

Francis Sant

Development at Pen Moriah, Llewellyn St, Glyn Neath Flood Consequence Assessment Report



May 2022
Final

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CONTENTS

	Page
1 Introduction	1
2 The Development	3
3 Flood Risk	6
4 Flood Proofing Measures	16
5 Conclusion and Recommendations	18

1 INTRODUCTION

The client proposes to convert the existing Pen Moriah building, at Llewellyn Street, Glyn Neath (previously used as a place of worship), into offices with storage. They have been advised, however, that the property lies within a Zone C2 flood area as defined by the development advice maps (see Figure 1.1) referred to in Technical Advice Note 15, Development and Flood Risk (TAN 15). This means that the building could be at risk of flooding during at least the 1 in 1000 year event and is not afforded protection from significant and recognised flood defence infrastructure.

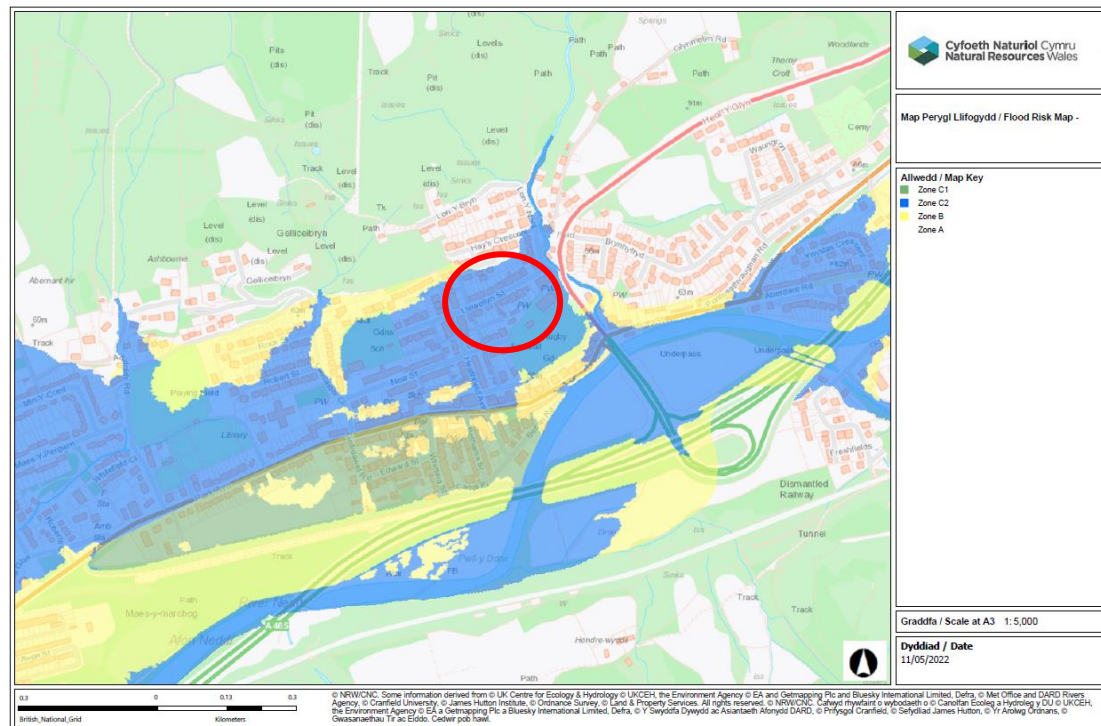


Figure 1.1 - Development Advice Flood Map

The Development Advice Maps are based on Natural Resources Wales Flood Maps (see Figure 1.2) supplemented by sediment data, held by the British Geological Survey (BGS), of historical flooding. The maps adopt the precautionary principle and are based on the best known information available at the time. However, a detailed examination of a site can refine an area's risk of flooding.

Considering the proximity of the site to the Afon Nedd and Nant Gwyddyl it is possible that the building could be at risk from fluvial flooding, particularly when taking climate change into consideration. As such the client has requested that a Flood Consequence Assessment be prepared to evaluate the risk of flooding to allow mitigation measures to be included in the proposed renovations if necessary. The assessment should be in accordance with the requirements of Section 7 and Appendix 1 of TAN 15. Francis Sant have been employed to undertake this task.

This document summarises the work undertaken as part of the study. Section 2 of the report gives a description of the surrounding area while the risk of flooding from various sources is considered in Section 3. Possible flood proofing measures are discussed in Section 4 and the conclusions and recommendations of the study are provided in Section 5.

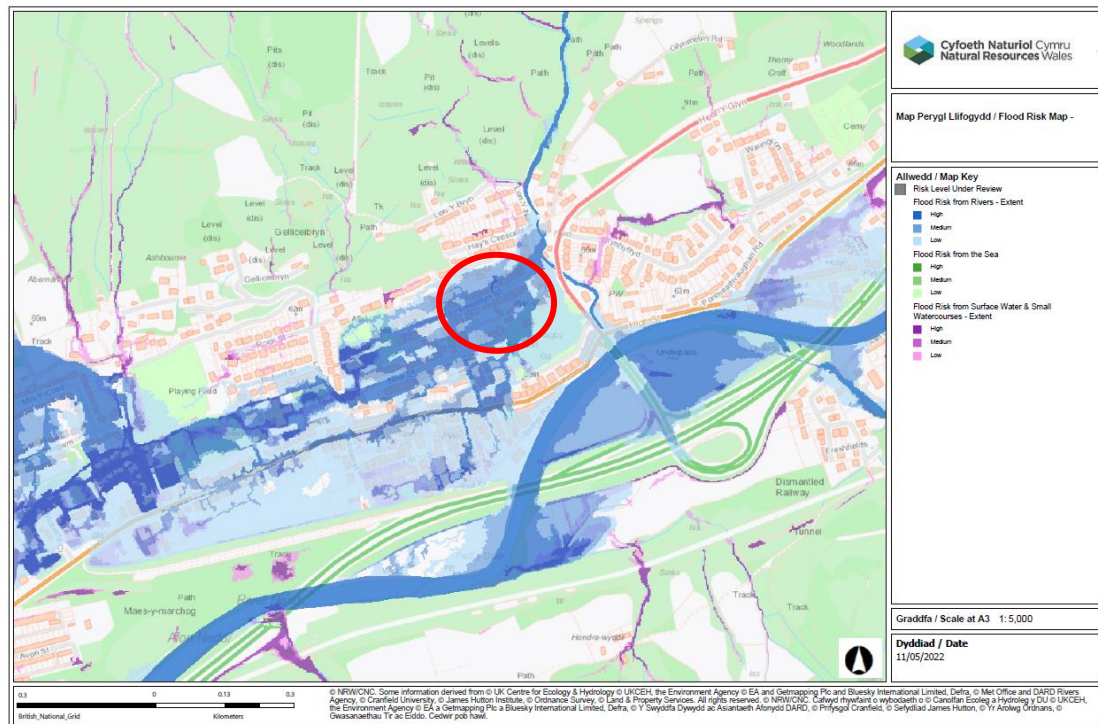


Figure 1.2 – NRW Flood Risk Assessment Map (New)

2 DEVELOPMENT

The Pen Moriah building (coordinates 288270 206733) is located between No. 28 and No. 30, Llewellyn Street in a residential area of Glyn Neath (see Figure 2.1 to 2.3 and Plate 2.1 and 2.2). It is some 16km north east of Neath and 15km west of Merthyr Tydfil. Nant y Gwyddyl is some 120m north east of the building while Afon Nedd is some 185m to the south east.

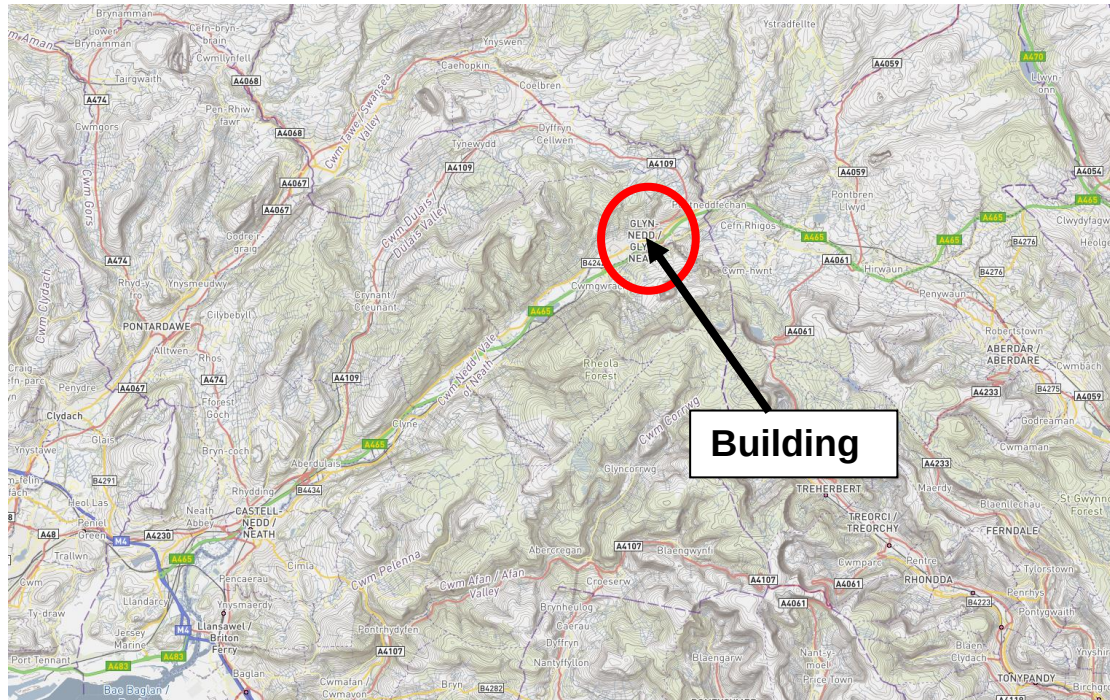


Figure 2.1 – Location Plan

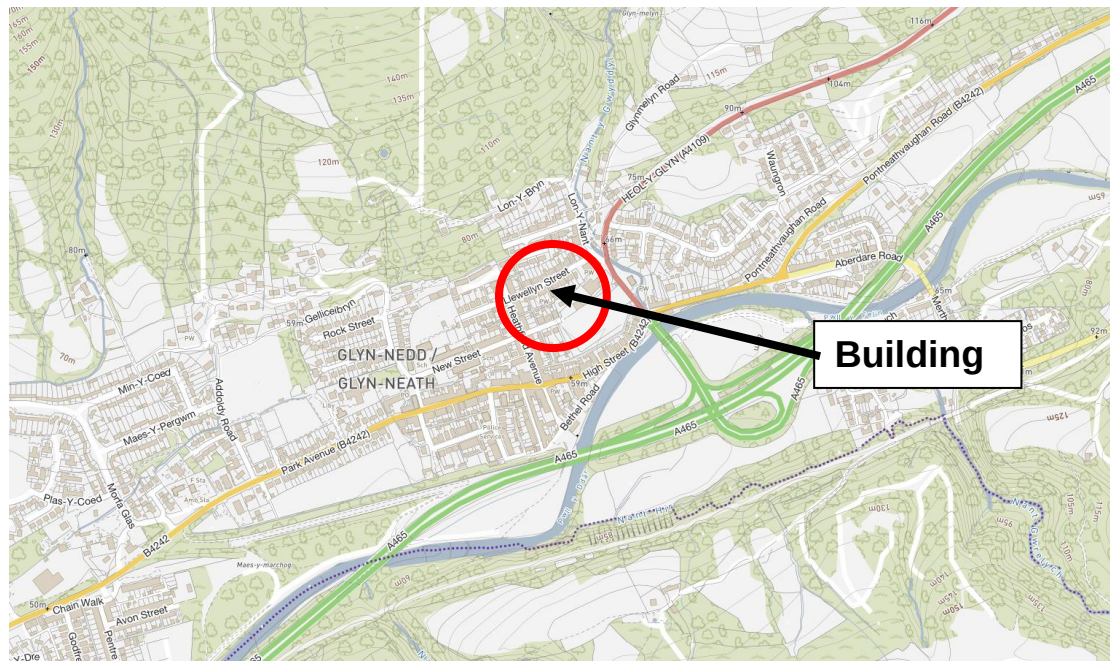


Figure 2.2 – Plan of Area

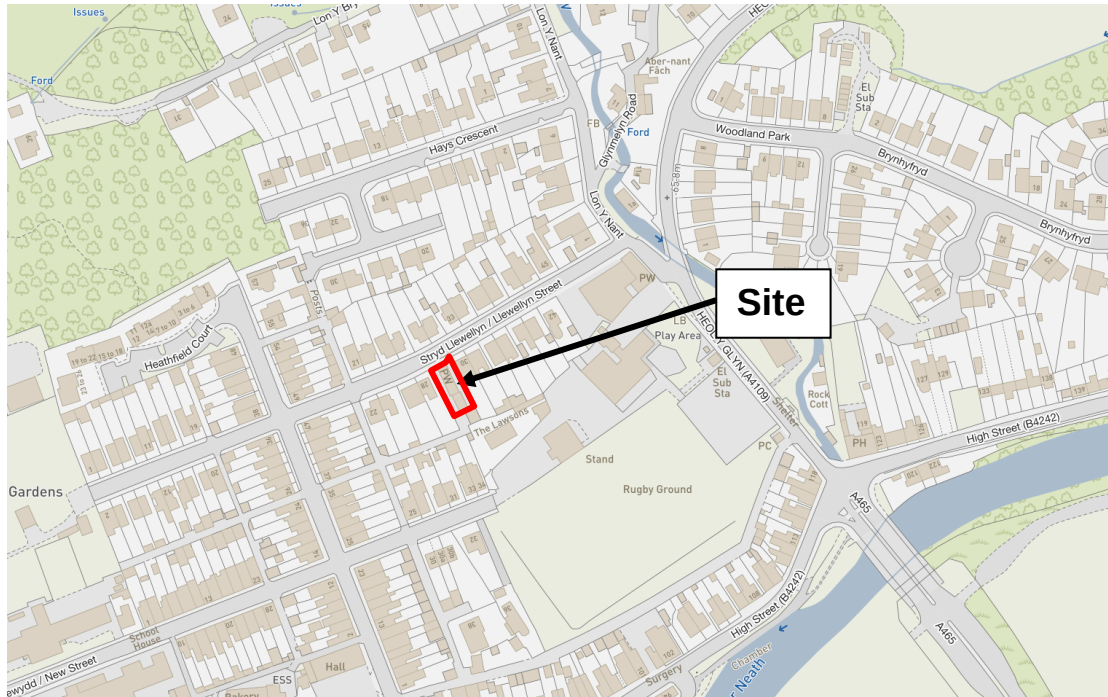


Figure 2.3 – Plan of Site

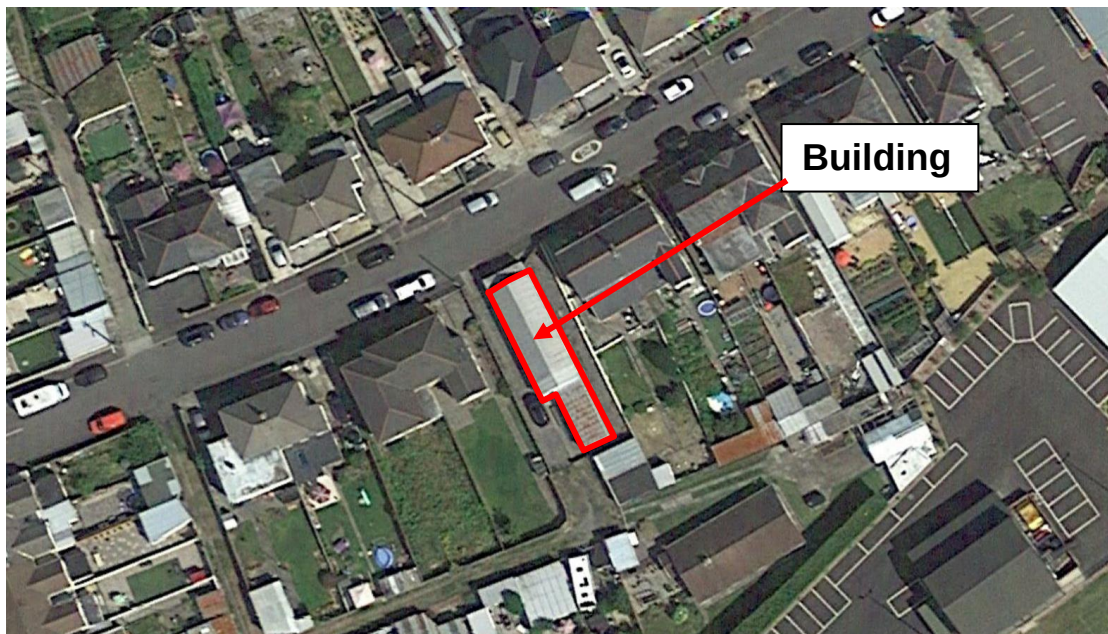


Plate 2.1 – Aerial View of Site



Plate 2.2 – Front of Building

Proposal

It is proposed to change the use of the existing Pen Moriah building from a place of worship into offices with storage area. Both uses are designated as less vulnerable developments in TAN 15.

Topography

Lidar data (see Figure 2.4) shows that the road in front of the building and the land to the rear is set at around 61.4m AOD. The step in front of the entrance is however set at around 61.7m AOD. Generally the land falls from north east to south west.

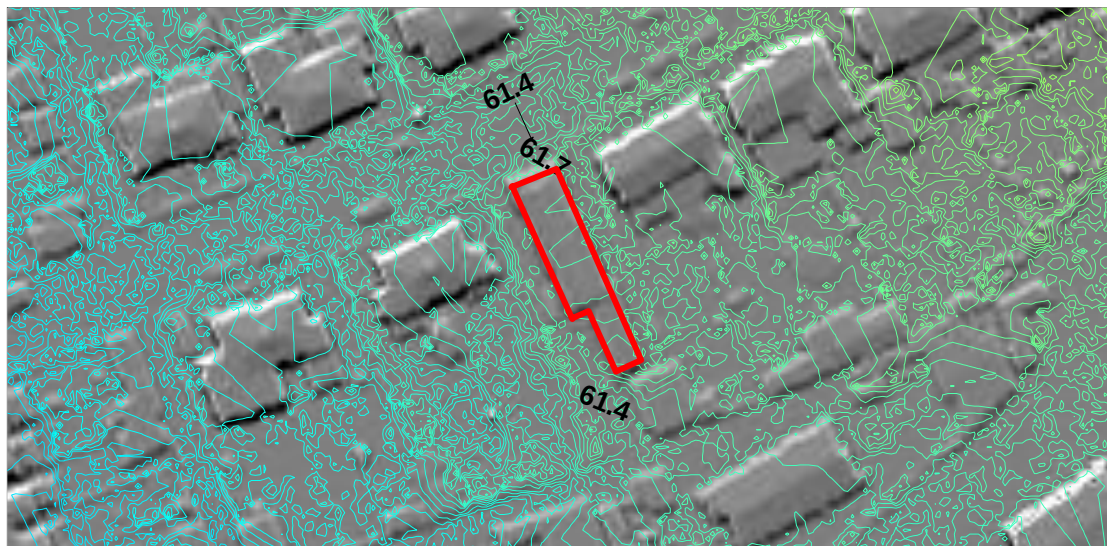


Figure 2.4 – Lidar Data for the Site

3 FLOOD RISK

Flooding can occur from several sources, some of which are considered in this section. The Flood Risk Assessment map (see Figure 3.1), produced by Natural Resources Wales, indicates that the property potentially could be at risk of flooding during both the Q100 and Q1000 fluvial events. It is noted that the map does not take climate change into consideration.

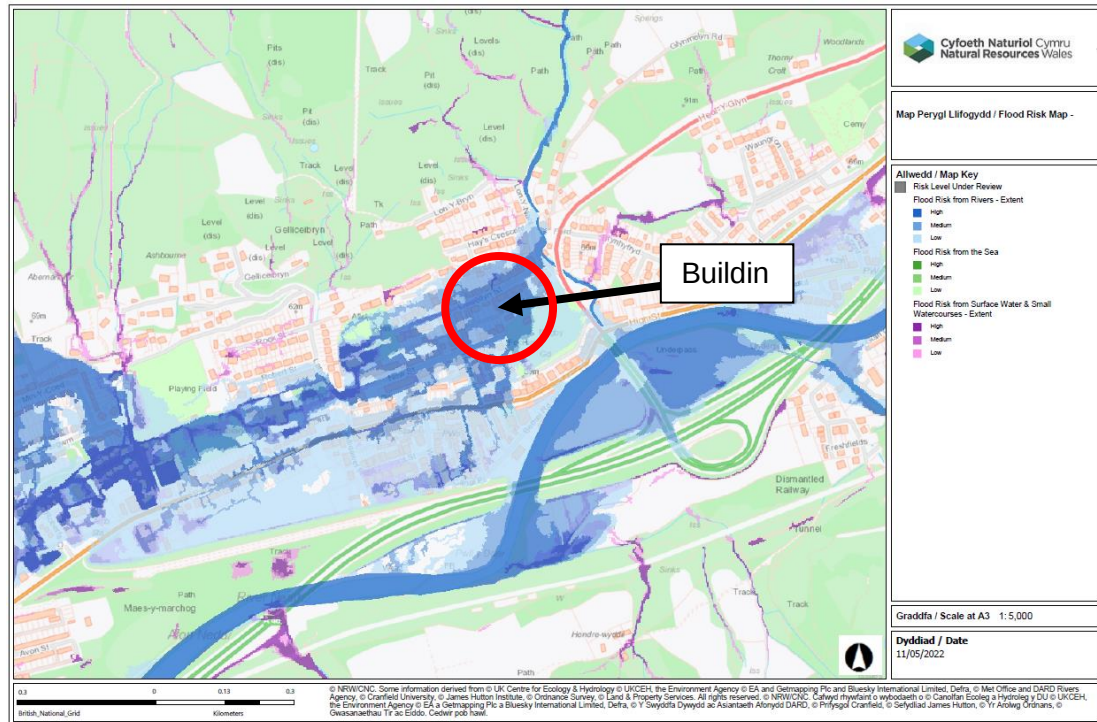


Figure 3.1- NRW Flood Risk Assessment Map

3.1 Fluvial

The NRW's Flood Map For Planning, which allows for climate change, also shows the building is at risk of flooding during both the Q100 and Q1000 events (see Figures 3.2 and 3.3). The flood hazard, however, is considered to be low even during the Q1000 event (see Figure 3.4).



Figure 3.2 – River Flood Map For Planning

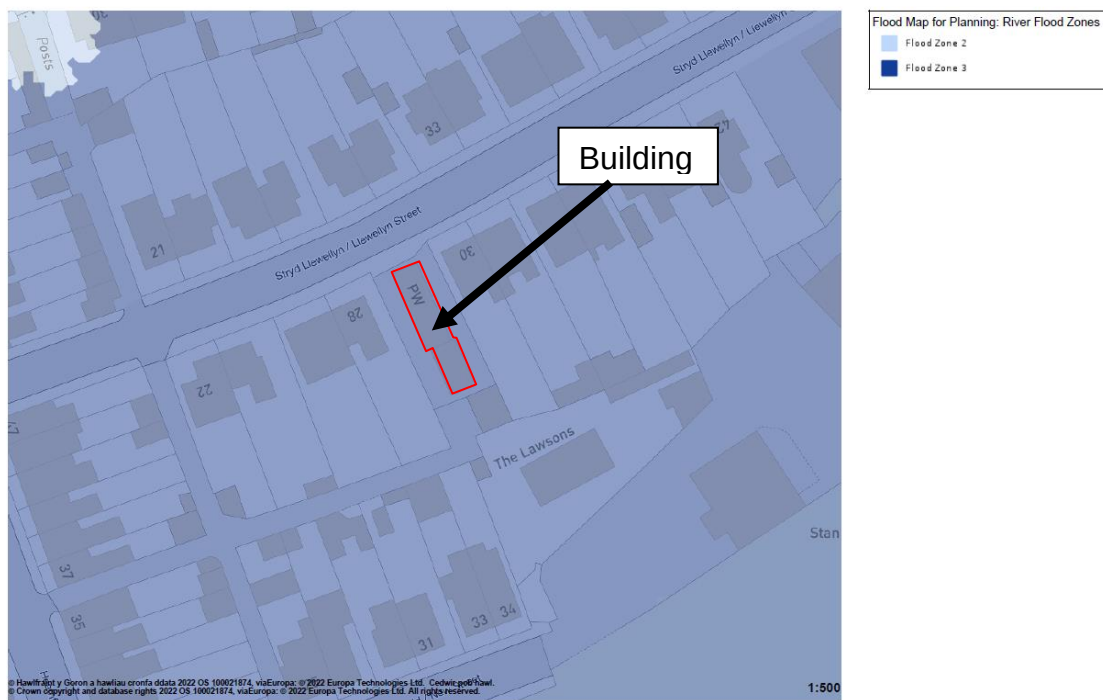


Figure 3.3 – Detailed River Flood Map For Planning

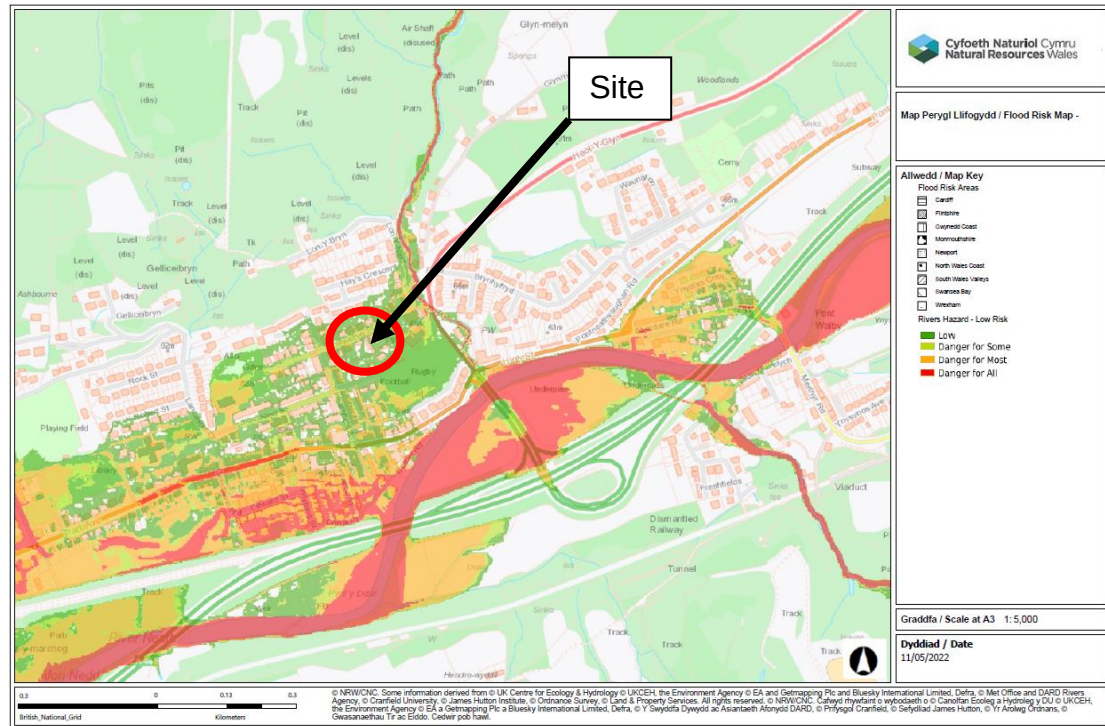


Figure 3.4 - Q1000 Hazard

The results from the latest NRW 2D TUFLOW model suggests that the area is at risk of flooding during the Q100 with a flood depth of less than 200mm but the flow velocity across the site could reach 0.6m/s and up to 2m/s on the road in front of the building (see Figure 3.5, 3.8 and Table 3.1). When taking climate change into consideration the flood depth increased slightly and the flow velocity across the site could exceed 0.6m/s and exceed 2m/s on the adjacent road (see Figure 3.6, 3.9 and Table 3.1). During the Q1000 event the flood depth could reach up to 300mm and the flow velocity across the site could reach 1m/s and reach 3m/s on the road. (see Figure 3.7, 3.10 and Table 3.1).

These values assume that the defences for the area are in place. However, when considering the undefended scenario, the flood depth and velocity did not change in the vicinity of the site (see Figure 3.11 to 3.16 and Table 3.1).

Table 3.1 Velocity and Depth Key			
Region	Depth	Region	Velocity
	0-0.1m		0 - 0.15m/s
	0.1m-0.2m		0.15m/s - 0.3m/s
	0.2m-0.3m		0.3m/s - 0.45m/s
	0.3m-0.6m		0.45m/s - 0.6m/s
	0.6m-1m		0.6m/s - 1m/s
	1m-2m		1m/s - 2m/s
	2m-3m		2m/s - 3m/s
	>3m		> 3m/s

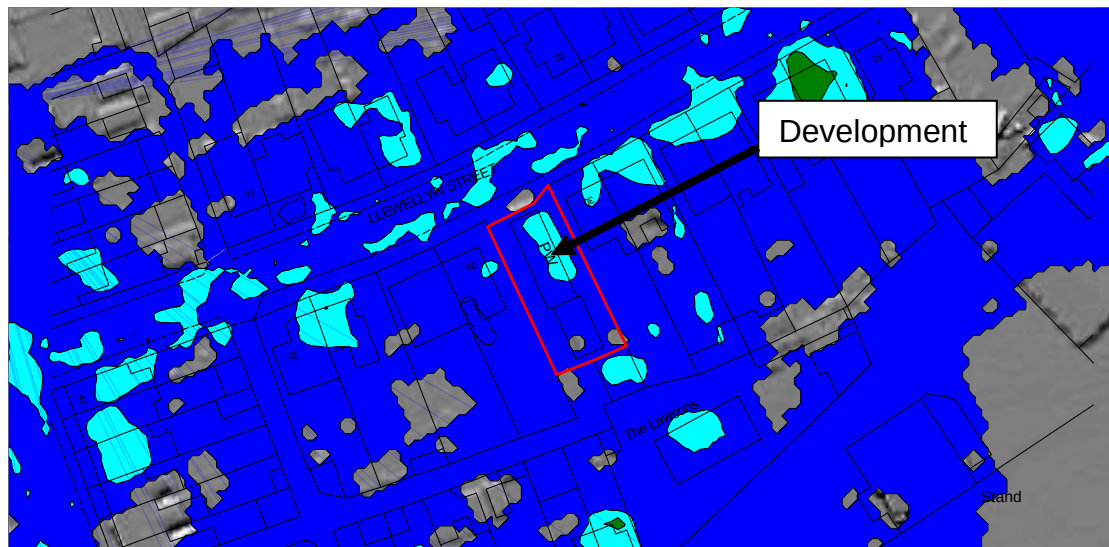


Figure 3.5 - Q100 Depth (Key on Table 3.1)

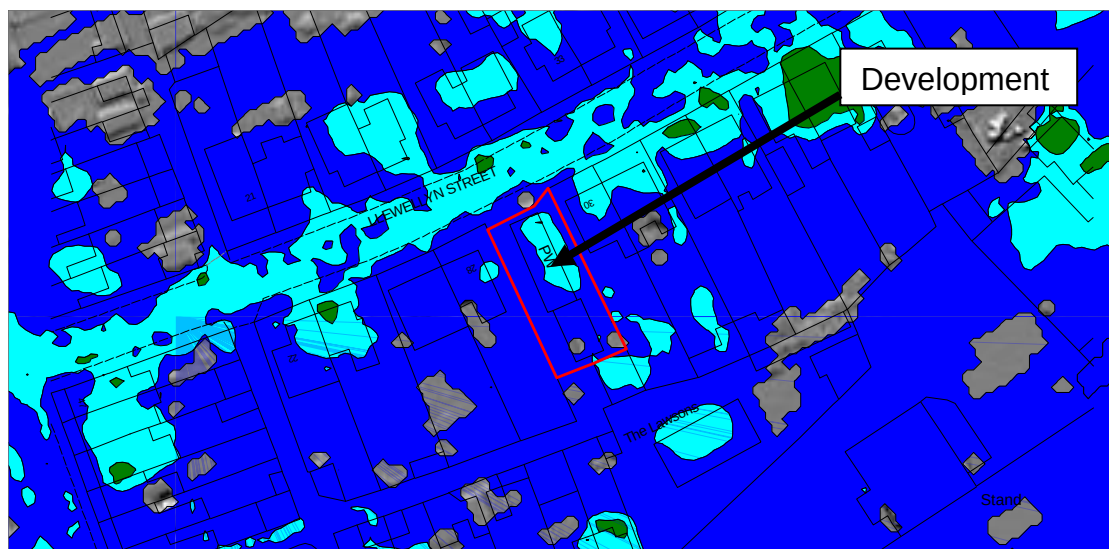


Figure 3.6 - Q100 With Climate Change - Depth (Key on Table 3.1)

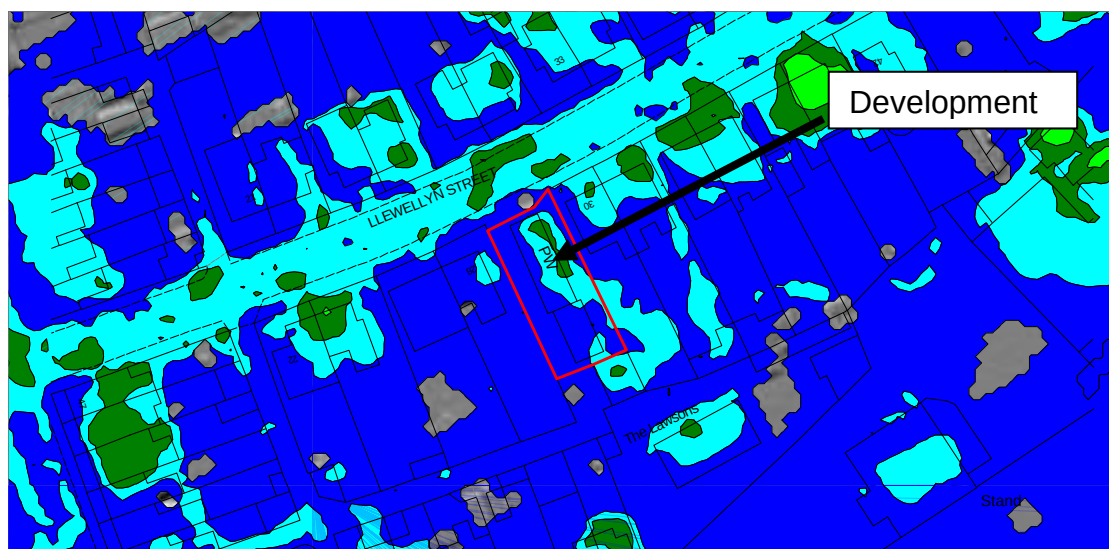


Figure 3.7 - Q1000 Depth (Key on Table 3.1)

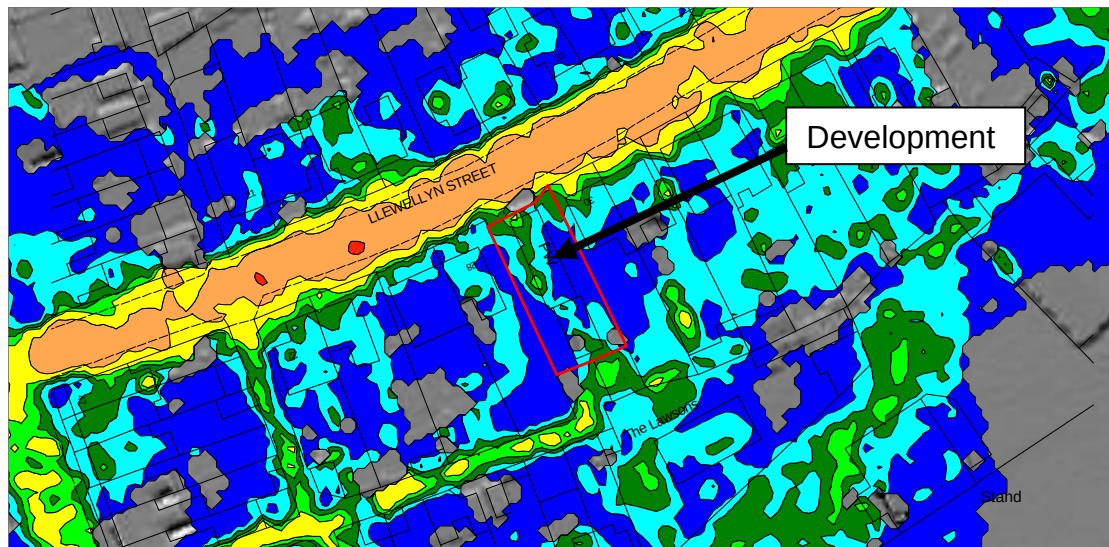


Figure 3.8 - Q100 Velocity (Key on Table 3.1)

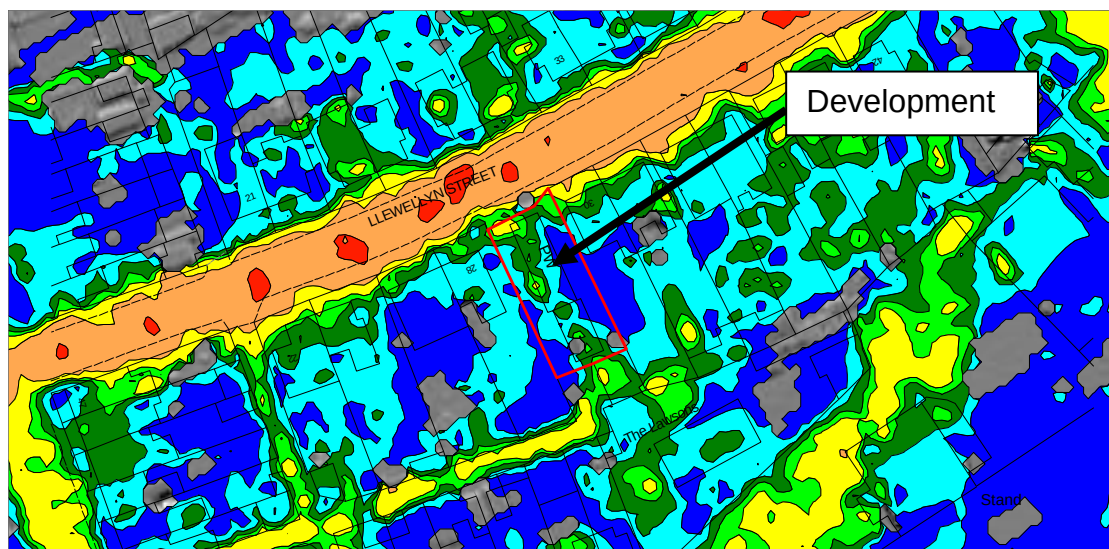


Figure 3.9 - Q100 + CC Velocity (Key on Table 3.1)

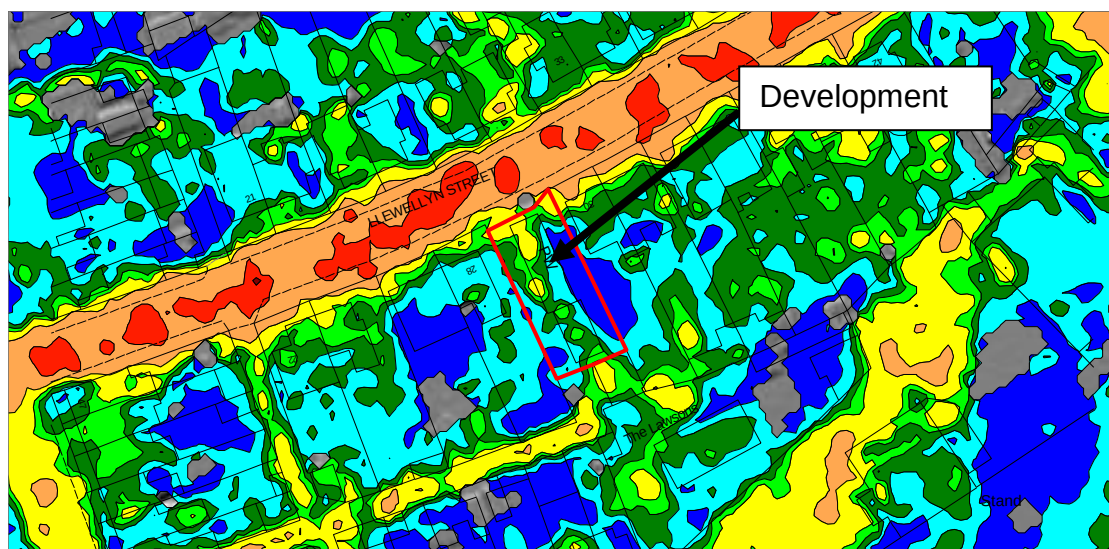


Figure 3.10 - Q1000 Velocity (Key on Table 3.1)

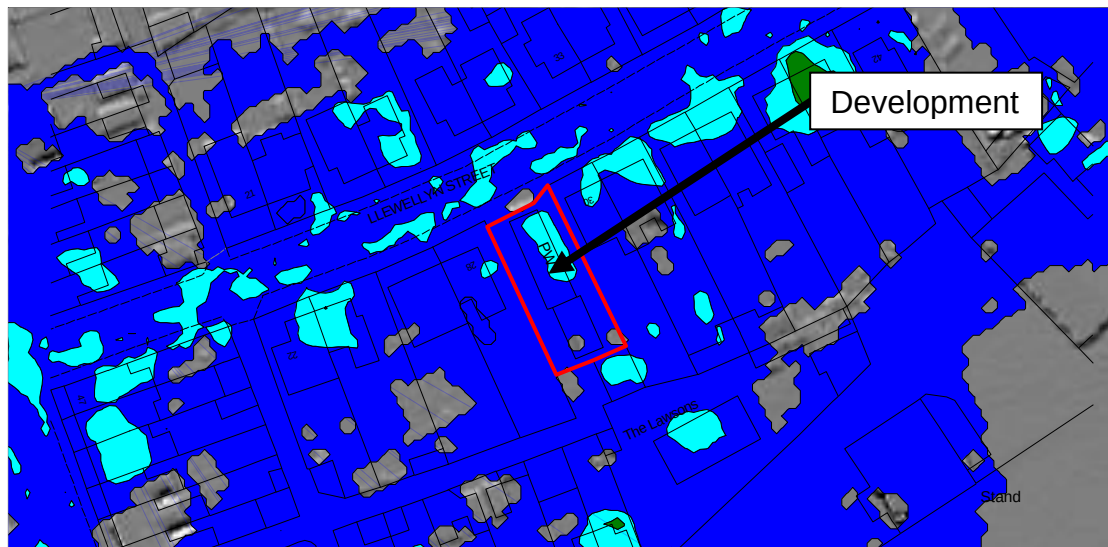


Figure 3.11 - Undefended Q100 Depth (Key on Table 3.1)

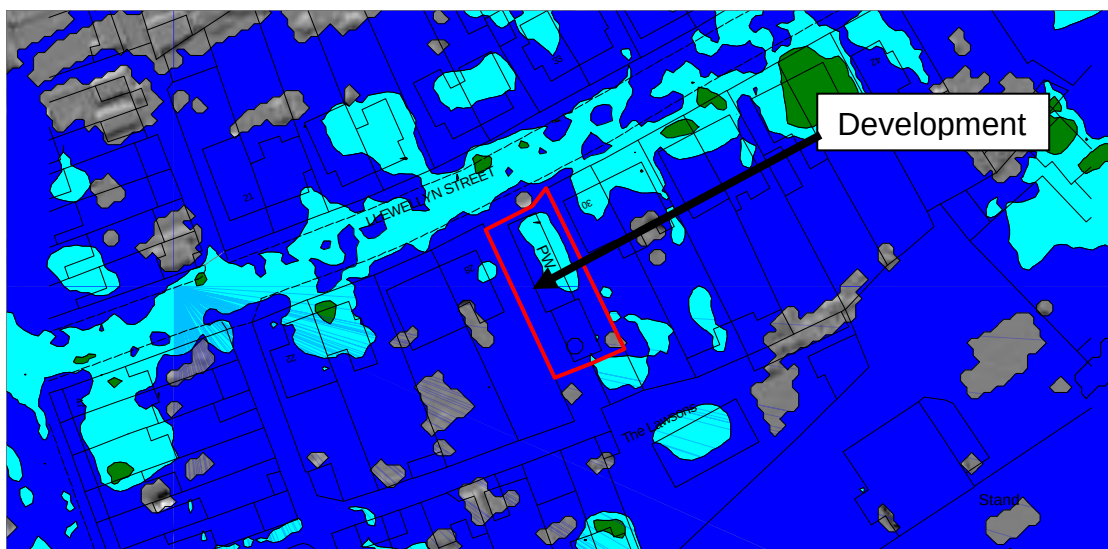


Figure 3.12 - Undefended Q100 + CC Depth (Key on Table 3.1)

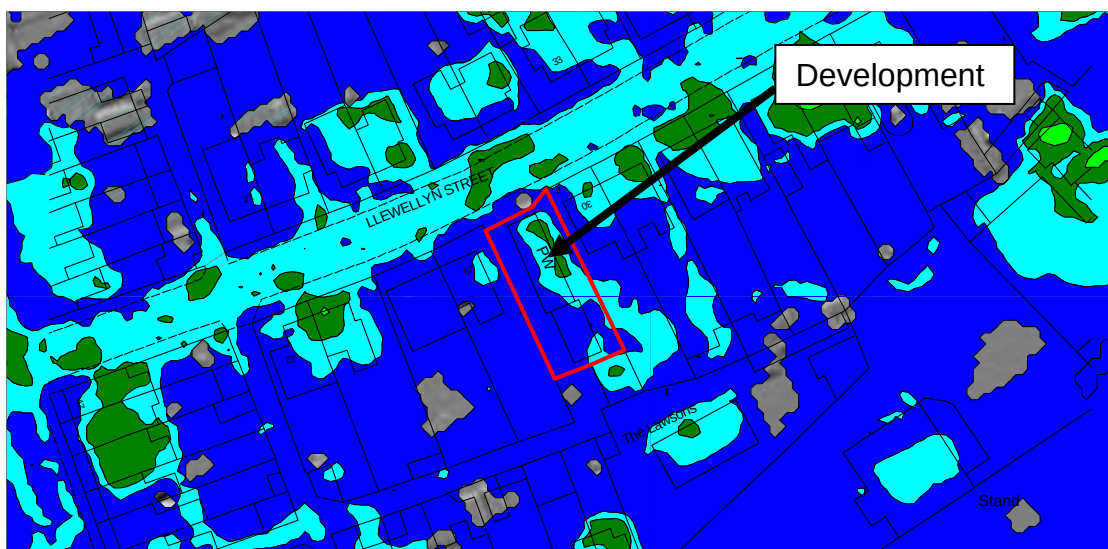


Figure 3.13 - Undefended Q1000 Depth (Key on Table 3.1)

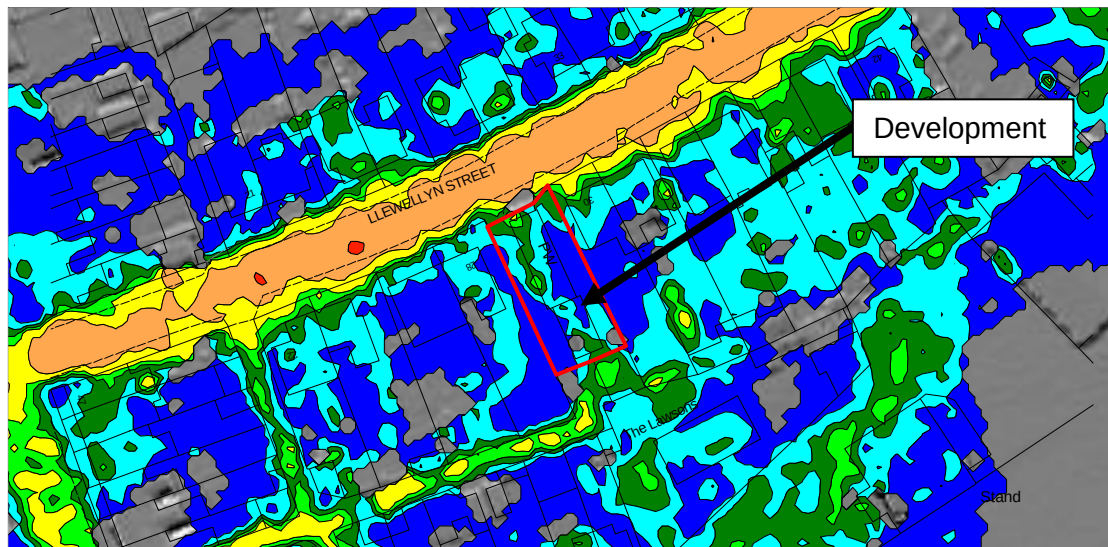


Figure 3.14 - Undefended Q100 Velocity (Key on Table 3.1)

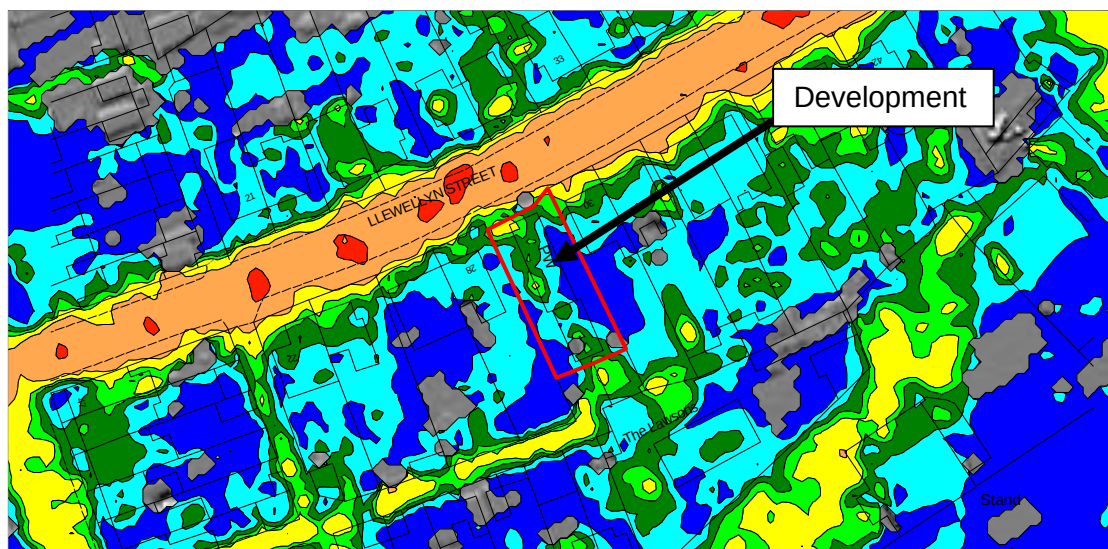


Figure 3.15 - Undefended Q100 + CC Velocity (Key on Table 3.1)

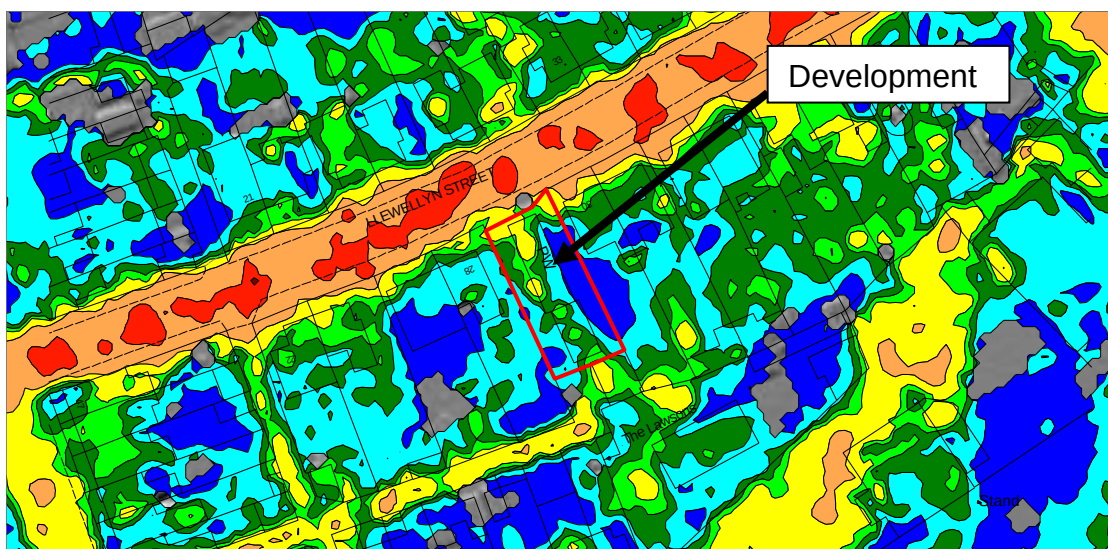


Figure 3.16 - Undefended Q1000 Velocity (Key on Table 3.1)

3.2 Tidal

The site is not considered at risk from tidal flooding.

3.3 Surface Water

The Surface Water Flood Map For Planning suggest that some surface water could flow along the adjacent road during the Q1000 event, however no water is expected to flow onto the site (see Figure 3.17 and 3.18).

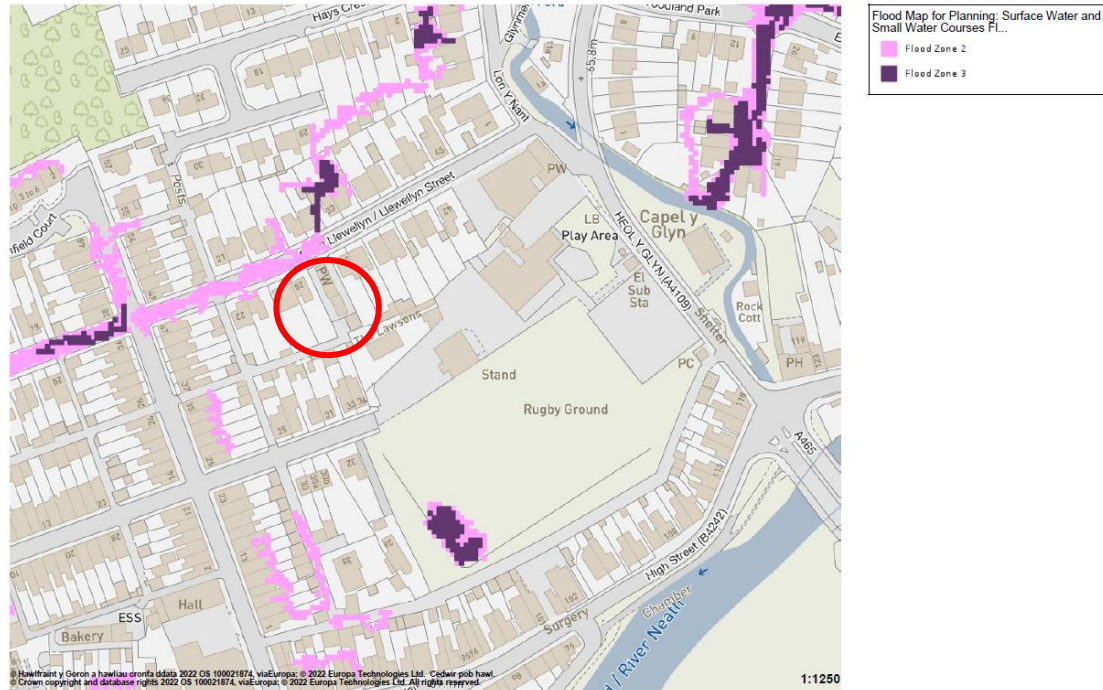


Figure 3.17 – Surface Water Flood Map For Planning

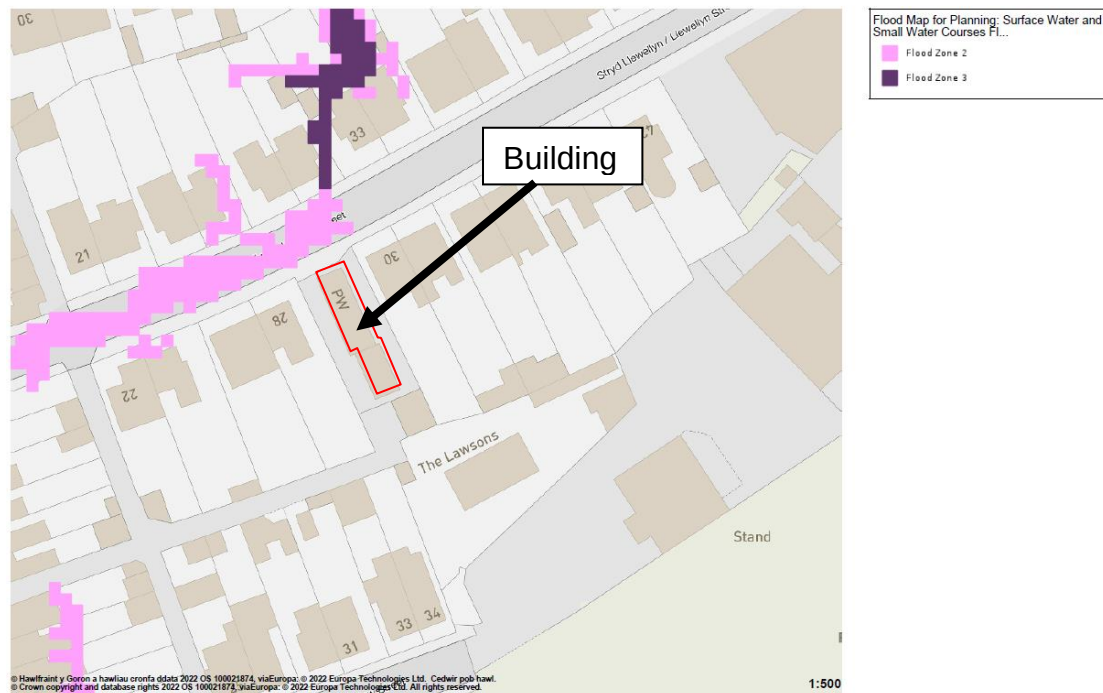


Figure 3.18 – Detailed Surface Water Flood Map For Planning

3.4 Sewage Backflow.

Care should be taken to ensure that water from the foul / combined sewer system is unable to back up into the property and consideration should be given to installing a none return valve.

3.5 Sustainable Drainage

As the development is the redevelopment of part of an existing building the installation of sustainable drainage system, in accordance with the Welsh Government Standards and the SUDS manual, is not strictly necessary. In addition, there is limited amount of room available for such a system to be installed.

3.6 Reservoir Failure

The building is not considered to be at risk from reservoir failure (see Figure 3.19).

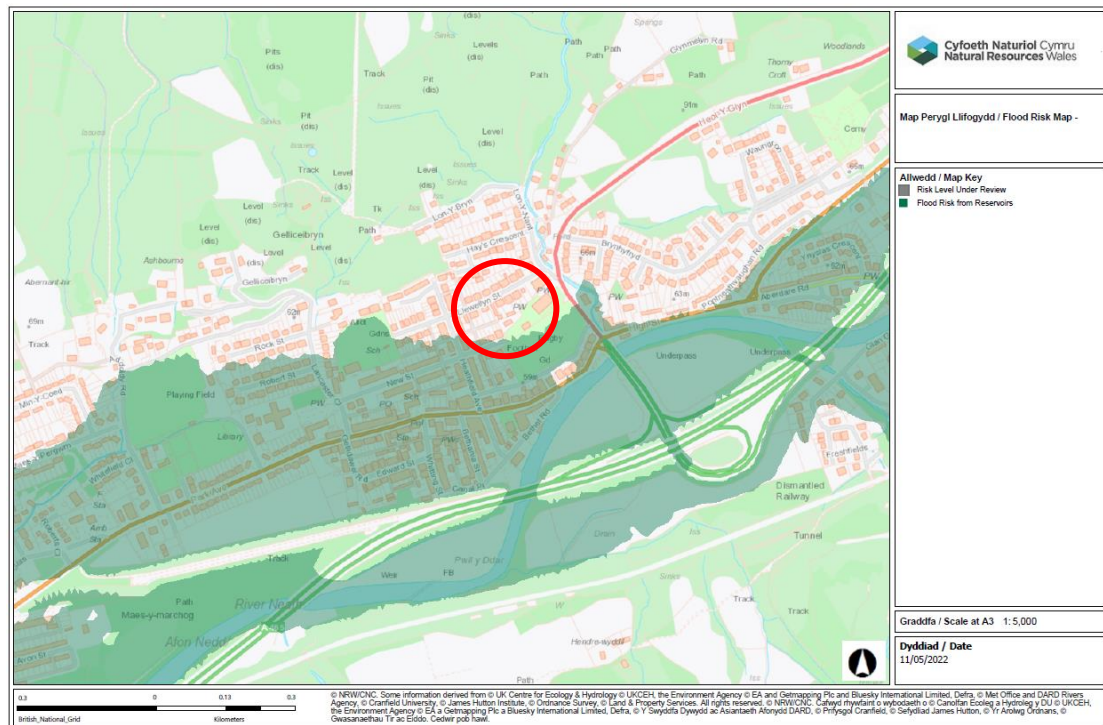


Figure 3.19 – Flood Map For Reservoir Failure

3.7 Ground Water

The superficial geology for the area consists of Clay, Silt, Sand and Gravel from Alluvium overlying a bedrock geology of Sandstone from the South Wales Lower Coal Measures Formation (see Figure 3.20 and 3.21). When also taking the terrain into account the risk of groundwater flooding is considered to be medium.

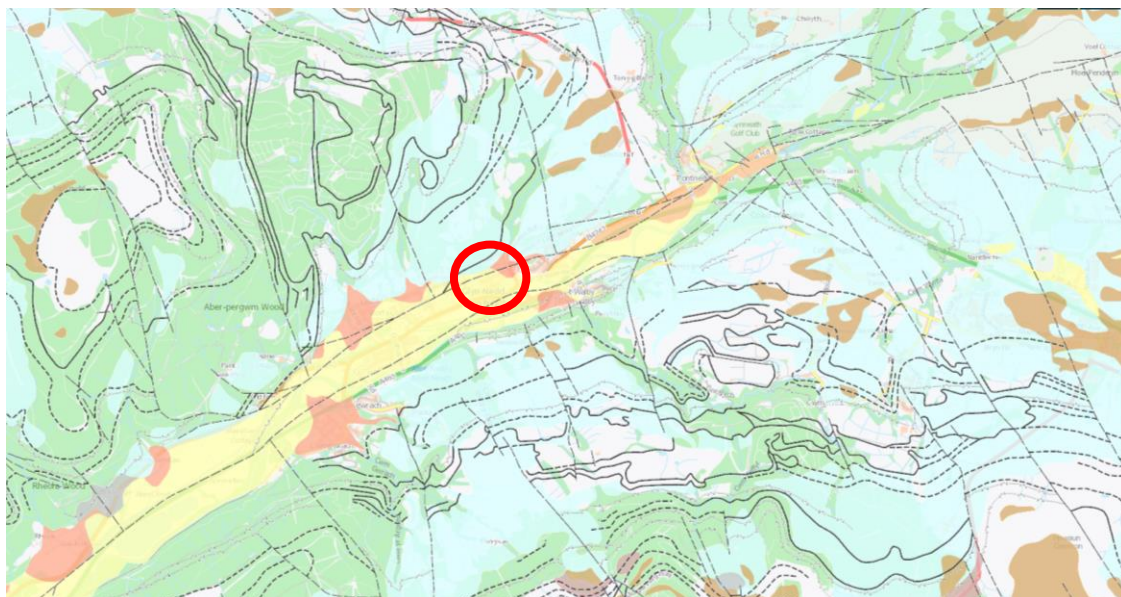


Figure 3.20 – Superficial Geology

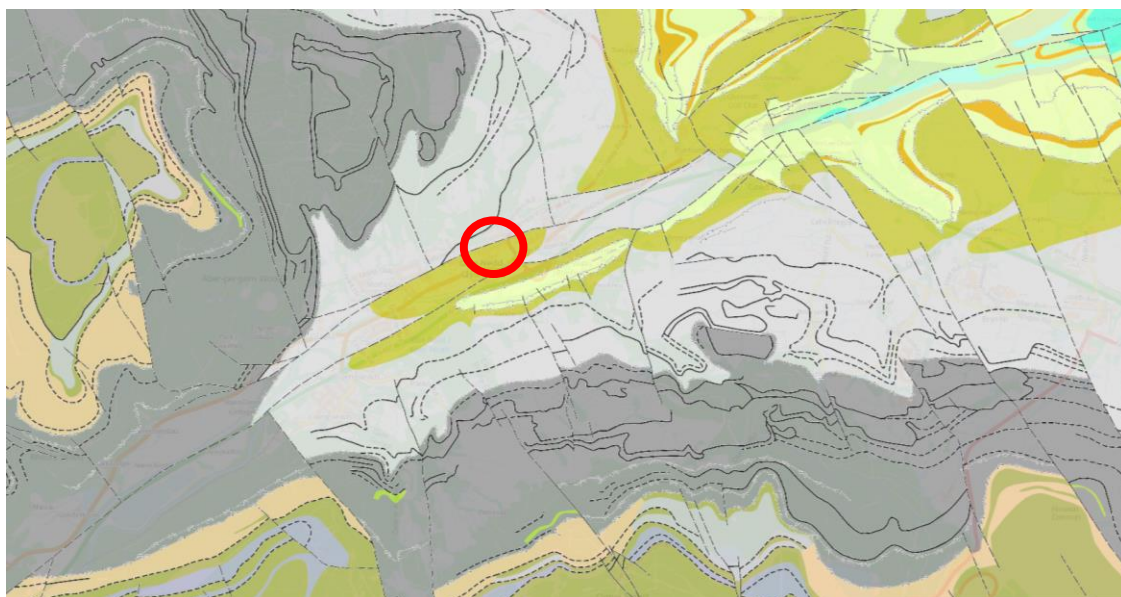


Figure 3.21 – Bedrock Geology

4 FLOOD PROOF MEASURES

Section 3 indicates that the development could be at risk of flooding from a fluvial source. Flooding can result in the need for expensive repairs. As well as the direct damage caused to the building, flooding can impact in many other, and possibly more stressful, ways. The inconvenience of cleaning up an office and the loss of good will, due to closure, can be immeasurable. There are methods, however, to limit and mitigate against the consequence of flood damage. Some of these are discussed in this section and should be considered as part of the development where applicable.

Water can enter a building:

- Around the edges of closed doors;
- Through airbricks;
- Backflow through overloaded sewers;
- Seepage through walls especially cracks;
- Seepage through the ground;
- Around cable / services entrance into the building.

Dryproofing - Preventing the water from entering the building.

In the first instance it is possible to take measures to prevent the ingress of water (dryproof).

- There are several propriety barriers available, however, these can be expensive. If desirable, it might be possible to ensure that the walls of the building are able to act as a barrier themselves (this will need to be assessed). Care should be taken to ensure that the pointing and any external plastering are kept in good order and that all cracks and gaps around cables and ducts entering the building are sealed;
- Providing temporary covers to any low air vents. These covers should be removed once the risk of flooding is over;
- Erecting a temporary barrier in front of any external doors or installing flood protection doors;
- Installing a valve allowing the sewer system to be shut preventing any back flow.

Wetproofing – Limiting the damage once water has entered a building.

It may not be feasible to eliminate the risk of flooding, however, it is possible to limit the damage that the water can cause once in the building (wetproof). Where appropriate the following could be considered:

- Move valuable items to a higher level;
- Have solid concrete floors. Suspended floors are more difficult to clean and dry underneath;
- Have tiled floors or removable rugs in place of fitted carpets;
- Use water resistant plaster for the walls;
- Ceramic tiles can be used for wall coverings especially in the kitchen and bathroom;
- Use non water absorbing insulation;
- Use corrosion resistant fittings such as galvanised or stainless steel;
- Ensure that the electric cables are fed from above with the sockets kept high;
- Use an appropriate damp proof course;
- Avoid timber frame construction for any new internal partition walls;
- Consider freestanding movable equipment;

- Install any equipment with motors high up from the floor;
- Install solid internal and external doors effectively sealed;
- Avoid storage heaters;
- Ensure boilers are off the ground.

A flood response plan should be prepared and regularly maintained. All future occupiers should be made aware of the flood risk and what actions are to be undertaken during an event. It is important to also have as much warning as possible to allow the flood response plan to be followed safely. If available, this can be achieved by registering on the flood warning scheme provided by NRW.

5 CONCLUSION AND RECOMMENDATIONS

The client wishes to change the use of the Pen Moriah building on Llewellyn Street, Glyn Neath, from a place of worship to offices with storage area. However, they are aware that the building lies within a C2 flood zone, in accordance with TAN 15, and wish to evaluate the risk of flooding.

NRW's 2D hydraulic model suggest that the building could be at risk during both the Q100 and the Q1000 events. While the flood depth around the building and along the adjacent road is expected to remain below 300mm the flood velocity could be up to 1m/s on the site and up to 3m/s on the road. The risk is not expected to change should the recognised flood defences in the area fail.

The building is not considered to be at risk from reservoir failure, tidal flooding or from surface water flooding and the risk of ground water flooding is considered to be medium.

The development will not change the current vulnerability status or have an impact on flood risk. However, the opportunity to introduce floodproofing measures, as part of the proposed works, should be taken.

Recommendations

In refurbishing the building, it is recommended that:

- The building is retained for less vulnerable purposes.
- Wet proofing measures, as identified in Section 4, are included in the development where possible.
- Flood doors are used for the entrances.
- A non-return valve is installed on the foul sewer system.
- An emergency evacuation plan is prepared, maintained, and effectively disseminated to all future occupiers.
- If available, the property is registered on the flood warning scheme provided by NRW.