

FLOOD CONSEQUENCE ASSESSMENT (FCA)

Clocktower Building, Glebeland Street
CNC Property Fund Management Ltd
CDGA-9506-REP01-RO

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C D GRAY & ASSOCIATES LTD
5-6 DERYN COURT
WHARFEDALE ROAD
PENTWYN
CARDIFF
CF23 7HB

T: 029 20 733 181
F: 029 20 734 445
E: design@cdgray.co.uk

 @C_D_Gray
Web: www.cdgray.co.uk



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0 INTRODUCTION

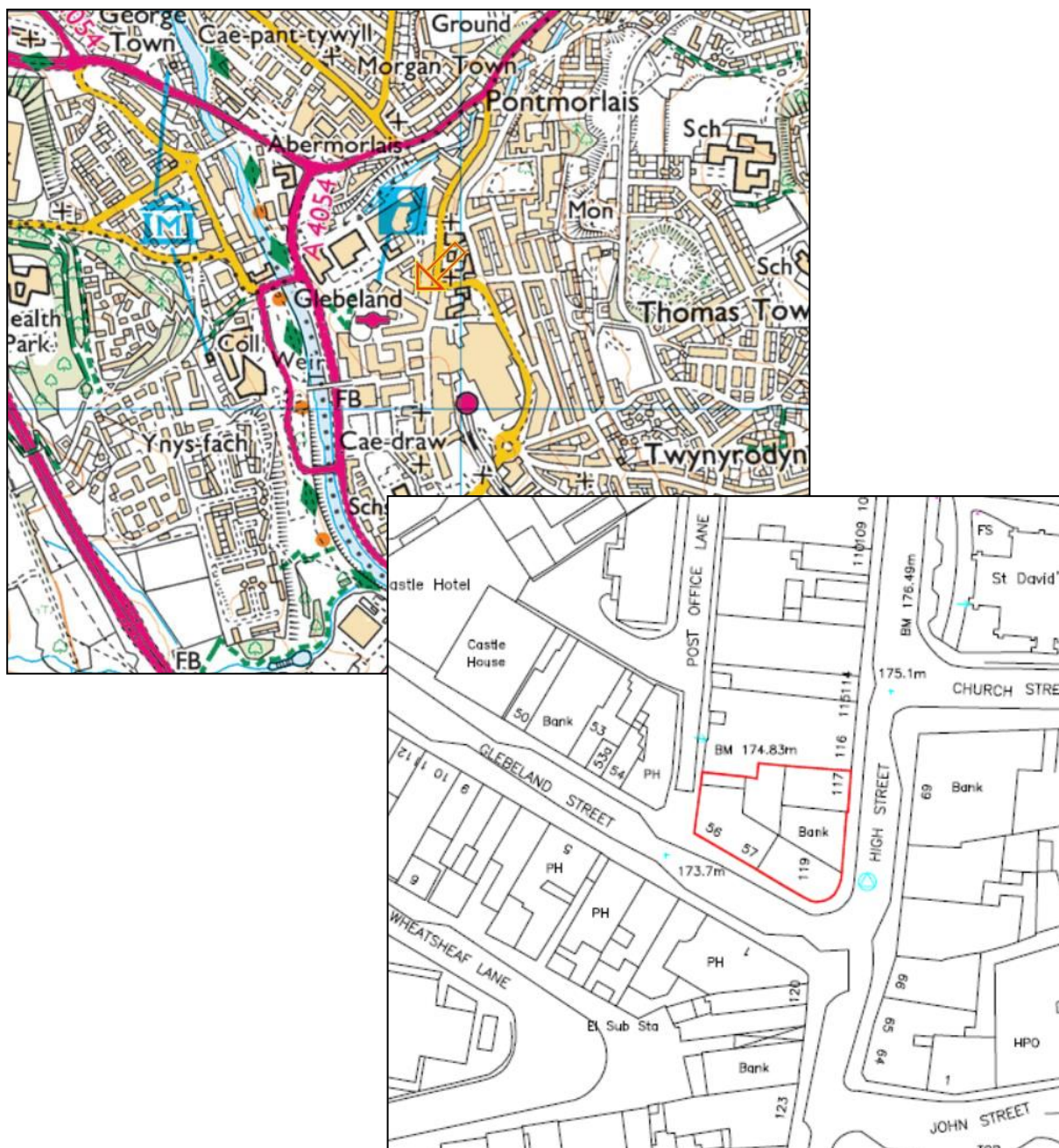
- 0.1 CNC Property Fund Management Ltd are proposing to redevelop the first and second floor of the Clocktower Building on Glebeland Street in Merthyr Tydfil to provide hotel accommodation.
- 0.2 CD Gray & Associates Ltd has been appointed to undertake a Flood Consequences Assessment (FCA) to support the proposed development's planning application.
- 0.3 Guidance within Planning Policy Wales 2002 prescribes a minimum standard of flood protection for any new development within flood zones. Zones of flood risk across Wales have been identified through Development Advice Maps (DAMs) included within the Technical Advice Note (TAN) 15: Development and Flood Risk guidelines published in July 2004.
- 0.4 Updated DAMs were issued in 2009 and more recently larger scale interactive version has become available on Natural Resources Wales (NRW) website. The site is identified as lying wholly within Flood Zone C2 which indicates its position within the 1% (1 in 100 year) and 0.1% (1 in 1000 year) Annual Event Probability (AEP) fluvial flood outlines of the River Taff.
- 0.5 This document follows the numbering of the seventeen points listed in paragraph A1.17 of TAN15 Appendix 1. The recently updated Merthyr Bus Station model has been used to inform this report which includes updated hydrology and latest Welsh Government climate change allowances (25%) under Natural Resources Wales (NRW) licence (ATI 15621A).
- 0.6 This report contains information supplied by NRW which subject to their respective copyright and database right. The copyright for architectural drawings used as base plans or referenced in this report rests with Richard Andrews Architects.

1 THE SITE

1.1 Site Location

- 1.1.1 The property known as the Clocktower building is located within the main commercial area of Merthyr Tydfil on the corner of Glebeland and High Street.

Figure 1.1 – Site Location



Source: www.streetmap.co.uk

- 1.1.2 The approximate National Grid reference of the site is S0049062 and Ordnance Survey Co-ordinates 304938, 206221.

1.2 Site Description

- 1.2.1 Access to the property is gained from the building's main entrance / shared lobby area off Glebeland Street.
- 1.2.2 The redevelopment associate with this application is limited to the conversion of the first and second floor levels of the building only. The existing first floor is currently used as office space and the second floor is residential flats. Existing floor plans are available within Appendix A.

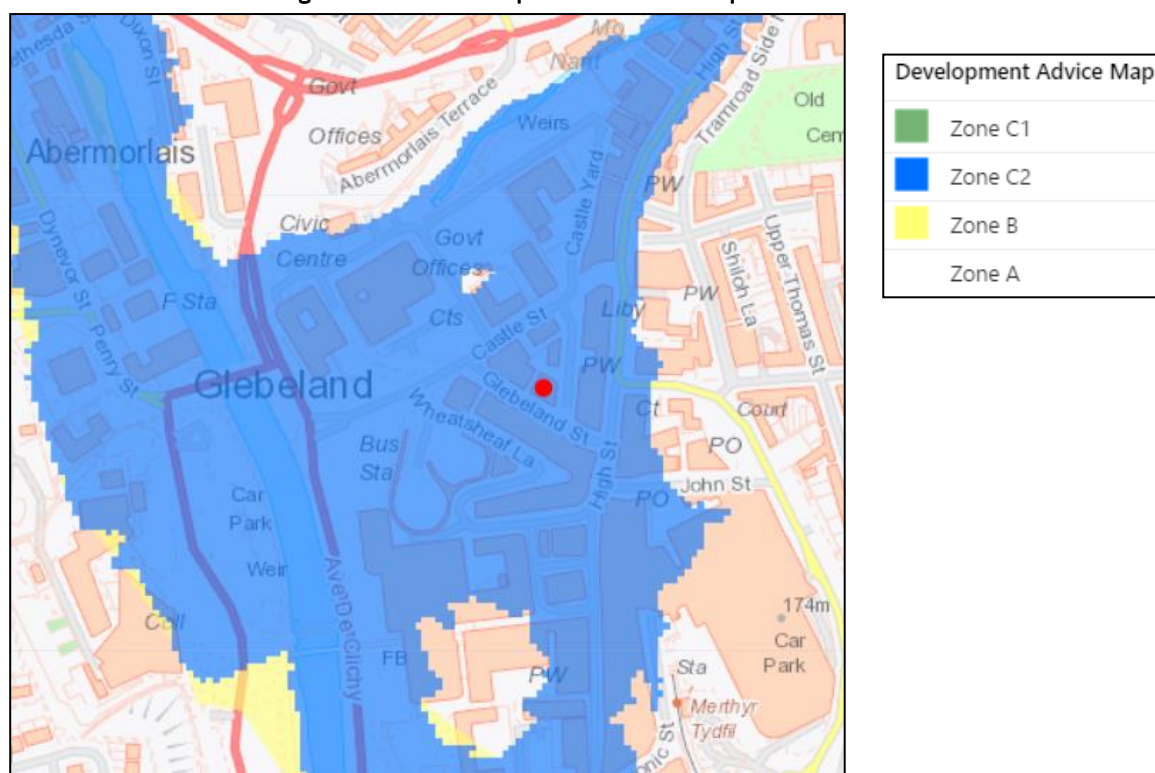
1.3 Main Watercourses

- 1.3.1 The site is located approximately 200m east of the River Taff and approximately 300m south of the Nant Morlais. Both are designated main watercourses and as such their management lies under the jurisdiction of Natural Resources Wales (NRW).

1.4 Flood Zone Classification

- 1.4.1 The site wholly lies within Flood Zone C2 which indicates its position within the 1% [1 in 100 year] and 0.1% [1 in 1000 year] AEP tidal flood outlines of the River Taff without benefitting from flood defences.

Figure 1.3 – Development Advice Map



Source: Natural Resources Wales

- 1.4.2 The site meets the definition of previously developed land and there is no change in vulnerability classification between the existing and proposed land uses with both consisting of residential elements being classified as 'highly vulnerable' in accordance with TAN15.

2 SITE LEVELS

- 2.1 A topographical survey has not been commissioned for the site and discussion surrounding flood levels relative to the property is based on LiDAR data incorporated into the detailed flood model.
- 2.2 Proposals are limited to internal modifications and there are no proposals to adjust existing finished floor levels. Furthermore, conversion / renovations are limited to first and second floor levels with only access being provided from a ground floor level which will be retained as existing.

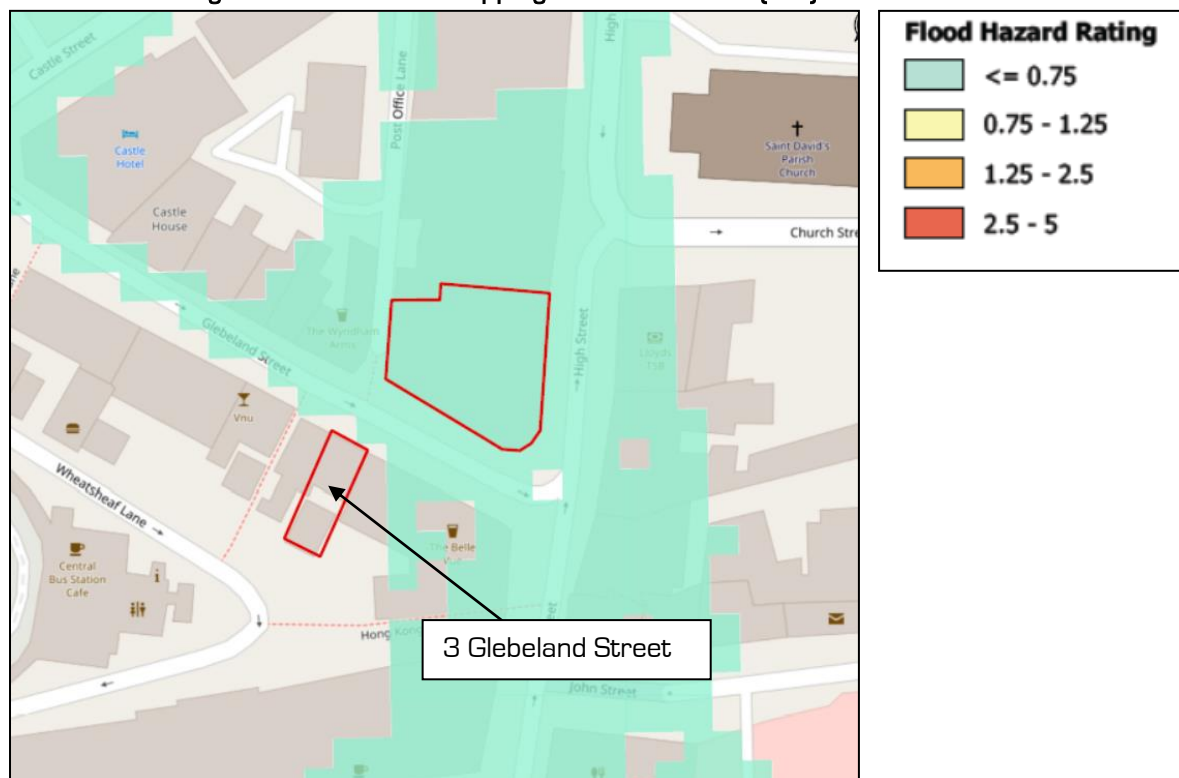
3 FLOOD ALLEVIATION MEASURES

- 3.1 The site and wider area does not benefit from any existing flood defences.
- 3.2 There are no proposals to introduce flood alleviation measures as part of this scheme.

4 ACCESS & EVACUATION ROUTES

- 4.1 Access to the hotel at first and second floor level is gained from a shared main entrance foyer and stair core off Glebeland Street.
- 4.2 In the current 1 in 100 year [1%] AEP flood event, the property max experience up to a maximum depth of 20mm flooding at ground level.

Figure 4.1 – Hazard Mapping – 1 in 100 Year [1%] AEP



- 4.3 In an extreme flood event the shortest route to a flood free area is approximately 120m exiting the property on Glebeland Street and heading east to join High Street and either heading north or south to join Church Street or John Street respectively.
- 4.4 The maximum hazard score in the immediate surrounding area and along the evacuation route in the current 1 in 100 year [1%] AEP event is less than 0.75 which represents a 'very low hazard - caution' classification representative of either shallow flowing water or deep standing water which is considered passable.
- 4.5 However, when climate change factors are applied over the lifetime of the development or the more extreme 1 in 1000 year [0.1%] AEP is considered the hazard score increases. With reference to Figure 4.2 and 4.3, the effects of this increase are most significant on High Street where the hazard score rises to lie within the 1.25 – 2.5 range which represents a 'significant – dangerous for most people' classification however this should remain passable for emergency vehicles.

Figure 4.2 – Hazard Mapping – 1 in 100 Year (1%) AEP + 25% Climate Change

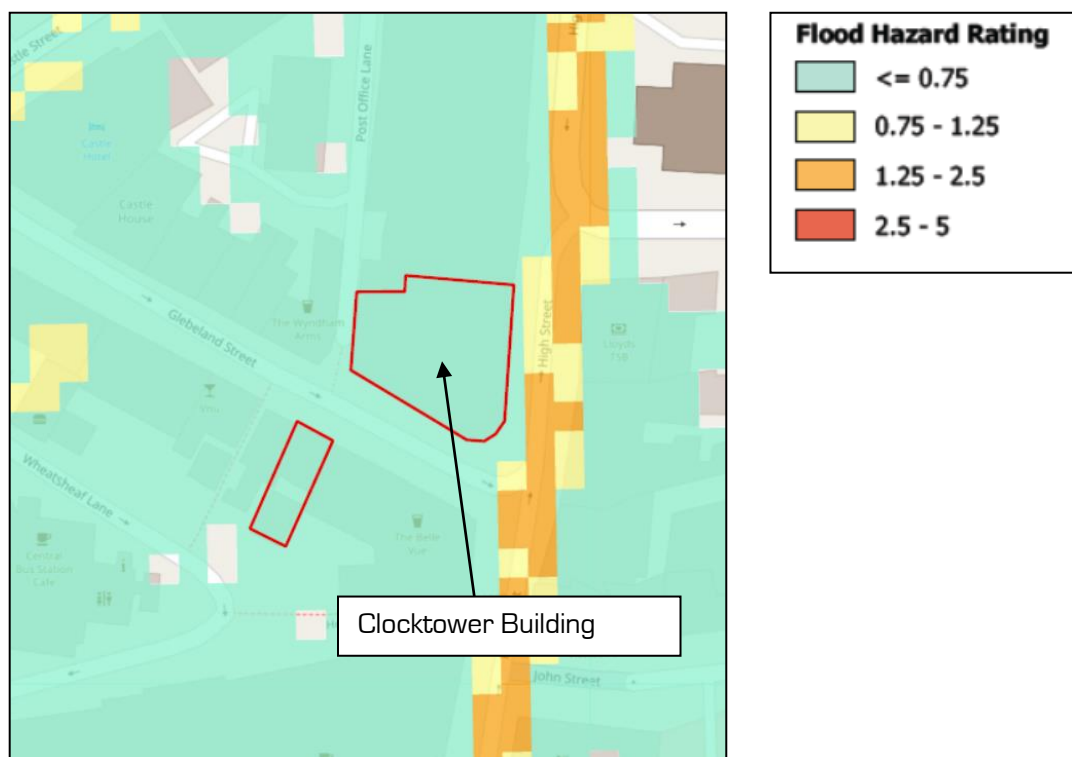
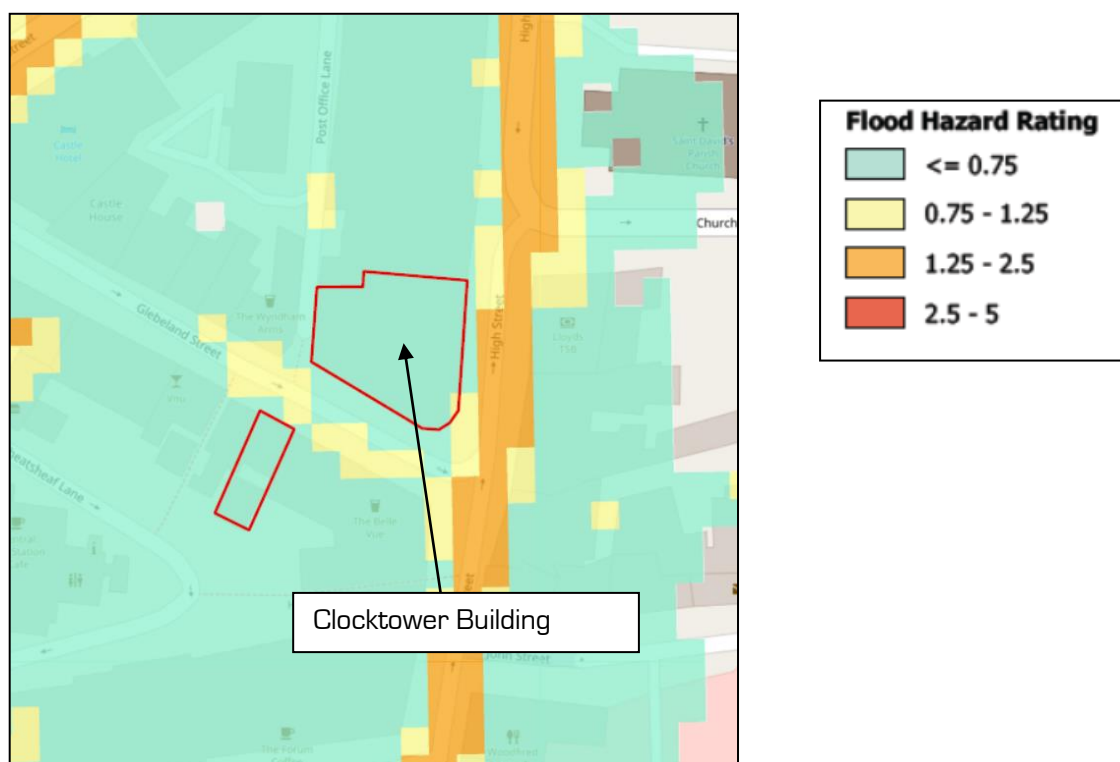


Figure 4.3 – Hazard Mapping – 1 in 1000 Year (0.1%) AEP



5 POTENTIAL FLOODING SOURCES

5.1 Tidal

- 5.1.1 Tidal flooding occurs when a high astronomical tide and storm (tidal surge) exceeds the level of coastal land or coastal flood defences. Tidal flooding can also be caused by 'tide locking' of rivers or estuaries. Tide locking prevents a river from discharging into the sea, causing 'backing up' / surcharge and resulting in tidal / fluvial flooding.
- 5.1.2 The site is inland and at significant elevation above sea level and therefore is not at risk at tidal flood risk.

5.2 Fluvial

- 5.2.1 Fluvial flooding occurs when the amount of water exceeds the flow capacity of the river channel. Most rivers have a natural floodplain into which the water overflows in times of flood.
- 5.2.2 The site is situated under the influence of the River Taff and Nant Morlais. Its designation within the NRW Flood Zone C2 is described as having a significant risk of flooding originating from these fluvial sources.

5.3 Pluvial

- 5.3.1 Pluvial sources of flood risk are considered to originate from public sewerage networks, highways drainage and local private infrastructure in the immediate vicinity of or within the proposed development.
- 5.3.2 DCWW public sewer records indicate the infrastructure in this area to be largely combined in nature with a 300mm diameter sewer within Glebeland Street. There is also evidence of traditional kerb and gully highway drainage on Glebeland Street and High Street however it is unknown whether there is a separate highway drainage network.

5.4 Groundwater

- 5.4.1 Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low-lying areas underlain by permeable rocks.
- 5.4.2 The site being located close to river may experience some sub-surface flows when the river levels are high however, the underlying geology at the site is reasonably impermeable.
- 5.4.3 The impact of groundwater flooding in terms of likelihood and flood depths is considered to be significantly less than that posed by fluvial flood risk.

6 FLOOD HISTORY

- 6.1 With reference to the Welsh Government / NRW open source data, there is no record of flooding having ever affecting the property which is located outside of the last known major flood event of the area in December 1979.

7 STRUCTURES INFLUENCING FLOW

- 7.1 Fluvial flooding is considered the dominant of flood risk. The mechanism of flooding is from the Nant Morlais which is caused by a throttle point and surcharging of the culvert that runs underneath Pont Morlais Car Park to the north east.
- 7.2 The hydraulic model used to inform the flood data within this report integrates this and other relevant flow influencing structures.

8 PROBABILITY OF FLOODING

8.1 Tidal

8.1.1 Not considered further.

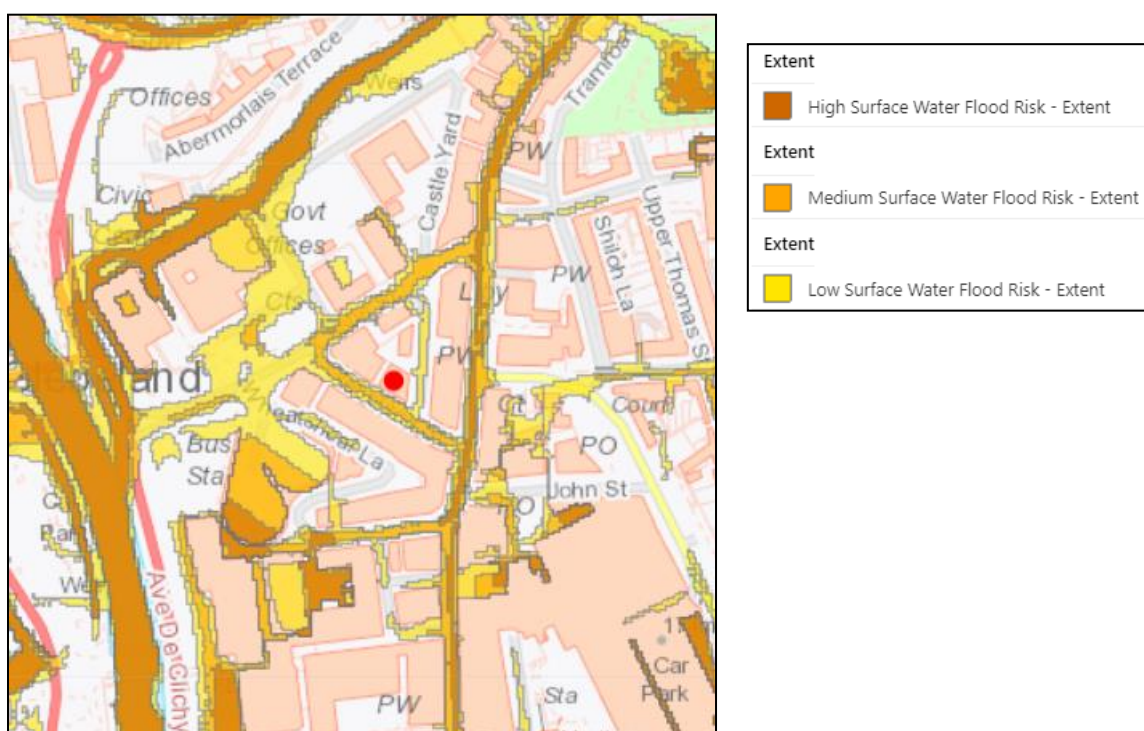
8.2 Fluvial

8.2.1 As stated previously, the River Taff and Nant Morlais present a fluvial flood risk. Detailed site specific flood modelling has been made available to inform the flood risk posed by these sources. The property begins to experience flooding during events of a 1 in 100 year [1%] AEP magnitude. This is discussed in further detail in Section 10.

8.3 Pluvial

8.3.1 NRW flood mapping indicates a low - medium risk of surface water flooding to Glebeland Street. This means there is a chance of flooding between 1 in 100 [1%] and 1 in 30 [3.3%] however, the flood extent is limited to the carriageway corridor and there is no encroachment of floodwaters into the property itself.

Figure 8.1 – NRW Surface Water Flood Map



Source: Natural Resources Wales

8.4 Groundwater

8.4.1 Groundwater levels can vary seasonally but there are no known historical issues / reports of water ingress. The impact of groundwater flooding in terms of likelihood and flood depths is considered to be significantly less than that posed by fluvial flood risk.

9 PROPOSED DEVELOPMENT

- 9.1 The proposals to modify the existing building are limited to internal refurbishment, which seek to convert the first and second floors to provide hotel accommodation. The existing access arrangement at ground level off Glebeland Street is being retained.
- 9.2 There is no change in vulnerability classification between the existing and proposed land uses with both having residential elements being classified as 'highly vulnerable' in accordance with TAN15.
- 9.3 The proposed development will not result in any increase in hardstanding area and therefore no increase in surface water run-off generation.

10 IMPACT OF FLOODING

- 10.1 Fluvial flood events, should they occur, would have the most significant impact to the occupants of the property and hydraulic modelling has been undertaken to assess the risk and potential impact.
- 10.2 Floodwaters are shown to propagate from the north east as a result of a throttle point at the culvert which runs underneath Pont Morlais Car Park. Floodwaters then spill southwards along High Street until encroaching onto the site.
- 10.3 The modelling indicates the property begins to experience flooding in events of a 1 in 100 year (1% AEP) magnitude. The effects of flooding worsen when climate change factors are introduced over the lifetime of the development and if flood defences / improvement measures are not introduced to the area in line with climate change, the property may experience flooding up to a depth of 120mm during a 1 in 100 year magnitude event and up to 200mm in the most extreme 1 in 1000 year event at ground level.
- 10.4 The maximum predicted flood depths, levels, velocity and hazard scores reported within the property's ground floor level are provided in Table 10.1 below.

Table 10.1 – Maximum Flood Data Outputs

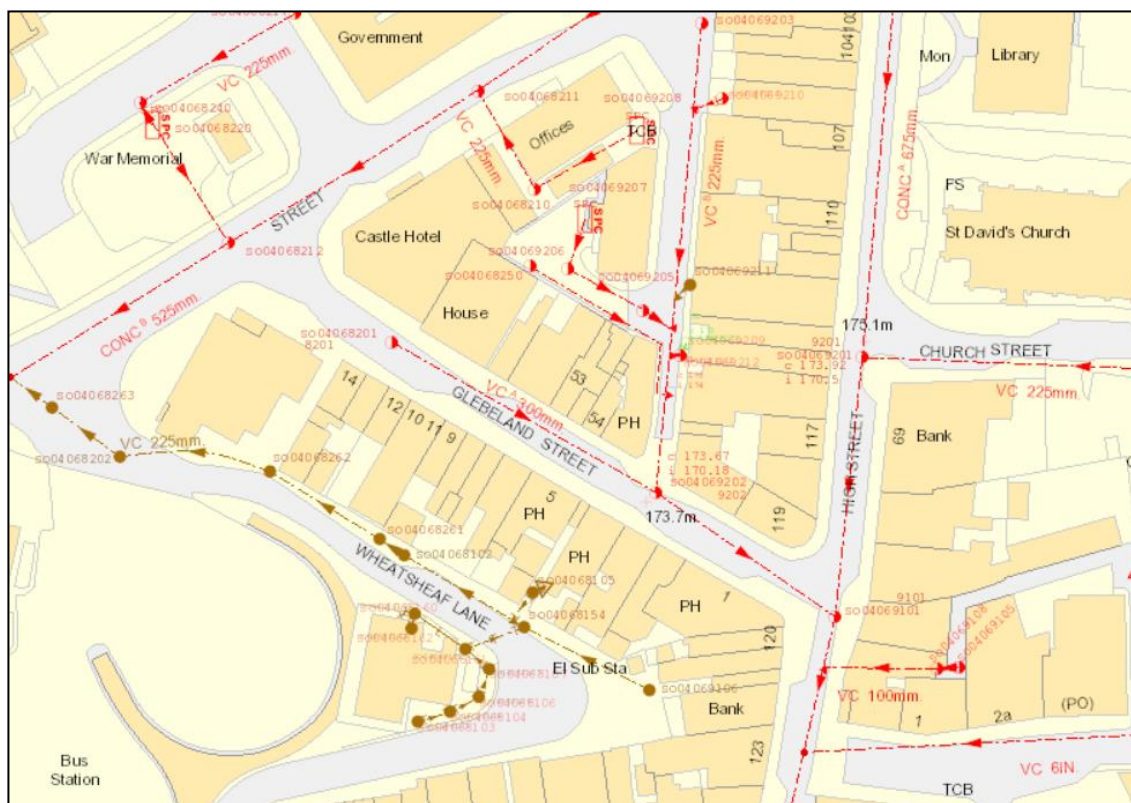
Flood Scenario	Max Flood Depth (m)	Level (m AOD)	Velocity (m/s)	Hazard
1 in 100 Year	0.02	174.62	0.09	0.51
1 in 100 Year + 25% Climate Change	0.12	174.71	0.89	0.59
1 in 1000 Year	0.20	174.28	1.18	0.67

- 10.5 The model also indicates the maximum rate of rise of floodwaters to be 0.14m/hr which just sits outside of acceptable TAN15 limits (0.1m/hr). Further outputs and mapping illustrations are available for reference in Appendix B.
- 10.6 It should however be noted that this application is limited to redevelopment at first and second floor only and whilst means of access and egress may be compromised at ground level, dry safe refuge would be available throughout the most extreme flood event within the upper floors of the hotel accommodation.

11 DRAINAGE IMPLICATIONS

- 11.1 With reference to the extract below, Dwr Cymru Welsh Water (DCWW) public sewerage records have been obtained and show the assets within the surrounding area to be combined in nature.

Figure 11.1 – DCWW Public Sewer Records



Source: DCWW

- 11.2 In addition to these systems there are speculatively likely to be surface water networks serving run-off generated by the public highway which would likely be owned and maintained by the Local Authority.
- 11.3 There are no changes proposed to the structure of the building and as such the existing surface water drainage connections serving roof run-off are to be retained as existing. Likewise, the proposed development will not result in any increase in hardstanding area and therefore no increase in surface water run-off generation.

12 WATER DISPLACED BY DEVELOPMENT

- 12.1 There are no changes in proposed levels and no increase in hardstanding area therefore no water will be displaced by this development.

13 IMPACT OF DISPLACED WATER

13.1 Not applicable.

14 LONG TERM IMPACT OF DEVELOPMENT

14.1 There will be no long term, adverse impacts to flood risk as a result of the development proposal.

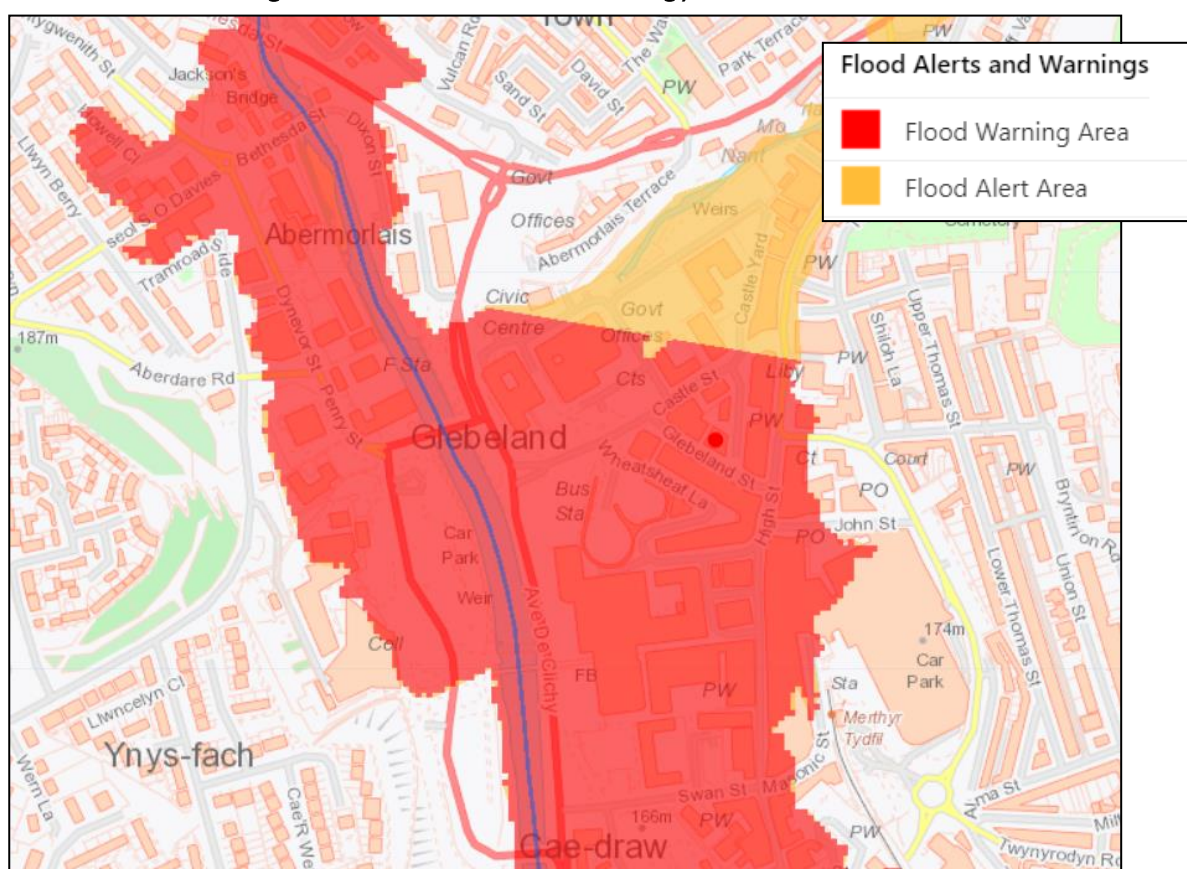
15 ALLOWANCES FOR FUTURE

- 15.1 TAN15 requires the possible impact of climate change to be taken into account in the assessment of flooding for a 100 year lifetime for residential development.
- 15.2 In August 2016 Welsh Government updated the Climate Change allowances for planning purposes and the latest flood data outputs including these updated factors (+25%) have been presented in this FCA in the interest of providing a robust assessment of flood risk.

16 RESIDUAL RISKS

- 16.1 Fluvial risk is considered the dominant source of flood risk.
- 16.2 Given the constraints associated with redevelopment of an existing property where proposals are limited to internal refurbishment and restricted to first and second storey conversion only, there are no proposals to mitigate for the residual fluvial flood risk and flood resilient measures are not considered to be appropriate.
- 16.3 NRW operate a flood alert and warning system for this area shaded in orange and red respectively in Figure 16.1 below.

Figure 16.1 – NRW Flood Warning / Alert Areas



Source: Natural Resources Wales

- 16.4 The end users are advised to incorporate flood risk responses into the operational /management procedures and emergency planning emphasising that whilst means of access and egress may become compromised at ground level, safe refuge is available throughout the most extreme of flood events within the hotel accommodation at first and second floor. This, together with appropriate flood warning systems, is thereby considered to manage the consequences of flooding.

17 SUMMARY / CONCLUSIONS

- 17.1 A large part of Merthyr Tydfil Town Centre is located within an area identified as being at risk of flooding.
- 17.2 The redevelopment of the existing property is limited to internal renovation and seeks to provide hotel accommodation at first and second floor levels with the existing access at ground level being retained. There is no change in end land use classification of 'highly vulnerable' development in accordance with TAN15.
- 17.3 The site is located within Flood Zone C2 which indicates its position within the 1% (1 in 100 year) and 0.1% (1 in 1000 year) annual probability fluvial flood outlines of the River Taff and its tributary the Nant Morlais which is considered the dominant source of flood risk.
- 17.4 Detailed hydraulic modelling has been used to inform the flood risk in this area and its impact on the property. The modelling indicates the property begins to experience flooding in events of a 1 in 100 year (1% AEP) magnitude. The effects of flooding worsen when climate change factors are introduced over the lifetime of the development and if flood defences / improvement measures are not introduced to the area in line with climate change, the property may experience flooding up to a depth of 120mm during a 1 in 100 year magnitude event and up to 200mm in the most extreme 1 in 1000 year event at ground level.
- 17.5 The end users are advised to incorporate flood risk responses into the operational /management procedures and emergency planning emphasising that whilst means of access and egress may become compromised at ground level, safe refuge would be available throughout the most extreme of flood events within the proposed hotel accommodation at first and second floor. The hazard scores also indicate that the evacuation route would be passable for emergency vehicles. This, together with the NRW operated flood alert and warning system for this area, is thereby considered to manage the consequences of flooding.

APPENDIX A: DEVELOPMENT DRAWINGS

APPENDIX B: HYDRAULIC MODELLING MAPPING OUTPUTS