Newbridge Methodist Church- Flood Consequences Assessment

Version 2

January 2024

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Contract

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This report describes work commissioned by JDL Consultants Ltd, by an instruction dated 29th of November 2023 and has been prepared and warranted for the Benefit of Buckland Dartford Ltd and Tesco. The Client's representative for the contract was James Adams of JDL Consultants Ltd. Hannah Booth of JBA Consulting carried out this work.

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Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

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1 Introduction

1.1 Terms of Reference

JBA Consulting were commissioned by JDL Consultants Ltd to undertake a Flood Consequences Assessment (FCA) for a proposed renovation at Newbridge Methodist Church, Newbridge. This FCA demonstrates the suitability of the proposed development and describes the flood mitigation measures recommended to manage flooding at the site.

1.2 FCA Requirements

This FCA follows Welsh Government guidance on development and flood risk set out in Technical Advice Note 15: Development and Flood Risk (TAN-15). Where appropriate, the following aspects of flood risk should be addressed in all planning applications over their expected lifetime:

- The likely mechanisms of flooding
- The likely source of flooding
- The depths of flooding through the site
- The speed of inundation of the site
- The rate of rise of flood water through the site
- Velocities of flood water across the site
- Overland flow routes
- The effect of access and egress and infrastructure, for example, public sewer outfalls, combined sewer outflows, surface water sewers and effluent discharge pipes from wastewater treatment work
- The impacts of the development in terms of flood risk on neighbouring properties and elsewhere on the floodplain

2 Site Description

2.1 Site Summary

The proposed development site is located at Newbridge Methodist Church, off Bridge Street, Newbridge, South Wales (Figure 2-1). The existing site is currently used as a church.

The approximately 0.10ha site is surrounded by a commercial building and storage yard to the north, an existing unnamed highway and the River Ebbw to the east, Bridge Street to the south and residential buildings to the west.

Table 2-1 gives a summary of the site particulars.

Table 2-1 Site Summary

Parameter	Description
Site Name	Newbridge Methodist Church
Site area	0.10ha
Existing land use	Religious building
Purpose of development	Commercial
OS NGR	ST 21141 96969
Local Planning Authorities	Caerphilly County Borough Council
Lead Local Flood Authority	Caerphilly County Borough Council

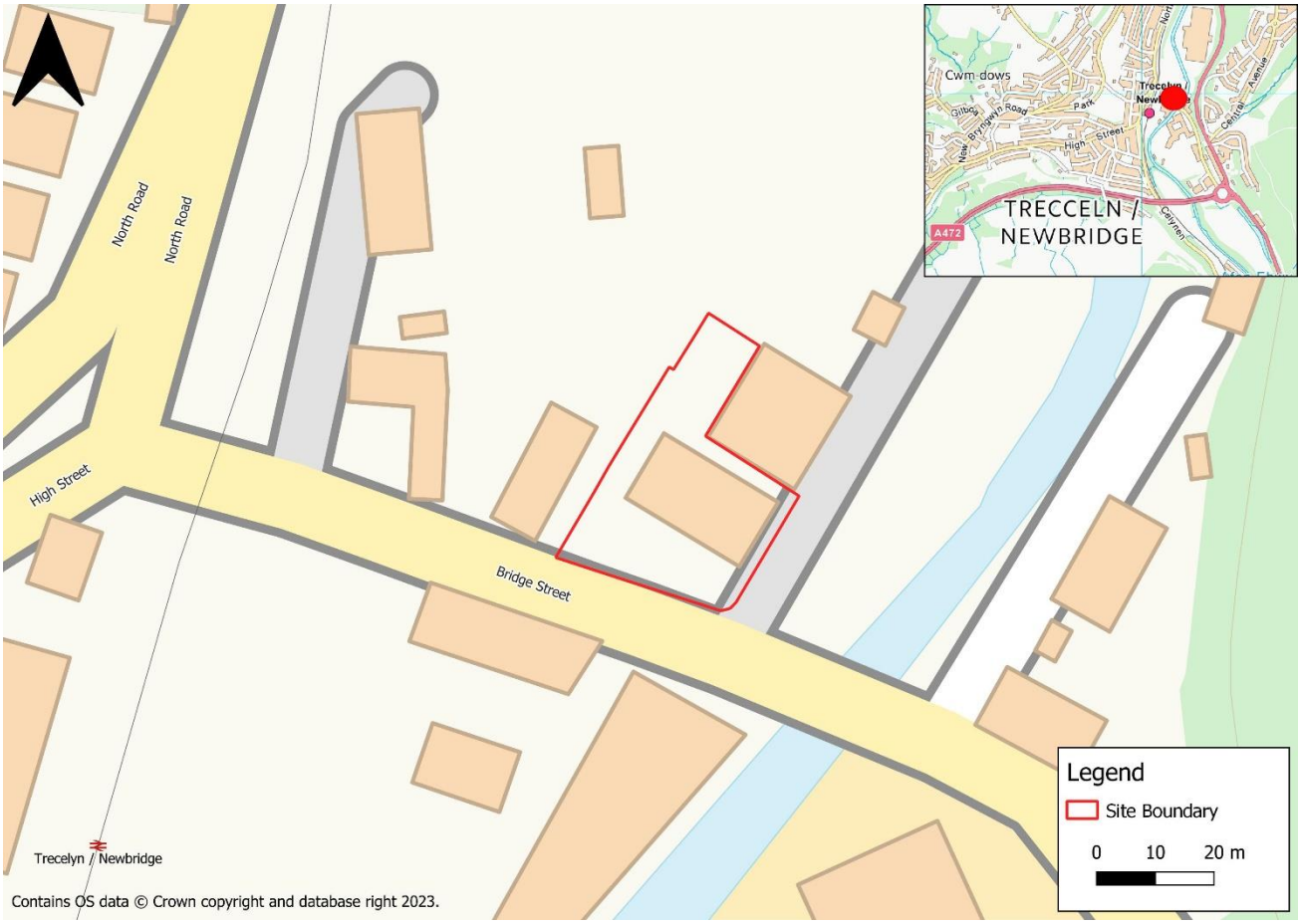


Figure 2-1 Site Location

2.2 Site Topography

A topographic survey was undertaken by Atlas Surveys in September 2022 and is contained in Appendix A. NRW's 1m LiDAR data is shown in Figure 2-2 as an alternative illustration of site topography.

The topographic survey shows that the site is predominantly flat with only very minor changes in ground level. Ground levels in the car park are highest in the north eastern corner at 105.40mAOD and are lowest at 104.84mAOD in the north western part of the site. The finished floor level of the entrance doors to the front of the existing building is 105.01 mAOD, and the finished floor level at the door to the rear of the existing building is 105.02 mAOD.

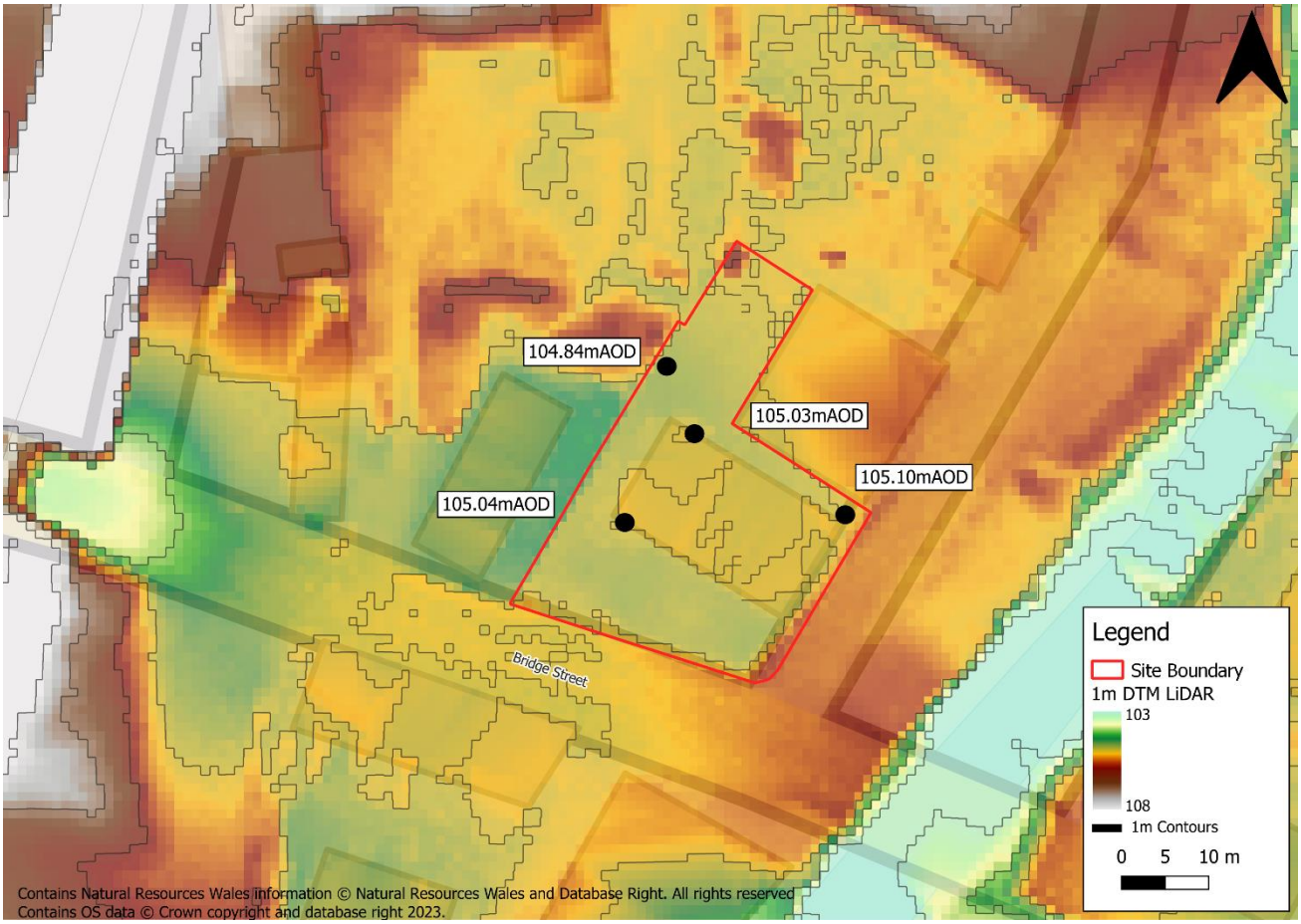


Figure 2-2 1m LiDAR site topography

2.3 Soils and Geology

The site's geology has been assessed using the British Geological Survey (BGS) GeoIndex[1]. The bedrock is shown to be Hughes Member comprised of sandstone. The superficial geology comprises Alluvium deposits containing clay, silt, sand, and gravel.

The soils have been assessed on the Cranfield University Soilscape viewer[2] and shown to be a freely draining loamy soil over rock.

2.4 Watercourses and flood defences

The site is situated 22m west of the River Ebbw, as shown in Figure 2-3. The River Ebbw is a designated NRW Main River and flows in a southerly direction towards its confluence with the River Usk, some 17 Km downstream. No flood defences are present along this section of River Ebbw.

1 https://www.bgs.ac.uk/map-viewers/geoindex-onshore/
2 Soilscapes soil types viewer - Cranfield Environment Centre. Cranfield University (landis.org.uk)

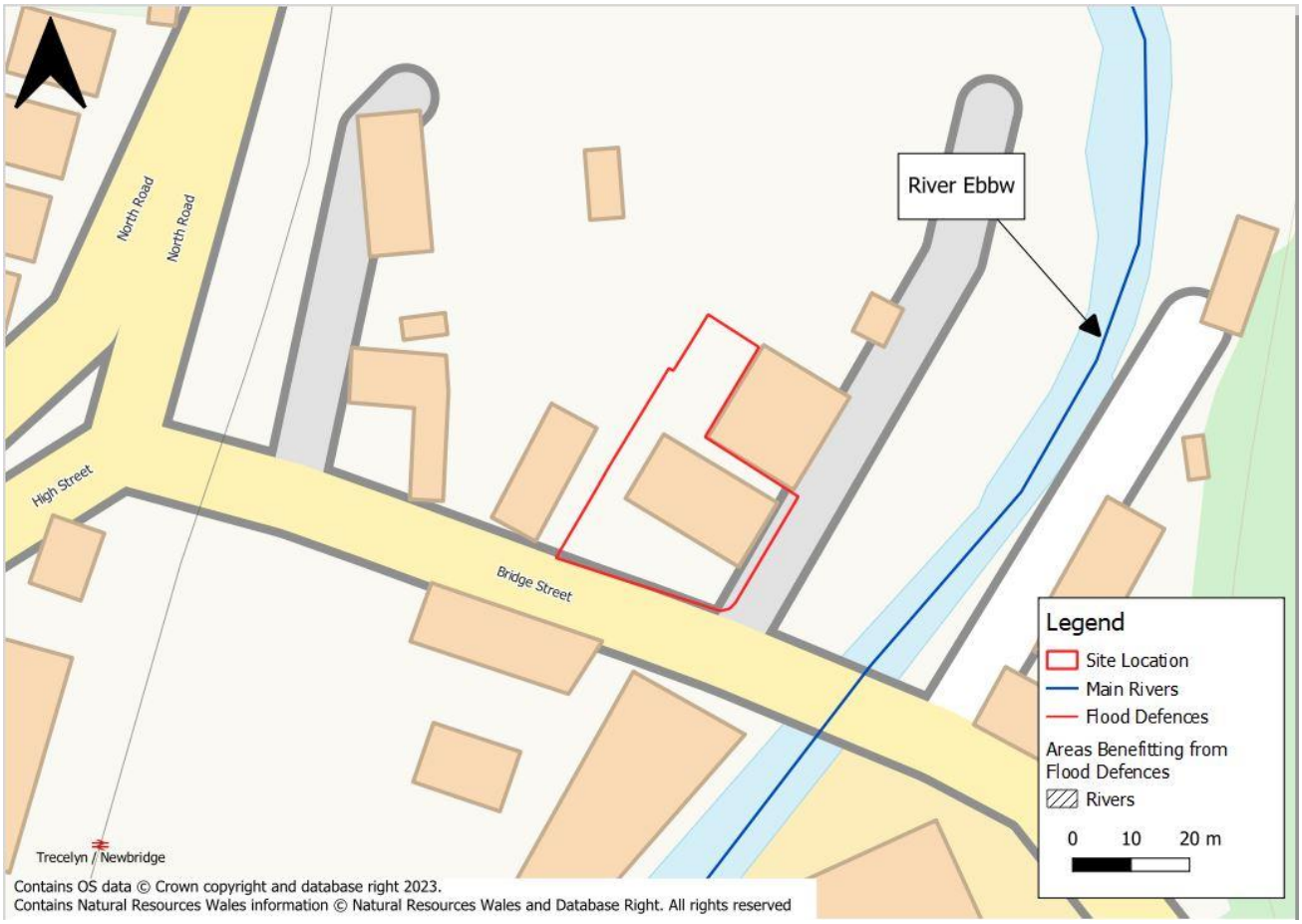


Figure 2-3 Watercourses

2.5 Proposed development

The development proposals are to convert the former methodist church into a Tesco supermarket. Minor modifications to the existing building footprint shall be undertaken, to form a minor extension to the rear and demolition of an existing building extension to the western elevation. There is no change in overall footprint area of the building as a result of the proposals. An additional first floor will be added into the building and the buildings ground floor Finished Floor Level (FFL) will be raised to 105.27mAOD. The levels immediately around the building will be raised to 105.12mAOD, whilst levels across the car park shall be retained as per current arrangements.

A plan of the development proposals is shown in Figure 2-4 and Appendix B.

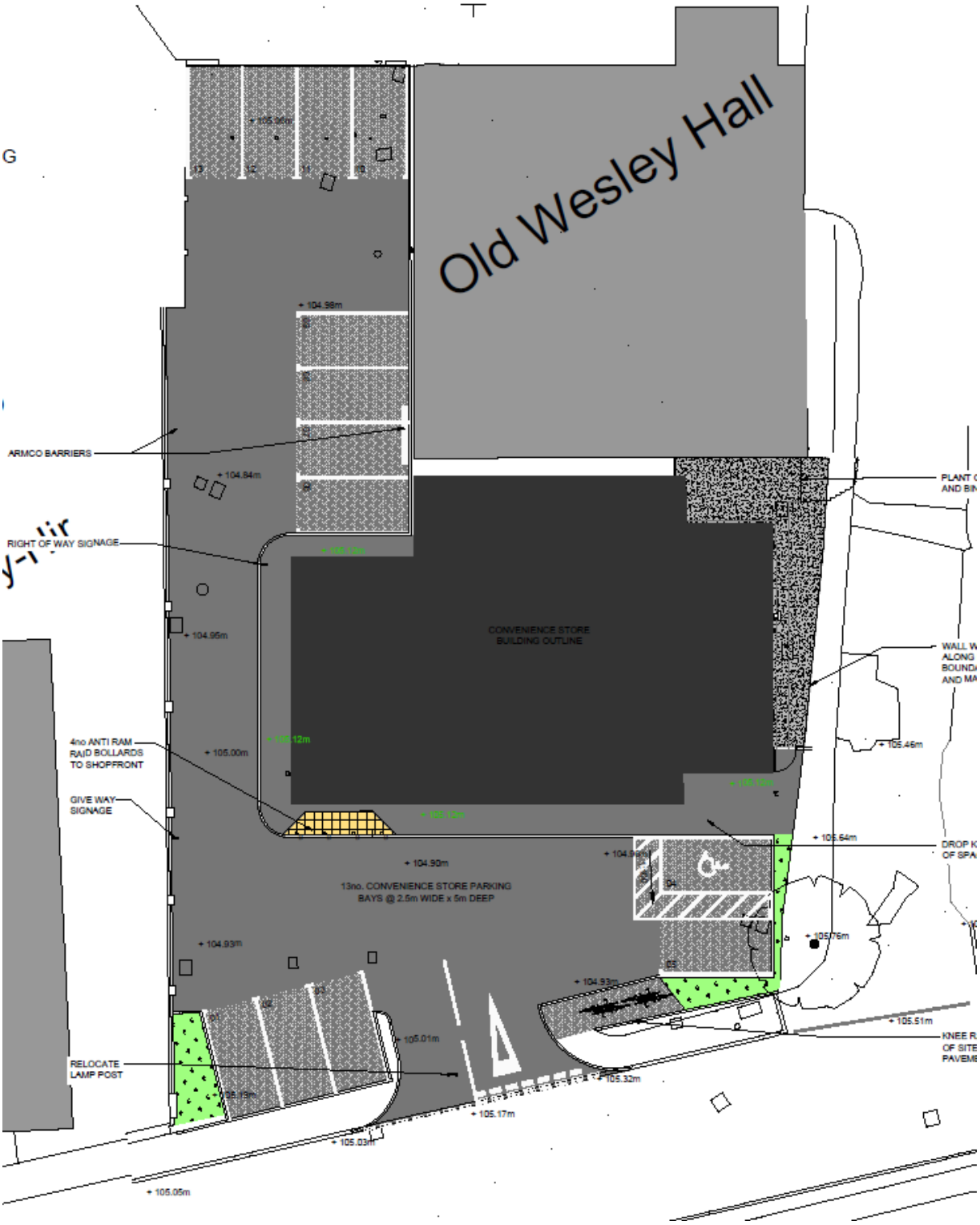


Figure 2-4 Development Proposals

3 Planning Policy and Flood Risk

3.1 Planning context

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy and improve the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing of Future Generations Act 2015.

Technical Advice Note (TAN-15) introduced by the Welsh Government in 2004, provides technical guidance relating to development planning and flood risk in Wales. The initial requirements of TAN-15 are to identify the vulnerability classification(s) and flood zones relevant to the proposed development, and to apply this information to the application of the justification tests.

An update for TAN-15 was released in October 2021. However, Welsh Government subsequently suspended this, and it is not currently known when the new TAN15 will be published in its final form and implemented.

Although the new TAN-15 is not a material consideration, Welsh Government and NRW advise that some consideration is given to the Flood Map for Planning (FMfP) as best available information. Therefore, where a site is located in a FMfP flood risk zone it is recommended that an FCA is carried out.

As a result of the above, both the DAM and FMfP are considered as part of this FCA, although only the current TAN-15 has been applied to the assessment.

3.2 Vulnerability classification

TAN-15 assigns one of three flood risk vulnerability classifications to a development, as shown in Table 3-1. The proposed development is for commercial purposes which is classified as **less vulnerable development**. The change in use results in the reduction in vulnerability from that of its current use as a public building which is classed as highly vulnerable.

Table 3-1 Development classification defined by TAN-15

Development category	Types
Emergency services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood.
Highly vulnerable development	All residential properties (including hotels and caravan parks) public buildings, (e.g., schools, libraries, leisure centres), especially vulnerable industrial development (e.g., power stations, chemical plants, incinerators), and waste disposal sites.
Less vulnerable development	**General industrial employment**, **commercial** and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites

3.3 Development Advice Map Classification

The Development Advice Map (DAM) is used to trigger different planning actions based on a precautionary assessment of flood risk. Figure 3-1 shows that the entire site is located within DAM Zone C2, which is described as “areas of the floodplain without significant flood defence infrastructure”. Only Less Vulnerable Development is permitted in Zone C2, subject to application of the Justification Test, and Acceptability Criteria. Further information on the Justification Test is contained in Section 3.6.

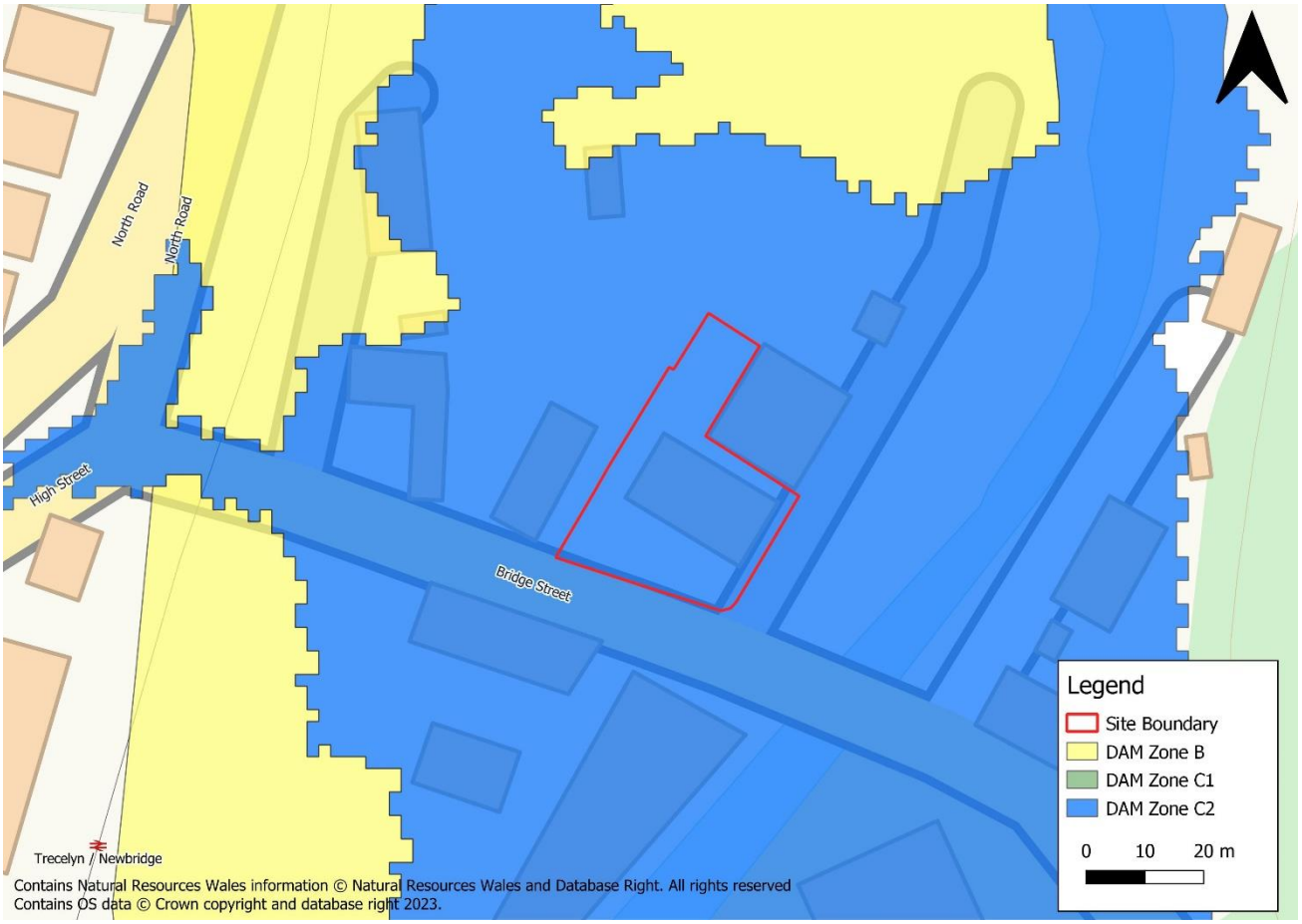


Figure 3-1 DAM Map

3.4 Flood Map for Planning Classifications

The Flood Map for Planning is used to trigger different planning actions in support of the new forthcoming TAN-15. Although the new TAN-15 is not a material consideration, the new Flood Map for Planning is useful in that it shows the flood risk allowing for climate change over a 100-year lifetime of development.

3.4.1 Flood Map for Planning - Rivers

As shown in Figure 3-2, the site is located within Flood Zone 2. Flood Zone 2 of the Flood Map for Planning for Rivers represents areas which have between a 0.1% - 1% AEP chance of flooding in a given year, including climate change. Due to its location in Flood Zone 2, the site triggers the requirement of an FCA.

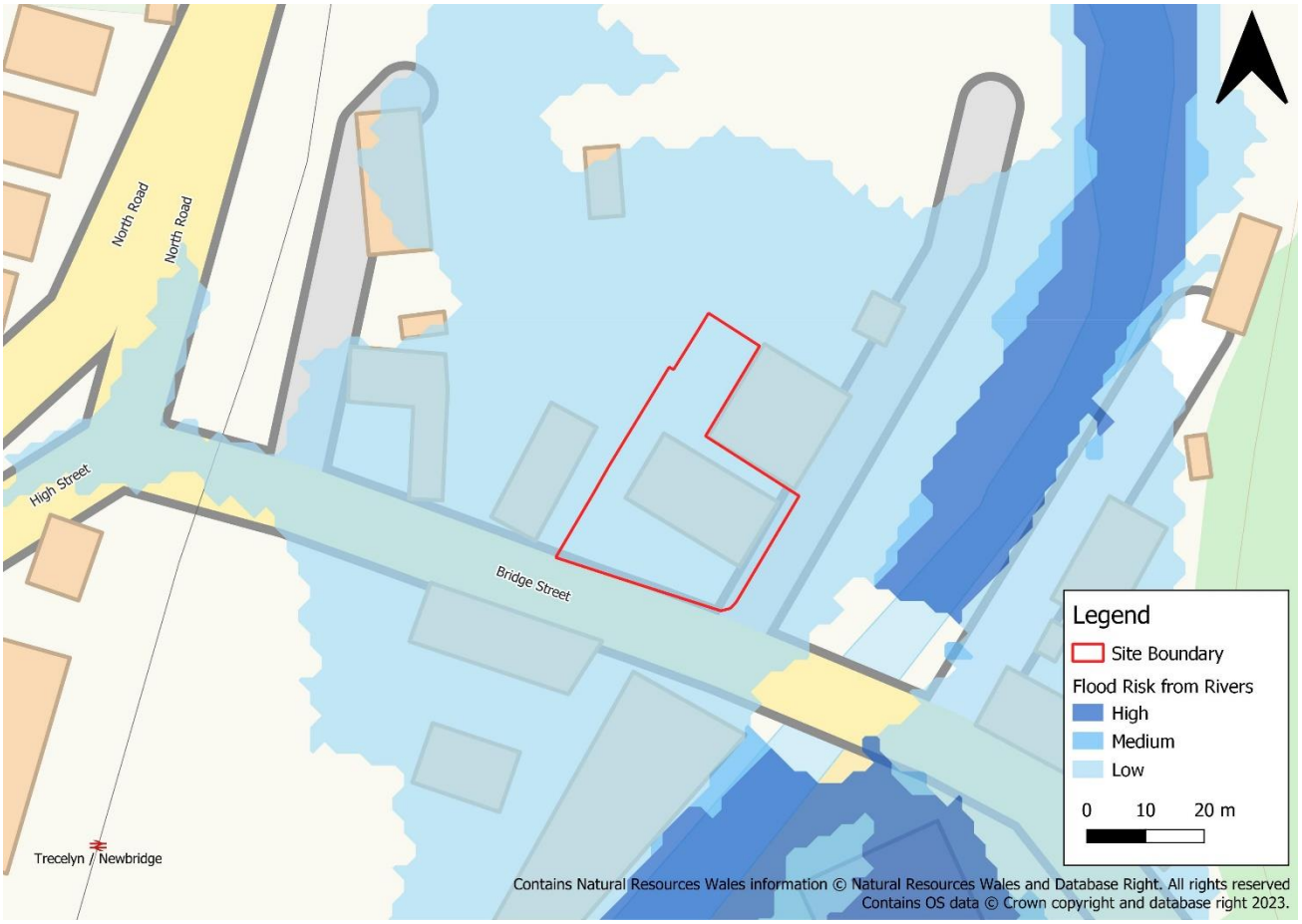


Figure 3-2 Flood Map for Planning – Rivers

3.4.2 Flood Map for Planning - Sea

The site is not located near the coast. Consequently, the site is located in Flood Zone 1 of the Flood Map for Planning for the Sea. Zone 1 represents areas that have less than a 0.1% AEP chance of flooding in a given year, including climate change. This area is shown as transparent in the Flood Map for Planning and therefore has not been graphically represented.

3.5 Local Development Plan

The local development plan for the Caerphilly County Borough[3] up to 2021 provides land use policies and proposals to encourage sustainable growth within the Caerphilly County Borough authority area.

The local development plan states *" The Strategy seeks to capitalise on the development opportunities in the Principal Towns of Blackwood and Ystrad Mynach, as well as the Local Centres of Newbridge and Nelson"*

3 https://www.caerphilly.gov.uk/business/planning-and-building-control-for-business/local-development-plan/local-development-plan-2010-(adopted)/the-adopted-ldp

The development proposals also contribute to Policy CW16 as it involves the addition of new retail space which will improve the facilities in Newbridge and will not undermine any other retail development in nearby areas.

The LDP also has an emphasis on the regeneration of existing brownfield sites in towns in the authority area rather than using greenfield sites. The development proposals are to refurbish an existing building and therefore is more sustainable than greenfield development.

3.6 Justification Test

Section 6.2 of TAN-15 states that "**new development** should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river and coastal flooding will be less of an issue".

The proposals involve the redevelopment and change of use of an existing building in Zone C2. It therefore follows that in terms of the drafting of TAN15 6.2, the proposals should not be regarded as 'new development' and the Justification Test does not apply.

TAN-15 provides no clear guidance on how such redevelopment should be assessed. However, the latest consultation draft of the updated TAN15 does provide a clear distinction between 'new development' and 'redevelopment' which clarifies the policy intentions of Welsh Government. The new TAN15 states that the in assessing redevelopment of existing buildings in a flood risk area, planning authorities may be sympathetic to changes which bring clear benefits to the area and building.

Although we conclude that the Justification Tests should not be applied to this proposal, for completeness, they have been applied below.

TAN-15 states that the development will be justified if it can be demonstrated that:

Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement.

or

Its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and

It concurs with the aims of Planning Policy Wales and meets the definition of previously developed land;

and,

The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable.

The proposed development has been assessed against the requirements of the Justification Test, with the results summarised in Table 3-2.

Table 3-2 Justification Test

TAN 15 Justification Criteria	Comments	Achievable?
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 proposed development site will assist with the relevant policies listed in the Local Development Plan (Section 3.5)	✓
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 site meets the definition of previously developed land.	✓
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 [Acceptability Criteria] … in order to be considered acceptable	An assessment of the flood consequences at the site has been undertaken to demonstrate the proposed development's acceptability. See Section 4 and Section 5.	✓

4 Flood Risk Assessment

This section assesses the risk to the site from all sources of flooding. Information is taken from publicly available data sources.

4.1 Review of Existing Flood Risk Data

The latest available information on flood risk at the site, published by NRW and the LLFA's, is summarised in Table 4-1 below.

Table 4-1 Flood Risk Summary

Source of Flooding	Onsite Presence	Description
Flood Risk from Rivers	✓	The site is at a **low risk** of fluvial flooding (Section 4.3).
Flood Risk from the Sea	✗	The site is at a **very low risk** of tidal flooding (Section 4.4).
Flood Risk from Surface Water and Small Watercourses	✓	The site is at a **high risk** of flooding from surface water and small watercourses (Section 4.5).
Flood Risk from Groundwater	✗	The site is at a **low risk** of flooding from groundwater (Section 4.6)
Flood Risk from Reservoirs	✗	The site is at **low risk** of flooding from reservoirs (Section 4.7).
Flood Risk from Sewers	✗	The site is at a **low risk** of flooding from sewers (Section 4.8).

4.2 Historical Flooding

NRW's map of recorded flood extents does not show any evidence of historical flooding on the site. The Caerphilly County Borough Council Preliminary Flood Risk Assessment (PFRA)[4] identifies a number of flood incidents within Newbridge. However, due to the scale of mapping, it is not possible to see whether any flooding has occurred on or near the site. The Caerphilly County Borough Council Local Flood Risk Management Strategy (LFRMS)[5] does not identify any flood risk incidents at the site.

Further to this, there are no known records of flooding to the property at the time of writing.

4 https://www.monmouthshire.gov.uk/app/uploads/2014/11/Final-PFRA-Report-Final-Version-Dec-2011-pdf.pdf
5 https://www.caerphilly.gov.uk/caerphillydocs/roads-and-pavements/localfloodriskmgtstrategyapril2013.aspx

4.3 Flood Risk from Rivers

NRW's Flood Risk Assessment Wales (FRAW) Flood Risk from Rivers shows that the entire site is at **low risk of flooding from rivers**. This means there is a 0.1% AEP to 1% AEP chance of river flooding in any given year.

To assess the impact of climate change on the risk of fluvial flooding, further assessment using detailed flood modelling data has been undertaken in Section 5.

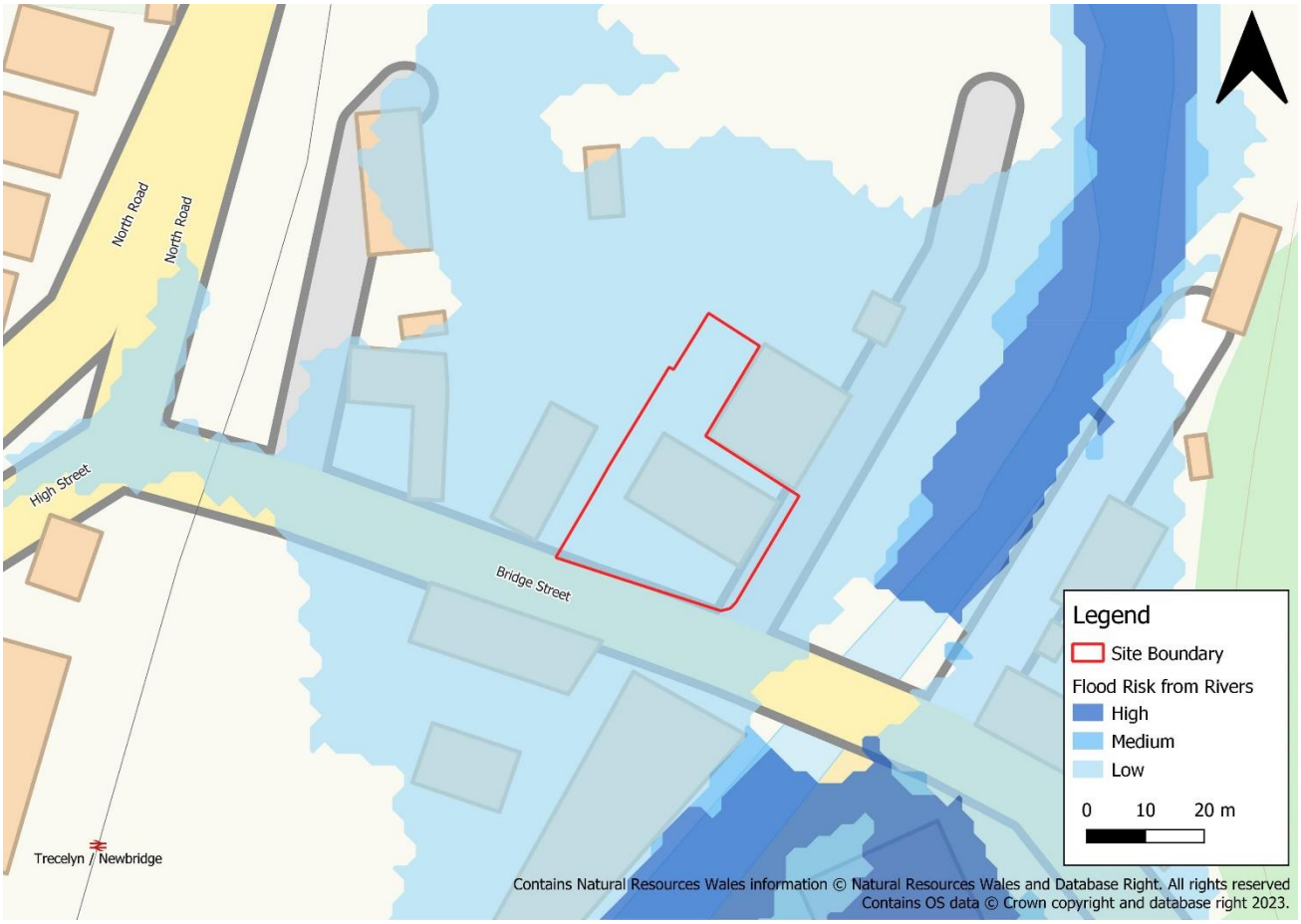


Figure 4-1 FRAW - Flood Risk from Rivers

4.4 Flood Risk from the Sea

NRW's Flood Risk Assessment Wales (FRAW) Flood Risk from the Sea map shows that the proposed development site is at **very low risk of flooding from the sea**, shown as a transparent layer on the maps. Therefore, this has not been shown graphically. A very low risk means that the site is located within an area that has less than a 0.1% Annual Exceedance Probability (AEP) chance of tidal flooding in any given year.

4.5 Flood Risk from Surface Water and Small Watercourses

NRW's FRAW Surface Water and Small Watercourses map is shown in Figure 4-2. The map shows that the site is at **high risk** of surface water and small watercourse flooding.

High risk means there is a greater than 3.3% AEP chance of the site flooding from surface water and small watercourses in any given year.

Surface water flooding of the site is predicted to occur as a result of flows into the site from two areas, as shown in Figure 4-3. The first area is from the north of the site in which surface water flows in a southerly direction along a topographic depression adjacent to the railway line towards the site. The second is from surface water flowing in an easterly direction from North Road onto Bridge Street and entering the site at the southern boundary. The NRW National Flood Hazard Mapping shows that flood depths are predicted to be up to 0.46m in the high-risk flood event.

The development proposals will not result in a significant change in building footprint area, and FFL within the property shall be raised by 200mm from existing levels. Consequently, it is considered that there will be no change in surface water flood risk to the building. Development proposals shall increase the resilience of the building to flood risk..

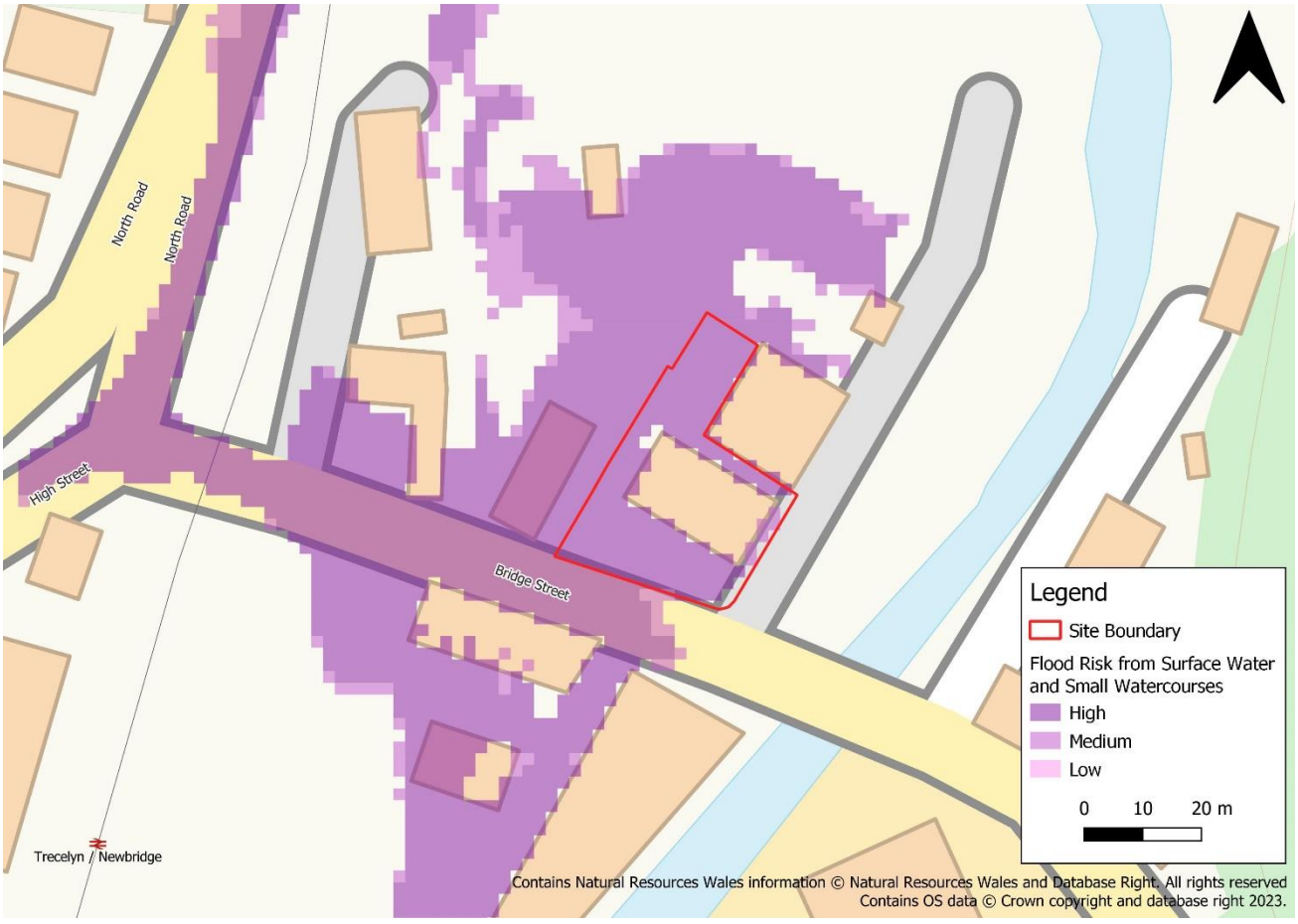


Figure 4-2 FRAW- Flood Risk from Surface Water and Small Watercourses

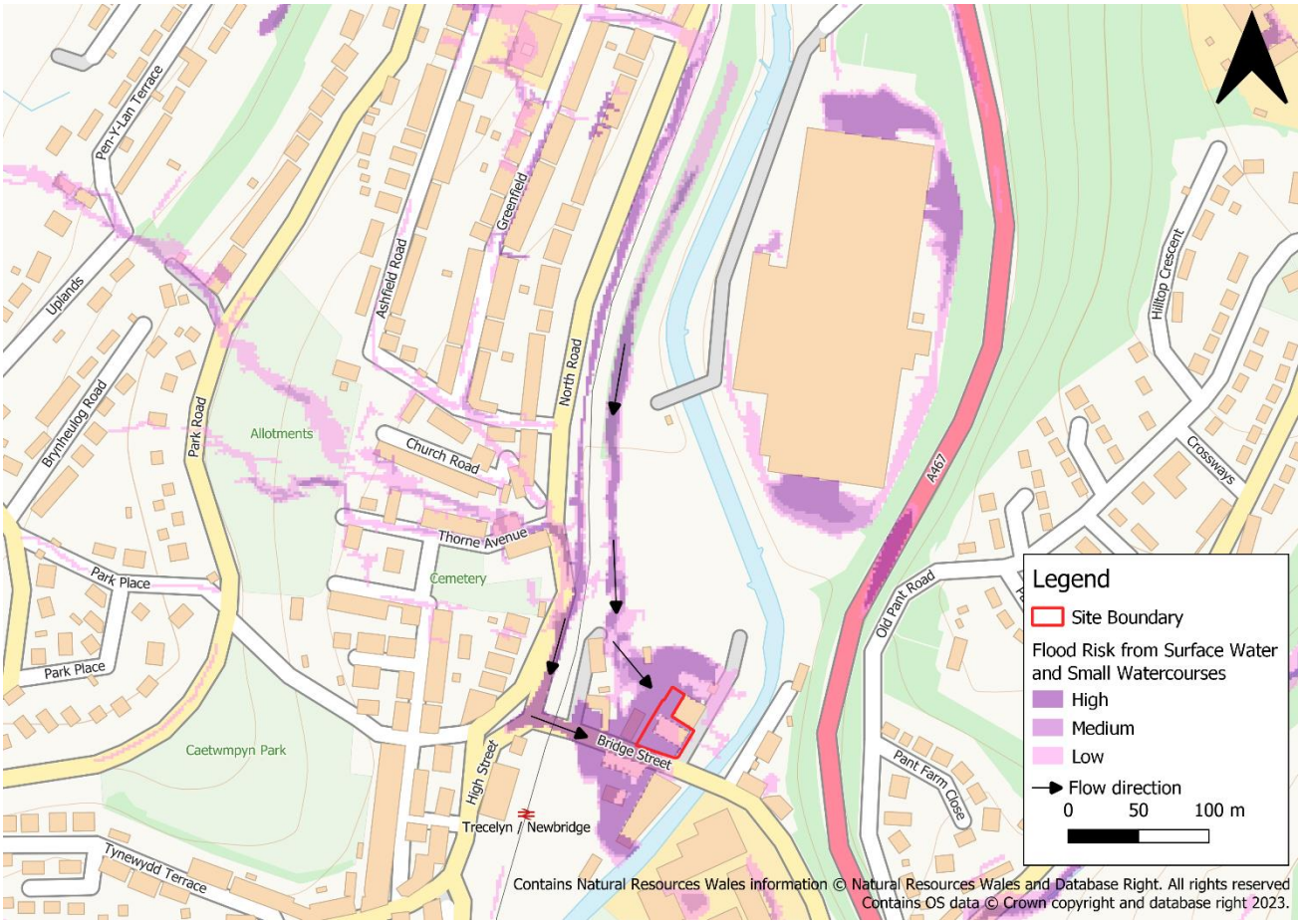


Figure 4-3 FRAW- Flood Risk from Surface Water and Small Watercourses- wider view

4.6 Flood Risk from Groundwater

Groundwater flooding is caused by unusually high groundwater levels, and it occurs as excess water emerges at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, sometimes lasting for weeks or months, and can damage property. This risk of groundwater flooding depends on the nature of the site's geological strata and the local topography.

Caerphilly County Borough Council's Flood Risk Management Plan[6] states that 'Where it has been classified, the majority of Newbridge is shown to have low susceptibility to groundwater flooding, based on the underlying geology. There are several old mine shafts in the area where groundwater flooding could occur as dewatering operations have ceased. However no specific incidents of groundwater flooding have been identified so this is not considered a significant issue.' The site is therefore considered to be at **low risk** of groundwater flooding.

6 https://www.caerphilly.gov.uk/caerphillydocs/roads-and-pavements/flood-risk-mgt-plan-dec2015.aspx

4.7 Flood Risk from Reservoirs

As shown in Figure 4-4, NRW Flood Risk from Reservoirs mapping indicates the site lies within the reservoir flood extent of the Blaen-y-cwm Reservoir.

As the enforcement authority for the Reservoirs Act 1975 in Wales, NRW ensure that reservoirs are inspected regularly, and essential safety work is carried out. The regulatory nature of reservoir management means that the probability of a failure at a statutory reservoir is very low. The Blaen-y-cwm Reservoir, which presents a risk to the site, is >16km away allowing substantial warning time if a failure should occur. It is therefore concluded, given the probability and consequences of such an event, that the risk at the proposed development site as a result of reservoir failure is **low**.

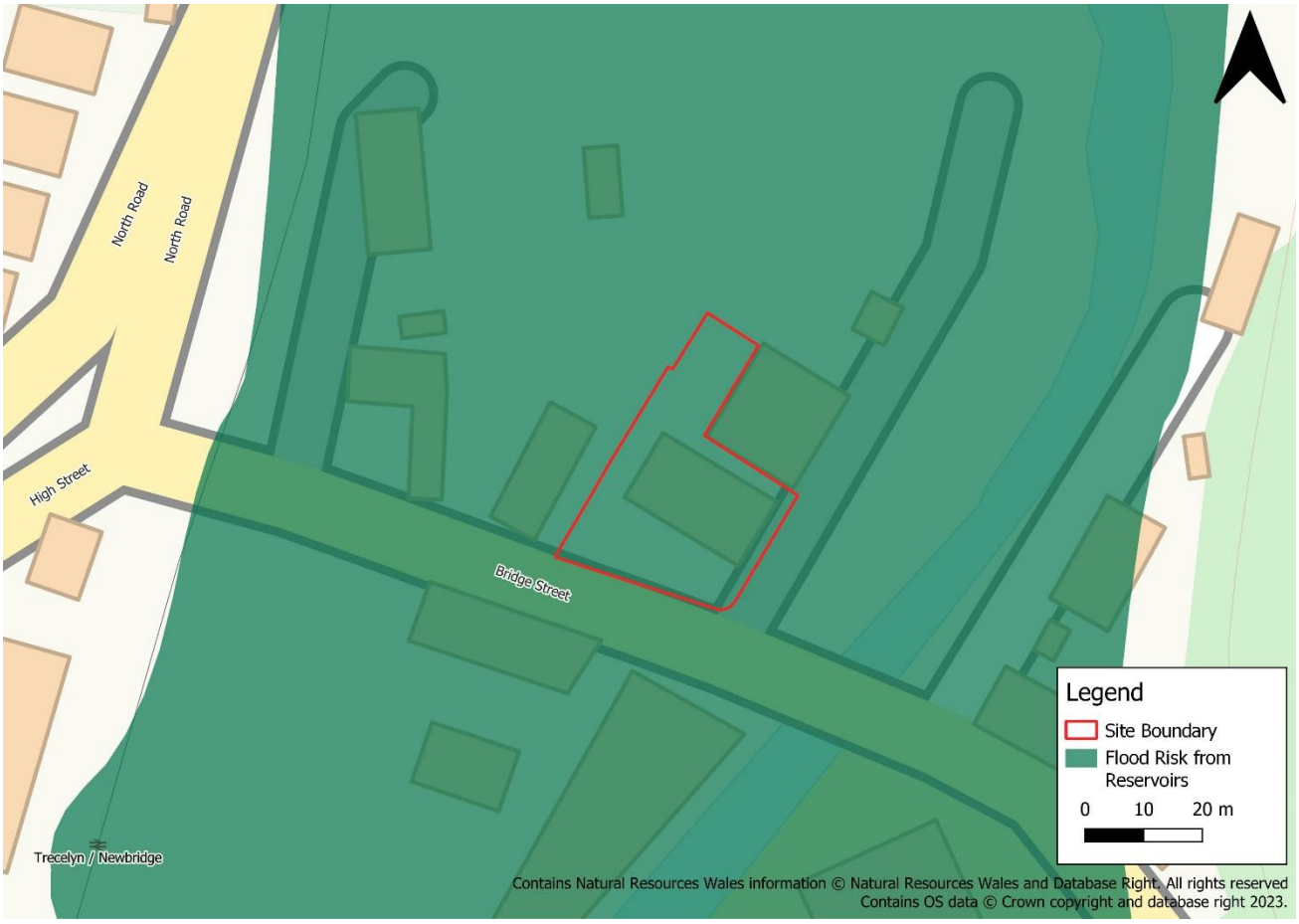


Figure 4-4 FRAW- Flood Risk from Reservoirs

4.8 Flood Risk from Sewers

No incidents of sewer flooding are noted in the Caerphilly County Borough Council PFRA[5] or LFRMS[6]. The site is therefore considered to be at **low risk** of sewer flooding.

5 Detailed Fluvial Flood Risk Assessment

5.1 Data availability

Wallingford Hydro Solutions were commissioned by NRW in 2019 to undertake an integrated catchment model for the River Ebbw. The Integrated Catchment Model (ICM) of the River Ebbw consists of 2 detailed 1D/2D hydraulic models, with are split between the upper and lower sections of the River Ebbw. The proposed development site is located in the Lower River Ebbw section.

Climate change values assume a 70% increase in flows from the original estimates, as per Welsh Government guidance for catchments in the Severn River Basin.

No updates have been made to the model as part of this assessment.

5.2 1% AEP Plus Climate Change Event

The building and its surrounding land are predicted to flood during the 1% AEP plus climate change event, as shown in Figure 5-1.

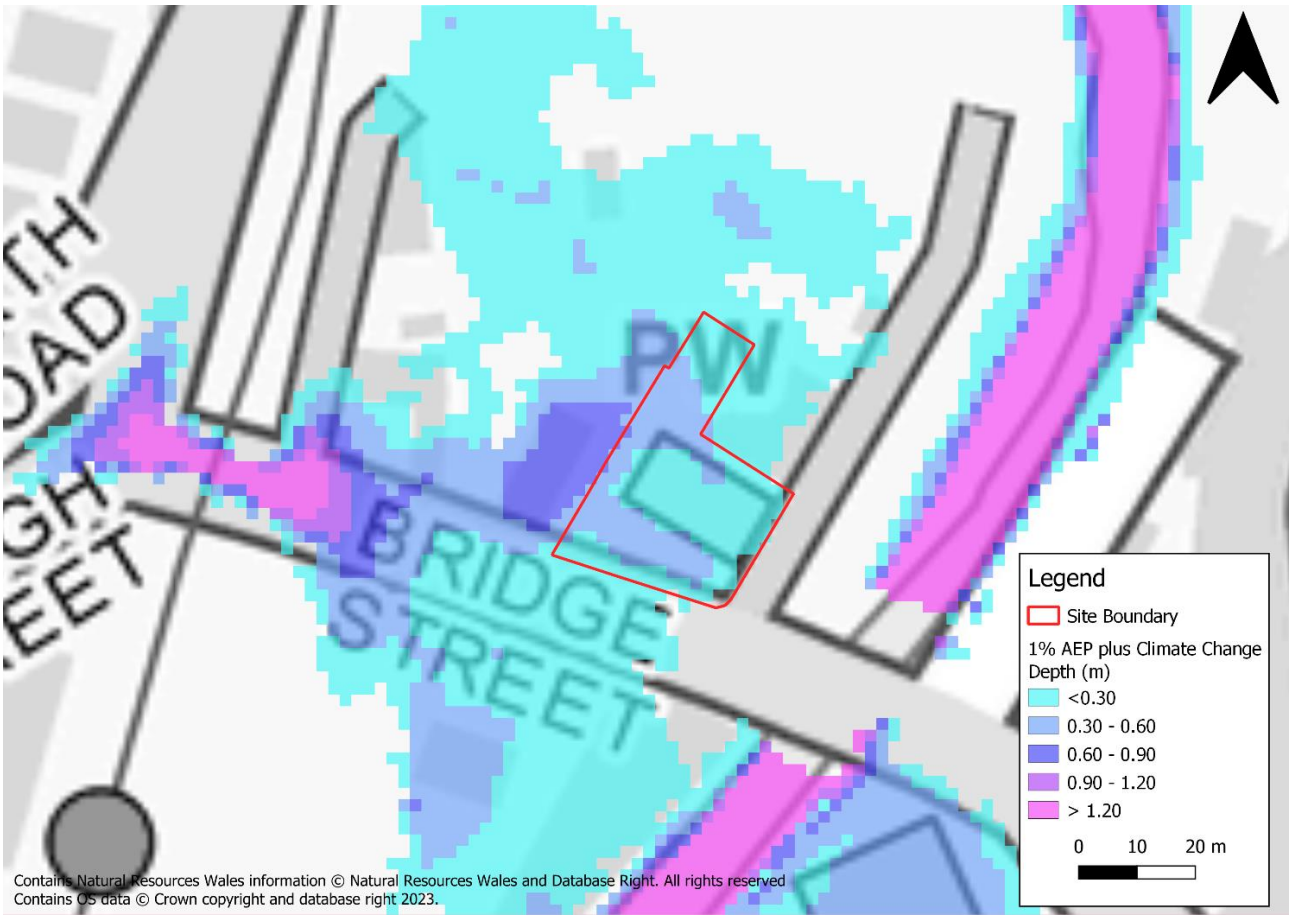


Figure 5-1 1% AEP plus Climate Change flood depths

Flooding of the site occurs as a result of flood water overtopping the banks of the River Ebbw to the east of Station Road, some 1.2km upstream of the site, and flowing in a southerly direction along North Road. From North Road, at its junction with Yewtree Road, water is predicted to flow in a south-easterly direction across the railway line towards Bridge Street. Flows enter the site at the northern boundary, as shown in Figure 5-2.

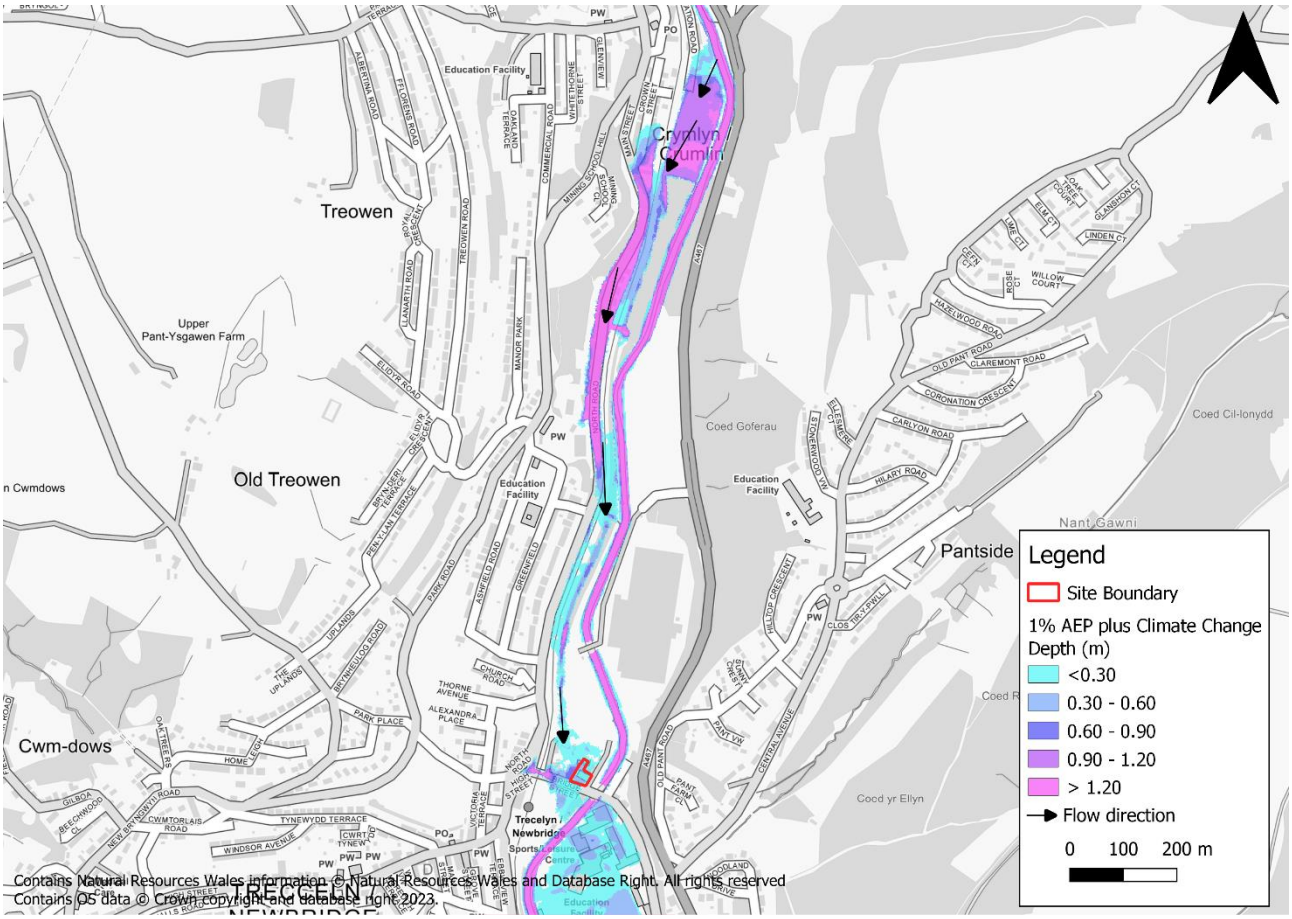


Figure 5-2 1% AEP plus Climate Change flood depths- Flood Mechanisms

Flood depths across the site are predicted to be generally less than 0.3m with isolated areas predicted to flood to depths of up to 0.44m. Similar flood depths are predicted on Bridge Street and the surrounding area of the site.

However, these flood depths are predicted on the basis of a LiDAR derived ground model that is inherently unable to accurately describe the actual level of buildings. Therefore, to accurately assess the flood depths, the modelled water level has been compared to the ground and finished floor levels of the proposed development. These have been summarised in Table 5-1. Flood depths in Table 5-1 are the maximum predicted depths, with some areas of the car park predicted to be flood free in this event.

The increase in finished floor levels has reduced the maximum depth of flooding predicted within the building during the design flood event. In addition, the vulnerability classification of the building has been reduced from highly vulnerable to less vulnerable as a result of the change of use. Consequently, there is considered to be no change in flood risk as a consequence of the proposals.

To mitigate the risk of flooding, additional mitigation measures can be applied to the building to improve its resilience to flooding. Further information is provided in Section 5.4.

Table 5-1 Potential flood depths in the 1% AEP plus climate change event

Area of the site	Ground and Finished Floor Level (mAOD)	Flood Level (mAOD)	Maximum Flood Depth (mm)
Building	105.27	105.30	30
Footpath around the building	105.12	105.30	180
Car Park	104.84-105.6	105.30	460- flood free

5.3 0.1% AEP Event

The flood extent and mechanisms during the 0.1% AEP event are the same as that within the 1% AEP plus climate change event. Figure 5-3 shows the maximum flood depths across the existing building and its surrounding land.

The figure indicates that flood depths across the site are predicted to be generally less than 0.82m in depth with some areas predicted to flood to depths of up to 1.16m. Similar flood depths are predicted on Bridge Street and the surrounding area of the site.

Table 5-2 provides a comparison of predicted water level to the ground and finished floor levels taken from the proposed site plan. The building is predicted to flood to a depth of 0.650m, with flood depths across the car park ranging from 0.32m to 1.08m. The footpath around the building is predicted to flood up to 0.8m.

Table 5-2 Potential flood depths in the 0.1% AEP event

Area of the site	Ground and Finished Floor Level (mAOD)	Flood Level (mAOD)	Maximum Flood Depth (mm)
Building	105.27	105.92	650
Surrounding area of the building	105.12	105.92	800
Car Park	104.84-105.6	105.92	1080- 320

Flood depths within the existing building exceed the tolerable limits as defined within A1.15 of TAN-15. However, the depths of A1.15 (600mm for commercial and retail properties) are provided for indicative guidance only and are not definitive. TAN-15 advises that each site must be considered individually, and a judgement taken in the context of the particular circumstances which could prevail at a site.

The increase in finished floor levels has reduced the maximum depth of flooding predicted within the building during the design flood event in comparison to the existing scenario. In

addition, the vulnerability classification of the building has been reduced from highly vulnerable to less vulnerable as a result of the change of use. Consequently, there is considered to be no change in flood risk as a consequence of the proposals.

To mitigate the risk of flooding, additional mitigation measures can be applied to the building to improve its resilience to flooding. Further information is provided in Section 5.4.

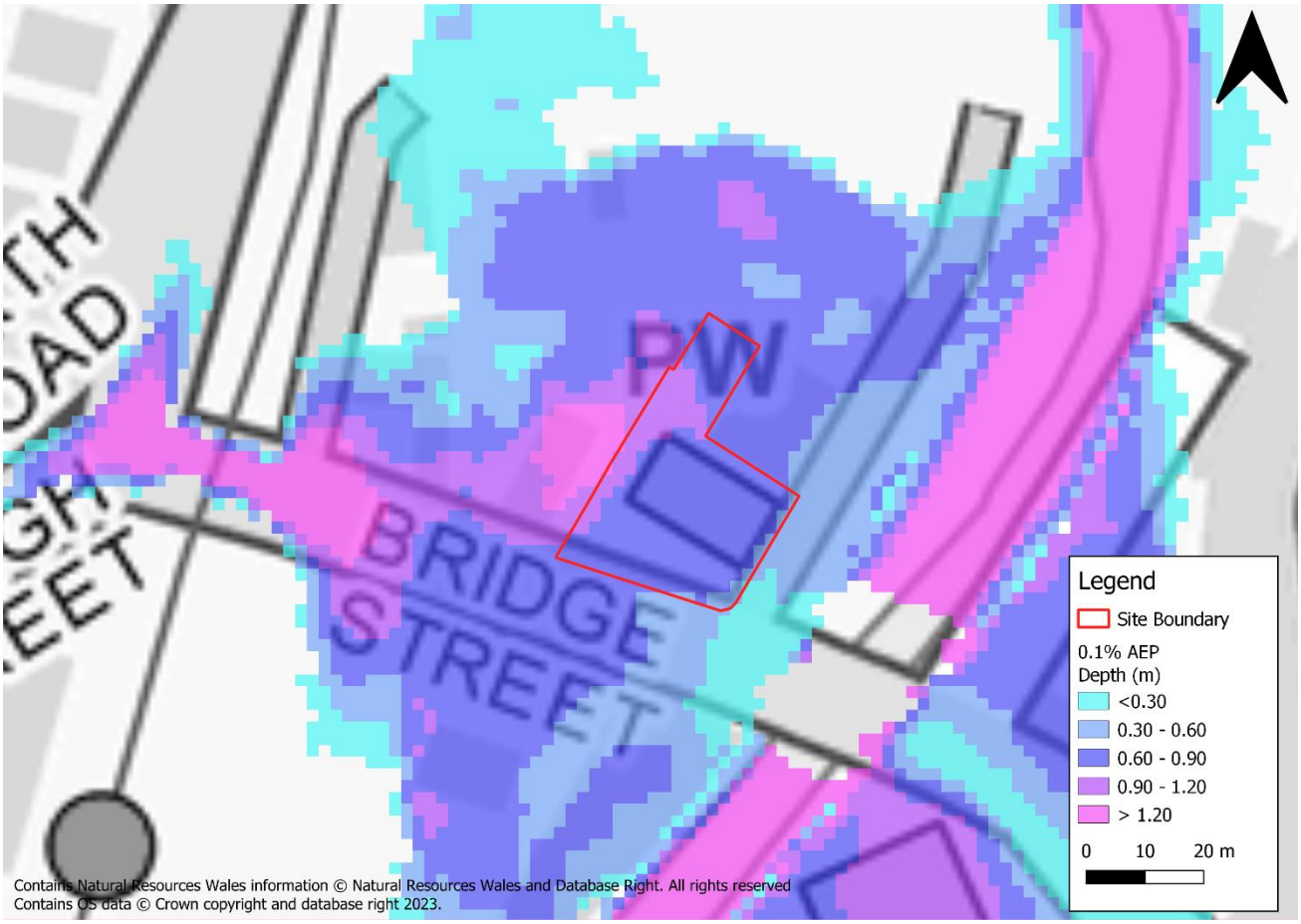


Figure 5-3 0.1% AEP flood depths

5.4 Flood risk mitigation

The refurbishment of the existing building offers the opportunity to improve the flood resilience of the property. The following section sets out recommendations for flood risk management measures to reduce the probability and consequence of flooding.

5.4.1 Property Flood Resilience Measures

The Finished Floor Level of the property is to be raised to 105.25mAOD, consequently reducing flood depths in the premises when compared to the baseline scenario. In addition, the developer is proposing to utilise flood barriers to entryway to mitigate the ingress of water into the property.

The full height of the British Standards Institution (BSI) Kitemark for PFR measures is 900mm above Floor Level. However, research carried out for the Department for

Communities and Local Government (DCLG) and the Environment Agency has recommended that the use of protection measures should generally be limited to a nominal protection height of 600mm above Floor Level: the lowest point of ground abutting the external property walls. This is because the structural integrity of the property may be compromised above this level, which also increases the risk of cracks and leaks.

The implementation of flood barriers to the protection height of 600mm would result in no flooding to the premises in the 1% AEP plus climate change event, and whilst flood waters would overtop the barriers in the 0.1% AEP event, flood depths in the building are likely to be less than those stated in Section 5.3 above.

This FCA does not constitue a full PFR survey for the property. Consequently, additional resistance measures may be required and should be considered further. PFR also consists of measures that can be installed to make individual buildings more resilient, to limit the impact of flooding if waters do enter the property. Resilience measures might include raising the boiler and electrics, using tiles on the ground floor and ensuring the users of the site have a Flood Response Plan.

Further information on potential resistance and resilience measures is included below in Table 5-3.

Table 5-3 PFR measures that could be included to help mitigate flood risk

Resistance or Resilience measure	Type	Description
Resistance Measures	Flood Barriers	Flood barriers can be installed across doorways, gateways or other openings to stop flood water entering a building. Barriers are demountable, so they can be fitted easily and quickly when there is a flood risk, then removed and stored away when not needed.
	Flood Doors	Flood doors automatically create a water-resistant seal when closed. This provides a benefit over flood barriers which have to be manually fitted into place when required. Flood windows are also available and can be used to replace standard windows at flood risk.
	Flood Gates	Standard garden gates can be replaced with flood resistant flood gates. Like a flood door, once shut and locked, a water-resistant seal is formed. Gates can be used around a property perimeter to keep water away from a building.

Resistance or Resilience measure	Type	Description
	Self-Closing Airbricks	Many buildings have airbricks located at ground level around the perimeter for ventilation. These can be replaced with automatic airbricks that allow for air to circulate but do not allow water to enter.
	Air Vent Protection	Water can enter the property through any vents connected to internal appliances (e.g. log burner or boiler). Vents can be blocked if redundant or raised above the flood level. Snorkel type measures can also be installed to raise the level of the vent. For any measures associated with combustible fuel sources, a Gas Safe engineer must be consulted.
	Non-Return Valves	Flood water can flow up through wastewater pipes leading to flooding within a property. Non-return valves can be fitted to these pipes so wastewater can flow out, but flood water cannot enter. Non-return valves can also be fitted to the foul sewer, preventing sewage backing up through the system if the main sewer network is also impacted by flooding. If a non-return valve cannot be fitted, a bung can be used to block the toilet.
	Re-Pointing	Gaps or cracks in walls can allow flood water to enter. Re-pointing helps to seal these ingress routes, improving the overall condition of the wall and reducing water ingress.
	Waterproof Spray	If flood water stays in contact with a building for a long period of time, it can soak through the wall. A waterproof breathable spray can be applied to external walls to reduce this.
Resilience Measures	Flood Resilient Walls	The use of water resilient materials and paints on walls can reduce the amount of internal damage done if flood water does enter a building. Plasterboard can also be installed horizontally so only the lowest sections are affected if flooding occurs.
	Water Resilient Flooring	Suspended timber floors, which are more susceptible to damage, can be replaced with solid concrete floors. Tiled floors and skirting boards are also easier to clean compared to carpet and laminate which usually need replacing after a flood event.
	Electrics	Electrics for the ground floor can be separated

Resistance or Resilience measure	Type	Description
		from other floors so power can be turned off in isolation. Wiring and plug sockets can be raised up above floor level to improve resilience.
	Boilers	Boilers can be relocated to a place where flood risk is reduced. For example, boilers could be wall mounted above the flood level or re-installed on the first floor rather than the ground floor. This will reduce the risk of the boiler being damaged during a flood event.

5.4.2 Flood Response plan

Considering the risk of fluvial flooding across the site, it is recommended that a Flood Response Plan is prepared for future users of the building. At a minimum, the flood response plan should cover adequate flood warning, evacuation and access/egress routes in the event of flooding for the lifetime of the development. NRW provide guidance for the production of flood response plans[7]. This guidance should be used to inform flood response procedures at the site.

5.4.3 Flood warning service

NRW flood warnings for fluvial flood events are typically provided 1-2hrs in advance of an event. Flood warnings give notice that “flooding is expected” and “immediate action is required”. A lower grade flood alert is used to prepare for possible flooding and will generally be issued with a greater lead-time.

The proposed development site is located within the ‘Rivers Ebbw, Sirhowy and Lwyd’ flood alert area. It is recommended that users of the building sign up for these flood alerts, and responses to these events are detailed within Flood Response Plans, allowing them to be enacted when appropriate. If users of the site were not able to evacuate in time, they could shelter in the upper floor of the building.

7 Natural Resources Wales, How to prepare your home business or farm for a flood, retrieved from: https://naturalresources.wales/flooding/preparing-your-home-business-or-farm-for-a-flood/?lang=en

6 Assessment of Acceptability Criteria

6.1 Acceptability criteria

Table 6-1 details the acceptability criteria required by TAN-15 and the site's compliance in against these criteria.

Table 6-1 Acceptability Criteria

TAN-15 Justification Criteria	Comments	Achieved?
Developer is required to demonstrate that the site is designed to be flood free for the lifetime [Ref: TAN-15 A1.5] of development for a 1 in 100 (1%) chance (fluvial) including an allowance for climate change in accordance with TAN-15 table A1.14.	The site is predicted to flood in the 1% AEP plus climate change event with the building predicted to flood to depths of up to 30mm. To improve the buildings resilience to flooding, PFR measures shall be installed on the building to further reduce the risk of internal property flooding. PFR measures should be applied to a maximum of 600mm above FFL. Consequently, it is likely that the building shall be flood free in this design event.	✓
The development should be designed so that in an extreme (1 in 1000) event there would be less than 600mm of water on access roads and within the property.	The site is predicted to flood in the 0.1% AEP event with the building predicted to flood to depths of up to 650mm. The refurbishment proposals will not result in a change in flood risk. To improve the buildings resilience to flooding, PFR measures shall be installed on the building to further reduce the risk of internal property flooding and reduce the depths of flooding to below 600mm within the building.	✓
No flooding elsewhere.	The proposed development has no significant change in building footprint, and is therefore unlikely to impact of flood risk to third parties.	✓
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 given year).	The site is not protected by the presence flood defences.	✓

TAN-15 Justification Criteria	Comments	Achieved?
The developer must ensure that future occupiers of development are aware of the flooding risks and consequences.	The developer will provide future occupants with information on flood risk in the form of this report and if a Flood Response Plan is prepared, it will be passed on for future users of the building.	✓
Effective flood warnings are provided at the site.	The site is not located in an NRW Flood Warning Area. The site is located in the Rivers Ebbw, Sirhowy and Lwyd Flood Alert Area. The Flood Response Plan will at a minimum, cover adequate flood warning, evacuation and access/egress routes in the event of flooding for the lifetime of the development.	✓
Escape/evacuation routes are shown by the developer to be operational under all conditions.	Flood risk can be managed with the assistance of the flood warning service provided by NRW, which provides adequate lead times to implement flood preparations. There is no change to existing escape/evacuation routes from the current scenario at the site. The Flood Response Plan will cover evacuation and access/egress routes in the event of flooding for the lifetime of the development.	✓
The development is designed by the developer to allow the occupier of the facility for rapid movement of goods/possessions to areas away from flood waters.	Flooding, should it occur, will be shallow, but it is recommended that the occupier signs up to the NRW flood warning service so that they are aware of the potential for any flooding. The Flood Response Plan will at a minimum, cover adequate flood warning, evacuation and access/egress routes in the event of flooding for the lifetime of the development.	✓
Development is designed to minimise structural damage during a flood event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of a flood.	Flooding, should it occur is unlikely to cause structural damage.	✓

7 Conclusions

JBA Consulting were commissioned by JDL Consultants Ltd to prepare a Flood Consequences Assessment (FCA) to undertake a Flood Consequences Assessment (FCA) for a proposed renovation at Newbridge Methodist Church, Newbridge.

The site is 0.10ha in size and currently comprises a car park and church. The existing building is therefore considered as highly vulnerable development by TAN-15

Development proposals for the site are to refurbish the building into a Tesco supermarket. A supermarket is considered as less vulnerable development by TAN-15. Whilst the proposals include demolition of a side porch, and minor extension to the rear, the overall footprint of the building remains the same.

The site falls within Zone C2, as categorised by NRW's Development Advice Maps. Zone C2 refers to areas of the floodplain without significant flood defence infrastructure. Less vulnerable development is permitted in Zone C2, subject to the Justification Test and Acceptability Criteria.

The site has a low risk of flooding from rivers, groundwater, reservoirs, and sewers. The site is considered to have a very low risk of tidal flooding and a high risk of fluvial flooding. The site is at high risk of surface water flooding.

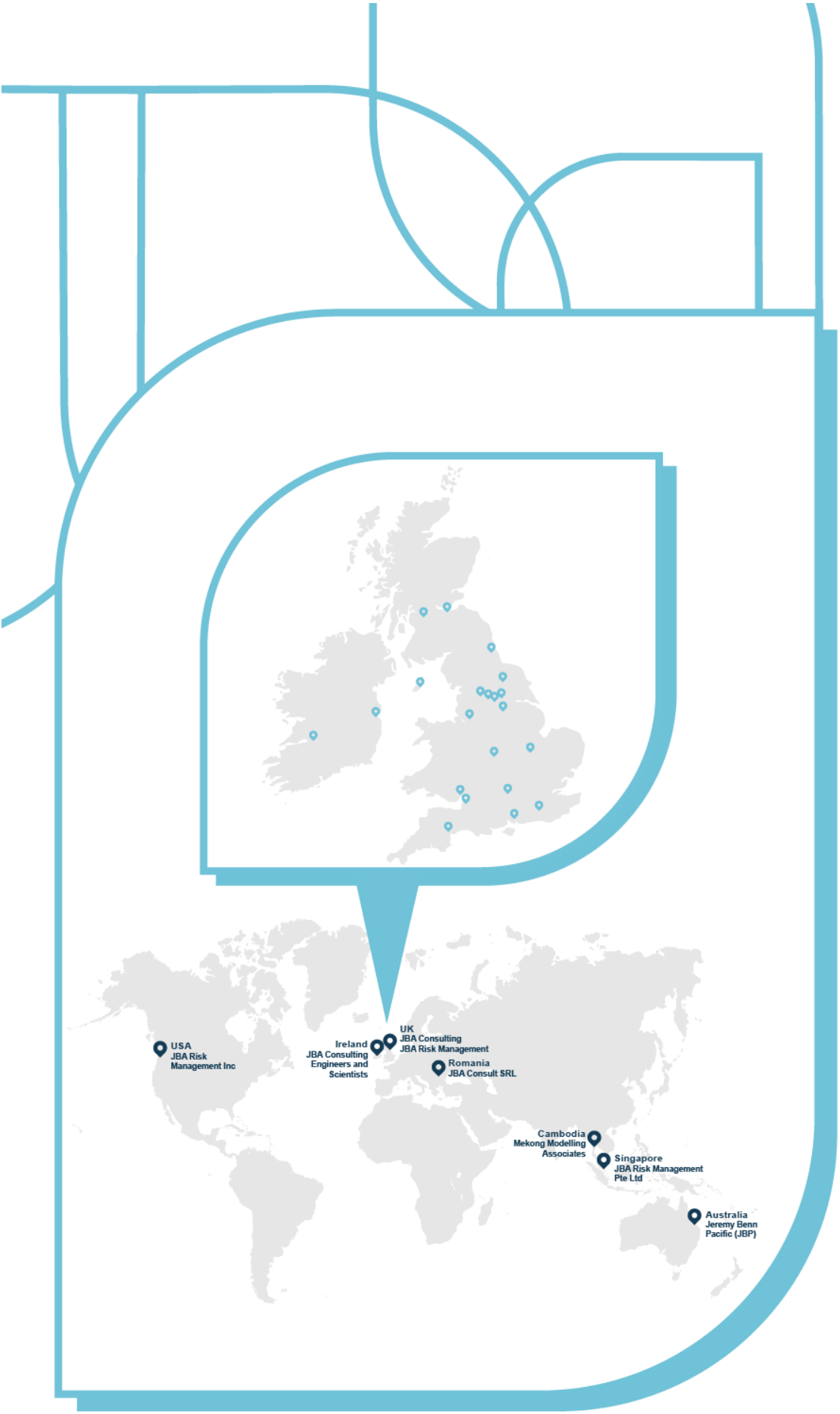
Detailed flood modelling shows that the existing building is predicted to flood to shallow depths during the 1% AEP fluvial event with an allowance for climate change and the 0.1% AEP events. Flood depths within the existing building exceed the requirements of A1.14 and the tolerable limits as defined within A1.15 of TAN-15. However, there is considered to be no change in flood risk as a consequence of the proposals and depths of A1.15 (600mm for commercial and retail properties) are provided for indicative guidance only and are not definitive.

To manage as far as practical the risk of internal flooding, the finished floor levels have been increased in comparison to the existing building, and it recommended that PFR measures are installed which will significantly reduce the risk and severity of internal flooding. Furthermore, the area is served by an effective flood warning service and it is recommended that the applicant develop a flood response plan for the site. The installation of PFR would reduce the risk of flooding and reduce the depths to comply with the requirements of TAN-15.

The proposed change of use reduces the vulnerability of flooding. By recognising the risk of flooding, the applicant will be able to take proactive steps to plan, prepare and mitigate the possibility of flooding, thereby reducing the existing flood risk and achieving the goal of TAN-15 and PPW to reduce flood risk through sustainable development.

A Topographic Survey

B Site Plan



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