PROPOSED BASEMENT AT NUMBER 30 RANELAGH AVENUE, BARNES, LONDON

FLOOD RISK ASSESSMENT

NOVEMBER 2021

REPORT REF: 2829/RE/11-21/01

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CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by The Basement Design Studio to carry out a Flood Risk Assessment for a proposed basement at number 30 Ranelagh Avenue, Barnes, London.

QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY

Evans Rivers and Coastal Ltd operates a Quality Assurance, Environmental, and Health and Safety Policy.

This project comprises various stages including data collection; hydrological and hydrogeological assessments; surface water drainage designs; and reporting. Quality will be maintained throughout the project by producing specific methodologies for each work stage. Quality will also be maintained by initiating internal quality procedures including the validation of third party deliverables; creation of an audit trail to record any changes made; and document control using a database and correspondence log file system.

To adhere to the Environmental Policy, data will be obtained and issued in electronic format and alternatively by post. Paper use will also be minimised by communicating via email or telephone where possible. Documents and drawings will be transferred in electronic format where possible and all waste paper will be recycled. Meetings away from the office of Evans Rivers and Coastal Ltd will be minimised to prevent unnecessary travel, however for those meetings deemed essential, public transport will be used in preference to car journeys.

The project will follow the commitment and objectives outlined in the Health and Safety Policy operated by Evans Rivers and Coastal Ltd. All employees will be equipped with suitable personal protective equipment prior to any site visits and a risk assessment will be completed and checked before any site visit. Other factors which have been taken into consideration are the wider safety of the public whilst operating on site, and the importance of safety when working close to a water source and highway. Any designs resulting from this project and directly created by Evans Rivers and Coastal Ltd will also take into account safety measures within a "designers risk assessment".

Report carried out by:

Rupert Evans, BSc (Hons), MSc, CEnv, C.WEM, MCIWEM, PIEMA

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1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by The Basement Design Studio to carry out a Flood Risk Assessment for a proposed basement at number 30 Ranelagh Avenue, Barnes, London.

1.1.2 Specifically, this assessment intends to:

1) Consider the impacts of tidal flood events in accordance with NPPF;

2) Review any literature and guidance specific to this area such as the SFRA and SWMP;

3) Assess the risks to people and property and propose mitigation measures accordingly;

4) Review existing evacuation and warning procedures for the area;

5) Carry out an appraisal of flood risk from any other sources such as groundwater as required by NPPF;

6) Report findings and recommendations.

1.1.3 This assessment is carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) dated 2021. Other documents which have been consulted include:

- DEFRA/EA document entitled *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*, 2005;
- Communities and Local Government 2007. *Improving the Flood Performance of New Buildings*. HMSO.
- DEFRA/EA document entitled *The flood risks to people methodology (FD2321/TR1),* 2006;
- EA *Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose*, 2008;
- National Planning Practice Guidance – Flood Risk and Coastal Change.
- UK Government's climate change allowances guidance.
- Environment Agency guidance entitled *Flood risk assessments: Climate change allowances – Kent and South London Area.*
- London Borough of Richmond Upon Thames Strategic Flood Risk Assessment Level 1 update (SFRA) dated 2021.
- London Borough of Richmond Upon Thames Strategic Flood Risk Assessment dated 2016.
- London Borough of Richmond Upon Thames Surface Water Management Plan (SWMP) dated 2011.

- London Borough of Richmond Upon Thames Planning Advice Note *Good Practice Guide on Basement Developments* dated 2015.

2. DATA COLLECTION

2.1 To assist with this report, the data collected included:

- 1:250,000 *Soil Map of South Eastern England* (Sheet 6) published by Cranfield University and Soil Survey of England and Wales 1983.
- 1:625,000 *Hydrogeological Map of England and Wales*, published in 1977 by the Institute of Geological Sciences (now the British Geological Survey).
- British Geological Survey Online Geology Viewer.
- LIDAR data at 1m resolution.
- Ordnance Survey 1:10,000 street view map (Evans Rivers and Coastal Ltd OS licence number 100049458).
- Product 6 flood breach data provided by the Agency as GIS files (Thames_Upriver_Breach_Model_P6).
- Product 4, 5 and 6 flood data provided by the Agency as GIS files (Beverley Brook 2009 model).

3. SITE CHARACTERISTICS

3.1 Existing Site Characteristics and Location

3.1.1 The site is located at number 30 Ranelagh Avenue, Barnes, London. The approximate Ordnance Survey (OS) grid reference for the site is 522265 176187 and the location of the site is shown on Figure 1.

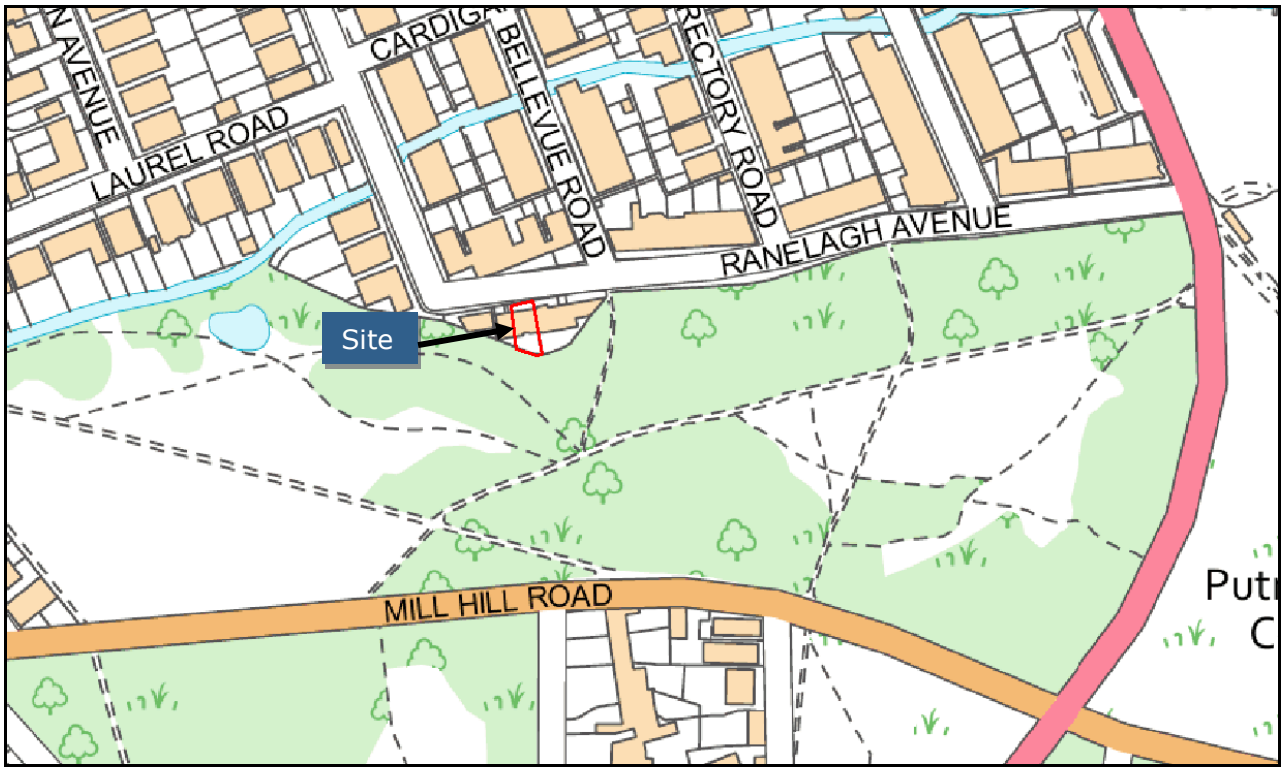

Figure 1: Site location plan (Source: Ordnance Survey)

3.1.2 The site is rectangular in shape and is located within a residential area. The site comprises a three-storey dwelling as shown on Drawing Number 21-022-01 Sheet 2 and 3.

3.1.3 The site is accessed from Ranelagh Avenue located adjacent to the northern frontage of the site.

3.1.4 Filtered LIDAR at 1m resolution has been obtained in order to determine the topography across the site and wider area (Figure 2).

3.1.5 Inspection of the survey data together with the on-site measurements indicate that the ground floor is set at 5m AOD.

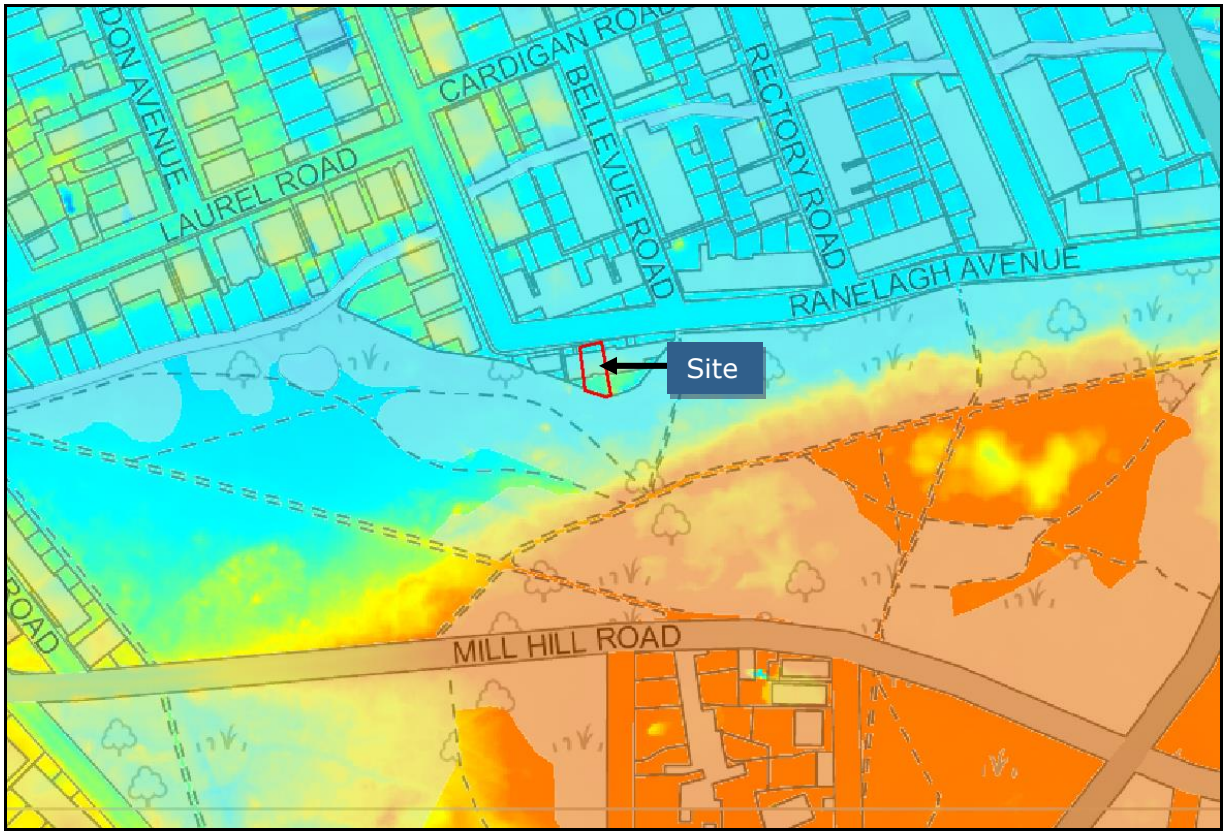

Figure 2: Filtered 1m LIDAR survey data where higher ground is denoted as orange and yellow colours and lower areas denoted by blue and green colours

3.2 Site Proposals

3.2.1 It is the Client's intention to create a basement level beneath the building footprint together with the creation of two front lightwells and one rear lightwell.

3.2.2 The basement will be set at 1.60m AOD and the top of the lightwells set at 4.35m AOD.

3.2.3 The basement will include recreational/living areas only. The site proposals can be seen on Drawing Numbers 21-022-02 Sheets 1, 2 and 3.

3.2.4 Paragraph: 066 Reference ID: 7-066-20140306 of the NPPG confirms that residential development is classified as a 'more-vulnerable' use.

4. BASELINE INFORMATION

4.1 Environment Agency Flood Zone Map

4.1.1 The Environment Agency's Flood Zone Map (Figure 3) and the Council's interactive maps which accompany the SFRA 2020 shows that the site is located within the NPPF defined (defended) Flood Zone 3a associated with the River Thames.

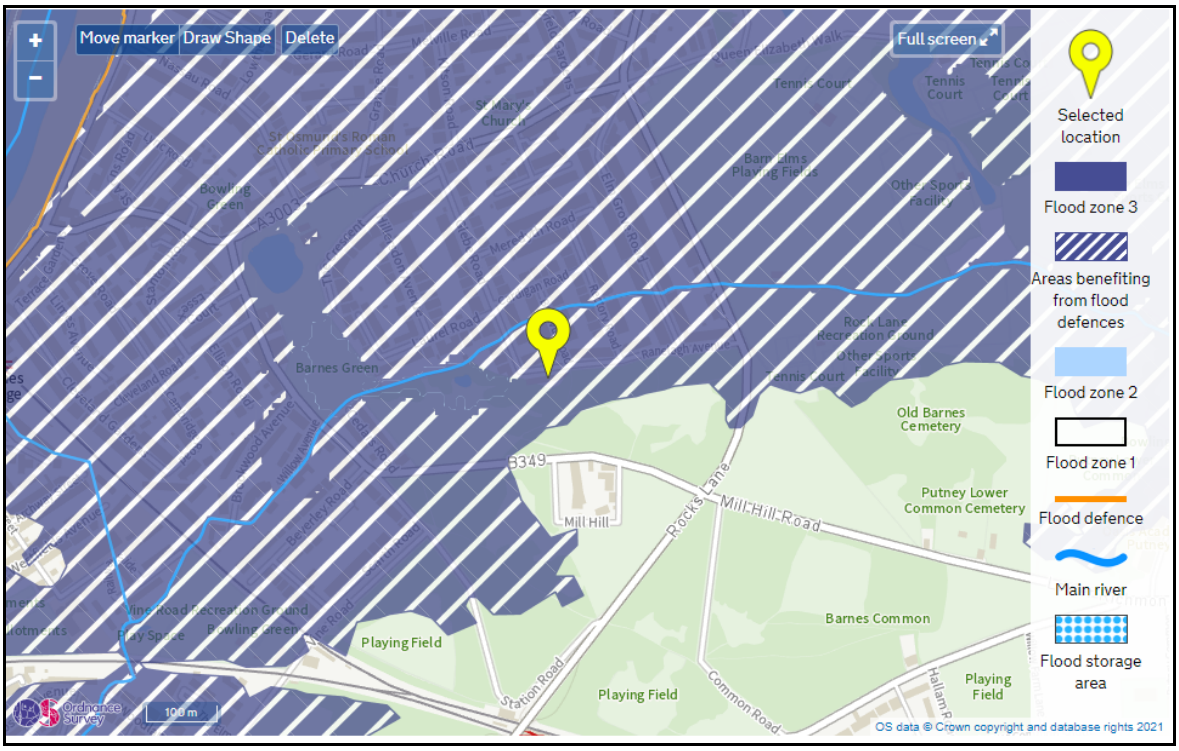

Figure 3: Environment Agency Flood Zone Map (Source: Environment Agency)

4.2 Flood Defences and Environment Agency Flood Levels

4.2.1 The Environment Agency flood defence information via https://environment.data.gov.uk/asset-management/index.html and Figure D of the SFRA 2016 indicates that the tidal River Thames is defended by raised river walls, which run parallel to the river and which are in good condition and set at 6m AOD. It is understood that the defences as a whole offer a standard of protection of 1 in 1000 years.

Thames

4.2.2 Product 6 flood breach data has been provided by the Agency as GIS files (Thames_Upriver_Breach_Model_P6). The Agency has stated that as a result of the Thames Estuary 2100 Study completed by HR Wallingford in 2008, together with the presence of the Thames Barrier, flood levels for specific return periods are not now provided. Instead, a single extreme water level is provided for present day conditions and a design water level is provided for future climate change conditions.

Table 1: EA modelled flood level data for the Thames

Model Node	TE2100 2008 Extreme Water Level (m AOD)	TE2100 climate change Design Water Level (m AOD)
2.17d	5.04	5.94

Beverley Brook

4.2.3 Product 4, 5 and 6 flood data from the Beverley Brook 2009 model has been provided by the Agency as GIS files. The flood levels for Beverley Brook, which is located 78m north of the site, are summarised in Table 2.

4.2.4 It is understood that the climate change 100 year flood level should reflect the UK Government's climate change allowances guidance updated July 2021.

4.2.5 It is understood from the recently updated UK Government's climate change allowances guidance dated July 2021, that for more-vulnerable development, the "Central" climate change allowance should be used in FRA's. Therefore, for the London management catchment the climate change allowance is 17% up to year 2080s.

4.2.6 Therefore, as the Agency's fluvial modelling includes a 20% climate change allowance, it is considered that this will give a conservative climate change estimate.

Table 2: Fluvial flood level data for Beverley Brook

Location	1 in 20 year (mAOD)	1 in 100 year (mAOD)	1 in 100 year plus climate change (mAOD)
2.0041	3.94	4.03	4.08

4.3 Flood Warning and Emergency Planning

4.3.1 The site is located within an Environment Agency flood warning area 064FWB40Barnes - Beverley Brook at Barnes, and 063FWT23Barnes - Tidal Thames from Putney Bridge to Mortlake High Street East.

4.3.2 The Environment Agency can issue each level of warning when necessary at least 12 hours prior to the next high tide or critical estimated peak surge tide (based on a model run which is reviewed every 6 hours).

4.3.3 Flood Alerts, Flood Warnings and Severe Flood Warnings are issued to residents and businesses within flood risk areas by the Agency's *Floodline Warnings Direct* (FWD) service. This system is managed by the Environment Agency and dials out a message to the recipient when a particular category of flood warning is being advised. The message is conveyed by a constant ringing of the telephone or can alternatively be communicated to mobile phones and computers. The system functions at all times, issuing flood warnings and alerts in conjunction with announcements on radio and other media. Owners and occupiers of dwellings or businesses thought to be at risk can sign up to the scheme. **The owners are encouraged to confirm details with the Agency and to sign up for these warnings.** The various flood warning codes can be seen on Figure 4.

Figure 4: Flood warning codes (Source: Environment Agency)

4.3.4 It is understood that in the event of flooding, evacuation is managed by a multi-agency team in conjunction with the Police. The multi-agency team provides suitable premises for shelter, first aid, refreshments and possible transportation with consideration given to the elderly and vulnerable groups. It is essential that occupants produce robust Emergency Flood Plans to avoid putting themselves or emergency services at risk and that they do not rely solely on emergency services during the event.

5. FLUVIAL AND TIDAL FLOOD RISK

5.1 Thames

5.1.1 The breach inundation map for 2100 (taken from Thames_Upriver_Breach_Model_P6) as shown on Figure 5 below, and the Council's interactive maps which accompany the SFRA 2020, show that the site is located within the 2100 breach inundation area. The site is shown not to be located within the 2005 breach inundation area.

5.1.2 The Product 6 flood breach data provided by the Agency as GIS files (Thames_Upriver_Breach_Model_P6) shows that the site would be affected during climate change events and that the flood level would reach 4.94m AOD.

5.1.3 The model indicates a flood hazard rating across the site of 1.21 which equates to a hazard which is *Dangerous for Some* according to *FD2320/TR2.*

5.1.4 The proposed basement would be affected to a depth of 3.34m, however, the ground floor would be set above the flood level thus providing safe (dry) refuge.

5.1.5 The proposed lightwells which could be a pathway for floodwater to enter the basement level would be set 0.59m lower than the flood level.

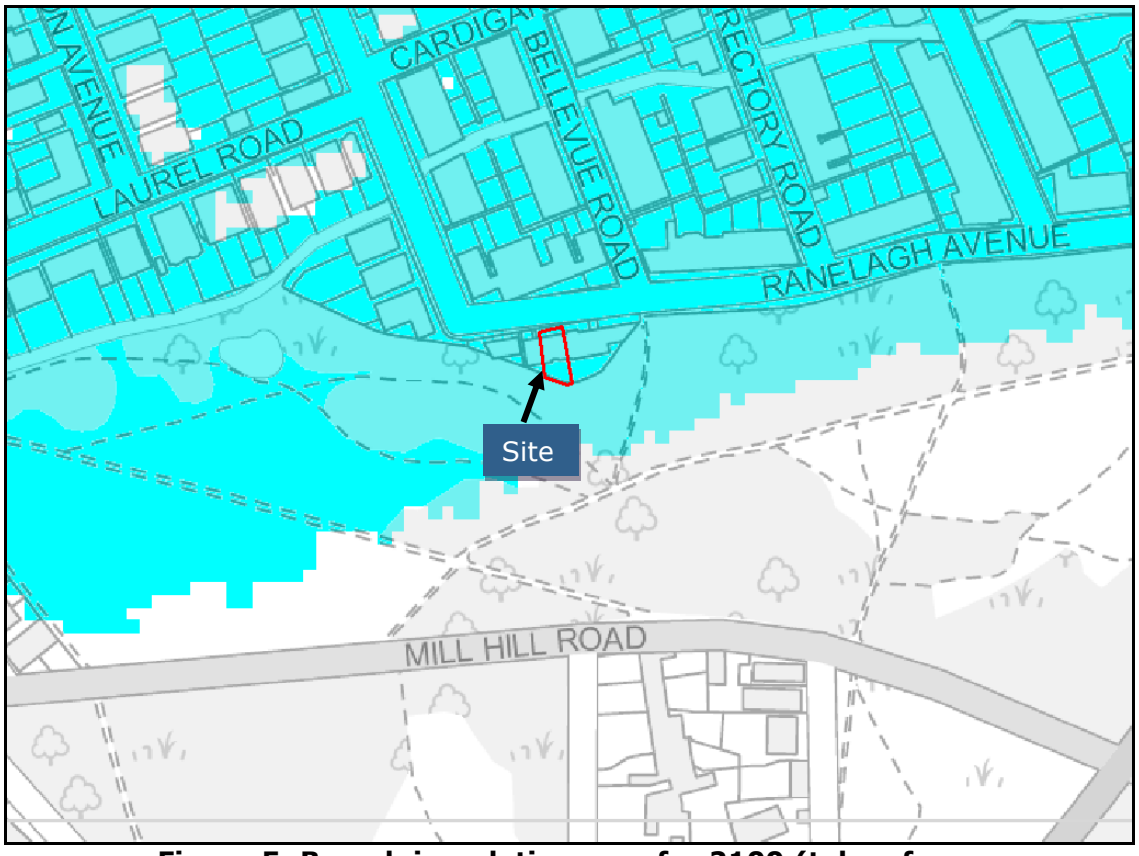

Figure 5: Breach inundation map for 2100 (taken from Thames_Upriver_Breach_Model_P6)

5.2 Beverley Brook

5.2.1 GIS data provided by the Agency from the Beverley Brook 2009 model (Figure 6 below), and the Council's interactive maps which accompany the SFRA 2020, show that the site is located outside of the climate change 1 in 100 year flood extent and 1 in 1000 year flood extent. Therefore, the fluvial flood risk from Beverley Brook is low.

Figure 6: Flood extents from Beverley Brook (taken from Beverley Brook 2009 model)

6. TIDAL FLOOD RISK MITIGATION AND EVACUATION

6.1 Reducing Exposure to the Hazard

6.1.1 In order to assess and reduce the exposure to the hazard and the vulnerability to the hazard after the site has been developed, the guidance outlined in the DCLG/DEFRA/EA document entitled *Flood Risk Assessment Guidance for New Development Phase 2*; *Flood Risks to People, Phase 2*; *Improving the Flood Performance of New Buildings* has been consulted.

6.1.2 In accordance with the Agency's recommendations and Paragraph 055 (ID 7-055-20140306) of the NPPF Planning Practice Guidance, the "design" event flood level for which mitigation measures should be designed to is the tidal breach climate change flood level of 4.94m AOD.

6.1.3 Paragraph 060 (ID 7-060-20140306) of the NPPF Planning Practice Guidance states that the first preference is to avoid flood risk by raising floor levels above the design flood level.

6.1.4 Paragraph 060 of the NPPF Planning Practice Guidance continues to state that "Resistance and resilience measures are unlikely to be suitable as the only mitigation measure to manage flood risk, but they may be suitable in some circumstances, such as:

- water-compatible and less vulnerable uses where temporary disruption is acceptable and an appropriate flood warning is provided;
- in some instances where the use of an existing building is to be changed and it can be demonstrated that no other measure is practicable;
- as a measure to manage residual flood risk".

6.1.5 As the proposals are in relation to an existing building the proposals comply with the second criterion above and raising of the proposed basement and proposed lightwells above the design flood level is not possible.

6.1.6 Therefore, as discussed above, other mitigation measures such as resistance and resilience measures will be appropriate in this case.

6.1.7 Safe (dry) refuge will be available across the ground floor for residents during the design event.

6.2 Differential Depth

6.2.1 Assuming water is permitted into the basement via the lightwells, during the design event the depth of floodwater could reach 3.34m across the basement. The differential depth (i.e. the depth difference between the inside of the building and outside of the building) could therefore reach 3.34m.

6.2.2 The DEFRA/EA document entitled *Improving the Flood Performance of New Buildings*, dated 2007, suggests that where the depth of floodwater is higher than 0.5m above the floor level within a building, there will be damage to internal finishes.

6.2.3 It is also stated in the aforementioned DEFRA/EA document that there is some damage to buildings if the depth differential between the outside and inside water levels exceeds 0.6m. Severe damage can occur if this reaches 1m even if the buildings are flood proofed.

6.2.4 It is proposed that in order to reduce the differential depth to safe limits, floodwater is allowed across the basement as part of a *Water Entry Strategy.*

6.3 Water Entry Strategy

6.3.1 In accordance with the ODPM guidance document *Preparing for Floods* and the aforementioned DCLG/DEFRA/EA document, a *Water Entry Strategy* in this case aims to allow floodwater to enter the building and flood resilience techniques are incorporated across the basement level to reduce the consequences of flooding. It is proposed that the following mitigation measures are established up to the design level of 4.94m AOD.

Floors

6.3.2 Suitable floor finishes such as ceramic or concrete based flooring are recommended.

Walls

6.3.3 Suitable flood proofing measures will need to be incorporated within the walls up to the flood level. Insulation can be fitted externally as it is easily replaced. If cavity insulation is preferred then rigid closed cell materials should be used as they have a low moisture take-up.

6.3.4 Internal cement renders should be avoided as they prevent effective drying. Standard gypsum plasterboard could be used as a sacrificial material and can be removed after the flood. Lime-based plaster and ceramic tiles are also known to offer some resilience.

Fittings

6.3.5 Durable fittings which are not affected by floodwater could be used internally (e.g. plastic or stainless steel units). Wood fittings should be avoided; however sacrificial fittings can be installed which can then be replaced easily after the flood. There should be gaps behind the fittings to promote drainage and drying.

Services

6.3.6 It is not practical to raise electrical sockets above the flood level, however, the mains supply of electric should be turned off in the event of a flood, and any boiler units should be placed as high as possible and above the flood level. Wiring for communications should also be insulated to prevent damage. Non-return valves are recommended to prevent back-flow of foul water.

6.3.7 It is recommended that after the event, a structural survey is carried out in order to assess any damage due to prolonged periods of flood water exposure. The CIRIA guidance document (C623) entitled *Standards for the repair of buildings following flooding* outlines the various approaches.

6.4 Reducing Vulnerability to the Hazard

6.4.1 The Agency aims to provide up to 12 hours notice before the issue of a *Flood Warning* for tidal events. It is understood that the police and other emergency services will assist in the evacuation to rest centres operated by the Council. The Fire Service will assist in any rescuing of people from the flooded area once this has occurred. People at the site will need to make a judgment themselves with regards to the flood hazard if evacuation is attempted and not solely rely on the emergency services.

6.4.2 It is recommended that the occupants liaise with the Agency in order to register with the Agency's Flood Warnings Direct service and ensure that they are aware of the flood risk so that they have the option to escape/evacuate upon receipt of a *Flood Warning* or upon the instruction of the emergency services.

6.4.3 The occupants should develop a *Family Flood Plan*. Further guidance is offered in the Environment Agency's guidance document entitled *What to do before, during and after a flood*. The *Family Flood Plan* should consider, for example, information about vital medication needed and a *Flood Kit*.

6.4.4 A *Flood Kit* is a useful precautionary measure especially if evacuation from the site is prolonged. The kit should be stored in an accessible location to ensure that it is not affected by floodwater. The contents should also be checked every 6 months and items replaced if necessary.

6.4.5 It may be sensible to compile two *Flood Kit's* to suit each eventuality. For example, a smaller kit could be compiled which would allow the occupants to carry it during evacuation. A larger kit could also be compiled which included additional food and beverage items in case of ongoing refuge within the property. Both kits should contain the necessary items as suggested below.

1. Important documents
2. Torch and batteries
3. Mobile phone (fully charged)
4. First-aid kit
5. Wind-up radio
6. Important telephone numbers
7. Bottled water
8. Non-perishable food provisions
9. Rubber Gloves and wellington boots
10. Medication or information relating to medication and its location
11. Blankets, warm clothes
12. Essential toiletries
13. Camera to record any damage
14. Emergency cash

Table 3: Flood Event Action Plan

Environment Agency Flood Warning Code	What to do!	Evacuate?
Flood Alert (Flooding Possible. Be aware/prepared! Watch Out). 	• Monitor flood risk through media and Floodline Warnings Direct. • Locate family members and inform them of risk. If away from the site make assessment on risk if considering returning to site (i.e. how long it will take to return etc). • Check flood kit, check occupants, check pets – BE PREPARED in case the situation gets worse.	Not necessary. Occupants can evacuate themselves if they feel unsafe providing that they make a judgement in relation to any external flood hazard. Take flood kit, occupants and pets with you.
Flood Warning (Flooding of homes, businesses and main roads is expected.	• Maintain communication through Floodline Warnings Direct and the	Occupants can evacuate themselves if they feel

Act now!).  	media. • Begin to implement Flood Plan. • Consider advice given from emergency services/Environment Agency. • Check insurance, Check flood kit, Check Pets. • Check alternative accommodation arrangements.	unsafe providing that they make a judgement in relation to any external flood hazard. Take flood kit, occupants and pets with you. People who do not evacuate should reside across ground floor. No formal evacuation or rest centre set-up will be undertaken at this warning level, however, if flooding is experienced across the area emergency services will rescue people.
Severe Flood Warning (Severe flooding is expected. Imminent danger to life and property. Act now!).  	• Leave site immediately if not already done so. • Take flood kit, occupants and pets with you. • Follow advice given by Emergency Services and Council.	Leave site according to advice given by Emergency Services and Council. Take flood kit, occupants and pets with you. If evacuation cannot be undertaken, people should reside across ground floor with *flood kit* and maintain communication with the emergency services.
Warnings no longer in force (No further flooding is expected in the area. Be careful).	• Return to site upon instruction from emergency services and assess any damage. • Contact insurance company depending on damage caused. • Beware of flood debris. • Do not touch sources of electricity. • Arrange for utilities to reconnect services. • Do not dispose of damaged property until your insurance company has agreed.	Not applicable, however site may be uninhabitable. Return to site upon instruction from emergency services as floodwater may not have receded.

6.5 Vulnerable Groups

6.5.1 The occupants at the site may include vulnerable groups such as elderly people, those with sensory or physical disabilities, minority ethnic groups, or the infirm. Priority will need to be given to these people during the flood event.

6.5.2 Vulnerable groups should be identified by the occupants and priority should be given to these groups during the event.

6.6 Safe Access/Egress

6.6.1 The hazard rating along the evacuation route has been provided by the Agency in the GIS model files, and is calculated by using the hazard equation as cited in the DEFRA/EA R&D Document *(FD2320/TR2).* The numerical hazard rating is then categorised into four degrees of flood hazard in accordance with *FD2320/TR2*, shown on Table 4 below.

Table 4: Hazard to people categories (based on *FD2320/TR2)*

Hazard Rating	Degree of Flood Hazard	Description
< 0.75	Very low hazard	Caution "Flood zone with shallow flowing water or deep standing water"
0.75 – 1.25	Danger for Some	Dangerous for some (i.e. children) "Danger: Flood zone with deep or fast flowing water"
1.25 – 2.0	Danger for Most	Dangerous for most people (i.e. general public) "Danger: Flood zone with deep fast flowing water"
> 2.0	Danger for All	Dangerous for all "Extreme danger: flood zone with deep fast flowing water"

6.6.2 When considering breaching of the defences during climate change events, the Agency's data shows that the hazard would be *Dangerous for Most* for 279m, *Dangerous for Some* for 19m, then *Very low* thereafter (Figure 8).

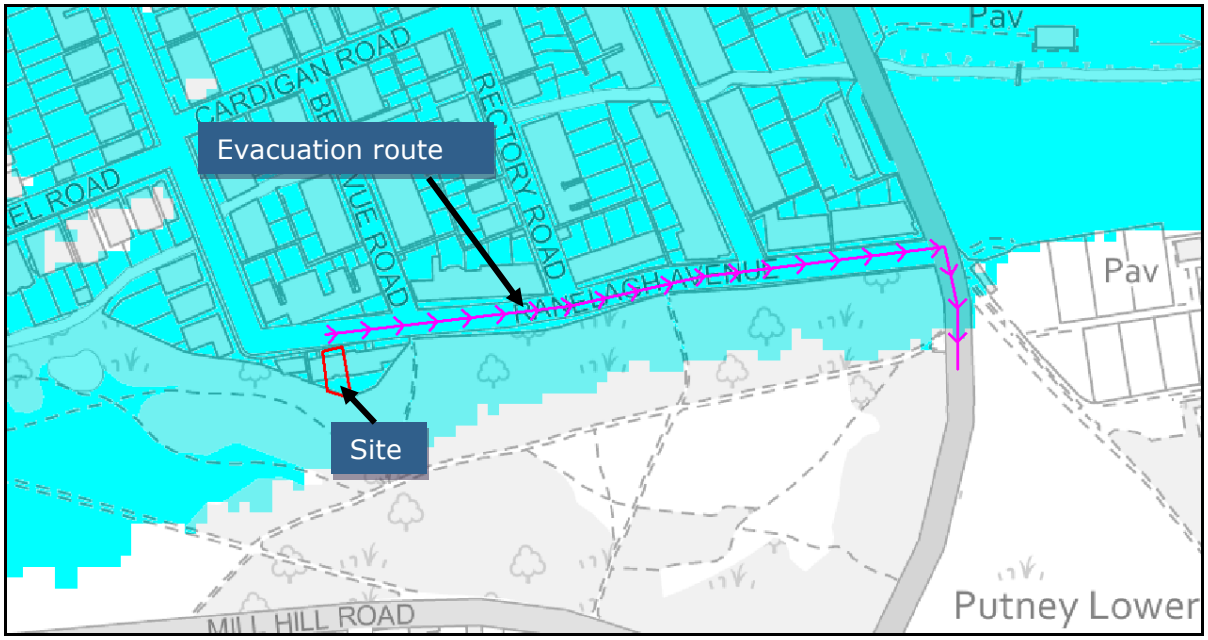

Figure 7: Preferred evacuation route in relation to Breach inundation map for 2100 (taken from Thames_Upriver_Breach_Model_P6)

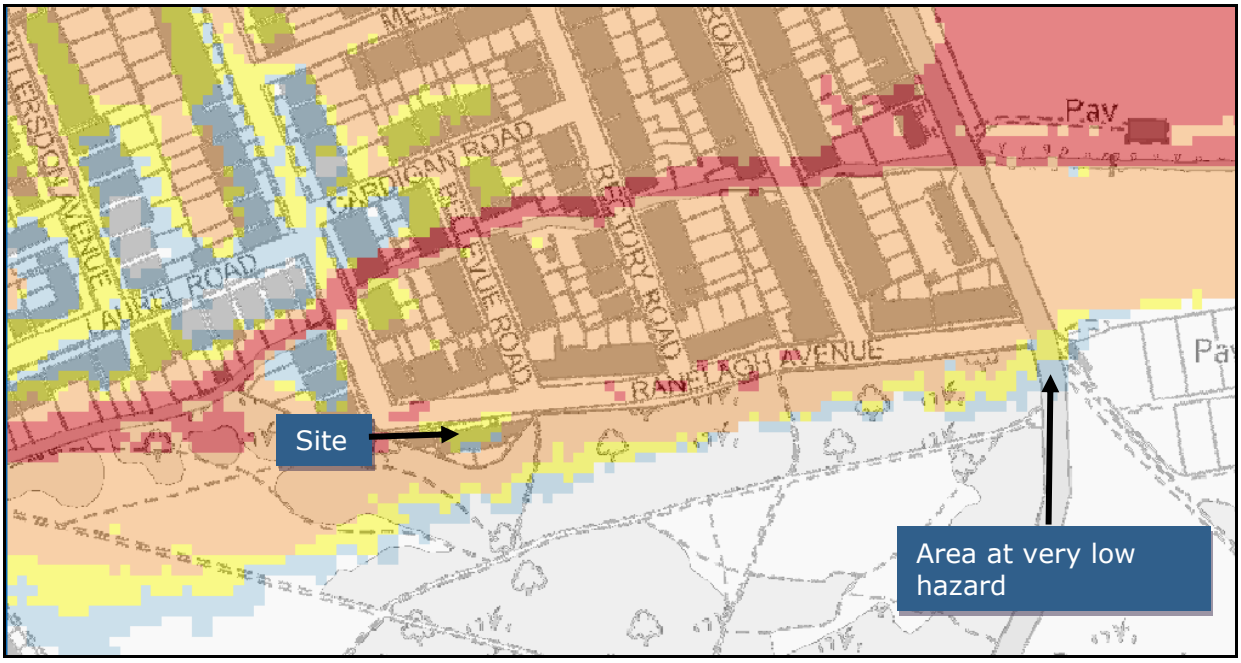

Figure 8: Breach hazard map for 2100 (taken from Thames_Upriver_Breach_Model_P6) (refer to Table 3 above for classification)

6.7 Insurance

6.7.1 The Association of British Insurers (ABI) published a guidance document in 2012 entitled *Guidance on Insurance and Planning in Flood Risk Areas for Local Planning Authorities in England*.

6.7.2 The ABI guidance sets out the requirements of the insurance industry when considering flood risk and insurability of the property. The guidance suggests that properties should be protected for flood events up to the 1 in 100 year event in order to access insurance at a competitive price.

6.7.3 The guidance also states that insurers would of course prefer to cover properties which are not at risk of flooding, however, for those properties which are at risk of flooding insurers would prefer that the properties are raised above the flood level, over resistance measures which prevent floodwater from entering the building, or resilience measures which allows floodwater to enter the building.

6.7.4 It is not practical to raise the proposed basement level above the flood level, however, flood resilience measures have been proposed up to the climate change breach event. Therefore, the ABI's requirement of protection during the climate change 1 in 100 year event will be exceeded and there will be a good chance of the property being insured at a competitive rate.

7. OTHER SOURCES OF FLOODING

7.1 Groundwater Flooding

7.1.1 In order to assess the potential for groundwater flooding during higher return period rainfall events, the Jacobs/DEFRA report entitled *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study*, published in May 2004, was consulted, together with the guidance offered within the document entitled *Groundwater flooding records collation, monitoring and risk assessment (ref HA5)*, commissioned by DEFRA and carried out by Jacobs in 2006.

Soil and Geology at the Site

7.1.2 It can be seen from the various soil and hydrogeological data, listed in Section 2, that the soils beneath the site comprise clay, silt, sand and peat.

Groundwater Flooding Potential at the Site

7.1.3 There have been no recorded groundwater flood events across the site between 2000 and 2003, as indicated by the Jacobs study and Figures D and K of the SFRA 2016.

7.1.4 The Council's interactive maps which accompany the SFRA 2020 shows that the site is located across an area with an increased potential for elevated groundwater. The maps indicate that there is a 50% to 75% susceptibility to groundwater flooding and that there is *Potential for groundwater flooding to occur at surface.*

7.1.5 The ground floor will be above any groundwater emergence, however, the proposed basement may need to be designed to achieve a Grade 3 level of waterproofing protection as outlined in BS8102:2009.

7.2 Surface Water Flooding and Sewer Flooding

7.2.1 Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewers thus causing them to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding.

Surface Water Flooding

7.2.2 Figure D-9 of the SWMP shows that the site is not located within a Critical Drainage Area (CDA).

7.2.3 Figure K of the SFRA 2016 indicates that there have been no historical flooding incidents across the site.

7.2.4 Figure G of the SFRA 2016 and the Council's interactive maps which accompany the SFRA 2020 shows that the site has a very low risk of surface water flooding.

7.2.5 The Agency's Surface Water Flooding Map (Figure 9) also shows that there is a very low surface water flood risk across the site (i.e. less than 1 in 1000 year chance).

7.2.6 The Agency's map indicates that there is a low risk along Ranelagh Avenue (i.e. between 1 in 1000 years and 1 in 100 years). The data associated with the map shows that the depth would be below 0.3m and the hazard would therefore be *Very low* using the hazard equation in paragraph 13.7.2 of *FD2320/TR2.*

Figure 9: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2021)

Sewer Flooding

7.2.7 The Council's interactive maps which accompany the SFRA 2020 and Figure I of the SFRA 2016 indicates that the site is located across a postcode area which has had between 6-10 reported incidents of sewer flooding. It is understood that the information was provided by Thames Water and on a broad scale. No information was provided for specific addresses.

7.2.8 Despite this, the London Borough of Richmond Upon Thames Planning Advice Note *Good Practice Guide on Basement Developments* dated 2015, states in section C4.7 that basements should be fitted with a positive pumped device so that they will be protected from sewer flooding.

7.2.9 In addition to the pumped device there should be a non-return valve (e.g. http://www.forgevalves.co.uk/) installed so that if the sewers become completely full during a heavy storm, foul water does not backflow into the property and basement.

7.3 Reservoirs, Canals And Other Artificial Sources

7.3.1 The failure of man-made infrastructure such as flood defences and other structures can result in unexpected flooding. Flooding from artificial sources such as reservoirs, canals and lakes can occur suddenly and without warning, leading to high depths and velocities of flood water which pose a safety risk to people and property.

7.3.2 The Environment Agency's "Risk of flooding from reservoirs" map indicates that the site is at risk of flooding reservoirs.

7.3.3 The map indicates that the site could mainly be affected to a depth of between 0.3m and 2m, however, as the information associated with the maps suggest, it is considered that

reservoir flooding is extremely unlikely to happen and such features are regularly inspected by qualified engineers under the Reservoir Act 1975.

8. SURFACE WATER DRAINAGE AND SUDS

8.1 The London Borough of Richmond upon Thames Local Plan policy LP21, and Policy 5.13 in Chapter 5 of the London Plan dated March 2015 and Chapter 9 Policy SI 13 *Sustainable drainage* of the Draft London Plan, requires sustainable drainage systems (SUDS) to be installed where appropriate and in line with the drainage hierarchy in order for runoff to be managed as close to its source as possible. The London Plan states that SUDS should be utilised unless there are practical reasons for not doing so.

8.2 Overall, there will not be a net increase in impermeable area as the basement will be located beneath the existing building footprint. Where the small lightwells will extend beyond the building footprint, this will be beneath existing paved areas.

8.3 There will not be an increase in runoff rate or runoff volume as a result of the proposed development.

8.4 As there will not be an increase in impermeable area and as the site comprises an existing building with a lack of available space, there is little opportunity to reduce runoff rates from the site via attenuation or rainwater harvesting.

8.5 The London Borough of Richmond Upon Thames Planning Advice Note *Good Practice Guide on Basement Developments* dated 2015, states in Section 3.4.1 that *A minimum amount of soil has to be provided above a basement that extends beyond the footprint of the building, and this later of soil has to enable and allow for garden planting and contribute to sustainable drainage (SUDS).*

8.6 As the basement will be located beneath the footprint of the existing building and only the small lightwells will extend beyond the building footprint, the 1m requirement does not apply across this area and as there will not be an increase in impermeable area there will not be an increase in runoff rate from the site.

9. CONCLUSIONS

- The site is located within the NPPF Flood Zone 3a from a tidal surge event within the River Thames.
- When considering a breach in the defences and tidal inundation during climate change events the flood level at the site is estimated to reach 4.94m AOD.
- The proposed basement would be affected to a depth of 3.34m, however, the ground floor would be set above the flood level thus providing safe (dry) refuge.
- The proposed lightwells which could be a pathway for floodwater to enter the basement level would be set 0.59m lower than the flood level.
- A *Water Entry Strategy* should be adopted across the basement to protect property up to a level of 4.94m AOD.
- A warning and evacuation strategy has been developed within this assessment. It is proposed that the occupants register with the Agency's *Flood Warnings Direct* and prepare a *Family Flood Plan*.
- Safe access/egress cannot be achieved during the peak of the event.
- Safe refuge during all modelled events is available at all times across the ground floor.
- It is considered that there is a low risk of groundwater flooding and a very low flood risk from surface water and sewers.
- There is a low fluvial flood risk from Beverley Brook.
- The basement is not to be converted to a separate dwelling to minimise the flood risk to occupants; no sleeping accommodation is provided for at basement level and internal access is to be maintained for occupants to reach a higher floor within the building in the event of a flood.

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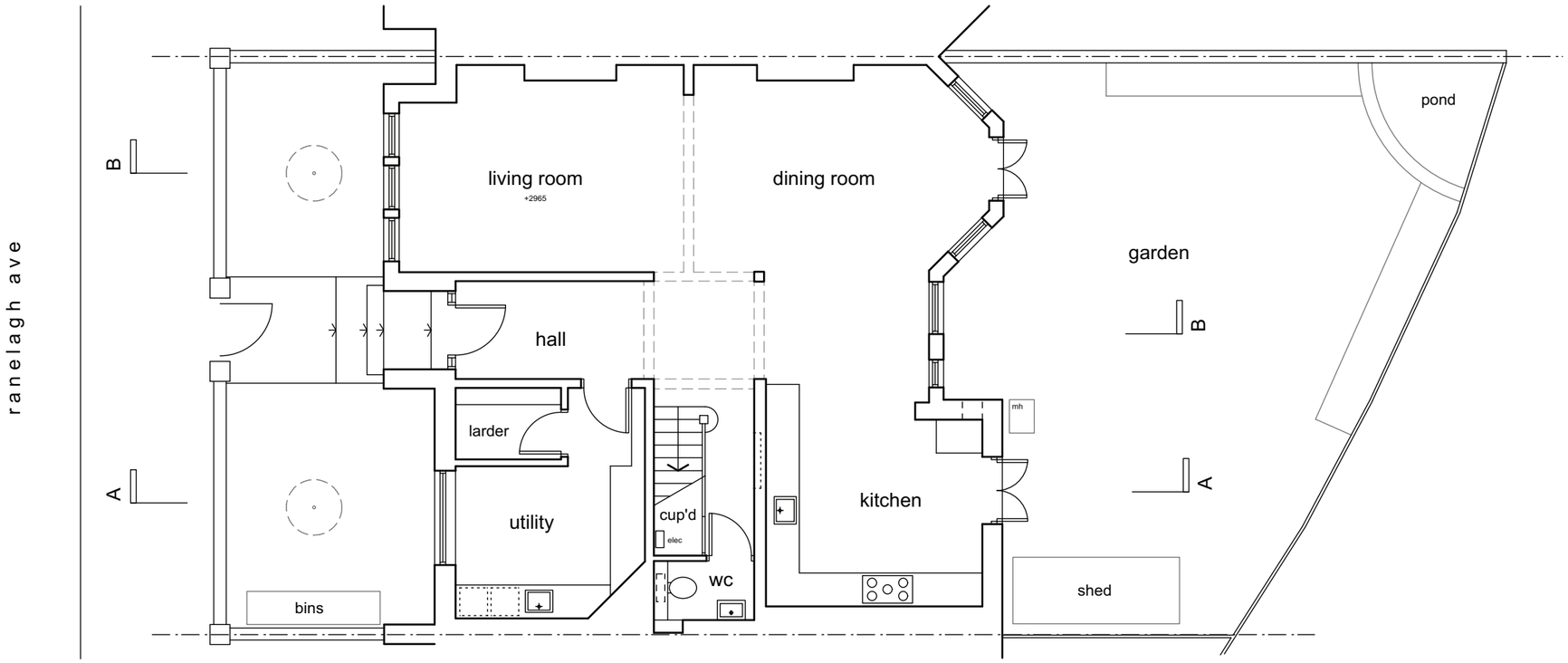
DRAWINGS



GROUND FLOOR PLAN as existing

N

0 1 2 3 4 5

scale bar (m)

1:100 @ A3

client: Kate Rothschild	project: 30 Ranelagh Avenue Barnes London SW13 0BN	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Premises as Existing drawing no: 21-022-01 (sheet 2 of 4)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk

FRONT ELEVATION as existing

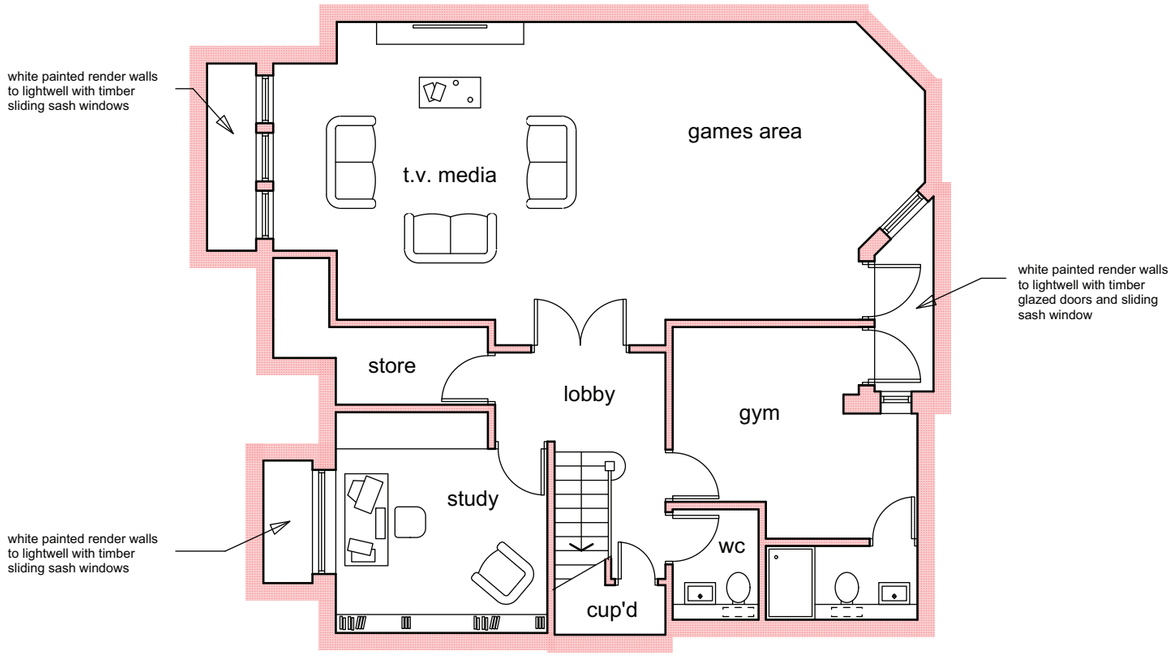
REAR ELEVATION as existing

0 1 2 3 4 5

scale bar (m)

1:100 @ A3

client: Kate Rothschild	project: 30 Ranelagh Avenue Barnes London SW13 0BN	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Premises as Existing drawing no: 21-022-01 (sheet 3 of 4)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk



BASEMENT PLAN as proposed

Schedule of Areas (gross internal approx)

Proposed Basement 95.25 m2 (1025 sq ft)

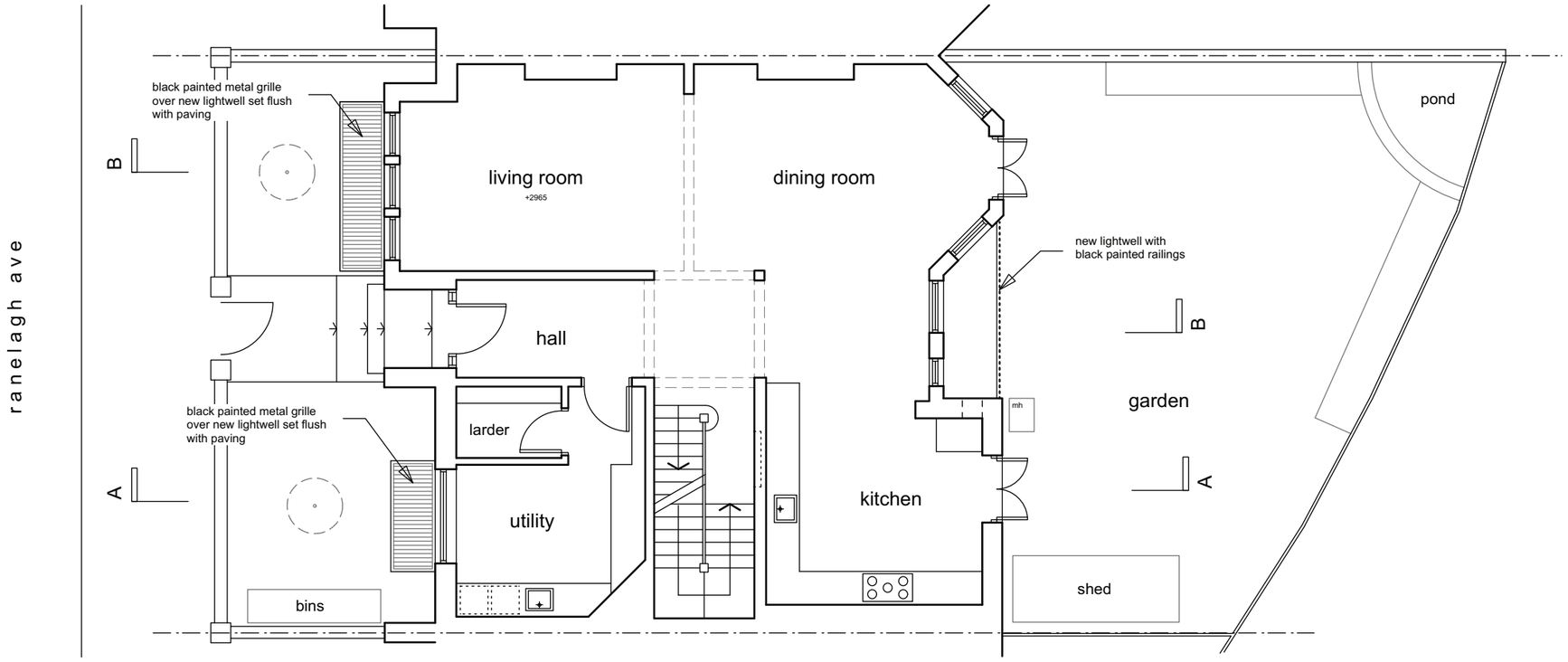
N

0 1 2 3 4 5

scale bar (m)

1:100 @ A3

client: Kate Rothschild	project: 30 Ranelagh Avenue Barnes London SW13 0BN	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Scheme Proposals drawing no: 21-022-02 (sheet 1 of 4)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk



GROUND FLOOR PLAN as proposed

N

0 1 2 3 4 5

scale bar (m)

1:100 @ A3

client: Kate Rothschild	project: 30 Ranelagh Avenue Barnes London SW13 0BN	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Scheme Proposals drawing no: 21-022-02 (sheet 2 of 4)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk

FRONT ELEVATION as proposed

REAR ELEVATION as proposed

0 1 2 3 4 5

scale bar (m)

1:100 @ A3

client: Kate Rothschild	project: 30 Ranelagh Avenue Barnes London SW13 0BN	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Scheme Proposals drawing no: 21-022-02 (sheet 3 of 4)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk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Rivers and Coastal