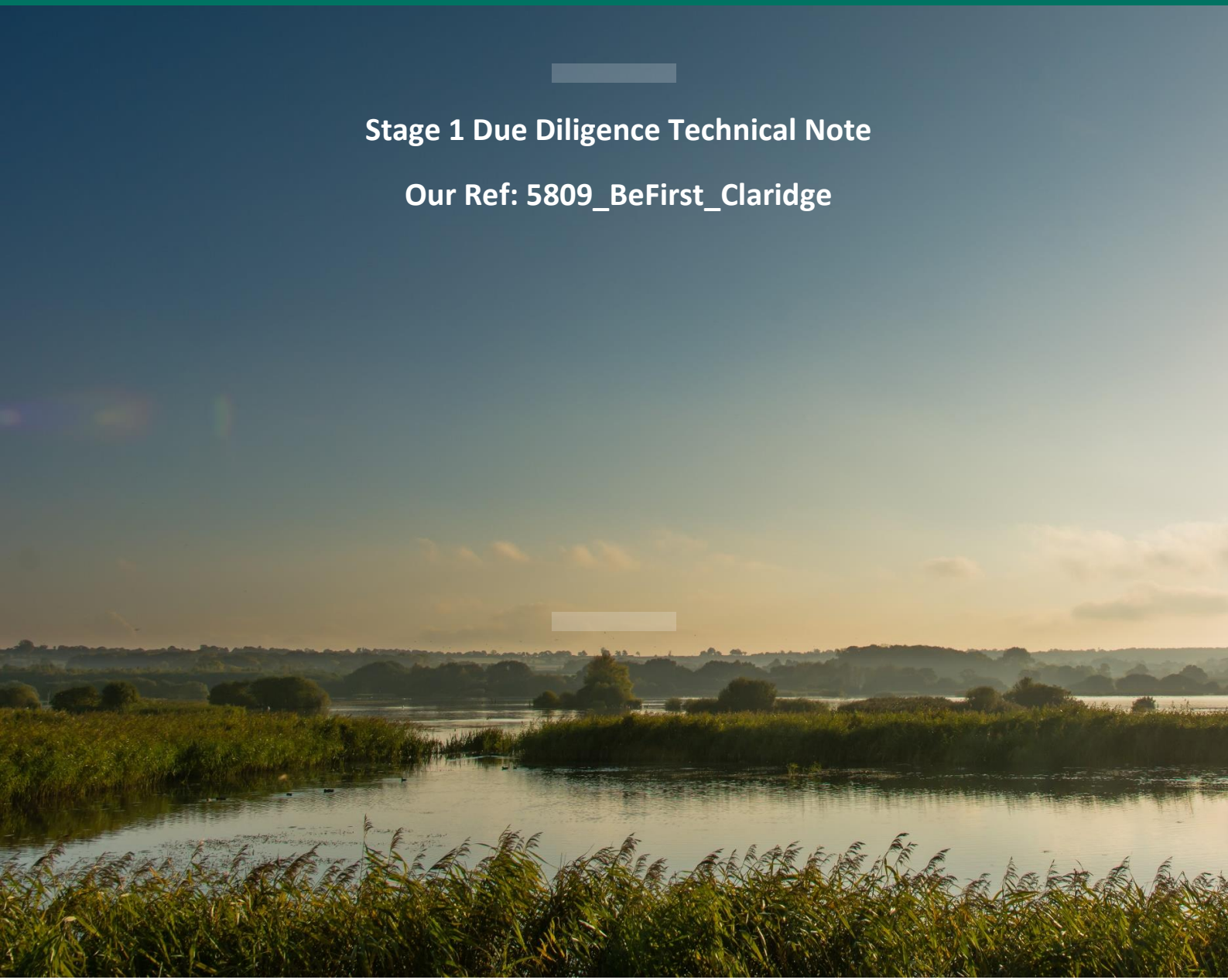
AMBIENTAL

ENVIRONMENTAL ASSESSMENT

# Stage 1 Due Diligence Technical Note

**Our Ref: 5809_BeFirst_Claridge**



# Document Issue Record

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# Glossary & Acronyms

**AEP**
Annual Exceedance Probability is the probability of a rainfall or tidal event occurring within any one year. For example, an event of a 100 year return period has an AEP of 1:100 or 1%.

**BGS**
British Geological Survey

**EA**
Environment Agency

**Flood Defences**
Artificial structures maintained to a set operational level designed to protect land people and property from Tidal and Fluvial flood sources to an established chance of happening in any year threshold.

**Flood Source: Fluvial (River)**
When flows within watercourses exceed the capacity of the watercourse causing out of bank flows.

**Flood Source: Groundwater**
Groundwater flooding is usually the result of prolonged wet weather causing groundwater levels to rise sufficiently to either emerge at surface or to cause flooding of below ground infrastructure, such as basements.

**Flood Source: Pluvial (Surface Water)**
When rainfall causes overland flows which exceed the capacity of the drainage network, causing flooding to land that is normally dry.

**Flood Source: Tidal**
When high tide events overtop the shoreline to cause flooding to land behind.

**Flood Zone 1**
Low Probability. Land defined as having a less than 1:1000 annual probability of flooding from tidal and fluvial sources.

**Flood Zone 2**
Medium Probability. Land defined as having a risk of fluvial flooding between 1:100 annual probability and 1:1000 annual probability. Or Land defined as having a risk of tidal flooding between 1:200 annual probability and 1:1000 annual probability.

**Flood Zone 3 (A)**
High Probability. Land defined as having a fluvial risk of 1:100 annual probability or greater. Or a tidal risk of 1:200 annual probability or greater.

**Flood Zone 3 (B)**
Functional Floodplain. Defined by SFRA's as areas where floodwater is stored during lower AEP events, typically the 1:20 annual probability.

**Flood Zone Map**
The Environment Agency has produced a mapping data set which covers England and provides the general extents of Flood Zones 1, 2, and 3. However the national data set available online does not differentiate between Flood Zone 3 (A) and 3 (B).

**LiDAR**
Light Detection And Ranging is an accurate ground terrain model obtained by aerial survey. The typical vertical accuracy is +/- 150 mm.

**Main River**
Defined on the Main River map and relate to rivers on which the Environment Agency have powers to carry out flood defence works.

**m AOD**
Metres Above Ordnance Datum.

**OS**
Ordnance Survey

**Ordinary Watercourse**
A watercourse which does not form part of a Main River, works on Ordinary Watercourses usually require consent from either the Lead Local Flood Authority, or the Internal Drainage Board (where one exists).

**RoFSW**
Risk of Flooding from Surface Water

**SFRA**
Strategic Flood Risk Assessment

**Source Protection Zone: Inner zone (Zone 1)**
Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.

**Source Protection Zone: Outer zone (Zone 2)**
Defined by a 400 day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction.

**Source Protection Zone: Total catchment (Zone 3)**
Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75. There is still the need to define individual source protection areas to assist operators in catchment management.

NOTE: The Source Protection Zones are not allowed to be displayed over base mapping greater than Ordnance Survey 1:50,000 scale, as the data was only modelled to this level and is not accurate pass this. They should not be compared against field boundaries.

**SuDS**
Sustainable Drainage Systems, which are designed to manage surface water flows in order to mimic the Greenfield run-off from an undeveloped site.

**SWDS**
Surface Water Drainage Strategy

# 1. Summary

1.1 Ambiental have been appointed by BeFirst London to undertake a Stage 1 Flood Risk Due Diligence Study to advise on the flood risks for the site at Claridge Road, Barking, RM8 1TT. It is understood that this review is to support a portfolio review of existing sites with a view to potentially redeveloping these sites.

1.2 The risk summary tables provided below cover tidal, fluvial, pluvial and groundwater flood risk, as well as the residual risks of flooding attributable to reservoir and flood defence failure.

| TIDAL (SEA & COAST) AND FLUVIAL (RIVERS) FLOOD RISK | | |
|---|---|---|
| **CLASSIFICATION** | **ASSESSED RISK** | **DEFINITION** |
| **HIGH** | ✗ | High risk means that each year this area has a chance of flooding of greater than 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. |
| **MEDIUM** | ✗ | Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. |
| **LOW** | ✗ | Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. |
| **VERY LOW** | ✓ | Very low risk means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. |
| **✓ = Risk present** | | **✗ = Risk not present** |

| GROUNDWATER FLOOD RISK | | |
|---|---|---|
| **CLASSIFICATION** | **ASSESSED RISK** | **DEFINITION** |
| **HIGH** | ✗ | High risk means that there is the potential for groundwater flooding to occur at the surface. |
| **MEDIUM** | ✓ | Medium risk means that there is the potential for groundwater flooding of property situated below ground level. |
| **LOW** | ✗ | Low risk means that there is limited potential for groundwater flooding to occur. |
| **NO DATA** | ✗ | No groundwater flood data is available for the area. |
| **✓ = Risk present** | | **✗ = Risk not present** |

| PLUVIAL (SURFACE WATER) FLOOD RISK | | |
|---|---|---|
| **CLASSIFICATION** | **ASSESSED RISK** | **DEFINITION** |
| **HIGH** | ✗ | High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| **MEDIUM** | ✗ | Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| **LOW** | ✓ | Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| **VERY LOW** | ✗ | Very low risk means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| **✓ = Risk present** | | **✗ = Risk not present** |

| RESERVOIR FLOOD RISK | | |
|---|---|---|
| **CLASSIFICATION** | **ASSESSED RISK** | **DEFINITION** |
| **MEDIUM** | ✗ | Medium risk means that the site is within the area predicted to be at risk of a failure of a reservoir. |
| **VERY LOW** | ✓ | Very low risk means that the site is not within the area predicted to be at risk of a failure of a reservoir. |
| **✓ = Risk present** | | **✗ = Risk not present** |

| BREACH (FLOOD DEFENCE FAILURE) FLOOD RISK | | |
|---|---|---|
| **CLASSIFICATION** | **ASSESSED RISK** | **DEFINITION** |
| **MEDIUM** | ✗ | Medium risk means that the site is within the area predicted to be at risk of a breach in the flood defences. |
| **VERY LOW** | ✓ | Very low risk means that the site is not within the area predicted to be at risk of a breach in the flood defences. |
| **NO DATA** | ✗ | No breach model data is available for this area. |
| **✓ = Risk present** | | **✗ = Risk not present** |

# 2. Introduction

2.1 Ambiental have been appointed by BeFirst London to undertake a Stage 1 Flood Risk Due Diligence Study to advise on the flood risks for the site at Claridge Road, Barking, RM8 1TT (Figure 1). Figure 1 demonstrates the three parcels of land at Claridge Road being assessed.

2.2 It is understood that this review is to support a portfolio review of existing sites with a view to potentially redeveloping these sites.




*Figure 1: Site Location Map (Source: OS)*

2.3 This Technical Note will cover the following:

- Flood Hazards
    - Analysis of EA Flood Risk Map for Planning (fluvial/ tidal)
    - Analysis of EA Risk of Flooding from Surface Water (RoFSW) dataset
    - Analysis of BGS Groundwater Data
    - Analysis of EA Reservoir Flood Risk
    - Review of EA Historic Flood Extents Mapping
    - Review of the Strategic Flood Risk Assessment / Surface Water Management Plan.
- Recommendations to mitigate the risk

2.4 This report has been written based on third party data that was available at the time of writing. The data has not been validated and has been relied upon as supplied.

# 3. Flood Hazards

## Fluvial/ Tidal

3.1 The EA Flood Map for Planning indicates that the site is located in Flood Zone 1. Flood Zone 1 has a low probability of less than 1 in 1000 (0.1%) of river or tidal flooding in any year.

3.2 The risk of flooding from river or tidal flooding is **very low**.

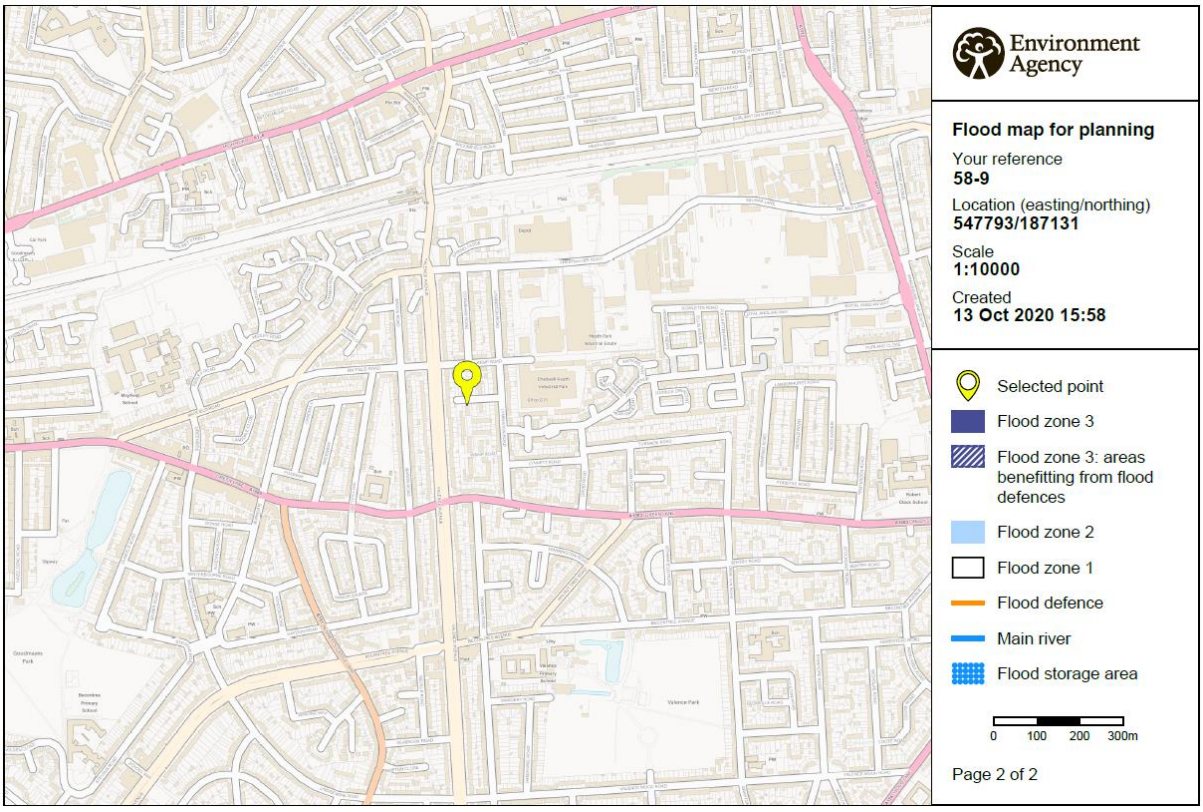



*Figure 2: Risk of Flooding from Rivers or Sea (Sources: EA, OS)*

## Tidal Defence Breach

3.3 The site is located approximately 3.75km north of the EA's modelled 1:1000 year (2115) tidal breach extent on the River Thames downriver of the Thames Barrier (Figure 3). As such, the risk of flooding following defence breach could be considered **very low**.

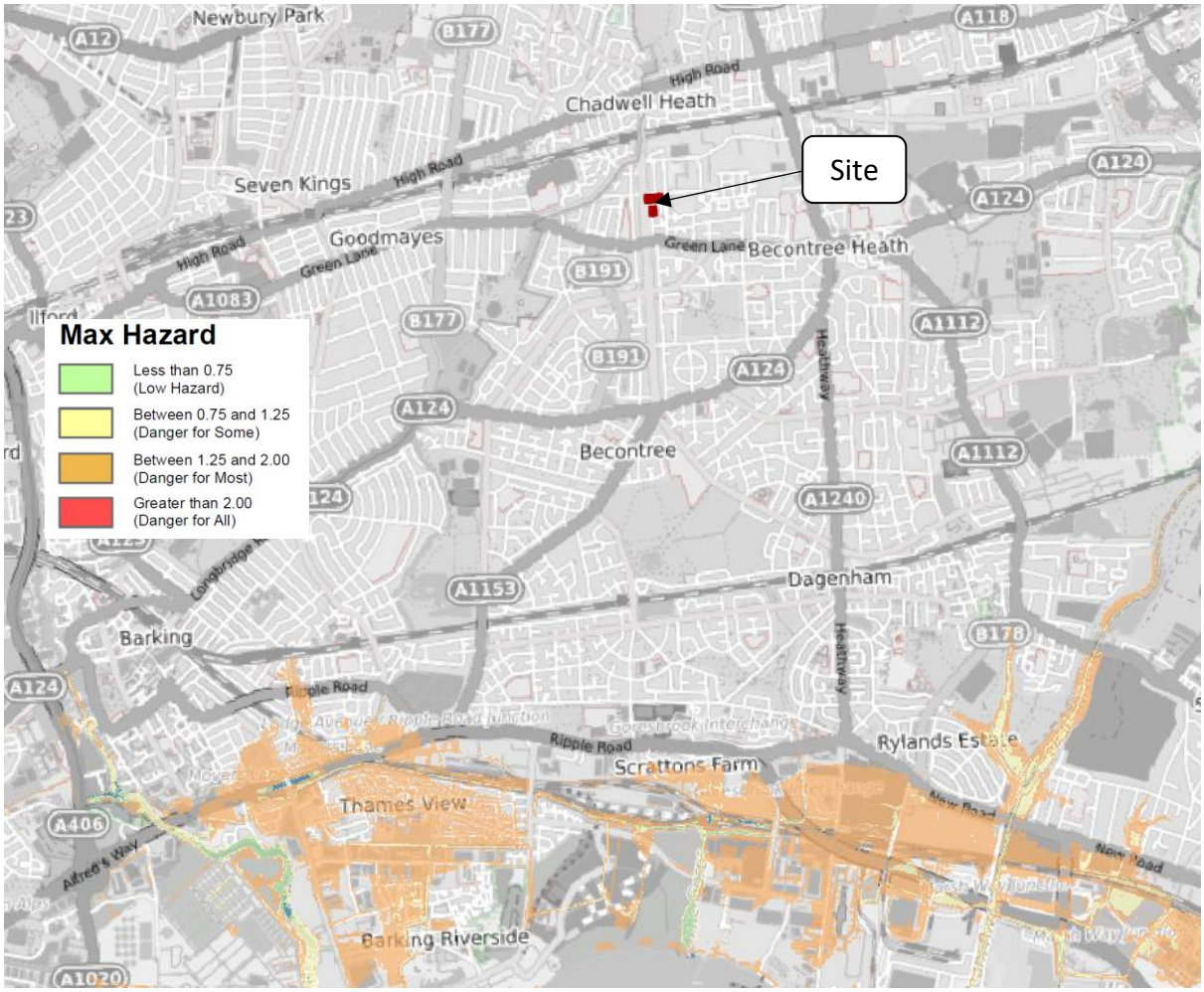



*Figure 3: EA Modelled 1:1000 year (2115) Downriver Breach Hazards (Sources: EA, OS)*

## Pluvial (Surface Water)

3.4 The EA's Risk of Flooding from Surface Water (RoFSW) dataset indicates that the site itself may remain unaffected in the 1:30 year and 1:100 year events (Figures 4, 5 and 6, respectively).

| Annual Exceedance Probability | Onsite Flood Depth | Road Network Flood Depth | Access / Egress Potential |
|---|---|---|---|
| **3.33% (1:30)** | None | None | Safe access/ egress possible |
| **1.00% (1:100)** | None | 0.15m to 0.3m | Safe access/ egress possible |
| **0.1% (1:1000)** | Up to 0.15m in southwest parcel, others unaffected | 0.15m to 0.3m | Safe access/ egress possible |

3.5 In the 1:30 year event, the site would remain unaffected and the road network will also be unaffected, so safe access/egress should be possible.




*Figure 4: 1:30 year pluvial flood depths (Sources: EA RoFSW, OS, BeFirst London)*

3.6 In the 1:100 year event, the site would remain unaffected and the road network will also be unaffected, so safe access/egress should be possible.

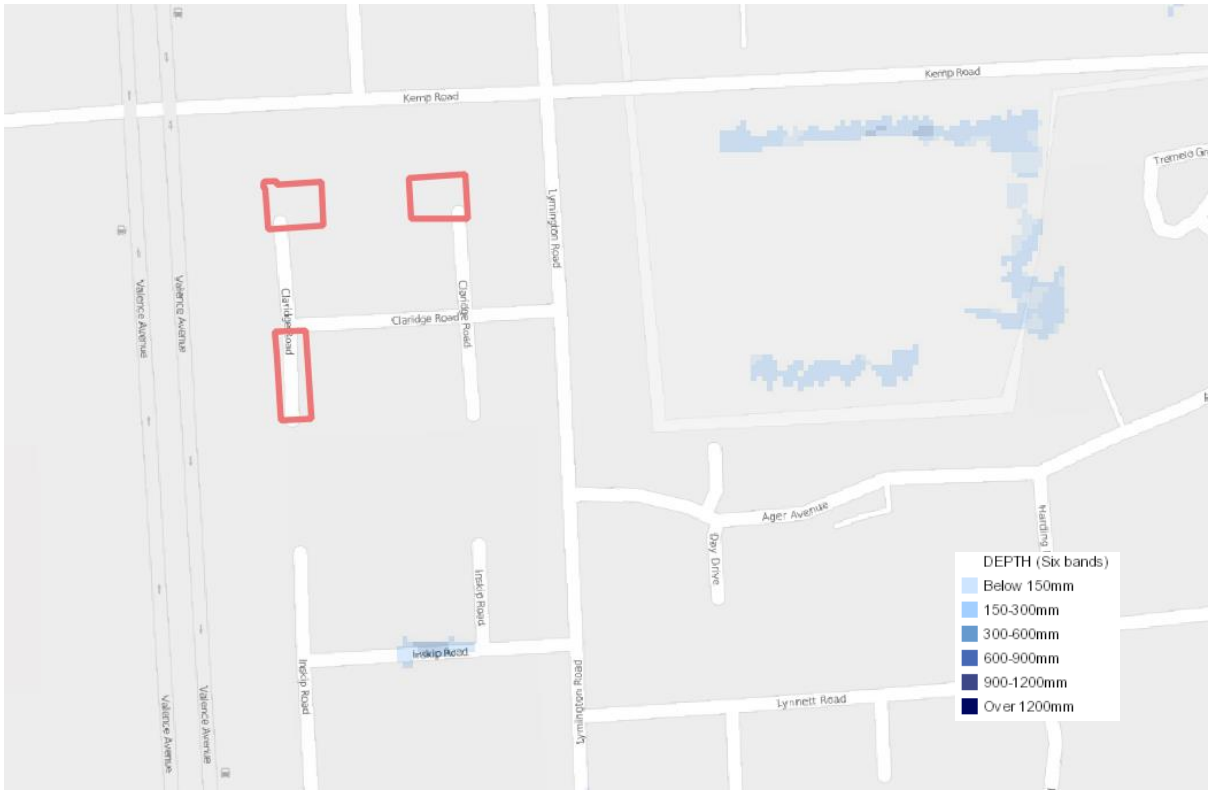



*Figure 5: 1:100 year pluvial flood depths (Sources: EA RoFSW, OS, BeFirst London)*

3.7 In the 1:1000 year event, the site would remain unaffected, however Claridge Road could experience flood depths of up to 600mm.

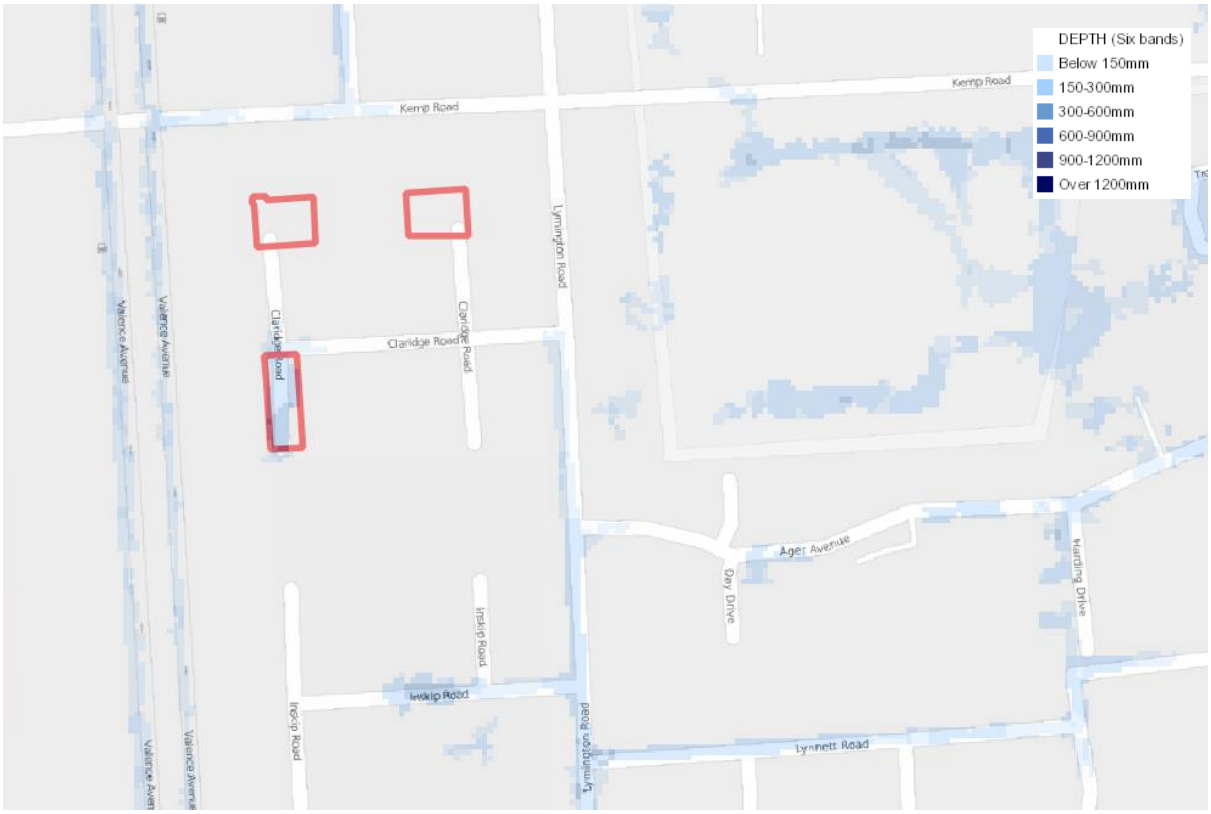



*Figure 6: 1:1000 year pluvial flood depths (Sources: EA RoFSW, OS, BeFirst London)*

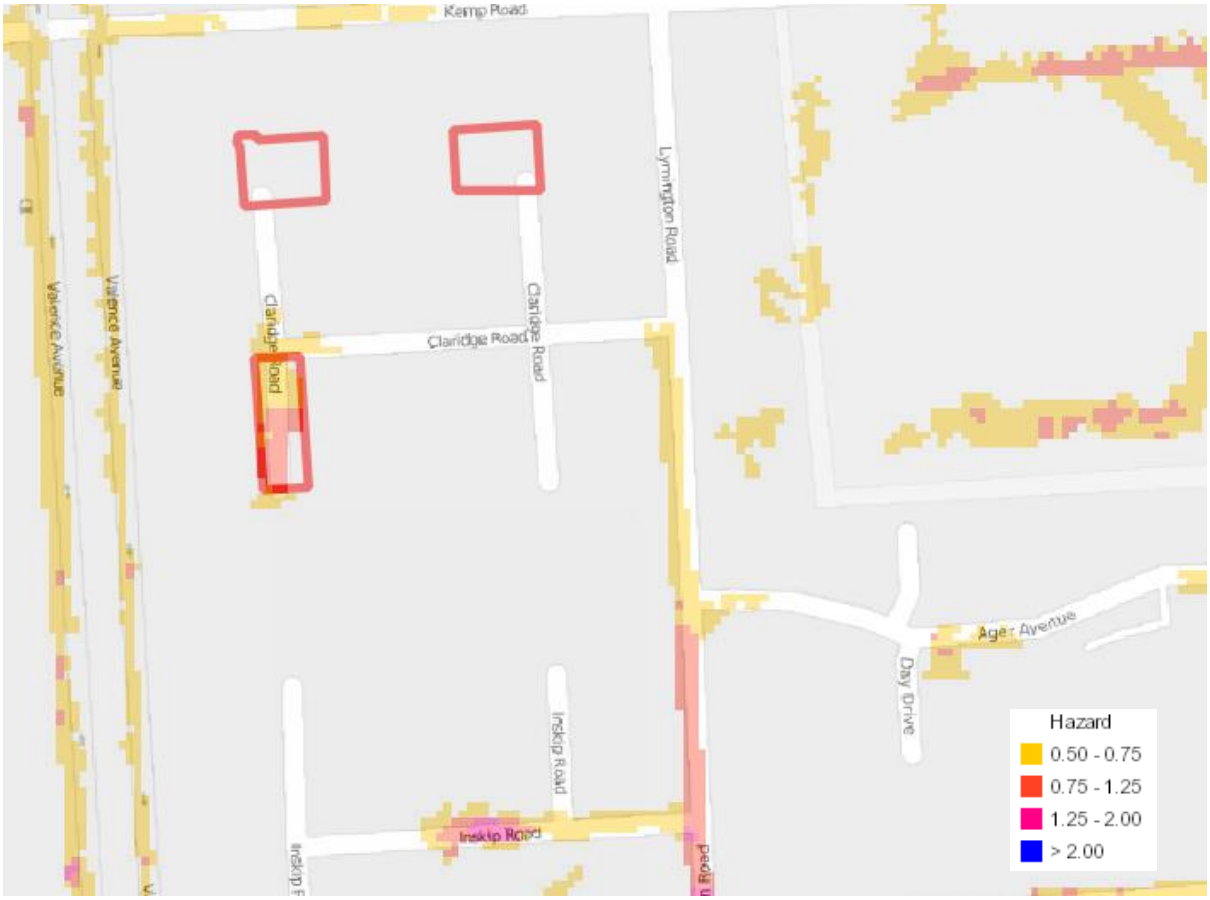



*Figure 7: 1:1000 year pluvial flood hazards (Sources: EA RoFSW, OS, BeFirst London)*

3.8 As such, the risk of flooding from pluvial sources could be considered **low.**

## Groundwater

3.9 The British Geological Survey (BGS) Groundwater Susceptibility dataset indicates that the site is located within an area considered to have potential for groundwater flooding (Figure 8).




*Figure 8: Groundwater Susceptibility (Sources: BGS, OS)*

3.10 The BGS Geology of Britain Viewer indicates that the bedrock geology below the site is the London Clay Formation, comprised of clay, silt and sand; and the superficial deposits over this are the Hackney Gravel Member comprised of sand and gravel.

3.11 BGS borehole record TQ48NE 104 is located approximately 490m west of the site. This borehole recorded indicated a 0.3m deep surface layer of topsoil, a further 1.1m of slightly sand clay, underlain by a 1.3m layer of dense gravel, the London clay formation was struck at a depth of 2.7m. The borehole log indicates that water was met at a depth of 2.7m.

3.12 The London Borough of Barking and Dagenham SFRA (2008) states:

*"Where the borough of Barking & Dagenham overlays London Clay the risk of groundwater flooding will typically be low. However, where alluvial drift deposits, such as gravels, sit over the impermeable clay geology* [such as at this site] *a perched water table can occur. This can lead to minor groundwater flooding."*

3.13 However, the SFRA further notes that no observed incidents of groundwater flooding were available for the report.

3.14 As such, no records could be found to indicate historic groundwater flooding at or in the immediate vicinity of the site.

3.15 As such, the risk of flooding from groundwater could be considered **to be moderate**.

3.16 Should the site be re-developed, it is recommended that any below ground construction is of flood proof design/ tanked to negate ingress of groundwater.

## Reservoirs

3.17 The EA Risk of Flooding from Reservoirs Map indicates that the site is located outside the maximum modelled flood extent following reservoir failure (Figure 9).

3.18 As such, the risk of flooding following reservoir failure could be considered **very low**.




*Figure 9: Reservoir Flood Map (Sources: EA, OS)*

## Sewers

3.19 Appendix J of the London Borough of Barking and Dagenham SFRA (2008) indicates that the RM9 postcode area, within which the site is locate, had not experienced any incidents of sewer flooding in the 10 years prior to 2008 (Figure 10). The risk of flooding from sewers can be considered **low**.

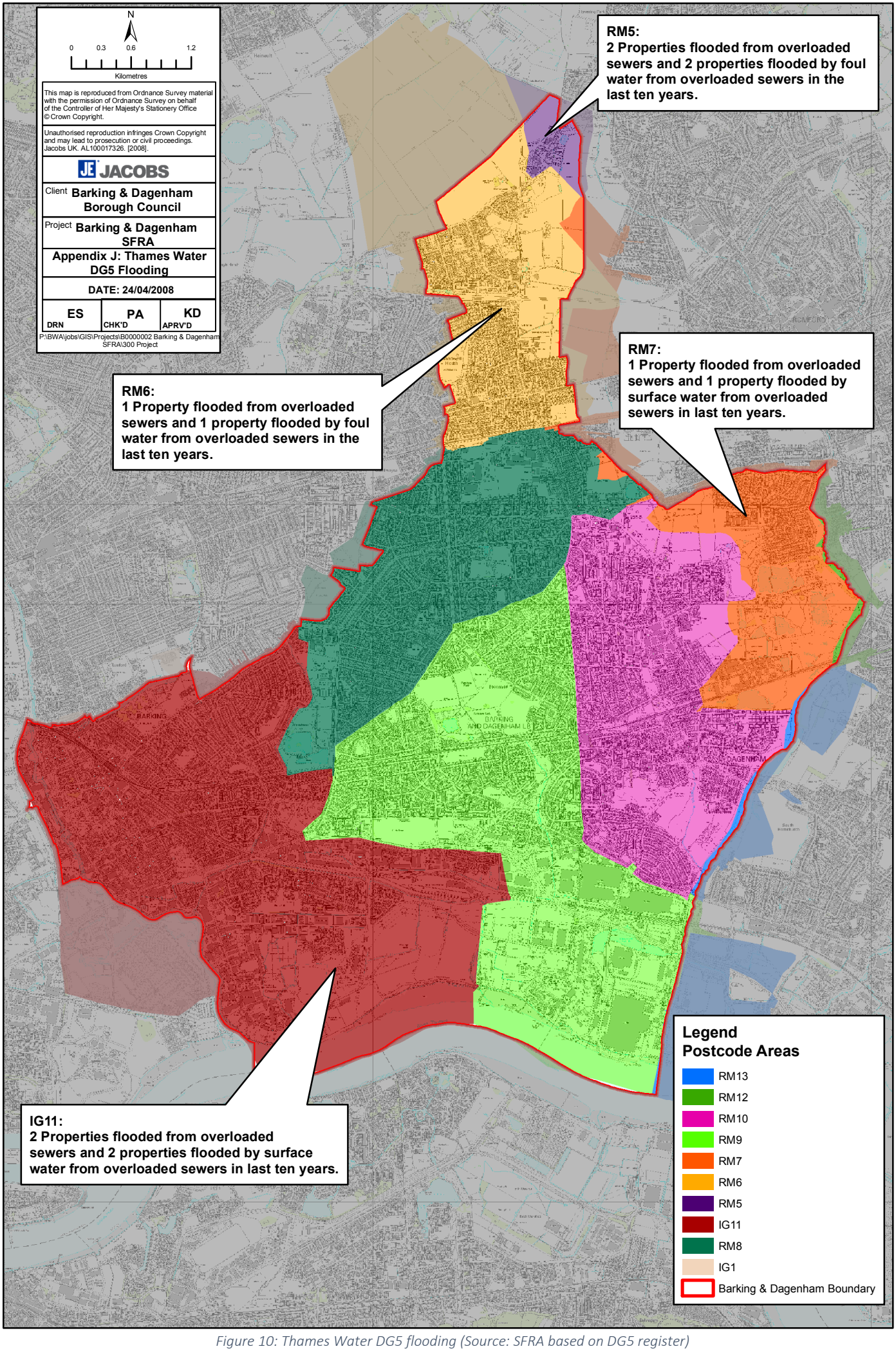



*Figure 10: Thames Water DG5 flooding (Source: SFRA based on DG5 register)*

## Historical Flooding/ SFRA

3.20 Appendix M of the London Borough of Barking and Dagenham SFRA (2008) indicates that the site is located outside the recorded flood outlines from all historical fluvial/ tidal events provided by the EA since 1707 (Figure 11).

3.21 No records could be found to indicate flooding from any source at the site. However, it should be noted that sources are not exhaustive, and this does not necessarily mean that the site has not flooded in the past and will not flood in the future.

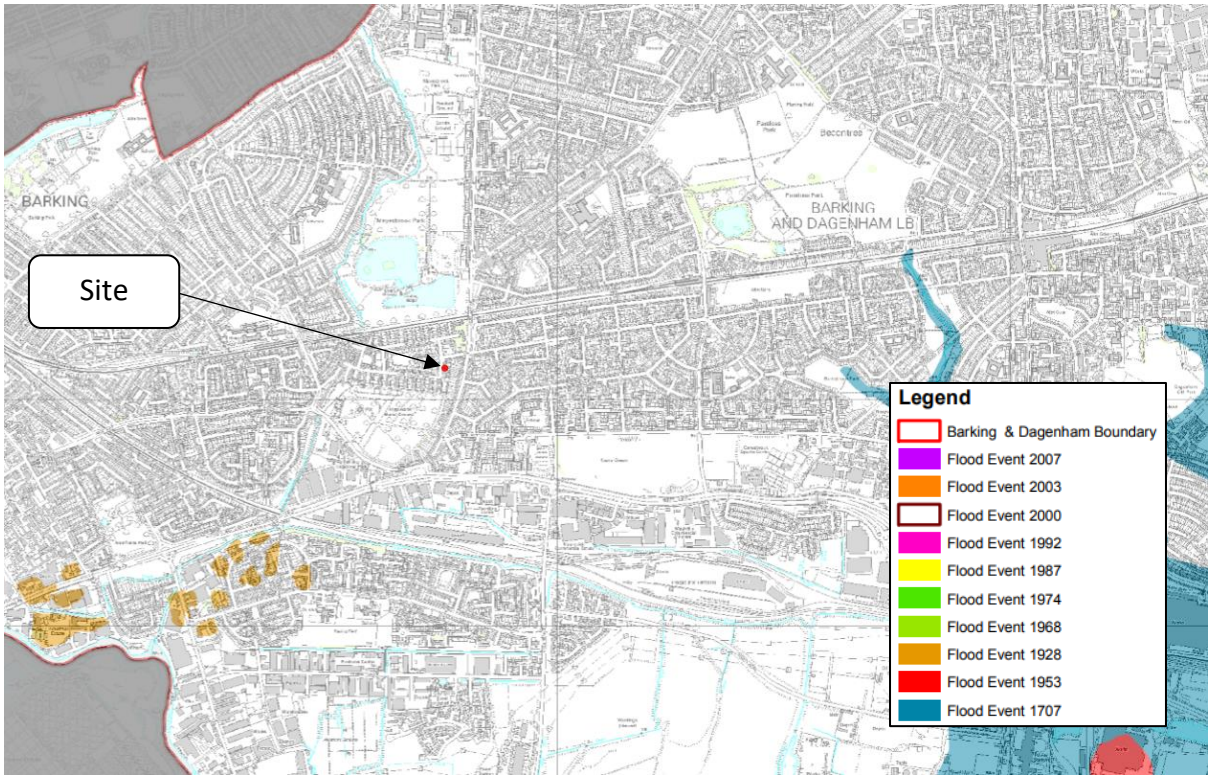



*Figure 11: Historical Flooding Events (Source: SFRA, 2008)*

# 4. Flood Mitigation Measures

4.1 The data reviewed as part of this due diligence Technical Note has indicated that the risk of flooding from the sources identified could be considered **low**, except for groundwater flooding which could be considered **moderate**.

4.2 If the site is to be redeveloped, the planning application may not need to be accompanied by a Flood Risk Assessment due to being in an area of low flood risk. However, if the development was for more than 10 residential dwellings it would be classified as a major development and would then need to be accompanied by a Flood Risk Assessment. However as the site is in Flood Zone 1, it may not need to be accompanied by a Sequential Test.

4.3 However, it is recommended that any below ground construction is of flood proof design/ tanked to negate ingress of groundwater.

4.4 Given the distance between the site and the nearest watercourse (more than 16m) a Flood Risk Activity Permit (FRAP) and Ordinary Watercourse Consent (OWC) wouldn't be required.

4.5 In addition, it is recommended that Sustainable Drainage Systems (SuDS) are used to manage runoff from any development on site in accordance with Policy 5.13 of the Adopted London Plan (2016) which states:

*"A development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible"*

4.6 As such, if the site is to be redeveloped, once development proposals are finalised it is recommended that a Surface Water Drainage Strategy (SWDS) is produced to demonstrate compliance with Policy 5.13 of the Adopted London Plan (2016). Liaison with Thames Water would be required for any proposed connection to a public sewer.

4.7 A checklist/ summary is provided below for the client's ease.

| Item | Required for Planning if Site Redeveloped |
|---|---|
| **Site-Specific Flood Risk Assessment** | ✗ (assuming development is a minor development) |
| **Sequential Test** | ✗ |
| **Surface Water Drainage Strategy** | ✓ |
| **Thames Water Approval (for drainage connections)** | ✓ |
| **Flood Risk Activity Permit** | ✗ |
| **Ordinary Watercourse Consent** | ✗ |

# 5. Conclusions

5.3 The data reviewed as part of this due diligence Technical Note has indicated that the risk of flooding from the sources identified could be considered **low**, except for groundwater flooding which could be considered **moderate**.

5.4 Should the site be re-developed, it is recommended that any below ground construction is of flood proof design/ tanked to negate ingress of groundwater.

5.5 Furthermore, a SWDS should be produced should the site be redeveloped to demonstrate compliance with Policy 5.13 of the Adopted London Plan (2016).

5.6 Liaison with Thames water will also be required for any proposed connection to a public sewer.