
# FLOOD RISK AND SUSTAINABLE DRAINAGE ASSESSMENT REPORT
# 34 Nassau Road, SW13 9QE

## Report prepared on behalf Richard James Hastings Architecture

**17/07/24**

**Rev. P06**

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# FLOOD RISK ASSESSMENT & SUDS STRATEGY

**Revision List**

| REVISION | REASON FOR ISSUE | DATE OF ISSUE |
|---|---|---|
| P01 | Initial Issue for Planning | 27/09/2023 |
| P02 | Updated to include EA Flood Modelling | 19/10/2023 |
| P03 | Updated to Include Full Set of Architect's Information | 06/12/2023 |
| P04 | Updated to include drainage proposals | 10/05/2024 |
| P05 | Updated to include revised floor plans | 11/06/2024 |
| P06 | Updated to include revised architectural plans | 17/07/2024 |

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# Appendices

# 1.0 Introduction

## 1.1 General

**1.1.1** This report relates to a planning application for the proposed extension of the basement level at 34 Nassau Road, SW13 9QE.

**1.1.2** This report sets out the results of a flood risk assessment required in support of a planning application for this development. The assessment has been carried out in accordance with the general principles set out in National Planning Policy Framework, Technical Guidance to the National Planning Policy Framework and Flood Risk and Coastal Change Planning Practice Guidance.

**1.1.3** This report is prepared solely for the benefit of Richard James Hastings Architecture. This report may not be assigned without prior written permission from Clancy Consulting Ltd.

## 1.2 Background Information

**1.2.1** In 2001 the Department for Transport Local Government Regions (DTLR) published Planning Policy Guidance Note 25 (PPG25), which explains how flood risk should be taken into consideration during the planning and development process.

PPG25 has now been replaced by Planning Policy Statement 25: Development and Flood Risk published in March 2010. This latest Policy Statement has been introduced to place more emphasis on the increased flood risk from climate change.

PPS25 specifies a sequential test which local planning authorities should apply to all future proposed development sites. An exception test may also be applied to provide a method of managing flood risk while still allowing necessary development to occur.

**1.2.2** In March 2012, the Government released National Planning Policy Framework (NPPF) aiming to make the planning system less complex and more accessible, to protect the environment and promote sustainable growth.

NPPF accompanied with the Technical Guidance published also in March 2012 supersedes PPS25 although the principles set out in the new publication remain similar in terms of the flood risk aspect.

The flood risk Practice Guide was published online in March 2014.

In July 2018 the NPPF was updated. This update has highlighted the need for further awareness of flood risk issues for new developments. This has since been revised in February 2019 to include minor clarifications.

**1.2.3** The following zones define the levels of flood risk:

Zone 1: Low Probability
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability
This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability
This zone comprises land assessed as having between 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.

Zone 3b: Functional Flood Plain
This zone comprises land where water must flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

**1.2.4** As part of its general obligations under the Water Resources Act 1991, The Environment Agency has carried out surveys of its existing defences against flooding and has published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling. In general terms, these maps give a good indication of the areas likely to be affected by flooding. More recently, the Environment Agency have published the 'Flood Map' on their website which is based on improved hydraulic modelling and detailed local data. The map indicates Zones 2 and 3 with Flood Zone 1 being all the land falling outside the Zones 2 and 3.

**1.2.5** The EA Flood Map for the area of the proposed development indicates that the development lies in an area of **flood risk zone 3**. A copy of the report can be found in Appendix B.

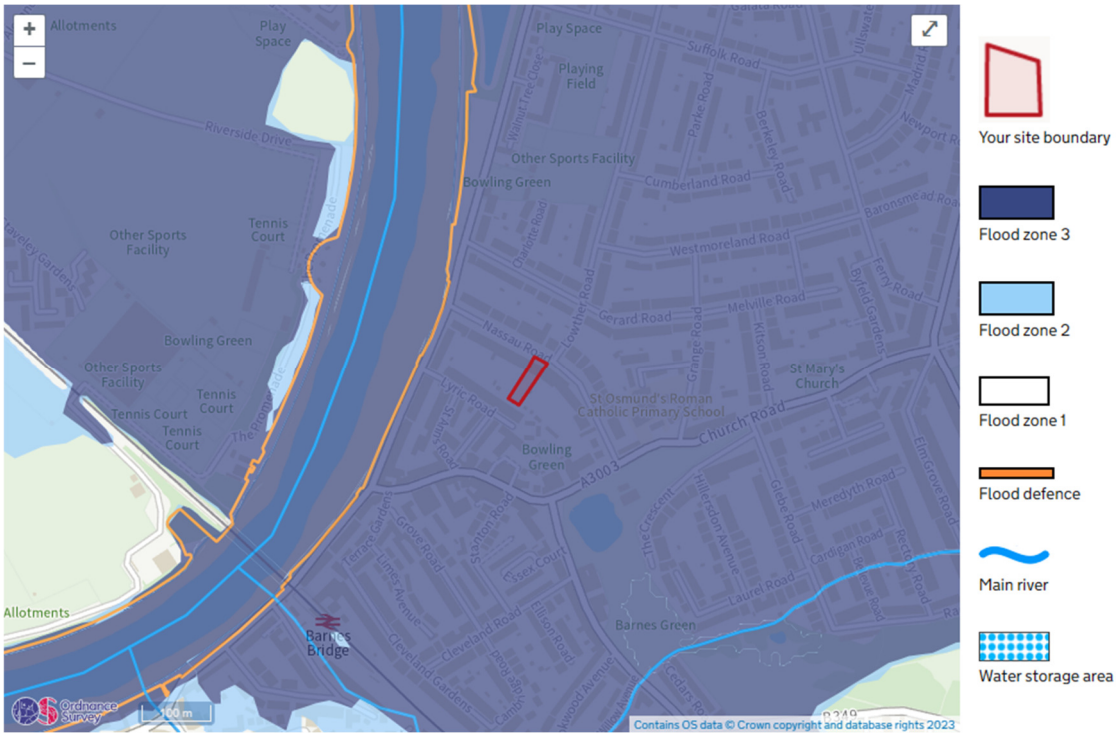



***Figure 1 – EA Flood Map for Planning***

# 2.0 Structure of the Report

**2.1** The report has been structured to follow the general principles set out in the Technical Guidance published in March 2014 along with subsequent revisions.

**2.2** The methodology for this FRA has comprised a desktop study making reference to the Environment Agency (EA) Mapping, and relevant local plans including plans showing the location of local sewers.

**2.3** Sources of information

- Flood maps from the Environment Agency published online
- The Royal Borough of Richmond Upon Thames Local Plan (July 2018)
- The Royal Borough of Richmond Upon Thames Strategic Flood Risk Assessment (March 2021)
- The Royal Borough of Richmond Upon Thames Surface Water Management Plan (December 2021)
- Thames Water Asset Plans
- British Geological Survey Online Mapping Service
- DEFRA MAGIC Maps
- British Geological Survey Borehole Logs

# 3.0 Site Description

## 3.1 Location

**3.1.1** The site is located detailed as below.

| | |
|---|---|
| OS X (Eastings) | 521791 |
| OS Y (Northings) | 176583 |
| Nearest Post Code | SW13 9QE |

***Table 1 – Site Location Details***


***Figure 2- Existing aerial plan (Google Maps)***

## 3.2 Existing Site Layout, Topography and Setting

**3.2.1** The existing site comprises a single 4 storey residential development with an accompanying rear garden area comprised of decking and soft landscaping. The site footprint is approximately 691m$^2$.

**3.2.2** The site is accessible via a gravel driveway and/or hard paved pedestrian walkway at the front elevation of the property adjacent to Nassau Road (north-east boundary).

**3.2.3** The topographic survey indicates the levels directly adjacent to the building on the rear decking area as being approximately 5.25m, with the levels falling away towards the bottom of the garden to a level of approximately 4.00m.

**3.2.4** The British Geological Survey's (BGS) online geological maps indicate the site has superficial deposits of Kempton Park Gravel Member comprising, Sand, Gravel with London Clay Formation bedrock comprising of Clay and Silt. This is backed up by the borehole logs taken from site which

indicate clay directly below the made ground, which is underlain by a layer of gravel – see appendix F for borehole records.

## 3.3 Hydrology

**3.3.1** There are no watercourses or surface drainage features within the site. The nearest Main River is The River Thames, highlighted on mapping from the EA, as shown below. This mapping indicates that the nearest watercourse is approximately 175m to the Northwest of the development site.


***Figure 3 – EA Statutory Main River Map (Environment Agency Website)***

## 3.4 Hydrogeology

**3.4.1** Perched ground water occurs when there are lenses of impermeable material in a subsoil that is otherwise permeable. This allows for localised water tables to develop over the lenses, which can overlay a regional much deeper water table in the surrounding rock mass.

**3.4.2** The borehole records shown within the ground investigation report conducted for the site indicate that there is made ground down to 1.20m with this being underlain by clay down to approximately 2.20m, followed by a layer of gravel down to 4.00m. There are water strikes shown at around 2.75m depth within the gravel layer, which indicate a relatively high water table that may be caused by a deep layer of impermeable material below the gravel layer, likely clay as is the case in most parts of London. This therefore shows that despite the presence of the permeable gravel layer, infiltration is unlikely to be viable due to the high water table. Refer to Appendix F for borehole logs.

**3.4.3** The Environment Agency's Groundwater Map identifies that the site is not located in a Groundwater Source Protection Zone, see figure 4.


***Figure 4 – Ground Water Source Protection Map (MAGIC Maps)***

# 4.0 Proposed Development

## 4.1 Description

**4.1.1** The proposed development is an extension to the existing basement level.

**4.1.2** The details of the proposed extension are currently unconfirmed at this time.

## 4.2 Vulnerability and Classification

**4.2.1** The gov.uk website provides information on the flood risk vulnerability for new development.

**4.2.2** Table 2 of the NPPF indicates the residential use to be "**More Vulnerable"**, see **Table 3**.

| | **Flood Risk Vulnerability Classification** | | | | |
|---|---|---|---|---|---|
| **Flood Zones** | Essential Infrastructure | Highly Vulnerable | More Vulnerable | Less Vulnerable | Water Compatible |
| Zone 1 | ✔ | ✔ | ✔ | ✔ | ✔ |
| Zone 2 | ✔ | Exception Test Required | ✔ | ✔ | ✔ |
| Zone 3a† | Exception Test Required† | ✕ | Exception Test Required | ✔ | ✔ |
| Zone 3b* | Exception Test Required* | ✕ | ✕ | ✕ | ✔ |

***Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' (Gov.uk)***

***Key:***
*✓ Development is appropriate*
*✗ Development should not be permitted*

*† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.*

*" * " In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere.*

The NPPF (Technical Guidance) Table 3, Flood Risk Vulnerability and Flood Zone Compatibility matrix, indicates that "**More Vulnerable**" development proposals in **Flood Zone 3** will require an "**exception test"** in which we will be required to demonstrate that the development will be safe for its lifetime and won't increase flood risk elsewhere in the surrounding area. We will be required to submit this to the local planning authority in addition to a flood risk assessment and planning application. A sequential test is not required as per policy LP 21 from the Local Plan for the London Borough of Richmond upon Thames, this states that a sequential test is not required for the redevelopment of an existing single residential property.

Some other requirements noted in the local plan for the LBRUT are as follows for new basements.

- restricted to less vulnerable / water compatible use only.
- 'More vulnerable' uses will only be considered if a site-specific flood risk assessment demonstrates that the risk to life can be managed. Bedrooms at basement levels will not be permitted.

# 5.0 Flood Potential

## 5.1 Potential for Flooding

**5.1.1** The site is located within **Flood Zone 3** in terms of flooding from any nearby water course.

**5.1.2** There are, therefore, five potential sources of flooding at the site which will be addressed in more detail in this report, i.e.

(i) From rivers
(ii) From surface-water overland flow off site.
(iii) From high groundwater levels.
(iv) From artificial sources, such as reservoirs.
(v) From the surcharging of drains or sewers on the site.

## 5.2 Existing Historical Flood Information

**5.2.1** The Royal Borough of Richmond upon Thames surface water management plan highlights historical flooding events in section 9.4. The section indicates that there are no historic or recent reports of flooding in the Putney catchment.

**5.2.2** Water ponding on the highway is typically cause by collapsed highway infrastructure such as gullies which become ineffective due to poor maintenance. Whilst no reason is indicated for basement flooding in the SWMP, typical reasons include surcharging from sewers, deteriorated or inadequate waterproofing to basements or poor design of basements for flood protection.

**5.2.3** Flood events have been recorded in the southwest of the borough with a high concentration in the areas surrounding the Thames in this location. However, historic flooding events are very sparse in the area surrounding the proposed development, refer to figure 5 – extract from the SWMP.

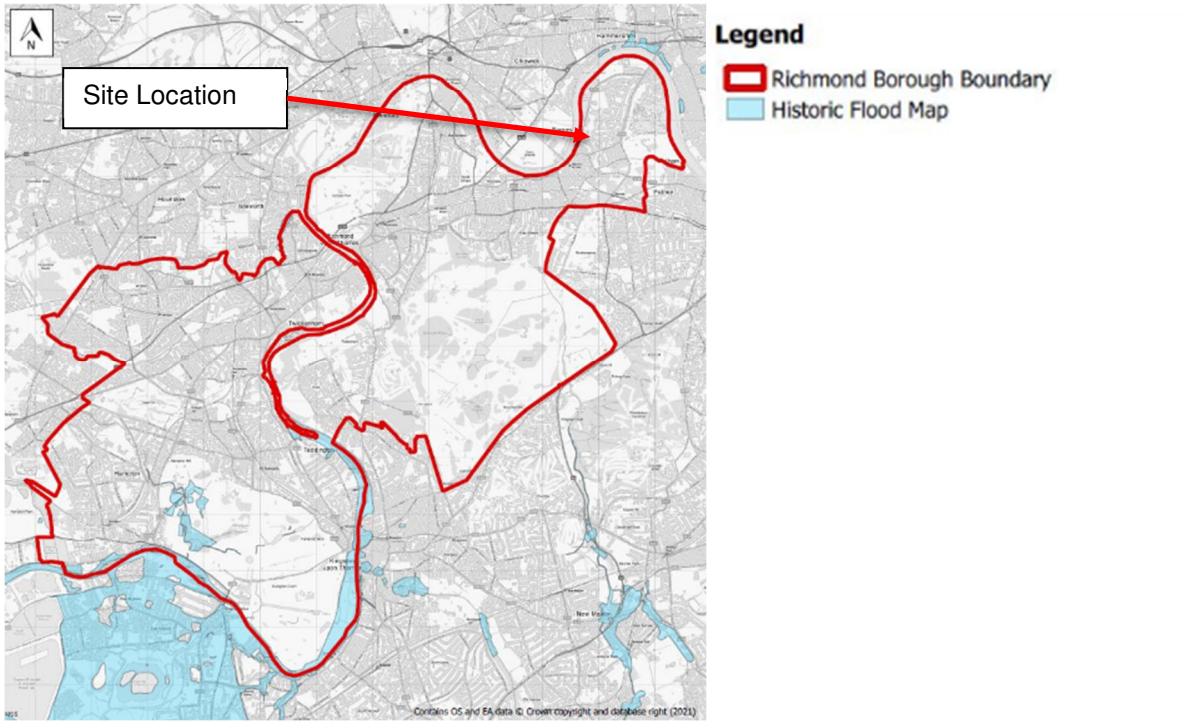



***Figure 5 – Historical Flooding Events (RBKC SWMP)***

## 5.3 Rivers

**5.3.1** During cases of extreme rainfall, the level of rivers can rise significantly causing flooding events inland. This site, at its closest point, is 175m away from the bank of the river Thames which poses a significant risk of flooding to the development. This risk is however greatly reduced to a relatively **low** level (see **figure 6** from the EA flood mapping) due to the presence of the Thames Flood Defences, which have been successfully operational for many years, with the last event of a breach being recorded in 1928. Nonetheless, provisions must always be in place to counteract the effects of a potential breach if one was to occur, to reduce the potential risk of harm to the occupant.

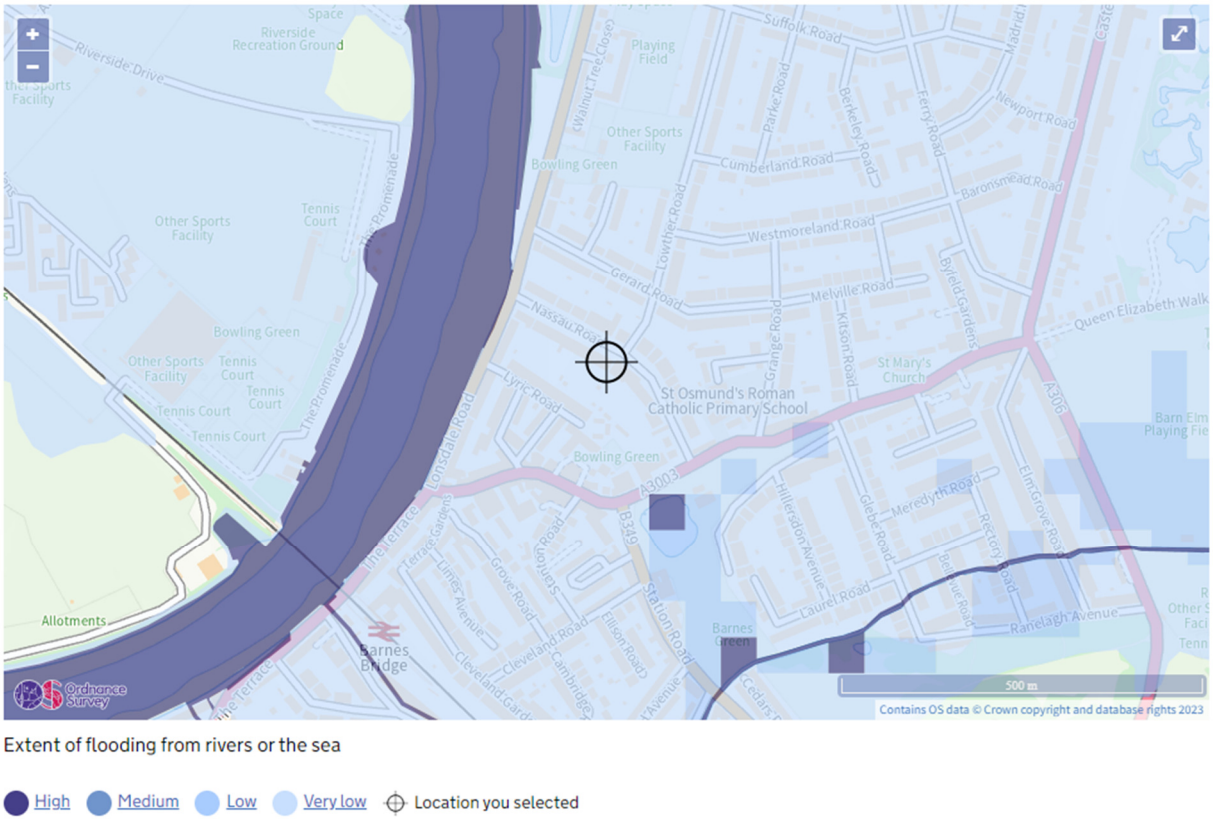
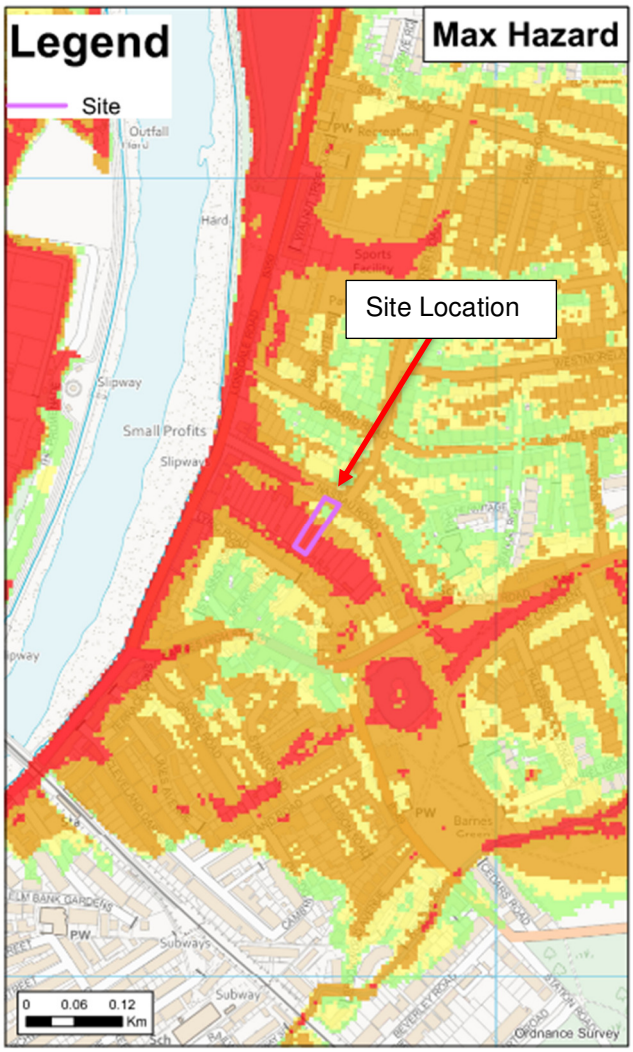
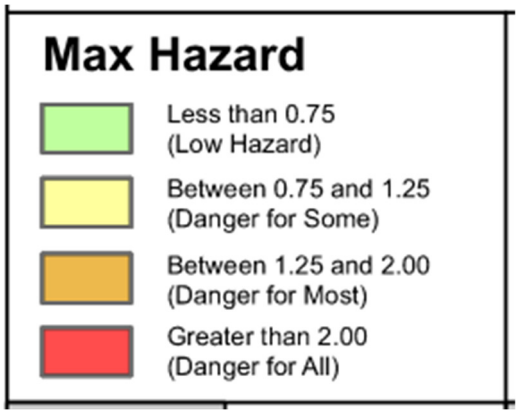



***Figure 6 – Flood Risk from Rivers and Sea (Gov.uk)***

**5.3.2** To allow us to adequately plan and implement effective control measures to protect against water ingress and flooding in the event of a breach, a review of the product 4 & 8 breach modelling data from the Environment Agency has been undertaken to allow us to provide accurate recommendations that comply with local policy requirements with regards to flood mitigation. The 'Thames Tidal Breach Hazard Mapping' (**figure 7**) shows the development to be within an area of significant-extreme risk and therefore must comply with the following statement from the Richmond Upon Thames Local Plan ''More Vulnerable' uses will only be considered if a site-specific Flood Risk Assessment demonstrates that the risk to life can be managed. Bedrooms at basement levels will not be permitted'. As a result of this, it is pivotal that the basement is not used for sleeping accommodation and it must also include an appropriate level of waterproofing in addition to an internal escape route to provide refuge to occupants during a flood event.

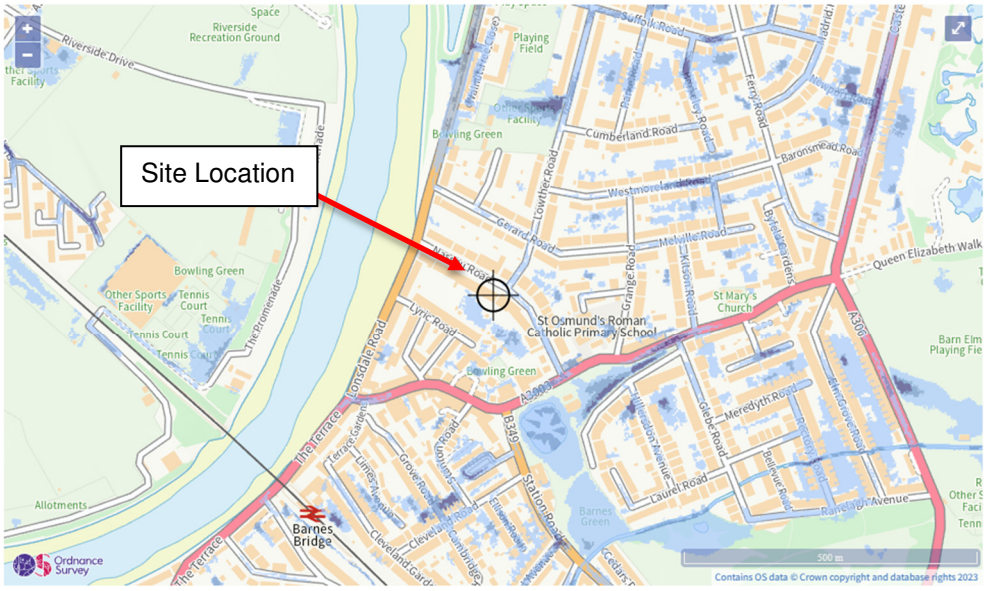
**5.3.3** The 'Thames Tidal Upriver Breach Inundation Modelling Study 2017' shows the projected flood level at node point 5, which is located in the rear garden area of the property, to reach 5.36m in the event of a breach during 2100. The level at the rear decking area is 5.25m which is lower than the breach level, therefore during extreme flood events residents would be expected to take refuge in the upper levels of the development for 24 hours or until the flood subsides. However, the likelihood of this event occurring is greatly reduced due to the governments planned works as part of the 'Thames Estuary 2100' plan to increase the level of flood defences in place along the river Thames, to help deal with the impact caused by rising sea levels and deteriorating assets.



## 5.4 Surface Water

**5.4.1** During extreme rainfall events, or due to poor gully drainage maintenance, there will be times when gully capacity is exceeded which will lead to surface flow within the surrounding roads. Mapping for this form of flooding is shown on the Environment Agency website.




Extent of flooding from surface water

High Medium Low Very low Location you selected

| Risk Category | Definition |
|---|---|
| High | Each year, there is a chance of flooding of greater than 1 in 30 (3.3%) |
| Medium | Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%) |
| Low | Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%) |
| Very Low | Each year, there is a chance of flooding of less than 1 in 1000 (0.1%) |

***Figure 7 – Flood Risk from Surface Water (Gov.uk)***

**5.4.2** It can be seen from the flood mapping (figure 7) that there is an area towards the bottom of the site in the garden area which is at low risk of potential flooding. It is understood from the surface water velocity mapping (figures 8 and 9) that water velocity poses little risk and that there is not a definitive flow path in the area suggesting surface water flooding is likely to cause a small area of localised ponding.

**5.4.3** Mapping from the SWMP (figure 10) shows that there is risk of flooding from 1 in 1000-year storm events in the rear garden area. This map again, indicates no clear flow paths, as such ponding in local areas is not expected throughout the Richmond area. The site is therefore not considered at elevated flood risk.

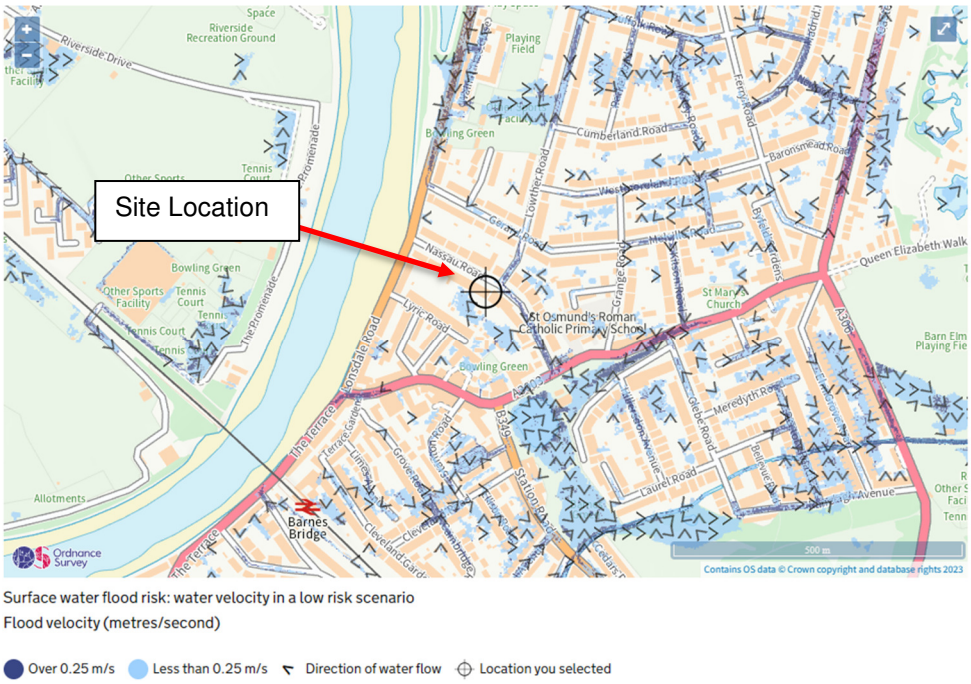



***Figure 8 - Flood Risk from Surface Water – velocity / flow direction (Gov.uk) – Low Risk***

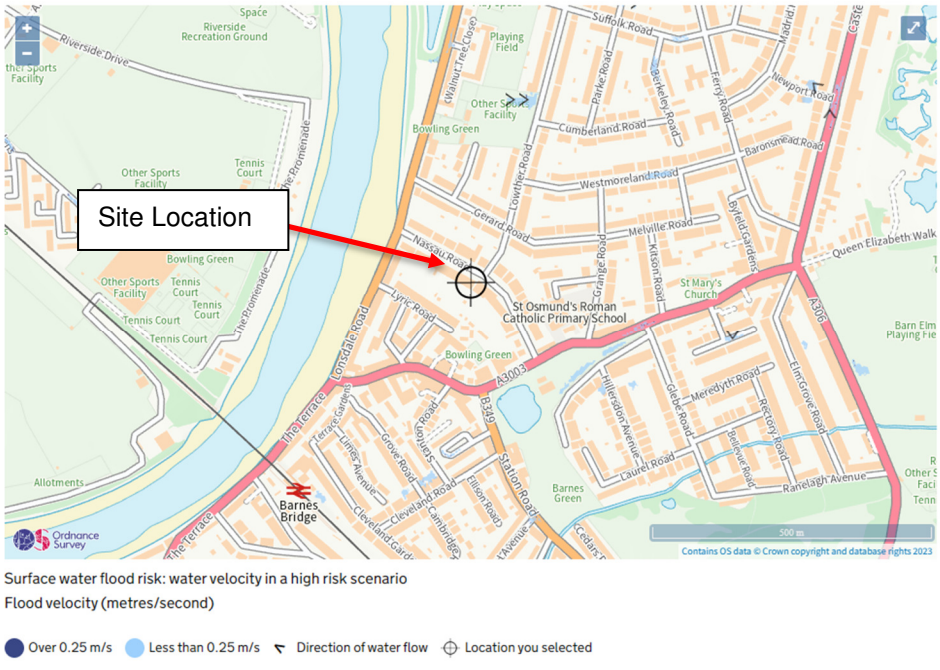



***Figure 9 - Flood Risk from Surface Water – velocity / flow direction (Gov.uk) – High Risk.***


***Figure 10 – 1 in 100yr +CC Surface Water Flood Depth (RBKC SWMP)***

**5.4.4** The front of the property currently has a dished channel drain at the front of the footway access, helping to prevent water ingress into the front garden area. The driveway area also surfaced with gravel which may also help to provide some absorption of surface water runoff before it reaches the property, however the effectiveness of this buildup would need to be confirmed via soil permeability investigations. The front of the property also includes a gully behind the gravel driveway to help collect any excess surface water that isn't absorbed by the gravel surface. The levels are shown to be falling away from the site into the public highway on the topographical survey, with the same being shown at the rear of the building with levels falling away towards the bottom of the garden. This is considered to provide an adequate level of protection to defend the property from flooding, due to the EA mapping indicating very low probability of surface water flooding in this area.

**5.4.5** The rest of the proposed development will have little impact on surface water flooding.

## 5.5 Ground Water

**5.5.1** Reference has been made to the SWMP for the London Borough of Richmond Upon Thames. Mapping has been provided for a number of flood risk scenarios which include areas susceptible to ground water flooding. The development site is indicated to be at medium-high risk of groundwater flooding – refer to figure 11.


***Figure 11 – Groundwater Flood Risk Map (RBRUT SWMP)***

**5.5.2** Discussion provided in the SWMP mirrors the evidence found in the BGS mapping and borehole records for the development site and surrounding area. The local boreholes show varying arrangements of gravel, sand and impermeable clay materials, with clay shown below the former in the local records with likely the same arrangement present in the site boreholes (unconfirmed due to insufficient depth). This can result in a build-up of groundwater over the impermeable clay strata which is allowed to rise to the surface in extreme rainfall events and therefore linked to increased risk from groundwater flooding. The clay layers are also shown to be relatively shallow in local borehole records (~3.2m and 2.2m deep) which only increases the risk of potential groundwater flooding. To counteract this, the development should have suitable waterproofing specified by the designer or specialist supplier. The proposed design may comprise of impermeable barriers, waterproof concrete, drained cavities, or a combination of any of these.

## 5.6 Artificial Sources

**5.6.1** Artificial sources of flooding are potentially from man-made structures and infrastructure. The Environment Agency have modelled the potential effect of flooding from failures in retaining structures containing reservoirs. The blue area on the map below indicates potential flooding when river levels are normal, with the red indicating areas at risk of flooding when the rivers are flooding also (figure 12).

**5.6.2** The risk of flooding from reservoirs at this site is **high**, especially when there is also flooding from rivers. It should however be noted that reservoir and river flooding is extremely unlikely to occur concurrently in this location as, in addition to there having been no loss of life in the UK from reservoir flooding since 1925, there are also flood defences in place currently with future plans to upgrade these as part of the 'Thames Estuary 2100' plan. All large reservoirs are inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.


***Figure 12 – Extent of Flooding from Reservoirs (Gov.uk)***

## 5.7 Flooding from Drainage on site.

**5.7.1** Flooding could occur if the on-site drainage system becomes blocked or a rainfall event exceeds the design capacity.

**5.7.2** The development should ensure that all drainage runs are easily accessible to allow for blockage removal. Drainage issues and details of the proposed drainage system are discussed in section 6.

# 6.0 Drainage

## 6.1 Existing Drainage

### 6.1.1 On site

**6.1.2** The current surface water drainage system in place on the site is a piped gravity network which captures run-off via guttering in conjunction with downpipes and gullies, with the hardstanding in the rear garden area draining to soft landscaping. The collected runoff is then discharged into the Thames Water surface water system in the road adjacent to the property.

**6.1.3** A CCTV survey has been conducted on the existing drainage system in place at the property, which has found the existing main surface water run to have numerous instances of cracking. Therefore, the proposed drainage strategy will involve the removal of the existing pipework, which is to be replaced by the new proposed system.

### 6.1.4 Pre and Post Development Runoff Rates.

**6.1.5** As part of the development the client will be seeking to improve the level of surface water run-off from the site.

**6.1.6** Further discussion of the proposed run-off rates can be found in section 6.2

Predevelopment Runoff Rates

Existing 1 in 1 year = 2.8l/s
Existing 1 in 30 year = 6.8l/s
Existing 1 in 100 year = 8.8l/s
Existing 1 in 100 year +40% Climate Change = 12.7l/s

See appendix E for calculations

### 6.1.7 Thames Water Sewers.

6.1.7.1 Thames Water asset plans show existing public surface water and combined sewers in Nassau Road adjacent to the property, with the existing private surface water system discharging to the former and the private foul system to the latter.

## 6.2 Proposed Drainage

In accordance with the RBRUT local plan (2019), The disposal of surface water should be considered in the following order of priority:

1. Storage of rainwater for later use.
2. Use infiltration techniques, such as porous surfaces in non-clay areas.
3. Attenuate rainwater in ponds or open water features for gradual release to a watercourse.
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release to a watercourse.
5. Discharge rainwater direct to a watercourse
6. Discharge rainwater to a surface water drain
7. Discharge rainwater to a combined sewer

RBRUT policy LP21 presents the target for all developments to achieve a reduction of the existing discharge rates to greenfield run-off rates wherever feasible. Where greenfield run-off rates are not feasible this is to be demonstrated by applicant and subsequently a minimum of at least 50% attenuation of the sites surface water run-off during peak times to be achieved. To accomplish this the design should ensure surface water is managed as close to its source as possible through:

i. the increase of permeable surfaces;
ii. recognising opportunities for SuDS to provide other environmental benefits;
iii. factoring all flows into the sewer system (including swimming pools discharges, groundwater or other flows) in the calculations of greenfield run-off rates;

### 6.2.1 Rainwater Re-use/Storage

The possibility for rainwater re-use has been explored for this development with the implementation of a green roof being proposed over the garden pool house and above a portion of the existing ground floor and ground floor extension. The utilisation of these features will help to provide added amenity value by providing a more aesthetic look to the development, whilst also providing added biodiversity to the site by encouraging wildlife to congregate and thrive in these areas.

In addition to the above, the use of a green roof also provides water quality and quantity value by providing a cleansing effect to the water that permeates through the layer of soil present within the feature, as well as by providing a level of attenuation by soaking up the first 5mm of rainfall for use in watering the planting beds. The level of water attenuation and use provided by these features is however negligible in the event of more extreme storm events and therefore has not been included within the calculations, with the need for additional attenuation being required to control flows from the site down to the required rate as well as an alternate method of discharge.

### 6.2.2 Infiltration

Desk study review of existing and current boreholes and BGS information suggests that surface level gravel and sand deposits are likely to be present which may have some level of good infiltration characteristics. Also, as per figure 13 (extract from Magic Maps), the site is not located within a groundwater source protection zone therefore infiltration should not pose a threat to potable water quality within local extraction sites. However, as the underlying strata is predominantly clay based and therefore likely impermeable, while also potentially being relatively shallow as shown in local borehole records, a full infiltration system for the property will not be suitable as the infiltration features will encourage water discharge to accumulate atop the clay layers and further increase the risk of groundwater flooding.

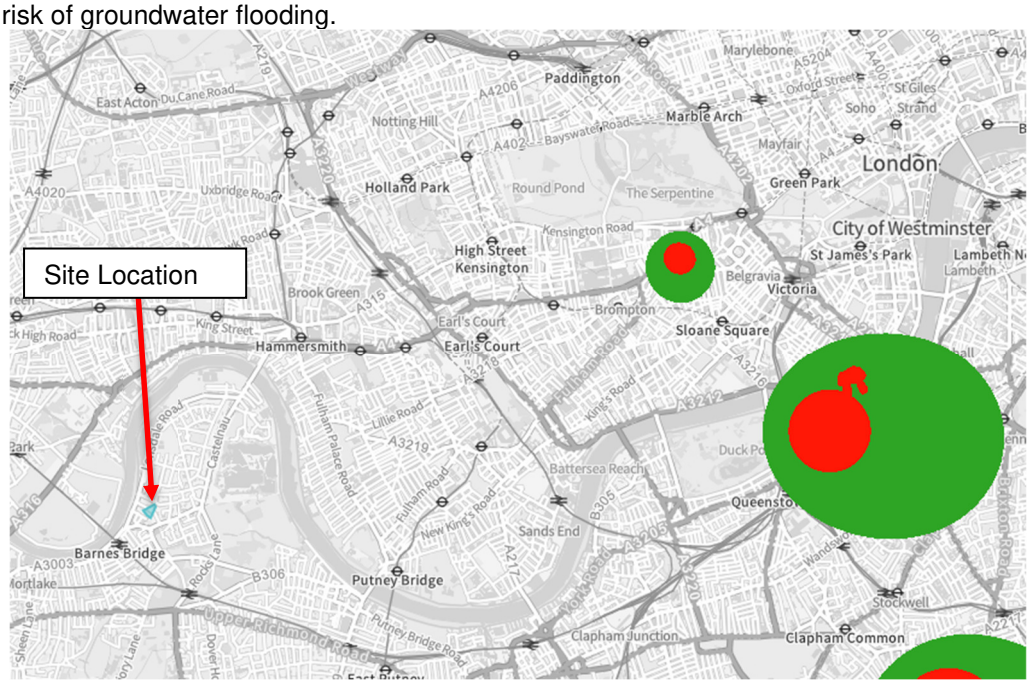



***Figure 13 – Groundwater Source Protection Zone Map (Magic Maps)***

The site does however benefit from the potential to capture and attenuate surface water in the garden area. The area of the garden directly adjacent to the property is currently mostly impermeable. By introducing permeable paving with sub-base storage in combination with a pumped flow control and orifice plate, any rainfall to the rear of the property can be captured and allowed to infiltrate the sub-base, providing attenuation and a controlling of the flows, helping to reduce the rate of discharge to the public network, therefore providing a betterment to the existing system.

### 6.2.3 Discharge to watercourse

The site is approximately 175m southeast of the closest watercourse (The Thames). Despite the proximity to the site being relatively close, there is a number of other properties in the path from the site to the river, as such, it will not be feasible to discharge directly to a watercourse as any drainage will need to pass through a significant area of third-party land.

### 6.2.4 Discharge to a surface water sewer

The CCTV survey conducted of the property in combination with the Thames Water asset plans confirm the presence of an existing surface water sewer within the adjacent Nassau Road which is currently utilised as the point of discharge for the existing private surface water system. Therefore, the re-use of this connection is the most likely option for discharge. This is then to be combined with the introduction of additional attenuation and flow control features to reduce the rate of runoff to the public system, as mentioned above in 6.2.1.

### 6.2.5 Discharge to a combined sewer

As discussed above, the CCTV survey confirms a connection to the existing public surface water network which would be preferred to a connection to the combined system, despite the presence of the combined sewer within Nassau Road.

### 6.2.6 SuDS Strategy

As described above, the current method of discharge from the site is to the existing Thames Water surface water network within Nassau Road. Therefore, we propose to re-utilise the existing connection to the public system with the addition of permeable paving and orifice plates in the rear and front garden area, in combination with a pump, to allow us to reduce the discharge rates from site down to greenfield rate or minimum by 50% so we are compliant with the requirements set out in the local plan for the borough.

It is also proposed to utilise green roofs above the ground floor extension and above the garden house. Whilst these have not been accounted for within the drainage calculations, a not insignificant level of runoff will be absorbed by these systems during rainfall events even further lowering the strain on the existing public system. In addition to this, the implementation of green roofs ensures that the development follows the drainage hierarchy set out by Richmond Borough Council and also provides an added level of amenity and biodiversity value to the site.

### 6.2.7 Proposed Run-off rates

The following rates have been taken from the drainage model calculations within Appendix E.

Post-Development Run-off Rates

| | |
|---|---|
| Proposed 1 in 2 Year | = 0.4l/s |
| Proposed 1 in 30 Year | = 2.4l/s |
| Proposed 1 in 100 Year | = 3.4l/s |
| Proposed 1 in 100 Year + 40% Climate Change | = 4.7l/s |

The above results show that for the 1 in 100 year plus 40% climate change storm event, we have achieved a reduction from 12.7l/s to 4.7l/s. This is a reduction of 63% putting the development well above the requirement for a 50% reduction of surface water run-off that is specified within the London Borough of Richmond Local Plan.

# 7.0 Flood Mitigation Measures

**7.1** The site is at a low risk of flooding except for the following.

**7.1.1** Flooding from Rivers

There is risk of flooding from Rivers at the site due to the close proximity of the site to the river Thames which if flooded could put the property high risk. However, the Thames has flood defences in place which significantly lowers the probability of the river flooding as it provides protection from all events up to 0.1%AEP. Nonetheless, further provisions such as additional waterproofing and an internal egress route should be put in place to ensure that in the unlikely event of the Thames flood defences failing, the occupants within the lower ground floor of the property would still be protected.

**7.1.2** Flooding from Ground Water

The property is at risk from Ground Water flooding due to the permeable strata overlaying impermeable London clay. The proposed development is not a substantial departure from the existing property and is therefore considered to not increase the risk. The addition of positively draining surface water flows through the use of permeable paving to the rear of the property will also lower the risk of ground water flooding.

# 8.0 Conclusions and Recommendations

**8.1.1** This report gives details of the flood risk and SUDs assessment, which has been carried out in relation to the proposed extension of the basement at 34 Nassau Road, London, SW13 9QE.

**8.1.2** The site is at a low risk of flooding from rivers and sea despite the close proximity of the site to the river Thames due to the protection that is provided by the flood defences that are currently in place. Furthermore, it is unlikely that the Thames Tidal Defences will be overtopped as there hasn't been a failure since 1928. However, there is always the potential for a breach to occur so the product 4 and 8 data from the Environment Agency will be required to be obtained and reviewed prior to commencement of the scheme to ensure the development is protected from fluvial flooding in the unlikely event of a breach in the tidal defences. Additional protection measures will also need to be taken, such as the provision of no sleeping accommodation and the inclusion of an internal escape route within the basement, to ensure any occupants are protected in the event of a flood.

**8.1.3** Surface water run-off and ground water flooding are currently potential risks and mitigation options have been reviewed.

**8.1.4** During extreme rainfall events it is possible that there will be surface flooding in the bottom end of the rear garden area of the property, as demonstrated by the Environment Agency mapping and the topographic survey which shows the levels all to be falling down to this point. It is shown as being low risk on the flood mapping but with no distinctive flow path, any area of the development lower than the external highway level will typically be at risk. Mitigation measures such as permeable paving and landscaped areas are to be added to provide extra protection to the property. The property also retains an existing dished channel drain at the front gate area and proposes a new permeable paved driveway areas which should provide some protection against surface water ingress caused by flooding of the adjacent highway.

**8.1.5** Ground water may be present at this site, and it will be necessary to provide suitable protection to the basement extension. Damp proofing specialists will be required to design the system to suit the ground conditions and may comprise of impermeable barriers, waterproof concrete and drained cavities or a combination of these systems. The basement extension will have no impact on flooding to other properties.

**8.1.6** The addition of permeable surfaces in combination with flow restriction devices such as pumps and orifice plates to the existing system will help to reduce the surface water discharge rates from the property in turn providing a betterment to the public network. Based on boreholes taken from the site groundwater strikes are shown at 2.75m deep in combination with impermeable layers of clay at 2.20m deep which provide unsuitable conditions for the implementation of local soakaways.

**8.1.7** Additional mitigation measures recommended to help protect the property further includes non-return valves to reduce the risk of back flow from surcharged drainage systems.

# Appendix A – Development Proposals


1 | SITE PLAN AS PROPOSED

02-00 | SCALE: 1:200 @ A3 // 1:100 @ A1

**DISCLAIMER:**

Dimensions to be verified on site. Only figured dimensions to be used and any discrepancies in dimensions are to be reported to RJHA. No dimensions are to be scaled from printed drawings. Any areas indicated on this drawing are for guidance only. No responsibility is taken for their accuracy.

There is a risk of injury or death in construction if works are not properly planning and supervised. The contractor must not undertake any elements of the work without first having carried out the necessary risk assessments and prepare detailed method statements.

**SCALE RULE:**

1:200@A3
1:100@A1
0m 2m 4m 6m 8m 10m 12m 14m 16m 18m 20m

**KEY:**

**NOTES:**

| REV. | DESCRIPTION: | BY: | DATE: |
|---|---|---|---|
| P- | ISSUED FOR PLANNING | CM | 16.07.2024 |

**STAGE:** PLANNING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| | | | |
|---|---|---|---|
| Client | MR & MRS RICHARDS | | |
| Address | 34 NASSAU ROAD SW13 9QE | | |
| TITLE | SITE PLAN AS PROPOSED | | |
| DRAWING | 2313_02-00 | | |
| REV. | P- | SCALE | AS STATED |
| STATUS | PLANNING | DRAWN | CM |
| DATE | 16.07.2024 | CHECKED | RJH |