



23 Mill Street, St Saviour's Wharf

Flood Risk Assessment

Job Number: 1166

Date	Version	Notes/Amendments
March 2022	1	Issued for Information

Contents	Page
Introduction	2
Site Description and Location	3
Development Proposal	4
Flood Risk Assessment	5
Flood Risk from Watercourses	5
Sequential and Exception Test	6
The Sequential Test	6
The Exception Test	6
Flood Risk from Groundwater	7
Flood Risk from Surface Water and Overland Flows	8
Flood Risk from Reservoir Failure	9
Flood Risk from Infrastructure Failure	10
Flood Evacuation Plan	13
Flood Mitigation Measures	15
Conclusions	16

Figure 1. Site Location

Figure 2. Proposed Ground Floor Plan

Figure 3. Environment Agency Flood Risk from Rivers or Sea Map (gov.uk, 2021)

Figure 4. Southwark's Areas at Risk of Groundwater Flooding Map (SFRA, 2017)

Figure 5. Environment Agency Flood Risk from Surface Water Map (gov.uk, 2022)

Figure 6. Environment Agency Flood Risk from Reservoirs Map (gov.uk, 2022)

Figure 7. Environment Agency Thames Tidal Upriver Breach Map, 2005 Epoch (gov.uk, 2021)

Figure 8. Environment Agency Thames Tidal Upriver Breach Map, 2100 Epoch (gov.uk, 2021)

Acronyms	
AOD	Above Ordnance Datum
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance

Introduction

Flume Consultants have been appointed to undertake a Flood Risk Assessment for the proposed development at Unit 4 St Saviours Wharf, 23 Mill Street London SE1 2BE.

This FRA has been carried out in accordance with the National Planning Policy Framework (NPPF) and the Planning Practice Guidance 'Flood Risk and Coastal Change'. This FRA also incorporates advice and guidance from the Environment Agency (EA), the Strategic Flood Risk Assessment (SFRA) produced by London Borough of Southwark (LBS) and CIRIA documents.

The Environment Agency's (EA) indicative floodplain map shows that the site is located in a defended area of Flood Zone 3. Our assessment will therefore focus on the flood risk to the site from watercourses including assessing the flood risk from a breach in defences, as well as from other sources.

Site Description and Location

The site is located to the west of Mill Street, adjacent to St Saviour's Dock to the River Thames. The development comprises a five-storey building. Hard paved areas surround the building, with pedestrian access from Mill Street.

The River Thames flows to the North, which is the primary source of flood risk associated with the development.

The site postcode is SE1 2BE and the OS grid reference is TQ 33952 79845.

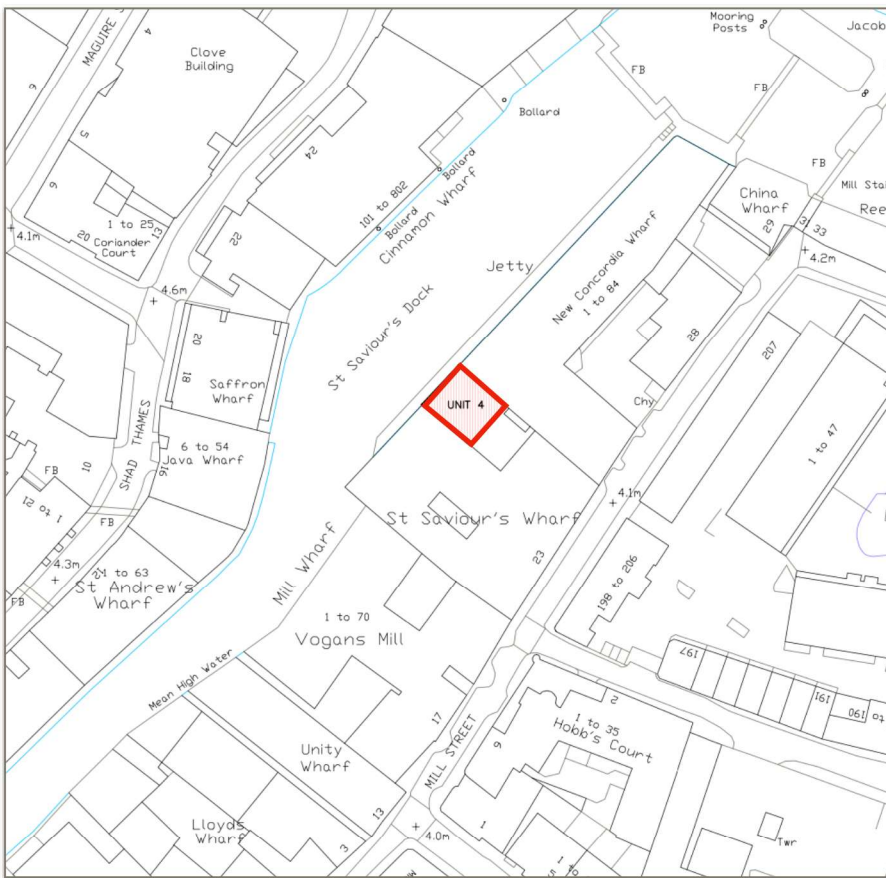


FIGURE 1. SITE LOCATION

Development Proposal

The developed proposals involve the change of use from office to residential use.

The proposals will be finished throughout to the same finished floor levels as the existing ground floor level, and will be accessed via main entrance. Pedestrian access will be maintained and remain unchanged from the existing case.

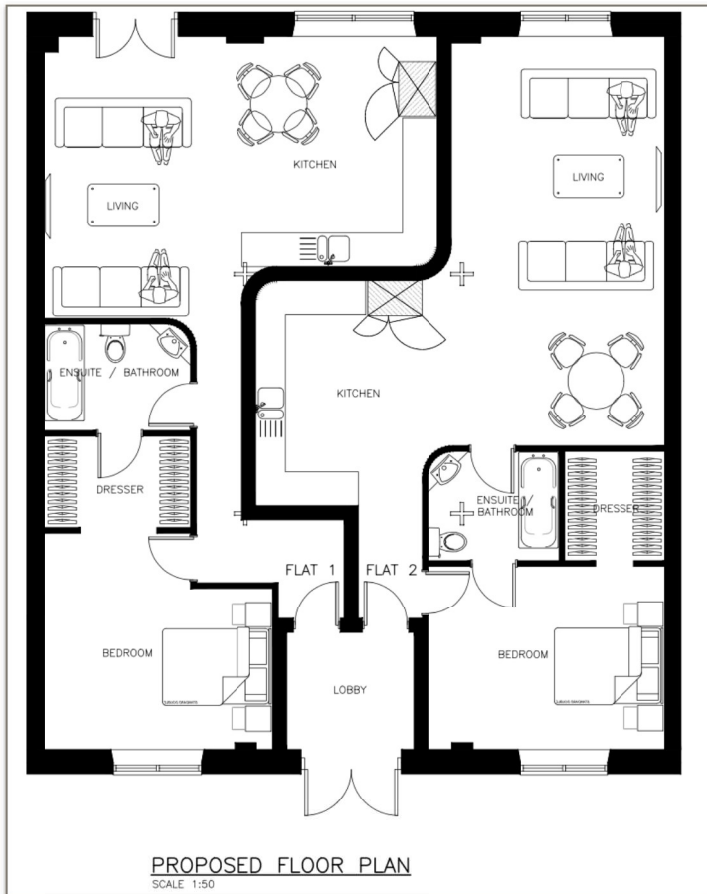


FIGURE 2. PROPOSED GROUND FLOOR PLAN

Flood Risk Assessment

The National Planning Policy Framework states that minor developments such as *change of use*, are unlikely to raise significant flood risk issues. The NPPF refers applications to the Environment Agency's (EA) 'Standing Advice' for further guidance.

Flood Risk from Watercourses

The EA's indicative floodplain map shows that the site is located in Flood Zone 3 and is at risk of flooding from the River Thames, and as such the Local Planning Authority has requested a site specific Flood Risk Assessment be carried out. Land in this flood zone is assessed as having annual probability of river flooding greater than 1%. However, the EA's indicative fluvial/tidal flood risk maps, Figure 3, suggest that the site is located in an area which benefits from flood defences.

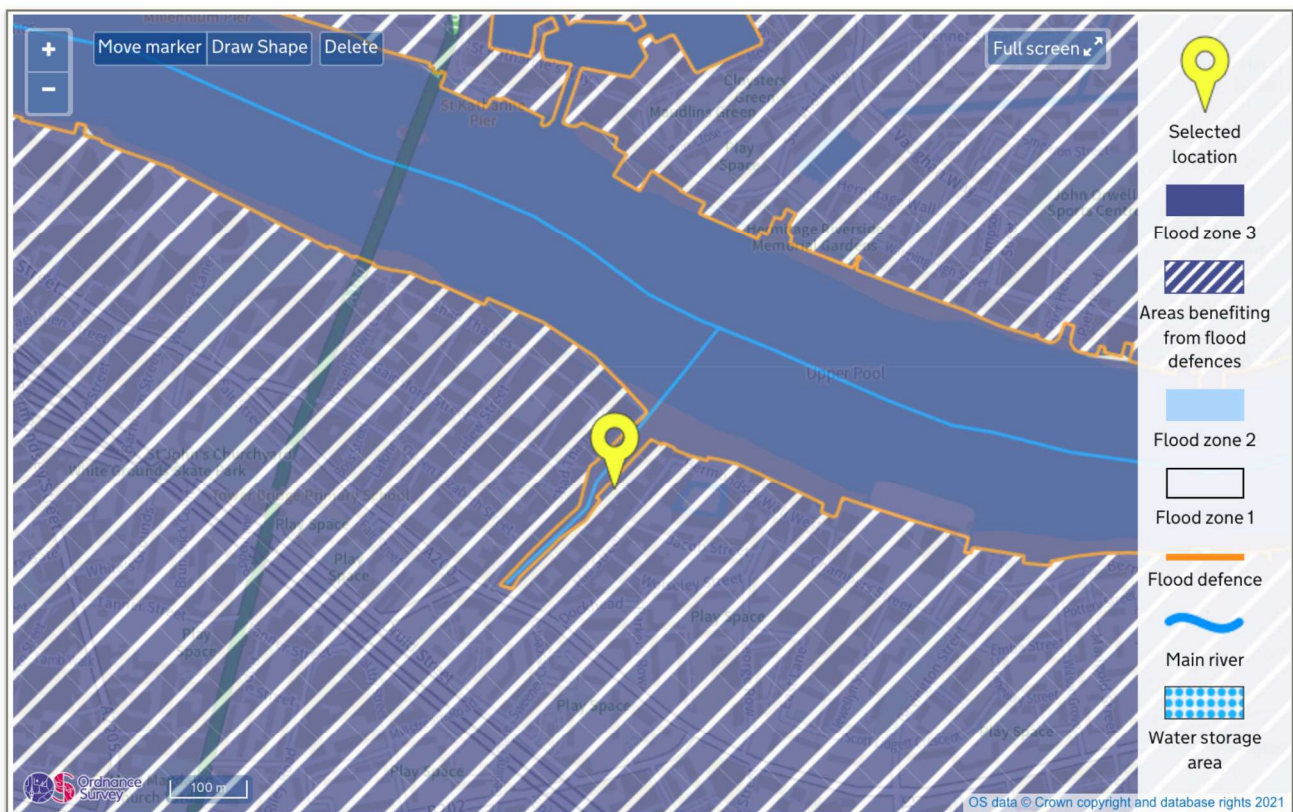


FIGURE 3. ENVIRONMENT AGENCY FLOOD RISK FROM RIVERS OR SEA MAP (GOV.UK, 2021)

Sequential and Exception Test

The Sequential Test

In accordance with the NPPF, before planning permission can be granted the risk-based Sequential Test should be applied and accepted. This needs to be done for those developments in Zone 2 or 3, and for all but *minor* developments¹. The Planning Practice Guidance (PPG) "Flood Risk & Coastal Change" states that "*The Sequential Test does not need to be applied for individual developments on sites which have been allocated in development plans through the Sequential Test, or for applications for minor development or change of use*".

The Exception Test

PPG goes on further to say "*the Exception Test does not need to be applied to minor developments and changes of use*".

As this development constitutes a *change of use*, the Sequential and Exception Tests do not need to be applied to this development.

¹ National Planning Policy Framework (para.164) and associated Technical Guidance (para.10)

Flood Risk from Groundwater

A ground investigation report was not available at the time of writing this report. The British Geological Survey (BGS) Map shows that the London Clay forms the bedrock geology, with superficial Alluvium - Clay, Silt, Sand And Peat, recorded near the site.

Southwark's SFRA and associated "Areas at Risk of Flooding from Groundwater" maps indicates that the development resides outside an area at risk of groundwater flooding, Figure 4.

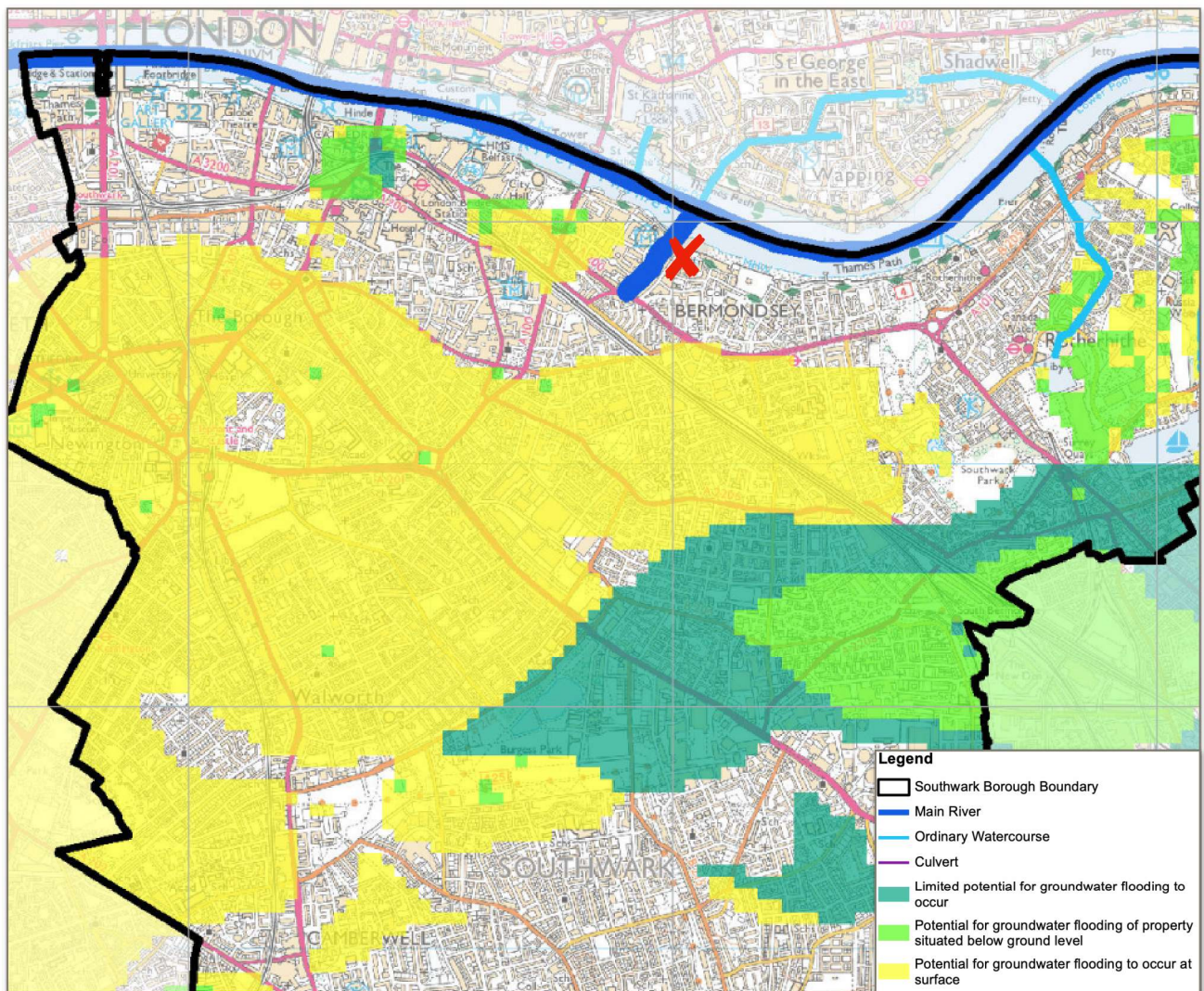


FIGURE 4. SOUTHWARK'S AREAS AT RISK OF GROUNDWATER FLOODING MAP (SFRA, 2017)

Groundwater flooding is an important consideration for subterranean basements. However, the development is a *change of use* to the existing building, and will not lower the level of the existing building in accordance with the EA's Standing Advice. Therefore, the risk of groundwater flooding is considered to be low.

Flood Risk from Surface Water and Overland Flows

Surface water flooding occurs when intense rainfall is unable to infiltrate into the ground or overwhelms the drainage system. This surface water runs across the surface of the ground causing flooding. Overland flows can also be generated by burst water mains, failed dams and any failure in a system storing or transferring water. The Environment Agency's Surface Water Flood Risk Map can also reflect surface water flooding along the line of small ordinary watercourses.

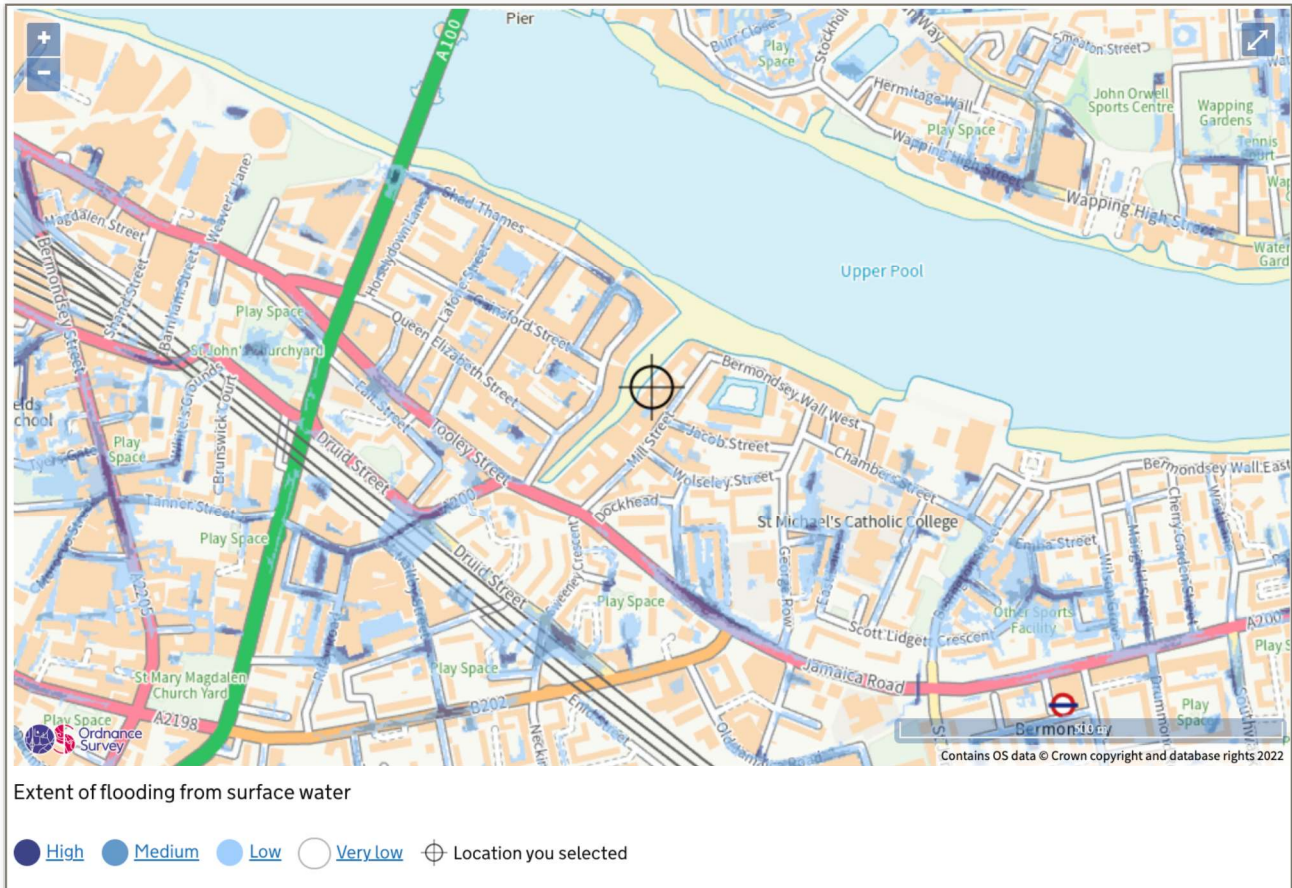


FIGURE 5. ENVIRONMENT AGENCY FLOOD RISK FROM SURFACE WATER MAP (GOV.UK, 2022)

The EA's indicative map shows that the development appears to be at *Very Low* risk, which means that each year this area has a chance of flooding of less than 0.1%.

A raised threshold is recommended with channel drainage at entrances to mitigate any opportunity for surface water to enter the building. Furthermore, ground levels on site will be encouraged to fall away from the building thresholds and positively drained, and any drainage should be designed to meet the requirements of Part H of Building Regulations. Sustainable Drainage Systems (SuDS), are also recommended to mitigate the surface water flood risk for the development.

Flood Risk from Reservoir Failure

The EA's information states that reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Reservoir Act of 1975 ensures that reservoirs are inspected regularly and essential safety work is carried out.

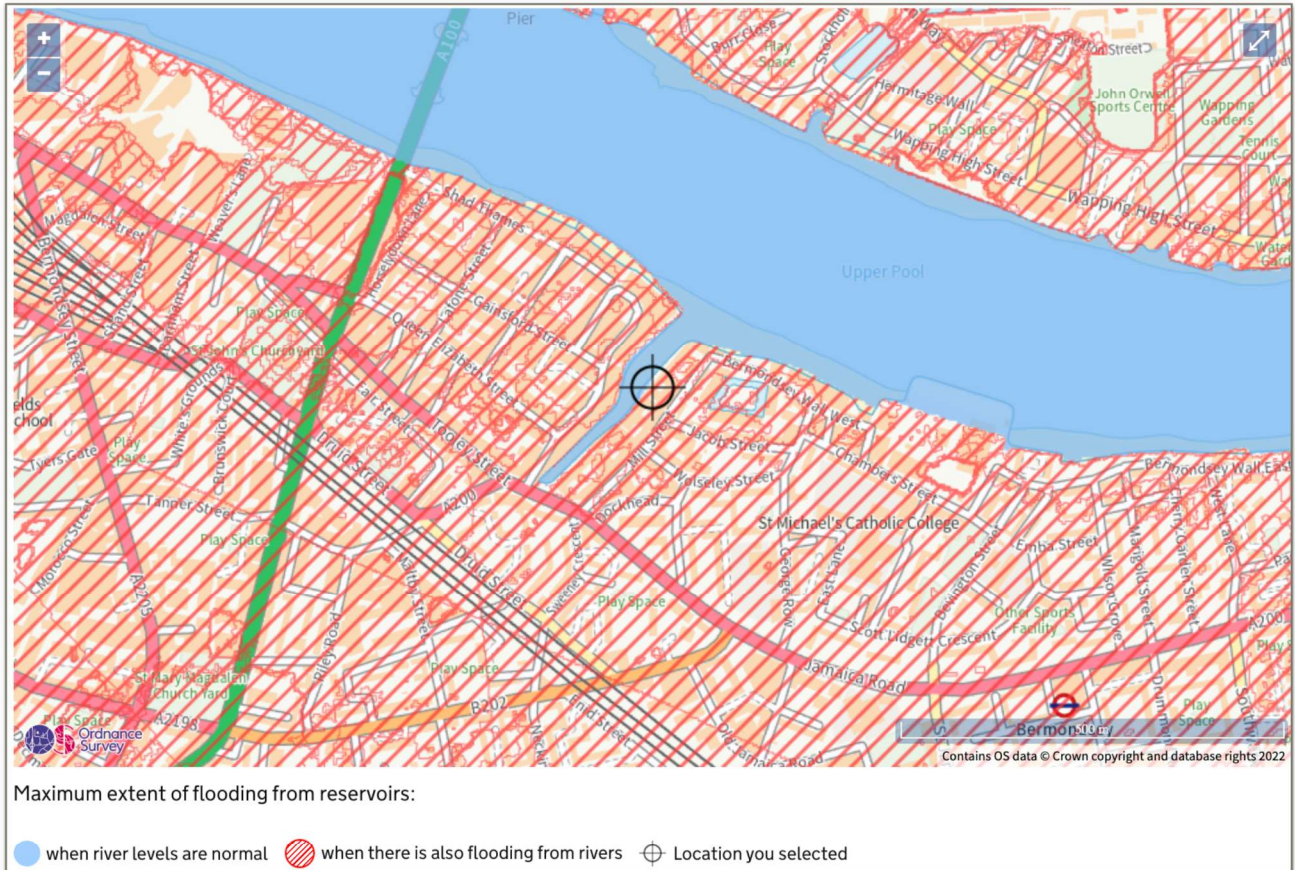


FIGURE 6. ENVIRONMENT AGENCY FLOOD RISK FROM RESERVOIRS MAP (GOV.UK, 2022)

The Environment Agency dataset 'Risk of Flooding from Reservoirs' identifies areas which could be flooded if a large reservoir was to fail and release the water into the surrounding area. The site is identified as having the potential to be inundated should a reservoir fail (Figure 6).

There are six large water supply reservoirs present within the Borough. Thames Water are responsible for the management of these reservoirs and ensuring all required safety standards are met.

Reservoirs in the UK have an extremely good safety record. The Environment Agency is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected and essential safety work is carried out. These reservoirs therefore present a minimal risk.

Flood Risk from Infrastructure Failure

Although the development benefits from flood defences in the area, the flood defences reduce but do not eliminate the flood risk, as the risk of a breach or overtopping remains. With any man-made structure there is a possibility of failure, and that flood water will inundate the site. Therefore, a residual risk will remain.

According to the LBS SFRA, *“the Borough is currently protected from combined tidal and fluvial flooding by the River Thames Tidal Defences (TTD) up to the 1 in 1000 year event. The risk is therefore of a residual nature, associated with overtopping or breaching of defences”*.

The TE2100 extreme water levels (2017) were obtained from a Product 6 and 8 request from the Environment Agency (represented in Figure 8 and 9):

Maximum Likely Water Level 2005 (mAOD): **4.78** (at Node 2.37)

Flood Level as a result of a Breach in defences 2005 (mAOD): **4.432** (at No. 23 Mill Street)

Maximum Likely Water Level 2100 (mAOD): **5.76** (at Node 2.37)

Flood Level as a result of a Breach in defences 2100 (mAOD): **4.908** (at No. 23 Mill Street)

These also align with the breach analysis carried out by the LBS in their SFRA in 2016 (Figure 7 and 8).

Overtopping

Overtopping of the defence walls is unlikely given the operation of the Thames Barrier. However, in the unlikely event of non-closure of the barrier, overtopping could occur. The likelihood of overtopping can be estimated by comparison of modelled water levels and defence crest levels. The TE2100 present day extreme water level for the nearest node to the development is 4.78m AOD, which is below the crest level of all defences in LBS, indicating that overtopping of the defences is highly unlikely.

The SFRA shows that LBS is protected by well-maintained defences that will not overtop even up to the 0.5% annual probability event plus climate change to 2100. Given the site has been shown to benefit from flood defences which provide a 1:1000 year standard of protection and will remain as such up to at least 2100, the risk of flooding from tidal sources is deemed low.

Breach

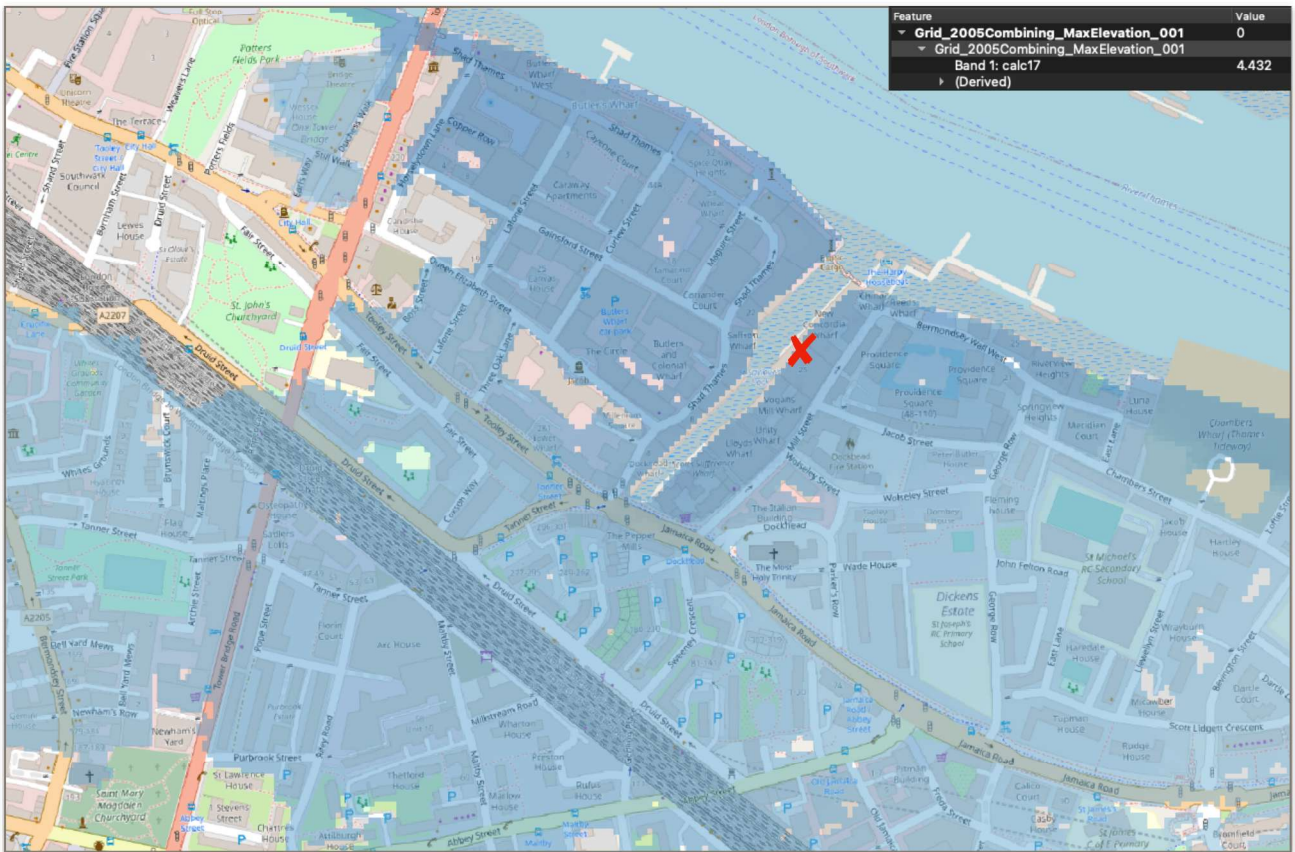


FIGURE 7. ENVIRONMENT AGENCY THAMES TIDAL UPRIVER BREACH MAP, 2005 EPOCH (GOV.UK, 2021)

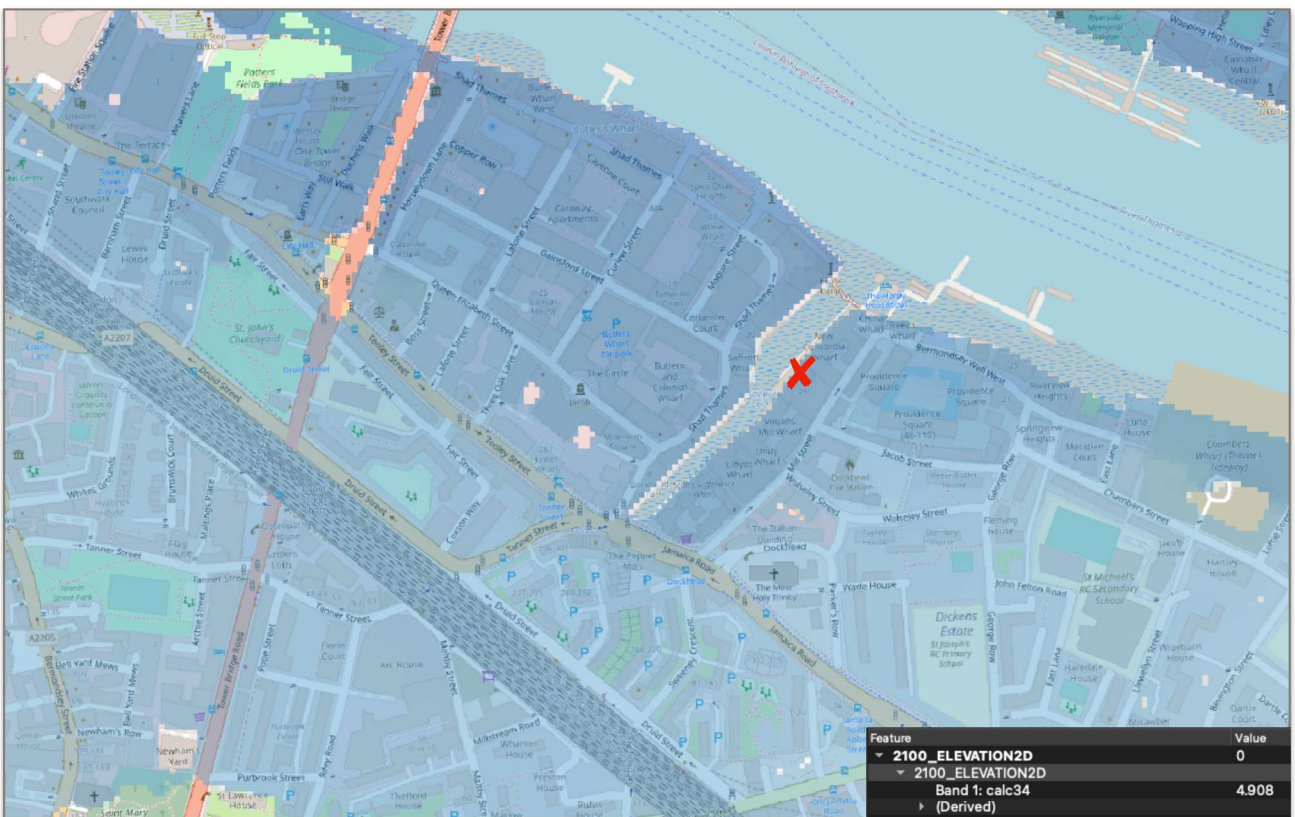


FIGURE 8. ENVIRONMENT AGENCY THAMES TIDAL UPRIVER BREACH MAP, 2100 EPOCH (GOV.UK, 2021)

Assessment of Residual Risk

Figure 8, illustrates the extents of the inundation from a breach in defences, and that the site resides within these extents. When considering the impact of climate change, this also includes the 2100 epoch which should also be considered (Figure 8). Both outlines reside within the flood extents as a result of breach.

According to the flood information supplied by the EA, the modelled flood level for the site as a result of breach for the 2100 epoch is 4.908m AOD. Ground floor FFLs for the proposed building should be constructed above this level, ensuring occupants remain safe at all times. By ensuring the ground floor is constructed above the flood level as a result of a breach in defences (including an allowance for climate change), the site users will remain safe at all times. Furthermore, unrestricted access to the upper floors will be available at all times.

However, as this is an existing building and proposals are for a *change of use*, raising FFLs higher than existing may not be feasible. The LBS SFRA states that *“There may be special circumstances under which flood risk to a development remains. For example where the use is water compatible, where an existing building is being changed, where residual risk remains behind defences, or where floor levels have been raised but there is still a risk at the 0.1% AEP. In such cases (and for existing development in the floodplain), additional measures can be put in place to reduce damage during a flood and increase the speed of recovery”*. The proposals meet the aforementioned requirements set forth in the SFRA. Furthermore, the EA's Standing Advice states that floor levels within the proposed development should be set no lower than existing levels, and flood proofing should be incorporated in order to protect the development from flooding.

Sewer Flooding

The sewers are managed by Thames Water. The DG5 register of recorded historical sewer flooding was provided by Thames Water, and confirms there has not been any recorded incidents of sewer flooding within this particular postcode.

Flood Evacuation Plan

The site is categorised as having a risk of flooding from watercourses, therefore it should be demonstrated that there is safe access egress arrangements on site, should the site be inundated.

- I. The proposed development is located within Flood Zone 3 and is at risk of fluvial/tidal flooding.
- II. Owners/tenants responsible for the Flood Plan should be registered to EA flood alerts, as these are important to enable safe flood evacuation of the site.
- III. A *safe haven* will be provided in the upper floors should a breach in defences occur. This procedure should be explained to residents/users and displayed in the proposed building, and all common areas (if applicable).
- IV. A contact list should be established by the site owner and regularly updated with changes in tenancy.
- V. A flood kit must be prepared and regularly checked.
- VI. It is recommended that further information is downloaded through the following link and distributed to residents of the site, and to advise residents of arrangements before a flood occurs: <https://www.gov.uk/government/publications/flooding-what-to-do-before-during-and-after-a-flood>
- VII. If not already listed, it is recommended that the property is registered with the EA's Flood Warning Service. If you are unsure and/or you wish to register for this free service please contact Floodline Warning Service. Floodline is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone etc. The EA is responsible for monitoring flood events and for issuing warnings to people in properties and businesses at risk of flooding. To fulfil their responsibilities, the EA operates a coded warning system. This is a four-stage warning system and each stage will trigger a set of procedures for the various emergency services. This warning system is outlined below.

ONLINE FLOOD RISK FORECAST

Meaning

Be aware.
Keep an eye on the weather situation.

General advice

- Check weather conditions.
- Check for updated flood forecasts on the Environment Agency website.



FLOOD ALERT

Meaning

Flooding is possible
Be prepared.

General advice

- Be prepared to act on your flood plan.
- Prepare a flood kit of essential items.
- Monitor local water levels and the flood forecast on our website.



FLOOD WARNING

Meaning

Flooding is expected.
Immediate action required.

General advice

- 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.



SEVERE FLOOD WARNING

Meaning

Severe flooding.
Danger to life.

General advice

- Stay in a safe place with a means of escape.
- Be ready should you need to evacuate.
- Co-operate with the emergency services.
- Call 999 if you are in immediate danger.

WARNING NO LONGER IN FORCE

Meaning

No further flooding is currently expected in your area.

General advice

- Be careful. Flood water may still be around for several days.
- If you've been flooded, ring your insurance company as soon as possible.

Flood Mitigation Measures

If the Finished Floor Level (FFL) of the proposed ground floor cannot be raised above the 2100 epoch as a result of a breach in defences (4.908m AOD), FFLs should remain the same as the existing ground floor. These proposals are in accordance with the EA's Standing Advice², which states that floor levels within the proposed development should be set no lower than existing levels, and flood proofing should be incorporated in order to protect the development from flooding.

It is recommended the building include flood resilience measures in the design, in accordance with the SFRA. All drainage systems should be routinely maintained to reduce the risk of blockage and surface water flood risk. Furthermore, it is proposed flood resilient³ materials will be used for flooring and on the walls at ground floor level to minimise the potential for damage, in the unlikely event of flood water inundating the building footprint.

It is recommended that external ground levels immediately outside the building entrance are set to fall away from the building thresholds, ensuring the minimisation of storm water ingress. If this is not possible, channel drainage along the building thresholds at the entrance should be introduced to positively drain overland flows.

If not already listed, it is recommended that the property is registered with the EA's Flood Warning Service. If you are unsure and/or you wish to register for this free service please contact Floodline Warning Service. Floodline is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone etc. The EA is responsible for monitoring flood events and for issuing warnings to people in properties and businesses at risk of flooding.

Anti-flood valves could be introduced at the outfall prior to connecting to the public sewer, should the appointed engineer deem it necessary. A '*Pre-development enquiry*' to Thames Water is also recommended to determine capacity in the sewer. This is a free application, and should be submitted to TW's Developer Services team.

² <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>

³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf

Conclusions

The EA's flood risk from watercourses map shows that the site is in Flood Zone 3. The National Planning Policy Framework (NPPF) states that minor developments including *change of use*, are unlikely to raise significant flood risk issues.

Proposed ground floor FFLs should be constructed above the modelled flood level for the site as a result of breach for the 2100 epoch (4.908m AOD). However, as this is an existing building and proposals are for a *change of use*, the SFRA and the EA's Standing Advice states that, floor levels for the proposed development should be set no lower than existing levels, and flood proofing should be incorporated in order to protect the development from flooding.

If not already listed, it is recommended that the property is registered with the EA's Flood Warning Service.

The proposed change of use will not increase the impermeable areas on the site. It will therefore not increase the flood risk from surface water, as there will be no increase in the surface water run-off rate or volumes.

The FRA has further demonstrated that the proposed development has an acceptable flood risk within the terms and requirements of the NPPF and accompanying technical guidance.

Note:

This report has been prepared for the purposes of submitting for planning to the local planning authority for review in relation to the associated flood risk for the proposed development, and uses the most up-to-date information available to us at the time. It should not be relied upon by anyone else or used for any other purpose. This report is confidential to our Client; it should only be shown to others with their permission. We retain copyright of this report which should only be reproduced with our permission.

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