

AWE GREEN PARK

Flood Risk Assessment



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Flood Risk Assessment
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1 INTRODUCTION

- 1.1 RPS was commissioned to prepare a Flood Risk Assessment (FRA) in support of a development at *250 Brook Drive, Green Park, Reading, RG2 6UA* in relation to the proposed footpaths upgrade and construction of shelters at the existing facility.
- 1.2 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). Reference has also been made to the Reading Borough Council Strategic Flood Risk Assessment (SFRA).
- 1.3 This report has been produced in consultation with the Environment Agency (EA) and the Lead Local Flood Authority (LLFA). The site is not located within an Internal Drainage Board (IDB) District.
- 1.4 The desk study was undertaken by reference to information provided / published by the following bodies:
- EA;
 - Centre for Ecology and Hydrology;
 - British Geological Survey (BGS); and
 - Ordnance Survey (OS).

2 PLANNING POLICY CONTEXT

National Planning Policy

- 2.1 The National Planning Policy Framework (NPPF)¹ was released in March 2012 and was updated in December 2024. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) for any of the following cases (Planning and Flood Risk paragraph 181 (footnote 63)):
- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
 - All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);
 - All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);
 - Land identified in a strategic flood risk assessment as being at increased flood risk in future; and
 - Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.
- 2.2 Paragraph 182 of the updated NPPF identifies that applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff; and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of development proposals should:
- a. Take account of advice from the Lead Local Flood Authority;
 - b. Have appropriate proposed minimum operational standards; and
 - c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.
 - d.
- 2.3 Defra published their 'Non-statutory technical standards for sustainable drainage systems' in March 2015. These are supported by the revised NPPF.

Local Planning Policy

- 2.4 The Reading Borough Local Plan was adopted in November 2019 and contains the following policies relating to flood risk and drainage:

EN18: Flooding and Sustainable Drainage Systems

Development will be directed to areas at lowest risk of flooding in the first instance, following the Sequential and Exceptions Test set out in the NPPF, and taking into account the effects of climate change. It will consider flooding from all sources, including fluvial, surface water, groundwater and sewer flooding. Where development in areas at risk of flooding is necessary, it will not reduce the capacity of the flood plain to store floodwater, impede the flow of floodwater or in any way increase

¹<https://www.gov.uk/government/publications/national-planning-policy-framework--2>

the risks to life and property arising from flooding. Wherever possible, development should be designed to reduce flood risk, both on- and off-site.

All major developments must incorporate sustainable drainage systems (SuDS) as appropriate and in line with the Government's Technical Standards. Smaller schemes are encouraged to incorporate SuDS, where possible. Runoff rates should aim to reflect greenfield conditions and, in any case, must be no greater than the existing conditions of the site. Schemes should ensure that the movement of water through vertical infiltration as well as horizontal run-off does not worsen contamination effects. Wherever possible, SuDS provision should maximise ecological benefits, link into the existing Green Network, incorporate tree planting and landscaping and avoid damage to existing significant trees, including through changes to the site hydrology. All new developments in areas of flood risk should give priority to SuDS.

EN11 Waterspaces

Reading's waterspaces will be protected and enhanced, so that they can continue to contribute to local and regional biodiversity and ecology, flood mitigation, local character, heritage and visual amenity, the provision of accessible leisure and recreational opportunities and, where appropriate, navigation. There will be no adverse impact on the functions and setting of any watercourse and its associated corridor.

Where development in the vicinity of watercourses is acceptable, it will:

- *Provide appropriate, attractive uses and buildings that enhance the relationship of buildings, spaces and routes to the watercourse, including through creating or enhancing views of the watercourse, and create a high quality public realm;*
- *Make positive contributions to the distinct character, appearance, historic significance, landscape and amenity of the watercourses;*
- *Provide a strengthened role for watercourses as important landscape features, wildlife corridors, historic features and recreation opportunities;*
- *Wherever practical and consistent with its biodiversity role, provide good, level access to and along the waterside for all those who want to use it;*
- *Be set at least ten metres back from the watercourse wherever practicable and appropriate to protect its biodiversity significance;*
- *Improve the quality of watercourse environment through protecting and enhancing habitats and ensuring that habitat creation is balanced with access and urban uses; and*
- *Pursue opportunities for deculverting of watercourses.*

CC3: Adaption to Climate Change

All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change. The following measures shall be incorporated into development:

- *Wherever possible, new buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing exposure to wind and other elements;*
- *Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, thermal mass, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc;*
- *Use of trees and other planting, where appropriate as part of a landscape scheme, to provide shading of amenity areas, buildings and streets and to help to connect habitat, designed with native plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions; and*

- All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change.

2.5 The Reading Borough Council Level 1 SFRA, released June 2017, identifies and maps flood risk from all sources at a borough-wide scale as well as providing guidance on producing site specific FRAs. Relevant information from the SFRA has been referenced throughout this FRA report.

Climate Change Allowances

2.6 The NPPF sets out how the planning system should help to minimise the vulnerability and provide resilience to the impacts of climate change. NPPF and supporting planning practice guidance on Flood Risk and Coastal Change explain when and how FRAs should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

2.7 To ensure future development can provide a safe and secure living and /or working environment throughout its lifetime, national planning policy requires proposals in areas of high flood risk to be accompanied by an assessment of flood risk to and from the development, taking into account the impacts of climate change.

2.8 In May 2022, the EA released revised climate change allowances, which updates the 2020 version of 'Adapting to Climate Change: Advice to Flood & Coastal Risk Management'. The EA have used the UKCP19 projections to update the peak river flow allowances and have based them on management catchments instead of river basin districts.

2.9 The guidance on how to apply peak river flow allowances has also changed. The following allowances must also be used:

- The central allowance for all assessment except for essential infrastructure, where you use the higher central allowance,
- the upper end for 'credible maximum scenario' assessments, and
- the central allowance to calculate flood storage compensation, except for where essential infrastructure is affected, where you use the higher central allowance.

2.10 Further information on the climate change allowances can be found at (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>).

2.11 The document provides a central, higher and upper estimate for increases in rainfall intensity as a consequence of climate change. Table 1 below presents the anticipated increase in peak river flows for the Kennet and tributaries Management.

2.12 The site is considered to be "less vulnerable", as it is used for commercial purposes. The site is located wholly within Flood Zone 2 and partially within Flood Zone 3. As such the central allowance should be considered within the assessment. Based on this, a 32% climate change allowance for the Kennet and tributaries Management Catchment, should be assessed.

Table 1. Peak River Flow Allowances by River Basin District

River Basin District	Management Catchment	Allowance Category	Total Potential change anticipated for '2020s' (2015 – 39)	Total Potential change anticipated for '2050s' (2040 – 2069)	Total potential change anticipated for the '2080s' (2070-2115)
Thames		Central	10%	8%	32%

REPORT

	Kennet and tributaries	Higher Central	16%	16%	39%
		Upper End	32%	35%	76%

3 CONSULTATION

Environment Agency

- 3.1 The FRA has been produced in consultation with the Customer & Engagement Team for the Thames Region. The EA has provided detailed Product 4 data from the Kennet (Tyle Mill to Thames Confluence) 2018 model, in the form of 1D and 2D in-channel and Flood Plain levels. Data has also been provided on historic flood data, defences and flood outlines.
- 3.2 The information provided by the EA is included as Appendix A and is summarised in Section 6.

Lead Local Flood Authority

- 3.3 The site is located within the administrative boundary of Reading Borough Council. Consultation has been undertaken with the Highway department within the Environmental and Commercial services team. The following advice was obtained regarding the site:
- There are no records held in the relation to properties flooding within the site area.
 - It was noted that low lying areas in Green Park have been raised by the developer to reduce the risk of flooding, in addition to other mitigation measures. However plans of this are not available. The council believes that this is not reflected in the current EA flood map. It is hoped that when the EA re-survey the site area to update the flood maps, the older lower lying areas may come out of the high risk flood map areas and therefore the risk Green Park is likely to be lower than currently depicted on the EA flood maps.
- 3.4 For the full responses please see Appendix B.

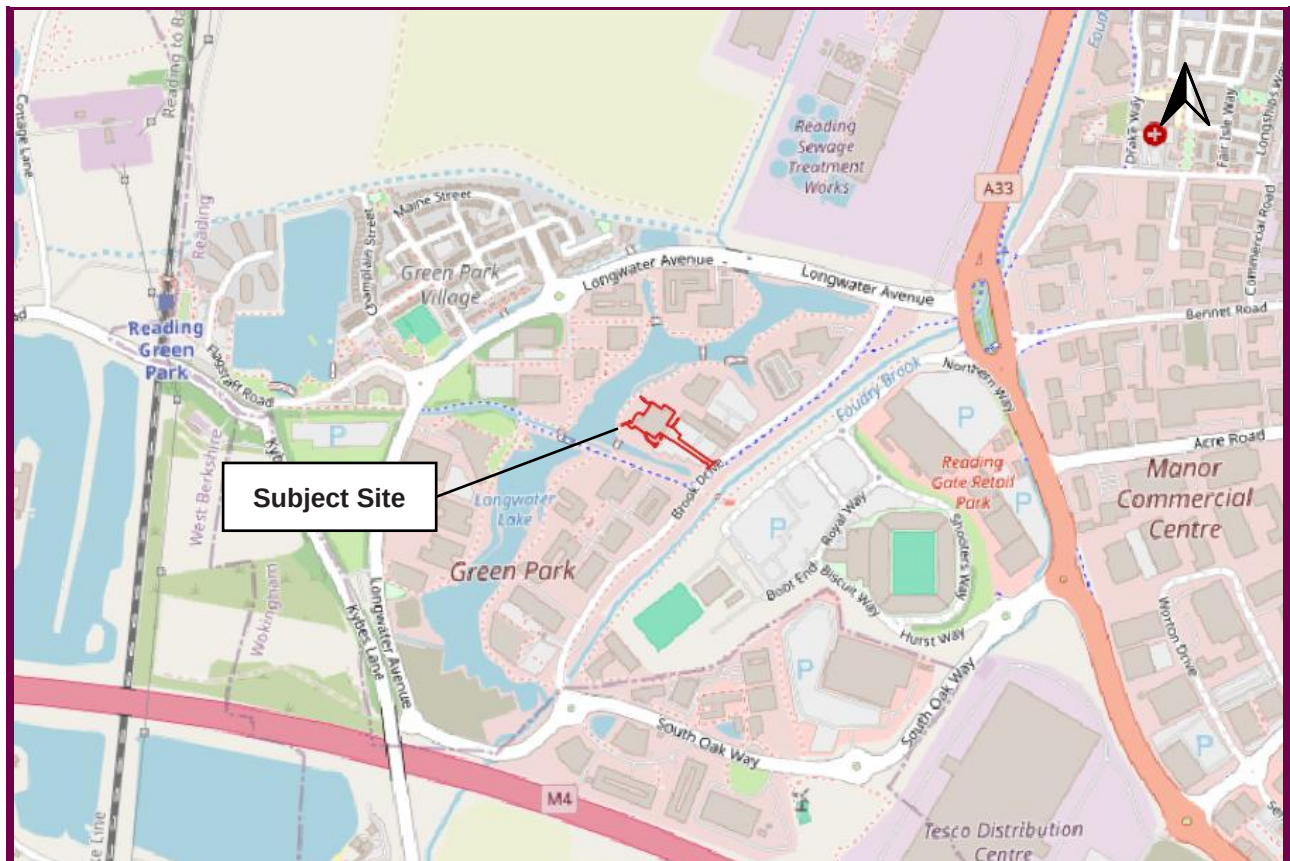
Internal Drainage Board

- 3.5 The site is not located within an IDB District.

4 SITE DESCRIPTION

Site Description

- 4.1 The site is located at National Grid Reference SU 70379 70006, is irregular in shape and occupies an area of approximately 0.402 hectares (ha). The site location is presented in Figure 1.



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Figure 1. Site Location

- 4.2 The site is currently occupied by a commercial office building, associated access road and soft landscaping features. The commercial office building comprises open plan office space over the ground floor and three upper floors. Located to the north and west of the site are areas of soft landscaping consisting of grass, bushes and trees.
- 4.3 Vehicular and pedestrian access to the site is via Brook Drive to the south-east of the site.
- 4.4 The Proportion of areas across the site are approximately hardstanding ~ 35%, building cover ~55% and soft landscaping ~ 10%.

Surrounding Land Uses

- 4.5 The site is located in the suburb of Green Park, Reading, within Green Park Business Park. The area is primarily comprised of office and commercial units. Located approximately 300m to the southeast of the site is Madejski Stadium. Brook Drive bounds the south-eastern extent of the site. Foudry Brook is present approximately 30m south east of the site. Meadowed landscaped lake features which are hydrologically connected to the Foudry Brook and utilised as a flood relief channel are present at the north western and southern boundary. There are no designated sensitive areas (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA) or Site of Special Scientific Interest (SSSI)) within close proximity to the site.

Topography

- 4.6 A topographic survey was completed by Warner Survey in December 2023 (Drawing reference: RT223/0109/P/0001) and indicates that the paving in front of the buildings entrance slopes away towards the centre of the site from around 39.79 metres above ordnance datum (m AOD) to 39.5 m AOD. The access road slopes down towards the centre of the road at 39.53m AOD and then raises again to 40.30m AOD at the south east end. Behind the building, the grassed area in the north west of the site appears to gradually slope north west from approximately 39.60 m AOD to around 37.77 m AOD towards the water's edge associated with the lake features.
- 4.7 The topographic survey is located in Appendix D.

5 PROPOSED DEVELOPMENT

- 5.1 The proposed development is for the construction of shelters and upgrade of pathways within the site boundary. The development will contain the following features:
- CCTV/ANPR columns;
 - Footpath upgrades;
 - Smoking shelter;
 - EV bike shelter;
 - Bollards; and
- 5.2 Planters. Development plans are shown in Appendix C.
- 5.3 Vehicular and pedestrian access will remain as existing via Brook Drive.
- 5.4 The Proportion of areas across the site will remain as existing with approximately 35% hardstanding, 55% building cover and 10% soft landscaping
- 5.5 The proposed use of the site will remain as 'less vulnerable' within the PPG.
- 5.6 Surface water runoff is anticipated to remain as existing. The acceptable discharge rate to the existing mains sewer will have already been agreed with Thames Water and the proposed development will not increase surface water runoff rates from the site.

6 HYDROLOGICAL SETTING

Nearby Watercourses

- 6.1 OS Mapping indicates that the nearest designated EA Main river is the Foudry Brook which is present approximately 30m south east of the site and flows in a north eastern direction until it joins the River Kennet approximately 1.3 km north east of the site.
- 6.2 Meadowed landscaped lake features called Longwater Lake, are present at the north western and southern site boundary. These features are hydrologically connected to the Foudry Brook approximately 475 m south of the site and the River Kennet approximately 200 m north east of the site and are utilised as flood relief channels to provide areas for conveyance and flood storage.
- 6.3 No reservoirs have been identified within 1km of the site.
- 6.4 Located approximately 1.3 km to the west of the site is Englefield Lagoon and Farnham Flint Lake. Burghfield Lake is located 1.8 km to the north-west of the site.
- 6.5 Fobney Island Nature Reserve which contains pond features, is located 1km to the north of the site.



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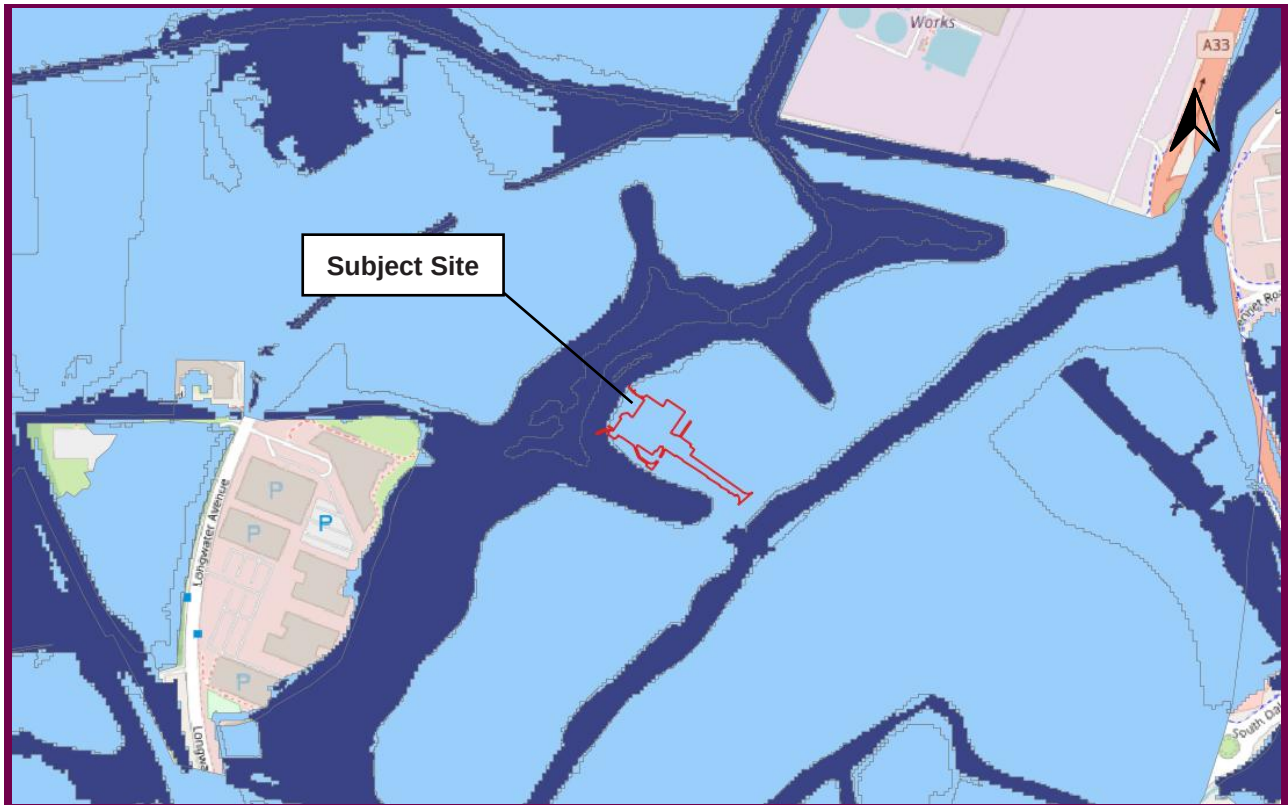
Figure 2. Hydrological Features

Fluvial / Tidal Flood Risk Classification

- 6.6 The EA Flood Map for Planning (available online) indicates that the whole site is located within Flood Zone 2, with the exception of the western footpath at the back of the building which is partially located in FZ3. The annual probability from fluvial or tidal sources is classified as the following:
- **Flood Zone 1:** land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (0.1%).

- **Flood Zone 2:** land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
- **Flood Zone 3:** land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

6.7 The EA Flood Map for Planning is provided in Figure 3.



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Figure 3. EA Flood Map for Planning

Environment Agency Detailed Flood Data

6.8 The EA has provided Product 4 data for the site (Reference: THM359293), detailing the modelled flood extents, floodplain heights and the modelled Nodes Map in-channel and within the site boundary. The modelled information is derived from the Kennet (Tyle Mill to Thames Confluence) 2018 model. The study was carried out using the 1D-2D modelling software (Tuflow). The full response is included in Appendix A and summarised below.

- The EA confirmed that the majority of site was located in Flood Zone 2, with a minimal linear area to the west in FZ3.
- Historic flood mapping indicates that the site has been flooded 3 times, in June 1971, October 1993 and January 2003. The source of flooding was as a result of the Foudry Brook channel capacity being exceeded. The 1971 flood event affected the entire site and 1993 flood extent was located on the south eastern boundary of the site. The 2003 event affected the north portion of the site.
- The site is not currently protected by any formal defences such as flood walls. The site does not currently have any flood alleviation works planned for the area.

- Modelling results include in-channel flood flows and flood levels for the Foudry Brook and associated Flood Relief Channel. Table 2 extracts the provided flood level information from selected nodes adjacent to the site vicinity.

Table 2. In Channel Flood Levels from the Kennet (Tyle Mill to Thames Confluence) 2018 Flood Model

In-Channel Node		Flood Level (m AOD)		
Node Label	Location	1 in 100 Year Event	1 in 1,000 Year Event	1 in 100 year + 35% CC Event
061_22_2018_001GPDC3_198i.2	South of the site (within Foudry Brook flood relief channel that extends south)	38.90	39.23	39.17
061_22_2018_001GPDC3_198.2		38.90	39.23	39.17
061_22_2018_001GREE1_1317.1	North west of the site (within Foudry Brook flood relief channel)	38.89	39.23	39.17
061_22_2018_001GREE1_1235.1		38.89	39.23	39.17
061_22_2018_001FOUD1_1510.1	South east of the site (within Foudry Brook channel)	38.91	39.23	39.17
061_22_2018_001FOUD1_1620.2		38.91	39.23	39.17

- In addition to in-channel nodes, modelled Floodplain Levels were provided for three locations around the site – near the north west, southern and south west site boundaries. Table 3 provides the flood level information for each flood plain node. The node locations are provided in Appendix A.

Table 3. Site Floodplain Flood Levels from the Kennet (Tyle Mill to Thames Confluence) 2018 Flood Model

Flood Point	Flood Level (m AOD)		
	1 in 100 Year Event	1 in 1,000 Year Event	1 in 100 year + 35% CC Event
Flood Point 1	38.89	39.23	39.17
Flood Point 2	38.90	39.23	39.17
Flood Point 3	No data	No data	No data

- Flood outlines for the 1 in 5-year (20% AEP), 1 in 20-year (5% AEP), 1 in 100-year (1% AEP), 1 in 1,000-year (0.1% AEP), 1 in 100-year + 15% CC, + 25% CC, +35% CC and 70% CC fluvial flood events were also provided:

- Small linear areas outside the site boundary are impacted by flooding for different return periods. However, the site itself within the redline boundary is not affected with the exception of minor areas of the western footpath which are impacted by the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) events.
- As outlined above, the central estimate is used when assessing the requirements for climate change, for the site and therefore required to assess against a 1 in 100 + 32% scenario. The modelled flood levels for the 1 in 100 year + 35% have been used, and viewed as a conservative measure.
- Hazard mapping was provided for the 1 in 100 + 25% CC and + 70% CC scenario only, not the 35% CC.
 - During the 1 in 100-year + 25% CC and 1 in 100-year + 70% CC fluvial flood events, the site is at 'very low' hazard, and the footpath to the west has hazard rating of "Danger to some" with a small section of "Danger to most" The access road to the south east, is not affected.
 - It is noted that the EA data displayed in Appendix A was provided for a wider site extent and meanwhile the application site boundary has been reduced in size. As a result, the main part of the current development site is not within the floodplain for the return periods provided by the EA, except for the small footpath to the west.
 - In addition, it is also noted that while the EA Flood Map for Planning indicates that the site is in FZ2, the predicted model flood level for the 1 in 1000 year event in the area of the site is 39.23m AOD, and the site specific topographical survey shows that the recorded ground levels are in the range of 36.6m AOD, except for the western part of the site which sloped towards the river bank. This suggests that the ground levels across the main part of the site are above the predicted maximum flood level and therefore the majority of the site, including the building are located within Flood Zone 1.

Flood Defences

- 6.9 Although the EA stated that there are no formal flood defences in the vicinity of the site, Spatial AIMS Defence Asset data shows that informal flood defences are located to the north west of the site, along Longwater Lake. The defences are in the form of Natural High Ground, Asset ID 93852. The natural high ground provides fluvial protection. The design standard of protection (SoP) offered by this defence is 2 years, the conditions of the defence and the asset owners are unknown.
- 6.10 Located to the south west of the site, along Foundry Brook, further flood defences are present, Asset ID 10637. These defences are also in the form of Natural High Ground. The defences also provide fluvial protection and are maintained by the EA. The defences currently have a condition of 3 'Fair' with a target condition of 3 'Fair'. The design SoP offered by these defences is 2 years.

EA Flood Warning Area

- 6.11 The EA defines a Flood Warning Area as *"geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater."*
- 6.12 The site is located in the Flood Warning Area "Foundry Brook from Stratfield Mortimer to Green Park".

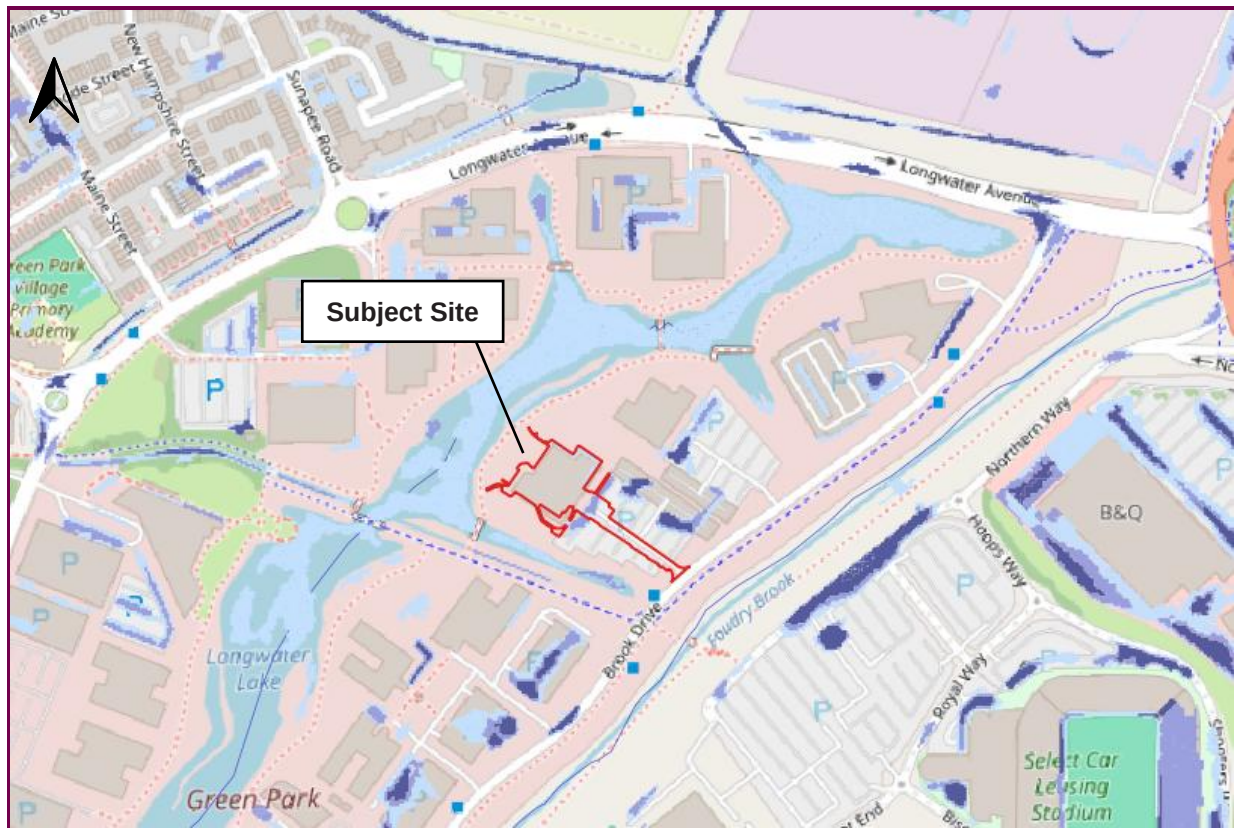
Surface Water Flood Risk Classification

- 6.13 The EA's updated Flood Map of Surface Water, which is available online, identifies areas at risk of surface water flooding. The classification of the risk is based on the following:
- **High risk:** The area has a chance of flooding of greater than 1 in 30 (3.3%) each year.

- **Medium risk:** The area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) each year.
- **Low risk:** The area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) each year.
- **Very low risk:** The area has a chance of flooding of less than 1 in 1000 (0.1%) each year.

6.14 The updated Flood Map for Surface Water indicates that the majority of the site is classified as being at a 'very low risk', of flooding from this source. There is a small linear area crossing the access road near the building entrance in the south east indicated to have "medium risk" of flooding, most likely associated with the slightly lower ground levels at this location. However, the depth map does not show any modelled flood depth at this location, suggesting that the predicted flooding would be very shallow and therefore negligible. The results are similar for the climate change scenario.

6.15 The updated Flood Map for Surface Water is presented in Figure 4.



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Figure 4. Updated Flood Map for Surface Water

Reservoir Flood Risk Classification

6.16 EA mapping also indicates that the site is not located within an area potentially at risk from reservoir flooding.

Local Authority Flood Risk Assessment

6.17 The Reading Borough Council Level 1 SFRA was published in June 2017. It provides an overview of flood risk from various sources within the borough. Information relevant to this assessment is summarised below:

- Longwater Lake is also referred to as Long Water Flood Relief Channel. Longwater is a flood storage and conveyance area that contains water at/below the ground level of the surrounding

area. As such the topography of the area eliminates any risk of 'breach' and in the event of a failure of any control structures the feature would drain into the surrounding fluvial system;

- The Green Park Flood Management Strategy (GPFMS) is a flood plan management scheme, which alleviates the existing flooding of Longwater Flood Relief Channel and dedicated flood storage areas. The provision of these measures allows the development over Green Park to be at or above the 1 in 200 annual probability flood level;
- The SFRA confirms that the site is located wholly within Flood Zone 2;
- The site is located within the EA Historic Floodplain Maps with a record of historic fluvial flooding in October 1993, and June 1971. There was also historic flooding recorded on the border of the site boundary during January 2003;
- The Level 1 SFRA makes reference to the Reading Complex Change Study (2011) and Lower Kennet Study (2007) to model the flood extents at the site.
 - The flood extents for the modelled scenarios including climate change do not appear to encroach the site boundary, except for the far western section of the footpath.
- DG5 register mapping indicated that Thames Water hold 1-5 incidents of sewer flooding incidents within the 'RG6 2' postcode area. However flood incidence mapping indicates that no sewer flood records are held at the site location;
- The SFRA indicates that the site appears to be at 'very low' risk from surface water flooding;
- The site has a potential groundwater vulnerability, which is deemed as a Minor Aquifer with High Permeability;
- The SFRA confirms that the site is situated on a Secondary A Aquifer for the superficial and bedrock deposits;
- The site has 75% chance or more of being susceptible to groundwater flooding.

The Reading Borough Council Level 2 SFRA was published in December 2017. It did not provide any relevant information relating to the site and therefore was not included.

7 HYDROGEOLOGICAL SETTING

- 7.1 British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is situated on superficial deposits of Beenham Grange Gravel Member which is formed of Sand and Gravel. This is underlain by a bedrock geology of Lambeth Group which is formed of Clay, Silt and sand.
- 7.2 Previous ground investigations at the site have been undertaken, these have been included and recorded within the Phase 1 Liability Report carried out by RPS, produced in 2024 and included as Appendix E. Geotechnical Information by Peter Brett Association (PBA) January 1998 confirmed that groundwater was typically encountered at each exploratory hole at depths of around 1.0m bgl and 1.8m bgl. The monitoring carried out indicated that groundwater flow direction is to the east.
- 7.3 A site investigation by LBH Wembley 1998 confirmed that groundwater strikes were encountered at various levels within the Woolwich and Reading Formation but confirmed the absence of perched water at shallow depths.
- 7.4 The Phase 1 Liability Report also indicated that the underlying groundwater has been classified as having 'good' chemical quality and multiple potable groundwater abstractions have been identified, the closest being located 455 m west.
- 7.5 The soils are described as 'Loamy and clayey floodplain soils with naturally high groundwater' by the National Soils Research Institute.
- 7.6 According to the EA's Aquifer Designation Mapping, the strata at the surface and the bedrock are classified as a Secondary A Aquifer. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
- 7.7 EA online groundwater Source Protection Zone (SPZ) mapping indicates that the site is not located within a groundwater SPZ.

8 FLOOD RISK AND MITIGATION

8.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial / Tidal Flooding

- 8.2 Fluvial flooding (flooding from rivers) occurs when water levels in watercourses rise higher than bank levels, causing floodwater to spill across the adjacent land.
- 8.3 The EA Flood Map for Planning, as seen in Figure 3, indicates that the site is located within Flood Zone 2 with a very small marginal area of the footpath to the west within Flood Zone 3. The annual probability of flooding within Flood Zone 2 is classified as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), and Flood Zone 3 land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), in the absence of any defences.
- 8.4 However, as mentioned in Section 6.8 above, the predicted model flood level provided by the EA for the 1 in 1000 year event in the area of the site is 39.23m AOD, and the site specific topographical survey shows that the recorded ground levels are in the range of 36.6m AOD, except for the western part of the site which slopes down towards the river bank. This suggests that the ground levels across the main part of the site are above the predicted maximum flood level and therefore the majority of the site is in reality within Flood Zone 1.
- 8.5 The site is afforded protection from Natural High Ground flood defences along the Foundry Brook and its associated flood relief channel to the south and north west of the site, respectively. The defences offer a SoP of 2 (50% in any given year) against flooding. Detailed information has been requested from the EA, and their response is provided in Appendix A.
- 8.6 The Level 1 SFRA states that the Long Water Flood Relief Channel, located to the north of the site, eliminates any risk of a breach scenario, however in the event of a failure any water would drain into the surrounding fluvial system.
- 8.7 The Level 1 SFRA indicated that the area to the south of the site is affected by the 1 in 5 (20% AEP) flood extent however the site itself appears to be out of the flood extent. The site is not affected during the 1 in 20 (5%) event and the 1 in 100 (1%) event. In the Climate change scenarios, the 1% + 25% CC and 35% CC, the flood extent extends into the site from the southern boundary but the site building still appears to remain out of the modelled flood extents.
- 8.8 The site is located within the EA Historic Floodplain Map and has a record of historic fluvial flooding in August 2003, October 1993 and June 1971.
- 8.9 The western proposed upgraded footpath is located within the modelled flood extents and appears to be affected by the 1 in 100-year + CC extents. In the event of flooding, it is recommended that site users do not use the affected footpath and take refuge in the east of the site.
- 8.10 The proposal include the construction of gravel paths across the site replacing the existing grass-concrete pathways. No land raising is proposed along the new pathways.
- 8.11 The PPG details the suitability of different land uses within each flood zone. The proposed land use is classified as 'less vulnerable' and such uses are generally considered appropriate within Flood Zone 2.
- 8.12 Additionally, as the majority of the site will remain as existing except for the proposed development of the pathways, it is thought that the development will not increase the number of users at the site thus not increasing its vulnerability.
- 8.13 Overall, the site can be considered to be at 'moderate' risk of fluvial flooding. With consideration of the mitigation actions, the residual risk can be considered 'low'. The proposal will not increase flood risk at the site and surrounding areas.

Flooding from Sewers

- 8.14 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity. The site is currently served by Thames Water (detailed in Section 8).
- 8.15 The SFRA has indicated that there have been 1-5 incidences of sewer flooding within the RG2 6 post code. However, this information is not site specific.
- 8.16 As the development is footpaths upgrades and shelters, the risk from sewer flooding can be considered low.

Surface Water Flooding (Overland Flow)

- 8.17 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems. The EA Surface Water Flood Risk Map indicates that the site is predominantly located within an area as being at 'very low risk'. There is a small linear area crossing the access road near the building entrance indicated to have "medium risk" of flooding, most likely associated with the slightly lower ground levels at this location. However, the depth map does not show any modelled associated flood depth at this location, suggesting that the predicted flooding would be very shallow, below the modelling threshold of approximately 0.1m and therefore negligible.
- 8.18 The implementation of the pathway is not expected to increase the risk of surface water flooding at the site.
- 8.19 Overall, the risk from surface water flooding is deemed to be 'low'.

Groundwater Flooding

- 8.1.1 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures. BGS mapping indicates that the site is situated on superficial deposits of Beenham Grange Gravel Member, which is underlain by a bedrock geology of Lambeth Group.
- 8.1.2 The LBH Wembley 1998 site investigation confirmed that groundwater strikes were encountered but confirmed the absence of perched water at shallow depths. The site investigation by PBA confirmed that groundwater was typically encountered at each exploratory hole at depths of around 1.0m bgl and 1.8m bgl.
- 8.1.3 As the development is for implementation of a gravel pathway, the depth of the paths are unlikely to reach the depths of any potential groundwater at 1 – 1.8m bgl.
- 8.1.4 Overall, the risk from groundwater flooding to the proposed works can be deemed to be low.

Other Sources

- 8.20 The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

Proposed Mitigation

- 8.21 Any staff or visitors to the site should be registered the EA's Flood Warning and Flood Alert Service.

Event Exceedance

- 8.22 The mitigation measures proposed as part of the development scheme are considered appropriate to help mitigate against event exceedance scenarios.

9 SEQUENTIAL TEST AND EXCEPTION TEST

Sequential Test

- 9.1 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding. Given that the subject site has not been allocated as one of the Council's proposed future development sites, it has not been specifically assessed within the SFRA. Therefore, the Sequential Test is based on the EA Flood Zones and information contained within the SFRA.
- 9.2 The proposed development is appropriate within Flood Zone 2 and partially Flood Zone 3a as it constitutes 'less vulnerable' development under the NPPF. In addition, it is noted that the proposed works are to serve the existing infrastructure in place. Therefore, the development could not be located elsewhere and sequentially this is the only reasonable location available for the proposed development.
- 9.3 Modelled flood data also indicates that the majority of the site including the building and its access is located within Flood Zone 1 as it will not be impacted during the 1 in 1000-year flood event.

The Exception Test

- 9.4 According to Table 3 of the PPG to the NPPF, 'less vulnerable' developments are considered appropriate within Flood Zone 2 and Flood Zone 3a without the requirement to apply the Exception Test. In addition, as modelled flood data indicates that the majority of the site is in Flood Zone 1, the application of the Exception Test is not required for the proposed development.

10 SUMMARY AND CONCLUSIONS

- 10.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in the NPPF. Reference has also been made to the SFRA and consultation with the EA's Partnership and Strategic Overview Team.
- 10.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in Table 2.

Table 4. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed	Residual Risk		
	L	M	H		L	M	H
Fluvial	✓			Site management and site users to sign up to EA Flood Alerts and Warnings	✓		
Tidal	✓			No further recommendations required	✓		
Sewers	✓				✓		
Surface Water	✓				✓		
Groundwater	✓				✓		
Other Sources (e.g. reservoirs, water mains)	✓				✓		

- 10.3 The site is located within Flood Zone 2 and partially within Flood Zone 3. Although the site is not within a recognised area which benefits from formal flood defences, Spatial AIMS defence data shows that there are 'informal' flood defences in the vicinity of the site with a 1 in 2-year standard of protection.
- 10.4 When climate change allowances are included, during the 1% + 25% CC and 35% CC event, the flood extent slightly encroach into the site, impacting the pedestrian access to the west, the site building still appears to remain out of the flood extent.
- 10.5 EA Surface Water flood modelling indicates that the site has a 'very low' risk from surface water flooding.
- 10.6 Overall, it has been demonstrated that the proposal would be safe, without increasing flood risk elsewhere.

APPENDICES

Appendix A

EA Detailed Flood Data

Product 4 (Detailed Flood Risk) for RG2 6UA

Our Ref: THM359293

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

- i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
- ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;

Statutory (Sealed) Main River (where available within map extents);

A table showing:

- i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
- ii) Flood defence locations unique identifiers and attributes; (supplied separately)
- iii) Historic flood events outlines unique identifiers and attributes; and
- iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

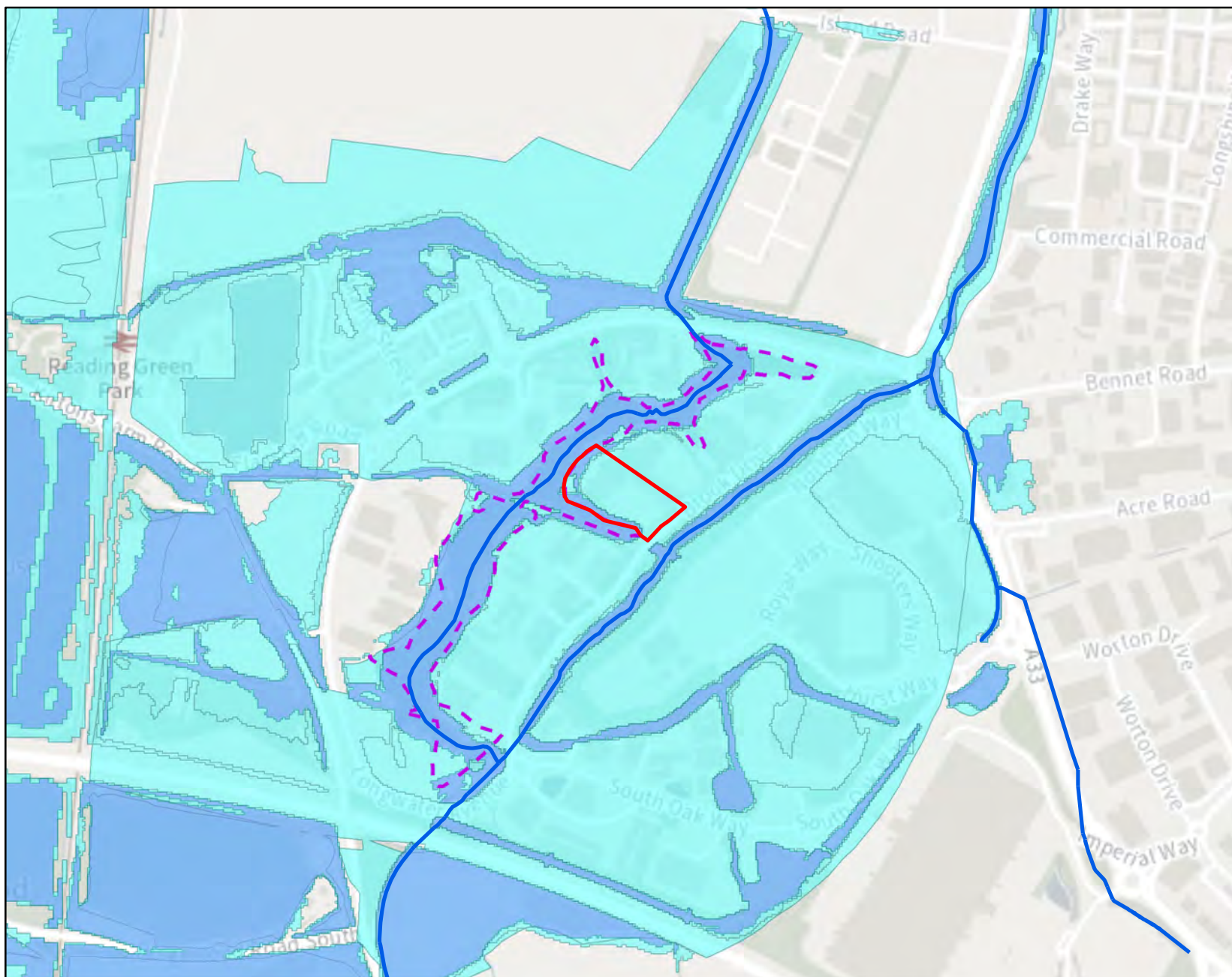
<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

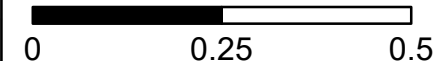
<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Flood map for planning centred on RG2 6UA

Created on 22/05/2024 REF: THM359293



Kilometres



Legend

- Statutory Main Rivers
- Site location
- Flood Map - Flood defences
- Flood Map - Flood Storage Areas
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Defence information

Defence Location: No defences on Main River

Description: This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

THM359293

Model: **Kennet (Tyle Mill to Thames Confluence) 2018**

Description: The information provided is taken from the Kennet (Tyle Mill to Thames confluence) 2018. The study was carried out using 1D-2D modelling software (Flood modeller-Tuflow).

Model design runs:

1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 30/ 3.3% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP; 1 in 100+15% / 1% + 15% AEP with climate change; 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; and 1 in 1000 / 0.1% AEP.

Mapped Outputs:

1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 30/ 3.3% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP; 1 in 100+15% / 1% + 15% AEP with climate change; 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; and 1 in 1000 / 0.1% AEP.

Modelled in-channel flood flows and levels

THM359293

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

Node label	Model	Easting	Northing	Flood Levels (mAOD)								0.1% AEP
				20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+15% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	
061_22_2018_001FOUD1_1510.1	Kennet (Tyle Mill to Thames Confluence) 2018	470568	169936	38.41	38.66	38.71	38.91	39.02	39.10	39.17	39.37	39.23
061_22_2018_001FOUD1_1620.2	Kennet (Tyle Mill to Thames Confluence) 2018	470488	169869	38.41	38.66	38.71	38.91	39.02	39.10	39.17	39.37	39.23
061_22_2018_001FOUD1_1729.1	Kennet (Tyle Mill to Thames Confluence) 2018	470425	169776	38.41	38.66	38.71	38.91	39.02	39.10	39.17	39.38	39.24
061_22_2018_001GPDC3_1981.2	Kennet (Tyle Mill to Thames Confluence) 2018	470411	169920	38.37	38.63	38.68	38.90	39.01	39.10	39.17	39.38	39.23
061_22_2018_001GPDC3_198.2	Kennet (Tyle Mill to Thames Confluence) 2018	470357	169941	38.37	38.63	38.68	38.90	39.01	39.10	39.17	39.38	39.23
061_22_2018_001GREE1_1648.2	Kennet (Tyle Mill to Thames Confluence) 2018	470153	169883	38.38	38.64	38.69	38.90	39.01	39.10	39.17	39.38	39.23
061_22_2018_001GPDC3_198.1	Kennet (Tyle Mill to Thames Confluence) 2018	470230	169968	38.37	38.63	38.68	38.89	39.01	39.10	39.17	39.37	39.23
061_22_2018_001GREE1_1317.1	Kennet (Tyle Mill to Thames Confluence) 2018	470298	170035	38.37	38.63	38.68	38.89	39.01	39.10	39.17	39.37	39.23
061_22_2018_001GREE1_1235.1	Kennet (Tyle Mill to Thames Confluence) 2018	470358	170091	38.37	38.63	38.68	38.89	39.01	39.10	39.17	39.37	39.23

Node label	Model	Easting	Northing	Flood Flows (m3/s)								0.1% AEP
				20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+15% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	
061_22_2018_001FOUD1_1510.1	Kennet (Tyle Mill to Thames Confluence) 2018	470568	169936	1.58	1.83	1.88	2.11	2.23	2.32	2.36	2.56	2.43
061_22_2018_001FOUD1_1620.2	Kennet (Tyle Mill to Thames Confluence) 2018	470488	169869	1.59	1.86	1.92	2.13	2.24	2.35	2.39	2.58	2.47
061_22_2018_001FOUD1_1729.1	Kennet (Tyle Mill to Thames Confluence) 2018	470425	169776	1.68	1.96	2.03	2.20	2.34	2.43	2.48	2.66	2.57
061_22_2018_001FOUD1_1820.1	Kennet (Tyle Mill to Thames Confluence) 2018	470411	169920	0.01	0.01	0.01	0.01	0.02	0.04	0.07	0.26	0.08
061_22_2018_001GPDC3_198.2	Kennet (Tyle Mill to Thames Confluence) 2018	470357	169941	0.05	0.05	0.05	0.05	0.07	0.14	0.15	0.14	0.15
061_22_2018_001GREE1_1648.2	Kennet (Tyle Mill to Thames Confluence) 2018	470153	169883	9.59	12.32	12.77	13.36	13.66	14.10	14.90	20.26	16.06
061_22_2018_001GPDC3_198.1	Kennet (Tyle Mill to Thames Confluence) 2018	470230	169968	9.64	12.43	12.81	13.37	13.53	14.13	15.10	20.29	16.23
061_22_2018_001GREE1_1317.1	Kennet (Tyle Mill to Thames Confluence) 2018	470298	170035	9.51	12.28	12.63	13.12	13.30	13.90	14.72	20.07	15.99
061_22_2018_001GREE1_1235.1	Kennet (Tyle Mill to Thames Confluence) 2018	470358	170091	9.47	12.19	12.50	13.04	13.21	13.87	14.73	20.25	16.02

Note:

Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

Modelled floodplain flood levels

THM359293

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)								
				20% AEP	5% AEP	3.3 AEP	1% AEP	1% AEP (+15% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
Flood Point 1	Kennet (Tyle Mill to Thames Confluence) 2018	470333	170030	38.37	38.63	38.68	38.89	39.01	39.10	39.17	39.37	39.23
Flood Point 2	Kennet (Tyle Mill to Thames Confluence) 2018	470384	169941	38.37	38.63	38.68	38.90	39.01	39.10	39.17	39.38	39.23
Flood Point 3	Kennet (Tyle Mill to Thames Confluence) 2018	470467	169941	No data	No data	No data	No data	No data	No data	No data	No data	No data

This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:

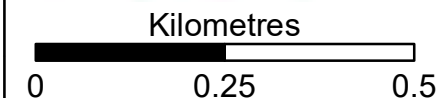
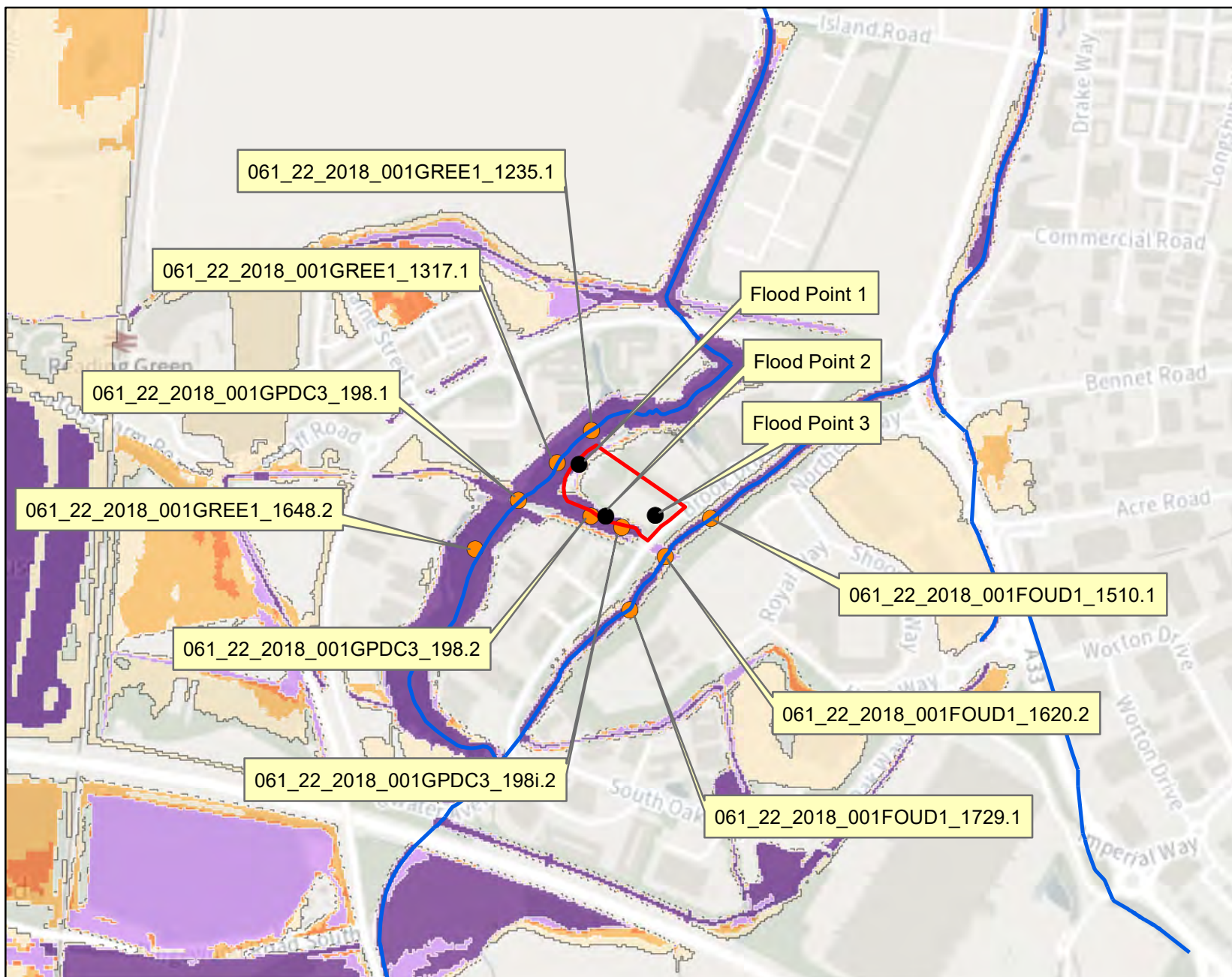
Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Detailed FRA map 1 centred on RG2 6UA

Created on 23/05/2024 REF: THM359293



Legend

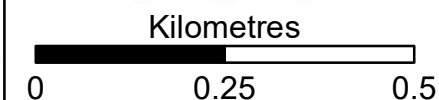
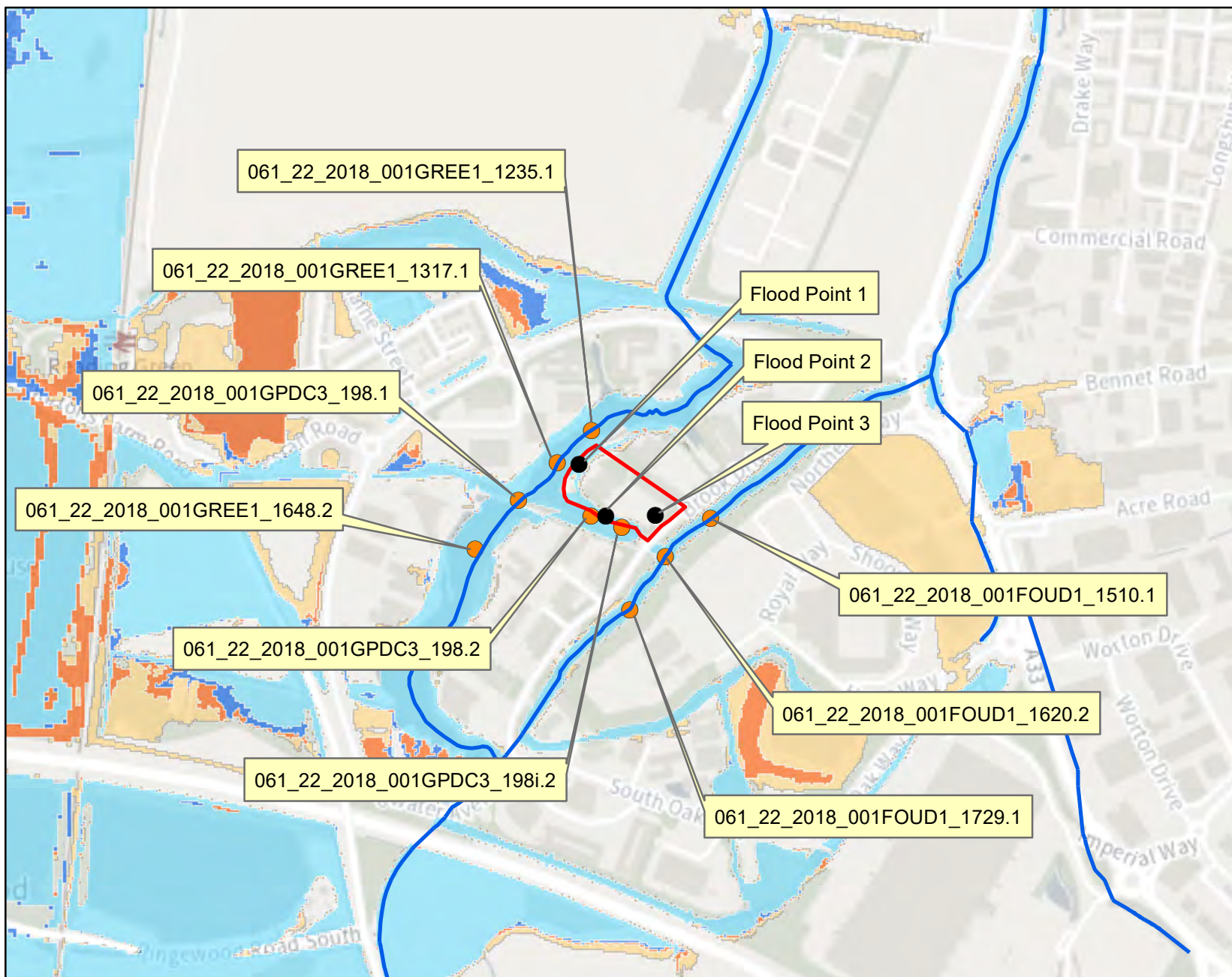
- Statutory Main Rivers
- Site location
- Model nodes
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 3.3% AEP Flood Outline
- 1% AEP Flood Outline
- 0.1% AEP Flood Outline

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occurring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Detailed FRA map 2 centred on RG2 6UA

Created on 23/05/2024 REF: THM359293



Legend

- Statutory Main Rivers
- Site location
- Model nodes
- 1%+15% CC AEP Flood Outline
- 1%+25% CC AEP Flood Outline
- 1%+35% CC AEP Flood Outline
- 1%+70% CC AEP Flood Outline

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occurring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Historic flood data

THM359293

Our records show that the area of your site has been affected by flooding.
Information on the floods that have affected your site is provided in the table below:

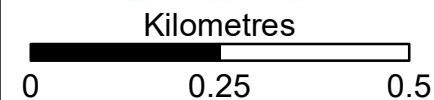
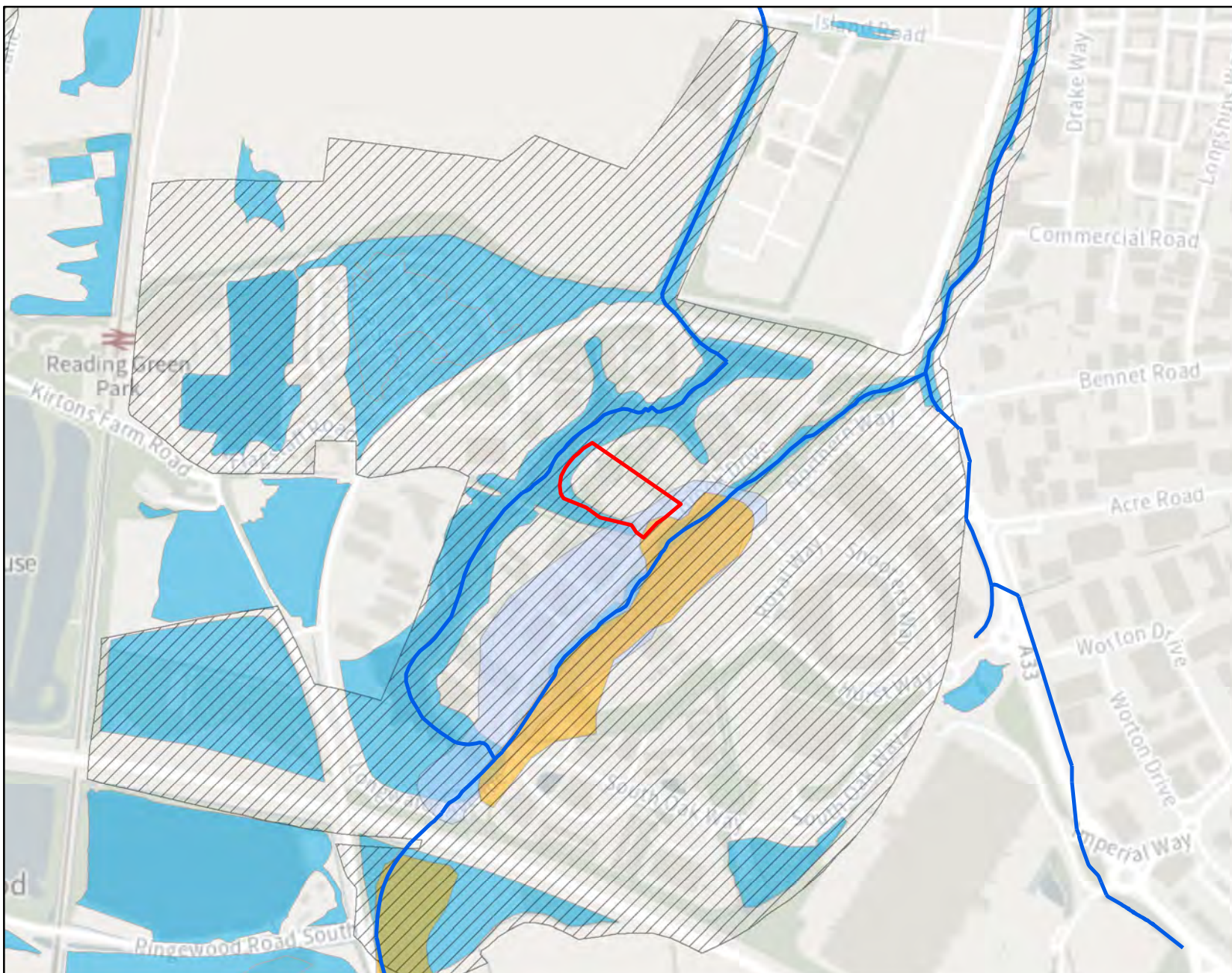
Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0619710600031	06JuneSummer1971	01/01/1971	12/12/1971	main river	channel capacity exceeded (no raised defences)
EA0619920900195	06SeptemberAutumn1992	01/01/1992	12/12/1992	main river	channel capacity exceeded (no raised defences)
EA0619931000115	06OctoberAutumn1993	01/01/1993	12/12/1993	main river	channel capacity exceeded (no raised defences)
EA0620030102035	06JanuaryNewYear2003	23/12/2002	12/01/2003	main river	channel capacity exceeded (no raised defences)

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

Historic flood map centred on RG2 6UA

Created on 22/05/2024 REF: THM359293



Legend

— Statutory Main Rivers

□ Site location

year

▨ 1971

■ 1992

■ 1993

■ 2002/2003

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Hazard Mapping

Hazard Mapping methodology:

To calculate flood hazard with the debris factor we have used the supplementary note to Flood Risk to People Methodology (see below).

The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

Where HR = flood hazard rating

d = depth of flooding (m)

v = velocity of floodwaters (m/sec)

DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

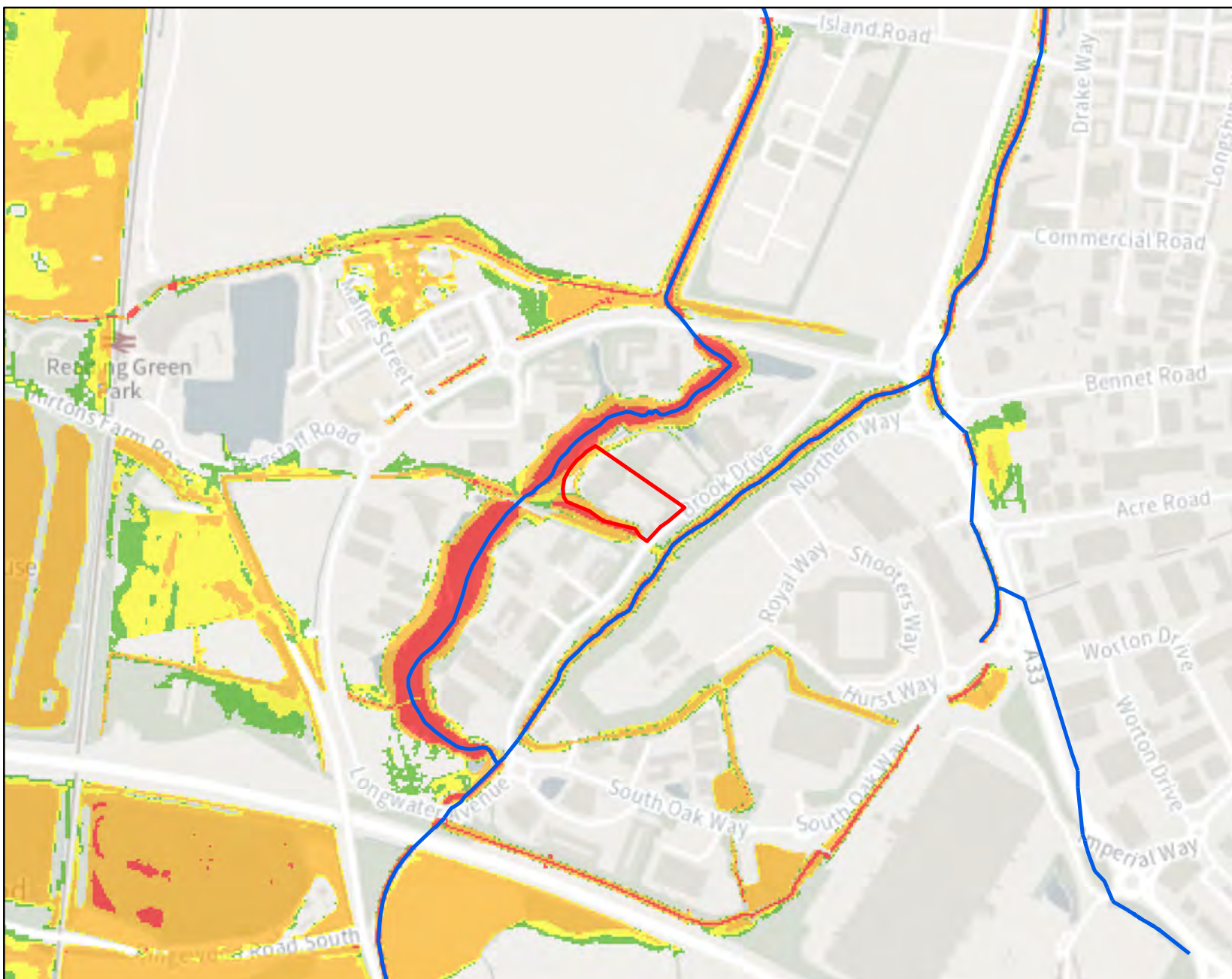
The resultant hazard rating is then classified according to:

Flood Hazard	Colour	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some - includes children, the elderly and the infirm
1.25 to 2.0		Danger for most - includes the general public
More than 2.0		Danger for all - includes the emergency services

REF: HR Wallingford and Environment Agency (May 2008) Supplementary note of flood hazard ratings and thresholds for development planning and control purpose – Clarification of the Table 113.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1

Hazard map (for the 1%+25% climate change scenario) centred on RG2 6UA

Created on 22/05/2024 REF: THM359293



Kilometres

0 0.25 0.5

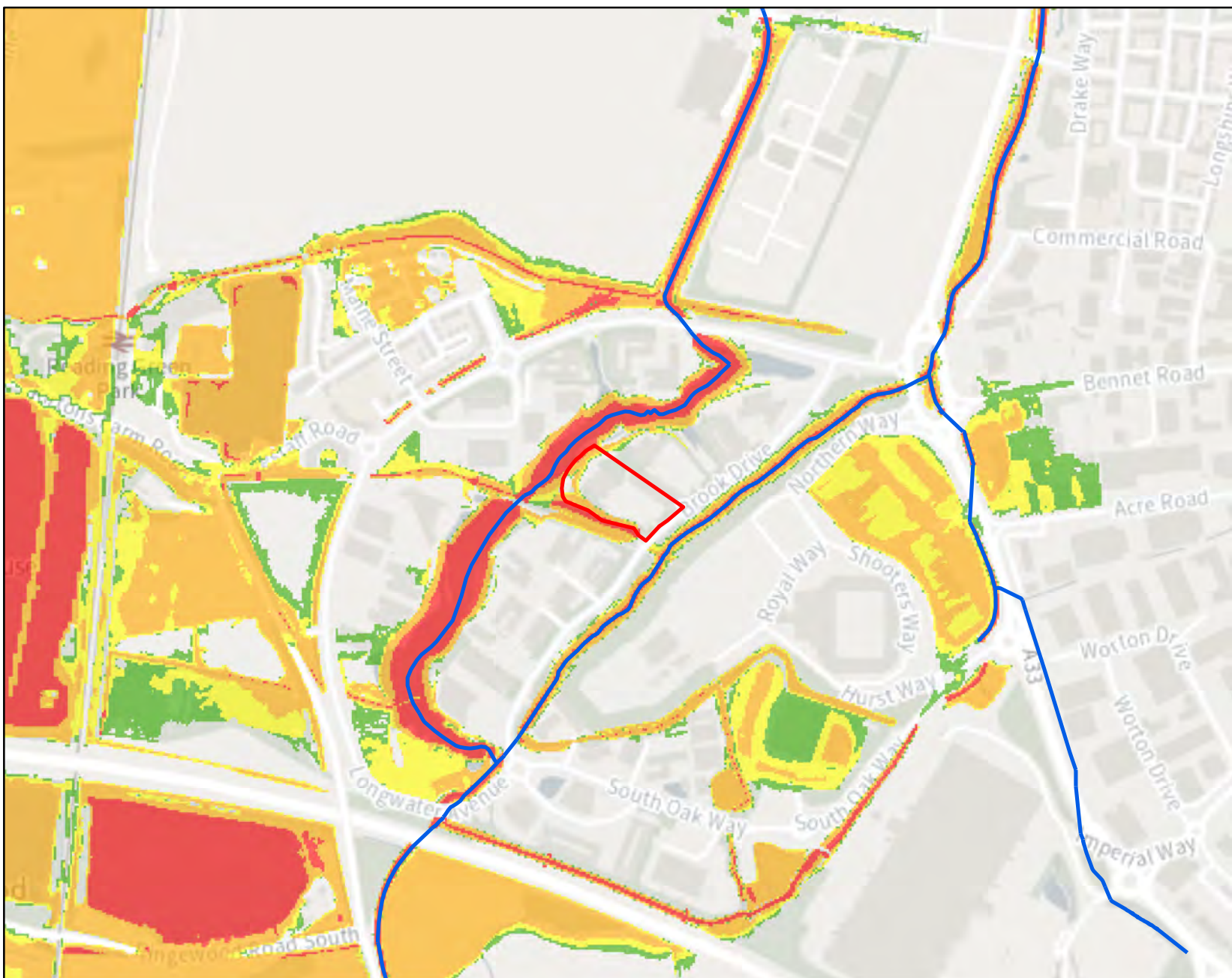
Legend

- Statutory Main Rivers
- Site location
- Low hazard
- Danger to some
- Danger to most
- Danger to all

For hazard and debris factor we used HR Wallingford and Environment Agency (May 2008) supplementary note on flood hazard ratings and thresholds for development planning and control purpose. The following calculation is used:
 $HR = d \times (v+0.5) + DF$
HR = flood hazard rating
d = depth of flooding (m)
v = velocity of floodwaters (m/sec)
DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

Hazard map (for the 1%+70% climate change scenario) centred on RG2 6UA

Created on 22/05/2024 REF: THM359293



Kilometres

0 0.25 0.5

Legend

- Statutory Main Rivers
- Site location
- Low hazard
- Danger to some
- Danger to most
- Danger to all

For hazard and debris factor we used HR Wallingford and Environment Agency (May 2008) supplementary note on flood hazard ratings and thresholds for development planning and control purpose. The following calculation is used:
 $HR = d \times (v+0.5) + DF$
HR = flood hazard rating
d = depth of flooding (m)
v = velocity of floodwaters (m/sec)
DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

Appendix B

LLFA Response

From: [Cook, Darren](#)
To: [Shean, Sam](#); [Hancox, Tomas](#)
Cc: [Morley, Jonathan](#)
Subject: RE: Flood Information Request - 250 Brook Drive, Reading, RG2 6UA
Date: 02 May 2024 16:51:11
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.jpg](#)
[image006.png](#)
[image007.jpg](#)

Some people who received this message don't often get email from darren.cook@reading.gov.uk. [Learn why this is important](#)

Hi Tomas,

I do not have any flood data either but in relation to any submission I would advise that any drainage proposal should comply with the Defra standards and also Policy EN18 of the Reading Borough adopted Local Plan.

Should you require anything further then please let me know.

Kind regards,

Darren Cook

Transport Development Control Manager

Transport | Directorate for Economic Growth and Neighbourhood Services (DEGNS)

Reading Borough Council
Civic Offices
Bridge Street
Reading
RG1 2LU

0118 937 2612 (72612)

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From: Shean, Sam <Sam.Shean@reading.gov.uk>
Sent: Tuesday, April 30, 2024 3:00 PM
To: Hancox, Tomas <Tomas.Hancox@rps.tetrattech.com>; Cook, Darren <Darren.Cook@reading.gov.uk>
Cc: Morley, Jonathan <Jonathan.Morley1@rps.tetrattech.com>
Subject: RE: Flood Information Request - 250 Brook Drive, Reading, RG2 6UA

Hi Tomas

Brook Drive is a private development, not on the public highway network that my team are responsible for.

I don't have any records of properties flooding in this area or at least they have not shared the information with my team.

The EA Flood Map does indicate the challenges for this development and I believe low lying areas in Green Park have been raised by the developer to reduce the risk of flooding, along with mitigation, but I don't have those plans. I am hoping that when the EA re-survey the LiDAR data to update their flood maps the older lower lying areas come out of the high risk flood maps.

I've copied in Darren Cook, the Development Control Manager whose team provide comments at planning application stage on Highways behalf, to check and provide any information relevant to your development.

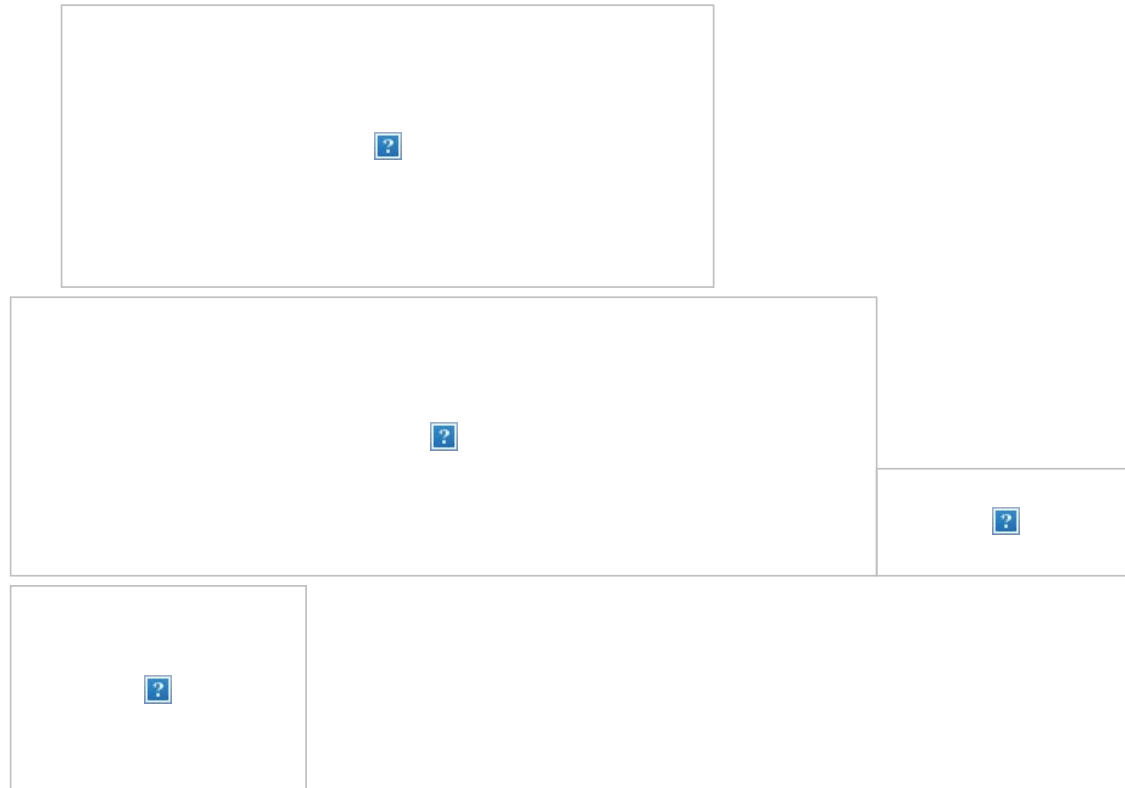
Regards

SAM SHEAN

Highways & Traffic Services Manager
Environmental & Commercial Services | Economic Growth & Neighbourhoods Directorate
Reading Borough Council 19 Bennet Rd, Reading, RG2 0QX
M: 0771 516 7880 (O) 0118 937 2138 (72138) (sam.shean@reading.gov.uk)

Environmental & Commercial Services: www.reading.gov.uk/commercialservices ;
commercialservices@reading.gov.uk

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From: Hancox, Tomas <Tomas.Hancox@rps.tetrattech.com>
Sent: Friday, April 26, 2024 2:46 PM
To: Shean, Sam <Sam.Shean@reading.gov.uk>
Cc: Morley, Jonathan <Jonathan.Morley1@rps.tetrattech.com>
Subject: Flood Information Request - 250 Brook Drive, Reading, RG2 6UA

Warning!
For the attention of
RBC, BFC Staff and Councillors

This mail is from an external sender - please do not click any links or open any attachments unless you trust this sender, and know the content is safe

Hi Sam,

I have on our records that you are the person to talk to regarding flood information requests from Reading LLFA, if this is not the case please let me know (and if you know the appropriate contact info, I would greatly appreciate it).

Could you provide me with any relevant flood information regarding a proposed development located at 250 Brook Drive, Reading, RG2 6UA – Grid Reference SU 70402 69983). Please find the attached reference plan for the site location. Please could you provide any flood information you hold for the site, such as flood maps and any historic flood records in the vicinity of the site.

We will be preparing a Flood Risk Assessment to support a planning application for the site, therefore do

you have any site-specific requirements for this?

Please note we are also contacting the EA.

Kind Regards,

Tom

Tom Hancox (He/Him)

Assistant Consultant
RPS | Consulting UK & Ireland
90 Victoria Street
Bristol

BS1 6DP, United Kingdom

T +44 1454 853 000

E tomas.hancox@rps.tetrattech.com

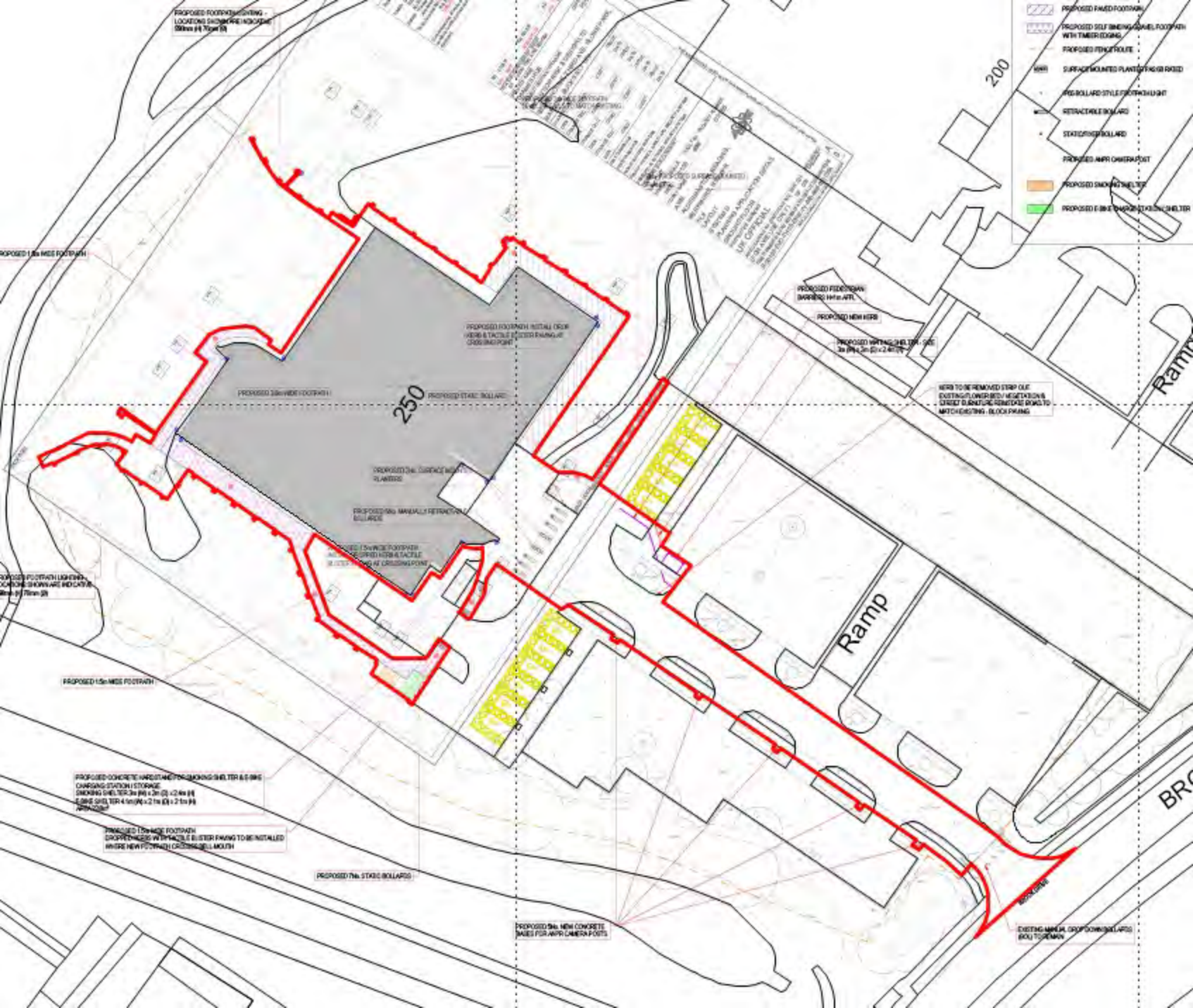


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Appendix C

Development Plans



Appendix D

Topographic Survey

OS NORTH

Topographical Abbreviations

1	LA	Linear Algebra	LA
2	CS	Computer Science	CS
3	MA	Mathematics	MA
4	PH	Physics	PH
5	CH	Chemistry	CH
6	BI	Biology	BI
7	EN	Engineering	EN
8	PS	Psychology	PS
9	ED	Education	ED
10	LT	Literature	LT
11	LA	Linear Algebra	LA
12	CS	Computer Science	CS
13	MA	Mathematics	MA
14	PH	Physics	PH
15	CH	Chemistry	CH
16	BI	Biology	BI
17	EN	Engineering	EN
18	PS	Psychology	PS
19	ED	Education	ED
20	LT	Literature	LT
21	LA	Linear Algebra	LA
22	CS	Computer Science	CS
23	MA	Mathematics	MA
24	PH	Physics	PH
25	CH	Chemistry	CH
26	BI	Biology	BI
27	EN	Engineering	EN
28	PS	Psychology	PS
29	ED	Education	ED
30	LT	Literature	LT
31	LA	Linear Algebra	LA
32	CS	Computer Science	CS
33	MA	Mathematics	MA
34	PH	Physics	PH
35	CH	Chemistry	CH
36	BI	Biology	BI
37	EN	Engineering	EN
38	PS	Psychology	PS
39	ED	Education	ED
40	LT	Literature	LT
41	LA	Linear Algebra	LA
42	CS	Computer Science	CS
43	MA	Mathematics	MA
44	PH	Physics	PH
45	CH	Chemistry	CH
46	BI	Biology	BI
47	EN	Engineering	EN
48	PS	Psychology	PS
49	ED	Education	ED
50	LT	Literature	LT

STREET STATIONS			
Name	Easting	Northing	Height
W51	470002.477	170006.877	42.373
W52	470002.477	170006.877	42.373
W53	470002.477	170006.877	42.373
W54	470002.477	170006.877	42.373
W55	470002.477	170006.877	42.373
W56	470002.477	170006.877	42.373
W57	470002.477	170006.877	42.373
W58	470002.477	170006.877	42.373
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W95	470002.477	170006.877	42.373
W96	470002.477	170006.877	42.373
W97	470002.477	170006.877	42.373
W98	470002.477	170006.877	42.373
W99	470002.477	170006.877	42.373
W00	470002.477	170006.877	42.373

No

[OSGB36] using industry Standard Network RTK GPS equipment utilizing OS Active Network (OS Net). A true OSGB36 coordinate has been established on site using the OSN15 (transmission) & OSGB15 (speed) models. The survey detail has been correlated to the point and a further one (or more) OSGB36 points established to produce a true OS bearing angle orientation. Scale factor 1.0 has been applied therefore the survey coordinates are shown on a pseudo OS grid. All levels are in metres unless otherwise specified.

Detail from drawing RT2230109P0001 showing ground level is shown in green as block ref:RT2230109P0001 on layer ref:RT2230109P0001

Rev	QA	Description	Date
0	Prelim	First Complete Issue	20/12/2011
1	-	Preliminary - Not Complete	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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SCALE

1:200

250 Brook Drive, Green Park, Reading

TOPOGRAPHICAL SURVEY

JOB No	DRAWING NUMBER
--------	----------------

A0 Sheet - 1,189mm X 841mm

Appendix E

Phase 1 Liability Report

GREEN PARK

250, Brook Drive, Reading, RG2 6UA

Phase 1: Environmental Liability Review

For: Savills UK Ltd



ENV20411

V2

26 February 2024

REPORT

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
V1	Phase 1 – Draft	Rosie Jones	Rob Thomson	Rob Thomson	17 th January 2024
V2	Phase 1 – Final	Rosie Jones	Rob Thomson	Robt Thomson	26 th February 2024

Approval for issue

Rob Thomson



26 February 2024

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RPS

Rosie Jones
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20 Farringdon Street
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Prepared for:

Savills UK Ltd

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Appendices

Appendix A : Site Location, Flood Risk & Historical Plans

Appendix B : Photographs

Appendix C : Overview of Part 2A (The Contaminated Land Regime)
Contaminated Land: Overview Of 'Part 2A'

Appendix D : General Notes
Environmental Liability Review / Desk Study Review
General Notes

OVERALL RISK SUMMARY:

Risk of statutory designation (e.g. Part 2A EPA 1990) or third party liability, in its current use and form.	Low to Moderate	
Acceptable as banking security from an environmental risk perspective based on a typical lending scenario.	Yes	 
Overall environmental risk associated with property ownership.	Low to Moderate	

EXECUTIVE SUMMARY:



Site Details	Location: Green Park, 250 Brook Drive, Reading, RG2 6UA Area: 1.66 ha NGR: SU 703 700 Current use: Office Building Proposed use: Unchanged
Contamination Potential	The site inspection did not identify any significant potential sources of contamination on site. A review of historical mapping has revealed an infilled drainage channel c.1899 in the centre of the site. However, given the time that has passed, and the development works that have taken place since, any potentially contaminative fill material is likely to have been removed and therefore does not present a significant risk to the site currently. No further potentially contaminative land uses were noted on site. A Peter Brett Associates (PBA) 1998 Summary of Geotechnical Information report carried out for Plot 5 (subject site and plot to the northeast) concluded that no significant groundwater contamination is expected to be found beneath the site. It should be noted that the findings and results of soil testing were not included within this report for review. However, for those off site testing results that were discussed these were not deemed to present a significant risk. Similarly, it is not evident from reviewing PBA's report which groundwater sampling was undertaken on the subject site and results were not provided. Historical landfill data supplied by the Environment Agency has identified a site, operated by Reading Football Club, located 60 m to the east. Following a review of the Geotechnical Information report (PBA 1998) and consultations with the Council, it was identified that the Smallmead Landfill had been mechanically extended from over 350 m northeast to 60 m southeast (170 m southeast from the onsite building) as part of development works to construct Reading Football Club Stadium. This landfill has been identified as a potentially significant off site source of contamination. It is understood that following the mechanical spreading of the landfill, extensive gas control measures including the placing of a gas membrane and gas vents were incorporated in this landfill. Overall likelihood of significant contamination beneath the site is considered to be Low to Moderate.
Environmental Setting	Human health receptors: The site is currently in commercial use as offices (i.e. reduced sensitivity). The nearest residential properties with garden areas are noted from 250 m northwest and the nearest school with outdoor recreational areas is noted 350 m northwest of the site. Given their distance from the site, they are not deemed vulnerable receptors to any on site contamination (if present).

	Geology/Hydrogeology: The site is located above Secondary A Aquifers relating to both the Beenham Grange Gravel Member and Lambeth Group. Foundry Brook is located 45 m southeast of the site and therefore the underlying groundwater is likely to be in hydraulic continuity with this watercourse. The PBA report dated 1998 stated groundwater was encountered at depths ranging from 0.4 m bgl to 1.7 m bgl. The underlying groundwater has been classified as having 'good' chemical quality and multiple potable groundwater abstractions have been identified, the closest being located 455 m west. The site is not located within a groundwater Source Protection Zone. Surface water features: Numerous watercourses and waterbodies have been identified within 1 km of the site. The closest are balancing ponds/Foundry Brook adjacent west. The closest classified watercourse is Foundry Brook 45 m southeast, which is seen as a sensitive receptor to any on site contamination (if present). However, as this is classified as having a 'fail' for chemical quality, its sensitivity can be seen as reduced. Other environmental receptors: Natural England has not identified any environmentally sensitivity receptors within 1 km of the site. Overall sensitivity: Low to Moderate
Regulatory Consultation	The Environmental Health Department at Reading Borough Council was consulted regarding any known contamination issues at the site. The council confirmed the site has not been identified for further investigation under the Council's Part 2A Strategy and the Council does not have any specific concerns regarding ground conditions at the site. Further consultations with the Council confirmed that the landfill to the southeast is an actively managed engineered landfill, with contamination mitigation measures in place including an engineered cap (to reduce infiltration of rainwater) and gas vents (providing preferential pathway for gas) in place.
Risk Assessment	The site is located above permeable aquifers (Secondary A Aquifers) relating to both the Beenham Grange Gravel Member (superficial geology) and Lambeth Group (bedrock geology). These aquifers may allow the lateral and vertical migration of contamination (if present) to underlying groundwater resources and receptors. The underlying groundwater has been classified as having a 'good' chemical quality, highlighting its sensitivity, and a potable groundwater abstraction is located 455 m west. No potentially significant sources of contamination were identified during the site inspection, nor from undertaking a review of historical mapping. A number of ground investigations have been undertaken at the site and to the land to the north (Plot 5), as briefly described in a report undertaken by PBA in 1998. PBA concluded that no significant groundwater contamination is expected to be found beneath the site. It should be noted that the findings and results of soil testing were not included within this report for review. However, for those off site testing results that were discussed these were not deemed to present a significant risk. Similarly, it is not evident from reviewing PBA's report which groundwater sampling was undertaken on the subject site and results were not provided. Nonetheless, no plausible linkages have been identified between any potential site derived contamination and the identified receptors. A potential linkage has however been identified between the off site landfill and site users. Risks to site users from Smallmead Landfill derived contamination are predominantly associated with the inhalation of ground gas. It is noted that the PBA Geotechnical Investigation report advised it prudent that gas protection measures in the form of a gas membrane are installed in any structure on Plot 5 (the site). It is however understood that no planning conditions requiring gas protection measures to be included within the construction of building were present. RPS would also note that whilst this linkage cannot be entirely discounted, the possibility of lateral migration of ground gas from the landfill site is considered reduced given that landfill site is engineered and actively managed with gas vents. Furthermore, the PBA Geotechnical Report also stated the risk of significant landfill gas migrating was considered low due to geology and geometry of the plot and the gas control measures being installed as part of the Football Club Development. At the time of writing, no information has been provided with regards to the installation of ground gas protection measures within the building, and as such the linkage between gas generated from the offsite landfill and site users cannot be entirely discounted. However, with the understanding that the landfill site has been engineered

	with gas vents to provide a preferential pathway for the gas, the likelihood of any lateral migration of gas via permeable strata is considered reduced. Based on a qualitative assessment of 'Contaminant-Pathway-Receptor' linkages and the information provided to date, the risk of an environmental liability (e.g. third party liability or regulatory action) relating to ground contamination under its current use and form is considered to be Low to Moderate.
Recommendations	No further work is required relating to ground conditions / contamination at the site, based on its current use and form.
Advisory notes	We recommend the following actions to reduce or clarify other potential environmental risks at the site: • RPS recommends the presence of a gas membrane was required and / or included within the construction of the building be confirmed. • Given the age of the building and the recent refurbishment works, it is unlikely that asbestos containing material is present within the building fabric. However, it would be prudent to enquire whether a survey was undertaken as part of the refurbishment works. • RPS understands that two interceptors are present on the site. These should be emptied and cleaned on a regular basis (approximately every 3-6 months). All relevant paperwork should be kept in a dedicated file on site. • The site is located in an area potentially at risk from fluvial / tidal flooding. This could significantly impact the value of the site. RPS has provided the client with a Flood Risk Due Diligence report proposal, which would include direct consultation with the Environment Agency and would consider the risk of flooding from all sources (including fluvial, tidal, surface water, groundwater and sewer flooding).

This summary is part of RPS's Phase 1 Environmental Review and should not be used as a standalone document.

1 INTRODUCTION

- 1.1.1 RPS Consulting Services Ltd (RPS) was commissioned by **Savills UK Ltd** to undertake an environmental review of *Green Park, 250 Brook Drive, Reading, RG2 6UA* in relation to the proposed tenant occupancy of the site.

The principal aim of the review was to determine whether there was potential for ground contamination to be present which could significantly constrain the use of the site, or give rise to the risk of significant environmental liability (including bodily injury, property damage, operational losses, regulatory or third party action, reputational damage or blight).

The assessment is based on the site remaining in its current use and form. Commentary is also provided on flood risk.

- 1.1.2 The environmental review comprised:

- A non-intrusive site inspection (walkover);
- A review of the historical land uses to assess the potential for ground contamination;
- A review of the environmental setting to assess the sensitivity of the surrounding area to contamination/pollution;
- Consultation with relevant regulatory authorities to establish whether any significant environmental issues have been recorded, which may impact on the site;
- Qualitative environmental risk assessment of the site's current and proposed use; and
- A review of existing relevant reports (if supplied).

Imagery included within Appendix A contains Ordnance Survey data (license 100035207) under © Crown copyright and database right (2024) and is replicated from Groundsure Report (Ref: GS-QO8-89U-CHD-SUJ / GS-GZ9-XNL-1SG-MC4)

- 1.1.3 The environmental risk assessment presented within this report has been prepared having regard to the contaminant-pathway-receptor model introduced under Part 2A of the Environmental Protection Act 1990, and associated guidance on contaminated land published by the Department of Environment, Food and Rural Affairs [and its predecessors]. The methodology is essentially a qualitative assessment, based on the identification and evaluation of potential 'contaminant-pathway-receptor linkages'. On the basis of this risk assessment, consideration has been given to the potential for the site to be designated as 'contaminated land' (under the local authority contaminated land inspection strategy). See Appendix C for an overview of Part 2A.

- 1.1.4 The scope of the report is in general accordance with:

- British Standard on the 'Investigation of potentially contaminated sites - Code of practice' (BS10175:2011); and
- The Environment Agency's Land Contaminated Risk Management (LCRM 2020).

- 1.1.5 Where appropriate, consideration has also been given to the following:

- The potential for environmental liabilities to occur under other associated ground contamination regimes, for example the Water Resources Act 1991 and the Environmental Damage Regulations 2015;
- Key environmental constraints on site redevelopment (if proposed), including the impact of other environmental issues (i.e. flooding);
- Potential implications of key environmental issues significantly impacting on the value / saleability of the property; and

- The site's acceptability as security from an environmental risk perspective for normal lending arrangements / debt finance purposes.

Although not part of the scope of this report, the following may be commented on for general information only where readily observed, reported or identified:

- General and high level environmental compliance of site activities (note – a detailed assessment of compliance with environmental law is outside the remit of this report);
- Asbestos-containing materials; and
- Japanese Knotweed (invasive plant species). It should be noted that its identification can be limited by the seasons, dense vegetation, physical, infrastructural, health & safety and other constraints.

Details of the limitations of this type of assessment are described in Appendix D.

2 LAND USE

2.1 Site Reconnaissance

This section of the report is based upon observations made during a site visit on 5th January 2024. This included an inspection of the internal and external parts of the buildings on-site and associated exterior areas. On-site discussions were held with Callum McGreevey (Site Representative), with follow up consultations held with Ricky Cairns (Site Representative), via Savills.

RPS understands that the site is proposed to remain in its current use and form.

The site location and site boundary plans are shown in Appendix A. Selected photos are shown in Appendix B.



Figure 1: General view of the site. For further photos see Appendix B.

2.1.1 The Site

Section	Description
Background:	The site is located within Green Park Business Park, located approximately 3 km south of Reading City Centre, at National Grid Reference SU 703 700. It is irregular in shape and occupies an area of approximately 1.66 ha.
Site Layout and Activity / Operations:	The site comprises a vacant office building located over ground and three upper floors, with associate grounds and car parking. The building forms approximately 20% of the total site area, with approximately 40% of the site forming hardstanding and 40% forming soft landscaping. Access to the site can be obtained via numerous points across the ground floor, however the main access is in the south of the building. Car parking is present in the southeastern half of the site, and a 1st floor level car park in the north with an associated car ramp and sloped pedestrian path to the north. The site appears to be relatively flat, apart from the 1st floor car park and associate ramp and pathway, and a small sloping in elevation from the centre of the car park to the north. Elevation changes are also noted around the boundary of the site, notably the shrubbery borders and the sloping elevation towards to the adjacent balancing ponds. Each level of the office building comprises empty office space, toilets, empty cleaners' stores, and access to two stairwells and passenger lifts. One service lift is also present on site. In addition to the above, the ground floor also comprises the main entrance to the building,

Section	Description
	reception, social workspace, water tank room, cleaners store (in use), showers, access to a rear (north) external decking area, and an electrical substation (access externally). The third-floor office space also benefitted from a roof terrace to the rear, overlooking the balancing ponds/Foundry Brook and the remainder of Green Park. The third floor also provided stairwell access to the roof plant. The roof plant comprised of air conditioning units, air handling units, a second water tank, solar panels, mechanical panel boards, mechanical distribution boards, cold water booster system, and mechanical control panel. The external areas of the site comprised the car park, bike store, waste storage area, disused gas house and gas governor station, a flammable gas store (unknown contents), electrical substation, grass areas, tree covered areas, vegetation, a rear decking area, and pathways leading to the Green Park Business Park.
Building Structure(s):	The building comprised brick, concrete, and glass construction. Metal fencing was noted surrounding the roof plant compound and partially across the external windows.
Surface Cover:	Approximately 40% of the site benefits from hardstanding cover (brick paving and tarmac), 20% of the site benefits from building cover, and the remaining 40% benefits from soft landscaping (grass, shrubbery borders and tree cover).
Drainage:	Utility Plans (dated December 2023) for the site were provided to RPS. The site benefits from a combined sewer, a foul sewer and a surface water sewer network on site. The combined sewer appears to join the wider sewage network off site along Brook Drive. No drainage covers were lifted as part of the assessment. No trade effluent discharges that would require the freeholder to obtain consent to discharge were identified during the site visit. Two interceptors were identified on site and within the Utility Plans provided. Two associated vent pipes were identified in the southwest and southeast of the site. It is not known what type of interceptors these are, or if they are regularly cleaned and emptied.
Storage / Tanks:	Bulk Storage Two cold water storage tanks were noted on site. One located on the roof (12,000 litres) and one located in a small tank room at ground level (2,275 litres). No leaks were identified. There were no further tanks present on site, and no evidence of Underground Storage Tanks (USTs). Other Hazardous Material Storage Small (<5 litre capacity) bottles of cleaning products were noted at ground level in the cleaner's store.
Waste:	The site is currently vacant and therefore no waste streams are present on site. However, one general waste bin was present within the bike store area to the west of the site. It is not known who will collect this and when.
Air Emissions:	A total of 30 air conditioning units were present on the roof containing the refrigerant R410A. Two air handling and air conditioning systems were also present, both also containing R410A. The use of all (virgin/recycled/recovered/reclaimed) HCFCs when servicing air conditioning systems is banned under The Ozone Depleting Substances Regulations 2015. All air-conditioning equipment, if still using an ODS, will no longer be able to be serviced with an ODS refrigerant gas and consideration should be given to conversion of the system(s) to a non-ODS or replacement of the system/unit. All ODSs used in refrigeration and air conditioning equipment must be recovered prior to dismantling or disposal of equipment. This is typically a tenant issue, although it would be prudent to clarify responsibility and to confirm the refrigerant type.
Electricity Sub-stations / Transformers:	An electrical substation is present in the west of the site. Access was not granted into the substation as this is operated by SSE. This substation is likely to fall under the ownership of SSE, and not the building owner or tenant.
Visual Evidence of Contamination:	RPS did not observe any significant visual or olfactory evidence of contamination on site during the site walkover.
Statutory Nuisance:	RPS is not aware of any complaints relating to statutory nuisance at the site.
Asbestos Containing Materials (ACM):	Based on historical mapping information it is understood that the property was constructed between 2001 and 2003. Given that ACMs were banned in the UK in 1999 under the Asbestos (Prohibitions) (Amendment) Regulations 1999 (although very limited exclusions still applied) it considered unlikely that ACMs are present in the building.

Section	Description
Other Environmental Considerations:	According to the site representative, there was no known history of complaints, enforcements or other regulatory actions regarding the site or immediate surrounding properties related to environmental conditions. No fire or spill events were reported. At the time of inspection, high water levels were noted from the adjacent balancing ponds which encroached onto the north-western boundaries of the site. This flood water did not ingress into the building. RPS is not aware of any previous flood events where flood water has impacted the site building. The Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2012 requires that non-domestic buildings are supported by an EPC document when constructed, sold or let. EPCs have been obtained from the Non Domestic Energy Performance Register state the site has an EPC Rating of 'A', valid until February 2033. No obvious gas monitoring wells or borehole installations were observed by RPS during the site inspection.

2.1.2 The Surrounding Area

The site is located in an area of predominantly commercial land uses. At the time of the site inspection, neighbouring land consisted of the following:

Direction	Description
North:	The north of the site is bounded by offices, balancing ponds/Foundry Brook, and wider offices former part of <i>Green Park Business Park</i> .
East:	The east of the site is bounded by Brook Drive, Foundry Brook, <i>Select Car Leasing Stadium</i> , and a retail comprising <i>B&Q</i> , <i>MacDonalds</i> , <i>Carpetright</i> , and <i>Smyths Toys Superstore</i> .
South:	The south of the site is bounded by a balancing pond/Foundry Brook, offices and the wider <i>Green Park Business Park</i> .
West:	The west of the site is bounded by a balancing pond/Foundry Brook, offices and the wider <i>Green Park Business Park</i> .

The nearest residential properties are located 250 m northwest.

2.2 Site History

2.2.1 Historical Map Review

The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500 and 1:10,000 dated 1872 to 2024. Extracts from selected historical maps are shown in Appendix A.

On-site Land Use and Features	Dates	
	From	To
The site comprised vacant land with a drainage channel bisecting the centre.	c.1872	c.1899
<i>Then</i> the drainage channel was infilled.	c.1899	c.2003
<i>Then</i> the site was redeveloped to comprise its current layout. No further changes were noted from a review of mapping.	c.2003	Present

Surrounding Land Uses (250 m radius)	Orientation	Approx. Distance	Dates	
			From	To
Drainage Channels	North and South	Adjacent	c.1872	c.1899
Farm Yard	West	160 m	c.1872	c.2001
Spoil	East	180 m	c.1976	c.1988

2.2.2 Site Planning History

Relevant planning records for the site, obtained from Reading Borough Council Planning Department are summarised as follows:

Planning Reference	Application Details	Date Approved
85/TP/690	Business use (incl. Light industrial), warehousing & ancillary offices. Service areas, roads & car parking.	26/07/1995
90/0835/FD	Temporary Soil Store	24/09/1996
98/0674/RM	Construction of 2 self-contained buildings with associated parking and landscaping	22/10/1998
97/0543/RM	Business uses (including light industrial) together with associated service areas, roads and car parking areas. Approval of Reserved Matters (layout, means of access and landscaping of First Phase – North) pursuant to outline planning permission 85TP690	15/04/1999
990799/ADV	Installation of company logos and other directional signage on the building and precinct	13/11/2000
990373/FUL / 00/00795/FUL	Installation of 3 pole-mounted CCTV cameras, 3 ram raid bollards, a back-up generator and battery system	11/10/2000
011400/OUT / 01/00049/OUT	Erection of smoking enclosure on roof terrace of the building, and of a security barrier at the perimeter of the site.	27/03/2001
020425/FUL / 02/00502/FUL	Installation of 1 pole mounted CCTV camera (Retrospective).	18/06/2002
110766/APC	Discharge of conditions of planning permission 02/00502/FUL	23/09/2011
110678/APC	Discharge of conditions of planning permission 00/00795/FUL	04/10/2011
110768/APC	Discharge of conditions of planning permission 01/00049/OUT	04/10/2011
220769/FUL	External refurbishment works to the existing office building (Use Class E(g)), including alterations to the main entrance, elevations and roof (to include the installation of PV panels), landscaping works, and amendments to form an external cycle store	21/10/2022

No planning conditions relating to contaminated land were identified associated with the above planning applications. Decision notices were not made available to planning applications 990799/ADV, 990373/FUL / 00/00795/FUL, 011400/OUT / 01/00049/OUT, or 020425/FUL / 02/00502/FUL. However, given their application details, it is not deemed likely that conditions pertaining to land contamination would have been included.

RPS has sent an enquiry to the Planning Department at Reading Borough Council enquiring for the application details regarding the site's original development. Consultations with the Council confirmed that the outline consent for development of the site relates to planning application 85/TP/690, with the construction of the site relating to planning application 98/0674/RM. No contaminated land conditions were placed on either of the applications.

2.2.3 Contemporary Trade Directory Entries

No Contemporary Trade Directory Entries were identified relating to the site. The closest Contemporary Trade Directories identified were Second-hand Vehicles 45 m northeast, Vehicle Hire and Rental 45 m northeast, and Medical Equipment, Supplies and Pharmaceuticals 95 m northwest.

3 ENVIRONMENTAL SETTING, REGULATORY CONSULTATIONS & ADDITIONAL INFORMATION

3.1 Geology & Hydrogeology

3.1.1 Published Mapping

Based on British Geological Survey mapping (1:10,000 / 1:50,000-scale) and the Environment Agency's Groundwater Vulnerability mapping (1:100,000-scale), the stratigraphic sequence and aquifer / groundwater classifications beneath the site are as follows:

Strata	Age	Description	Aquifer Classification
Beenham Grange Gravel Member	<i>Devensian</i>	This comprises sand and gravel and is likely to be up to 10m in thickness beneath the site.	Secondary A
Lambeth Group	<i>Ypresian</i>	This comprises clay, silt and sand and is likely to be up to 39 m in thickness beneath the site.	Secondary A

The site is located above a Secondary A Aquifers relating to both the Beenham Grange Gravel Member and Lambeth Group. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.

Foundry Brook is located 45 m southeast of the site and therefore the underlying groundwater is likely to be in hydraulic continuity with this watercourse.

According to Environment Agency data, the site is not located in a groundwater Source Protection Zone.

Under the Water Framework Directive, the Environment Agency's local River Basin Management Plan classifies groundwater chemical quality beneath the site within the Thatcham Tertiaries waterbody as 'good' quality.

3.1.2 Previous Investigation Reports / Borehole Records

Two Ground Investigation reports were reviewed (see section 3.10) and the details of the ground conditions encountered are as follows:

- Summary of Geotechnical Information undertaken by Peter Brett Associates (PBA) January 1998 confirmed:
 - o Made Ground to a depth of 0.8 m bgl to 1.5 mbgl, underlain by Alluvium ranging from 0.4 m bgl to 1.7 m bgl, further underlain by Valley Gravels ranging from 1.4 m bgl to 2.1 m bgl. Reading Beds were further noted to 20.5 m bgl (only proven in one borehole), underlain by Chalk, however this was not proven.
 - o Groundwater was typically encountered in each exploratory hole at depths of around 1.0 m bgl and 1.8 m bgl. The monitoring carried out historically over the whole of Green Park indicated the groundwater flow direction in the gravels is to the east.
- Site Investigation Report undertaken by LBH Wembley August 1998 confirmed:
 - o Made Ground was recorded to a depth between 0.70 m bgl and 0.80 m bgl. Alluvium was found to depths between 1.70 m mbgl and 2.40 m bgl, underlain by dense sandy gravels to depths between 2.80 m and 4.40 m bgl. Lambeth Group (Woolwich and Reading Formations) were proven to 25.00 m bgl.
 - o Groundwater strikes were encountered at various levels within the Woolwich and Reading Formations but confirmed the absence of perched water at shallow depth.

3.2 Water

3.2.1 Surface Water

Under the Water Framework Directive, the Environment Agency identifies three watercourses within 1 km of the site which are classified within the local River Basin Management Plan. A list of nearby watercourses and water bodies is as follows:

Watercourse / body	Quality Classification	Approx. Distance & Direction from Site
Foundry Brook/Balancing Ponds	Not Classified	Adjacent West
Unnamed Drainage Channels	Not Classified	From 20 m South
Foundry Brook (West End Brook to M4)	Ecological Quality: Poor Chemical Quality: Fail	45 m Southeast
Unnamed Drainage Channels	Not Classified	From 240 m north
Unnamed Drainage Channels	Not Classified	From 320 m North
Unnamed Drainage Channels	Not Classified	From 550 m Southwest
Unnamed Drainage Channel	Not Classified	From 620 m East
Unnamed Drainage Channel	Not Classified	From 655 m Southeast
Burghfield Brook	Ecological Quality: Moderate Chemical Quality: Fail	960 Southwest
River Kennet	Ecological Quality: Moderate Chemical Quality: Fail	980 m North

3.2.2 River / Coastal / Surface Water Flood Risk

According to the Environment Agency flood map, the site is partially located within Flood Zone 3, with the annual probability of flooding classified as greater than 1 in 100 (1%) and entirely located within Flood Zone 2, with the annual probability of flooding classified as greater than 1 in 1000 (0.1%) but less than 1 in 100 (1%). The floodplain appears to be associated with the River Kennet to the north and Foundry Brook to the southeast, as well as the numerous watercourse and wider drainage network located in the surrounding area. The Environment Agency Flood Map (see Appendix A, Figure A-3) shows the predicted extent of flooding not taking into account the effect of flood defences (if present). The site does not appear to benefit from flood defences.

At the time of writing, RPS has provided the client with a Flood Due Diligence report proposal.

Surface water (pluvial) flooding occurs when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. According to EA data held on the GOV.UK website the site is located within an area at a very low of surface water flooding where the risk of flooding each year is less than 0.1%.

3.2.3 Water Abstractions

Information provided by the Environment Agency indicates that there are records of 11 licensed groundwater abstractions and no licensed surface water abstractions within 1 km of the site. These are detailed below:

Licence Holder	Source	Use	Approx. Distance & Direction from Site
Kennet Valley Park Ltd	Groundwater	General Farming and Domestic	455 m West

Kennet Valley Park Ltd	Groundwater	Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household	455 m West
Cemex UK Materials Limited	Groundwater	Transfer Between Sources	805 m Northwest
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,105 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,135 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,140 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,185 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,190 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,205 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,210 m North
Thames Water Utilities Ltd	Groundwater	Potable Water Supply	1,250 m North

3.3 Sensitive Sites / Designated Protected Areas

Natural England data indicates that there are no Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA), Special Areas of Conservation (SAC), wetland site designated of international importance under the Ramsar Convention (RAMSAR), Nature Reserves or other protected / sensitive environmental areas within 1 km of the site.

Historic England data identifies no World Heritage Sites, Listed Buildings or Scheduled Monuments within 250 m of the site.

3.4 Landfills and Waste Sites

Information provided by the Environment Agency, Local Authority or British Geological Survey shows that there are nine recorded licensed or known historical landfill sites and one licensed waste treatment / transfer site recorded within 500 m of the site. The details of these are as follows:

Source of Record	Licence Details	Waste Type and Details	Approx. Distance & Direction from Site
Landfill Sites			
Environment Agency	Operator: Reading Football Club Address: Reading Football Club, Smallmead, Bennet Road, Reading, Berkshire, RG2 0JL	Waste Type: Household, Commercial & Industrial Waste Landfill Status: Closed	60 m Southeast
Environment Agency	Operator: Cemex U K Materials Limited Address: RMC Aggregates (Southern) Ltd, Smallmead Farm, Burghfield, Reading, Berkshire, RG30 3UR	Waste Type: Household, Commercial & Industrial Waste Landfill Status: Closed	280 m North
Environment Agency	Address: Island Road Tip, Island Road, Reading, Berkshire	Waste Type: Inert, Industrial, Liquid Sludge Status: Historical (17/11/1970 to 22/03/1975)	283 m North
Environment Agency	Address: Sludge Beds, Reading, Berkshire	Waste Type: Not known Status: Historical	330 m North

REPORT

Environment Agency	Address: Smallmead Tip, Smallmead Road, Reading	Waste Type: Inert, Industrial, Commercial, Household, Special, Liquid Sludge Status: Historical (22/03/1973 to 31/03/1981)	350 m East
Environment Agency	Address: Smallmead Stadium, Reading Operator: Hall Aggregates Limited	Waste Type: Inert Status: Historical	385 m Northeast
BGS	Address: Smallmead Tip, Smallmead Road, Reading	Waste Type: Not known. Status: Historical Landfill	415 m East
Environment Agency	Operator: Cemex UK Materials Limited Site Address: Burghfield Lfs, Island Road, Reading, Berkshire, RG2 0RR	Waste Type: Waste Landfilling, 25,000T excluding inert waste. Status: Effective	485 m West
Environment Agency	Address: Burghfield Area D, Burghfield, Reading, Berkshire	Waste Type: Not Known Status: Historical	495 m West
Scrap Yards & Waste Transfer / Treatment Sites			
Environment Agency	Green Park Village, Longwater Avenue, Reading, Berkshire, RG30 3UR	Waste Type: Deposit of waste to land as a recovery operation Status: Modified (first issued 11/05/2016 and modified 06/03/2017)	460 m Northwest

RPS notes from reviewing previous reports that as part of development works to construct Reading Football Club Stadium, Smallmead Landfill over 350 m east was increased. Previous reports state this to be adjacent, however RPS notes from EA mapping and Council consultations that this was increased to 60 m southeast (170 m southeast from the onsite building). Extensive gas control measures were constructed as part of these development works, including that this is an engineered landfill. Please see sections 3.5.1 (below) and 3.10 for further detail.

3.5 Regulatory Consultations / Local Authority Responses

3.5.1 Environmental Health

The Environmental Health Department at Reading Borough Council was consulted regarding any known contamination issues at the site. The Council confirmed the following:

- The site has not been identified for further investigation under the Council's Part 2A Strategy.
- The Council does not have any specific concerns regarding ground conditions at the site.
- The Council is not aware of any site investigation and / or remediation works that has been undertaken at the site.
- The Council is aware of Smallmead Landfill site.
- The Council does not hold any records of pollution incidents.
- There are no Part B (APC) Authorisations within 250 m of the site.
- If the site were to be redeveloped, the Council would require a desk study to be carried out. If the desk study identified any plausible pollutant linkages the Council would require and intrusive investigation.

Further correspondence with the Environmental Health Officer at Reading Borough Council confirmed that that Smallmead Landfill was initially located over 250 m to the northeast. As part of the development of

Reading Football Stadium, the landfill was excavated and was redispersed to cover an area of approximately 15 ha. This area is believed to relate to the landfill listed 60 m southeast (170 m southeast from the onsite building). The Environmental Health Officer confirmed that this landfill is an engineered landfill and provided documentation that confirmed the landfill comprises the following four components:

- A low permeability cap which in addition to providing a barrier to gas migration also reduces the rate of gas generation by reducing the rate of waste degradation;
- Vertical fin drains in the waste which provide a low resistance path for gasses to flow through;
- A gas collection blanket (part of the engineered cap) that provides a low resistance flow path, below the cap, to gas discharge vents; and
- A series of gas vents across the site which discharges gases to the atmosphere thereby minimising the pressure within the waste and the gas control system.

The Environmental Health Officer also confirmed that this landfill is now monitored by the Environment Agency, with regular readings taken on gassing levels.

3.5.2 Petroleum Licences

No issues have been identified that indicate consultation with the Petroleum Officer is needed.

3.5.3 Building Control

Whilst RPS has not directly consulted with Building Control, a Certificate of Completion of Works for 250 Brook Drive (plot 5a) has been provided to RPS. This certifies 'that building works carried out at the above address, were inspected at all notifiable stages, and no outstanding contraventions were noted'. Ground floor construction was noted to be a reinforced concrete slab. RPS has been unable to confirm if a gas protection membrane was installed within the construction of the building.

3.6 Pollution Incidents

Environment Agency data indicates that there is one records of 'major' or 'significant' pollution incident within 500 m of the site. This is outlined in the following table:

Date	Pollutant	Receiving Medium & Severity of Incident	Approx. Distance & Direction from Site
21/04/2013	Gas and Fuel Oils	Water Impact: Category 2 (Significant)	485 m East

3.7 Authorised Processes

3.7.1 Environmental Permits

Environment Agency and Local Authority data indicates that there are no Part A(1), Part A(2) or Part B processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2016) and no Category 3 or 4 Radioactive Substances Authorisations within 500 m of the subject site.

3.7.2 COMAH Sites

There are no records of any operations under the Control of Major Accident Hazards (COMAH) Regulations within 500 m of the site.

3.8 Radon

According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (now Public Health England) and the British Geological Survey, the site is not located in an area at risk from radon gas.

3.9 Coal Authority

The site is not located in an area potentially affected by coal mining activities.

3.10 Previous Reports

RPS has been provided with the reports detailed below. A summary of these reports is provided below. RPS cannot vouch for the accuracy of the information provided within the reports and legal reliance should be sought from the original authors of the reports where their content is considered material to the characterisation of the site.

For the purposes of clarity, RPS notes that Plot 5 relates to the subject site (250 Brook Drive) as well as 200 Brook Drive, adjacent east.

Summary of Geotechnical Information for Plot 5 Green Park Reading, undertaken by Peter Brett Associates (PBA), ref 2942/815/Plot5/WST/KB/RP/FC/JE, dated January 1998

PBA was instructed to undertake this report as part of civil and structural consultancy services. As part of the development, the site level was raised using imported fill to provide level development plots above the predicted 1:200 year flood level.

A number of ground investigations have been carried out historically for the whole Green Park Development, of these, five investigations included boreholes and trial pits sunk within or adjacent to Plot 5. These are detailed below:

Foundation and Explorations Services Ltd 1988

One borehole (BH5) and six trial pits were undertaken on Plot 5. From reviewing a site plan for all borehole and trial pits, BH5 is believed to fall within the boundary of 200 Brook Drive. Yet, trial pits TP34 and TP20 fall within the boundary of 250 Brook Drive. These trial pits were excavated to a depth of between 1.9 m and 3.6 m. No laboratory tests were undertaken on these trial pits, or BH5 off site.

PBA 1995

As part of this investigation, three trial pits were undertaken on Plot 5. However, from reviewing the site plan, none of the trial pits were undertaken on site.

AMEC 1997

Eight trial pits were excavated adjacent to Plot 5, to depths of 3.0 m. Details of the strata encountered, samples taken, and groundwater observations were stated to be within Appendix 4, however no appendices were included.

PBA 1997

As part of a gas monitoring programme, two monitoring boreholes were noted to be installed along the boundary of Green Park and the former Smallmead Refuse Tip. These two boreholes (97/3 and 97/4) were located off site to the southeast.

Ove Arup 1997

Ove Arup, the consultants associated with the Football Club Development off site, installed a number of boreholes across Green Park. One of the boreholes (BH238) is noted off site to the southwest. A log of this is present in the appendix, however no appendices were included.

Ground Conditions

Ground conditions across Plot 5 are described as Made Ground to a depth of 0.8 m bgl to 1.5 mbgl, underlain by Alluvium ranging from 0.4 m bgl to 1.7 m bgl, further underlain by Valley Gravels ranging from 1.4 m bgl to 2.1 m bgl. Reading Beds were further noted to 20.5 m bgl (only proven in one borehole), underlain by Chalk, however this was not proven.

Groundwater was typically encountered in each exploratory hole at depths of around 1.0 m bgl and 1.8 m bgl. The monitoring carried out historically over the whole of Green Park indicated the groundwater flow direction in the gravels is to the east.

Soil Contamination Results

Whilst the PBA 1995 survey did not include any trial pits on the subject site, concentrations of contaminants sampled in close proximity were below the ICERL Guidelines for domestic gardens. The exception to the above is slightly elevated level of nickel recorded in one of the trial pits. This is located off site and PBA states this is not considered to be significant in terms of proposed end use of the site owing to that area being at least 1.5 m below the finished levels.

PBA also states the results of contamination testing of soil samples from other areas of Green Park has also indicated that no significant contamination is present.

RPS notes no further contamination results were provided within the report.

Groundwater Contamination Results

As part of the 1991 and 1995 PBA investigations, samples of groundwater were taken for contamination testing. Results are stated to be provided within Table 2. However, no such table was included within the report. RPS notes that an investigation from 1991 undertaken by PBA has not been reviewed.

As part of the 1997 PBA investigation, groundwater quality monitoring was undertaken on samples recovered from the boreholes noted off site to the southeast. The results are stated to be within appendix 10, however, no appendices are included within the report.

PBA states the results of testing indicated the quality of groundwater to be good across the whole of Green Park, with only slightly elevated levels of cadmium, chromium and iron being recorded. An elevated level of zinc was noted within WS2 from the 1991 investigation. Elevated ammonia levels were also recorded in the 1991 and 1997 samples, but this was stated to potentially be a result of the sample techniques adopted then. As RPS has not been provided with this report, it is not possible to say where this sample was taken from.

As a result of the above, PBA states no significant groundwater contamination is therefore expected to be beneath Plot 5.

Landfill Gas

In 1997, construction of the new Reading Football Club started on the former Smallmead Landfill site. As part of the development, the height of the landfill was increased to adjacent Plot 5 using fill material derived from other parts of the tip. *RPS notes that according to Environment Agency mapping, this landfill was noted 60 m southeast of the site, and 170 m from the onsite building.* Extensive gas control measures were included as part of the development of the Football Club, including the placing of a membrane along the side and top of the reported fill together within passive ground venting as well.

PBA reported (1998) that they are carrying out a survey which commenced in 1991 and installed a number of gas monitoring boreholes along the boundary of the site and Smallmead Tip, supplemented by further gas monitoring positions along the boundary in 1997 (*previously discussed*).

Results of ground gas monitoring off site along the southeastern boundary indicated minimal methane concentrations, varied levels of carbon dioxide over the monitoring period in each position, with levels in excess of 1.5% volume on several occasions and in excess of 9% volume on one occasion in boreholes 97/G2 and 97/G5. PBA stated it likely that some of the carbon dioxide recorded presents naturally occurred

CO₂. However, from reviewing the site map, these boreholes do not appear to be located adjacent to the subject site.

PBA stated the risk of significant landfill gas migrating is considered low in respect of the geology and geometry of the plot and the gas control measures being installed as part of the Football Club development. However, as elevated CO₂ was recorded, PBA felt it prudent that gas protection measures in the form of a gas proof membrane to be installed in any structure built on Plot 5. A well-constructed, ground floor slab was also recommended with a minimal penetration by services.

RPS Comments:

RPS notes that from a review of the site plan, a number of boreholes and trial pits were plotted. A number of these were either not discussed within PBA 1998 report, or soil samples were not discussed or provided for review. PBA states that no significant contamination is present, yet RPS has not reviewed soil testing results to confirm this. PBA states no significant groundwater contamination is therefore expected to be beneath Plot 5, yet state elevated levels of ammonia and zinc were noted.

RPS notes that whilst elevated levels of CO₂ were noted in ground gas monitoring wells, these were not identified to be located adjacent southeast of the site, and PBA stated the risk of significant landfill gas migrating is considered low. However, it was recommended as a prudent measure that a ground gas membrane to be included within all future building construction within Plot 5.

Site Investigation Report, Plot 5 Green Park, Reading, undertaken by LBH Wembley, ref LBH1725, dated August 1998

This report was instructed to review the geotechnical aspects of the 1998 PBA report, discussed above. This stated that only one borehole (BH5) undertaken by FES in 1988 was sunk where building footprints are to be and therefore, a further three boreholes were sunk across the plot. Two of these (BH1 and BH2) appear to be present within the boundary of the subject site. These are noted to have been advanced to a depth of 25.00 m bgl. Made Ground was recorded to a depth between 0.70 m bgl and 0.80 m bgl. Alluvium was found to depths between 1.70 m mbgl and 2.40 m bgl, underlain by dense sandy gravels to depths between 2.80 m and 4.40 m bgl. Lambeth Group (Woolwich and Reading Formations) were proven to the end of the boreholes at 25.00 m bgl.

Groundwater strikes were encountered at various levels within the Woolwich and Reading Formations but confirmed the absence of perched water at shallow depth. The difference from this investigation and the previous investigations could be explained by the creation of the flood relief channels around the site, draining any perched groundwater.

Low concentrations of soluble sulphate were measured in selected soil samples. Special precautions, to guard against sulphate attack, were therefore not required in the design of foundation concrete.

4 ENVIRONMENTAL RISK ASSESSMENT

4.1 Background

This Risk Assessment consists of an appraisal of the contaminant-pathway-receptor 'linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'contaminant' linkage'.

- **Contaminant** referring to a substance in or under land that can cause harm or pollution to the source (Hazard).
- **Pathway** for the contaminant to move/migrate to receptor(s).
- **Receptor** (Target) that could be affected by the contaminant(s).

Receptors include human beings, other living organisms, crops, controlled waters and buildings / structures. The assessment includes a qualitative review for the 'significant possibility of significant harm' (SPOSH). The mere presence of a contaminant / hazard at a site does not mean that there will necessarily be related risks or that the site will be designated as 'contaminated land'. For further details see Appendix C.

The assessment includes preliminary consideration of redevelopment constraints, the site's 'suitability for use' and the perception by any future purchasers regarding the potential impact on investment value and future saleability.

The Risk Assessment comprises a summary of current and historical land uses of concern as well as the identified receptors in a tabular layout. The Conceptual Model is also demonstrated in a tabular format with Contaminant, Pathway and Receptor components (in accordance with The Environment Agency's Land Contaminated Risk Management (LCRM 2020)). Within the Conceptual Model an assessment of risk has been evaluated for each potential contaminant linkage identified, based on the likelihood of occurrence and its commercial impact. This risk is assessed in relation to ground contamination and has been classified under three broad risk categories (see below).

Risk definitions used for the following assessment are provided as follows:

- **Low risk** - it is considered unlikely that issues within the category will give rise to significant harm to receptors or a liability/cost for the owner of the site.
- **Moderate risk** - it is possible, but not certain that issues within the category will give rise to significant harm to receptors or a liability/cost for the owner of the site
- **High risk** - there is a high potential that issues within the category will give rise to significant harm to receptors or a liability/cost for the owner of the site.

4.2 Conceptual Site Model

4.2.1 Contamination Source(s)

Potential on-site sources of contamination	Current	No potentially significant sources of contamination were identified during the site inspection.
	Historical	A review of historical mapping has revealed an infilled drainage channel in the centre of the site c.1899. However, given the time that has passed, and the development works that have taken place since, any potentially contaminative fill material is likely to have been removed and therefore does not present a significant risk to the site currently. No further potentially contaminative land uses were noted on site. A Peter Brett Associates (PBA) 1998 Summary of Geotechnical Information report concluded that no significant groundwater contamination is expected to be found beneath the site. It should be noted that the findings and results of soil testing were not included within this report for review. However, for those off site testing results that were discussed these were not deemed to present a significant risk. Similarly, it is not evident from reviewing PBA's report which groundwater sampling was undertaken on the subject site and results were not provided.
Potential off-site sources of contamination	Current	No current sources of contamination have been identified in the surrounding area.
	Historical	Historical potential sources of contamination identified in the surrounding area include: • Drainage Channels adjacent north and south c.1872, filled c.1899; • Farm Yard 160 m west c.1872 to c.2001; and • Spoil 180 m east c.1976 to c.1988. These land uses are unlikely to pose a significant risk to site owing to the time passed since they were present. In addition, whilst the spoil material is not known, this has been cleared for over 30 years and was located some distance from the site, reducing the risk it currently poses. Historical landfill data supplied by the Environment Agency has identified a site, operated by Reading Football Club, located 60 m to the east. Following a review of the Geotechnical Information report (PBA 1998) and consultations with the Council, it was identified that the Smallmead Landfill had been mechanically extended from over 350 m northeast to 60 m southeast (170 m southeast from the onsite building) as part of development works to construct Reading Football Club Stadium. This landfill has been identified as a potentially significant off site source of contamination. It is understood that following the mechanical spreading of the landfill, extensive gas control measures including the placing of a gas membrane and gas vents were incorporated in this landfill.

Overall likelihood of significant contamination beneath the site is considered to be **Low to Moderate**.

4.2.2 Receptor(s)

The following identified receptors may be impacted by an environmental hazard if linking pathways are found to be present:

Site Users	The site is currently in commercial use as offices (i.e. reduced sensitivity).
Surrounding Site Users	The nearest residential properties with garden areas are noted from 250 m northwest and the nearest school with outdoor recreational areas is noted 350 m northwest of the site. Given their distance from the site, they are not deemed vulnerable receptors to any on site contamination (if present).
Groundwater	The site is located above a Secondary A Aquifers relating to both the Beenham Grange Gravel Member and Lambeth Group. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers. The PBA report dated 1998 stated groundwater was encountered at depths ranging from 0.4 m bgl to 1.7 m bgl. Foundry Brook is located 45 m southeast of the site and therefore the underlying groundwater is likely to be in hydraulic continuity with this watercourse. The underlying groundwater has been classified under the Water Framework Directive (WFD) as having 'good' chemical quality and multiple potable groundwater abstractions have been identified, the closest being located 455 m west. In addition, the site is not located within a groundwater Source Protection Zone.
Surface Water	Numerous watercourses and waterbodies have been identified within 1 km of the site. The closest is balancing ponds/Foundry Brook adjacent west. The closest classified watercourse under the WFD is Foundry Brook 45 m southeast, which is seen as a sensitive receptor to any on site contamination (if present). However, as this is classified as having a 'fail' for chemical quality, its sensitivity can be seen as reduced.
Ecology	Natural England has not identified any environmentally sensitivity receptors within 1 km of the site.

Overall sensitivity of the site is considered to be **Low to Moderate**.

4.2.3 Conceptual Model

Source (s)	Pathways	Receptors	Risk	Justification
Current and historical activities on site	Dermal contact / ingestion and inhalation of dust and vapours.	Site Users	Low	No significant potentially contaminative land uses were identified during the site walkover, and from a review of historical mapping. A Peter Brett Associates (PBA) 1998 Summary of Geotechnical Information report was undertaken for Plot 5, in which the site falls within. However, it should be noted that the findings and results of soil testing were not included within this report for review. However, for those off site testing results that were discussed, these were not deemed to present a significant risk. The site comprises areas of soft landscaping where site users could come into direct contact with the underlying ground and associated contamination (if present). However, the site is in commercial use (i.e. reduced sensitivity) and therefore these areas are unlikely to be used for recreational activities, restricting the dermal contact/ingestion pathway becoming released.
	Leaching and lateral and vertical migration.	Groundwater	Low	The site comprises areas of soft landscaping and is underlain by the permeable Beenham Grange Gravel Member (superficial geology) and Lambeth Group (bedrock geology). These would allow potential infiltration of rainwater and subsequent leaching of contaminants (if present) beneath the site and to underlying groundwater. The underlying groundwater has been classified as having a 'good' chemical quality, highlighting its sensitivity to any contamination. A number of potable groundwater abstractions have been identified, the closest being 455 m west. This is also deemed a sensitive receptor but given its distance its vulnerability to any contamination is reduced. However, no significant potentially contaminative land uses were identified during the site walkover and from a review of historical mapping, which would present a significant risk to this receptor. A Peter Brett Associates (PBA) 1998 Summary of Geotechnical Information report concluded that no significant groundwater contamination is expected to be found beneath the site. However, it is not evident from reviewing PBA's report which groundwater sampling was undertaken on the subject site and results were not provided.
	Surface water runoff and/or leaching and lateral migration.	Surface Water	Low	Numerous watercourses and waterbodies have been identified within 1 km of the site. The closest is balancing ponds/Foundry Brook adjacent west. Whilst these have not been classified under the WFD, they are still classed as sensitive features owing to their close proximity. The closest classified watercourse under the WFD is Foundry Brook 45 m southeast, which is seen as a sensitive and vulnerable receptor to any on site contamination (if present) owing to its close proximity. However, as this is

REPORT

Source (s)	Pathways	Receptors	Risk	Justification
				classified as having a 'fail' for chemical quality, its sensitivity can be seen as reduced. However, no significant potentially contaminative land uses were identified during the site walkover and from a review of historical mapping, which would present a significant risk to these receptors.
	Surface water runoff and/or leaching and lateral migration, with direct uptake resulting in bioaccumulation.	Ecology	Low	Natural England has not identified any environmental sensitivity receptors within 1 km of the site.
	Migration via permeable geology and groundwater, dermal contact (water/soils) and soil ingestion.	Surrounding Site users	Low	The nearest residential properties with garden areas are noted from 250 m northwest and the nearest school with outdoor recreational areas is noted 350 m northwest of the site. Given their distance from the site, they are not deemed vulnerable receptors to any on site contamination (if present). In addition, no significant potentially contaminative land uses were identified during the site walkover and from a review of historical mapping, which would present a significant risk to these receptors.
Current and historical activities off-site	Surface water runoff and/or leaching and lateral migration, and subsequent ingestion or dermal contact	Site Users	Low	The site comprises areas of soft landscaping where site users could come into direct contact with the underlying ground and associated contamination (if present). The site is also underlain by the permeable Beenham Grange Gravel Member (superficial geology) and Lambeth Group (bedrock geology) which could allow the lateral migration of off-site contaminants onto the subject site. However, the site is in commercial use (i.e. reduced sensitivity) and therefore the areas of soft landscaping are unlikely to be used for recreational activities. In addition, the site also benefits from large areas of building cover and hardstanding, breaking the pathway between site users and the underlying ground.
	Generation of landfill ground gas, ingress, accumulation within building voids and subsequent inhalation	Site Users	Low to Moderate	A potential linkage has been identified between the off site landfill and site users. Risks to site users from Smallmead Landfill derived contamination are predominantly associated with the inhalation of ground gas. It is noted that the PBA Geotechnical Investigation report advised it prudent that gas protection measures in the form of a gas membrane are installed in any structure on Plot 5 (the site). It is however understood that no planning conditions requiring gas protection measures to be included within the construction of building were present. RPS would also note that whilst this linkage cannot be entirely discounted, the possibility of lateral migration of ground gas from the landfill site is considered reduced given that landfill site is engineered and actively managed with gas vents. Furthermore, the PBA Geotechnical Report also stated the risk of significant landfill gas migrating was considered low due to geology and geometry of the plot and the gas control measures being installed as part of the Football Club Development.

REPORT

Source (s)	Pathways	Receptors	Risk	Justification
				At the time of writing, no information has been provided with regards to the installation of ground gas protection measures within the building, and as such the linkage between gas generated from the offsite landfill and site users cannot be entirely discounted. However, with the understanding that the landfill site has been engineered with gas vents to provide a preferential pathway for the gas, the likelihood of any lateral migration of gas via permeable strata is considered reduced.

Overall, the risk of an environmental liability (e.g. third party liability or regulatory action) relating to ground contamination is considered to be **Low to Moderate** in its current use and form.

5 CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The following conclusions have been drawn from the observations recorded and the information collated (to date) and reviewed as part of this Risk Assessment:

The site is unlikely to be classed as 'contaminated' under Part 2A of the EPA 1990 whilst it remains in its current use and form.

Overall, RPS has not identified a significant risk of third party liability or regulatory action associated with ground contamination, which could affect the site whilst it remains in its current use and form.

The likelihood of ground contamination issues significantly affecting value / saleability is considered to be low to moderate for its continued use. It is considered that the site should be considered acceptable as a security from an environmental risk perspective based on a typical lending scenario.

If the site was to be redeveloped in the future, it is possible that intrusive site investigations would be required to satisfy any planning conditions set by the local authority (or in advance of planning consent being granted) and there is the potential for increased waste disposal costs associated with any soil arisings.

5.2 Risk Management Recommendations

5.2.1 Ground Contamination

No further work is required relating to ground conditions / contamination at the site, based on its current use and form.

5.2.2 Other Environmental Considerations

We recommend the following actions to reduce or clarify other potential environmental risks at the site:

- RPS recommends the presence of a gas membrane was required and / or included within the construction of the building be confirmed.
- Given the age of the building and the recent refurbishment works, it is unlikely that asbestos containing material is present within the building fabric. However, it would be prudent to enquire whether a survey was done as part of the refurbishment works.
- RPS understands that two interceptors are present on the site. These should be emptied and cleaned on a regular basis (approximately every 3-6 months). All relevant paperwork should be kept in a dedicated file on site.
- The site is located in an area potentially at risk from fluvial / tidal flooding. This could significantly impact the value of the site. RPS has provided the client a Flood Risk Due Diligence report proposal, which would include direct consultation with the Environment Agency and would consider the risk of flooding from all sources (including fluvial, tidal, surface water, groundwater and sewer flooding).

Appendix A: **Site Location, Flood Risk & Historical Plans**

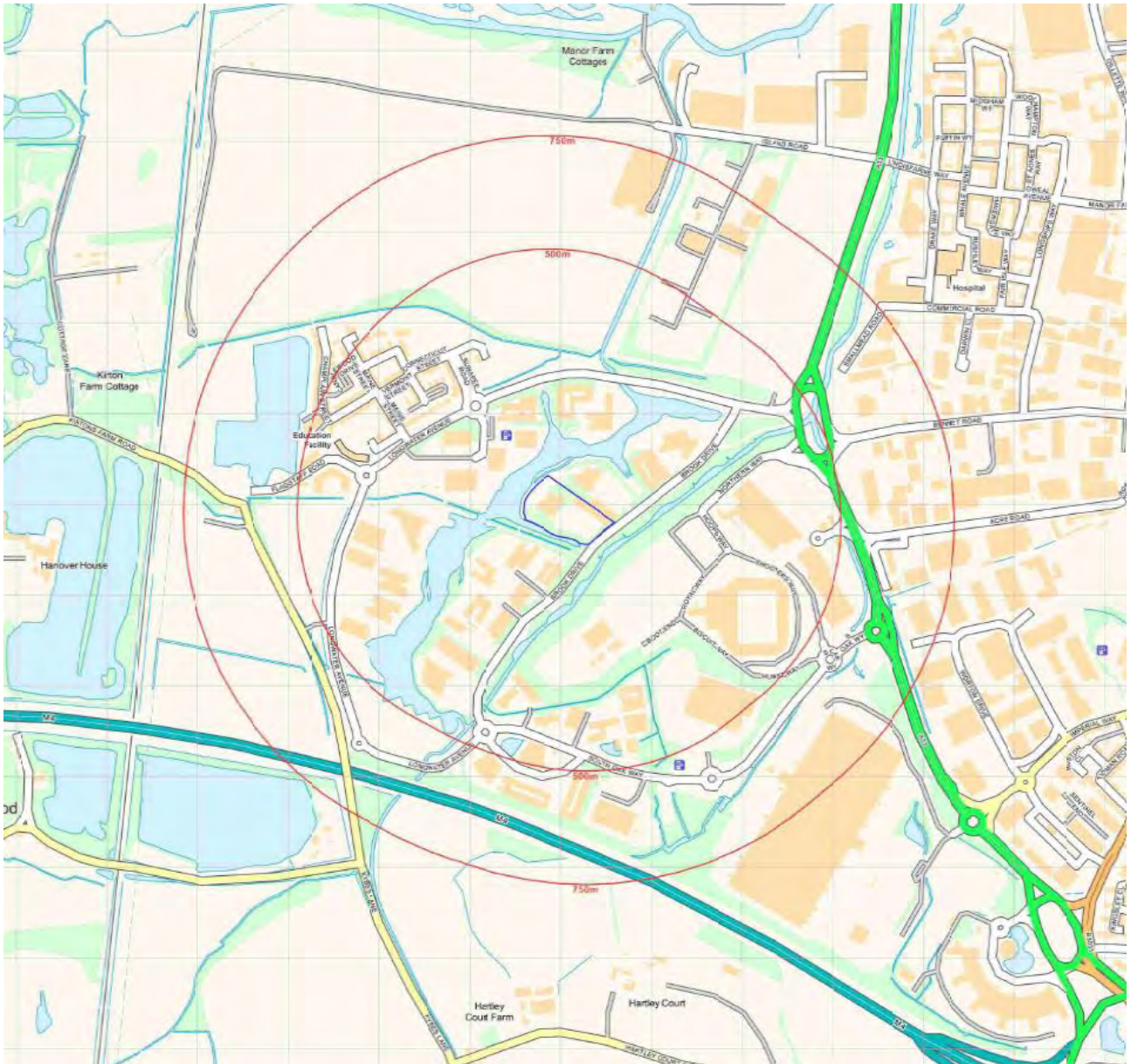


Figure A-1: Site Location Plan

Map Date: 2024

Scale: Not to scale

RPS
20 Farringdon Street
London EC4A 4AB
020 3691 0500
www.rpsgroup.com

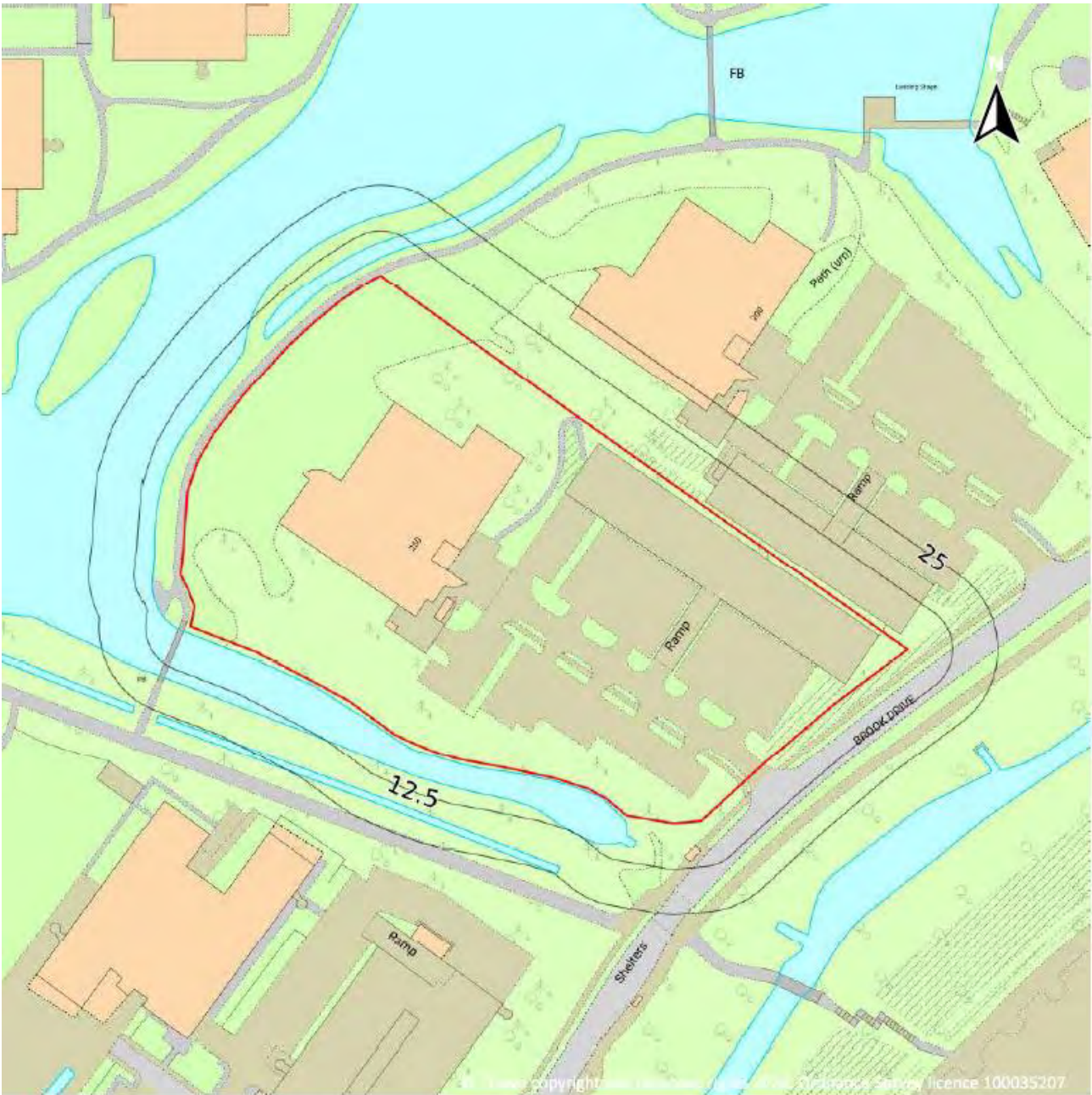


Figure A-2: Site Boundary Plan

Map Date: 2024

Scale: Not to scale

RPS
20 Farringdon Street
London EC4A 4AB
020 3691 0500
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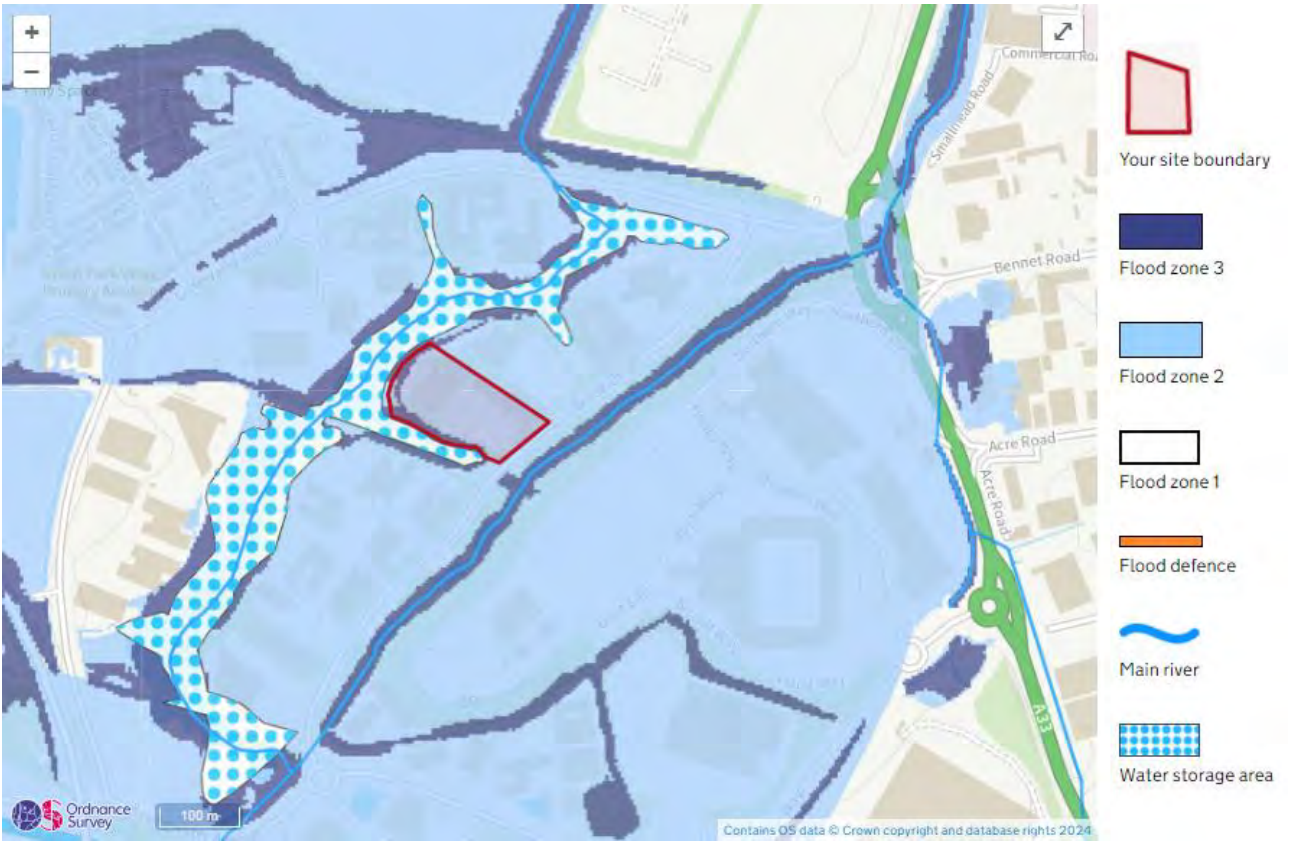


Figure A-3: Environment Agency Flood Map

Map Date: 2024

Scale: Not to scale

RPS
20 Farringdon Street
London EC4A 4AB
020 3691 0500
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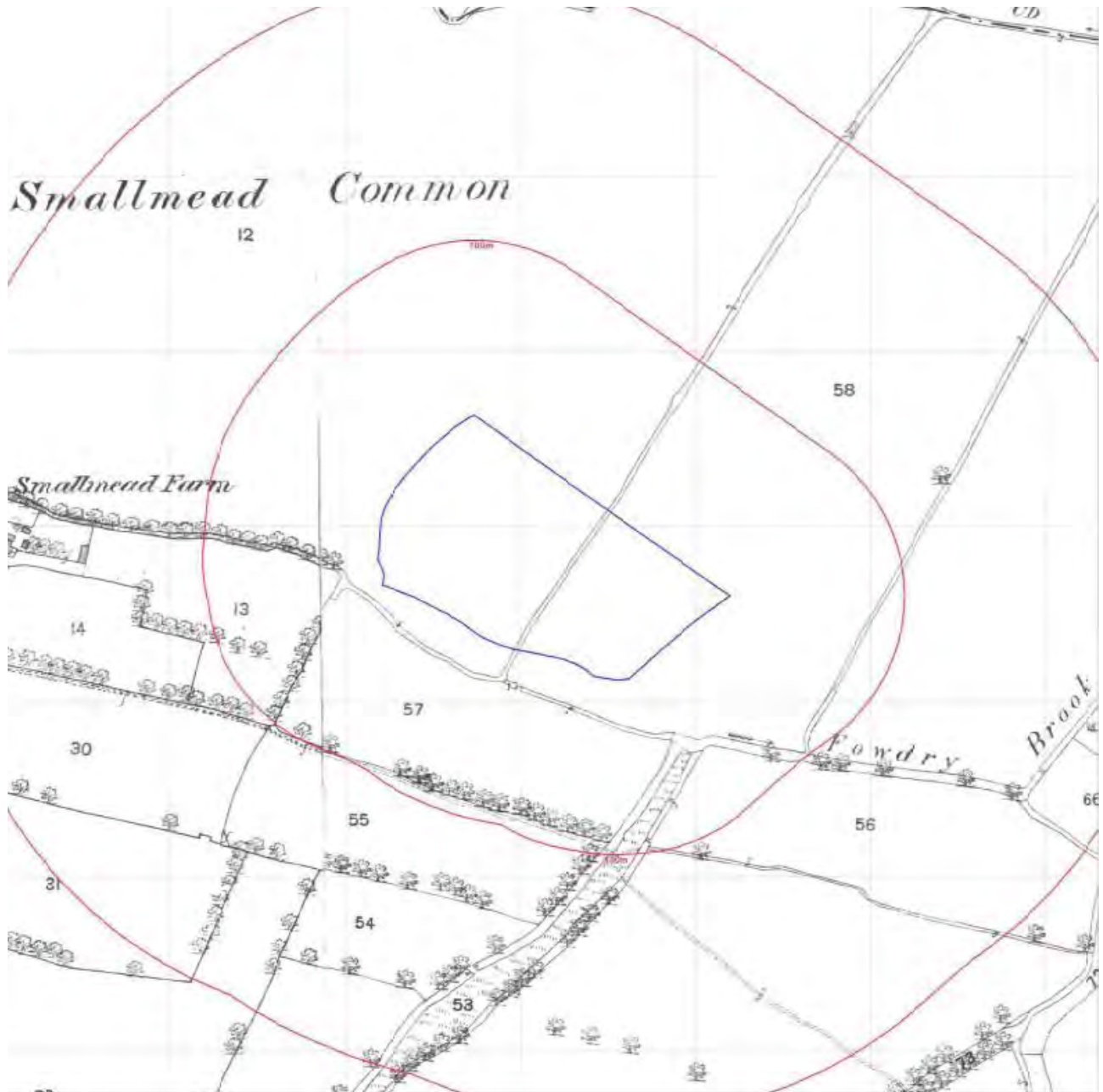


Figure A-4: Historical Map Extract

Map Date: 1872

Scale: Not to scale

RPS
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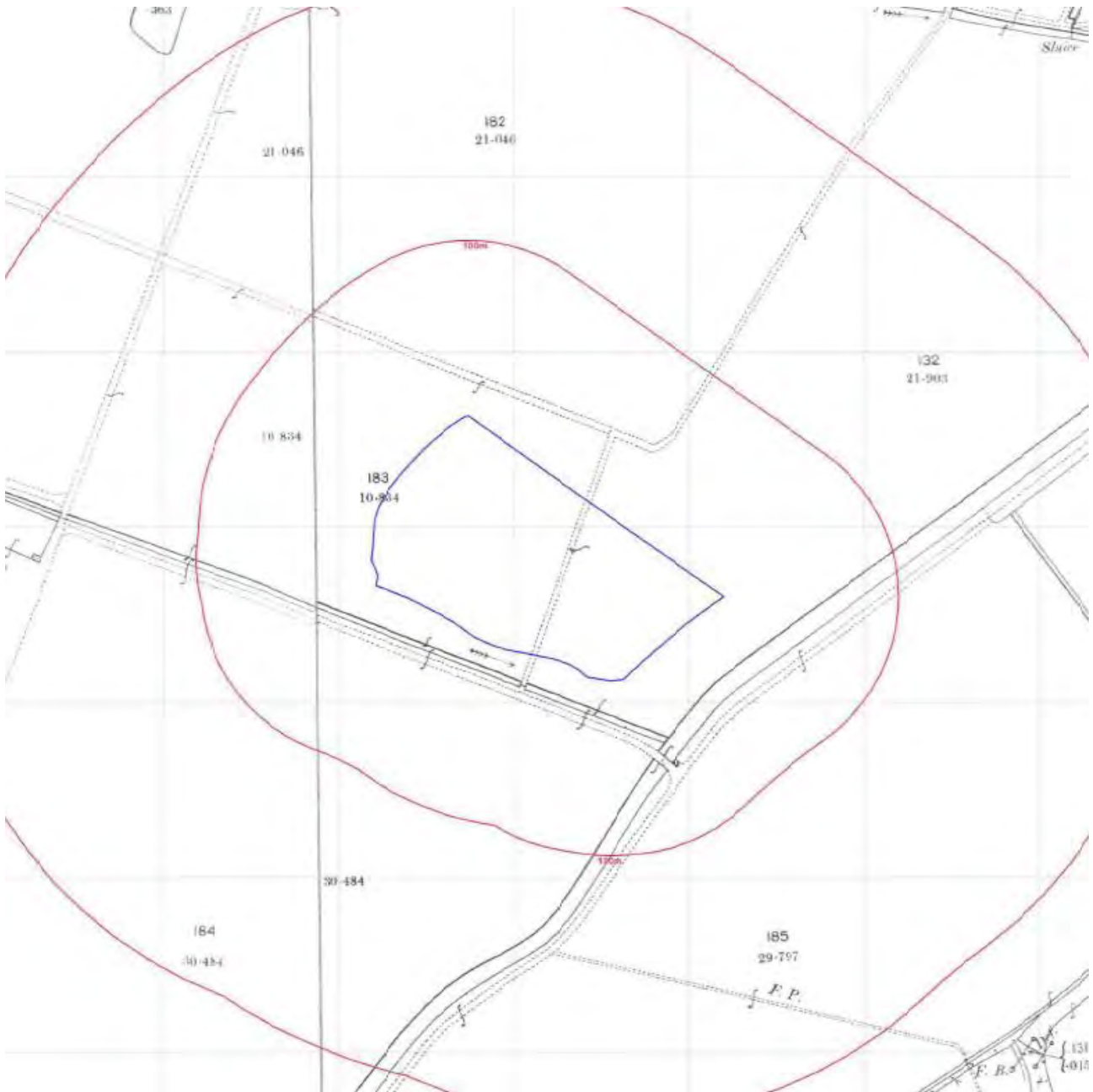


Figure A-5: Historical Map Extract

Map Date: 1889

Scale: Not to scale

RPS
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Figure A-6: Historical Map Extract

Map Date: 1976

Scale: Not to scale

RPS
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Map Date: 1988

Scale: Not to scale

RPS
20 Farringdon Street
London EC4A 4AB
020 3691 0500
www.rpsgroup.com



Figure A-8: Historical Map Extract

Map Date: 2001

Scale: Not to scale

RPS
20 Farringdon Street
London EC4A 4AB
020 3691 0500
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Figure A-9: Historical Map Extract

Map Date: 2003

Scale: Not to scale

RPS
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London EC4A 4AB
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Appendix B: Photographs

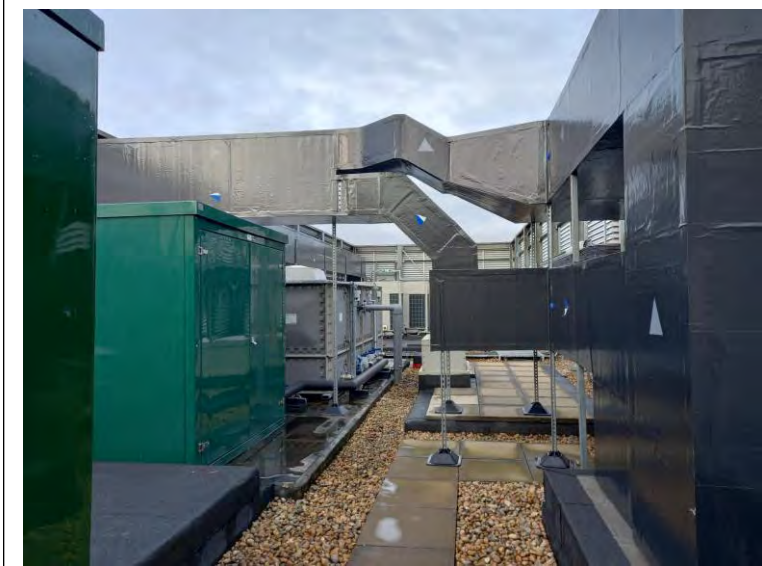


Photo 1: Roof Plant



Photo 2: One of the two water tanks at roof level



Photo 3: Air conditioning units at roof level

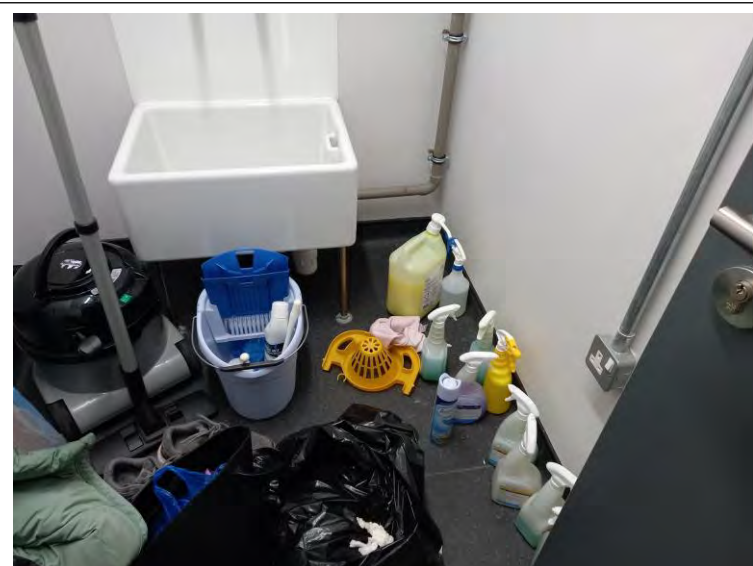


Photo 4: Small bottles of cleaning chemicals stored in ground level cleaners store



Photo 5: Social work space at ground level



Photo 6: One of the interceptors in car park



Photo 7: Second interceptor in the car park



Photo 8: Associated vent pipe for interceptor (two in total)



Photo 9: Flood water encroaching the north of the site



Photo 10: Electrical substation operated by SSE



Photo 11: Disused gas house



Photo 12: Bike store

Appendix C: **Overview of Part 2A** **(The Contaminated Land Regime)**

CONTAMINATED LAND: OVERVIEW OF 'PART 2A'

This section provides a summary of aspects of Part 2A of the Environmental Protection Act 1990. Full details of all aspects of the legislative regime can be obtained from the Environmental Protection Act 1990, the Contaminated Land (England) (Amendment) Regulations 2012 and the contaminated land statutory guidance (Defra 2012). Further Information of the technical requirements for dealing with Contaminated Land, and supporting technical information is hosted on the land Contamination Risk Management pages of the UK government website at <https://www.gov.uk/government/collections/land-contamination-technical-guidance>.

What is Part 2A

The Contaminated Land Regulations 2000 implemented a new section (Part 2A) of the Environmental Protection Act 1990. Part 2A, the regulations and the associated statutory guidance are the primary regulatory framework and statutory regime for the identification and management of contaminated land in the UK. It came into force in England in April 2000, Scotland in July 2000 and Wales in July 2001. The primary statutory instrument enacting the requirements have been amended in 2006 and again in 2012 with the primary statutory guidance being issued most recently in April 2012.

The intention of Part 2A is to provide a framework for identifying land where historical contamination has resulted in an unacceptable risk to human health or the environment and aims to ensure land identified as 'contaminated land' under the regime will be remediated where possible. Local councils are the lead regulators for Part 2A. Contaminated land is defined as any land where significant harm is being caused or there is a significant possibility of such harm being caused; or significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.

The statutory guidance identifies that the overarching objectives of the Government's policy on contaminated land and the Part 2A regime are to:

- a. identify and remove unacceptable risks to human health and the environment.
- b. seek to ensure that contaminated land is made suitable for its current use.
- c. ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development

The statutory guidance makes it clear that the Part 2A regime is one of several ways in which land contamination can be dealt with. Enforcing authorities are directed under the statutory guidance to use Part 2A only where no appropriate alternative solution exists. For example, land contamination can be addressed when land is developed (or redeveloped) under the planning system, during the building control process, or where action is taken independently by landowners.

Land contamination and planning

The majority of land contamination issues are expected to be dealt with under the planning regime during site development or redevelopment.

The National Planning Policy Framework (NPPF) (2021) sets out a number of requirements in relation to development of land where land contamination may exist, including requiring that planning policies and decisions should ensure that:

- a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under [Part 2A of the Environmental Protection Act 1990](#); and

- adequate site investigation information, prepared by a competent person, is available to inform these assessments.

Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

How Part 2A works

The Part 2A statutory guidance requires local councils to write an inspection strategy for their areas. Inspections involve local councils looking at previous land uses and activities that may have caused contamination and assessing the potential risks from these to people and the environment. Part 2A provides a legal definition of contaminated land. The accompanying statutory guidance introduces the idea of significant contaminant linkages that must be present in order to define land as contaminated land. Where all of these conditions are met, a local council can then determine the site to be contaminated land under Part 2A.

Once a site has been determined as contaminated land decisions can be taken about how to deal with it and who should pay. In some specific circumstances (that are defined in the Contaminated Land (England)(amendment) Regulations 20012) the Environment Agency becomes the enforcing authority. This happens when a site is designated by the local council as a special site.

In either case, remediation should be carried out by the appropriate person(s). There are two classes of appropriate person:

1. Class A: those persons who caused or knowingly permitted the pollution
2. Class B: a site owner or occupier – but would only be liable if a Class A appropriate person cannot be found for a particular significant contaminant linkage.

The provision for remediation follows the 'polluter pays' principle. Where an appropriate person may be unable to pay for remediation, the regulators must consider hardship. The regulator may also be able to recover costs if they do the remediation. However, where no appropriate person can be found the cost of remediation may be met by taxpayers.

Remediation can be achieved by breaking the -contaminant-pathway-receptor linkages. For example, removing or reducing the source of contamination, blocking the pathway between the contamination and the receptor, reducing the exposure of the receptor to the contamination or removing the receptor all together.

The remedial actions are documented and appropriately verified and may include a combination of further assessment, treatment or monitoring actions.

For further information please see the Contaminated Land section on www.gov.uk/contaminated-land

Appendix D: General Notes

ENVIRONMENTAL LIABILITY REVIEW / DESK STUDY REVIEW

General Notes

1. A "desk study" means that no site visits have been carried out as any part thereof, unless otherwise specified.
2. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the Client.
3. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.
4. The accuracy of maps cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.
5. No intrusive surveys, sampling or analysis has been undertaken in relation to this desk study.
6. Any borehole data from British Geological Survey sources is included on the basis that: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation".
7. All structural and/or geotechnical issues are outside the remit of this desk study.
8. Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
9. This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new / updated information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission.
10. The copyright in the written materials shall remain the property of RPS but with a royalty-free perpetual licence to the Client deemed to be granted on payment in full to RPS by the Client of the outstanding amounts.
11. The report is provided for sole use by the Client and is confidential to them, their professional advisors, no responsibility whatsoever for the contents of the report will be accepted to any person other than the Client. [Unless otherwise agreed]
12. Where a statement is made on the acceptability of the site as lending security from an environmental risk perspective. This is provided on the basis of 'normal' bank lending arrangements, which is taken to be approximately 75% loan to value ratio (LTV).
13. These terms apply in addition to the RPS "Standard Terms & Conditions" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms & Conditions the said Standard Terms & Conditions shall prevail.) In the absence of such a written contract the Standard Terms & Conditions will apply.