 020 7280 3300 W: rpsgroup.com
Client: Marubeni		
Title: Undefended 1 in 1000-year Flood Hazard Map		
Site: Bryncethin		
Date: 16-11-2022		
Scale: 1:3880	Size: A3	
Job Ref: HLEF84951	Rev: A	
Drawn JC	Checked LS	Approved JM

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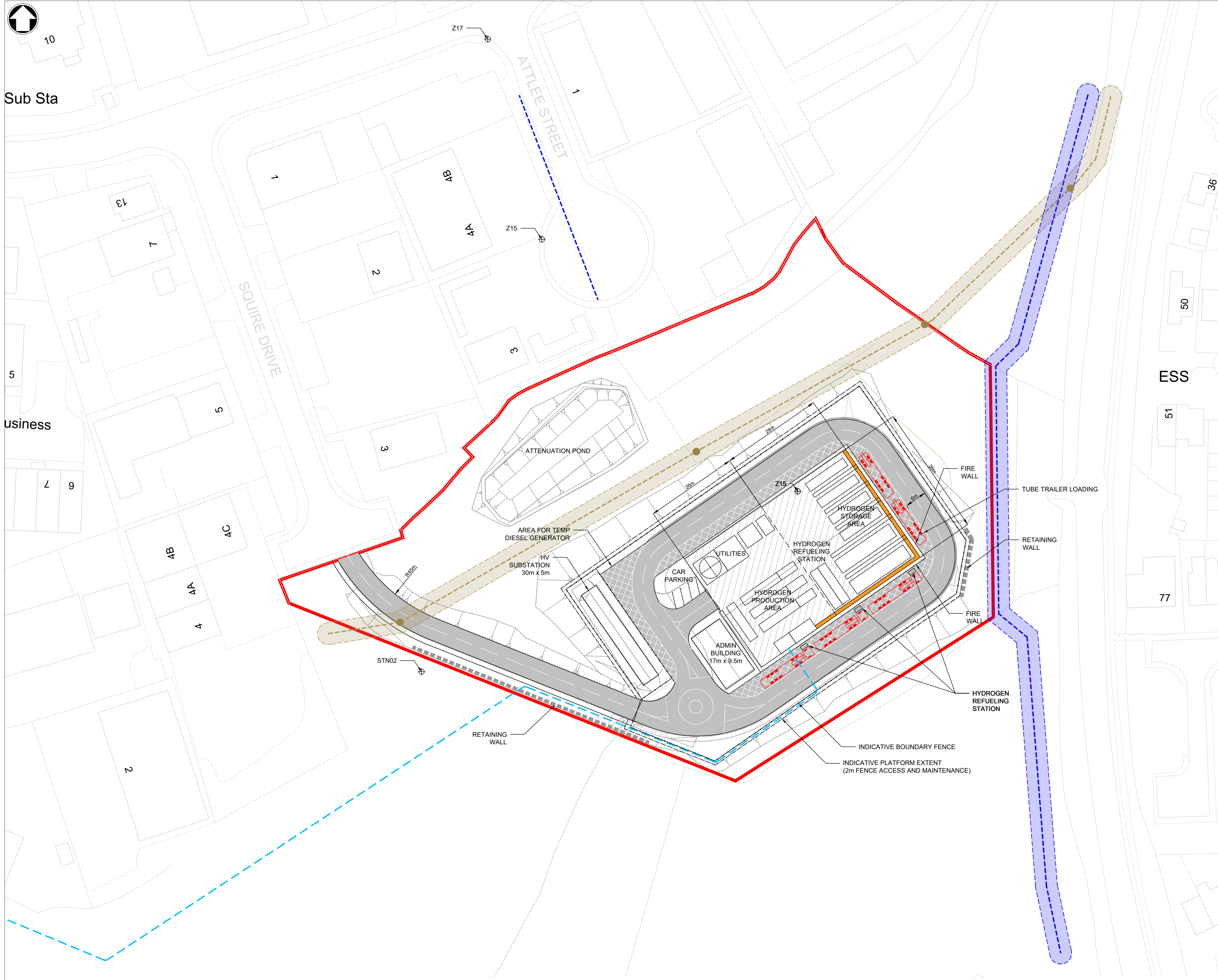
Appendix B

Climate Change Exercise

Undefended Flood Level for Bryncethin Site

Node ID	Fluvial Flood Event		Incremental Exercise			1 in 100+30% CC
	1 in 100	1 in 100+20% CC	20% CC	1% CC	30%CC	
1	null	null	null	null	null	null
2	76.72	76.77	0.05	0.00259	0.08	76.80
3	null	null	null	null	null	null
4	68.76	68.77	0.02	0.00078	0.02	68.78
5	68.70	68.71	0.01	0.00040	0.01	68.72
6	67.28	67.31	0.04	0.00187	0.06	67.33
7	75.95	76.05	0.11	0.00530	0.16	76.11
8	76.72	76.77	0.05	0.00259	0.08	76.80
9	null	74.5083	null	null	null	null
10	70.42	70.42	0.00	0.00014	0.00	70.42
11	76.72	76.77	0.05	0.00250	0.07	76.80
12	null	76.2555	null	null	null	null
13	72.28	72.33	0.06	0.00279	0.08	72.36
14	76.18	76.25	0.07	0.00373	0.11	76.29
15	76.72	76.77	0.05	0.00259	0.08	76.80
16	76.82	76.88	0.06	0.00311	0.09	76.91
17	76.10	76.19	0.10	0.00494	0.15	76.24
18	73.08	73.13	0.05	0.00258	0.08	73.15
19	76.20	76.27	0.08	0.00384	0.12	76.31
20	76.72	76.78	0.05	0.00258	0.08	76.80
21	67.46	67.60	0.14	0.00706	0.21	67.67
22	null	72.78	null	null	null	null
23	72.55	72.64	0.08	0.00420	0.13	72.68
24	75.10	75.19	0.09	0.00453	0.14	75.24
25	75.72	75.79	0.07	0.00356	0.11	75.83
26	71.98	72.06	0.08	0.00424	0.13	72.10
27	null	71.25	null	null	null	null
28	76.72	76.77	0.05	0.00259	0.08	76.80
29	76.72	76.77	0.05	0.00260	0.08	76.80
30	null	null	null	null	null	null
31	null	76.25	null	null	null	null
32	76.73	76.78	0.05	0.0026	0.08	76.80
33	71.13	71.16	0.03	0.0014	0.04	71.17
34	73.04	73.11	0.07	0.0037	0.11	73.15
35	null	null	null	null	null	null
36	null	null	null	null	null	null
37	null	null	null	null	null	null
38	null	null	null	null	null	null
39	null	null	null	null	null	null
40	null	null	null	null	null	null
41	null	null	null	null	null	null
42	null	null	null	null	null	null
43	null	null	null	null	null	null
44	null	null	null	null	null	null
45	null	null	null	null	null	null
46	null	null	null	null	null	null

Appendix C
Development Plans



- Notes
1. Do not scale from this drawing.
 2. All dimensions are in metres unless otherwise stated.
 3. This drawing is to be read in conjunction with all relevant documents and drawings.
 4. No unauthorised disclosure, storage or copying.
 5. All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36).
 6. All levels are in meters and relate to AOD (Ordnance Survey, Newlyn).
 7. Indicative high level site layout areas for hydrogen production, hydrogen storage, hydrogen refueling station and tube trailer loading.
 8. Admin/ security building to include control room and maintenance facilities.
 9. Site boundary depicts the land use case to support lease agreement discussions. Additional land may be required for third party interfaces unknown at this time.

Key to symbols

- SITE BOUNDARY
- EXISTING WATER MAIN
- EXISTING SEWER
- PIPELINE ROUTE
- UNIT OPERATION
- ROAD
- WAITING/ UNLOADING AREA

SITE STATION CONTROL

Z15	290968.323	184466.498
Z17	290953.470	184521.437
STN01	291038.569	184397.359
STN02	290935.296	184347.653

Reference drawings
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Rev	Date	Drawn	Description	Ch'k'd	App'd
H	17/11/22	TK	Attenuation and earthworks updated	PM	JP
G	04/11/22	TK	Pipeline route included	AH	JP
F	01/11/22	TK	Updated per discipline and client requirements	AH	JP
E	11/10/22	TK	Client comment incorporated	AH	JP
D	10/10/22	TK	Civil requirements incorporated	PM	JP
C	15/07/22	AS	Modified as per client comments	AH	JP
B	14/03/22	AS	Issued for Information	AH	AT
A	08/03/22	AS	Issued for Information	AH	AT
P01	12/02/22	MJ	Preliminary Issue	AH	JP

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 F +44 (0)20 8681 5706
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Client
Marubeni

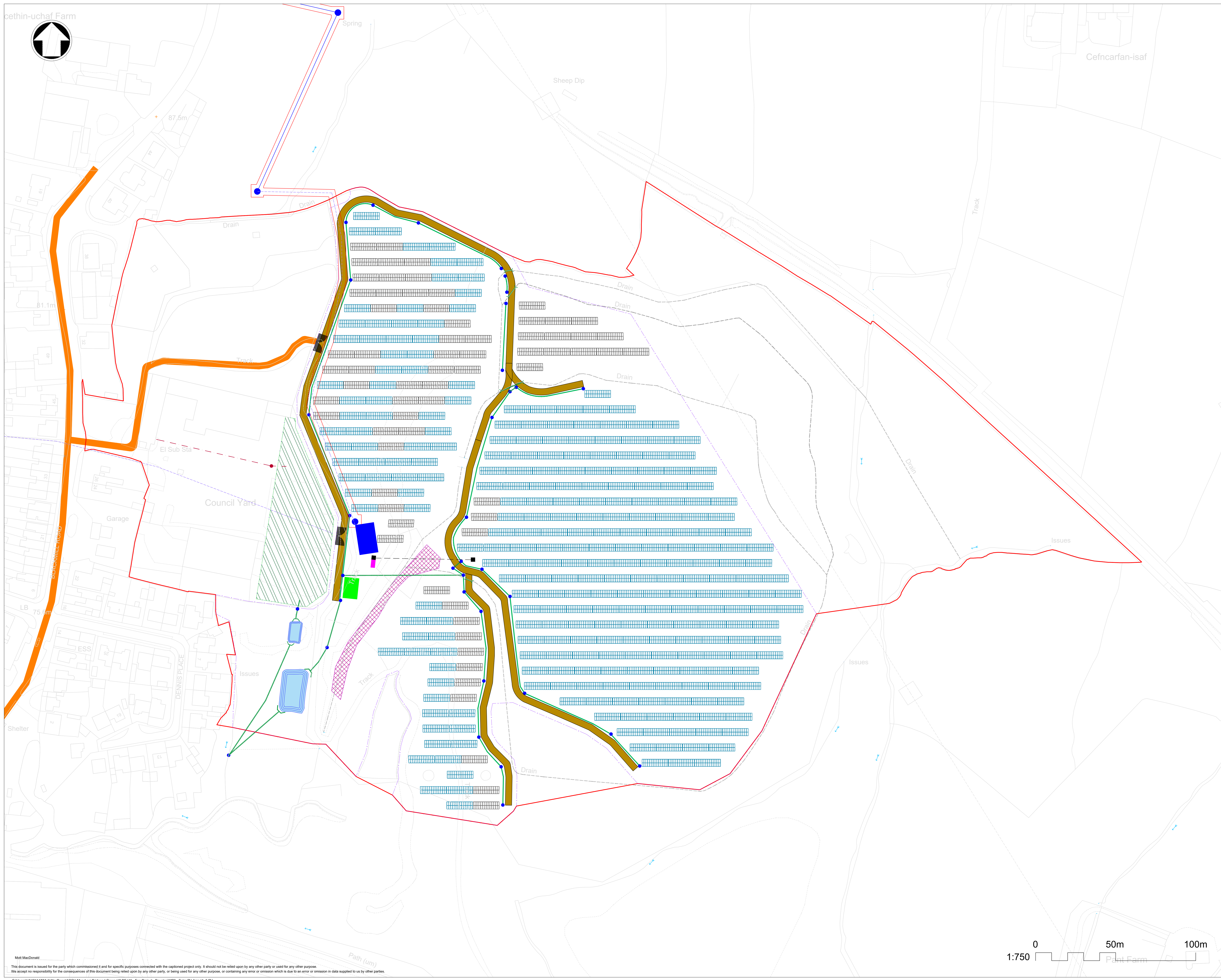
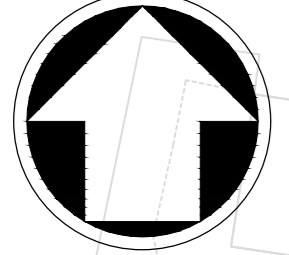
95 Gresham Street
 London
 EC2V 7AB
 +44 (0)20 7826 8811
 www.marubeni-europower.com

Title
Bridgend Green Hydrogen

Site Layout

Sheet 01 of 01

Designed	A.Harris	AH	Eng check	A.Ho	AH
Drawn	T.King	TK	Coordination	T.King	TK
Dwg check	T.King	TK	Approved	J.Paul	JP
MMD Project Number	108939	Scale at A1	1:500	Security	STD
Suitability Description	Suitable for Review & Comment				Suit. Code
Drawing Number	108939-MMD-BRGR-XX-DR-C-0002				Revision
					H



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 5. All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36).
 6. All levels are in meters and relate to AOD (Ordnance Survey, Newlyn).
 7. Private wire route alignment subject to update by designer; the expected wire route revision to follow the fence line and not pass through the solar panel array.
 8. Pending results of surveys, the site may be subject to minor grading/preparatory groundworks to level steeper slopes in the panel area.

- Key to symbols
- Site Boundary
 - Fence
 - LV OHL Private wire route Option 1
 - LV buried Private wire route Option 2
 - Drainage plan design
 - New internal road
 - Existing road
 - Switchgear
 - 2P14 frame module
 - 2P14 frame module above 15% slopes
 - Control Building
 - Substation
 - Gates: northern for maintenance southern for construction
 - OHL between the transformers
 - LV Transformer
 - Small valley with steep sided slopes
 - Attenuation pond
 - Indicative zone for construction compound and laydown areas

Design

- Latitude and longitude:	51°32'53.43"N, 3°33'36.55"W
- Country, location:	United Kingdom
- PV module nominal power:	565 Wp
- PV module quantity:	9,744
- PV inverter:	180kVA
- PV inverter quantity:	26
- DC nominal capacity:	5.51 MWp
- AC installed capacity:	4.81MWac
- AC export capacity:	4.81MWac
- Modules' configuration per structure:	2 Portrait
- Module dimensions:	2.384 x 1.134 x 0.35 m
- Azimuth:	0 (due south)
- Tilt Angle:	20°
- Pitch Distance:	9.50 m
- Ground Cover Ratio (GCR):	49.87%
- DC/AC ratio:	1.14
- Fence area:	8.23 Ha
- 2P14 module quantity:	348

Heights of the buildings and other infrastructure:

- Control Building: 3 m
- HV board and Substation compound: 3 m
- Solar Switchgear: 3 m
- Transformers: 3 m
- Fence: 2.5 m
- Security camera poles: 4 m

- Reference drawings
- Solar PV Constraints Map: 106856-MMD-BRGR-XX-DR-Y-0011
 - Site Terrain and Slope Map: 106856-MMD-BRGR-XX-DR-Y-0012

POI	Date	EL	Description	CH'kd	App'd
PO3	15/11/2022	EL	Preliminary PV layout revised	MH	OV
PO2	27/10/2022	EL	Preliminary PV layout revised	MH	OV
PO1	21/09/2022	EL	Preliminary PV layout	MH	OV

Rev | Date | Drawn | Description | CH'kd | App'd

Status Stamp

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Client

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EC2V 7AB
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www.marubeni-europower.com

Title

Bryncethin Solar PV Project
General PV layout

Sheet 01 of 01

Designed	E. Lici	EL	Eng check	M. Hayward	MH
Drawn	E. Lici	EL	Coordination	M. Hayward	MH
Dwg check	M. Hayward	MH	Approved	O. Velasco	OV
MMD Project Number	108939	Scale at A0	1:750	Security	STD
Suitability Description	PRE	Suit. Code	S3	Revision	P03
Drawing Number	108939-MMD-BRGR-XX-DR-E-0014				

Mott MacDonald
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C:\Users\HAY11\OneDrive\Documents\01\Marubeni\Bridgend Green H2 DE UK - Fin Project - Drawings\WP3 - Solar PV Array\1_3_PV Layout\108939-MMD-BRGR-XX-DR-E-0014_SolarPVLayout_A0.dwg Nov 17, 2022 - 12:52PM HAY1147

