

FLOOD CONSULT



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14 Glyn Street

Flood Consequence Assessment

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Preface

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Executive Summary

The proposed development is a change of use from of an existing three-bedroom house into a five-bedroom HMO property which requires a flood consequence assessment in line with TAN15 guidance to assess the vulnerability and impacts of the development from flooding. The development location has been reviewed based on commercially available information with the present-day exposure summarised in the below table:

Source of Flooding	Exposure	Likelihood
Fluvial	Very Low	Less than 0.1% (1 in 1000)
Tidal	Very Low	Less than 0.1% (1 in 1000)
Surface Water	Very Low	Less than 0.1% (1 in 1000)
Artificial	Very Low	N/A
Groundwater	Low	N/A

The flood exposure of the site is detailed below:

- The site is shown to lie within the low risk flood zone from fluvial flooding equating to between 1% (1 in 100) and 0.1% (1 in 1000) chance.
- The Development Advice Map (DAM) shows the property to lie within flood zone C1 which is described as areas of the floodplain which are developed and served by significant infrastructure, including flood defences.
- Detailed fluvial flood modelling shows the site boundary to lie outside of the predicted 0.1% (1 in 1000) extent and therefore the risk of fluvial flooding is considered to be very low.
- Flood risk from tidal flooding is deemed to be very low at present day, equating to less than 0.1% (1 in 1000) chance. When accounting for climate change up to the year 2091 the property boundary is only affected during the 0.1% (1 in 1000) flood scenario with a level of 7.01mAOD predicted. By the year 2116, the property boundary is affected during the 0.5% (1 in 200) flood scenario with a level of 7.12mAOD predicted which increases up to 7.30mAOD during the 0.1% (1 in 1000) flood scenario.
- Flooding up to 7.01mAOD is only sufficient to produce flood depths of up to 0.01m externally and 0.31m within the property during the 0.1% (1 in 1000) tidal flood event up to the year 2091.
- Flooding up to 7.30mAOD is sufficient to produce flood depths of up to 0.60m externally and 0.29m within the property during the 0.1% (1 in 1000) tidal flood event up to the year 2116.
- Surface water flooding is deemed very low.
- Flooding from artificial sources (reservoirs and canals) has been deemed very low.
- Flooding from groundwater has been deemed low.
- The most practical method of flood protection is considered to be the use of resilient materials on the ground floor as raising floor levels is not viable and local fluvial protection is also not viable given the scale of the development.
- A flood evacuation plan has also been created to minimise the risk to life and property damage.

Flood Risk Report

1.0 Introduction

Following instruction given to FCI by the property owner James Bointon, a flood consequence assessment has been completed to form part of the planning application for the change of use of a terraced property in Port Talbot. This report will discuss any flood risk that has been identified and give recommendations to mitigate if required.

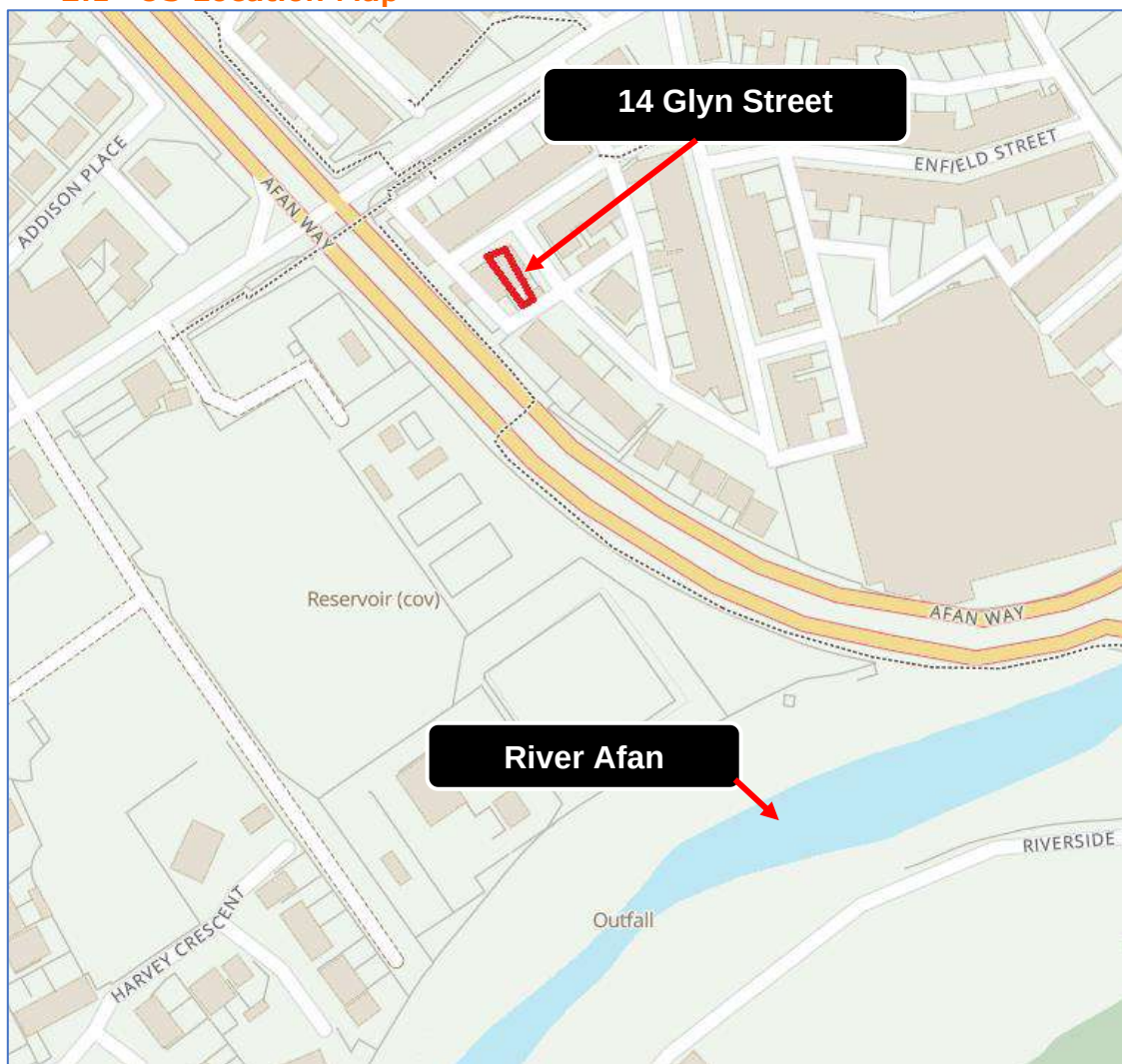
2.0 Site Information

14 Glyn Street is located at grid reference SS 75628 89807 in Port Talbot, South Wales. Access into the grounds is gained from Glyn Street.

The nearest watercourse to the site is the River Afan which lies 165m south east of the site. This can be seen on the following OS and aerial image.

The property is a three-bedroom terraced house constructed in the early 1900's from brick with solid concrete floors throughout.

2.1 OS Location Map



(OS Copyright)

2.2 Aerial Image



(Google Copyright)

3.0 Site Information

3.1 Geology

Analysis of the British Geological Survey (BGS) indicates that the superficial site geology is Tidal Flat Deposits - Clay, Silt And Sand. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by shorelines (U).

The bedrock geology is defined as South Wales Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone. Sedimentary Bedrock formed approximately 310 to 318 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas..

No formal geotechnical survey has been undertaken at the proposed site at the time of this report.

3.2 Hydrology

The nearest major watercourse to the site is the River Afan which lies approximately 165m south east of the property. The site lies within the Western Wales Drainage Basin within the Tawe to Cadoxton management area.

3.3 Existing Property

The overall site covers approximately 125m² and consists of one terrace house with rear garden constructed in the early 1900's. The property is constructed from brick with solid concrete floors throughout and is currently a three-bedroom house.

Based on available LiDAR information obtained from the LLE Geo-Portal for Wales the site topography is generally between 6.70mAOD and 7.00mAOD with ground rising from south east to north west through the boundary.

A topographical survey is unavailable at the time of this report and therefore the floor level of the property is assumed to 7.00mAOD which is the closest ground level to the main entrance of the property on the north western perimeter.

3.4 Proposed Development

The proposed development of the property is a redevelopment from a three-bedroom house into a five-bedroom house of multiple occupancy (HMO).

The requirement for an FCA for planning is for change of use as opposed to an extension and hence the redevelopment will not increase the footprint of the existing house or create any new impermeable areas externally.

The ground floor of the property will consist of one bedroom with kitchen, living room, hallway and bathroom with three bedrooms on the first floor and one bedroom on the second floor. The property floor plan can be seen in APPENDIX J.

3.5 Planning Information

This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the PPW (2016) and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage any flood risk to the development was undertaken.

This report has been prepared with reference to the TAN 15 (2004) which supplements the PPW (2016).

The general approach of PPW, supported by the TAN, is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. The overarching aim of the precautionary framework is, in order of preference, to:

- Direct new development away from those areas which are at high risk of flooding; and
- Where development is considered to be in high risk areas (Zone C) only those developments which can be justified on the basis of the tests outlined in section 6 and section 7 are located within such areas.

The proposed development is classed as Highly Vulnerable according to Table 9 (Summary of Policy Requirements) in TAN 15 (2004).

3.6 Report Scope

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

A thorough review of a commercially available flood risk report and NRW supplied data indicating potential sources of flood risk to the property from rivers, the sea, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from NRW and a review of the Neath Port Talbot County Borough Council Strategic Flood Consequences Assessment Stage 1 & 2 (Clarkebond, 2014) have been used to ascertain local flooding issues and, where appropriate, identify information to support a Justification test and Assessment of Flood Consequences required as part of the PPW (2016).

NRW have provided detailed fluvial and tidal modelling outputs from their Port Talbot Modelling Study completed by JBA Consulting in 2016 which covers the property boundary. Using available data, the existing and future flood risks to and from the property from all flood sources will be assessed in line with current best practice.

Limitations

It should be noted that the findings presented in this report will be a desktop study using information supplied by third parties. It is assumed that all information is representative of past and present conditions we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

4.0 Flood Risk Assessment

4.1 Planning Information

The following flood risk assessment has been undertaken in line with the TAN15 Technical Guidance on flood risk. Information has been gathered from relevant parties and include the following:

- Flood Zone Map (Natural Resources Wales)
- Flood Zone Classification (Natural Resources Wales)
- Modelled Flood Levels (Natural Resources Wales)
- Historical Flooding Information (Natural Resources Wales)
- LiDAR Topographic Data in metres above Ordnance Datum (mAOD)
- Development proposals provided by the client.

4.2 Modelling Introduction

FCI set out to use the most accurate flood risk modelling information that is available which will cover flood risk from Fluvial (River), Pluvial (Surface Water) and Tidal (Coastal Flooding), Groundwater and Artificial sources (Reservoir, Canal). Below, each potential flood risk will be discussed.

4.3 Fluvial Flooding

4.3.1 Flood Zone

Based on the Natural Resources Wales (NRW) flood zone map, the site is shown to lie fully within the low risk flood zone which equates to a between 1% (1 in 100) and 0.1% (1 in 1000) probability of flooding from fluvial sources in any given year. The NRW flood zone map can be seen in APPENDIX A.

According to the NRW Development Advice Map (DAM) the property is located within zone C1 which is defined Areas of the floodplain which are developed and served by significant infrastructure, including flood defences. The NRW DAM can be seen in APPENDIX C.

The DAM zone definitions can be seen in the below table:

Zone Description	Zone
Considered to be a little or no risk of fluvial/tidal flooding	A
Areas known to have flooded In the past evidenced by sedimentary deposits	B
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1
Areas of the floodplain without significant flood defence infrastructure	C2

4.3.2 Fluvial Flood Levels

Following the searches conducted, the most up to date fluvial modelling information for the site was obtained from NRW. The River Afan lies 54m south east of the property for which NRW have supplied modelled flood levels taken from their 1D-2D linked ESTRY-TuFLOW model completed in 2016 by JBA Consulting. The table below shows the maximum predicted flood levels within the property boundary.

	7 Clarice Street
Return Period	Modelled Level (mAOD)
5% (1 in 20)	N/A
1.3% (1 in 75)	N/A
1% (1 in 100)	N/A
1%CC (1 in 100CC)	N/A
0.1% (1 in 1000)	N/A

The above table shows the modelled fluvial flood levels from the 5% (1 in 20) return period up to the 0.1% (1 in 1000) return period.

The fluvial flood extent during the extreme 0.1% (1 in 1000) chance ceases approximately 95m east of the site where the flood level is deemed to be 6.22mAOD. The lowest site ground levels are circa 6.70mAOD and as such as above the 0.1% (1 in 1000) flood level by 0.48m.

The risk of fluvial flooding to the property location is therefore deemed very low.

4.3.3 Climate Change

In order to account for climate change with regard to development proposal and vulnerability into the future. The table below sets out current guidance with regard to climate change uplifts for rivers located in the Western Wales Catchment.

Catchment	Allowance Category	Total potential chance anticipated for the '2020's' (2015 to 2039)	Total potential chance anticipated for the '2050's' (2040 to 2069)	Total potential chance anticipated for the '2080's' (2070 to 2115)
Western Wales	Upper End	25%	40%	75%
	Higher Central	15%	25%	30%
	Central	5%	10%	15%

Government guidance in Wales with regard to climate change uplift states:

'The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor, 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.'

It is assumed that the design life of the development will be 100 years so '2080's' uplift of 30% will be considered.

The fluvial flood modelling currently available does not include a 30% addition to the peak flow, however, the property location is outside of the 0.1% (1 in 1000) flood extent which exceeds the 1%CC30% (1 in 100CC30%) scenario and therefore the development is considered safe for its lifetime.

Consideration should also be given to the upper end estimate for the '2080's' scenario of 75%, however, modelling for this scenario is not currently available. The 0.1% (1 in 1000) flood event is considered the most suitable proxy on which to base the potential future fluvial flood levels and the site location is shown to be unaffected during this scenario. Therefore, the risk of fluvial flooding is considered to be very low.

4.3.4 Fluvial Flood Defences

The NRW mapping indicates that the River Afan is defended from overtopping in the locality with defences comprising of a revetment wall, blockside revetment and gabion revetment which are stated to offer a 1% (1 in 100) standard of protection. These defences are included within the flood modelling provided which shows no out of bank flooding during the 1% (1 in 100) scenario.

4.4 Coastal/Tidal Flooding

The River Afan is tidally influenced in the locality for which NRW have supplied modelled tidal flood levels for the year 2091 and 2116, these can be seen below:

14 Glyn Street	
Return Period	Modelled Level (mAOD)
0.5% (1 in 200) 2091	N/A
0.1% (1 in 1000) 2091	7.01
0.5% (1 in 200) 2116	7.12
0.1% (1 in 1000) 2116	7.30

At present the risk of tidal flooding is negligible up to the 0.1% (1 in 1000) chance as tidal flood water is contained within the River Afan channel.

When accounting for sea-level rise up to the year 2091, flood is only expected to impact the site boundary from the 0.1% (1 in 1000) flood event up to a maximum level of 7.01mAOD.

The site ground levels are circa 6.70mAOD at the lowest points and hence flood depths of up to 0.31m could be expected during the 0.1% (1 in 1000) flood scenario 69 years into the future, the year 2091.

When accounting for sea-level rise up to the year 2116, flood is expected to impact the site boundary from the 0.5% (1 in 200) flood event up to a maximum level of 7.12mAOD.

The site ground levels are circa 6.70mAOD at the lowest points and hence flood depths of up to 0.42m could be expected during the 0.1% (1 in 1000) flood scenario 94 years into the future, the year 2116. The predicted tidal flood depth increases to 0.60m when considering the 0.1% (1 in 1000) flood event for the year 2116.

4.5 Surface Water Flooding

Based on the NRW indicative flood map for surface water, the site is deemed at very low risk of flooding from this source equating to less than 0.1% (1 in 1000) chance. The EA surface water flood map can be seen in APPENDIX F.

The site topography is generally flat local topography falling steadily from west to east across the site boundary and therefore any surface water flooding is expected to be minimal and freely disperse to the surroundings before resulting in inundation to the ground floor.

4.6 Groundwater Flooding

Based on information within the Neath Port Talbot Strategic Flood Consequence Assessment (SFCA) 2014, groundwater flooding is not considered to be a significant source of flooding in the area with no specific records of flooding from this source historically.

Although the risk of flooding from this cannot be completely discounted, the proposed development will not include any below ground structures and hence rising ground water is not expected to impact the property.

4.7 Artificial Sources of Flooding

Based on the NRW reservoir flood maps the extent of flooding from an uncontrolled release of water from reservoirs further upstream in the River Afan catchment does not affect the site boundary, therefore the flood risk associated with reservoir breach is considered negligible.

5.0 Development Flood Risk

Taking into account the information gathered within this report, the site location is only shown to be susceptible to flooding during the 0.1% (1 in 1000) tidal scenario when including additions for climate change up to the year 2091.

The below section will therefore discuss the potential flood risk in and around the proposed development location from tidal flooding and also discuss how the development affects flood risk elsewhere.

5.1 Tidal Flood Risk

The tidal flood mechanism affecting the site boundary is as a result of overtopping of the River Afan with a maximum flood level of 7.01mAOD expected within the site boundary from the 0.1% (1 in 1000) return period including additions for climate change up to the year 2091.

Based on the ground levels external to the property of circa 6.70mAOD at the lowest point, flood depths of up to 0.31m can be expected in this area.

The floor level of the property has been estimated to be 7.00mAOD which when compared to the predicted flood level of 7.01mAOD results in an internal flood depth of 0.01m.

Predicted flood depths above the property ground floor when considering tidal flood risk up to the year 2116 increase to 0.11m during the 0.5% (1 in 200) flood scenario and up to 0.29m during the 0.1% (1 in 1000) flood scenario.

5.2 Impact on Local Flood Risk

5.2.1 Loss of Floodplain Volume

The proposed development is change of use of an existing property with no increase to the building footprint. Therefore, the flood risk locally will not be increased as a result of the development.

5.2.2 Increased Run-off

The proposed development will not create any additional impermeable areas from the existing and therefore surface water run-off will not be increased as a result of the development.

6.0 Flood History

Through the background research conducted as well as data received from NRW, no records were found to show that the site or immediate locality had suffered any degree of flooding from any source historically. Flood records however are not exhaustive and therefore this does not mean that flooding has not occurred in the area just that no instances have been recorded.

7.0 Development Suitability

The information below outlines the suitability of proposed development in relation to national and local planning policy.

Planning Policy

The aims of the national planning policies TAN15 (2004) and PPW (2012 and 2016) are achieved through application of the Justification Test and by assessing Flood Consequences. The key requirements of these are outlined below:

Justification Test: New developments should be directed away from Zone C and towards suitable land in Zone A, otherwise Zone B, where river or coastal flooding will be less of an issue. In Zone C the tests outlined in sections 6 and 7 of TAN15 will be applied, recognizing, however, that highly vulnerable development and Emergency Services in Zone C2 should not be permitted. All other new development should only be permitted within Zones C1 and C2 if determined by the planning authority to be justified in that location.

Assessing Flood Consequences: If a development proposal in Zone C1, or in C2 and if it is defined as being of low vulnerability, it would meet the test outlines in section 6, however it should be noted that those developments would be more likely to flood and appropriate mitigation would need to be planned accordingly. This section applies to Zone C, and those parts of Zone B where flooding has been identified as a material consideration to allow for localised problems.

Assessing whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed and reduced to a level which is acceptable for the nature/type of proposed development, including its effects on existing development.

Suitability of the proposed development, and whether a Justification Test is required, is based on the Development Advice Map Zone the Site is located in and the flood risk vulnerability classification of the development proposals.

As the area of the Site proposed for development is located within DAM Zone C2, and the proposed development is defined as Highly Vulnerable, according to Table 9 (Summary of

Policy Requirements) in TAN 15 (2004).

It should be noted that on the provision the mitigation measures detailed within the following section and planning application are implemented, flood resilience materials and a flood evacuation plan, the flood risk and overall risk to life will be minimal.

A Justification Test (Section 6 of TAN15) and Assessment of Flood Consequences (Section 7 and Appendix 1 TAN15) will be included with the report as set out in Table 9 of TAN15 which can be seen below:

Zone	Development Type (Section 5)	Planning Requirements (Section 4)	Acceptability Criteria (Section 7 & Appendix 1)	Development Advice (Section 5, 6, 7 and Appendix 1)
A	Emergency services Highly vulnerable development Less vulnerable development Other	- Justification test not applicable - Refer to surface water requirements	No increase in flooding elsewhere	No constraints relating to river or coastal flooding, other than to avoid increasing risk elsewhere.
B	Emergency Services	- If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further. - Refer to surface water requirements	- Acceptable consequences for nature of use - Flood defences adequate - Agreement for construction and maintenance costs secured - Occupiers aware of flood risk - Escape/evacuation routes present - Effective flood warning provided - Flood emergency plans and procedures - Flood resistant design - No increase in flooding elsewhere	Generally suitable for most forms of development. Assessments, where required, are unlikely to identify consequences that cannot be overcome or managed to an acceptable level. It is unlikely, therefore, that these would result in a refusal of planning consent on the grounds of flooding.
	Highly vulnerable development		- Acceptable consequences for nature of use - Occupiers aware of flood risk - Escape/evacuation routes present - Effective flood warning provided - Flood emergency plans and procedures - No increase in flooding elsewhere	
	Less vulnerable development		No increase in flooding elsewhere	

	Other	• Refer to surface water requirements	• Occupiers aware of flood risk • No increase in flooding elsewhere	
C1	Emergency services Highly vulnerable development Less vulnerable development	• Application of justification test (section 6) , including acceptability of consequences (section 7 and appendix 1) • Refer to surface water requirements	• Acceptable consequences for nature of use • Flood defences adequate • Agreement for construction and maintenance costs secured • Occupiers aware of flood risk • Escape/evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures • Flood resistant design • No increase in flooding elsewhere	Plan allocations and applications for all development can only proceed subject to justification in accordance with section 6 and acceptability of consequences in accordance with section 7 and Appendix 1.
	other	• Application of acceptability of consequences (section 7 and appendix 1) • Refer to surface water requirements	• Acceptable consequences for nature of use • Occupiers aware of flood risk • Desirable if effective flood warning and evacuation routes/procedure provided depending on nature of proposal • No increase in flooding elsewhere	Plan allocations and applications for development should only be made if considered acceptable in accordance with section 7 and Appendix 1.
C2	Emergency services Highly vulnerable development	The flooding consequences associated with Emergency Services and highly vulnerable development are not considered to be acceptable. Plan allocations should not be made for such development and planning applications not proposed.		
	Less vulnerable development	• Application of justification test (section 6) , including acceptability of consequences (section 7 and appendix 1) • Refer to surface water requirements	• Acceptable consequences for nature of use • Flood defences adequate • Agreement for construction and maintenance costs secured • Occupiers aware of flood risk • Escape/evacuation routes present • Effective flood warning provided	Plan allocations or applications for less vulnerable development can only proceed subject to justification in accordance with section 6 and acceptability of consequences in accordance with section 7

			• Flood emergency plans and procedures	and Appendix 1.
	Other	• Application of acceptability of consequences (section 7 and appendix 1) • Refer to surface water requirements	• Flood resistant design • No increase in flooding elsewhere • Acceptable consequences for nature of use • Occupiers aware of flood risk • Effective flood warning provided • No increase in flooding elsewhere	Plan allocations and applications for development should only be made if considered acceptable in accordance with section 7 and Appendix

As per the guidance in TAN15, for highly vulnerable development in zone C1 the justification test is required to be passed of which the following applies (FCI comments in red):

Justification Test

1) Should be located only in an area of flood risk which is developed and served by significant infrastructure, including flood defences (Zone C1 of the DAM); **The proposed development is located within Zone C1 on the DAM maps and hence is served by significant flood defence infrastructure.**

AND

2) Its location is necessary to assist a local authority regeneration initiative or Strategy, or contribute to key employment objectives, necessary to sustain an existing settlement or region; **The property is an existing property located within the Harbourside Strategic Regeneration Area and will increase the potential occupancy from 3 bedroom to 5 bedroom.**

AND

3) The site meets the definition of previously developed land (i.e. it is not a Greenfield site) and concurs with the aims of Planning Policy Wales (i.e. the presumption in favour of sustainable development). **The property is existing with no change of footprint planned and therefore is previously developed.**

AND

4) A Flood Consequence Assessment has been produced to demonstrate that the potential consequences of a flood event up to the extreme flood event (1 in 1000 chance of occurring in any year) have been considered and meet the criteria below in order to be considered acceptable. **This FCA has evaluated the flood risk to the property from a range of potential flood mechanisms with recommendation put forward to minimise the risk of damage in the event of flooding.**

Acceptability Criteria (has to meet all):

Q. Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a 1 in 1000 chance of occurring in any year).

The site location does benefit from local flood defences along the River Afan which are designated as formal flood defences by NRW and the DAM and are routinely inspected and maintained by NRW. Therefore, the defences are deemed to be structurally adequate.

Q. The cost of future maintenance for all new/approved flood mitigation measures, including

defences must be accepted by the developer and agreed with the Environment Agency (now Natural Resources Wales).

Flood resilience measures would be maintained as part of the building structure and ongoing by the owner. NRW are responsible for inspection and maintenance of the existing River Afan defences.

Q. The developer must ensure that future occupiers of the development are aware of the flooding risks and consequences.

The property owner has commissioned this FCA and therefore should make any third party aware of the flood risk.

Q. Effective flood warnings are provided at the site

The property is located with the River Afan at Port Talbot flood warning service and it is recommended that the client sign up for this service.

Q. Escape/evacuation routes are shown by the developer to be operational under all Conditions

Evacuation of the property in the event of flooding is covered within the flood evacuation plan (separate to this report). The property should be evacuated before the onset of flooding and the routes of egress should be maintained.

Q. Flood emergency plans and procedures produced by the developer must be in place

As part of this FCA, a site-specific flood evacuation plan has been included as a separate document.

Q. The development is designed by the developer to allow the occupier the facility for rapid movement of goods/possessions to areas away from floodwaters.

Non-fixed vulnerable items (TV's, computers, routers etc.) should be located on stands or tables or have the facility to relocate to tables/worktops in the event of a flood alert.

Q. Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.

Flood resilience measures will be made within this report so that permanent damage is avoided where possible and property re-occupation can take place as efficiently as possible.

Q. No flooding elsewhere.

The existing property footprint is not changing during the redevelopment process and floor levels will remain the same. Therefore, flood risk will not be increased.

Q. Developer is required to demonstrate that the site is designed to be flood free for the lifetime (A1.5) of development for either a 1 in 100 chance (fluvial) flood event, or a 1 in 200 chance (tidal) flood event including an allowance for climate change (depending on the type of flood risk present) in accordance with table A1.14.

The site location lies outside of the 0.1% (1 in 1000) fluvial flood extents and therefore is considered safe from flooding during its lifetime from fluvial flooding.

Tidal flooding is only shown to affect the site boundary during the 0.1% (1 in 1000) chance including climate change additions up to the year 2091. During the 0.5% (1 in 200) flood scenario for the year 2091 flooding does not encroach the site boundary.

The development is therefore considered safe for its lifetime from both fluvial and tidal flooding.

Q. In respect of the residual risk to the development it should be designed so that over its lifetime (A1.5) in an extreme (1 in 1000 chance) event there would be less than 600mm of water on access roads and within properties, the velocity of any water flowing across the development would be less than 0.3 m/second on access roads and 0.15m/second in properties, and the maximum rate of rise of floodwater would not exceed 0.1m/hour (see table A1.15).

During the 0.1% (1 in 1000) fluvial flood scenario inundation to the property boundary is not expected and hence the residual risk is considered negligible.

During the 0.1% (1 in 1000) tidal flood scenario, flood water is contained within the channel at present day with flooding only shown to affect the site boundary when accounting for climate change up to the year 2091. Flood depths during this scenario are very low, up to 0.31m externally, which is significantly lower than the 600mm stated within TAN15.

The ground floor of the property will be designed with flood resilience measures so that permanent damage is avoided where possible and property re-occupation can take place as efficiently as possible.

8.0 Recommendations

Taking into account the information gathered within this report, the proposed development is deemed at risk of tidal flooding during the 0.1% (1 in 1000) chance with additions for climate change up to the year 2091.

During this event the maximum predicted flood level is 0.01m above the floor level and hence considered to be very minor. With inundation expected to the property, best practice in the event of flooding should be considered with regard to fabric and layout ground floor. Therefore, FCI will propose general recommendations for the ground floor:

Flood Resilience – A flood resilient building is designed and constructed to reduce the impact of flood water entering the building so that no permanent damage is caused, structural integrity is maintained and drying and cleaning is easier.

8.1 Flood Resilience Measures

Flood resilience measures are considered the most practical solution to minimise the risk of permanent damage to the property during a flood event. These measures will be listed below:

- Ground floors designed to be resistant to water and permit passage of flood water when subject to elevated depths. E.g tiled flooring, vinyl flooring, composite panel flooring.
- Resilient material usage for fixtures, fittings and furniture. Such as metal/plastic chairs, tables, kitchen cupboards, stair cases etc.
- Water resilient materials for walls and internal finishes. Avoid gypsum based plaster board and consider lime base plasterboard, plastic fittings and finishes, water resilient paint.
- Raising of electrical sockets above the extreme 0.1% (1 in 1000) flood level of 7.26mAOD.
- Retractable rugs to be used in place of carpet which can be relocated in the event of a flood alert.

Further information regarding flood resilience techniques can be found on the below link:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf

8.2 Property Services

Given the predicted flood risk, services entering the property such as electric boxes and gas telemetry may be located below predicted flood depths. It is therefore advised that where possible any vulnerable services are relocated above predicted flood levels.

8.3 Flood Evacuation Plan

A flood evacuation plan will be included as separate document and added as an appendix to this report.

8.4 NRW Flood Warnings

The property is located within an area where flood warnings are provided by NRW and therefore it is recommended the client is signed up to receive these.

Further information regarding any of the above recommendations can be attained by contacting Flood Consult International.

9.0 Conclusion

Following investigation into the flood risk exists at the 14 Glyn Street, the following conclusions are made:

- The site lies within the low risk flood zone on the Natural Resources Wales flood map which equates to between 1% (1 in 100) and 0.1% (1 in 1000) probability of flooding from the nearby River Afan.
- The site is located within flood zone C1 on the Development Advice Map (DAM) and is classed as 'highly vulnerable' in line with TAN15 guidance.
- The purpose of applying for planning is a change of use from an existing three bedroom property into a five bedroom HMO property.
- Modelled flood level information obtained from NRW show that inundation to the ground floor is only applicable from the 0.1% (1 in 1000) tidal scenario with additions for climate change up to the year 2091.
- Predicted flood levels during the 0.1% (1 in 1000) tidal flood event with additions for climate change up to the year 2091 is 7.01mAOD. This is likely to produce flood depths externally up to 0.31m and internally up to 0.01m.
- Fluvial flooding from the River Afan does not affect the site boundary up to the 0.1% (1 in 1000) chance.
- The risk of surface water flooding has been deemed very low.
- The site location is not known to have suffered flooding from any source historically.
- The proposed development is the redevelopment of an existing property from a three-bedroom house into a five bedroom property.
- There will not be an increase to the building footprint or raised floors levels and therefore there will be no displacement of floodplain cause.
- There will be no increase to impermeable areas as a result of the development and hence no increase in surface water run-off will result.
- Recommendations have been made within the report pertaining to flood resilience measures for the ground floor of the property to minimise the risk of permanent damage and speed up the site re-occupation process following a flood event.
- It is advised that the client signs up for flood alerts from Natural Resources Wales.
- The redevelopment of the property will not increase flood risk elsewhere, can be managed in line with TAN15 guidance.

10.0 Glossary

Word	Definition
1D	Estimation of peak flow and elevation in the river channel only
2D	Estimation of flow routes and elevations across the floodplain
CC	Climate Change
BGS	British Geological Survey
DAM	Development Advice Map – flood maps used in Wales to derive development suitability
Fluvial	Rivers
LiDAR	Light Detection and Ranging – method of remote sensing using laser pulses to measure variable distances to earth.
mAOD	Meters Above Ordnance Datum - a vertical datum used by Ordnance Survey as the basis for deriving altitudes on maps.
Pluvial	Rainfall or surface water
Property Level Protection	Utilising the existing structure of an asset to implement flood protection measures.
Return Period	Estimated likelihood of an event
SFCA	Strategic Flood Consequence Assessment – a broadscale overview of flood risk for a town or borough
TAN15	Technical Advice Note 15 – Guidance in Wales with regard to development and flood risk
Topography	The arrangement of the natural and artificial physical features of an area

APPENDIX A
NRW Fluvial Flood Zone Map

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APPENDIX B
NRW Fluvial Flood Extents



APPENDIX C
Development Advice Map



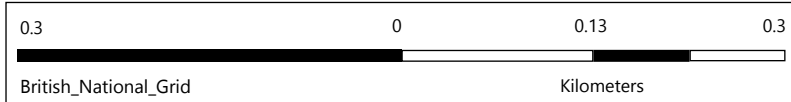
Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

- Zone C1
- Zone C2
- Zone B
- Zone A

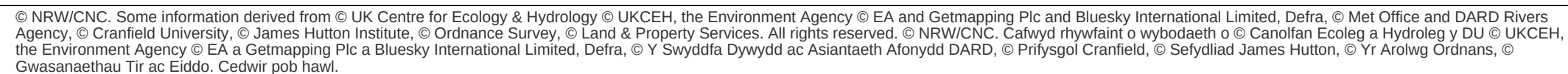
Graddfa / Scale at A3 1: 5,000

Dyddiad / Date
20/01/2023



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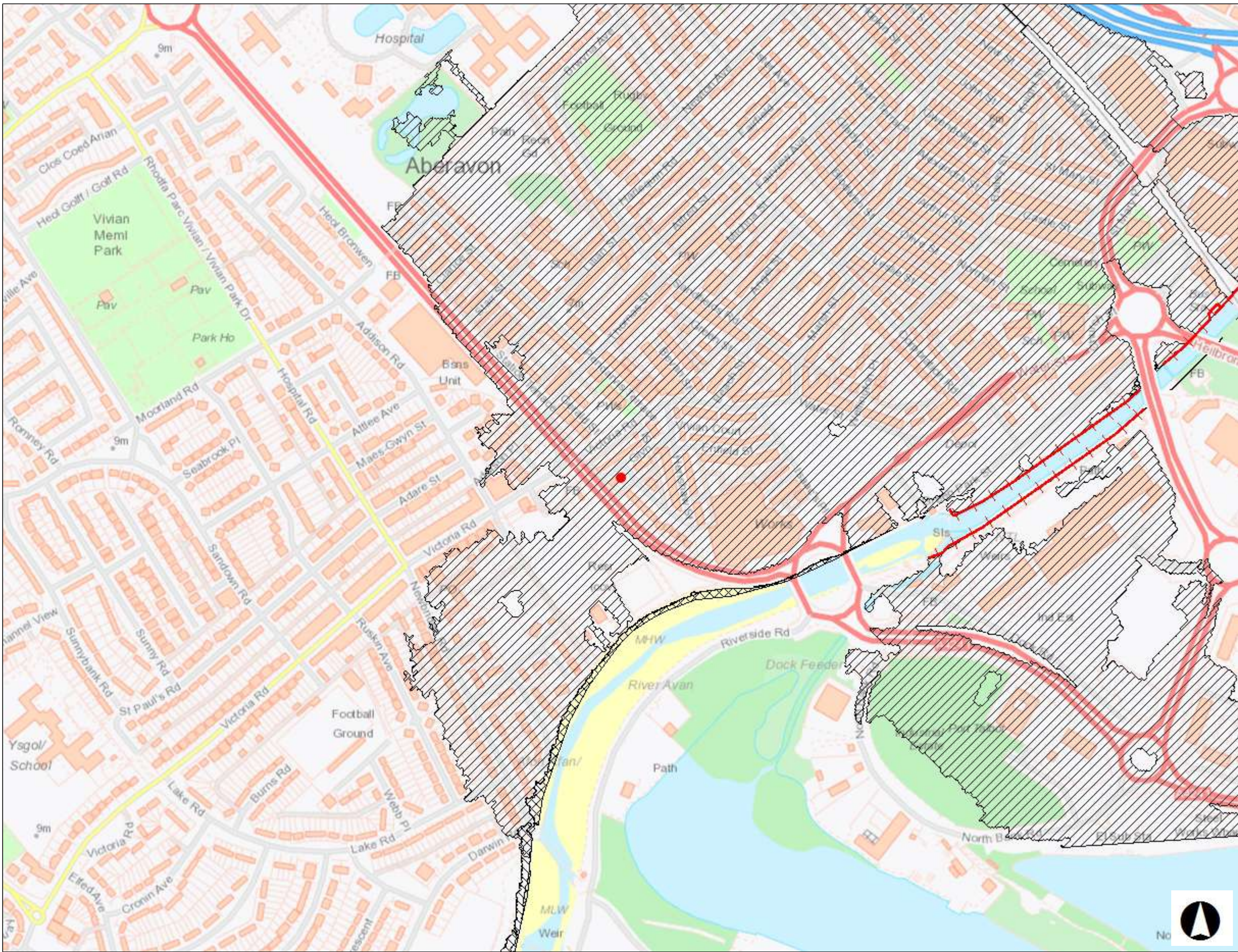
APPENDIX D
NRW Tidal Flood Zone Map



APPENDIX E
NRW Tidal Flood Modelling Extents



APPENDIX F
NRW Flood Defence Locations & Areas Benefitting from Defences



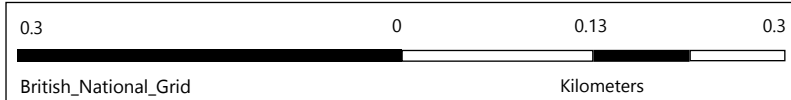
Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

-  Flood Defence Locations
- Areas Benefitting from Flood Defences
 -  Rivers
 -  Sea
 -  Rivers and Sea

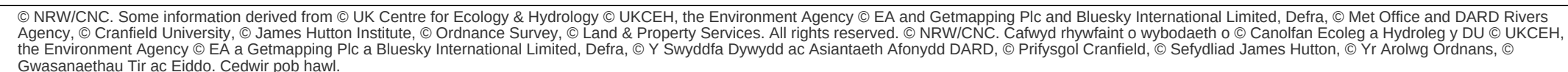
Graddfa / Scale at A3 1: 5,000

Dyddiad / Date
20/01/2023

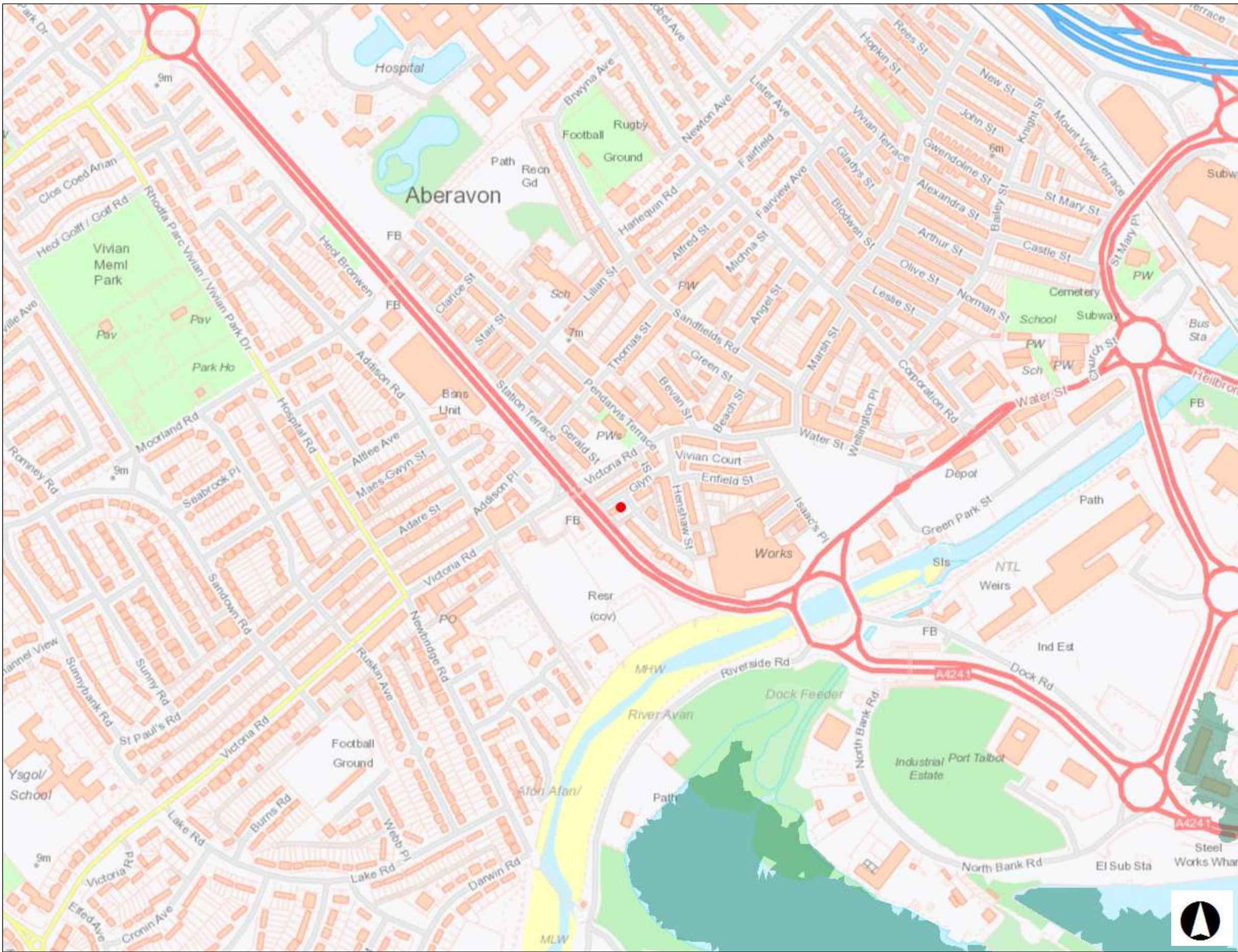


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APPENDIX G
NRW Surface Water Flood Zone Map



APPENDIX H
NRW Reservoir Flood Map



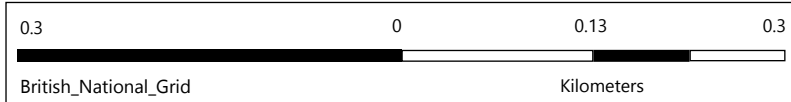
Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

-  Flood Risk from Reservoirs

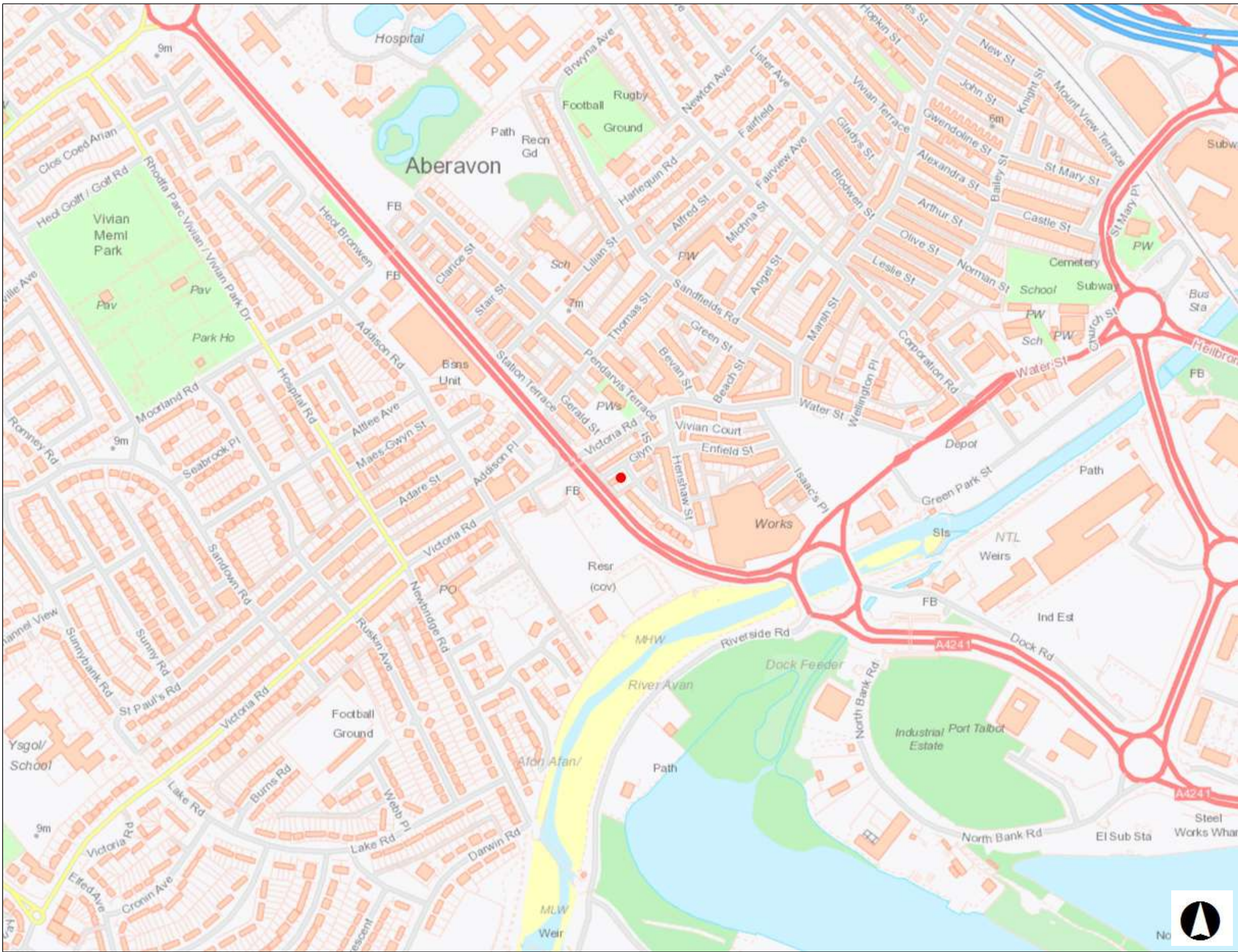
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Dyddiad / Date
20/01/2023



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APPENDIX I
NRW Flood History Map





Cyfoeth Naturiol Cymru
Natural Resources Wales

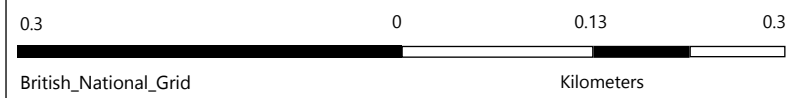
Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

 Recorded Flood Extents

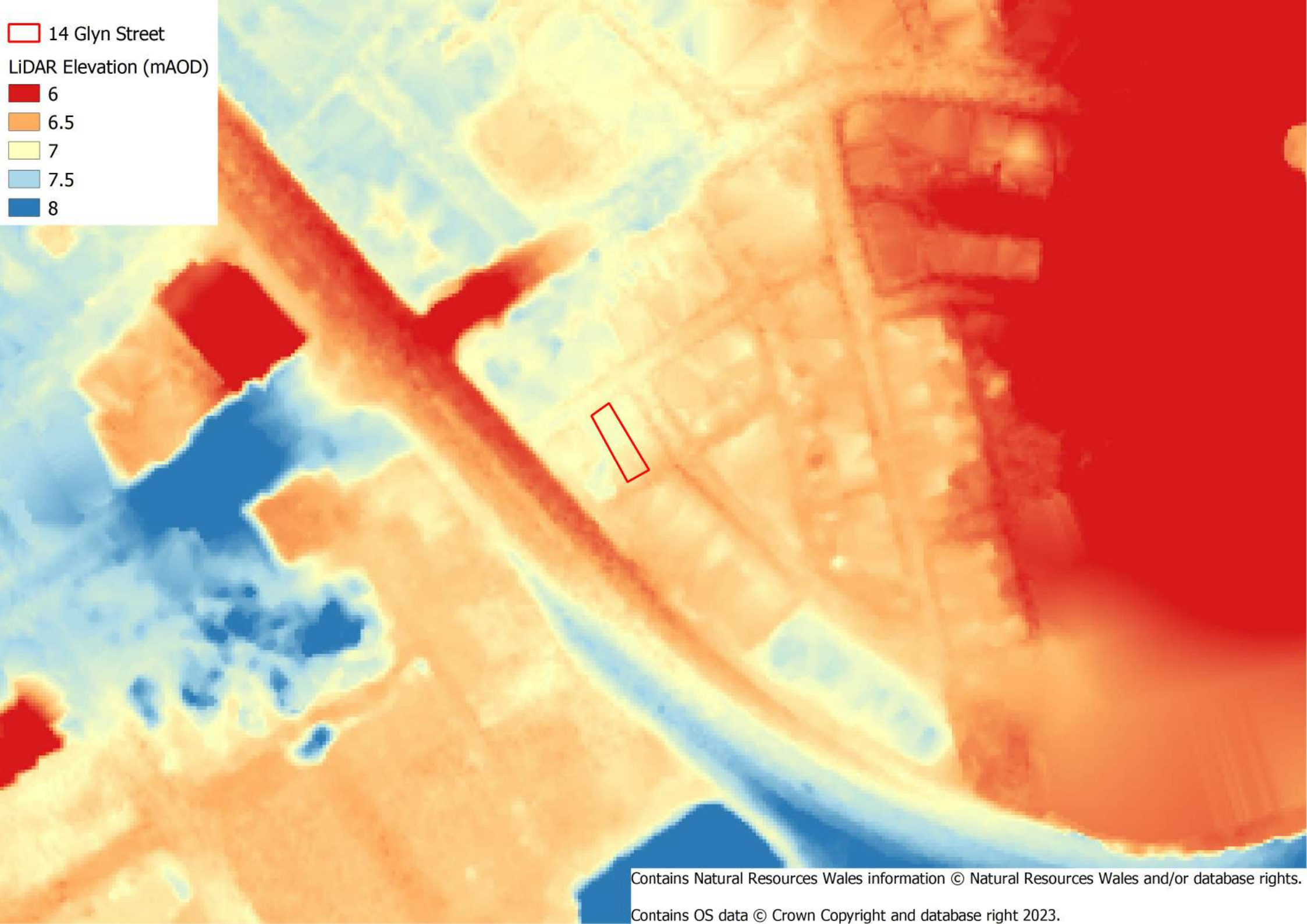
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Dyddiad / Date
20/01/2023



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APPENDIX J
Site LiDAR Topography



14 Glyn Street

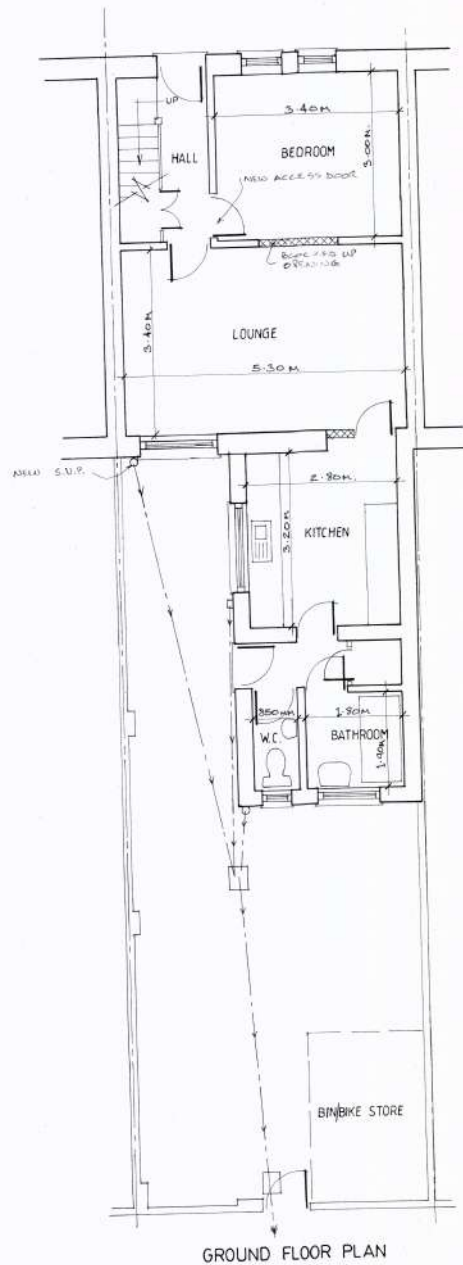
LiDAR Elevation (mAOD)

6
6.5
7
7.5
8

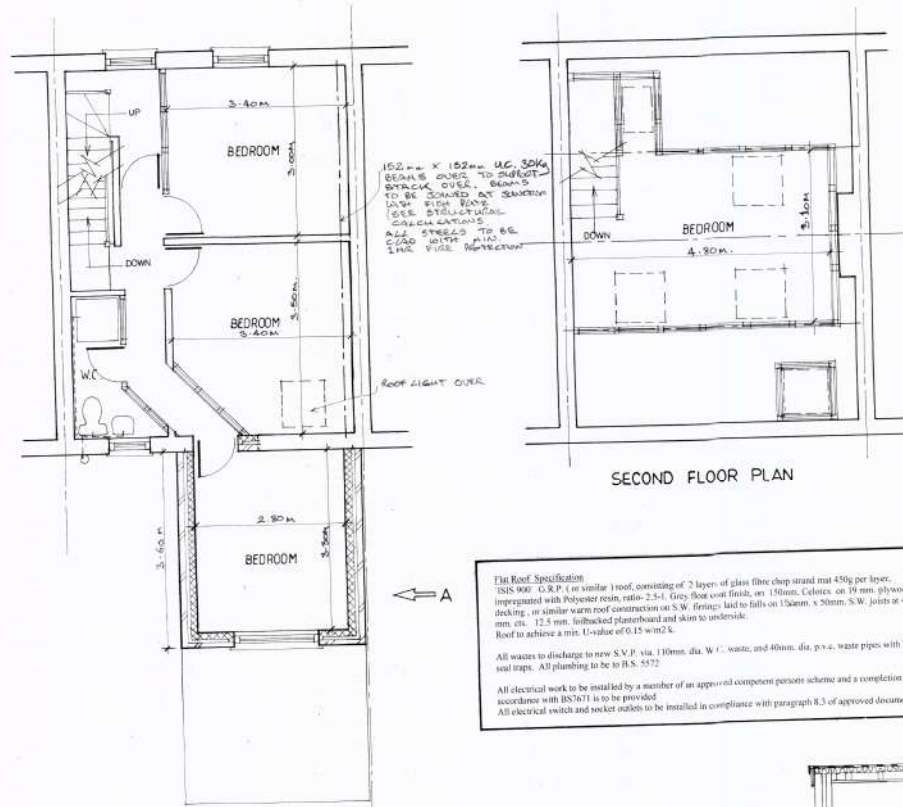
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APPENDIX K
Existing Site Plans



GROUND FLOOR PLAN

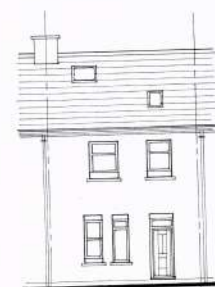


FIRST FLOOR PLAN

SECOND FLOOR PLAN

The Roof Specification
 BS100 G.R.P. (or similar) roof, consisting of 2 layers of glass fibre chip strand mat 450g per layer, impregnated with Polyester resin, ratio 2.5:1. Grey float coat finish, on 10mm Celotex on 19mm plywood decking, or similar warm roof construction on S.W. fittings laid to falls on 150mm x 50mm S.W. joists at 400mm c/c. 12.5mm. Insulated plasterboard and skin to underside.
 Roof to achieve a min. U-value of 0.15 w/m2 K.
 All wastes to discharge to new S.V.P. via 110mm dia. W.C. waste, and 40mm dia. p.v.c. waste pipes with 70mm deep seal traps. All plumbing to be to B.S. 5572.
 All electrical work to be installed by a member of an approved competent persons scheme and a completion certificate in accordance with BS7671 is to be provided.
 All electrical switch and socket outlets to be installed in compliance with paragraph 8.3 of approved document M 2004.

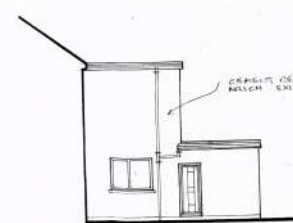
Pitched Ceiling Specification
 50 mm x 50 mm s.w. timbers fixed to underside of existing rafters, 100 mm Celotex insulation board fitted between rafters with layer of 'super quilt' fitted to underside of rafters. Rafter to be doubled up each side of roof light.
 12.5 mm. Insulated plasterboard and skin internal finish. New breathable membrane fitted in place of existing parking felt. 50 mm air gap to be maintained over the top of the insulation. Roof to have a min. u-value of not less than 0.15 w/m2 K.
 Stair partitions to be of 100 mm x 50 mm s.w. studs at 600 mm c/c, with bungs to suit 100 mm mineral wool infill to provide min. 40db sound insulation. 12.5 mm. plasterboard and skin to both sides.
 New floor joists to be 175 mm x 50 mm s.w. at 400 c/c.
Staircase Specification
 New staircase to have min. 225mm treads and max. 187mm risers and a pitch line not to exceed 42 degrees. Min. headroom of 2.0m. Handrail to be fixed at a max. height of 1.00m off the pitch line.
 Means of escape window to be provided to new second floor which has an unobstructed openable area of at least 0.33 m squared and to be at least 450 mm x 750 mm, in either direction. The bottom of the openable area should not be more than 1100 mm above the floor. All glazing to be Pilkington K glass with a min. U-value not less than 1.60 w/m2 K.
 A smoke detection system to be installed with a min. of 3 no. detectors (1 no. in hall, 1 no. on landing & 1 no. on new second floor) wired into the mains with a battery back up. All fitted in accordance with B.S. 5839.
 All doors to habitable rooms off existing hall and landing to be min. 1/2 hr. fire doors, or, smoke detection system to be extended to include detectors fitted in all habitable rooms.
Cavity wall specification
 100mm concrete blockwork inner skin. Min. 125 mm. Cavity with 75mm Celotex insulation batt.
 100 mm. Concrete blockwork with 19mm sand/cement render - outer skin.
 9mm. Supalite cavity closures. Wall ties to be stainless steel with insulation but retainers, and staggered 450mm. Vertical and 600mm. Horizontal. Wall to achieve a min. U-value of 0.21 w/m2 K.
 Kitchen to be mechanically ventilated to the outside air to give extraction of :
 Extract fan - 40 litres/sec. Or Cooker hood - 30 litres/sec.
 Utility to be mechanically ventilated to the outside air to give min. 30 litres/sec extraction.
 Bathrooms to be mechanically ventilated to the outside air to give min. 15 litres/sec, extraction with a 15 min. time delay.
 Wastes from Utility, bathrooms and kitchen to discharge to foul sewer system via 110mm dia. W.C. waste, and 40mm dia. p.v.c. waste pipes with 75mm deep seal traps.
 An in line blending valve is to be fitted to all baths to ensure the maximum hot water temperature is no more than 48 degrees centigrade.
 Cavity CG130 linings over all external openings. Vertical and horizontal D.P.C.'s to all openings.
 Glazing to be Pilkington K glass with a min. U-value of not less than 1.6 w/m2 K.
 Glazing in critical locations to be toughened safety glass to comply with the test criteria as indicated in B.S. 6206 1981.
 Means of escape window to be provided to proposed first floor bedrooms, which have an openable area of at least 0.33 m squared and be at least 450 mm x 750 mm, in either direction. The bottom of the openable area should not be more than 1100 mm above the floor.



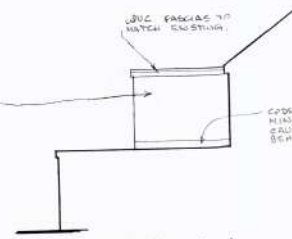
FRONT ELEVATION



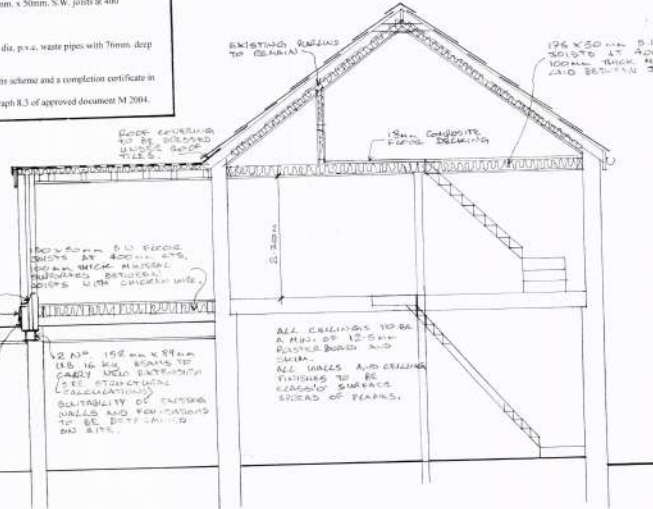
REAR ELEVATION



SIDE ELEVATION



ELEVATION A



TYPICAL SECTION

Project: PROPOSED CHANGE OF USE OF 14, GLYN STREET, PORT TALBOT, NEATH PORT TALBOT.		
PROPOSED		
Scale: 1:50, 1:100	Dwg. No. PTP03	Date: NOVEMBER 2022.
 meridian BUILDING DESIGN ARCHITECTS & ENGINEERS		Tel. 02920 515952

APPENDIX L
Flood Evacuation Plan

Flood Plan

Site Address:

14 Glyn Street,
Port Talbot,
Neath Port Talbot,
SA12 6NF

Property Owner:**Introduction**

Given the flood risk that has been identified at the above address, this plan will detail the necessary actions required if the site is at risk from an impending flood event. The objective of the flood plan is to provide the responsible parties onsite with procedures to ensure a safe and efficient evacuation of the site as well as provide useful information on preventative measures and hazards associated with flood water. All tenants should be aware of this plan with adequate training organised by the property owner to safely evacuate if a flood alert is issued.

Situation

The site is a terraced property which is proposed to be redeveloped from a three-bedroom house into a five-bedroom house, HMO. The ground floor will consist of one bedroom, kitchen and living room with the first floor containing three bedrooms and bathroom and the second floor containing one bedroom.

Flood Risk Assessment

FCI have undertaken a desktop FCA on the site which has led to the determination of the flood risk to the site. Flooding is only deemed to inundate the property from the extreme 0.1% (1 in 1000) chance with additions for climate change up to the year 2091. The flood level during this event is 7.01mAOD which produces minor flood depths of up to 0.31m externally and 0.01m internally.

The 0.1% (1 in 1000) flood level during a tidal flood event for the year 2116 is 7.30mAOD which produces flood depths of up to 0.60m externally and 0.29m internally.

During the tidal 0.1% (1 in 1000) flood scenario in the year 2116, flood depths are considered to be significant and would result in the ground floor of the property suffering inundation and damage. Should a flood event of this magnitude occur the site would still be accessible on foot due to depths externally amounting to 0.30m at the property entrance on the north western perimeter, however, it is recommended that everyone is able to evacuate site and proceed to a flood free zone as safely and efficiently as possible.

Flood Warnings & Preparation

Natural Resources Wales operates a flood warning service called Floodline. The site is not located within an area that can receive these warnings but is covered by the flood alert service, all types of NRW flood warnings are described in the below table:

<i>Warning</i>	<i>Description</i>	<i>Timescale</i>	<i>Action(s)</i>
 FLOOD ALERT	Flooding is possible – Be prepared	2-48 hours in advance of flooding	Be prepared for flooding
 FLOOD WARNING	Flooding is expected – Immediate Action is required	Half an hour to 24 hours in advance of flooding	- Act now to protect/defend your property - Install any flood resilience measures - Move any critical equipment to raised levels
 SEVERE FLOOD WARNING	Severe Flooding – Danger to life	When the threat of flooding is to cause significant threat to life and different actions are required	- Be ready should you need to evacuate from the property - Co-operate with the emergency services and call 999 if you are in immediate danger.
Warning Removed	No further flooding is expected in your area	Issued when a flood warning is no longer in force	- Accumulated flood water may still exist and may be contaminated - If your property has flooded, contact your insurance company

In times of high rainfall and flooding is predicted through local media, contact Floodline on 0345 988 1188, quoting the property address. Upon receiving a flood warning, the responsible parties' should prepare to move all vulnerable items to a higher level above the predicted flood level such as tables, kitchen counters or upstairs. Given that the flood alert may only be issued two hours before flooding begins, adequate labour will need to be sought in order to complete the move prior to inundation of the Property.

Considerate Measures

When preparing for evacuating site, the following information should be taken into consideration:

- Always consider your own safety, loss preventive measures and procedures should always be undertaken in pairs and should only be completed if safe to do so
- Avoid contact where possible with flood water as it maybe contaminated. Ensure any staff who are contacted by flood water wash their skin thoroughly
- Be aware that access/egress routes to the site may be compromised
- Be vigilant if required to walk along main roads
- Do not walk/drive through flood water unless unavoidable
- 6 inches of fast flowing water can knock you off your feet
- 2 feet is sufficient to float your car
- Manhole covers can be lifted with other debris hidden beneath the surface
- Flood water may be contaminated
- Follow advice from the emergency services

Protective Measures

In line with predicted flood depths of up to 0.79m above the property floor level, the following measures can be taken with a view to reducing the risk of damage to vulnerable items.

Item	Possible Action	Safe Location (if applicable)
Computers, Printers & Office Electrical Equipment	Raise Up	Desks/Upper Floor Level
Paper Files	Raise Up	Desks/Upper Floor Level
Routers	Back-up Files	N/A
Chairs	Raise Up	Desks/Upper Floor Level
Vehicles	Move Off Site	Car Parks, Yards or Closed Roads
Utilities (Electric, Gas, Water)	Turn Off	N/A

The above protective measures are aimed at reducing the damage to vulnerable on the ground floor of the property. With regard to the utility service points within the property, it is recommended that the shut-off points for each service are shown on a layout plan so this can be actioned as efficiently as possible.

Site Evacuation Route

1. Once a flood alert has been given and evacuation has been advised, the following route should be observed to vacate the property and reach a flood free zone.

2. Exit the property at the main entrance on the north western perimeter and proceed onto Glyn Street.
3. Turn Right and proceed 50m along Glyn Street, turn left towards Victoria Road.
4. At the Junction with Victoria Road, turn left and proceed 210m using the footbridge to cross Afan Way (A4241).
5. Continue on Victoria Road until the Junction with Addison Road and turn right onto Addison Road.
6. Proceed 65m to the junction with Adare Street.
7. This flood free zone and the evacuation route are shown on the aerial image below and the projected flood extents on the map underneath, follow the advice of the emergency services.



Site Reoccupation

Following the subsidence of flood water and subsequent removal of the flood warning, the following hazards should be considered during the reoccupation of the site:

- The local area is likely to be severely disrupted with access/egress routes compromised.
- Do not re-renter your property unless instructed to do so. The building may have been subject to structural damage or electrical cables may be exposed to water (if not able to be turned off).
- Ensure photographic/video evidence of all damage to goods and property as evidence to present to your insurance company.
- Instruct a local contractor who specialises in restoration following flooding to pump out your premises (if required), dispose of damaged/contaminated goods and commence the 'drying-out' process.
- Do not turn on utility services unless authorised to do so by the local service provided following a site inspection by a qualified engineer.
- Do not use any electrical apparatus contacted by flood water unless declared safe to use by a qualified engineer.
- Flood water could contain harmful chemicals and sewage, therefore handling any objects that have been contacted by flood water should be done using suitable PPE (gloves, overalls, wellies) and take extra care to identify sharp objects (i.e. nails, broken glass).
- Open all windows and doors to allow the building to ventilate, be aware not to expose valuables to theft.
- Identify vulnerable equipment/assets likely to require replacement/refurbishment.
- Do not re-open your premises to the public until thoroughly cleaned and disinfected, contact the environmental health department of the local authority for further assistance.

It would be advantageous to select a local flood restoration contractor prior to a flood event as post flood extended waiting periods are likely due to increased demand. In terms of drying out of the premises following a flood, it is suggested that purchasing dehumidifiers in anticipation of a flood event would speed up the drying out process as these are likely to be in short supply after a flood event.

Useful Contacts

Below is a list of contacts which may be useful when preparing for flooding or reinstatement works following a flood event.

Description	Company Name	Contact Number
Floodline	Environment Agency	0345 988 1188
Electricity Supplier	Western Power Distribution	
Gas Supplier	Wales & West Utilities	
Water Supplier	Welsh Water	
Telephone Provider	British Telecommunications	
Local Authority Emergency Services	Neath Port Talbot Council	01639 686868
Insurance Company Claims Service		
Insurance Agent		
Flood Restoration	Belfor UK Ltd	01827 307600
Flood Restoration	DriTech Ltd	01322 586522
Flood Restoration	Rainbow International	01322 662277