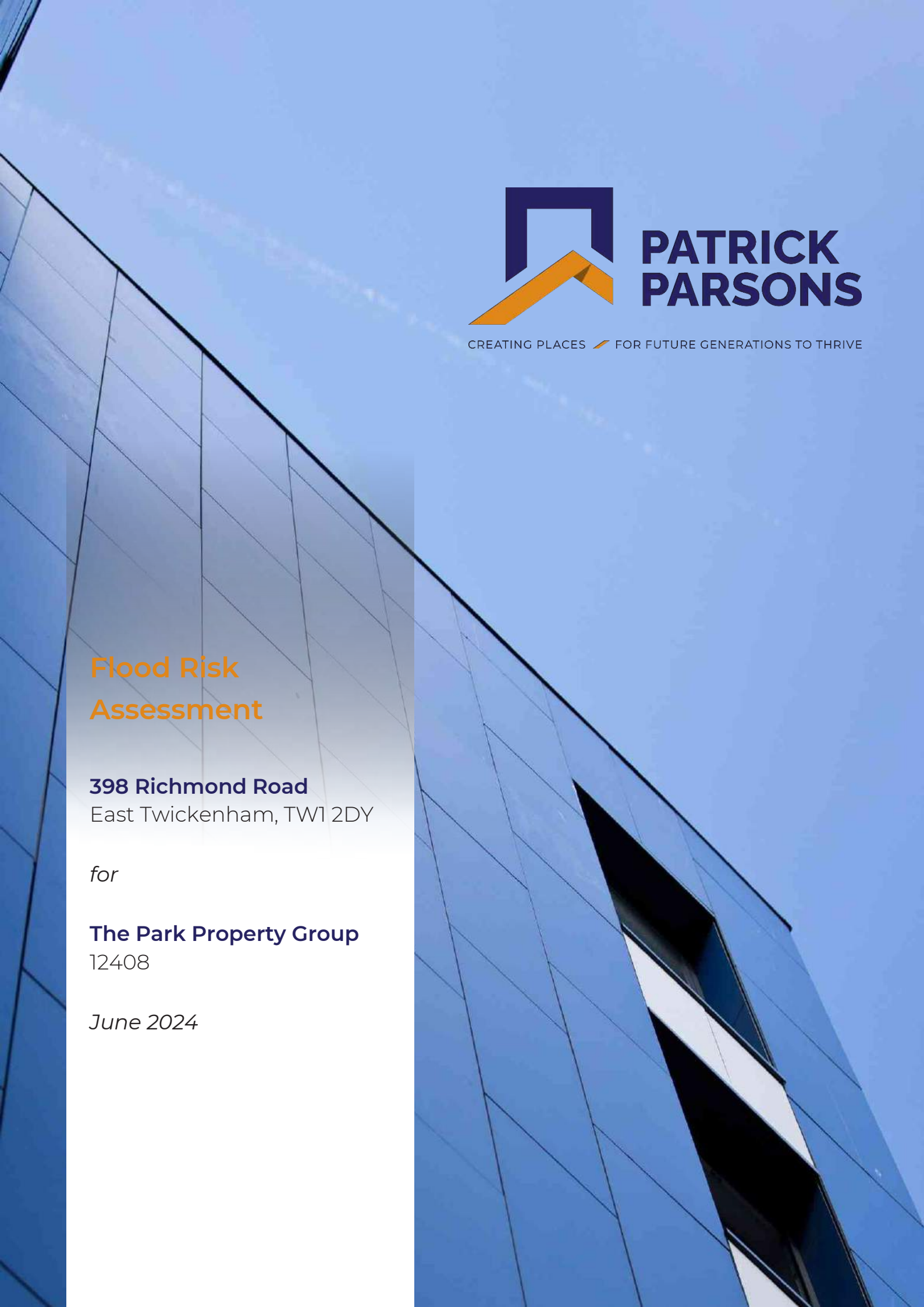

PATRICK PARSONS

CREATING PLACES FOR FUTURE GENERATIONS TO THRIVE

Flood Risk Assessment

398 Richmond Road
East Twickenham, TW1 2DY

for

The Park Property Group
12408

June 2024

Flood Risk Assessment

398 Richmond Road

for

The Park Property Group

Revision	Date of issue	Comments	Prepared By	Checked By
1.0	22.06.2024	Initial Issue	AM	DB
2.0	21.06.2024	Development Description Revised	AM	DB

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PATRICK PARSONS

Executive Summary

Description	
Patrick Parsons has been instructed by The Park Property Group, to produce a Flood Risk Assessment under National Planning Policy Framework (NPPF) to support the Planning Application for the site at 398 Richmond Road, East Twickenham, TW1 2DY.	
Flood Risk Assessment	
Coastal: Fluvial: Pluvial: Groundwater: Other sources:	Zone 3 Zone 3 Low Low Low
Flood Resilience Measures	
Set all plot levels to a minimum level above estimated 1 in 100-year storm event (+climate change) level.	
Conclusions	
The site has a moderate risk from fluvial sources of flooding when considering the extensive flood defences along the Thames. Tidal Flooding would be unlikely at this location due to the function of the Thames Barrier and so considered a residual risk. As such, it is considered that with the mitigation measures proposed and the recommendations below, the site could be considered in general compliance with local planning policy and the NPPF.	

PATRICK PARSONS

Contents

Appendices

1.0 Introduction

1.1.1 The Park Property Group is planning a proposed development on the site at 398 Richmond Road, East Twickenham, TW1 2DY.

1.1.2 Patrick Parsons has been instructed by The Park Property Group, to produce a Flood Risk Assessment to support the Planning Application.

1.1.3 This report aims to demonstrate that the site is not at risk of any form of flooding.

1.1.4 The general limitations of this assessment are that:

- Several data sources have been used in compiling this report. Whilst Patrick Parsons believe them to be trustworthy; it is unable to guarantee the accuracy of the information that has been provided by others.
- This report is based on information available at the time of preparation. There is potential for further information to become available, which may create a need to modify conclusions drawn in this report.

2.0 Location of Site

2.1.1 The site is located south of Richmond Road in London. A location plan is enclosed in **Appendix A**.

2.1.2 The Local Authority is the London Borough of Richmond upon Thames.

3.0 Site Description

3.1 Existing Site

3.1.1 The site comprises a three-storey building with a single storey rear projection to the south of Richmond Road. The existing ground and first floor plans and elevations are shown in **Appendix B**.

3.2 Existing Geology

3.2.1 The geology of the site has been ascertained by reference to the 1:50,000 British Geological Survey website. The data provided on the website indicates the bedrock and superficial drift geology for the site.

3.2.2 The strata of the site (bedrock geology) comprises London Clay formation, described as follows:

"London Clay Formation - Clay and silt. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period."

3.3 Hydrogeology Setting

3.3.1 The Environment Agency (EA) mapping service, as provided by Magic Map, indicates the aquifer designation for the bedrock and superficial drift geology and the groundwater vulnerability in the area. The mapping, as included at **Appendix C**, provide the following information for the site:

Geology Map	Site Description
Aquifer Designation (Bedrock)	Unproductive
Aquifer Designation (Superficial Drift)	Principal
Groundwater Vulnerability	Medium-Low
Groundwater Source Protection Zone	None

3.4 Hydrology

3.4.1 The nearest strategic watercourse is the River Thames, located 300m to the east of the site.

4.0 Proposed Development

4.1.1 The shop unit has been vacant for a number of months and the applicant wishes to convert the rear part to residential use, retaining the front part as commercial.

4.1.2 The proposed site plan and elevation are attached in **Appendix D**.

4.1.3 The finished floor levels should be set a minimum of 300mm above the existing ground level to protect against any potential storm water ingress. The EA are recommending that no sleeping accommodation is available below the breach flood level of 6.0m. Therefore, the FFL will be set at 6.0m.

4.1.4 Flood protection should be introduced to 300mm above the maximum tidal breach flood level, or higher. Protection should be up to a level of 6.65m AOD.

4.2 Flood Protection

4.2.1 It is impossible to completely guard against flooding since an extreme event is always possible; however, the risk can be minimised by employing flood resilient construction techniques to the proposed building as listed below:

- The use of concrete floor with waterproof membrane
- Waterproof walls up to a height providing 300mm freeboard to the assumed flood level
- Sealed service ducts
- Location of electrical and other plant above the floor
- High electrical sockets and
- Ensuring security of supplies.

4.2.2 It is recommended that the developer considers all the mitigation measures and above techniques when discussing and agreeing the precise detail of the development with the Local Authority.

4.2.3 Finished floor levels will be raised to 6.0m AOD, which is 300mm above the existing ground floor level.

4.2.4 Demountable defences (650mm) will be fitted to the flat entrance and attached when a flood warning is received, providing protection up to flood levels of 6.65m AOD.

4.2.5 The owner/occupier of the property will be responsible for the maintenance of the flood protection measures and at the appropriate time replace of any of these measures if required.

5.0 Flooding Information

5.1.1 As set out in the National Planning Policy Framework (NPPF), inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. For these purposes:

- "areas at risk of flooding" means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency;
- "flood risk" means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

5.1.2 Flooding information for Planning from the Environment Agency (EA) has indicated the site is located within Flood Zone 3, as found in the map at **Appendix E**.

5.1.3 As the site is within Flood Zone 3, further data was required from the Environment Agency and can be found at **Appendix F**.

5.1.4 As part of the data capture, data and mapping from the Richmond Strategic Flood Risk Assessment (SFRA) was sought. This will be included and references in the relevant sections below.

5.2 Flood Data

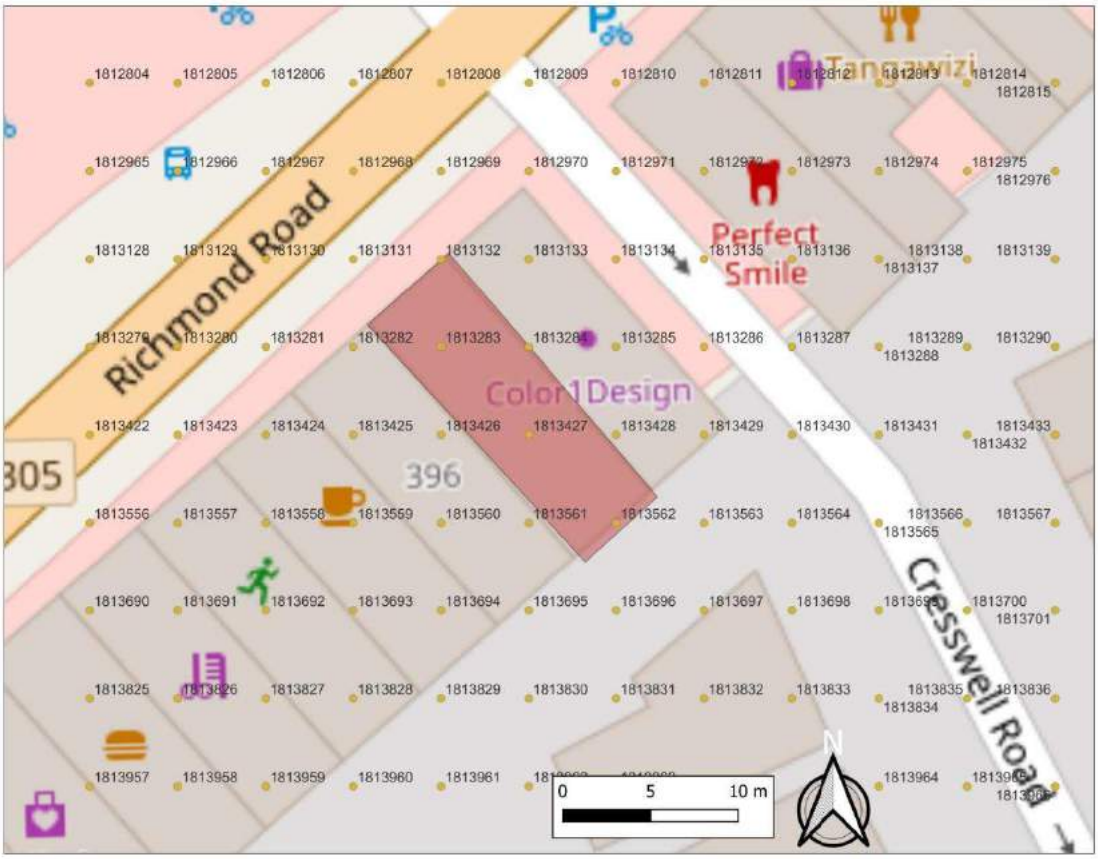
5.2.1 The predicted flood levels have been taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008. The modelled node closest to the site is 1813132.

5.2.2 The maximum water levels for the Thames Estuary indicate that the site is protected by defenses at this present time, with upgrades to be completed to provide protection to the site to 2100.

5.3 Downriver Breach Inundation

5.3.1 Predicted flood levels have been taken from the Thames Tidal Upriver Breach Inundation Modelling 2017.

5.3.2 The resulting water levels are as follows:



Node	Easting	Northing	Modelled Fluvial Flood Level (m)		Tidal Breach(m)	
			1% AEP + 35%CC	1% AEP + 81%CC	2005	2100
1813132	517547	174340	5.982	6.360	5.630	6.343
1813282	517542	174335	5.982	6.358	5.627	6.341
1813283	517547	174335	5.982	6.360	0.000	6.340
1813284	517552	174335	5.982	6.363	0.000	6.340
1813426	517547	174330	5.982	6.361	0.000	6.340
1813427	517552	174330	5.982	6.364	0.000	6.340
1813428	517557	174330	5.982	6.367	0.000	6.340
1813561	517552	174325	5.982	6.364	0.000	6.340
1813562	517557	174325	5.982	6.367	0.000	6.340

6.0 Flood Risk Classification

6.1.1 The data on the EA's website in their updated mapping, shows the site has a "medium" risk of flooding.

6.1.2 The EA confirmed that the proposed development site is located in Flood Zone 3 for Planning.

6.1.3 According to Table 2 of National Planning Policy Framework (NPPF), the development, being residential, is classed as 'more vulnerable'.

6.1.4 According to NPPF Table 3 'Flood Risk Vulnerability and Flood Zone Compatibility', the development should be permitted, with an exception test.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

6.2 Sequential Test

6.2.1 Local Planning Authorities (LPA) are encouraged to take a risk-based approach to proposals for development in or affecting flood risk areas through the application of the Sequential Test and the objectives of this test are to steer new development away from high-risk areas towards those at lower risk of flooding.

6.2.2 However, in some areas where developable land is in short supply, there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the Sequential Test is used to ensure that the lower risk sites are developed before the higher risk ones.

6.2.3 NPPF (PPG25) states that the Sequential Test should be applied at all stages of the planning process and the starting point is generally the Environment Agency's flood zone maps.

6.2.4 These maps and the associated information are intended for guidance and cannot provide details for individual properties. They do not consider other considerations such as existing flood defences, alternative flooding mechanisms and detailed site-based surveys. They do, however, provide high level information on the type and likelihood of flood risk in any area of the country.

6.2.5 The site is within Flood Zone 3 and is classified as more vulnerable. As the River Thames benefits from defences, there is no need for a sequential test.

6.3 Exception Test

6.3.1 The Exception Test is an additional test to be applied by decision-makers following application of the Sequential Test. The Exception Test has two elements as shown below, both of which must be satisfied for development in a flood risk area to be considered acceptable.

6.3.2 The Exception Test is only appropriate for use when there are large areas in Flood Zones 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is needed for wider sustainable development reasons, considering the need to avoid social or economic blight and the need for essential civil infrastructure to remain operational during floods.

6.3.3 For the Exception Test to be passed:

a. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA; and,
b. A site-specific FRA must demonstrate that the development will be safe for its lifetime, without increasing flood risk elsewhere and, where possible, reducing flood risk overall.

6.3.4 The site does not require an exception test in accordance with NPPF. This Flood Risk Assessment demonstrates that the site is safe from flood risk for its lifetime and therefore passes the exception test.

7.0 Climate Change Allowance

7.1.1 Climate change allowances, as set out by the Government guidance, are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed / extreme wave height.

7.1.2 To increase resilience to flooding and coastal change, allowances for climate change are considered in any flood risk assessment.

7.1.3 The allowances are based on percentiles from UKCP18 climate change prediction data. A percentile is a measure used in statistics. They describe the proportion of possible scenarios that fall below an allowance level. The:

- Central allowance is based on the 50th percentile
- Higher central allowance is based on the 70th percentile
- Extreme allowance is based on the 95th percentile

7.1.4 To manage river flooding in on the site, any flood assessment should use the:

- Central allowance as your design allowance
- Higher central allowance to test the impacts of higher scenarios of climate change and any extra mitigation
- Extreme allowance to test your option under more extreme climate change and exceedance events
- 2080s epoch allowances for changes beyond the 2080s epoch and up to 2115

7.2 Climate Change Allowances

7.2.1 The Environment Agency have prepared a River Catchment map (**Climate change allowances for peak river flow in England (data.gov.uk)** that identifies the percentage allowances required for a specific postcode.

Baseline	Central	Higher	Upper
2020s	10%	14%	26%
2050s	7%	14%	30%
2080s	**17%**	**27%**	**54%**

8.0 Flood Risk Assessment

8.1 Fluvial Flooding Risk

8.1.1 The Environment Agency flood information indicates some risk from fluvial sources on the site. The design flood level for the 1 in 100-year storm is 5.982m AOD (35 % climate change). The resilience flood level is 6.360m AOD (81% climate change).

8.1.2 The ground level on site varies but is generally lower than the 1 in 100-year storm level (with no climate change applied) at around 5.70m AOD.

8.1.3 This indicates that there is anticipated to be a flood depth of approximately 300mm across the site generally.

8.1.4 The worst-case hazard rating (35% climate change for design)) for the site can be refined and calculated using the formulae in the guidance document in **Appendix G**. The hazard can be obtained from the maximum possible water depth of 300mm and assumed velocity of 0.15 m/s (although it is expected to be much lower).

8.1.5 The flood Hazard Rating (HR) is based primarily on consideration to the direct risks of people exposed to floodwaters and is expressed below.

HR = d (v + n) + DF
HR = 0.300 x (0.15 + 0.5) + 0.5
HR = 0.695

d = Depth of water (m)
v = Velocity of water (m/s)
n = constant taken as 0.5

8.1.6 The guidance document provides details of the potential risk to occupants of the site as per the table below:

Thresholds for Flood Hazard Rating H = d x (v + 0.5) + DF		**Degree of Flood Hazard**	**Description**
FD2321	**FD2320**		
<0.75	<0.75	Low	**Caution** - "Flood zone with shallow flowing water or deep standing water"
0.75 - 1.25	0.75 - 1.25	Moderate	**Dangerous for some (i.e. children)** - "Danger: Flood zone with deep or fast flowing water"
1.25 - 2.5	1.25 - 2.0	Significant	**Dangerous for most people** - "Danger: flood zone with deep fast flowing water"
>2.5	>2.0	Extreme	**Dangerous for all** - "Extreme danger: flood zone with deep fast flowing water"

8.1.7 The worst possible flood hazard from surface water based on this calculation is "Low". This indicates that there is a hazard level of "Caution", from potential shallow water.

8.1.8 Therefore, it can be stated that most of the site to be developed is at a low hazard from flood water.

8.2 Tidal Breach

8.2.1 The maximum water levels have been provided for an upstream tidal breach scenario. These levels are not related to any return period as noted in the EA data.

8.2.2 The levels provided are Maximum Likely Water Levels (MLWL) using a 2005 baseline and 2100 baseline (epoch event). The maximum water levels are 5.63m AOD and 6.34m AOD respectively.

8.2.3 During a breach event with a 2005 baseline, there is no risk of flood water in the site. In the 2100 baseline, there is a significant amount of water on the entire site.

8.2.4 As the flood mechanism is a defence breach, any occupants of the site will be notified of the event as they will be signed up to the EA flood warning service.

8.2.5 Based on the mapping, the time of inundation is anticipated to be high, and occupants of the site will be able to evacuate to the south (St Fidelis Road) in good time prior to the ingress of flood water.

8.2.6 Flood protection measures have been promoted to a level providing 300mm freeboard to the maximum breach water level.

8.3 Historic Flood Data

8.3.1 The Environment Agency have no information indicating that the site was flooded historically from fluvial sources.

8.4 Groundwater

8.4.1 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A ground water flood event results from a rise in ground water level, sufficient for the water table to intersect the ground surface and inundate low lying land. Groundwater floods may emerge from either a single point or diffuse locations.

8.4.2 The underlying strata throughout the area and investigations into the SFRA geology data suggest that there is a risk of groundwater emergence which is likely to relate to the geology of the area. However, groundwater flooding risks are often highly localised, and dependent upon geological interfaces between permeable and impermeable subsoils. Therefore, sustainable construction techniques for surfacing will minimise any potential groundwater risk.

8.4.3 The Richmond SFRA indicates that the site is within an area with limited potential (between 50% and 75%) for groundwater flooding to occur.

8.5 Flooding from Sewers

8.5.1 Flooding from sewers can occur because of different reasons; if sewers are blocked during the heavy rainfalls, or if a sewer cannot provide adequate capacity, then flooding can cause a large amount of damage.

8.5.2 The Richmond SFRA has no records indicating the site has been flooded by sewers historically.

8.6 Flooding from Reservoirs

8.6.1 Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensures that reservoirs are inspected regularly, and essential safety work is carried out.

8.6.2 However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. If the site is within a risk area, plans should be made for safe evacuation and escape. Residents may need to evacuate immediately, know the safest route to safety, and be ready to follow the advice of emergency services.

8.6.3 The EA data indicates that the site is at no risk from reservoir flooding.

8.7 Surface Water Flooding

8.7.1 Overland flow / surface water flooding typically arise because of intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems. It can run quickly off land and result in localised flooding.

8.7.2 The Environment Agency has produced illustrative mapping (Flood Map for Surface Water) relating to flooding risks from surface water. They are classified as Flood Hazard Maps for the purpose of the Flood Risk Regulations 2009. These maps are the next generation on from the previous “Area Susceptible to Surface Water Flooding” maps, which are contained within the SFRA.

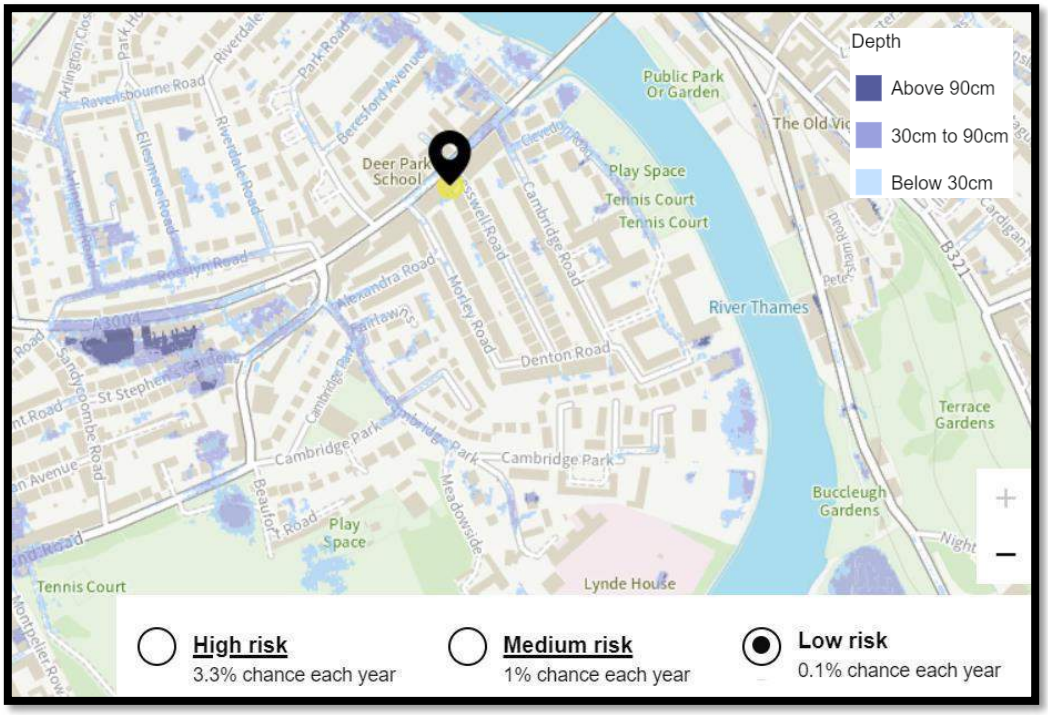
8.7.3 The EA maps show high resolution image and indicative flow paths for pluvial events. The maps are based on coarse level data and indicate ridges, valleys and flat spots where water would collect. Typically, the flow paths follow valleys, rivers and watercourses.

8.7.4 The surface water maps and the associated information are intended for guidance only and cannot provide details for individual properties. They do, however, provide high level information and indicate areas in which surface water flooding issues should be investigated further. The risk categories are classified as follows:

- Very low probability of flooding – This zone is assessed as having less than a 1 in 1000 annual probability of surface water flooding.

- Low probability of flooding – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of surface water flooding.
- Medium probability of flooding - This zone comprises land assessed as having between a 1 in 30 and 1 in 100 annual probability of surface water flooding.
- High probability of flooding – This zone is assessed as having greater than a 1 in 30 annual probability of surface water flooding.

8.7.5 A review of the EA mapping, as included at below, indicates there is some minor risk of surface water flooding to the edge of the site.



8.7.6 An assessment of the "Medium" risk scenario (up to 1 in 100-year event), indicates that there would be some flood water on the site. The water appears to be highly localised and shallow.

8.7.7 For the purposes of hazard identification, a flood depth of 400mm and velocity of 0.1 metres per second has been selected.

8.7.8 The worst-case hazard rating (up to 1 in 100-year event) for the site can be refined and calculated using the formulae in the guidance document in **Appendix G**. The hazard can be obtained from the maximum possible water depth of 400mm and assumed velocity of 0.1 m/s (although it is expected to be much lower).

8.7.9 The flood Hazard Rating (HR) is based primarily on consideration to the direct risks of people exposed to floodwaters and is expressed below.

HR = d (v + n) + DF	d = Depth of water (m)
HR = 0.400 x (0.1 + 0.5) + 0.5	v = Velocity of water (m/s)
HR = 0.740	n = constant taken as 0.5

8.7.10 The guidance document provides details of the potential risk to occupants of the site as per the table below:

Thresholds for Flood Hazard Rating H = d x (v + 0.5) + DF		Degree of Flood Hazard	Description
FD2321	FD2320		
<0.75	<0.75	Low	**Caution** - "Flood zone with shallow flowing water or deep standing water"
0.75 - 1.25	0.75 - 1.25	Moderate	**Dangerous for some (i.e. children)** - "Danger: Flood zone with deep or fast flowing water"
1.25 - 2.5	1.25 - 2.0	Significant	**Dangerous for most people** - "Danger: flood zone with deep fast flowing water"
>2.5	>2.0	Extreme	**Dangerous for all** - "Extreme danger: flood zone with deep fast flowing water"

8.7.11 The worst possible flood hazard from surface water based on this calculation is "Low". This indicates that there is a hazard level of "Caution", from potential shallow water, which should not prevent any occupants from escaping.

8.7.12 The proposed drainage strategy should carefully consider these localised low points and sources of surface water flooding. Mitigation measures should be included as appropriate to remove any risk to occupants.

8.7.13 There is some risk in the 1 in 1000 year (low risk scenario), with water up to a potential depth of 900mm, but still with low velocity.

8.7.14 The flood Hazard Rating (HR) is based primarily on consideration to the direct risks of people exposed to floodwaters and is expressed below.

HR = d (v + n) + DF
HR = 0.900 x (0.1 + 0.5) + 0.5
HR = 1.04

d = Depth of water (m)
v = Velocity of water (m/s)
n = constant taken as 0.5

8.7.15 The worst possible flood hazard from surface water based on this calculation is "Moderate". This indicates that there is a hazard for the elderly, children or the less able.

8.7.16 Protection measures for dwellings should be installed to ensure that they can be used as a safe refuge in an extreme (1000 year) storm event.

8.7.17 As this is for the low-risk scenario, the overall risk from surface water can be considered as low.

9.0 Flood Procedures / Warning

9.1.1 The site is within Flood Zone 3 of the Environment Agency Flood Map (for planning) and is located within a flood warning area.

9.1.2 In the event of a flood there are several key groups and organisations, the roles of whom should be understood by occupants. Key groups and organisations are listed below.

9.2 Environment Agency

9.2.1 In England and Wales, the Environment Agency is responsible for building, maintaining and operating flood defenses. The Environment Agency is also issuing flood warnings to the public, other flood responding organisations and the media.

9.2.2 The Environment Agency also provides the Flood line 0345 988 1188 service. You can listen to recorded flood warning information for your area or speak to an operator for advice 24 hours a day.

9.3 Local Authorities

9.3.1 During a flood event, the Local Authorities have the power to do some if not all of the following.

- Work with the police, fire and rescue services and the Environment Agency to co-ordinate responses during severe flooding.
- Provide local advice to the public about the incident and what to do.
- Set up rest centres for people evacuated from their homes and arrange temporary shelters or accommodation for those people who have nowhere else they can go to.
- Deal with road closures and disruption to social services.
- Investigate disruption caused by overflowing drains and sewers.
- Where possible they may provide sandbags and other emergency provisions.
- If you need help or support to prepare for flooding you could consider contacting your local authority. Many of them keep list of vulnerable people who might need extra support in a flood or emergency situation.

9.4 The Police

9.4.1 Co-ordinate the emergency services in a major flood incident and help with evacuation of people from their homes where it is necessary.

9.5 The Fire and Rescue Service

9.5.1 The primary responsibility of the Fire and Rescue Service is to save life; they do not rescue people who are stuck in floodwater if their lives are not at danger. The fire service may also pump out floodwater, this however varies between local services and some do charge for pumping out of water.

9.6 The Citizens Advice Bureau

9.6.1 The Citizens Advice Bureau is available to help and could be able to offer advice on how to obtain money in an emergency and deal with insurance queries.

9.7 National Flood Forum

9.7.1 Provide advice and support to communities and individuals who have been flooded or are at risk of flooding.

9.8 NHS Direct

9.8.1 If you have any health concerns during or after a flood NHS direct can give advice and information on what you should do.

9.9 National Grid

9.9.1 If you smell gas or spot a potential hazard on or near overhead electric lines you should call Nation Grid and report the incident.

9.9.2 Information sourced from The National Grid shows contact details of the aforementioned groups and organisations.

9.9.3 The site will be located within an area which is able to receive Flood Alerts from the Environment Agency. The Residential properties must be registered with the Environment Agency to receive warnings via the Floodline Warnings Direct Service. All occupants on site will thus receive direct warnings through this system. All owners and occupiers are advised to sign up to this system. Registration can be undertaken via the website: **https://www.gov.uk/sign-up-for-flood-warnings**

9.9.4 The following extract has been taken from the Floodline Warning's Direct registration page. You can register online with our Floodline Warnings Direct service if your home or business is at risk of flooding.

- If you want to register you will have to supply a telephone number that we can contact you on any time of the day or night. Please ensure the number you provide has no inbound call barring as this will prevent you from receiving our recorded flood warning messages. You will also need your current email address.
- If you need to register both your home and a business you should register twice: once for your home address and once for your business.
- If you are a landlord registering a tenant's property, then you should select the business category.
- If you are a tenant, you can still register the property in which you are living and you should select the home category.
- If you would prefer to register by telephone, or if you need help during the registration process, please call Flood line on 0345 988 1188.' It is highlighted that following

registration; it is the owner's/occupant's responsibility to keep registration details including contact telephone numbers up to date.

9.9.5 A warning of imminent flooding will be transmitted by telephone to the occupants or property owners' registered telephone numbers. The aim of the Flood Warning Service is to provide a minimum of two hours' notice of flooding, either day or night, to enable occupants to take the necessary action to protect themselves and their property. For severe warnings, the Environment Agency supplements the telephone warnings with sirens and vehicles utilising loud hailers, repeating the flood warnings.

9.9.6 Given the nature of the site, the designated person(s) should be able to notify all occupants and neighbours by initially knocking on doors. Other methods of contact such as texting or social media sites will also be used. The designated person(s) will be made aware of vulnerable occupants who may have impaired hearing or sight. The latest technology will be utilised due to the fact that media coverage via TV, radio and social networking is instant and comprehensive.

9.9.7 In the event of a flood, the warning authority is the Environment Agency (EA). The EA operates its warning systems for areas at risk of flooding from rivers or sea, based on direct measurements of rainfall, river / tidal levels and information from the Met Office.

9.9.8 In the event of a forecast flood within the resident's area, the EA will issue a flood status. This information can be obtained through the EA website at;

- Website: **https://check-for-flooding.service.gov.uk/alerts-and-warnings**
- Digital Text Service (formerly Ceefax) on 0345 602 6340
- Local weather, news and travel bulletins an TV & Radio
- The Environment Agency Flood Line Service on 0345 988 1188.

9.9.9 The EA has three types of warnings that are to help occupants prepare for flooding or take necessary action. **Table 1** below gives an explanation of the Environment Agencies different flood warning symbols.

Table 1 Environment Agency Flood Warning System

Flood Warning Symbol.	What Does it mean?	When It's Used.	What To Do?
	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding.	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.
	Flooding is expected. Immediate action required.	Half an hour to one day in advance of flooding.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.
	Severe flooding. Danger to life.	When flooding poses a significant threat to life.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.
WARNING'S NO LONGER IN FORCE	No further flooding is currently expected in your area.	When river or sea conditions begin to return to normal.	Be careful. Flood water may still be around for several days. If you've been flooded, ring your insurance company as soon as possible.

9.9.10 A Personal Flood Plan should be completed for each residential property, which can be completed online via the Environment Agencies website. The Flood Plan is to be followed in the event of flooding. A copy of the Flood Plan along with copies of the following Environment Agency Guidance documents should be kept with a Flood Kit:

- Prepare your Property for Flooding
- What to do Before, During and After a Flood.

9.9.11 It is important that occupants prepare and maintain a 'Flood Kit', containing items which are essential in the event of an evacuation. Occupants will be made aware of flood evacuation procedures and the safest route of escape in the event of an 'exceedance' flood. The Flood Kit will also contain this information. The Flood Kit should be easily accessible in the event of a flood evacuation, and should contain the following items:

- Blankets or sleeping bag
- Warm clothing and waterproofs
- First aid kit including any essential medication
- Mobile and a list of useful telephone numbers
- Bottled water supply
- Stock of non-perishable food items
- Portable radio with batteries and torch
- Wellington / waterproof boots
- Copy of home insurance.
- Turning off major supplies to the building during flood conditions is required; and as such simple lever stop cocks should be clearly marked for ease of visibility for turning off the water and electricity supplies.

9.9.12 It is advisable that during a severe flood event, occupants of the dwellings tune into local radio stations and check the Environment Agencies website on a regular basis. Local radio stations will convey advice issued from emergency services.

10.0 Route of Escape

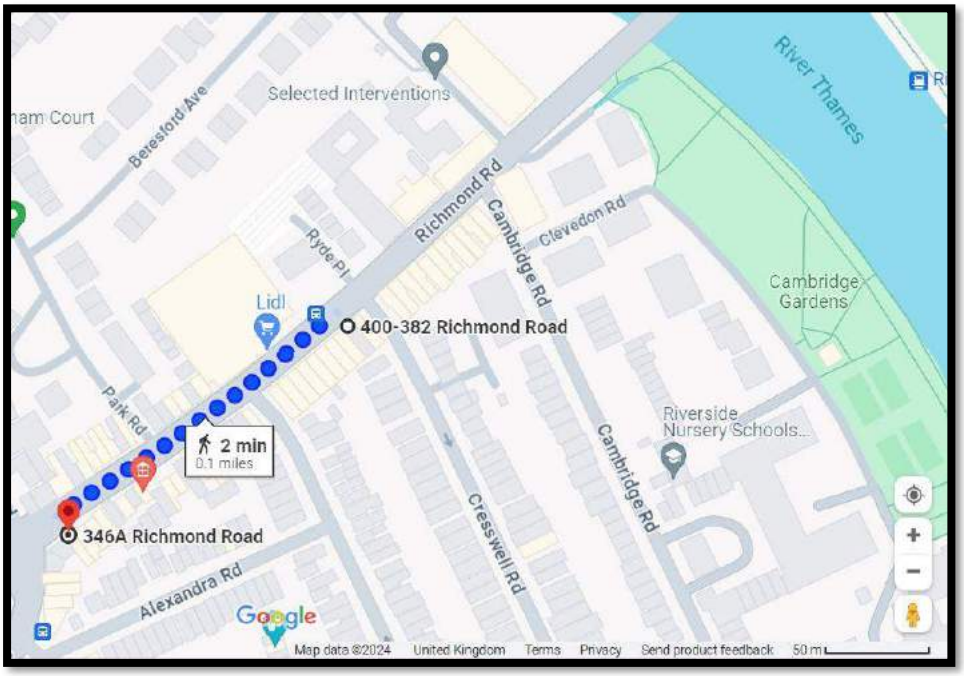
10.1.1 In an extreme storm event with the flood defences not working for the River Thames, there is likely to be flood water on site, with a predicted water depth of 300 generally.

10.1.2 This report has already indicated that the site should not pose a hazard generally for occupants in a storm event, although the main entrance to site may be more dangerous than the site itself.

10.1.3 Occupants of the site should be connected to the Environment Agency flood warning serve and take appropriate action as soon as possible in the event of a potential storm.

10.1.4 The dwellings will be able to provide safe refuge for occupants, or evacuation should be possible in the initial stages of the storm event, before the water depth creates a hazard.

10.1.5 A last resort for occupants wanting to evacuate by foot is to go directly west to the higher ground in the adjacent site as shown below.



10.1.6 It is not envisaged that there would be any problem for access of emergency vehicles in an extreme storm event as there is no flood depth unless the extreme storm scenario occurs. Emergency vehicles may operate in depths of 0.5m with velocity of 5 metres per second (with some operating at depths of 1m).

10.1.7 The Planning Authority must be in consultation with the emergency services as to the appropriate access and safe routes for the site during an extreme storm event, in accordance with Section 13.S3.3 of the FRA Guidance for New Developments. Emergency Response Plans for the local area are available on the council website and would require updating for the proposed residence. It is not envisaged that there will be any additional burden on emergency services during a flood event.

10.1.8 General Evacuation Advice:

- Avoid walking or driving through flood water, as only 150mm of fast flowing flood water is able to knock a person over and 600mm is able to float a car. Flooding can cause manhole covers to come off, leaving hidden dangers.
- Do not walk on sea defences or riverbanks.
- Take care or avoid crossing bridges when water levels are high.
- Take care crossing culverts as they are dangerous when flooded.
- Look out for other hazards such as fallen power lines and trees.
- Keep Children away from flood water.
- Wash hands thoroughly if you come into contact with flood water as it may be contaminated with sewage.
- Always follow the advice provided at the time by the Emergency Services. The Emergency Services may direct you to a Local Authority Evacuation Centre, which has been specially prepared for people being evacuated from their homes. Free food and bedding is provided, however spare clothing should be taken, essential medication and any baby care products should an infant be involved in the evacuation.

11.0 Flood Compensation

11.1.1 The site is within a Flood Zone for planning so there is a statutory requirement to evaluate the requirement for flood compensation.

11.1.2 The site will not be flooded in a normal storm event provided the Environment Agency defences are intact.

11.1.3 Because of this, there is no requirement to provide flood compensation on the site.

12.0 Summary and Conclusions

12.1.1 The Park Property Group is planning a proposed development on the site at 398 Richmond Road, East Twickenham, TW1 2DY.

12.1.2 Patrick Parsons has been instructed by The Park Property Group, to produce a Flood Risk Assessment under National Planning Policy Framework (NPPF) to support the Planning Application.

12.1.3 The Environment Agency mapping indicates that the site is within Flood Zone 3 and has a high risk of fluvial flooding if there is a failure of River Thames flood defences.

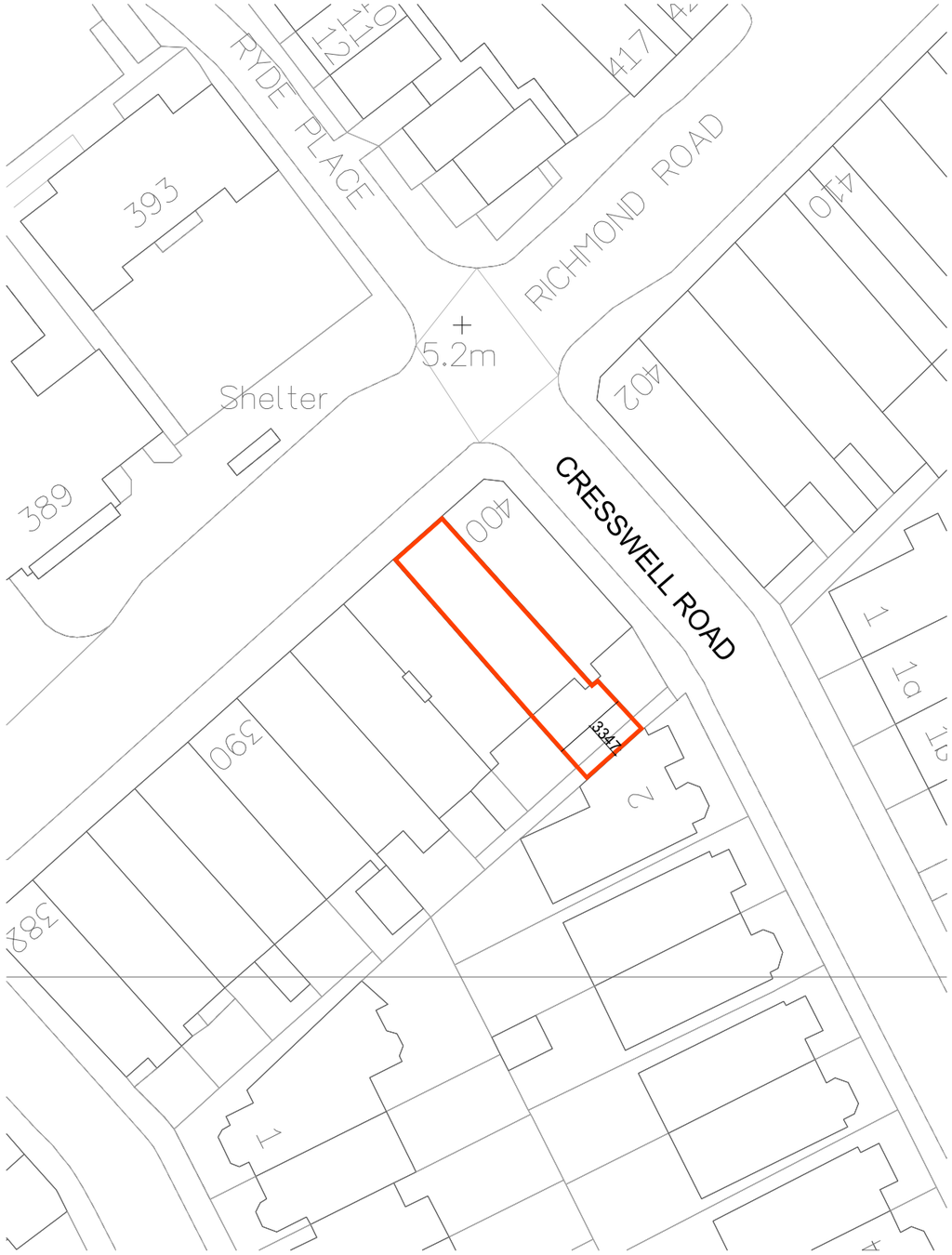
12.1.4 There will be flood water on site during an extreme storm, but the hazard level across the developed portion of the site is generally low.

12.1.5 Mitigation and protection measures have been included within this report to ensure that the development does not pose a risk to occupants. The FFL for the property will be set at 6.0m AOD and flood resilient measures should be provided to a minimum level of 6.65m.

12.1.6 All other sources of flooding for the site have been investigated and shown to be of minimal or no risk.

12.1.7 The proposed development is appropriate and sustainable in the terms as set out in NPPF.

Appendix A
Location Plan



BLOCK PLAN (1:500)

1:500 0 10 20 30 40 50

NOTES
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REV.	DATE	DESCRIPTION
–	–	–

CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East Twickenham,
Twickenham, TW1 2DY.

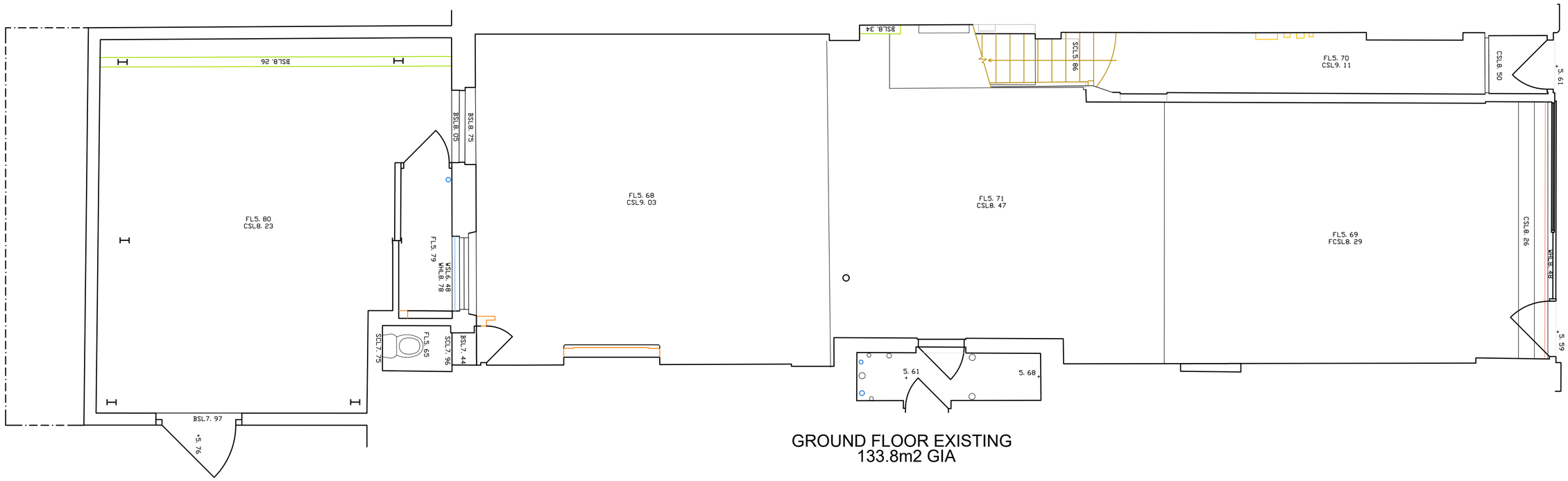
Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

DRAWING:
Location Plan

1:1250 0 10 20 30 40 50

DRG NO.	DATE:	SCALE:
13/095-008	13/03/24	A3: 1:1250

Appendix B
Topographical Survey



GROUND FLOOR EXISTING
133.8m2 GIA

NOTES
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REV.	DATE	DESCRIPTION
–	–	–

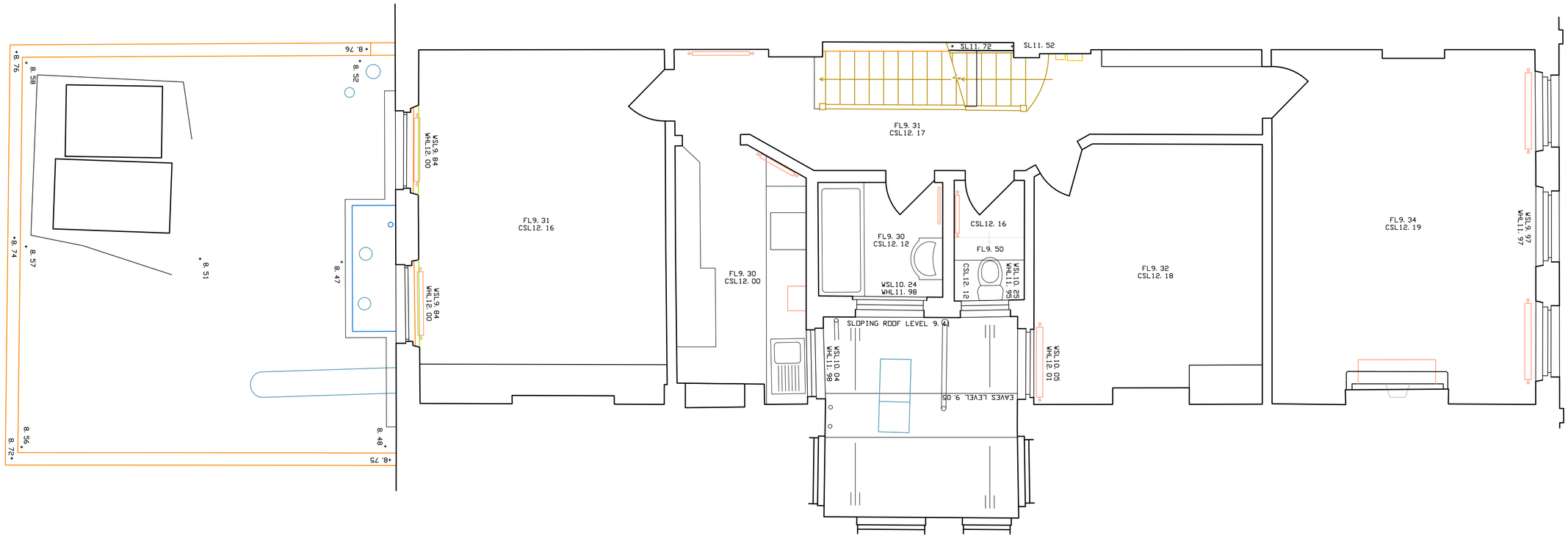
CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East
Twickenham, Twickenham, TW1 2DY.

Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

DRAWING:
Ground floor existing

1:100 0 1 2 3 4 5
1:50 0 0.5 1.0 1.5 2.0 2.5

DRG NO.	DATE:	SCALE:
13/095-001	13/03/24	A2: 1:50



–	–	–
REV.	DATE	DESCRIPTION

CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East
Twickenham, Twickenham, TW1 2DY.

Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

DRAWING:
First floor existing

1:100 0 1 2 3 4 5
1:50 0 0.5 1.0 1.5 2.0 2.5

DRG NO.	DATE:	SCALE:
13/095-002	13/03/24	A2: 1:50

NOTES
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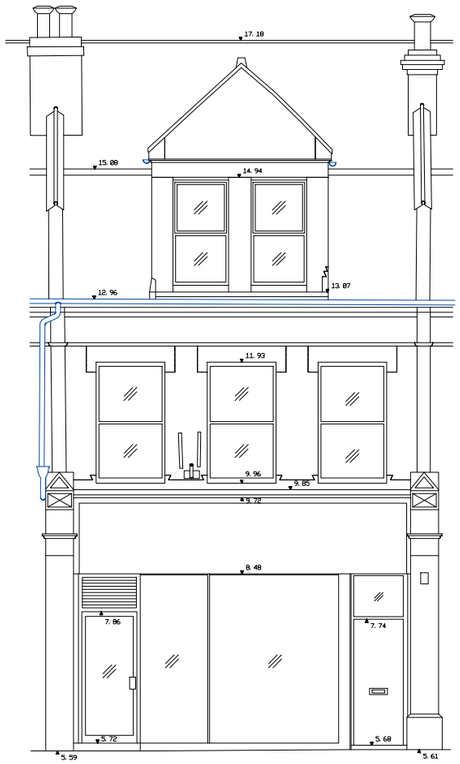
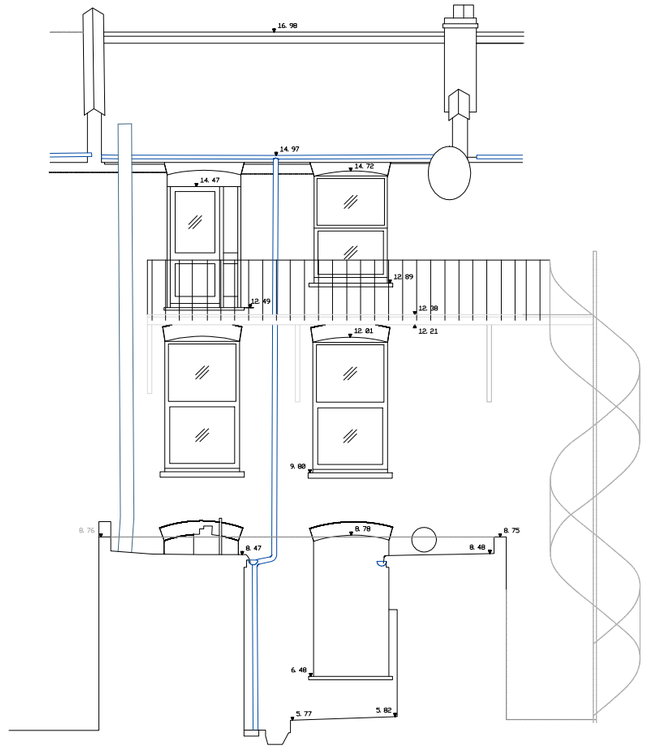


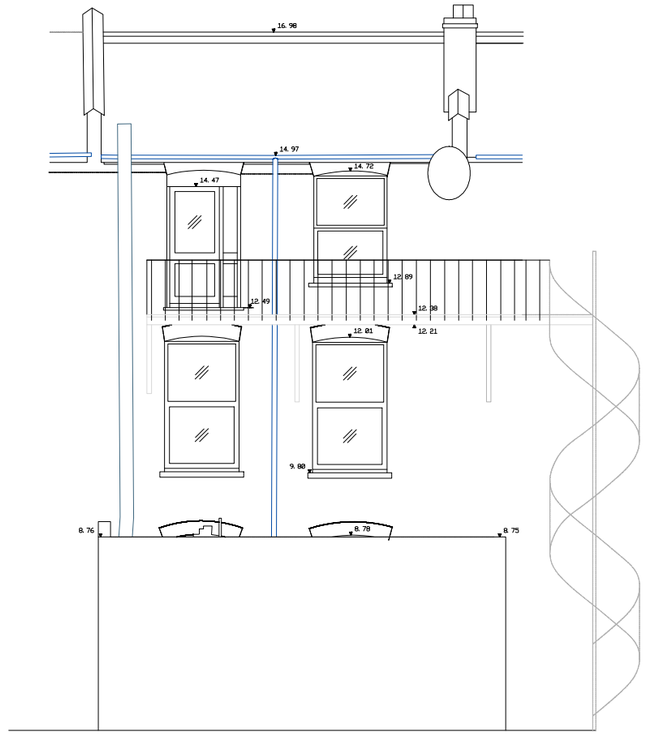
DATUM 5.00m

FRONT ELEVATION



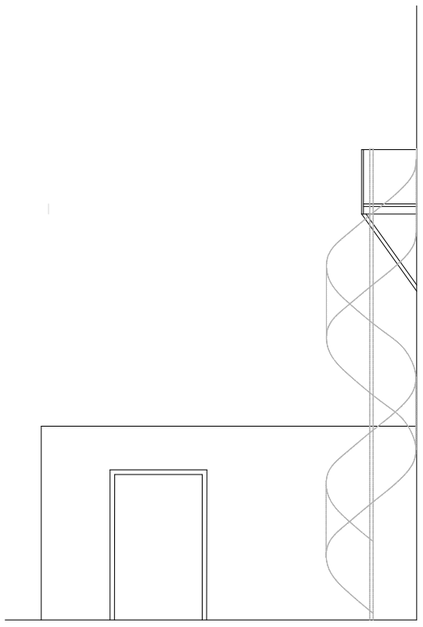
DATUM 5.00m

REAR ELEVATION (THRU LIGHTWELL)

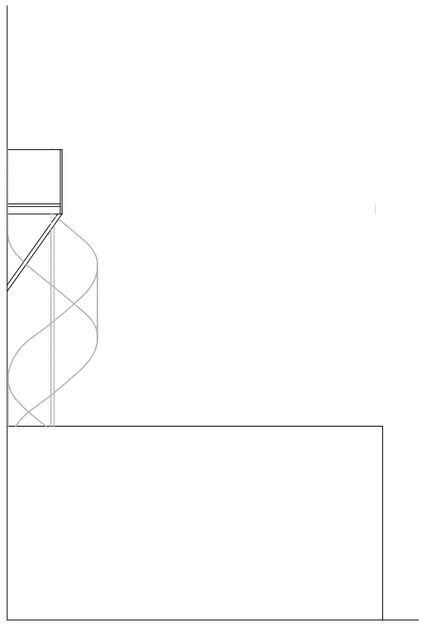


DATUM 5.00m

REAR ELEVATION



PARTIAL SIDE ELEVATION



PARTIAL SIDE ELEVATION

NOTES
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–	–	–
REV.	DATE	DESCRIPTION

CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East Twickenham,
Twickenham, TW1 2DY.

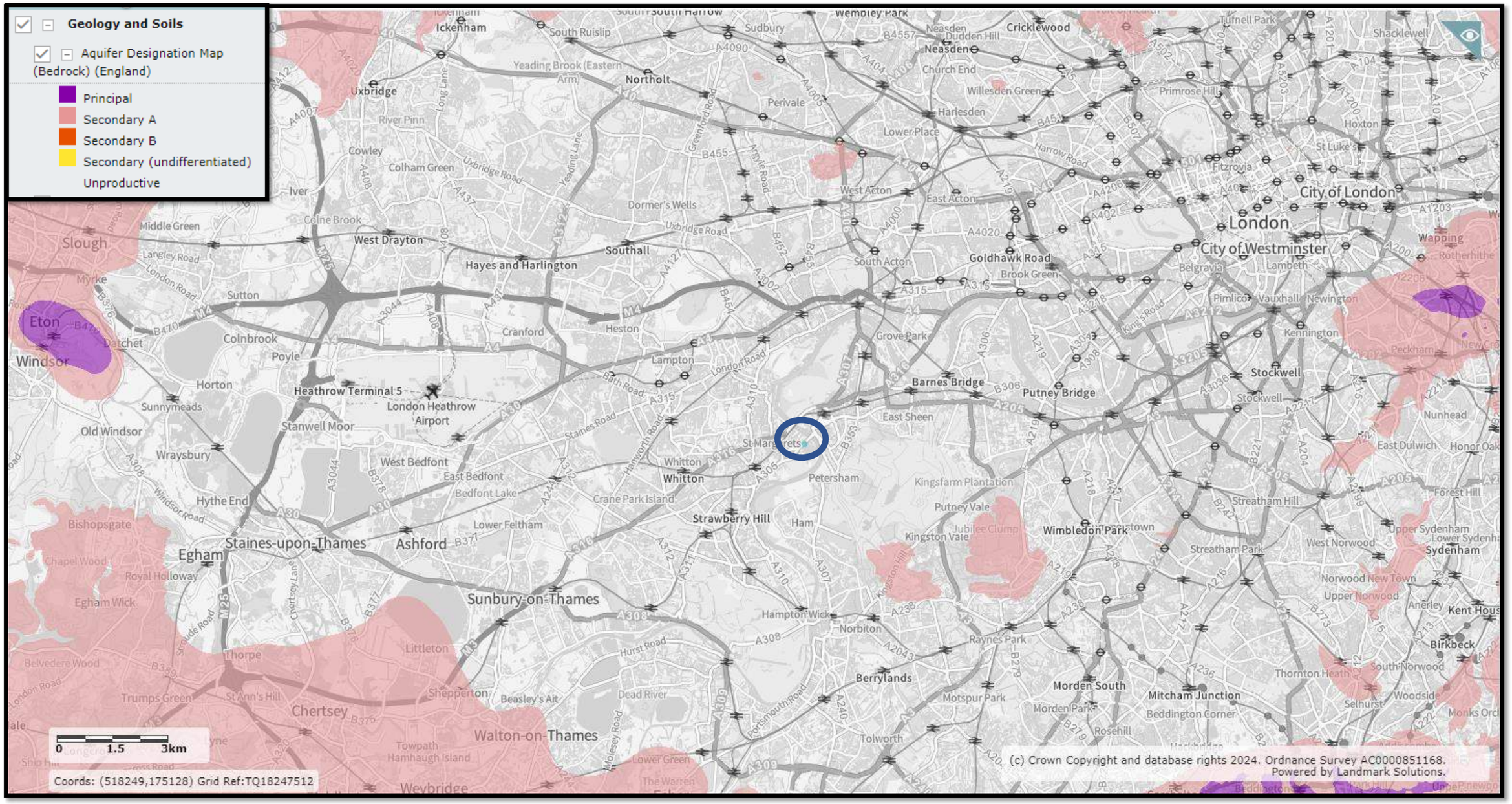
Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

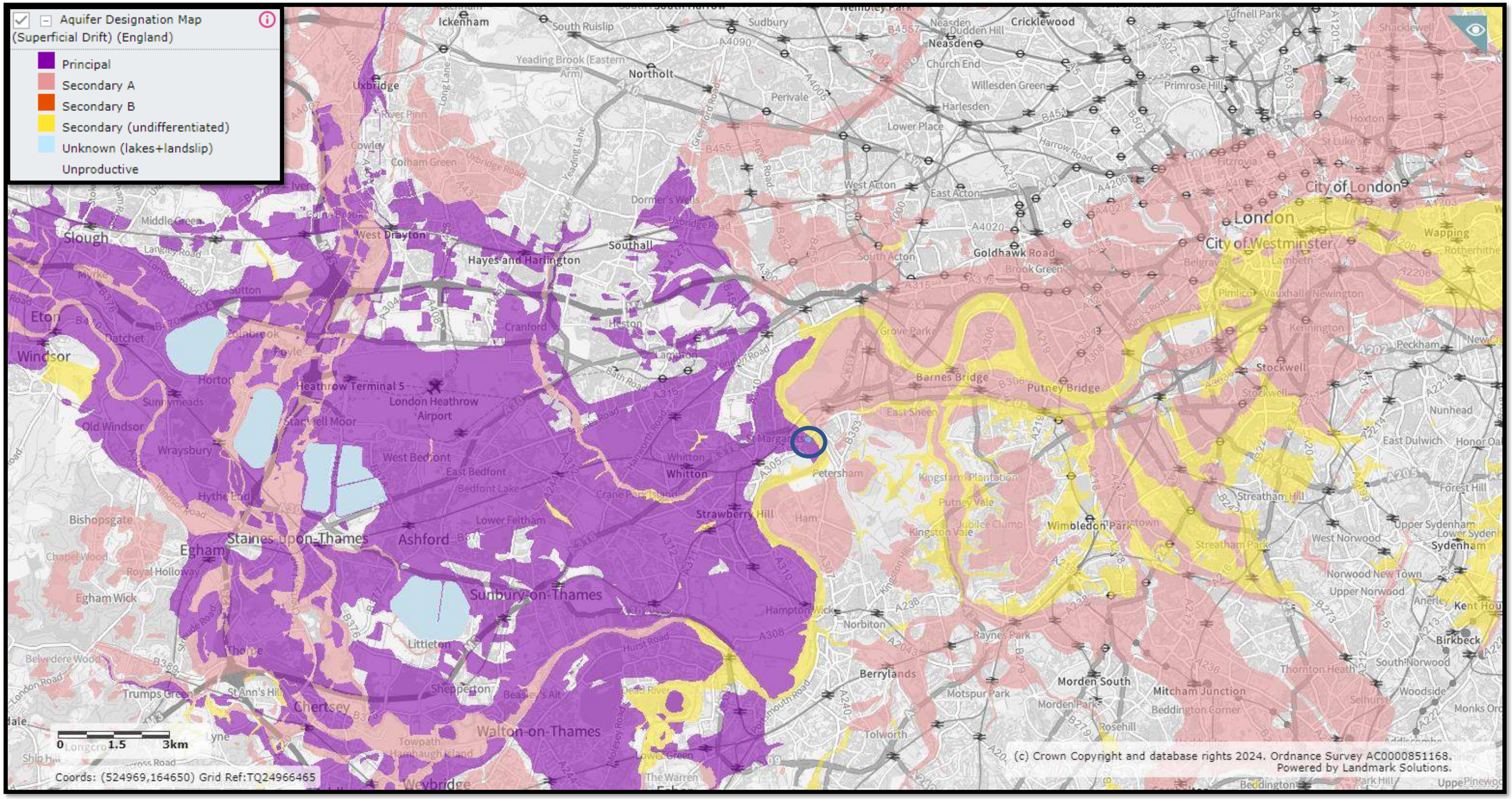
DRAWING:
Existing Elevations

1:100 0 1 2 3 4 5
1:50 0 0.5 1.0 1.5 2.0 2.5

DRG NO.	DATE:	SCALE:
13/095-006	13/03/24	A3: 1:100

Appendix C
Magic Map Geology Information


Geology and Soils
Aquifer Designation Map (Bedrock) (England)
Principal
Secondary A
Secondary B
Secondary (undifferentiated)
Unproductive
0 1.5 3km
Coords: (518249,175128) Grid Ref:TQ18247512
(c) Crown Copyright and database rights 2024. Ordnance Survey AC0000851168.
Powered by Landmark Solutions.


Aquifer Designation Map (Superficial Drift) (England)
Principal
Secondary A
Secondary B
Secondary (undifferentiated)
Unknown (lakes+landslip)
Unproductive
Ickenham
South Ruislip
Sudbury
Neasden
Cricklewood
Tufnell Park
Northolt
Uxbridge
Yeading Brook (Eastern Arm)
Perivale
Harlesden
Willesden Green
Primrose Hill
Church End
Lower Place
West Acton
East Acton
City of London
London
City of Westminster
Slough
Middle Green
West Drayton
Hayes and Harlington
Southall
Goldhawk Road
Brook Green
South Acton
Wapping
Eton
Windsor
Datchet
Sutton
Cranford
Heston
Grove Park
Barnes Bridge
Putney Bridge
Stockwell
Peckham
Heathrow Terminal 5
London Heathrow Airport
Horton
Old Windsor
Wraysbury
West Bedfont
East Bedfont
Whitton
East Sheen
Nunhead
East Dulwich
Petersham
Kingsfarm Plantation
Putney Vale
Streatham Hill
Forest Hill
Strawberry Hill
Ham
Jubilee Clump
Kingston Vale
Wimbledon Park
Streatham Park
Upper Sydenham
Sydenham
West Norwood
Staines-upon-Thames
Ashford
Egham
Chapel Wood
Royal Holloway
Egham Wick
Sunbury-on-Thames
Norwood New Town
Upper Norwood
Hampton Wick
Norbiton
Raynes Park
Berrylands
Motspur Park
Morden South
Morden Park
Mitcham Junction
Beddington Corner
Rosehill
Tolworth
Thornton Heath
South Norwood
Woodside
Birkbeck
Thorpe
Littleton
Shepperton
Chertsey
Trumps Green
Walton-on-Thames
Weybridge
0 1.5 3km
Coords: (524969,164650) Grid Ref:TQ24966465
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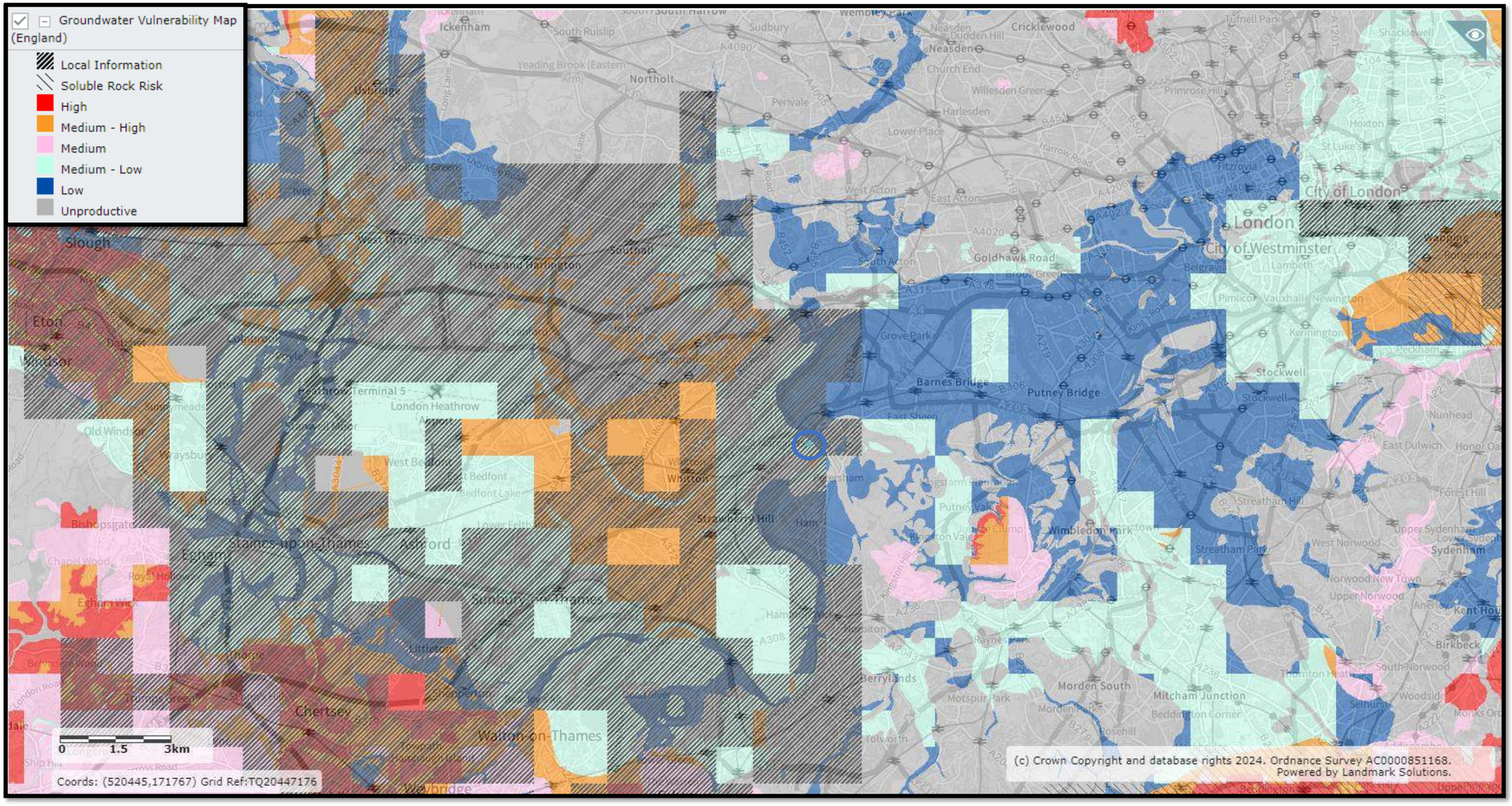
Powered by Landmark Solutions.


Groundwater Vulnerability Map (England)
Local Information
Soluble Rock Risk
High
Medium - High
Medium
Medium - Low
Low
Unproductive
Ickenham
South Ruislip
Sudbury
Wembley Park
Neasden
Cricklewood
Northolt
Uxbridge
Perivale
Harlesden
Willesden Green
Primrose Hill
Hoxton
West Acton
East Acton
City of London
London
Slough
West Drayton
Hayes and Harlington
Southall
Goldhawk Road
City of Westminster
Eton
Windsor
Grove Park
Pimlico
Vauxhall
Kennington
Barnes Bridge
Putney Bridge
Stockwell
Heathrow Terminal 5
London Heathrow
Old Windsor
East Sheen
Nunhead
East Dulwich
Bishopsgate
Strawberry Hill
Ham
Staines-upon-Thames
Ashford
Egham
Wimbledon Park
Streatham Park
West Norwood
Sydenham
Norwood New Town
Upper Norwood
Littleton
Shepperton
Chertsey
Berrylands
Morden South
Mitcham Junction
Walton-on-Thames
Weybridge
0
1.5
3km
Coords: (520445,171767) Grid Ref:TQ20447176
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Source Protection Zones merged (England)
Zone I - Inner Protection Zone
Zone I - Subsurface Activity
Zone II - Outer Protection Zone
Zone II - Subsurface Activity
Zone III - Total Catchment
Zone III - Subsurface Activity
Zone of Special Interest
0 1.5 3km
Coords: (508353,174784) Grid Ref:TQ08357478
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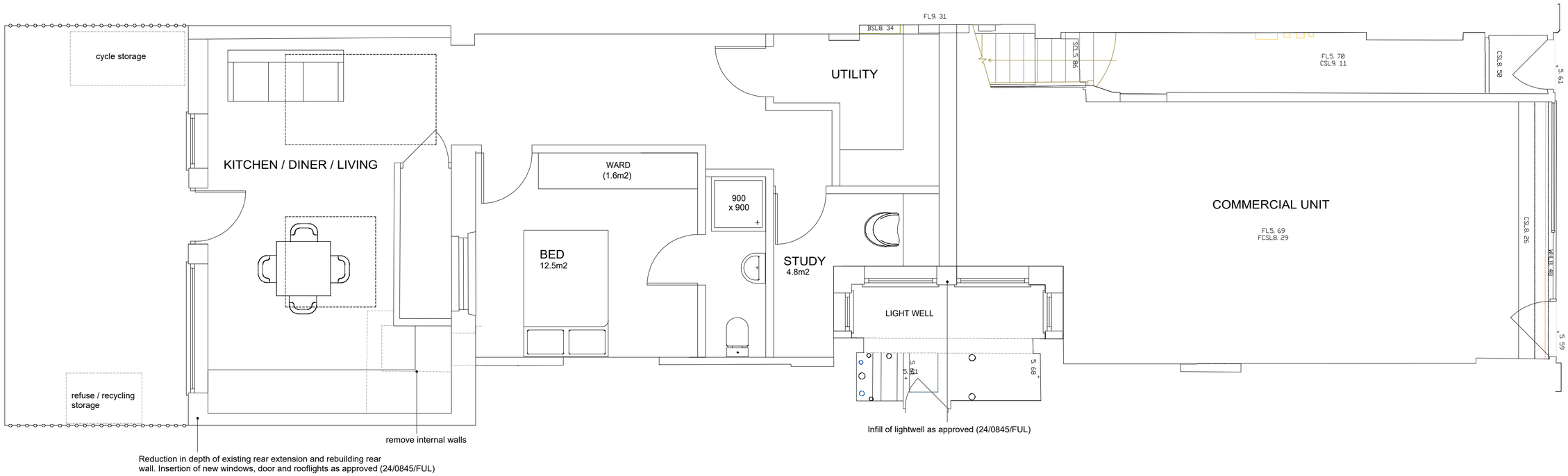
Appendix D
Site Plan

Schedule of accommodation

Bed - 12.5m2
Study - 4.8m2
Storage - 1.6m2
Flat GIA - 65.9m2



GROUND FLOOR PROPOSED

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REV.	DATE	DESCRIPTION
B	19/06/24	Internal layout amendments
A	21/05/24	Internal layout amendments

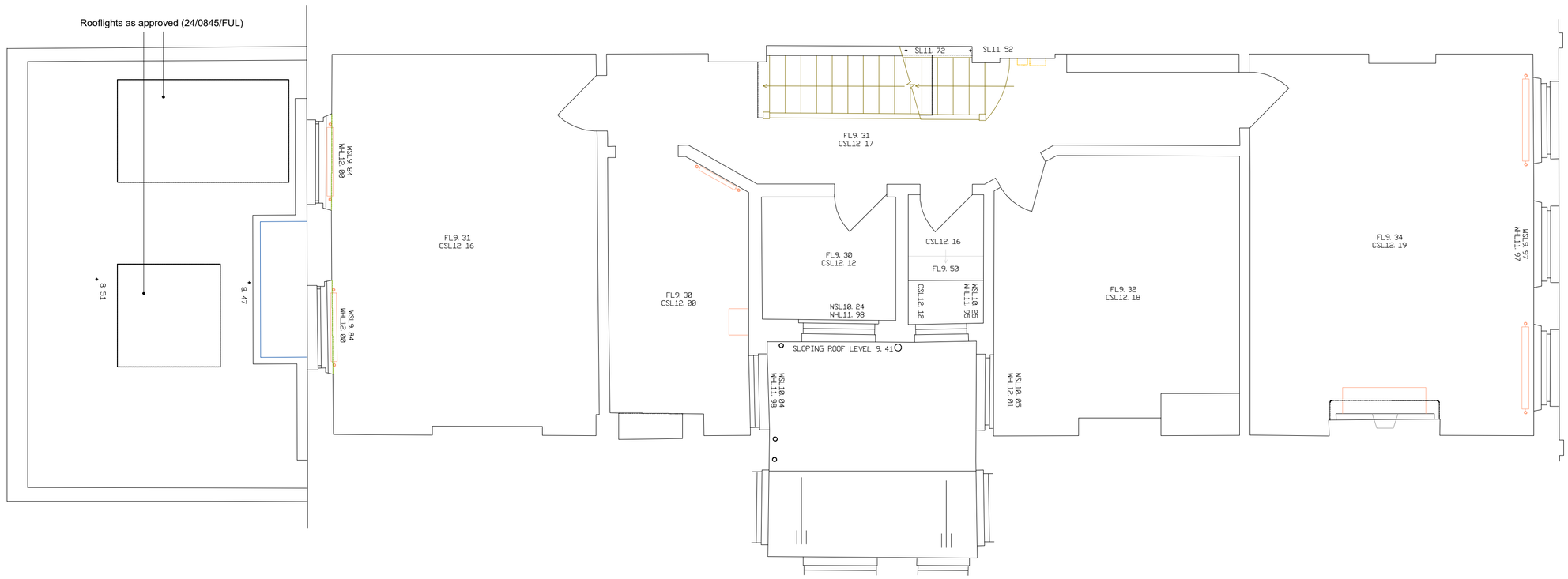
CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East
Twickenham, Twickenham, TW1 2DY.

Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

DRAWING:
Ground floor proposed

1:100 0 1 2 3 4 5
1:50 0 0.5 1.0 1.5 2.0 2.5

DRG NO.	DATE:	SCALE:
13/095-015	10/05/24	A2: 1:50



NOTES
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REV.	DATE	DESCRIPTION
–	–	–

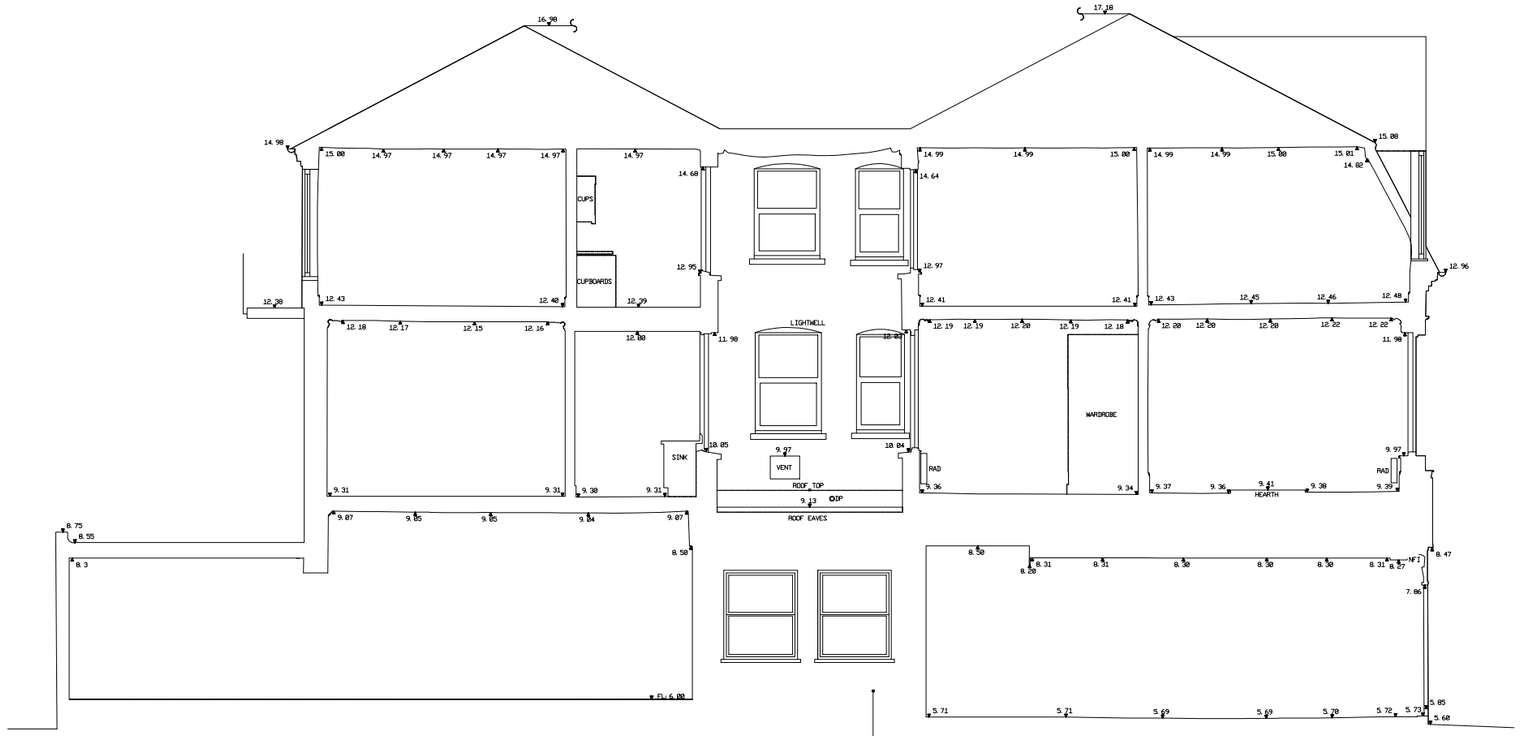
CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East
Twickenham, Twickenham, TW1 2DY.

Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

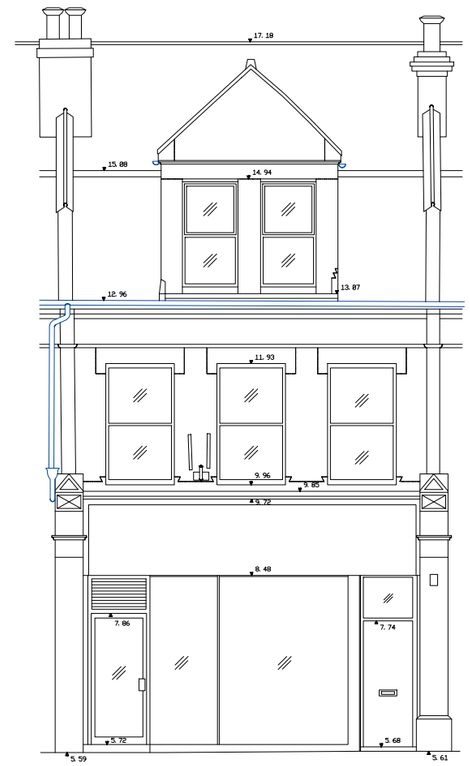
DRAWING:
First floor proposed

1:100 0 1 2 3 4 5
1:50 0 0.5 1.0 1.5 2.0 2.5

DRG NO.	DATE:	SCALE:
13/095-016	10/05/24	A2: 1:50

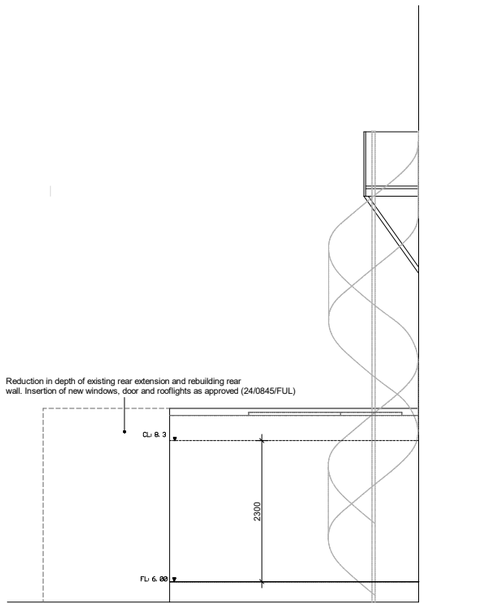


LEFT ELEVATION/ SECTION A-A

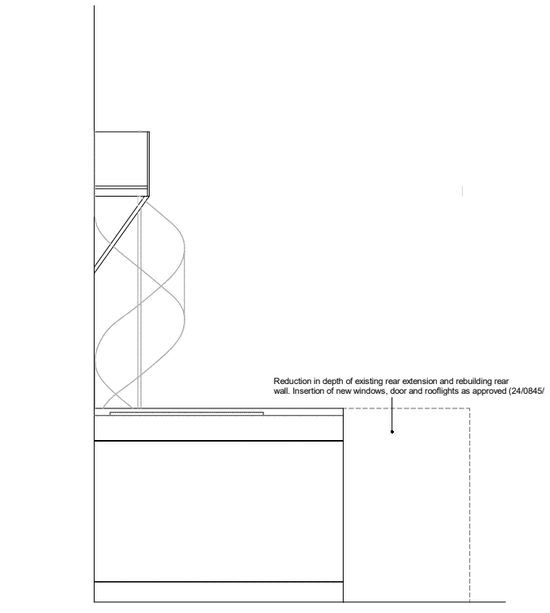


FRONT ELEVATION

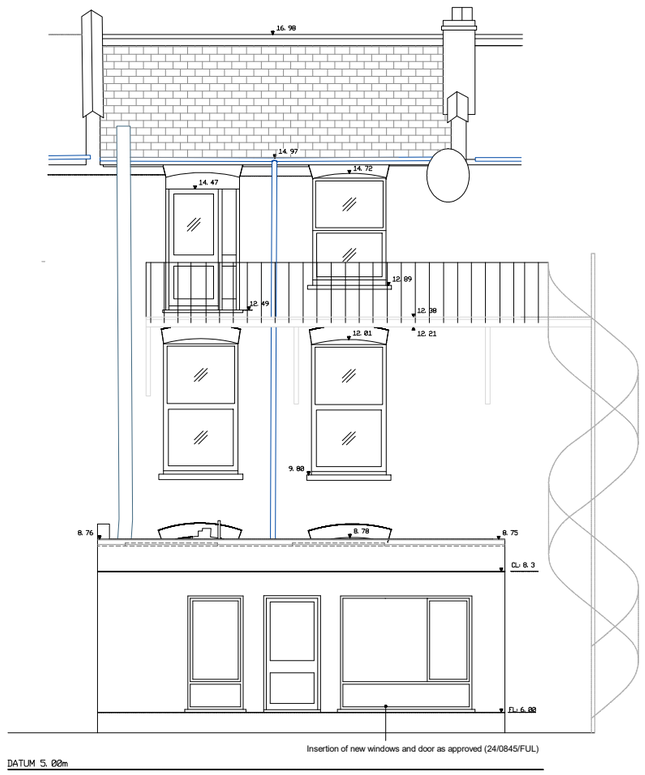
Infill of lightwell as approved (24/0845/FUL)



PARTIAL SIDE ELEVATION



PARTIAL SIDE ELEVATION



REAR ELEVATION

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REV.	DATE	DESCRIPTION
–	–	–

CLIENT:
Park Property Group (Richmond Road)
398 Richmond Road, East Twickenham,
Twickenham, TW1 2DY.

Architectural Services
t : 01428 879450 / 01243 767440 w: architectural.uk.com

DRAWING:
Proposed Elevations

1:100 0 1 2 3 4 5
1:50 0 0.5 1.0 1.5 2.0 2.5

DRG NO.	DATE:	SCALE:
13/095-017	10/05/24	A3: 1:100

Appendix E
Environment Agency Flood Map (For Planning)

Flood map for planning

Your reference	Location (easting/northing)	Created
398 Richmond	**517552/174329**	**7 Jun 2024 12:39**

Your selected location is in flood zone 3
– an area with a high probability of flooding.

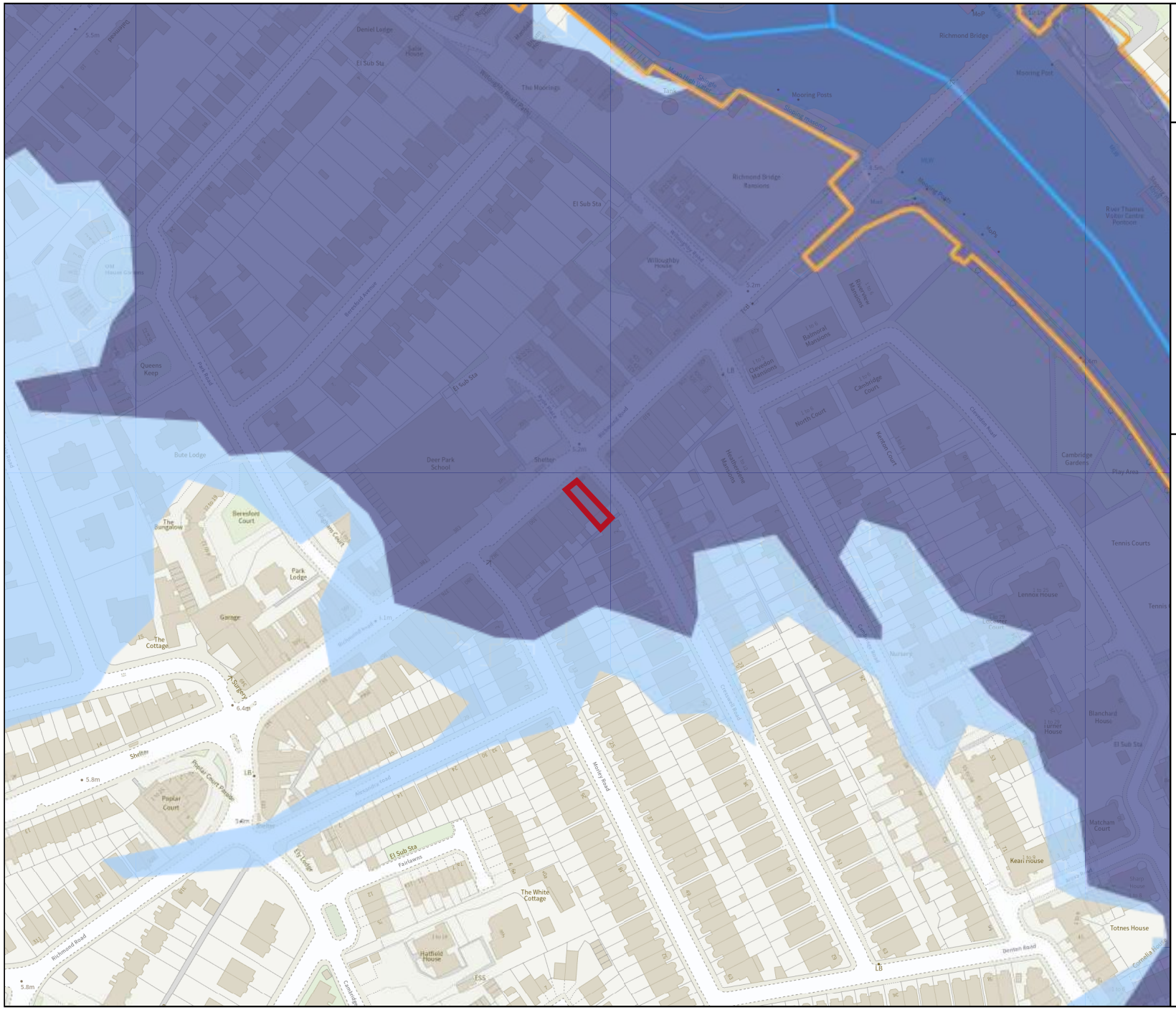
This means:

- you may need to complete a flood risk assessment for development in this area
- you should ask the Environment Agency about the level of flood protection at your location and request a Flood Defence Breach Hazard Map (You can email the Environment Agency at: enquiries@environment-agency.gov.uk)
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (find out more at www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
398 Richmond

Location (easting/northing)
517552/174329

Scale
1:2500

Created
7 Jun 2024 12:39

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

Appendix F
Environment Agency Flood Data

Abbie Moghimi

From: NET Enquiries <HNLenquiries@environment-agency.gov.uk>
Sent: 06 June 2024 09:23
To: Abbie Moghimi
Subject: HNL 362079 WD - Flood risk data request - L398A Richmond Road
Attachments: HNL Guidance on using Product 6 data in a Flood Risk Assessment v5.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good Morning

Enquiry regarding Product 5 & 6 for 398A Richmond Road, TWICKENHAM, TW1 2DY

Thank you for your enquiry which was received on 31 May 2024.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please note that we have recently changed our process for responding to modelled data requests, please read the information within this letter for further details.
Your request for a Product 4 falls under the exemption in provision 6(1)(a) and (b) of the Environmental Information Regulations 2004 (EIR) which states that
'……6.—(1) Where an applicant requests that the information be made available in a particular form or format, a public authority shall make it so available, unless—
(a) it is reasonable for it to make the information available in another form or format; or
(b) the information is already publicly available and easily accessible to the applicant in another form or format……'
On this occasion we are not providing the information in the Product 4 format for the following reasons:

- Complying with the preference would incur a significant cost, which the public authority [The Environment Agency] cannot pass on to the requester;
- Providing shapefiles used to create a Product 4 allows us to make the information available at a lower cost; and
- The impact on the available resources of the public authority [The Environment Agency], of supplying shapefiles used to create a Product 4, is therefore much less.

We are licensing the supplied data to you under the Environment Agency Conditional Licence.
You must first check this supporting information, to determine if the conditions of use are suitable for your purposes. If the conditions for use are not suitable for your purposes, this information is not provided with a licence for use, and the data is provided for the right to read only.

Product 4 data is derived from the shapefiles supplied above and the following open data sources:

Flood Zone 3 https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-flood-zone-3

Flood Zone 2 https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-flood-zone-2

Historic Flood Map https://data.gov.uk/dataset/historic-flood-map1

Please note, that the Flood Map for Planning is available to view and export maps for your site at: https://flood-map-for-planning.service.gov.uk/

Please note that our historic flood event maps may not be comprehensive. We would therefore advise that you make further enquiries locally with specific reference to flooding at your location.

You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea.
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system) Please contact the Lead Local Flood Authority.
- overflowing or backing up of sewer or drainage systems which have been overwhelmed. Please contact the local Water Company.
- groundwater rising up from underground aquifers.

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea.

Please find attached guidance on how to use this data.

The following information is not available under the Open Government Licence but we may be able to license it to you under the Environment Agency Conditional Licence:

P5,6	1. https://ea.sharefile.com/d-s7373c5d160e446cdb3a87a95c6e083ef
P5,6,7	2. https://ea.sharefile.com/d-s2bac80053a1f4cb49e7694cb46d46bb0
Name	1. Thames Tidal Upriver Breach Inundation Modelling 2017 2. Thames (Datchet to Teddington) 2023 - Thames domain only
Description	Product 5,6,7
Licence	Environment Agency Conditional Licence
Conditions	1.0 You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2.0 Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3.0 We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentialities of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. 4.1 The Information may contain some data that we believe is within the definition of “personal data” under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or

	commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual. 4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data. 5.0 The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km2. Information about the operation of flood assets should not be published. 6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as “the Data”. 6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us. 1. **Model Conditions/Information warnings:** A modelled representation of all upriver tidal breach locations along the Thames from Teddington to the Thames Barrier, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2100. When looking at P8 data (hazard/depth/velocity) the Max Velocity extents are different from the Max Hazard and Max Depth extents in our breach modelling. This due to the way in which the modelling has been conducted; extreme cells of the simulation were assumed to have no velocity. The 0/No data velocity values are not represented in this data. Please be aware that they follow the same outlines as the Max Hazard and Max Depth outlines.

	Please read all additional documentation provided as part of the P6 prior to extracting and manipulating the data (both the P8 data text and the note on epoch outputs). 2. **Model Conditions/Information Warnings:** It is important to note that this model has been designed for catchment wide flood risk mapping, with an intended use on a strategic/appraisal/design scale. It was not created specifically for Flood Risk Assessments, or to produce flood levels for particular development sites within the catchment. If you are intending to use the model for planning purposes, you must review and update the model where necessary to ensure it is site specific, fit for your intended purpose, and to best practice standards. Please also note that any model changes will need to be reviewed by the Environment Agency as part of the Flood Risk Assessment submission. Further guidance around undertaking hydraulic modelling can be found here: River modelling: technical standards and assessment - GOV.UK (www.gov.uk). Please be aware that model data is not raw, factual, or measured, but comprises of estimations or modelled results based on the data available to us. Defended modelled outlines take into account catchment wide defences.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. May contain Ordnance Survey data © Crown copyright 2024 Ordnance Survey 100024198.

However, you MUST first check the supporting information and the above link to determine if the conditions on use are suitable for your purposes. If they aren't, this information is not provided with a licence for use, and the data is provided for read right only.

Here is the link to the climate change allowances:
https://www.gov.uk/government/publications/peak-river-flow-climate-change-allowances-by-management-catchment

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments:

https://www.gov.uk/planning-applications-assessing-flood-risk
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Data Available Online

Many of our flood datasets are available online:

- **You can view and download flood risk maps from our website at:** http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=floodmap#x=357683&y=355134&scale=2
- **Flood Map For Planning** (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map

- Assets and Defences
- Current Flood Warnings
- Open data

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards

Will Douglas
Customers and Engagement Officer
Environment Agency, Hertfordshire and North London
Alchemy, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HE
Direct dial 0203 025 9210
Direct email HNLenquiries@environment-agency.gov.uk

From: Abbie Moghimi <abbie.moghimi@patrickparsons.co.uk>
Sent: Tuesday, May 14, 2024 10:16 AM
To: NET Enquiries <HNLenquiries@environment-agency.gov.uk>
Subject: Flood risk data request - L398A Richmond Road

Dear Sir/Madam,

398A Richmond Road, TWICKENHAM, TW1 2DY

Grid Reference : TQ175743

Please could we request flood risk data in the way of **Product 3, 4, 6 and 8** data (including Flood Defence Breach Hazard Map) for the above site.

I have attached the EA flood map and a site location plan for your information.

If you require any further information, please let us know.

Kind Regards,

Abbie

ABBIE MOGHIMI

Assistant Engineer

PATRICK PARSONS

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Appendix G
Hazard Technical Note

SUPPLEMENTARY NOTE ON FLOOD HAZARD RATINGS AND THRESHOLDS FOR DEVELOPMENT PLANNING AND CONTROL PURPOSE – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1.

Suresh Surendran and Geoff Gibbs (Environment Agency),
Steven Wade and Helen Udale-Clarke (HR Wallingford)
May 2008

Introduction

This document is a supplementary note to reconcile information provided in the 'Flood Risks to People Methodology' (FD2321/TR1[1]) and the 'Framework and Guidance for Assessing and Managing Flood Risk for New Development' (FD2320/TR2[2]) reports about the Flood Hazard Rating. It has been produced because both PPS25 in England and TAN15 in Wales require that people should be appropriately safe around new development. The document emphasises that for FRAs and FCAs at all levels to inform development allocations and proposals the simplified approach of FD2320 with regard to flood hazard rating should be used rather than the approach in FD2321. Although the final version of FD2321/TR1 post-dates FD2320/TR2, the work presented actually pre-dates the guidance in FD2320/TR2. This supplementary guidance is issued for those involved in development planning and control and to clarify the detail or difference of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1.

FD2321/TR1 was a research project based on the detailed literature review and analysis of empirical evidence related to flood hazard, derived mainly from theoretical assumptions and some basic laboratory experiments. Factors that affected flood hazard and vulnerability were combined in a form of multi-criteria analysis that was be used to identify the hot-spots and broadly estimate the probability of people seriously harmed and fatalities during the event of a flood. The multi-criteria method was calibrated to actual events, validated using data from seven flood events and shown to work well. The FD2321 (Risk to people) methodology illustrates the fundamental concepts and demonstrate how the approach could be used for different applications - it did not set a policy for flood hazard thresholds.

(Nevertheless there are a number of assumptions used in the FD2321 methodology, particularly with respect to the impact of debris and people's behaviour during flood events. There is a requirement for further research to collate more evidence on flood hazard, particularly the impacts of debris, and vulnerability in order to refine assumptions made in the flood hazard calculations, flood hazard thresholds and risks to people guidance. The study recommend more laboratory and field based tests on the impact of physical water quality aspect such as debris, mudflow; chemical and biological water quality that cause seriously harm or fatalities to people.)

[1] Defra and Agency (2006) *The Flood Risks to People Methodology*, Flood Risks to People Phase 2, FD2321 Technical Report 1, HR Wallingford et al. did the report for Defra/EA Flood and Coastal Defence R&D Programme, March 2006.
(http://sciencesearch.defra.gov.uk/Document.aspx?Document=FD2321_3436_TRP.pdf)

[2] Defra and Agency (2005) *Framework and Guidance for Assessing and Managing Flood Risk for New Development*, Flood Risk Assessment Guidance for New Development, FD2320 Technical Report 2, HR Wallingford et al. did the report for Defra/EA Flood and Coastal Defence R&D Programme, October 2005.
(http://sciencesearch.defra.gov.uk/Document.aspx?Document=FD2320_3364_TRP.pdf)

FD2320/TR2 (FRA guidance for new development) provides guidance that is a specific interpretation of the methodology developed under FD2321, within the context of development planning and control. Based on FD2320 consultation workshops, the project board (key users and experts) advised the project team to provide a simple methodology. Due uncertainties and limitations related to estimating risks to people, FD2320 adopted a precautionary approach, particularly with respect to the selection of debris factors and flood hazard thresholds

Risk to People (Ninj)

Ninj = **Nz** x **Flood Hazard Rating** x **Area Vulnerability** x **People Vulnerability**

where,

Ninj (Risk to People)	= number of injuries within a particular hazard 'zone';
Nz	= number of people within the hazard zone (at ground/basement level);
Flood Hazard Rating	= HR = function of flood depth/velocity (within the hazard zone being considered) and debris factor;
Area Vulnerability	= function of effectiveness of flood warning, speed of onset of flooding and nature of area (including types of buildings); and
People Vulnerability	= function of presence of people who are very old and/or infirm/disabled/long-term sick

Flood Hazard Rating (HR) and thresholds

The revised 'hazard rating' expression based primarily, on consideration to the direct risks of people exposed to floodwaters.

HR = **d** x (**v** + **n**) + **DF**

where,	HR	= (flood) hazard rating;
	d	= depth of flooding (m);
	v	= velocity of floodwaters (m/sec); and
	DF	= debris factor (0, 0.5, 1 depending on probability that debris will lead to a hazard)
	n	= a constant of 0.5

This final revised Flood Hazard Rating formula from the Flood Risks to People project is presented on page 10 (section 3.5) of FD2321/TR1. The formula is identical in both FD2320 and FD2321 reports.

Based on Table 3.2 of FD2321, the Figure 3.2 of FD2321 illustrates the "Hazard to People Classifications" as a function of depth, velocity and debris factor. Such categorisation and the look-up table with flood hazard threshold could be useful for a range of application as an initial indication of Risks to People.

In this case (Figure 3.2 of FD2321) the calculation takes a debris factor as zero (**HR** = **d** x (**v** + **0.5**) + **0**).

However FD2321 strongly recommends the use of the debris factor and the formulas described in the Guidance Document for further calculation. The Table 3.1 of FD2321/TR1 (Table 1 of this note) suggests appropriate debris factors for different depths, velocities and the dominant land use.

Table 1: Guidance on debris factors for different flood depths, velocities and dominant land uses. (Source FD2321 Table 3.1):

Depths (d)	**Pasture/Arable**	**Woodland**	**Urban**
0 to 0.25 m	0	0	0
0.25 to 0.75 m	0	0.5	1
d>0.75 m and\or v>2	0.5	1	1

The way that Flood Hazard Rating and thresholds have been presented in Table 13.1 in FD2320/TR2 compared to Figure 3.2 of FD2321/TR1

A concern was raised in the FD2320 consultation workshops and by the FD2320 Project Board during discussions on FD2321, that the methodology was complex and the results presented in the Figure 3.2 of FD2321 were not reflecting the potential risk to people (as this table was of hazard rating for different depths and velocity without debris). There was a need for further work to include debris, area vulnerability and people vulnerability aspects. They requested a simpler single table to represent the risk to people.

For example Figure 3.2 of FD2321 did not reflect the fact that there is a risk from drowning even at low depths and velocities. In reality FD2321/TR1 recognises this but only in the subsequent "people vulnerability" calculation (risk to children, old, sick and disable). For still water up to 1.25m depth, the Figure 3.2 of FD2321/TR1 assumes that there is low hazard, if there are no debris or vulnerable group. However to avoid further calculation, but include the vulnerability aspect the Table 13.1 of FD2320 for still water with the depths between 0.25–1.25m were reclassified as "danger to some", which was felt to be more appropriate for development planning and control, where users may make use of flood hazard without completing he more complex full calculations including people and area vulnerability.

Similarly Figure 3.2 of FD2321/TR1 shows that at the depth of 0.25m, if there is no debris then up to the flow velocity of 2.0 m/sec there would be low hazard. However FD2321/TR1 suggests the usage of an appropriate debris factor dependent on depth, velocity and the dominant land use. To make the process simpler (whatever the land use), FD2320/TR2 includes a default debris factor. In the Table 13.1 of FD2320/TR2 a debris factor of 0.5 has been applied for depths less than and equal to 0.25m and a debris factor of 1.0 has been used for depths greater than 0.25m. Therefore, in the Table 13.1 of FD2320/TR2 at the depth of 0.25m, up to the flow velocity of 0.30 m/sec is treated as low hazard.

Table 3.2 of FD2321/TR1 (Table 2 of this note) provides thresholds for classifying the hazard to people. In the FD2321/TR1 report the threshold between "danger for most" and "danger for all" is 2.5 and it was used as an initial indication of Risk to People (further calculation is recommended using the formulas). However as there is no further analysis in FD2320 but the Project Board decided that the threshold between "danger for most" and "danger for all" should be more precautionary and a Flood Hazard Rating of 2.0 is selected as a key threshold. i.e. In FD2321 the threshold for "danger for all" is 2.5 and it lowered to 2.0 in FD2320. Therefore, the Flood Hazard Rating between 2.0 to 2.5 in FD2320 is not classified as it is in FD2321.

Table 2: Hazard to People (Source Table 3.2 in FD2321/TR1)

Thresholds for Flood Hazard Rating H = d x (v + 0.5) + DF		**Degree of Flood Hazard**	**Description**
FD2321	**FD2320**		
<0.75	<0.75	Low	**Caution -** "Flood zone with shallow flowing water or deep standing water"
0.75 - 1.25	0.75 - 1.25	Moderate	**Dangerous for some (i.e. children) -** "Danger: Flood zone with deep or fast flowing water"
1.25 - 2.5	1.25 - 2.0	Significant	**Dangerous for most people -** "Danger: flood zone with deep fast flowing water"
>2.5	>2.0	Extreme	**Dangerous for all -** "Extreme danger: flood zone with deep fast flowing water"

The final difference between Table 13.1 in FD2320/TR2 and Figure 3.2 of FD2321/TR1 is the use of smaller increments of depth, so that lower depths are presented more fully in FD2320/TR2. This was felt to be more helpful for identifying what might be judged as acceptable depending on site specific circumstances.

Conclusions

Table 13.1 of FD2320 and Figure 3.2 of FD2321 look very similar but there are significant differences (see Table 3 of this paper). Either Table/Figure can be used as the basis for assessing the risks to people associated with different flood depths velocities and debris factors.

Table 3: comparison of Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1

	In Table 13.1 of FD2320/TR2	**In Figure 3.2 of FD2321/TR1**
The depths above 0.25m	Danger for some, most or all	For still water, up to 1.25m the hazard is low (In addition to hazard rating further calculation to include vulnerability aspect is recommended)
Debris factor	Debris factor of 0.5 has been applied for depths $\leq$0.25m and a debris factor of 1.0 has been used for depths $\geq$ 0.25m.	In this case a Debris factor of zero applied (in addition to this further calculation is recommended using debris factor and the formulas)
HR Thresholds for "Dangerous for all" hazard classification	>2.0 (precautionary due to uncertainties and to avoid further calculation as FD2321)	>2.5
Increments of depth	Small increments at lower depths	Every 0.25 m

Table 13.1 of FD2320/TR2 is a simple method applies the precautionary principle and uses suitable assumptions (so that there is no need for further calculations) for application in the development planning and control context (see Table 4 of this paper - an extended version of table 13.1).

This table is recommended for development planning and control use.

Table 4 – Hazard to People Classification using Hazard Rating *(HR= d x (v + 0.5) + DF)* for (Source Table 13.1 of FD2320/TR2 - Extended version)

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity - v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03 + 0.5 = 0.53	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.13 + 0.5 = 0.63	0.15 + 1.0 = 1.15	0.20 + 1.0 = 1.20	0.25 + 1.0 = 1.25	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25
0.1	0.03 + 0.5 = 0.53	0.06 + 0.5 = 0.56	0.12 + 0.5 = 0.62	0.15 + 0.5 = 0.65	0.18 + 1.0 = 1.18	0.24 + 1.0 = 1.24	0.30 + 1.0 = 1.30	0.36 + 1.0 = 1.36	0.48 + 1.0 = 1.48	0.60 + 1.0 = 1.60	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50
0.3	0.04 + 0.5 = 0.54	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.19 + 0.5 = 0.69	0.23 + 1.0 = 1.23	0.30 + 1.0 = 1.30	0.38 + 1.0 = 1.38	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	1.13 + 1.0 = 2.13	1.50 + 1.0 = 2.50	1.88 + 1.0 = 2.88
0.5	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.25 + 0.5 = 0.75	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	2.50 + 1.0 = 3.50
1.0	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.38 + 0.5 = 0.88	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	2.25 + 1.0 = 3.25	3.00 + 1.0 = 4.00	3.75 + 1.0 = 4.75
1.5	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.50 + 0.5 = 1.00	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	2.00 + 1.0 = 3.00	3.00 + 1.0 = 4.00	4.00 + 1.0 = 5.00	5.00 + 1.0 = 6.00
2.0	0.13 + 0.5 = 0.63	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	0.63 + 0.5 = 1.13	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.60 + 0.5 = 1.10	0.75 + 0.5 = 1.25	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	1.80 + 1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18 + 0.5 = 0.68	0.35 + 0.5 = 0.85	0.70 + 0.5 = 1.20	0.88 + 0.5 = 1.38	1.05 + 1.0 = 2.05	1.40 + 1.0 = 2.40	1.75 + 1.0 = 2.75	3.10	3.80	4.50	6.25	8.00	9.75
3.5	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.80 + 0.5 = 1.30	1.00 + 0.5 = 1.50	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23 + 0.5 = 0.73	0.45 + 0.5 = 0.95	0.90 + 0.5 = 1.40	1.13 + 0.5 = 1.63	1.35 + 1.0 = 2.35	1.80 + 1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	1.00 + 0.5 = 1.50	1.25 + 0.5 = 1.75	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50
5.0	0.28 + 0.5 = 0.78	0.60 + 0.5 = 1.10	1.10 + 0.5 = 1.60	1.38 + 0.5 = 1.88	1.65 + 1.0 = 2.65	3.20	3.75	4.30	5.40	6.50	9.25	12.00	14.75

Flood Hazard Rating (HR)	Colour Code	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

PATRICK PARSONS

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