



VOLUME 1: GENERAL INFORMATION

I 1.5.2 FLOOD RISK ASSESSMENT





Flood Response Plan for Glassworks Student Accommodation

Final

Version 2.0

Date: 15 May 2024

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www.jbaconsulting.com



Revision History

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Amendments None

Issued to: Redcliff MCC LLP

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Contract

This report describes work commissioned by IESIS Consult by an instruction dated 24 November 2023. The Client's representative for the contract was Chris Barton. Evie Whatling and Toby Jones of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Plan for the sole use of Site Managers of Redcliff Quarter, and its appointed agents in accordance with the Agreement under which our services were performed.

JBA has no liability regarding the use of this Plan except to IESIS Consult.

No other warranty, expressed or implied, is made as to the professional advice included in this Plan or any other services provided by JBA. This Plan cannot be relied upon by any other party without the prior and express written agreement of JBA.

The actions contained in this Plan are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Plan.

The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Plan. The work described in this Report was undertaken between 24 November 2023 and 01 February 2024 and is based on the conditions encountered and the information available during the said period. The scope of this Plan and the services are accordingly factually limited by these circumstances.

Certain statements made in the Plan that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are



based on reasonable assumptions as of the date of the Plan, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. JBA specifically does not guarantee or warrant any estimates or projections contained in this Plan.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time, and further confirmatory measurements should be made after any significant delay in issuing this Report.

This Plan is only for Site Managers of the Student Accommodation building at Glassworks in Bristol. A separate plan has been developed for students in the Student Accommodation, which is equally the responsibility of the Site Manager to review and maintain.

Plans cannot anticipate everything, and as such, this Plan should be used as a guidance document during an incident. Due to the level of risk identified for this site, it is paramount that the Site Manager takes additional action to inform and educate students on how to manage their safety. Human judgement and discretion are required when applying this plan to a flooding incident and by balancing the local risk and situational context. The emergency services guidance should always be prioritised over the actions specified in this plan to protect and preserve life and livelihoods.

This Plan should also be regularly trained and exercised by all relevant staff, and tests should be done with students or site users. Training should be done at a minimum twice a year to maintain competency in roles and responsibilities. One tabletop exercise should be organised, run, and reviewed yearly, with a full simulation and live test of the plan once every two years. Gaps and identified lessons are to be recorded, and an effective implementation plan developed to embed those lessons. The operator is responsible for adhering to this training and exercising schedule to ensure the plan remains correct and valid.

Unless otherwise stated in this Plan, 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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Abbreviations

AEP.....Annual Exceedance Probability

CC.....Climate change

EAEnvironment Agency

FFL.....Finished Floor Levels

FRA.....Flood Risk Assessment

FRP.....Flood Response plan

JBA.....Jeremy Benn Associates

PFR.....Property Flood Resilience

Definitions

Flood Risk Assessment: A site specific assessment of all forms of flood risk to the site and the impact of development of the site to flood risk in the area.

Fluvial flooding: Overland flooding occurring from a river, lake or stream overflowing.

Surface water flooding: Overland flooding occurring from rainwater being unable to drain away through existing drainage systems.

Reservoir flooding: Water escaping from a reservoir, for example as a result of dam failure.

Risk: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.



The next two pages of the Flood Response Summary are to be printed and made available in communal areas. This summary should be printed and made available in communal areas. This summary should also be printed and made available in all welcome materials for new students and those who will be present on the site.

Following the creation of this plan and subsequent updates, this summary is also expected to be shared with all individuals on the site to inform them of the response and evacuation procedures should flooding occur.



Flood Response Summary

Person(s) responsible for the plan	Site Manager
Person(s) responsible for activating the evacuation procedure	Site Manager
Site name	Glassworks Built-to-rent
Site address	St Thomas Street, Bristol, BS1 6AE
Proposed site use	Student Accommodation
Nearest hospital	Nuffield Health Bristol Hospital, 3 Clifton Hill, Clifton, Bristol BS8 1BN

Triggers and Response

Phase 1: Be aware and make preparations ready for the possibility of a flood event, including deployment of Property Flood Resilience measures, following the activation of any of these triggers:

- Flood Alert from the Environment Agency.
- Yellow, Amber or Red Severe Weather Warning for rainfall by the Met Office.
- Reports and forecasts on local radio, TV stations and / or Met Office Websites indicating potential for heavy rainfall and / or stormy conditions.
- Local observations that raise concerns of flooding.

Phase 2: Act, adapt and remain vigilant. Students remain away from flood water. Prepare for the possibility of floodwater surrounding the property and entering the ground floor. Phase 2 is activated following any of these triggers:

- Flood Warning from the Environment Agency.
- Local observations from those on site indicate an immediate risk of flooding or access to / from the site.
- Reports and forecasts on local radio and TV stations that indicate a threat of flooding in the area.
- Reports of road closures.

Phase 3: Remain on-site and seek safe refuge on-site upstairs or at a high level. This phase is triggered when:

- **Severe Flood Warning** is issued by the Environment Agency.
- Reports from the emergency services or local news of flooding onsite or nearby.
- Reports of a reservoir risk.
- Advised to seek refuge by the emergency services.
- Receive a UK Government Emergency Alert to your phone.



Commercial unit closure and evacuation

Due to the modelled flood extents which impact the entirety of the site and the surrounding access roads, dry evacuation of the ground floor commercial units is required during Phase Two: Act, adapt and remain vigilant of the plan.

It is recommended that if access and egress to the site is compromised, or if the lead time to flooding on the site is reduced, affected individuals should seek refuge on the upper floors of the building.

It is recommended that commercial personnel and the public are evacuated southwards via Three Queens Lane and Redcliff Street to the roundabout on Redcliff Way, located approximately 180m south of the site.

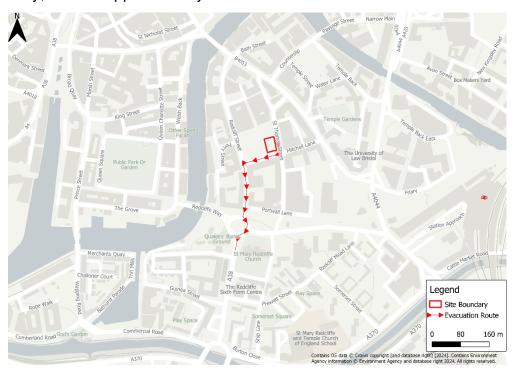


Figure 0-1 – Evacuation route

On-site containment

On-site containment for students has been identified as the safest action when flooding to access roads or the ground floor is occurring. On-site containment means students are to remain inside their property on the upper storeys of the building for the full duration of the flooding, or when otherwise advised it is safe to leave.

When flooding is occurring on site or on the surrounding access roads, students who are off-site should not attempt to return the site. They should be directed to seek refuge with friends, family or at a public venue. It is the personal choice of students if they wish to leave site during *Phase One: Be Aware and Prepare* or *Phase Two: Act, adapt and remain vigilant* in advance of any flooding occurring on-site or to access roads. Leaving site should not be attempted if flooding is underway.



Flood Risk Summary

Flood risk from rivers

The Environment Agency (EA) Flood Map for Planning indicates that the proposed residential and commercial development at Glassworks falls within Flood Zone 3 and is therefore at high risk of flooding from the River Avon.

Detailed modelling for the site was run for 1 in 100 (1% AEP) with climate change (+28%) flood events. The model results show that the proposed development site experiences some flooding during this scenario to a maximum flood level of 0.90-1.20m AOD for a duration of 6 to 12 hours.

During this scenario, safe access and egress during flooding would not be possible. This is because the surrounding roads to the site is classified as Hazard for Most. This means members of the public should not walk or drive through flood water, but it is accessible by the emergency services should they need to reach people contained in the site.

Within the site boundary, the hazard to people classification is Danger for Most on the ground floor. The modelled duration of flooding to the area is 6 to 12 hours before flood water begins to recede.

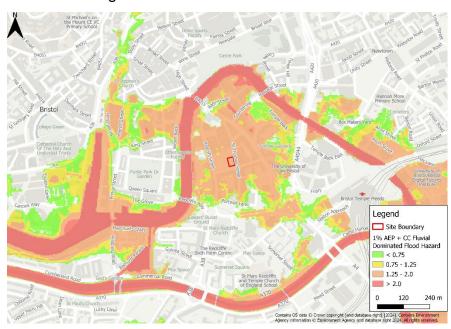


Figure 0-1 - Post-development Hazard to People

Flood risk from sea

The Environment Agency (EA) Flood Map for Planning shows that the site primarily falls within Flood Zone 3 (high risk) from tidal flooding. Due to the risk of climate change and the rise in sea level, the risk of coastal flooding will increase over time.



During the modelled 1000-year-plus climate change (28%) tidal event, the modelled extent of flooding on-site increases for 1 hour to 90 minutes before reaching its maximum extent where access and egress roads are classified as Danger for All. and remains at its peak for between 6 and 12 hours before beginning to recede.

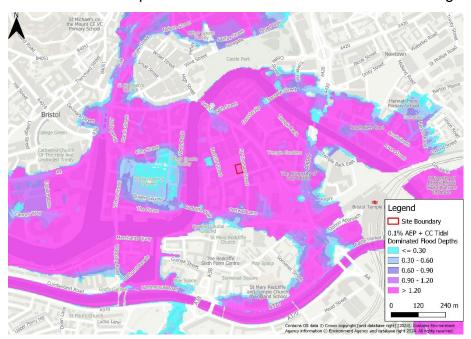


Figure 0-2 Tidal Flood Depths Map (1000 year event +28% Climate Change)

Flood risk from surface water

The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map has been consulted to assess flood risk from surface water and this risk is considered to be low within the site. The access road and connecting roads surrounding the site have a low risk of flooding from surface water.

Flood risk from groundwater

Although there are no documented cases of groundwater flooding at the site, given the close proximity to the River Avon, groundwater conditions at the site are expected to be characteristic of the area adjacent to the watercourse, with the potential for naturally high groundwater levels, particularly when the water levels in the river are high.

Flood risk from reservoirs

The Environment Agency's Risk of Flooding from Reservoirs map has been consulted to assess flood risk from reservoir breaches and this risk is considered to be high. Figure 10-7 - Environment Agency's Reservoir Flood Risk Map shows the risk from Dry and Wet Day Extent flooding. Dry Day Extent is taken from Chew Valley Lake. Wet Day Extent Flooding is taken from Chew Valley Lake and Tubbs Bottom Washland.



Section One: Flood Response



1 Phase One: Be Aware and Prepare

The Site Manager(s) are responsible for monitoring triggers and enacting the responses as outlined in this section or delegating this responsibility for 24/7 monitoring and response capability. It is essential that Site Managers maintain communication with students so they can make informed decisions by communicating aspects of this plan and flood risk information.

1.1 Phase One Trigger Levels

Phase One of the plan will be enacted as a result of any of the following triggers being met:

- The Environment Agency issues a Flood Alert for the area.
- The Met Office issues an Amber Severe Weather Warning for rainfall in the area.
- Reports and forecasts on local radio, TV stations and/ or Met Office websites indicated the potential for heavy rainfall and / or stormy conditions for the area.
- Local observations by students or the public that raise concerns of potential flooding in the local area.
- River gauge levels for Bristol Frome is close to, or at 6.7m as displayed below.

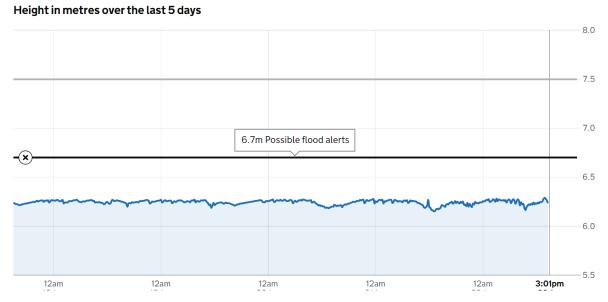


Figure 1-1 - Bristol Frome Flood river gauge for Flood Alerts



1.2 Phase One Response Actions (Site Manager)

These response steps for the Site Manager (or delegate) to complete during periods they are at the premises. This page can be printed separately and marked in an incident to evidence actions have been completed.

Phase One Actions	Completed (Y/N)
 Inform students that the site is on standby for flooding, to be prepared for the possibility of flooding and to activate their Personal Flood Plans. Student's may also wish to move private vehicles from nearby roads to higher ground. 	
 Advise students to check welfare stocks and check vulnerable students have sufficient supply medication and other essential resources. 	
 Inform Local Authorities, the University and other stakeholders, if necessary, that preparations are being made for flooding. 	
 Request students inform friends and family that flooding is possible and suggest they stay away from the area. 	
5. Tie / anchor down or move objects to a safe location that could float away.	
6. Ensure business continuity and alternate accommodation information is available.	
7. Begin deploying Flood Barriers to non-essential doorways (e.g. bin stores, low lying windows). Check with the Build to Rent property next door to identify if they require support deploying Flood Barriers, or can support deploying Flood Barriers for the student accommodation site.	
8. Remain vigilant. Monitor local news stations and weather and flood-related services (Met Office, EA, local and national TV/radio stations, etc.) for worsening conditions.	
 Periodically, check the River Avon to monitor River Levels. Do not go to the River if roads or streets begin to flood. If this occurs, activate Phase Three: Survive and containment. 	



Phase One Actions	Completed (Y/N)
10. Periodically, check Bristol Frome river gauge levels. If river gauge levels appear to be reaching towards 7.5m, prepare to activate Phase Two: Act, adapt and remain vigilant .	
11. Monitor triggers listed in Phase Two Trigger Levels and prepare to activate.	

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2 Phase Two: Act, adapt and remain vigilant

The Site Manager(s) are responsible for monitoring triggers and enacting the response. Throughout this phase, if there is any risk to life, then any individual must call 999 and request emergency services. Await their instructions and prioritise them over those listed in the plan.

2.1 Phase Two Trigger Levels

Phase Two of the plan will be enacted as a result of any of the following triggers being met:

- The Environment Agency issues a Flood Warning for the area.
- The Met Office issues a Red Severe Weather Warning for rainfall in the area.
- Reports and forecasts on local radio and TV stations that inform of increased likelihood of flooding to the area.
- Local visuals observations of River Avon showing high water levels and is close to overtopping the banks.
- River gauge levels for Bristol Frome is close to, or at 7.5m as displayed in Figure 2-1.
- Emergency services inform of road closures in the local area due to the risk of flooding.
- Reports of flooding in the local area by students or the public.

Height in metres over the last 5 days

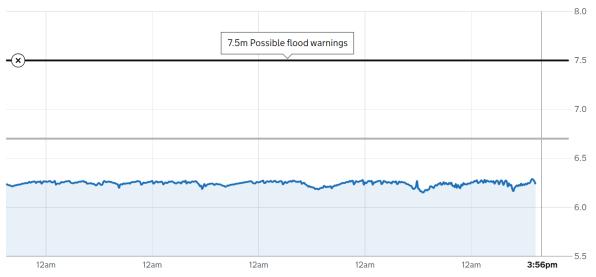


Figure 2-1 - Bristol From river gauge for Flood Warnings



2.2 Phase Two Response Actions (Site Manager)

These response steps for the Site Manager (or delegate) to complete during periods they are at the premises. This page can be printed separately and marked in an incident to evidence actions have been completed.

Phase Two Actions	Completed (Y/N)
 If a flood warning has been issued, check for flooding in England on the Government website or by calling Floodline on 0345 988 1188 to see if your local area is affected. 	
 Inform students that the flood risk has increased in the local area and to remain vigilant. If student's wish to leave site, they should do so promptly ahead of flood risk being realised. Students should advise others against coming to the premises. This should be done via digital and physical signage in communal areas. 	
 Inform students to refer to their Personal Flood Plan and contact the emergency services if there is risk to life at any point. 	
4. Undertake necessary actions to the building to ensure the ground floor and access to it is safe for students in the event of it flooding. This may include managing lift operation and door access to prevent sudden exposure to floodwater.	
5. Deploy the remaining Flood Barriers to remaining unprotected doors and windows. Inform students and visitors this is about to happen to ensure that people are able to evacuate should they voluntarily decide to do so. Check with the Build to Rent property next door to identify if any Flood Barriers also need to be deployed.	
 Make contact with the University informing them of the escalated risk and the need to identify alternate accommodation should it be needed. 	
7. Remain vigilant. Listen to the radio and check for updates from the emergency services.	



Phase Two Actions	Completed (Y/N)
 Monitor the triggers listed in Phase Three Trigger Levels and be prepared for the possibility of containment. 	
9. If flooding is observed, call the 24/7 Environment Agency Incident Hotline on 0300 2000 to report the flood incident.	100
10. All staff for the site, including site manager, are to leave the premises.	



3 Phase Three: Survive and containment

The Site Manager(s) monitors triggers and enacts the responses. Throughout this phase, if there is any risk to life, then any individual must call 999 and request emergency services. Await their instructions and prioritise their advice over the ones listed in the plan. You are responsible for your own safety and that of those to whom you have a duty of care.

The duration of flooding is modelled to be up to 12 hours before beginning to recede for a '1 in 100 plus climate change (CC)' event. Safe refuge on-site is located on the first floor and above of the building.

3.1 Phase Three Trigger Levels

Phase Three of the plan will be enacted as a result of any of the following triggers being met:

- The Environment Agency issues a Severe Flood Warning for the area.
- Reports and forecasts on local radio and TV stations that indicate imminent risk of flooding at the site.
- Local advice and warning from the emergency services.
- Local observations from students or others alerting that the site has begun to flood, or the following roads:
 - o B4053
 - Portwall Street
 - Redcliff Way
 - Canynge Street
 - Redcliff Street
 - Three Queens Lane
 - St Thomas Street
 - Ferry Street
 - Mitchell Court
 - o Michell Lane



3.2 Phase Three Response Actions (Site Manager and staff)

Phase Three Actions	Completed (Y/N)
 Inform all students, and anyone else remaining on site, that they are to remain inside the building and it is unsafe to leave. They are to seek refuge on the first floor and above until flooding to site and access roads has ended or they have been instructed it is safe to leave. This should be shared via digital formats. 	
2. Activate emergency business continuity plans for the site.	
Provide additional updates through digital formats.	
4. Begin the process of booking alternate accommodation for any students who were off the site when flooding began and are unable to return to their home.	
5. If a severe flood warning has been issued, check for flooding in England on the Government website or by calling Floodline on 0345 988 1188 to see if your local area is affected.	
6. Continually assess risks as they emerge to determine if it is still safe to remain inside. Contact the emergency services if remaining inside is no longer considered safe.	
7. Remain vigilant and inside the property for the duration of flooding being on site. Keep checking information on the flood risk and continue to monitor local news stations and flood-related services (Met Office, EA, local and national TV/radio stations, etc.).	

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4 On-site containment and safe refuge

Students should be made aware of the on-site containment process. This information should be available for visitors and ready to share should the plan be activated.

The lead time provided by the Environment Agency Flood Warnings should be used by the Site Manager(s) to inform whether it is safe to advise visitors to leave site ahead of any potential flooding.

Evacuation of site should only take place well in advance of flooding, as described in Phase One and Phase Two of this plan. Evacuation should not be attempted once flooding to access roads or the site is occurring.

Should students decide to voluntarily evacuate from the site, it is recommended they evacuate southwards via Three Queens Lane and Redcliff Street to the roundabout on Redcliff Way, located approximately 180m south of the site.

Students are to inform the Site Manager that they have left site.

4.1 On site-containment

Containment in a safe refuge is when individuals will remain within the property when flooding occurs.

Flood risk modelling indicates that the ground floor of the building is considered to be at flood risk. Property Flood Resilience measures have been put in place to protect against flooding of the ground floor but the floor remains to be considered at flood risk.

Off-site evacuation during a flood should not be attempted without advice from the emergency services, as access routes may be flooded. In the very unlikely event that it is unsafe to remain on-site indoors, the emergency services should be contacted.

The upper floors provide suitable welfare facilities and will be safely above the flooded area. Provided students and visitors have sufficient access to food, water, medicines and warmth, the safe refuge location is suitable for the full duration of a flood events.

4.2 Access Road Flooding

According to modelling of 1 in 100 (+28% Climate Change) event, there is risk of flooding to the access roads before the site becomes at risk of flooding. The hazard rating for the access road is between moderate and low depending on the type of flooding.

Therefore, in the event of flooding occurring on the access road, staff and students should take the following actions:

Do not walk or drive into flood water.



- Remain indoors and away from flood water while the access road is flooded.
- Contact Bristol City Council and inform them that the access road has flooded.
- Follow Phase Three Response Actions.
- Contact the emergency services if at any point there is a danger to life.

For fluvial flooding, access routes are modelled as accessible to emergency service vehicles in a 1 in 100 (+28% Climate Change) event.

However, access routes are not accessible by all, including emergency services, for 3 to 7 hours in tidal flooding events. It is the students and visitors' discretion whether they leave site in advance where sufficient lead time permits. Containment is mandatory if flooding occurs on the surrounding roads or at the site. Consideration should be made to those who are vulnerable and may require emergency care during a flood event.

4.3 Assessing risks to safe refuge

When determining whether on-site containment in a safe refuge remains a safe option, consider the following elements:

- What is the potential duration for the flood event? / How long are you likely to be in the refuge location?
- What is the time of day? If the event continues into the night, you may be there
 for additional hours until it is light and safe to move out of the building.
- · Are there any medical conditions which take priority?
- Are there enough resources on the site to care for all personnel?
- Are radios or televisions accessible to listen to updates?

4.4 Warning and Lead Times

The Environment Agency provide a flood warning service, notifying of the possibility of a fluvial flood from the River Avon. This is the most reliable source for predicting a fluvial flood event, with the warnings being suitable on which to base the necessary containment and preparation measures that need to be taken.

Advice for the public on Floodline: 0845 988 1188

- Flood Alert: Lower Bristol Avon Area (quick dial 210004)
- Flood Warnings: Bristol Floating Harbour (quick dial 164246)

The EA aims to provide between 2 and 12 hours lead time between a Flood Alert being issued and possible flooding occurring and a minimum of 1-2 hours lead time for Flood Warnings on rivers.



Table 4-1 - Flood Alert and Warning Summary

Flood code	What it means
Flood Alert	Flooding is possible, be prepared
Flood Warning	Flooding is expected, immediate action is required
Severe Flood Warning	Severe flooding and danger to life
Warning no longer in force	Warning has been removed in the last 24 hours

Further details and explanations of flood alerts and warnings are provided in Section 11.3 of the plan.

There is currently no national system available that could forewarn surface water flooding. To indicate the chance of flooding, students and site users are advised to refer to the Met Office weather forecast and local radio station updates, regularly check the EA 5-day forecast, and sign up for the Met Office Severe Weather Warning System.



5 Flood Response Plan Background

5.1 Aim and objectives

This Flood Response Plan records the contingency measures drawn up to maximise the safety of persons at the commercial and residential development at St Thomas Street, Bristol, BS1 6AE.

Aim:

 To minimise the risk of harm to students, staff, visitors and any other individuals and promote safety at the development at Glassworks during a flood and immediately after a flood event.

Objectives:

- To reduce the risk to life;
- To establish procedures for activating the plan;
- To establish procedures for on-site containment;
- To define the areas of responsibility for those participating in the plan.

5.2 Scope

This Flood Response Plan has been informed by the Flood Risk Assessment (FRA) completed by JBA Consulting on behalf of IESIS Consult for the commercial and residential development at Redcliff Quarter.

The Flood Response Plan has been written for fluvial, surface water, coastal and reservoir flood event which could impact the development.

The Flood Response Plan does not detail short- or long-term recovery actions after a flooding event at the site. However, possible initial recovery actions to be taken in the immediate aftermath of the flood event have been provided.

This plan has been based on the following guidance documents:

- The Civil Contingencies Act 2004;
- Flood risk emergency plans for new development; guidance for planners Environment Agency and ADEPT Flood risk emergency plans for new development (2019);
- Local planning guidance.

5.3 Who is Responsible for the Plan?

In this plan, the term "Site Manager(s)" is used and refers to the person responsible for the commercial units of the site, for coordinating the response plan and for facilitating evacuation. They may be individual site managers per commercial unit.

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The term "Student" refers to the persons living or visiting the proposed development site and who will use this plan during a flood event. The 'Management Company' is responsible for residential unit management and maintenance.

Site Managers and Management Companies have a duty of care to individuals at the site as stated under the provisions of the 'Health and Safety at Work Act 1974' and the 'Occupiers' Liability Act 1957'. Employers have duties under health and safety law to assess risks in the workplace. Workers have a duty to take care of their own health and safety and that of others who may be affected by their actions at work. Workers must cooperate with employers and co-workers to help everyone meet their legal requirements. This duty of care includes dangers to the state of the premises and making all persons aware of the dangers to this site. In this plan, the 'danger' is considered to be flooding of outdoor areas of the site and flooding to access routes.

Under the 'Contingency Planning' sections of the 2004 Civil Contingencies Act, it states that emergency plans should be maintained, and although the site users are not responding agencies as defined by the Act, it is good practice that such plans include the provision to carry out regular exercises of the plan.

A copy of this plan will also be given to the Management Company, which will be responsible for ensuring all students are aware of the emergency response plan and that it is reviewed at least annually.

5.4 Critical Success Factors

To prompt emergency procedures on the site before flooding/different phases of this flood response plan, please refer to the below.

5.4.1 Key information for students

- Receive app notifications or sign up for severe weather warnings from the Met Office Weather App, and Met Office: Guide to email alerts;
- Go to Gov UK: Sign up for flood warnings to receive Flood Alerts and Warnings from the Environment Agency;
- Advertise across the building to site users the Gov UK: Flooding website to check flood warnings, how to prepare for flooding and what to do before, during and after a flood:
- Refer Site Users to Personal Flood Plan templates;
- Students can become members of any local flood groups and provide guidance on developing a Community Flood Plan.
- Appropriate inductions, training, maintenance and dissemination of Personal Flood Response Plans for those in the Student Accommodation flats.

2023s1579 Redcliff Quarter Flood Response Plan_Student Accommodation v2.0



5.5 Health and Safety

For the success of the flood response plan, the Site Manager(s), students must acknowledge the following before undertaking any evacuation procedures.

- If there is a risk to life at any stage of the evacuation or containment process, the emergency services should be called on 999; request their assistance and await their instructions.
- "Each individual should assess each situation to check it is safe to proceed and request help if required. Those on site have not been trained as a member of the emergency services and should never be asked to do anything that could put their life at risk."
- Never walk or drive through flood water.
- Throughout each stage of the response plan, the resident is to assess the health and safety risks.

5.6 Familiarisation

It is important that Site Manager(s) become familiar with this plan and its contents. This ensures all students are aware of the containment processes, understand their responsibility during a flood event, know the risks, and can guide any additional personnel on site.

It is also important that the Site Manager(s) appropriately educate and inform students on what to do in a flood event. As Site Managers will not always be present at the premises, it is critical that those in the Student Accommodation flats understand what they can do in a flood event, and respond appropriately to not jeopardise theirs, and others, welfare.

Alongside this, it will be beneficial to establish a local Community Resilience Group and volunteer Emergency Co-ordinators with whom you can remain in contact throughout the flood event.

5.7 Training and exercising the plan

This Plan should be trained and exercised by all relevant staff, and tests should be done that include students or site users to maintain familiarity with procedures.

Training should be done at least twice a year to maintain competency in roles and responsibilities, with one tabletop exercise organised, run, and reviewed once a year.

It is also recommended a full simulation / live test of the plan is done once every two years to accurately test the plan against realistic conditions, which is a more effective exercise type to identify lessons or gaps in the plan.



Identified lessons are to be formally recorded, with an effective implementation plan developed to embed those lessons. A responsible person is to be assigned to lessons to ensure they are implemented appropriately. The plan owner will check the improvement plan monthly to track progress on all actions and sign off the document once lessons have been implemented.

5.8 Plan Review Schedule

For the plan to be a success, those responsible for the plan will need to ensure that all details within the plan are regularly checked, rehearsed, reviewed and revised. It is essential that:

- The plan is reviewed annually or following any flooding incident that triggers the activation of this plan.
- The plan is reviewed and amended following any lessons identified from a flood incident, training and/or exercises.
- That an amendment record is kept and updated following any reviews and subsequent revisions.
- That amendments to the plan are communicated to all site users, including staff, students and visitors.



6 Precautionary Actions

6.1 General considerations

Listed below are general precautionary actions, tasks and considerations that the resident must consider.

6.1.1 Monitoring Persons on Site

It is important to remain aware of what visitors are on site to make it easier to communicate messages to those who need to be aware of flood risk and to those away from the area who may be returning during a flood event.

This also helps keep track of visitors leaving the site during an evacuation so that missing persons can be identified and that the register can be ready to give to the emergency services if requested.

6.1.2 Vulnerability of Site Users

The vulnerability of site users is unknown at this stage. However, it is possible that students and people with disabilities or long-term illnesses will occupy the accommodation units.

If individuals on site are vulnerable due to disabilities etc., they are to have priority as they may require extra assistance. During containment, these vulnerable people may have extra needs that need to be catered for. So it is recommended that provisions are made to accommodate these in the event of evacuation. A greater lead time may need to be given to allow additional assistance to be made in good time.

6.2 Preparedness

You can check the Be Flood Ready page Understanding your Flood Risk for more information on preparing for a flood.

6.2.1 Personal Flood Response Plan

A personal flood plan details what students will personally do in the event of a flood. One has been developed for students so they are aware of what do in the event of flooding.

It is important that these are reviewed in the same means as this Flood Plan to maintain consistency in triggers and that recommended actions are still safe. Should there be updates to the students Personal Flood Plans, these changes are to be communicated and a new version of their plans printed and disseminated.

The Environment Agency provide a template and guidance on how to complete a personal flood plan which can be accessed on Gov UK: Personal Flood Plan.



6.2.2 Grab Bags

It is strongly advised that Site Managers inform students to create grab bags should it be needed.

During the activation of Phase Three: Survive and containment, containment is issued. There is a possibility that staff are unable to leave site beforehand, and so will require to take a Grab Bag. A Grab Bag should include everything you may need if you had to evacuate your home or move upstairs suddenly.

The following items are considered essential to include in a grab bag:

- Insurance documents and a camera to record damage for insurance purposes.
- Mobile phone and charger.
- Emergency cash and credit cards.
- First aid kit and essential prescription medications/repeat prescription forms.

Additional considerations:

- Torch and batteries (not rechargeable).
- Portable radio (wind-up is preferable).
- Warm clothing, blankets, etc., and waterproof clothing (consider high visibility).
- A laminated copy of the emergency actions as outlined in this plan.
- Bottled water and non-perishable food items (including energy or cereal bars).
- Wash kit and essential toiletries (including toilet paper and wet wipes).
- The means to wash hands (e.g. hand sanitiser or soap and water).

It is recommended that such resources and important documents kept on site are kept in an accessible, safe place and sealed so that these can be promptly accessed.

The National Flood Forum provides further ideas and a short video about items to consider for a grab bag: Emergency Flood Kit – National Flood Forum.

6.2.3 Commercial stock and hazardous materials

It is advised that any materials on site that could be lifted by floodwater and / or that are pollutants or present a hazard to others are secured, contained and moved to areas not at risk or above the flood level.



7 Communicating Flood Risk

Any information communicated must be accessible to all relevant individuals. This means picking clear, direct, and timely communication formats. Alongside this, communications should be as accurate as possible to ensure all individuals have a shared understanding of the risk and their next actions.

Below are recommendations on communication methods that should be established and prepared on the site.

7.1 Informing Site Users

Site Manager(s) must ensure that all students are aware of the Flood Response Plan. The main objective of raising awareness is to ensure students thoroughly understand their part of the response procedure and what to do in a flood event.

Students must ensure that all property inhabitants and visitors know about the Flood Response Plan. The main objective of raising awareness is to ensure students and visitors thoroughly understand their role and responsibility as part of the response procedure and what to do in a flood event.

It also needs to be carefully considered what the most appropriate cascade approach is to inform students of flood risk, and regularly updating them on escalating risks. This could over time be in conjunction with the University, and utilising their platforms to communicate risk with students. It should also be a platform that students are familiar with and more likely to engage with to remain informed of their preparedness.

7.1.1 Signage

To promote awareness of flood response, signage should be implemented across the site to alert individuals to the risk of flooding. Signage should also consider users with English not as a first language and should include appropriate alternative first languages if applicable.

Signage can also be used to inform the Site Manager or commercial staff on the doors and windows that require the deployment of Property Flood Resilience measures.

7.2 Contacts directory

An emergency contacts directory should be prepared. This should include all key contact details for external organisations that may be contacted before, during, and after a flood event (e.g., insurance providers, utilities providers, etc.). An example contacts directory with key external organisations is provided below.



Table 7-1: Emergency Contact Directory

Company Name	Contact number
Environment Agency	0345 988 1188
Avon and Somerset Police	Emergency: 999 Non-emergency: 101
Avon Fire and Rescue Service	Emergency: 999
Bristol City Council	0117 922 2100, 8:30am to 6pm, Monday to Friday 0117 922 2050 at all other times
Bristol Water	0800 801 011 (burst water main)
Wessex Water	0345 850 5959 (sewer)
Electricity and Gas suppliers	phone number



8 Returning to Site and Recovery Actions

8.1 Returning to Site and Site Reopening

The intention of this section is to provide a list of actions for the Site Manager and Management Company to consider in the immediate aftermath of a flood event to maintain site safety.

Firstly it is important to find out if it is safe to return to the site. If floodwater has receded from the roads, the site is likely safe to return to. If the site has flooded, it is recommended that advice is sought from either of the following organisations before returning to the site:

- The emergency services.
- Your insurance company.
- Bristol City Council.

The government website contains flood guidance, including what to do if a flood happens and advice on clearing up after a flood: Flooding: health guidance and advice - GOV.UK.

The British Damage Management Association also provides information and guidance on flood recovery and what should be expected from personal contractors:

Understand basic flood recovery procedures - BDMA (British Damage Management Association).

The following text boxes list recommended actions to be taken immediately after the flood, as well as follow-up actions during the clean-up operations. The actions listed are not exhaustive and only seek to list generic recovery actions.

8.1.1 Immediate actions

- Open doors and windows to provide ventilation to impacted units.
- Speak to your insurance company's 24-hour Emergency Helpline as soon as
 possible for advice on dealing with your claim and assistance in recoverability.
- Make arrangements to deal with any secondary pollution or contamination due to the flood event (for example, damaged domestic oil tanks). Contact your insurance company and arrange for an assessment and clean-up work.



8.1.2 Follow-up actions

- Keep a record of flood damage (take photos or videos). List the damage caused to property and belongings and note all phone calls to insurers. Retain all correspondence with insurers after the flood.
- Restock your supplies.
- Get advice on where detailed repairs are needed. Your insurer or loss adjuster can advise on reputable contractors/tradespersons. Always check references.

8.1.3 Cleaning the site

- Contact the insurance company to identify approved providers who can assist in clean-up operations for the site.
- Remember hazards associated with flood water and, in particular, the electricity supply and electrical appliances (get a qualified electrician if needed). Wear appropriate protection if involved with the clean-up operations and undertake health precautions such as washing hands and decontaminating footwear.
- Be mindful of potential contaminants in floodwater and unsanitary conditions.
- If not already done so, contact your insurance company and arrange for clean-up
 of any secondary pollution or contamination due to the flood event (for example,
 damaged domestic oil tanks).
- The Citizens Advice Bureau and other organisations may help students if they feel under pressure.



Section Two: Site Information and Flood Risk



9 Site Information

9.1 Site Location

A location plan is shown in Figure 9-1. The site is located in close proximity of the River Avon.

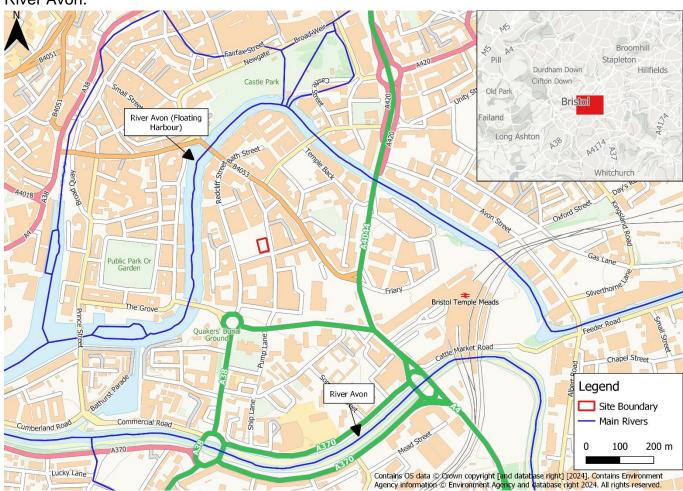


Figure 9-1 - Site boundary and nearby watercourses

9.2 Proposed Development

9.2.1 Buildings

The proposed development comprises the development of Glassworks, Bristol, BS1 6AE, into commercial and utility units of the ground floor and residential units on the first floor and above.

The walls of the buildings on the ground floor should be constructed of a double skin non-porous material and treated with silicone waterproofing sealant spray. The floor is to be constructed of solid concrete.



9.2.2 Site access

Access to the site is gained via by driving South along the A4044, and drive to the roundabout at Quakers' Burial Ground. From the roundabout, the site can be accessed by driving along Redcliff Street or Portwall Lane to St Thomas Street.

9.2.3 Local geography

The Bristol Feeder Canal (Bristol Harbour) runs approximately 140m west from the site and the River Avon runs approximately 270m to the south.

The site will have a variable minimum Finished Floor Level of 8.5-9.5m AOD with the first floor (residential use) to be 12.275m AOD.



Figure 9-2 – Ground floor site plan



10 Flood Risk

10.1 Overview

The 2023 JBA Consulting Flood Risk Assessment for the site identifies that the site is at high risk from of coastal, fluvial flooding, and flooding as a result of a reservoir failure. The site is at a low risk from surface water.

The principal watercourse in the vicinity of the site is the River Avon located along the southern boundary, and the Marina layout travels around the site along the western, northern and eastern boundaries.

10.2 Tidal and Coastal Flood Risk

Coastal flooding results from high tides, stormy conditions and tidal surges. These events can cause the area to be at risk of strong winds, and the force of the spray can injure people if they are close to it. Evacuation routes and information dissemination of potential coastal events should reiterate that people stay away from the coast's edge.

As part of the warning and informing for coastal events, the EA will likely share the peak periods for the coastal event and when it is safe again. It is important to continue monitoring weather forecasts and warnings to check if a secondary event is to occur.

The Environment Agency (EA) Flood Map for Planning shows that the site primarily falls within Flood Zone 3 (high risk) from tidal flooding. Due to the risk of climate change and the rise in sea level, the risk of coastal flooding will increase over time.



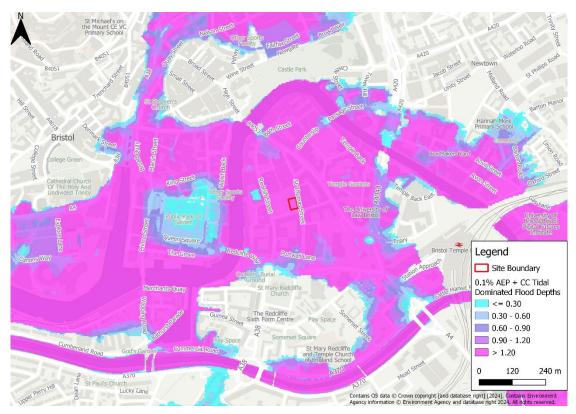


Figure 10-1 Tidal Flood Depths Map (1000 year event +28% Climate Change)

10.2.1 Tidal Hazard to People

During the 1000-year-plus climate change (28%) event, access and egress roads were also flooded. The Hazard to People classification shows that all streets leading to the site are Risk to All for people during the tidal event.

Risk to All means members of the public and the emergency services are not to walk or travel through flood water, regardless of the circumstances. This does mean additional consideration needs to be made to vulnerable people on the site.

When flooding occurs at the site, it will not be possible for the Site Manager to determine if the flooding is as a result of the River Avon or a tidal surge unless communication is had with the Environment Agency or emergency services to understand the level of risk.

It is important in the preparation for flooding at the site that all vulnerable people are identified, and in Phase 1, preparations and checks are done to ensure those vulnerable people have the equipment needed to ensure they are safe if they do not voluntarily evacuate and are contained on the site during flooding.

10.2.2 Tidal flood duration

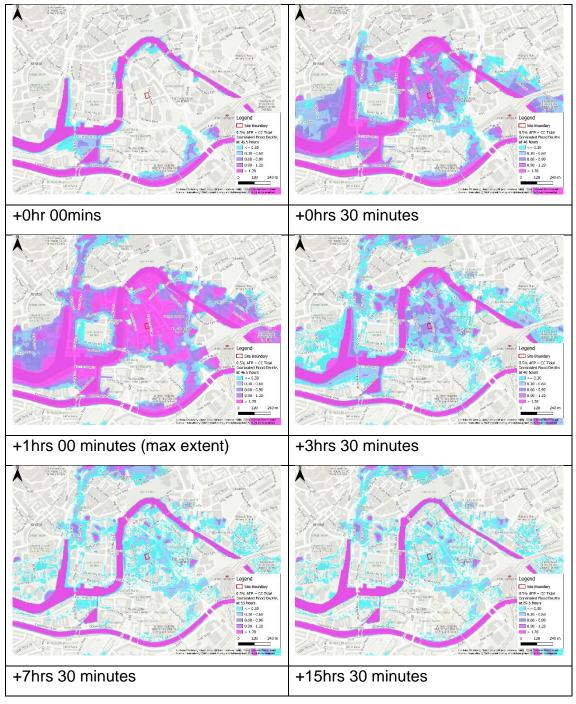
From the first instance of flooding occurring in the local area, the modelled extent of flooding on-site increases for 1 hour to 90 minutes before reaching its maximum



extent. The maximum flood extent remains between 6 and 12 hours before beginning to recede. A breakdown of the flood duration is shown in Figure 10-1.

It is essential that if the Site Manager, commercial staff or students visually observe flooding occurring in the surrounding area (as outlined in Table 10-1) that the Flood Response Plan is adhered to for the safety of those on site. This is because flooding in the area increases significantly in the first hour and could put people's lives at risk.

Table 10-1 – Modelled tidal flood depth duration (in hours)





10.3 Fluvial Flood Risk

10.3.1 Fluvial Baseline

The Environment Agency (EA) Flood Map for Planning (Figure 10-4) indicates that the site primarily falls within Flood Zone 3 (high risk from river flooding).

10.3.2 Fluvial flood modelling

Detailed hydraulic modelling for the site was run for a 1 in 100 with climate change (+28%) flood event whereby the site is unaffected by flooding from the River Avon. This is shown in Figure 10-2.

It is highly recommended that Property Flood Resilience measures are installed to the site to minimise the effects of flood water. Although the ground floor has been developed to flood, if mitigation can be taken in the form of PFR measures, it will be advantageous to those taking refuge during flooding and will help reoccupation and return to normality.

It is recommended for this site that all doors on the ground flood have Flood Barriers or Flood Doors installed, and Flood Barriers for the ground floor windows if approved by structural engineers.

Electrical sockets, gas and electric metres and wiring should be installed at a high level / above the likely flood depths inside the ground floor. Kitchen units and other equipment should be constructed from water resistant materials (such as metal) with concrete flooring.

More details on flood resistance and flood resilience measures can be explored on the BeFloodReady website.



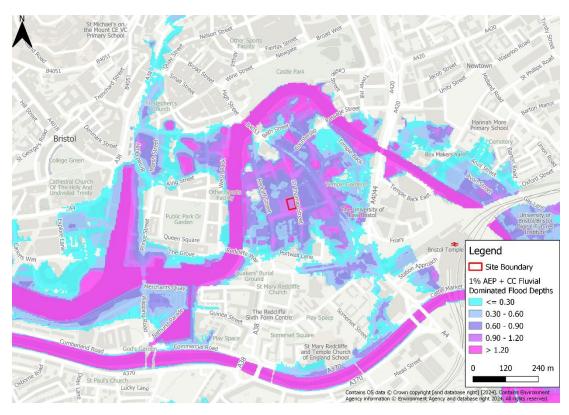


Figure 10-2 - Fluvial Flood Depths (1 in 100 year event + Climate Change)

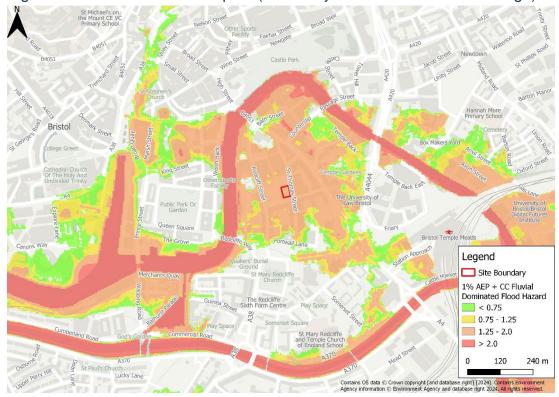


Figure 10-3 – Fluvial Hazard Map (1 in 100 year event + Climate Change)



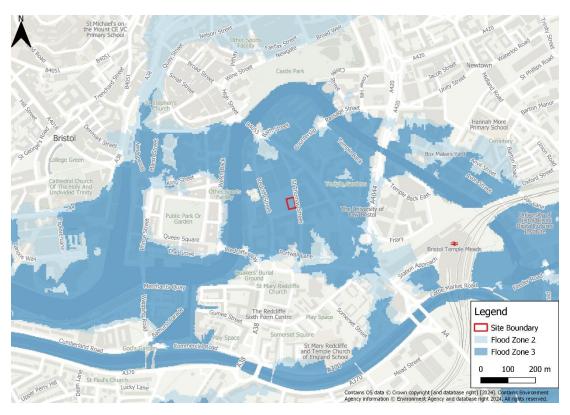


Figure 10-4 – Fluvial Flood Zones at the Site

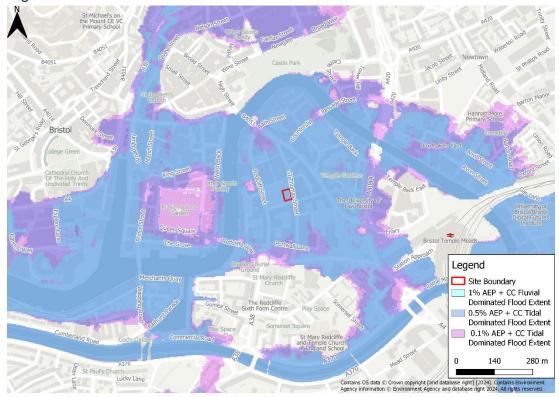


Figure 10-5 – Fluvial Flood Extents for different Return Periods + Climate Change



10.3.3 Fluvial Hazard to People

During the 100-year-plus climate change (28%) event, access and egress roads were also flooded. The Hazard to People classification shows that all streets leading to the site are Risk to Most for people during the flood event.

Risk to Most means members of the public are not to walk or drive through flood water, regardless of the circumstances. However, emergency services are able to access the site should emergency care be needed for vulnerable people contained at the site.

When flooding occurs at the site, it will not be possible for the Site Manager to determine if the flooding is as a result of the River Avon or a tidal surge unless communication is had with the Environment Agency or emergency services to understand the level of risk.

If communication is had with the emergency services and the Site Manager is confident it is fluvial flooding, they can advise the emergency services (if requested) that the best access and egress route is along either Redcliff Street or St Thomas Street from the roundabout by Quakers Burial Ground.

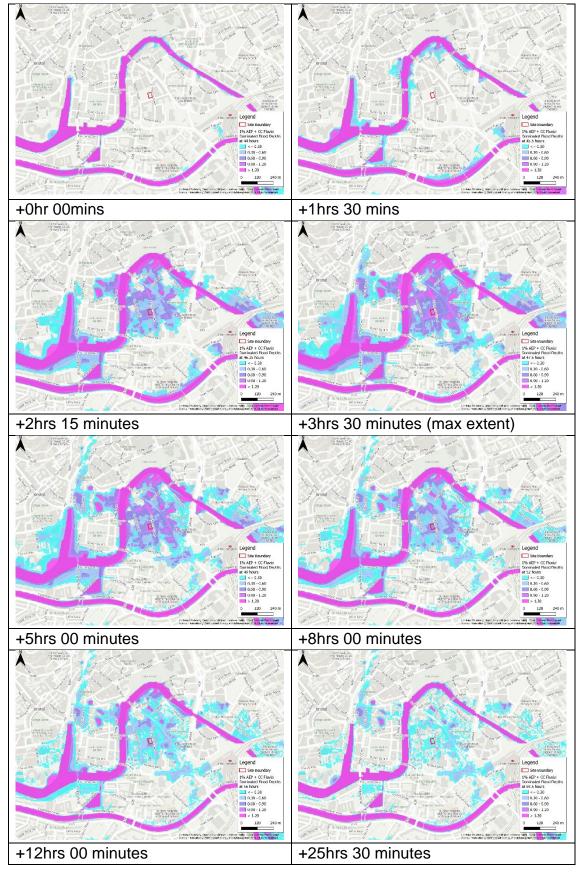
It is important in the preparation for flooding at the site that all vulnerable people are identified, and in Phase 1, preparations and checks are done to ensure those vulnerable people have the equipment needed to ensure they are safe if they do not voluntarily evacuate and are contained on the site during flooding.

10.3.4 Fluvial flood duration

From the first instance of flooding occurring in the local area, the modelled extent of flooding on-site increases for 3 and a half hours before reaching its maximum extent. The maximum flood extent remains for approximately 5 to 9 hours before beginning to recede. A breakdown of the flood duration is shown in Table 10-2.



Table 10-2 – Modelled fluvial flood depth duration (in hours)





10.4 Surface Water Flood Risk

Surface water flooding arises when rain falling on saturated ground flows overland, following the local topography. Surface water flooding and subsequent overland flow can originate from several sources, for example, surcharging sewers and blocked drains. Surface water flood risk is classified as:

- High an area has a chance of flooding of greater than 1 in 30 each year.
- Medium an area has a chance of flooding of between 1 in 30 and 1 in 100 each year.
- Low an area has a chance of flooding of between 1 in 100 and 1 in 1,000 each year.
- Very Low an area has a chance of flooding of less than 1 in 1,000 each year.

The - Environment Agency's Risk of Flooding from Surface Water Map has been consulted to assess flood risk from surface water. This risk is primarily considered low within the site, although a small portion of the site at its north side is considered medium to high risk.

The surrounding streets and areas are at no risk of surface water flooding. Surface water has not been considered as part of this flood plan because of its low risk, and actions listed in The Flood Response Plan will address any possible effects from surface water flooding.

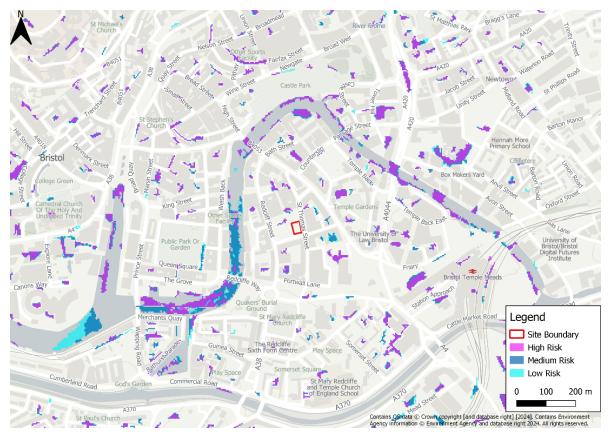


Figure 10-6 - Environment Agency's Risk of Flooding from Surface Water Map



10.5 Risk of flooding from reservoirs

The Government's "Risk of Flooding from Reservoirs" map (Figure 10-7) shows that the entire site is at high risk of reservoir flooding if there happened to be a breach of the reservoir. This risk for Dry Day Extent is taken from Chew Valley Lake. Wet Day Extent Flooding is taken from Chew Valley Lake and Tubbs Bottom Washland.

It is important to note that the EA states that its map shows the worst-case scenario, and that actual flood extents and depths are unlikely to be as large or deep as those shown within the map. The site should be considered to be very low of flooding from reservoirs.

Alongside the above, although there is no formal warning and informing system in place for reservoir risk, due to the location of the reservoir in relation to the site, there would be time for the site to prepare and evacuate before flooding reached the site.

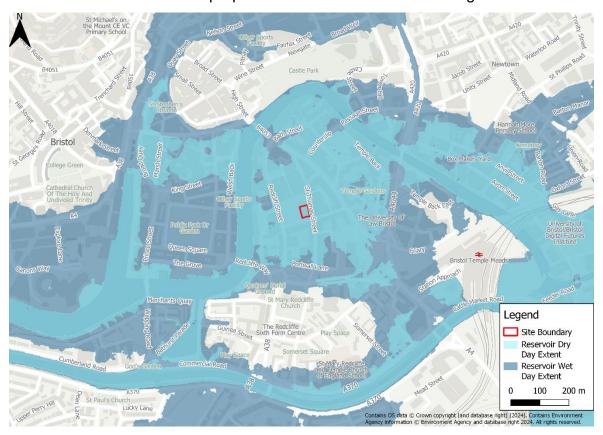


Figure 10-7 - Environment Agency's Reservoir Flood Risk Map

10.6 Groundwater flood risk

The review of flood related documentation (particularly the Bristol City Council Level 1 SFRA) did not identify the site as being at specific risk of groundwater flooding. Considering the nature of the proposed above ground development, in an urban area of Bristol, the flood risk from groundwater flooding can be considered as very low.



Section Three: Information Sources



11 Information sources

11.1 Directory of Information Sources

The following services provide a wide range of useful information for monitoring a flood event. The list is not exhaustive.

It may be useful to follow these sources on social media platforms.

Table 11-1: Met Office Flood Information Sources

Met Office Services	What to look out for		
National Severe Weather Warnings	A severe weather warning for rainfall - this may indicate potential stormy conditions.		
Weather forecast	Weather forecast for Bristol		
Met Office Guide to email alert service	Register for warnings		

Table 11-2: Environment Agency Flood Information Sources

Environment Agency Services	What to look out for			
5-day weather forecast	Notification of severe weather and flood risk			
Flood Alerts and Flood Warnings	Notifications of flood alerts and warnings			
Sign up for Flood Warnings	Register for warnings			
River and Sea Levels in England	River levels at Bristol Harbour Passage Street			

Table 11-3: Other weather and flood-related services for monitoring activities

Services	What to look out for		
Avon and Somerset Police	Potential notification of flooding.		
Local and National TV and Radio Stations	Notifications of flooding can be disseminated via local TV and/or radio stations.		
Highways England	Notifications of road closed due to flooding.		
Bristol City Council	Potential notification of flooding.		

It is important to note that for river flooding, the Environment Agency typically issues a flood alert 2-12 hours ahead of possible flooding and aims to issue Flood Warnings 1-2 hours before the predicted event.



11.2 Met Office Weather Warnings

The Met Office warn the public of severe hazardous rainfall that can potentially cause damage, widespread disruption and/or danger to life via their national severe weather warning system. The warning levels are determined based on the likelihood of the rainfall event occurring and the impact the conditions may have.

This is colour-coded as:



To view the Met Office National Severe Weather Warnings, visit: UK weather warnings - Met Office

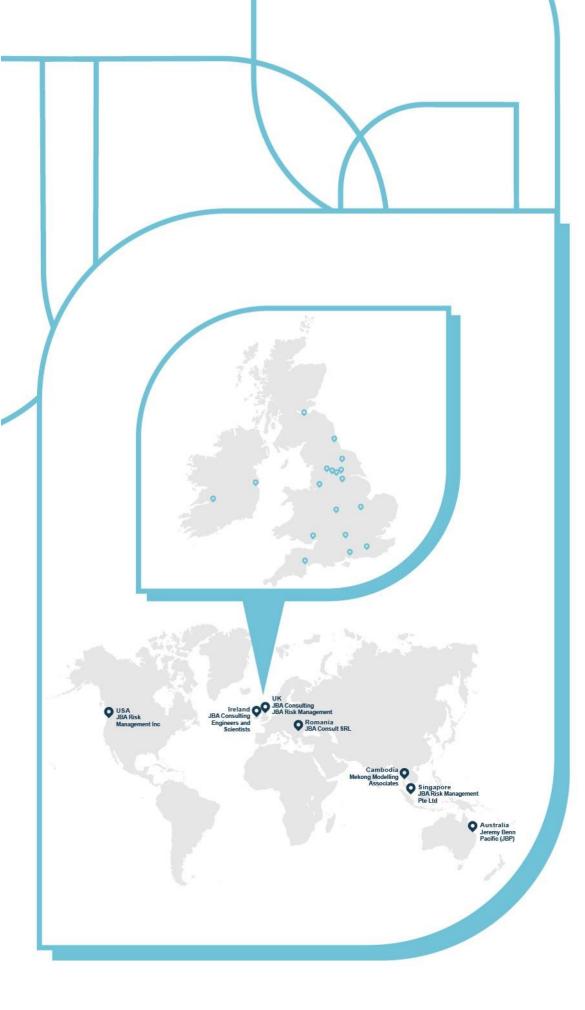
On the site, several tabs are at the top of the page. The tabs allow you to navigate through the next seven days, with warning triangles highlighting any weather warnings affecting the UK each day. To see the full details for each warning, click on the chosen warning label on the map.

For example, if Bristol is shown to be affected by a Yellow, Amber or Red Warning for Rainfall, ensure you click on the warning and read the further detailed information. This is explained on the Met Office's Weather warnings guide.



11.3 Environment Agency Flood Alerts and Warnings

Three-day flood risk forecast	FLOOD ALERT	FLOOD WARNING	SEVERE FLOOD WARNING	Warning no longer in force
What it means Be aware. Think ahead. Keep an eye on the weather situation.	What it means Flooding is possible. Be prepared.	What it means Flooding is expected. Immediate action required.	What it means Severe flooding. Danger to life.	What it means No further flooding is currently expected for your area.
When it's used Daily forecasts of flood risk on our website www.environment-agency.gov.uk. These are updated more frequently for higher flood risk situations.	When it's used Two hours to two days in advance of flooding.	When it's used Half an hour to one day in advance of flooding.	When it's used When flooding poses a significant risk to life or significant disruption to communities.	When it's used When a flood warning or severe flood warning is no longer in force.
Triggers Information updated daily on the Environment Agency website. The information includes the current and forecast situation and how this is likely to affect each county in England and Wales over the next three days.	Triggers Forecasts that indicate that flooding from rivers may be possible. Forecast intense rainfall for rivers that respond very rapidly. Forecasts of high tides, surges or strong winds.	Triggers • High tides, surges coupled with strong winds. • Heavy rainfall forecast to cause flash flooding of rivers. • Forecast flooding from rivers.	Triggers Actual flooding where the conditions pose a significant risk to life and/or widespread disruption to communities. On-site observations from flooded locations. A breach in defences or failure of a barrier that is likely to cause significant risk to life. Discussions with partners.	Triggers • Risk of flooding has passed. • River or sea levels have dropped back below severe flood warning or flood warning levels. • No further flooding is expected. • Professional judgment and discussions with partners agree that a severe flood warning status is no longer needed.
Impact on the ground Maps will show one of four levels of risk for each county: • Green = no risk of flooding • Yellow = low risk of flooding • Amber = medium risk of flooding • Red = high risk of flooding	Impact on the ground Flooding of fields, recreation land and car parks. Flooding of minor roads. Flooding of farmland. Spray or wave overtopping on the coast.	Impact on the ground Flooding of homes and businesses. Flooding of rail infrastructure. Flooding of rail roint roi	Impact on the ground Deep and fast flowing water. Debris in the water causing danger. Potential or observed collapse of buildings and structures. Communities isolated by flood waters. Critical infrastructure for communities disabled. Large number of evacuees. Military support.	Impact on the ground No new impacts expected from flooding, however there still may be: standing water following flooding; flooded properties; flooding or damaged infrastructure.
Advice to the public/media • Check the forecast on our website. • Remain aware of the impending weather conditions for your area.	Advice to the public/media Be prepared to act on your flood plan. Prepare a flood kit of essential items. Avoid walking, cycling or driving through flood water. Farmers should consider moving livestock and equipment away from areas likely to flood. Call Floodline on 0845 988 1188 for up-to-date flooding information. Monitor local water levels on the Environment Agency website www.environment-agency.gov.uk.	Advice to the public/media Protect yourself, your family and help others. Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place. If you are caught in a flash flood, get to higher ground. Call Floodline on 0845 988 1188 for up-to-date information.	Advice to the public/media Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger. Call Flo	Advice to the public/media Be careful. Flood water may still be around for several days and could be contaminated. If you've been flooded, ring your insurance company as soon as possible.
Advice to operational organisations • The three-day forecast is the public facing version of the Flood Guidance Statement that category 1 and 2 responders receive. • Advice for organisations varies depending on the level of flood risk and is provided on the Flood Guidance Statement issued by the Flood Forecasting Centre.	Advice to operational organisations • Check your flood response plans to see how your organisation needs to respond. • Speak to your local Environment Agency Flood Warning Duty Officer for the latest forecast information. • Dial into Flood Advisory Service teleconferences. • Advise the public to call Floodline on 0845 988 1188 for up-to-date flooding information. • Please report any flooding in your area to your local Environment Agency office.	Advice to operational organisations • Check flood response plans for actions required at this stage. • Speak to your local Environment Agency Flood Warning Duty Officer for the latest forecast information. • Advise the public to call Floodline on 0845 988 1188 for up-to-date flooding information. • Please report any flooding in your area to your local Environment Agency office.	Advice to operational organisations • Check flood response plans for actions required at this stage. • Advise the public to put their safety first and to be ready to evacuate should the authorities decide it's needed. • Develop clear messages for local communities and the public.	Advice to operational organisations Recovery phase will have started. Advise the public to call Floodline on 0845 988 1188 for advice on what to do if they have been affected by flooding.





Offices at

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