



# Flood Risk Assessment for Planning

**Prepared for:**

William Gresford

**April 2023**

**Our reference:**

92821-Gresford-WesternRd

**Location:**

22 Western Road

Oxford

OX1 4LG



## Document Issue Record

<b>Project:</b>	Flood Risk Assessment for Planning
<b>Client:</b>	William Gresford
<b>Location:</b>	22 Western Road, Oxford OX1 4LG
<b>Application:</b>	Erection of a second floor rear extension, erection of front access to the basement and associated works (to remain a single dwelling).
<b>Our reference:</b>	92821-Gresford-WesternRd
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<b>Authorisation:</b>	Ms Jackie Stone

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# 1. Key Facts

## 1.1 Flood Risk Posed:

- EA Flood Zones 2 and 3 (Medium & High Risk).
- The risk would appear to be predominantly fluvial and originate from the River Thames which is located approximately 75m north east of the site and the Hogacre Ditch located approximately 49m to the south.
- Site-specific modelled flood levels and flood extents have been requested from the EA as part of the Product 4 data request.
- Comparison of these modelled flood levels with topographic site levels (55.01mAOD to 56.28mAOD), shows that the site is between 0.0m and 1.27m below the modelled 1:100yr flood level (56.28mAOD) provided, between 0.15m and 1.42m below the modelled 1:100yr +25% CC flood level (56.43mAOD) provided and between 0.26m and 1.53m below the modelled 1:1000yr flood level (56.54mAOD) provided.
- The Oxford City Council SFRA (November 2017) shows the site to be located outside of Flood Zone 3b (Functional Floodplain).
- No EA formal flood defences in the area.
- No historical flooding on the site.
- Risk of pluvial flooding would appear to be "Very Low" to "Low".
- Risk of groundwater, sewer surcharge or reservoir flooding would appear to be very low.

## 1.2 Flood Risk Mitigation:

- The development is considered to fit within the EA Standing Advice for domestic extensions.
- There will be no introduction of additional or separate units, no sub-division, and no intensification of usage.
- No new bedrooms will be created in the basement or at ground floor level.
- Internal access will be maintained from the basement to the upper floor levels of the property.
- Floor levels within the extension will be set no lower than existing adjacent floor levels.
- Flood proofing will be incorporated as appropriate.
- Due to the small scale of the development, existing drainage arrangements will be retained.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

**Assuming accordance with these flood risk management measures, Un da Consulting Limited consider the proposed application to be suitable in flood risk terms.**

## 2. Introduction

Unda Consulting Limited have been appointed by William Gresford (hereinafter referred to as “the applicant”) to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at 22 Western Road, Oxford OX1 4LG (hereinafter referred to as “the site”). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance, as well as relevant Local Policies.

The site appears to be located entirely within Flood Zones 2 and 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

- The objectives of a FRA to support a planning application are to establish:
- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

## 3. Existing Situation

### 3.1 Site Usage:

The site is currently occupied by a single terrace residential dwelling. The site is understood to have lawful planning permission for residential use. The surrounding area is characterised by residential dwellings.

Existing plans are provided in the report Appendix.



Figure 1: Aerial imagery of site and surrounding area (Source: Google Earth)

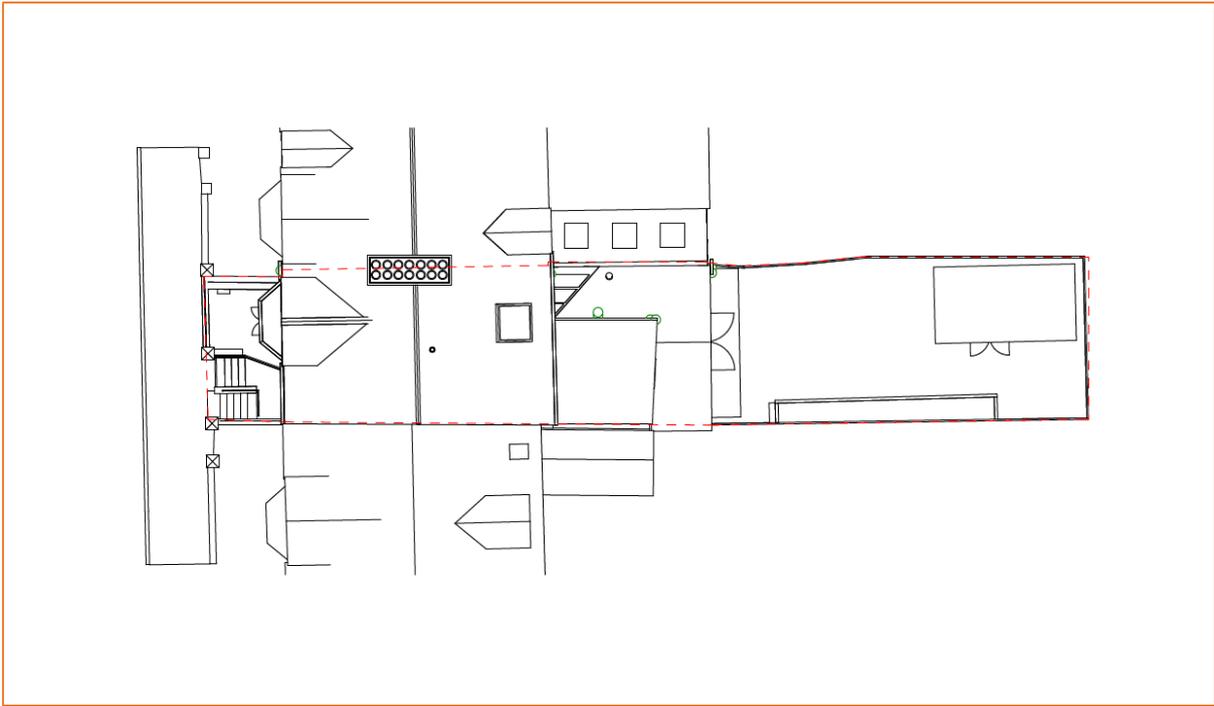


Figure 2: Block Plan (Source: Gresford Architects)

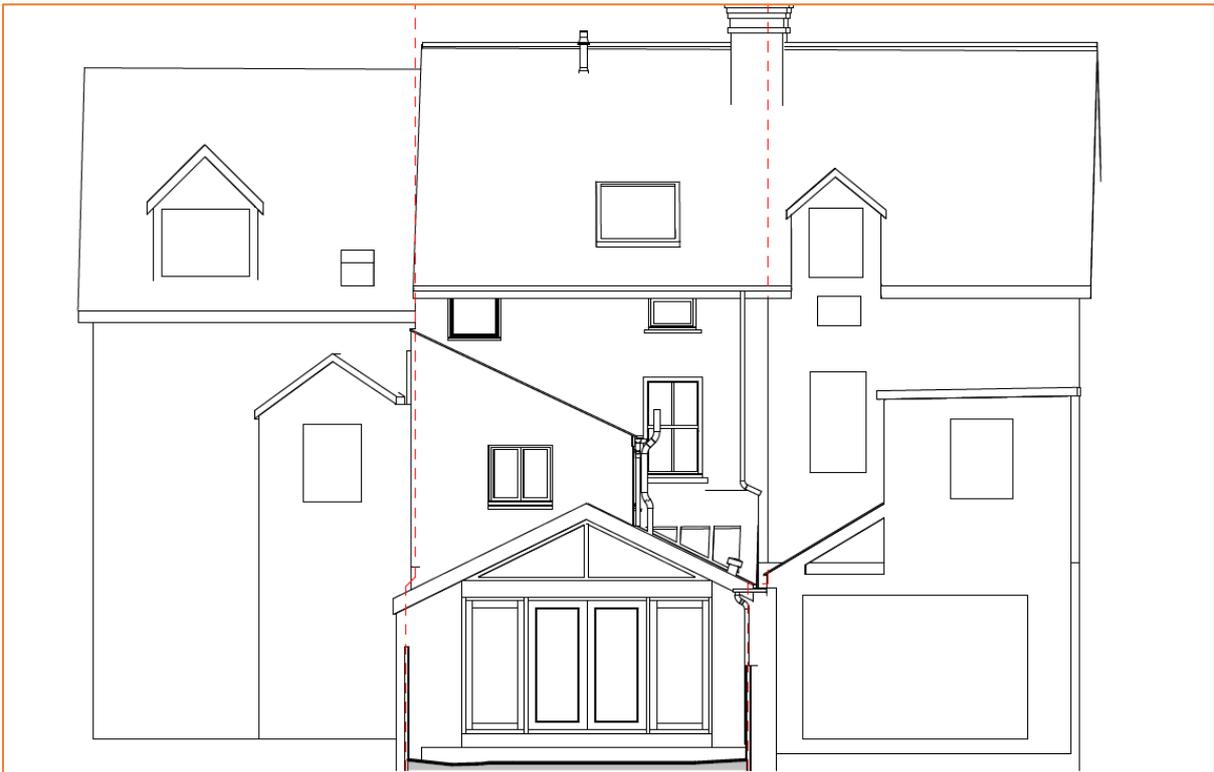


Figure 3: Existing Rear Elevation (Source: Gresford Architects)

### 3.2 Topography:

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.3m every 2m. This dataset is derived from a combination of our full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 1.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

Data suggests that the ground topography on site ranges from approximately 56.28mAOD at the rear of the property to 55.01mAOD at the front of the property.



Figure 4: 1m resolution LiDAR DTM showing topographic levels across the site (Source: EA LiDAR, Google Maps)

### 3.3 Geography and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Oxford Clay Formation and West Walton Formation (undifferentiated) - Mudstone, with superficial deposits of Northmoor Sand and Gravel Member- Sand and Gravel.

The soil type in the area taken from the UKSO Website is Deep Riverine Sands/Gravel soil parent material, with Sand to Sandy Loam soil texture.

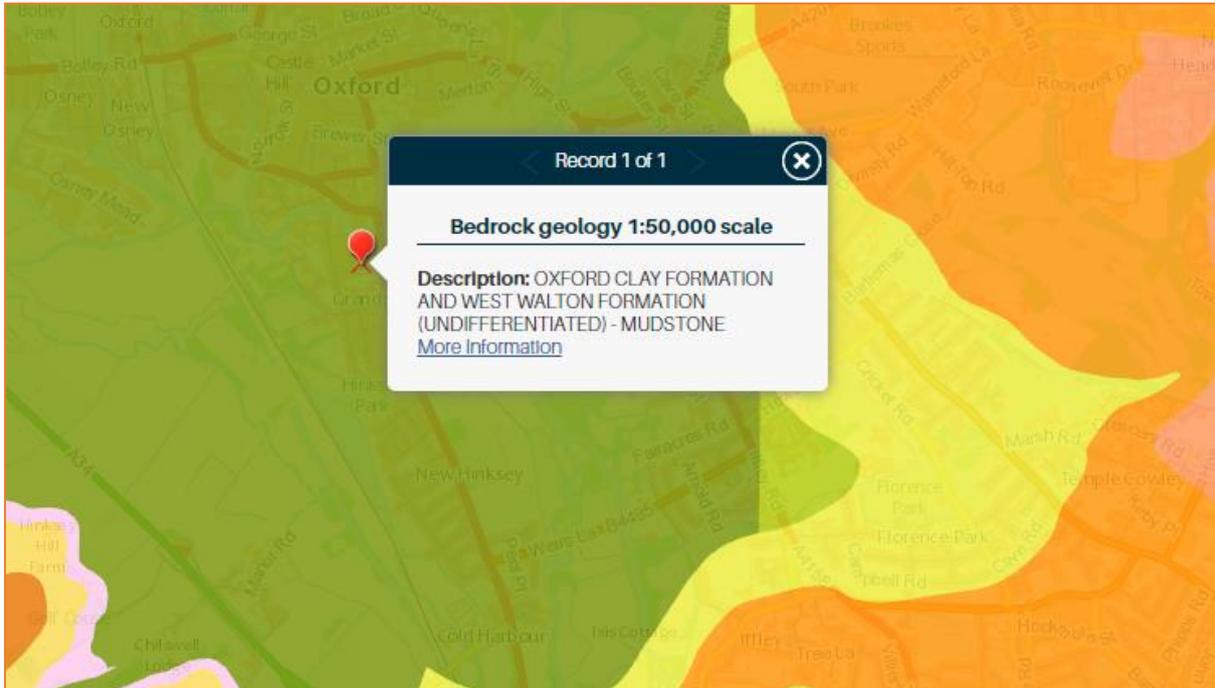


Figure 5: Bedrock Geology (Source: BGS)

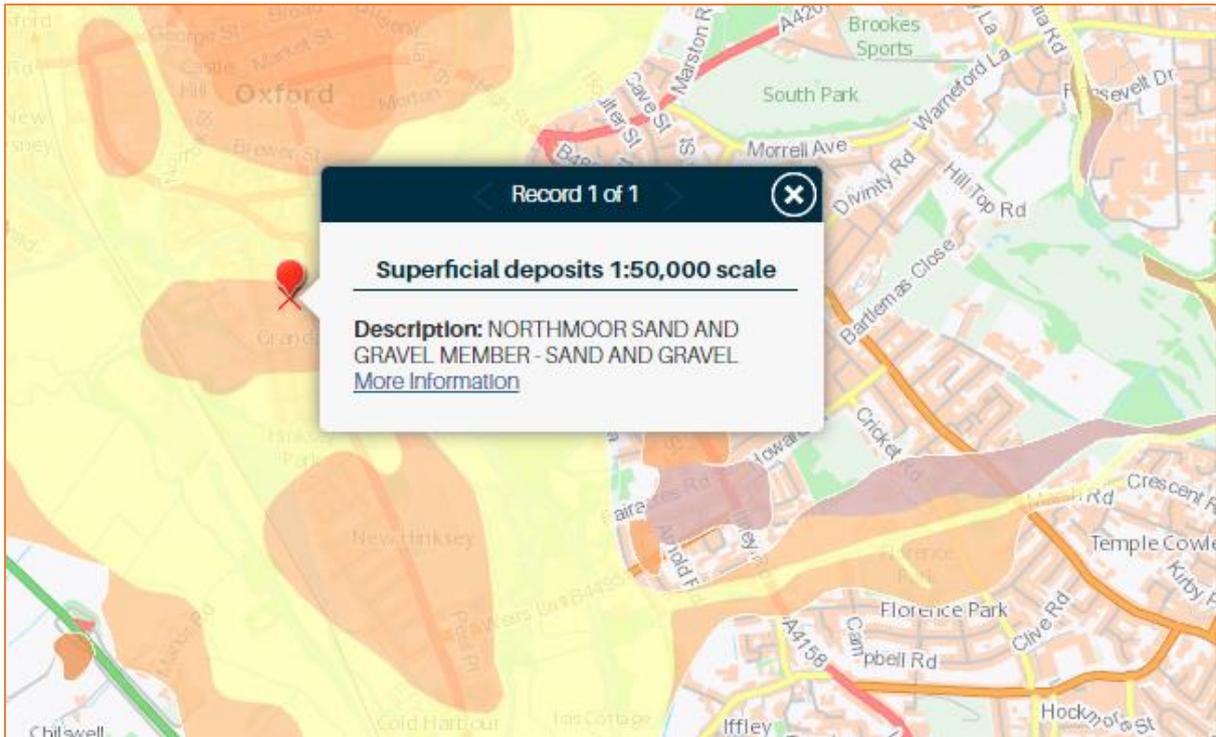


Figure 6: Superficial deposits (Source: BGS)



Figure 7: Soil Types (Source: UKSO)

## 4. Development Proposal

The proposed planning application is for the erection of a second floor rear extension, erection of front access to the basement and associated works (to remain a single dwelling).

There will be no introduction of additional or separate units, no sub-division, and no intensification of usage. No new bedrooms will be created in the basement or at ground floor level.

In addition, internal access will be maintained from the basement to the upper floors of the property.

Proposed plans are provided in the report Appendix.

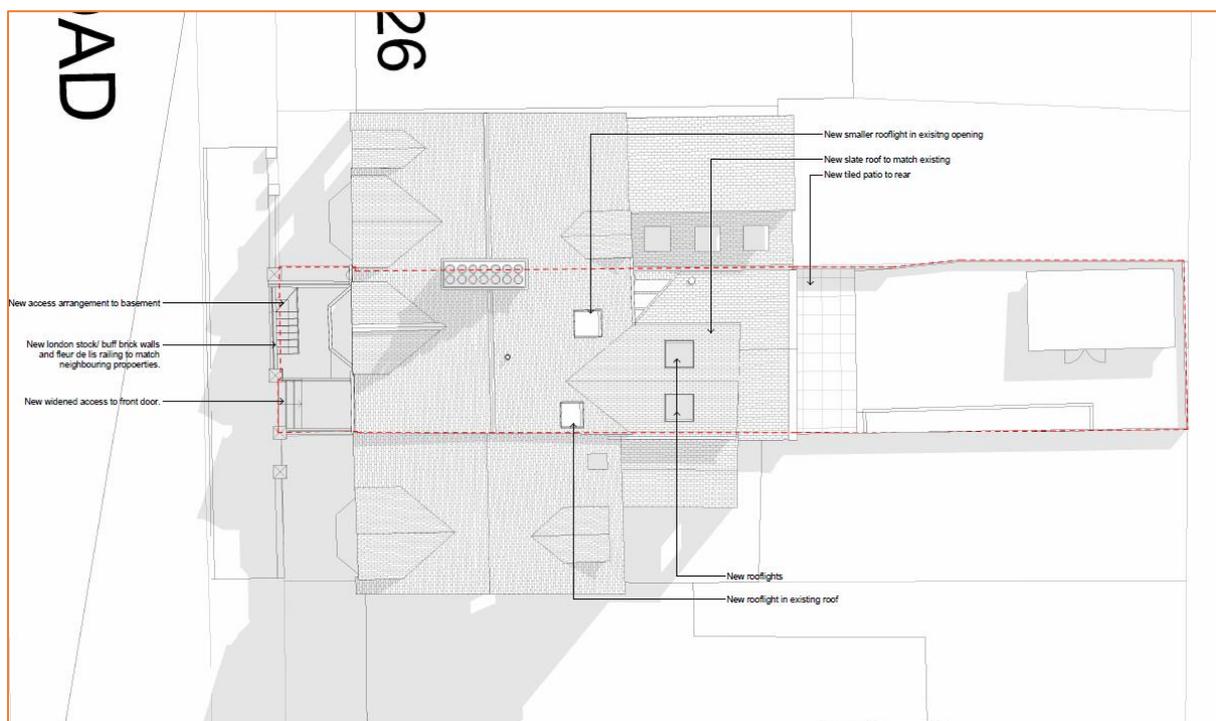


Figure 8: Proposed Roof Plans (Source: Gresford Architects)

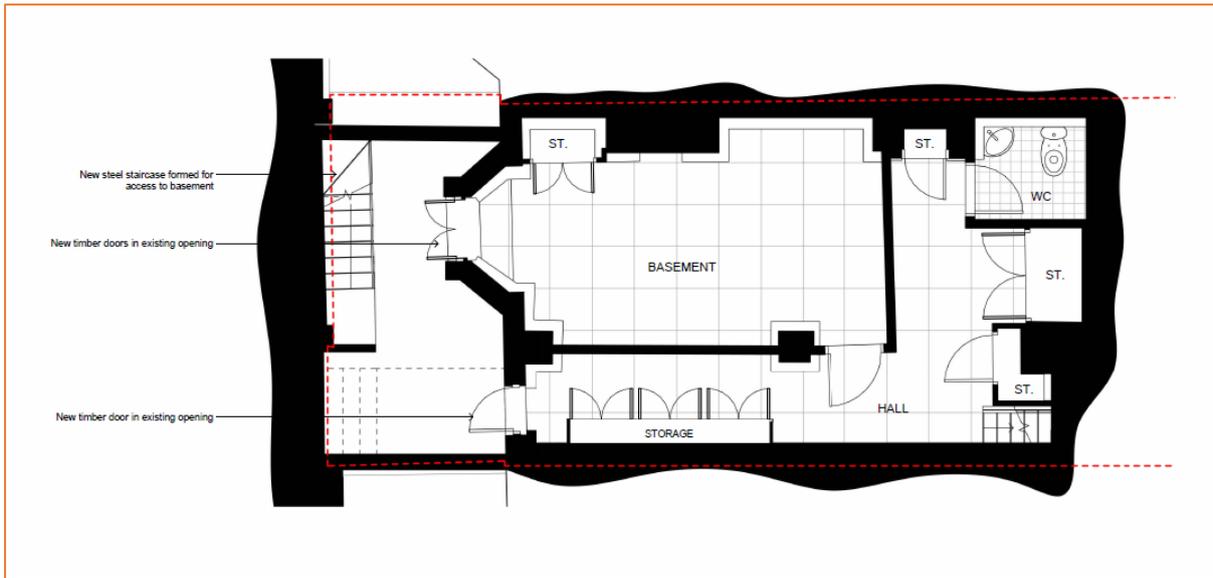


Figure 9: Proposed Basement Floor Plans (Source: Gresford Architects)

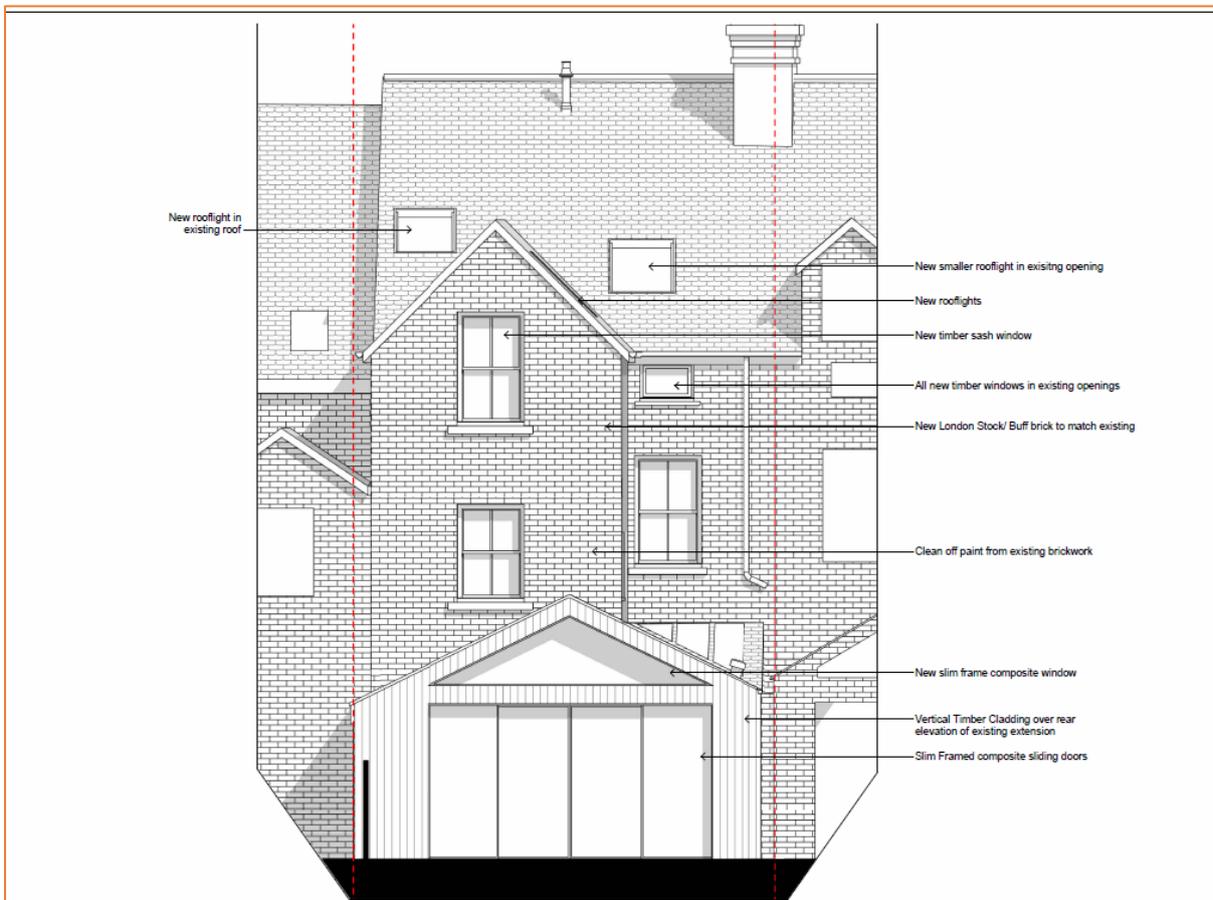


Figure 10: Proposed Rear Elevation (Source: Gresford Architects)

The existing house and proposed extension are residential, and therefore the lifetime of the proposed development is assumed to be 100 years.

## 5. Assessment of Flood Risk

### 5.1 Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's website.

Flood Zone	Definition
Zone 1 <b>Low Probability</b>	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 <b>Medium Probability</b>	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a <b>High Probability</b>	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b <b>The Functional Floodplain</b>	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

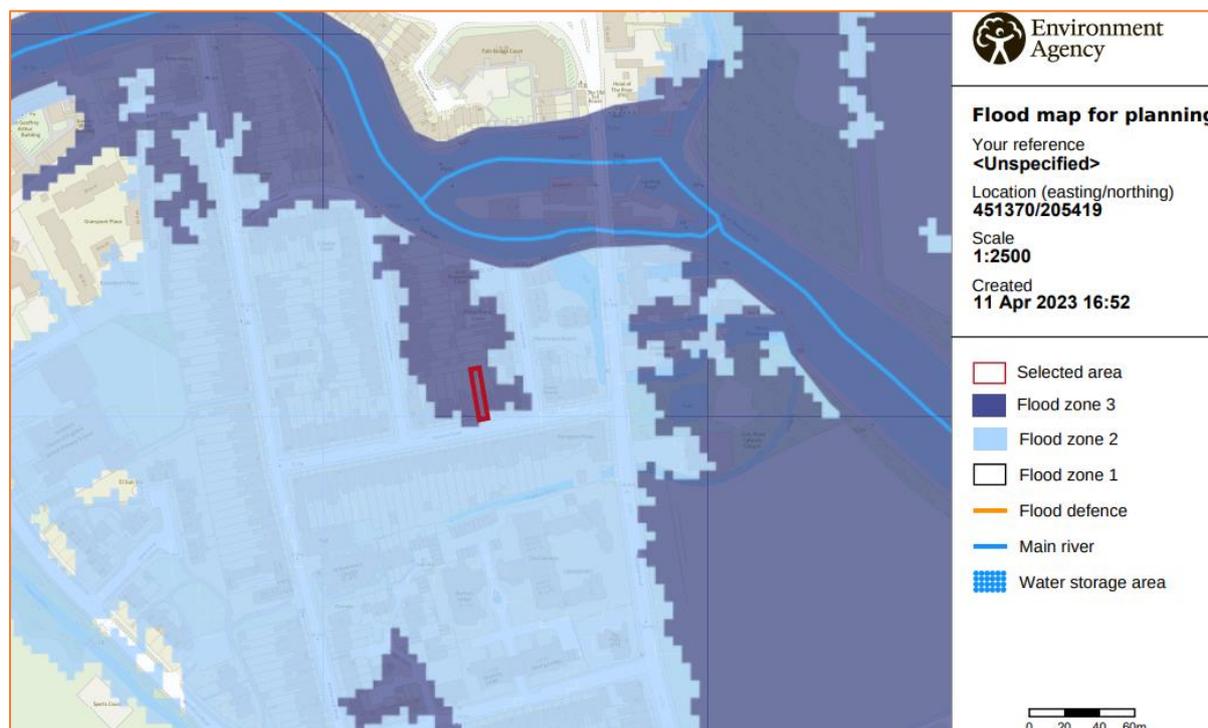


Figure 11: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river and sea flooding and Flood Zone 3 (High Probability), which means it is defined as land having at least a 1:100 annual probability of fluvial flooding.

The risk would appear to be predominantly fluvial and originate from the River Thames which is located approximately 75m north east of the site and the Hogacre Ditch located approximately 49m to the south.

The Oxford City Council SFRA (November 2017) shows the site to be located outside of Flood Zone 3b (Functional Floodplain).

## 5.2 Fluvial

### 5.2.1 River Thames and its tributaries

The River Thames, known alternatively in parts as the River Isis, is a river that flows through southern England including London. At 215 miles (346 km), it is the longest river entirely in England and the second-longest in the United Kingdom, after the River Severn.

It flows through Oxford (where it is commonly called the Isis), Reading, Henley-on-Thames and Windsor. The lower reaches of the river are called the Tideway, derived from its long tidal reach up to Teddington Lock. It rises at Thames Head in Gloucestershire, and flows into the North Sea via the Thames Estuary. The Thames drains the whole of Greater London.

### 5.2.2 Detailed flood modelling:

Modelled flood levels and flood extents have been received from the EA as part of a Product 4 data request.

The EA has provided modelled flood data from the Thames (Eynsham to Sandford) 2018, the information provided is from the Oxford Flood Alleviation Scheme mapping completed in March 2018. The project included updating the existing (2014) hydraulic model to support development of the outline FAS design. The study was carried out using 1D-2D modelling software (Flood modeller-Tuflow).

The site falls within Gloucestershire and the Vale Catchment, where the Central climate change allowance for the 2080's is a 26% increase in river flows. As such, the most suitable modelled flood data provided in the flood modelling provided is a 25% increase in flows, and as such this will be used for this assessment.

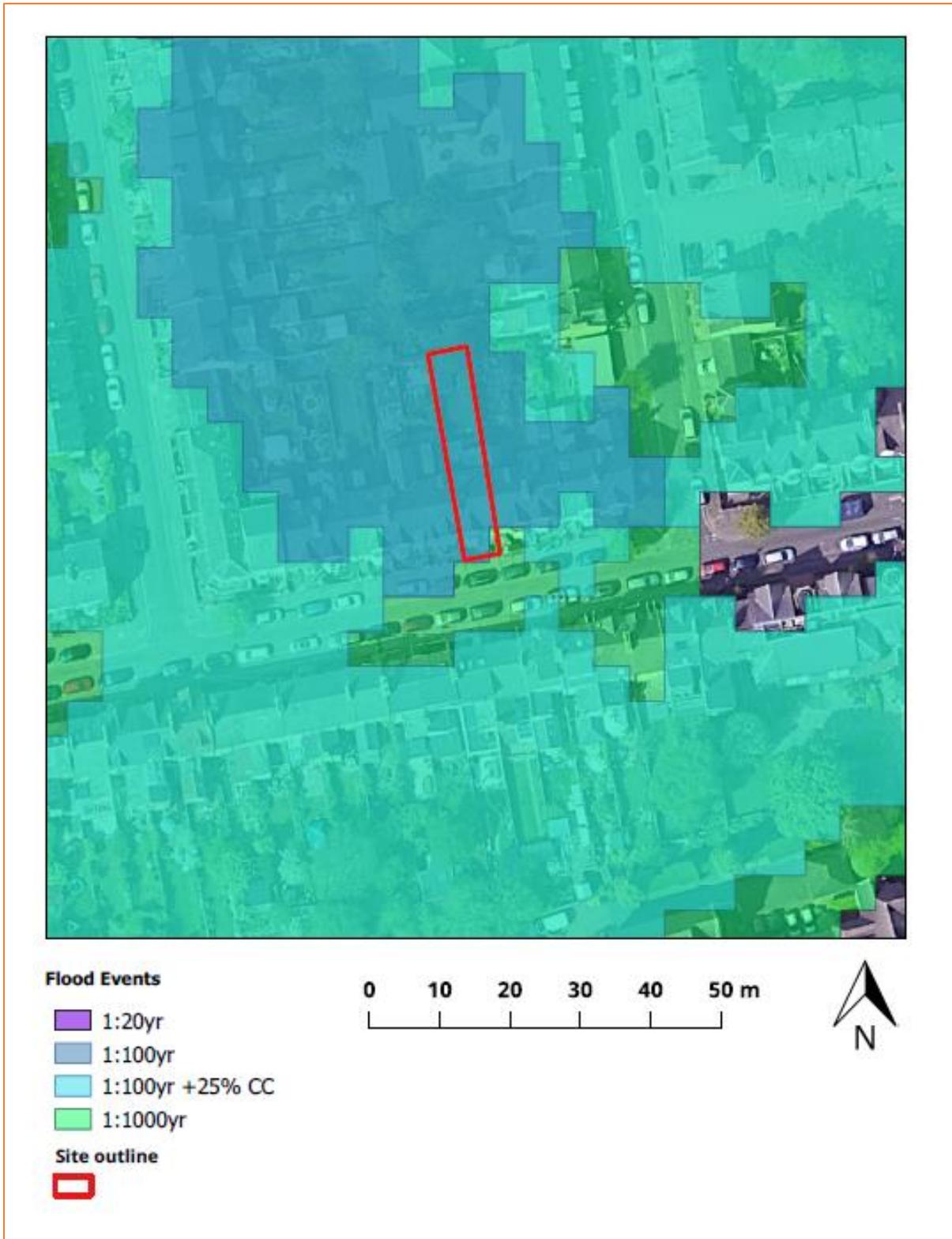


Figure 12: Environment Agency modelled flood extents (Source: EA, Google Maps)

The site is shown to be within the modelled 1:100 year 1:100 year +25% CC and 1:1000 year flood extents.

The following on site modelled flood levels have been provided from the EA:

Return Period	Modelled flood level
1:20yr	Outside
1:100yr	56.28mAOD
1:100yr+25% (Higher Central)	56.43mAOD
1:1000yr	56.54mAOD

Table 2: Modelled on-site flood levels (Source: EA)

Comparison of these modelled flood levels with topographic site levels (55.01mAOD to 56.28mAOD), shows that the site is between 0.0m and 1.27m below the modelled 1:100yr flood level (56.28mAOD) provided, between 0.15m and 1.42m below the modelled 1:100yr +25% CC flood level (56.43mAOD) provided and between 0.26m and 1.53m below the modelled 1:1000yr flood level (56.54mAOD) provided.

### 5.2.3 Flood defences:

Flood defences are structures which affect flow in times of flooding in order to reduce the risk water entering property. They generally fall into one of two categories; 'formal' or 'informal'.

A 'formal' flood defence is a structure which has been specifically built to control floodwater. It is maintained by its owner or statutory undertaker so that it remains in the necessary condition to function. In accordance with the Flood and Water Management Act, the Environment Agency has powers to construct and maintain defences to help against flooding.

An 'informal' defence is a structure that has not necessarily been built to control floodwater and is not maintained for this purpose. This includes road and rail embankments and other linear infrastructure (buildings and boundary walls) which may act as water retaining structures or create enclosures to form flood storage areas in addition to their primary function.

According to the Environment Agency, this location is not currently protected by any formal defences, and they do not currently have any flood alleviation works planned for the area.

### 5.2.4 Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below

defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

The site is not shown to benefit to any significant degree from the presence of flood defences.

### **5.2.5 Historical flood events:**

According to EA records, historical flooding has occurred at the site and the surrounding area in 2002 from the main river exceeding channel capacity (no raised defences).

No further information has been provided to suggest that the site has flooded in the past.

## **5.3 Pluvial (Surface Water):**

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- High: Greater than or equal to 3.3% (1 in 30) chance in any given year (3.3%)
- Medium: Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low: Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low: Less than 0.1% (1 in 1,000) chance in any given year

The mapping below shows the Risk of Flooding from Surface Water centred on the site. Please note that the EA do not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Surface Water Flood Map suggests that the entire site is located in an area at "Very Low" or "Low" risk of flooding from surface water.

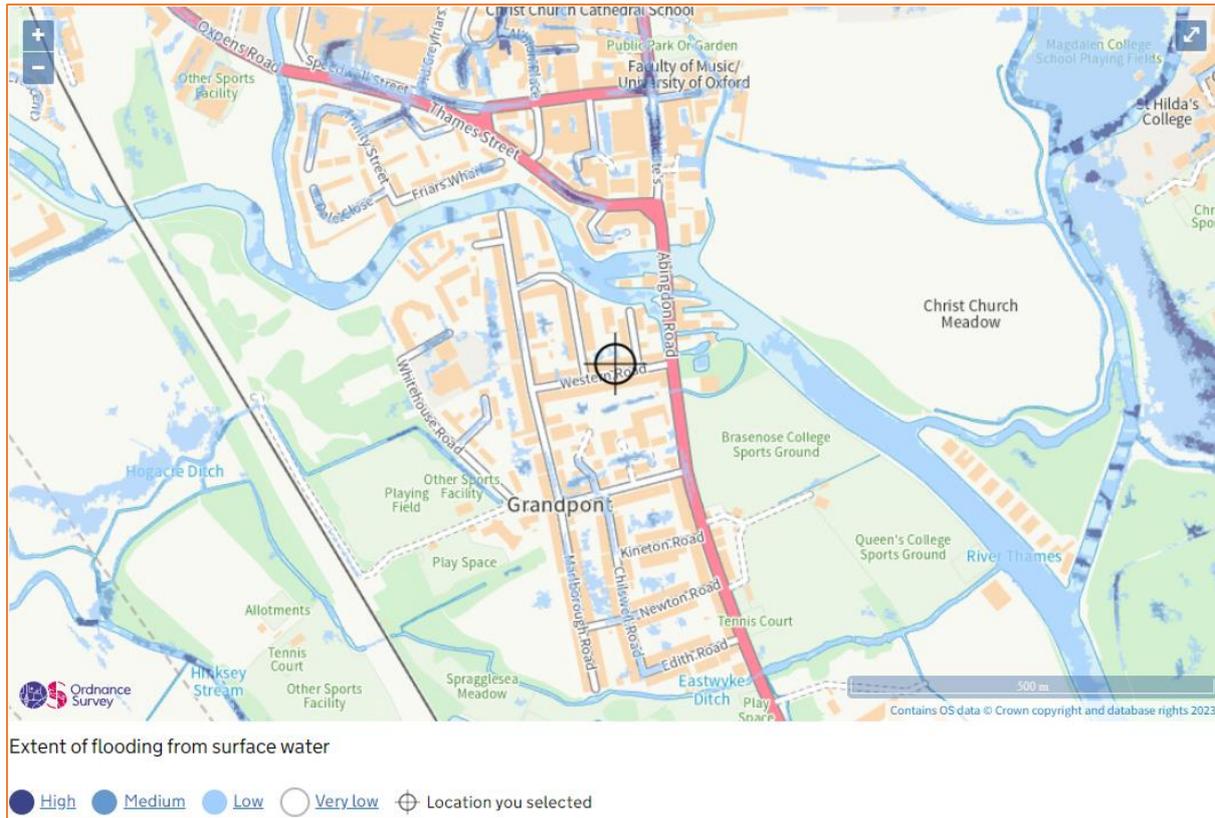


Figure 13: Extract from Environment Agency RoFSW map (Source: EA)

The EA has also produced surface water flood depth mapping for the 1 in 30 year (High Risk), 1 in 100 year (Medium Risk) and 1 in 1000 year (Low Risk) scenarios (high risk, medium risk and low risk respectively).

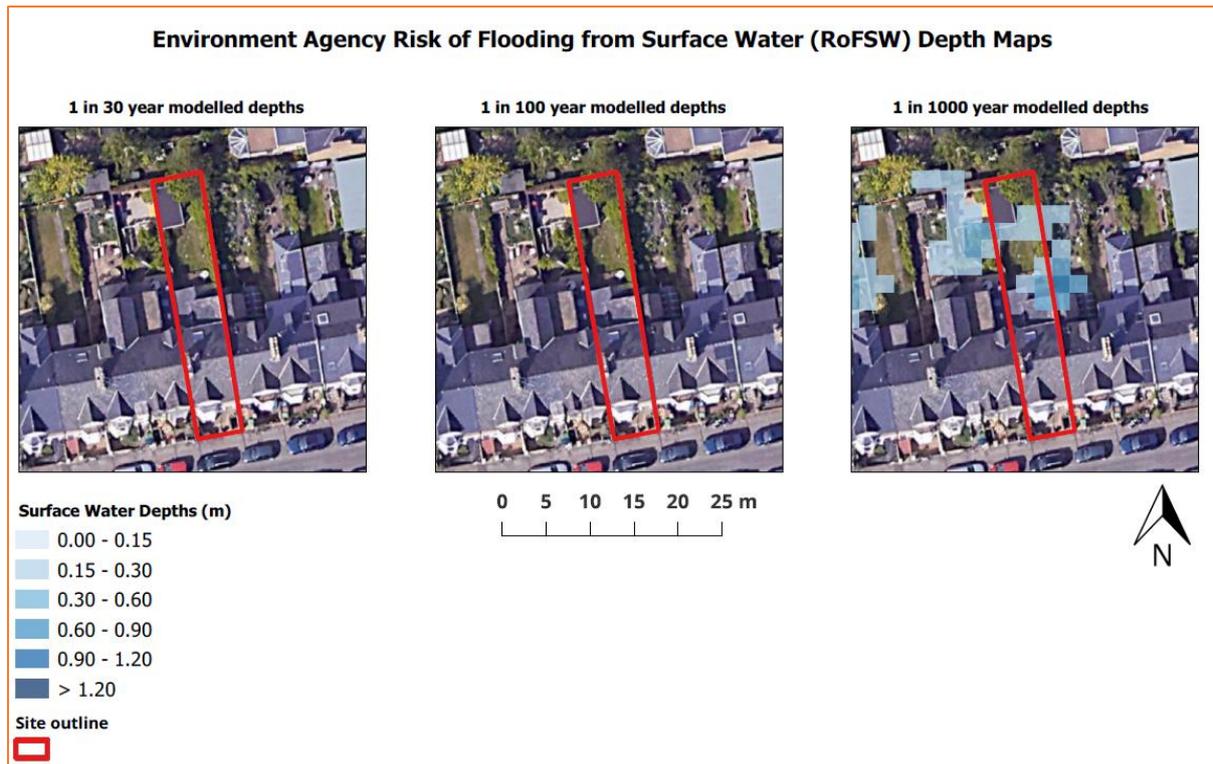


Figure 14: Environment Agency Risk of flooding from Surface Water Flood Depth Maps for High (1:30yr), Medium (1:100yr) and Low (1:1000yr) modelled events (Source: EA)

The Environment Agency risk of flooding from surface water depth maps show:

- For the 1:30 year event (High), and for the critical 1:100 year event (Medium), the site and surrounding area is flood free during these events.
- For the 1:1000 year event (Low), on the site there is a maximum flood depth of between 0.3-0.6m.

Therefore, there will be no loss of potential surface water storage at present day.

## 5.4 Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater

flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

The Oxford City Council SFRA (November 2017) shows the site not to be located within of the Groundwater Registrar Locations.

According to the EA, flooding from groundwater is unlikely in this area.

No further records of groundwater flooding on the site or the surrounding area have been provided.

## 5.5 Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

## 5.6 Other Sources:

The EA Risk of Flooding from Reservoirs Map suggests that the site lies within the "Maximum extent of flooding" from reservoir failure "when there is also flooding from rivers". The EA also advise on their website that reservoir flooding is extremely unlikely. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. These inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial flooding to occur.

The Oxford City Council SFRA (November 2017) states that there is a risk to reservoir flooding however it has a low probability of occurrence and has not identified any historical occurrences of flooding or flood risk within the city limits.

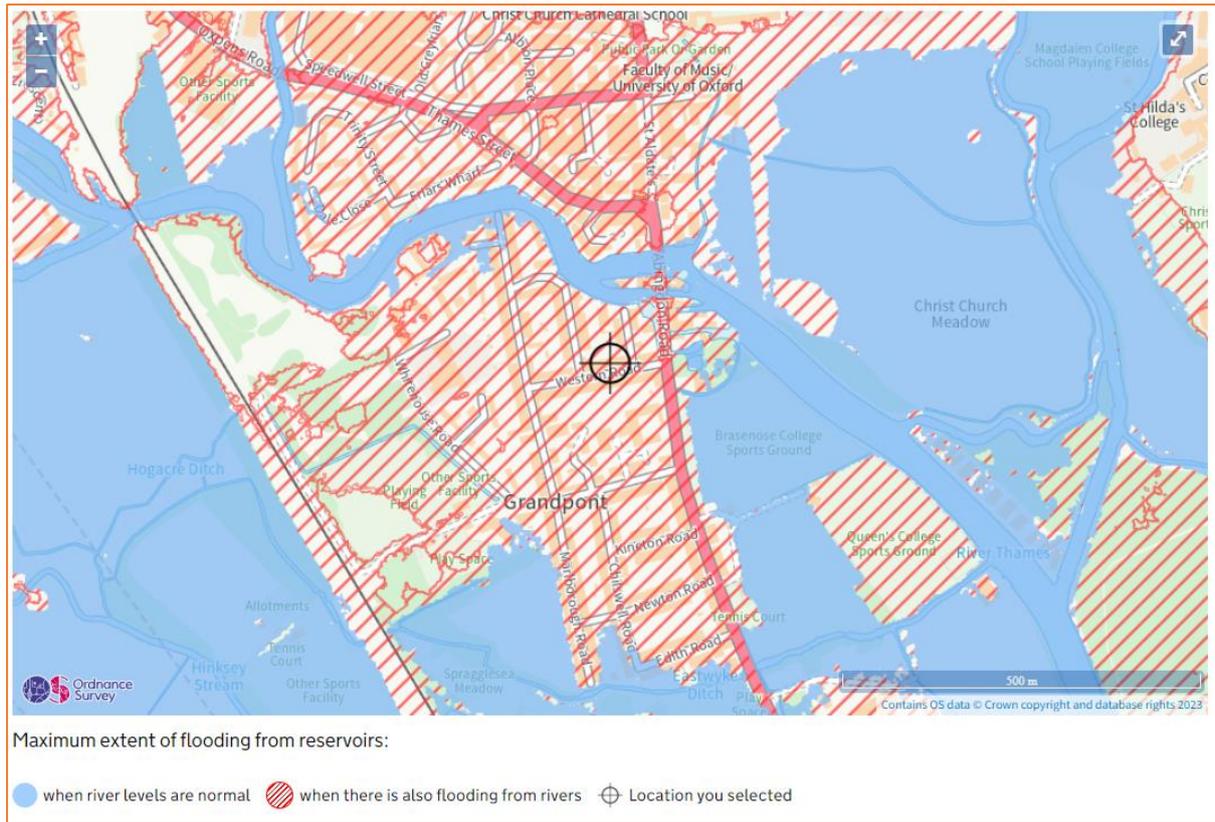


Figure 15: Extract from Environment Agency Risk of Flooding from Reservoirs Map (Source: EA)

## 6. Flood Risk Management

### 6.1 Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site usage is classified as "more vulnerable" throughout, as it is a residential property. Post development, the site will remain "more vulnerable", as the application is for the erection of a second floor rear extension, erection of front access to the basement and associated works (to remain a single dwelling).

Accordingly, it is considered that the vulnerability of the site as a whole has not increased post development. There will be no introduction of additional or separate units, no sub-division, and no intensification of usage.

### 6.2 EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m<sup>2</sup>. It should not be applied if an additional dwelling is being created, e.g. a self-contained annexe or additional commercial unit.

The development is considered to fit within the EA Standing Advice for domestic extensions.

### 6.3 Physical Design Measures:

The applicant has confirmed that the finished floor level of the extension will be set no lower than the existing adjacent floor levels. No new bedrooms will be created in the basement or at ground floor level. In addition, internal access will be maintained from the basement to the upper floors of the property.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the proposed ground floor extension. These measures could include the following where possible:

- Solid concrete ground floor, with waterproof membrane;
- Waterproof screed used on floors;
- Closed-cell foam used in wall cavities;
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;

- Anti-syphon fitted to all toilets;
- Install demountable flood defence barriers to defend ground level doorways and low windows.

#### **6.4 Safe Escape and Flood Action Plan:**

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm during the 1:100 year fluvial plus allowance for climate change flood event.

However, it should be noted that the proposed application is for the extension of the existing property. No new units or additional dwellings will be created as part of the development. Safe escape is not a requirement under the EA Standing Advice guidance for extensions.

As such, site users should follow the flood warning and evacuation procedures outlined in the following section.

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The applicant has agreed to subscribe to the EA's flood warning service. The site is situated in the "River Thames and Tributaries in the Oxford Area" flood warning area.

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
<b>What it means?</b>	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
<b>When it's used?</b>	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
<b>What to do?</b>	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.	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.	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.

Table 3: EA Flood Warning Service

The applicant has prepared the following flood plan to protect life and property during a flood event:

**Before a flood:**

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

**During a flood:**

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

**After a flood:**

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

## 6.5 Off-Site Impacts:

### 6.5.1 Fluvial floodplain storage:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is situated in Flood Zones 2 and 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea). The proposal is for a minor domestic extension, which fits within the EA Standing Advice. Accordingly, therefore there will be no unacceptable loss of floodplain storage.

### 6.5.2 Surface Water Drainage:

The development will utilise Sustainable Urban Drainage (SuDs) design in accordance with the NPPF for Planning Applications hierarchy as follows:

1. Store rainwater for later use;
2. Infiltration techniques;
3. Attenuate rainwater by storing in tanks for gradual release;
4. Discharge rainwater direct into watercourse;
5. Discharge rainwater into surface water sewer;
6. Discharge rainwater into a combined sewer;
7. Attenuation of rainwater in ponds or open water features with controlled discharge into the local watercourse.

Due to the small scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning. However, SuDS features will be incorporated into the development where practically possible or will utilise the existing arrangement on site.

## 7. Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available.

The Sequential Test is applied to developments in areas identified as being at risk of any source of flooding now or in the future. The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account.

The sequential approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk.

The site is situated in Flood Zones 2 and 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea) and lies in an area at "Very Low" to risk from surface water flooding. The proposed development is considered to be 'more vulnerable' (residential), but the proposal is for a minor extension, and will not increase the vulnerability of the site or introduce any separate or additional units.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
<b>Zone 1</b>	✓	✓	✓	✓	✓
<b>Zone 2</b>	✓	Exception Test required	✓	✓	✓
<b>Zone 3a</b>	Exception Test required	✗	Exception Test required	✓	✓
<b>Zone 3b</b>	Exception Test required	✗	✗	✗	✓

Table 4: Flood risk vulnerability and flood zone 'compatibility'

The Sequential and Exception Tests do not need to be applied to minor developments and changes of use (this application is for 'minor development' – a residential extension).

## 8. Discussion and Conclusions

Unda Consulting Limited have been appointed by William Gresford to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at 22 Western Road, Oxford OX1 4LG. The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance, as well as relevant Local Policies.

This report presents our findings based on the readily available information and data relating to the site and surrounding drainage area.

The existing site usage is classified as "more vulnerable" throughout, as it is a residential property. Post development, the site will remain "more vulnerable", as the application is for the erection of a second floor rear extension, erection of front access to the basement and associated works (to remain a single dwelling). Accordingly, it is considered that the vulnerability of the site as a whole has not increased post development. There will be no introduction of additional or separate units, no sub-division, and no intensification of usage.

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river and sea flooding and Flood Zone 3 (High Probability), which means it is defined as land having at least a 1:100 annual probability of fluvial flooding.

The risk would appear to be predominantly fluvial and originate from the River Thames which is located approximately 75m north east of the site and the Hogacre Ditch located approximately 49m to the south.

The Oxford City Council SFRA (November 2017) shows the site to be located outside of Flood Zone 3b (Functional Floodplain).

The EA has provided modelled flood data from the Thames (Eynsham to Sandford) 2018, the information provided is from the Oxford Flood Alleviation Scheme mapping completed in March 2018. The project included updating the existing (2014) hydraulic model to support development of the outline FAS design. The study was carried out using 1D-2D modelling software (Flood modeller-Tuflow).

The site falls within Gloucestershire and the Vale Catchment, where the Central climate change allowance for the 2080's is a 26% increase in river flows. As such, the most suitable modelled flood data provided in the flood modelling provided is a 25% increase in flows.

The site is shown to be within the modelled 1:100 year 1:100 year +25% CC and 1:1000 year flood extents.

Comparison of these modelled flood levels with topographic site levels (55.01mAOD to 56.28mAOD), shows that the site is between 0.0m and 1.27m below the modelled 1:100yr flood level (56.28mAOD) provided, between 0.15m and 1.42m below the modelled 1:100yr +25% CC flood level (56.43mAOD) provided and between 0.26m and 1.53m below the modelled 1:1000yr flood level (56.54mAOD) provided.

According to the Environment Agency, this location is not currently protected by any formal defences, and they do not currently have any flood alleviation works planned for the area.

According to EA records, historical flooding has occurred at the site and the surrounding area in 2002 from the main river exceeding channel capacity (no raised defences).

The EA Surface Water Flood Map suggests that the entire site is located in an area at "Very Low" or "Low" risk of flooding from surface water.

The Environment Agency risk of flooding from surface water depth maps show:

- For the 1:30 year event (High), and for the critical 1:100 year event (Medium), the site and surrounding area is flood free during these events.
- For the 1:1000 year event (Low), on the site there is a maximum flood depth of between 0.3-0.6m.

Therefore, there will be no loss of potential surface water storage at present day.

No information has been provided to suggest that the site is susceptible to groundwater, sewer surcharge or reservoir flooding.

Safe escape is not a requirement under the EA Standing Advice guidance is for domestic extensions.

The development is considered to fit within the EA Standing Advice for domestic extensions.

**The applicant has confirmed that:**

- The development is considered to fit within the EA Standing Advice for domestic extensions.
- There will be no introduction of additional or separate units, no sub-division, and no intensification of usage.
- No new bedrooms will be created in the basement or at ground floor level.
- Internal access will be maintained from the basement to the upper floor levels of the property.
- Floor levels within the extension will be set no lower than existing adjacent floor levels.
- Flood proofing will be incorporated as appropriate.
- Due to the small scale of the development, existing drainage arrangements will be retained.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

**Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.**

**Unda Consulting Limited**

**April 2023**

## Appendix

- Site location, existing and proposed plans.
- Environment Agency Flood Map for planning.



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Revision	Date	Description	Drawn	Checked
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Project  
**22 Western Road**

Project number  
**4211**

Drawing Title  
**Location Plan**

Drawing Number  
**101**

Client



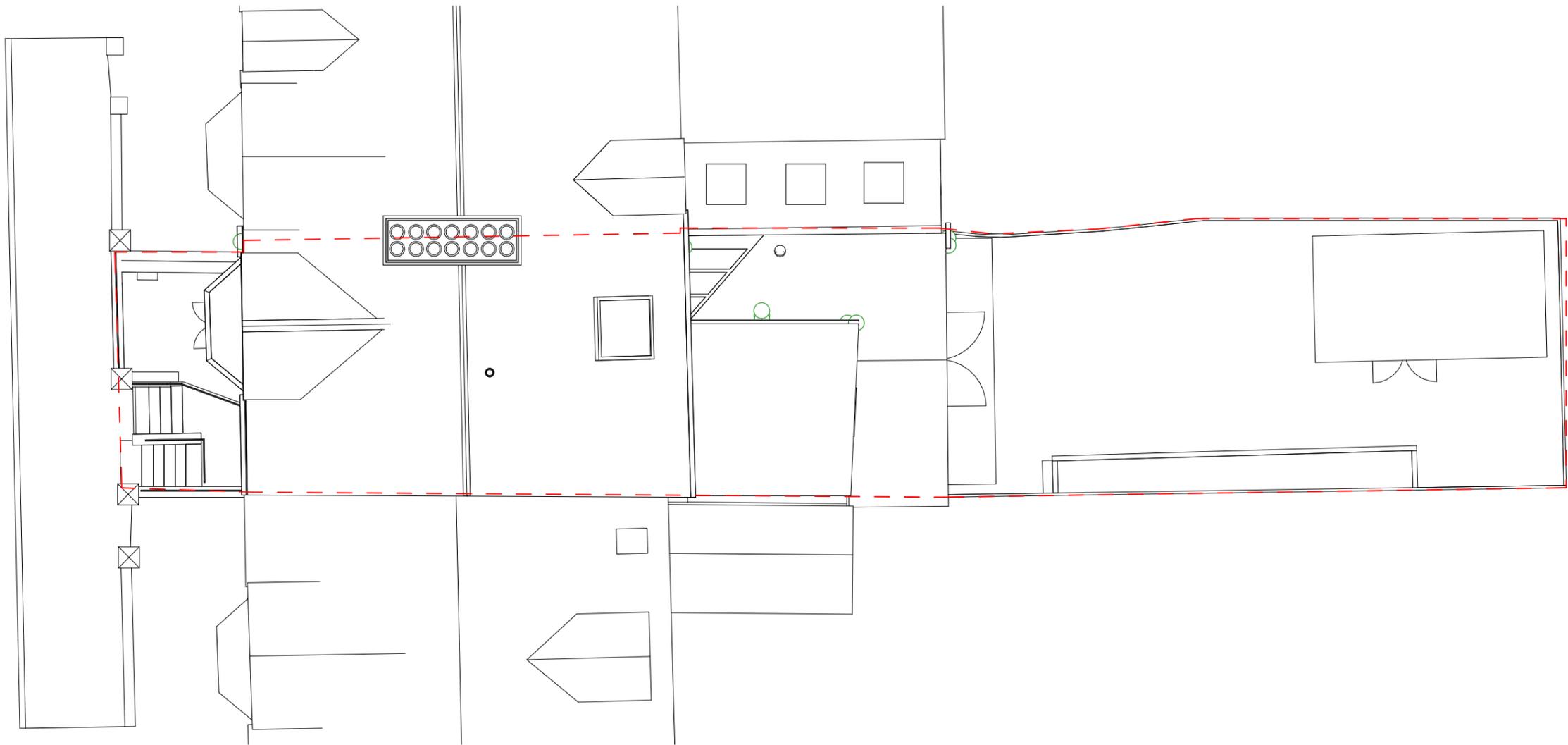
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**4211**

Drawing Title  
**Site Plan**

Drawing Number  
**001**

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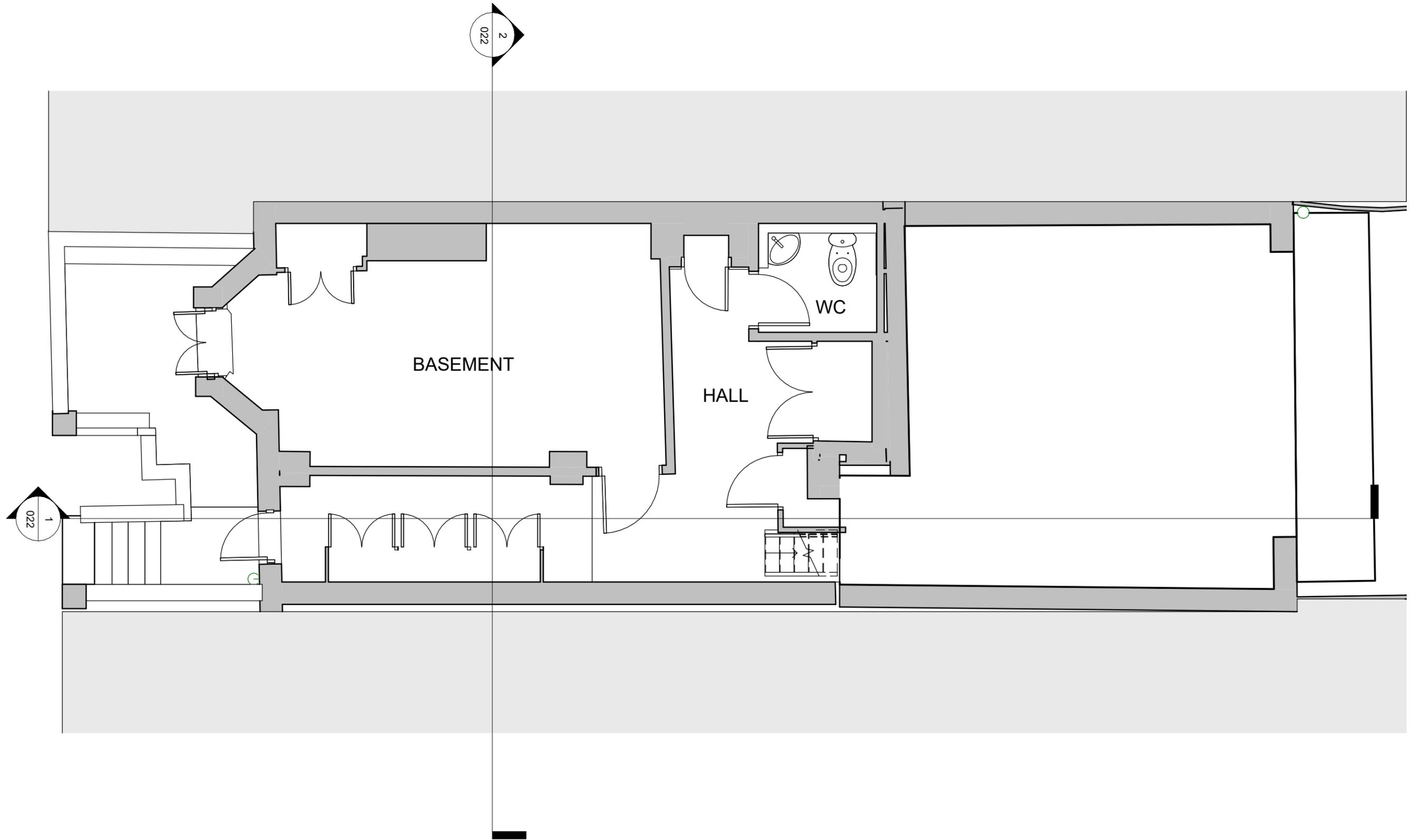
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**22 Western Road**

Project number  
**4211**

Drawing Title  
**Existing Basement Floor Plan**

Drawing Number  
**010**

Client



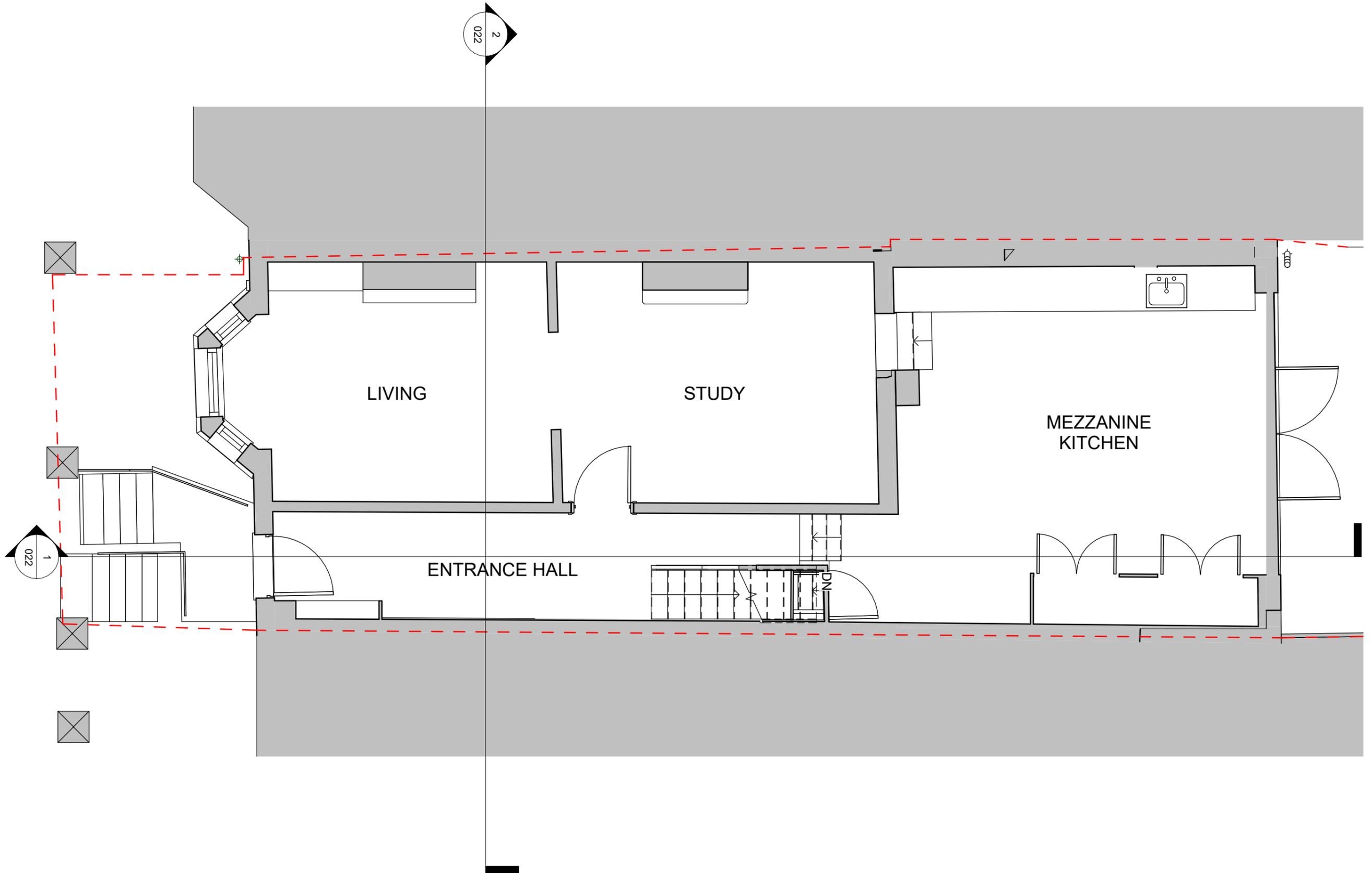
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Drawing Title  
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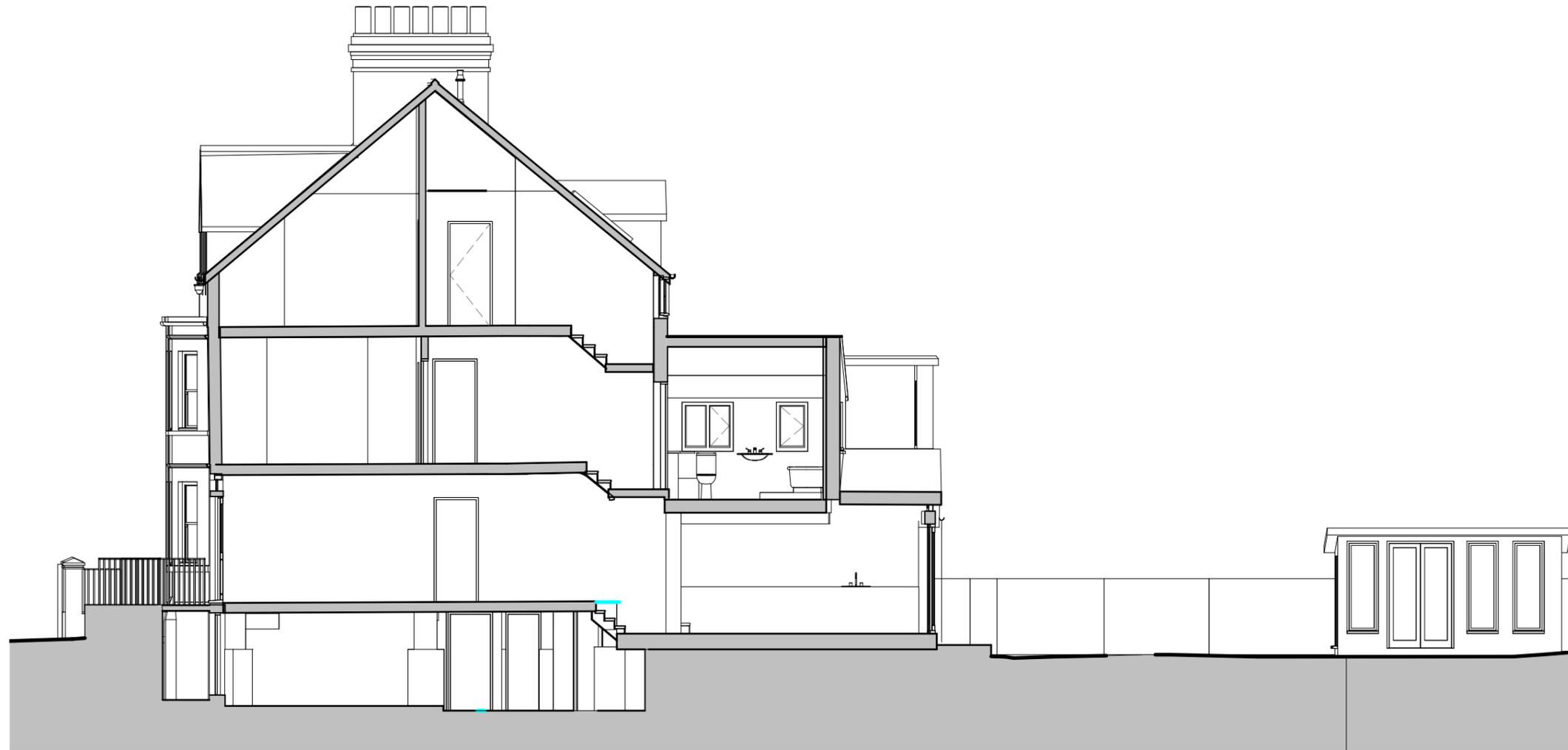
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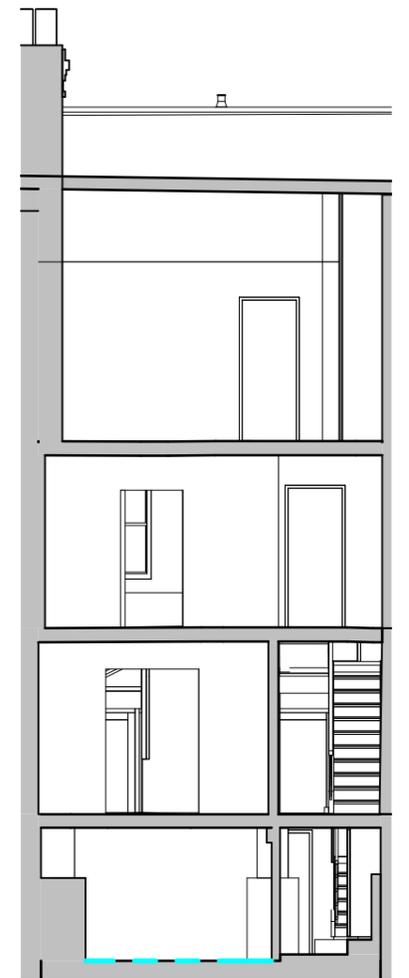


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Section AA



Section BB



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Revision Date Description Drawn Checked

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**22 Western Road**

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**4211**

Drawing Title  
**Sections**

Drawing Number  
**022**

Client



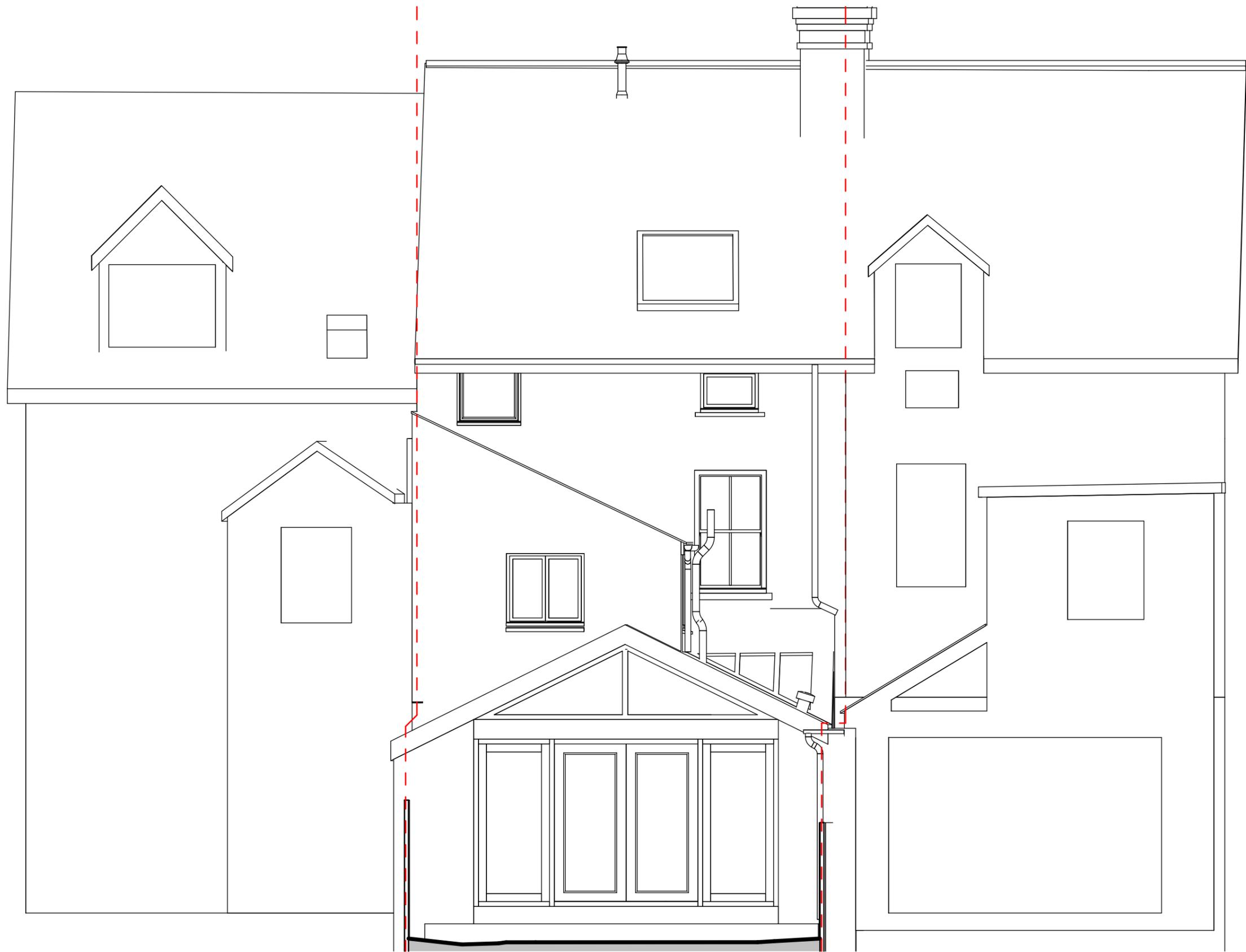
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**4211**

Drawing Title  
**Rear Elevation**

Drawing Number  
**021**

Client



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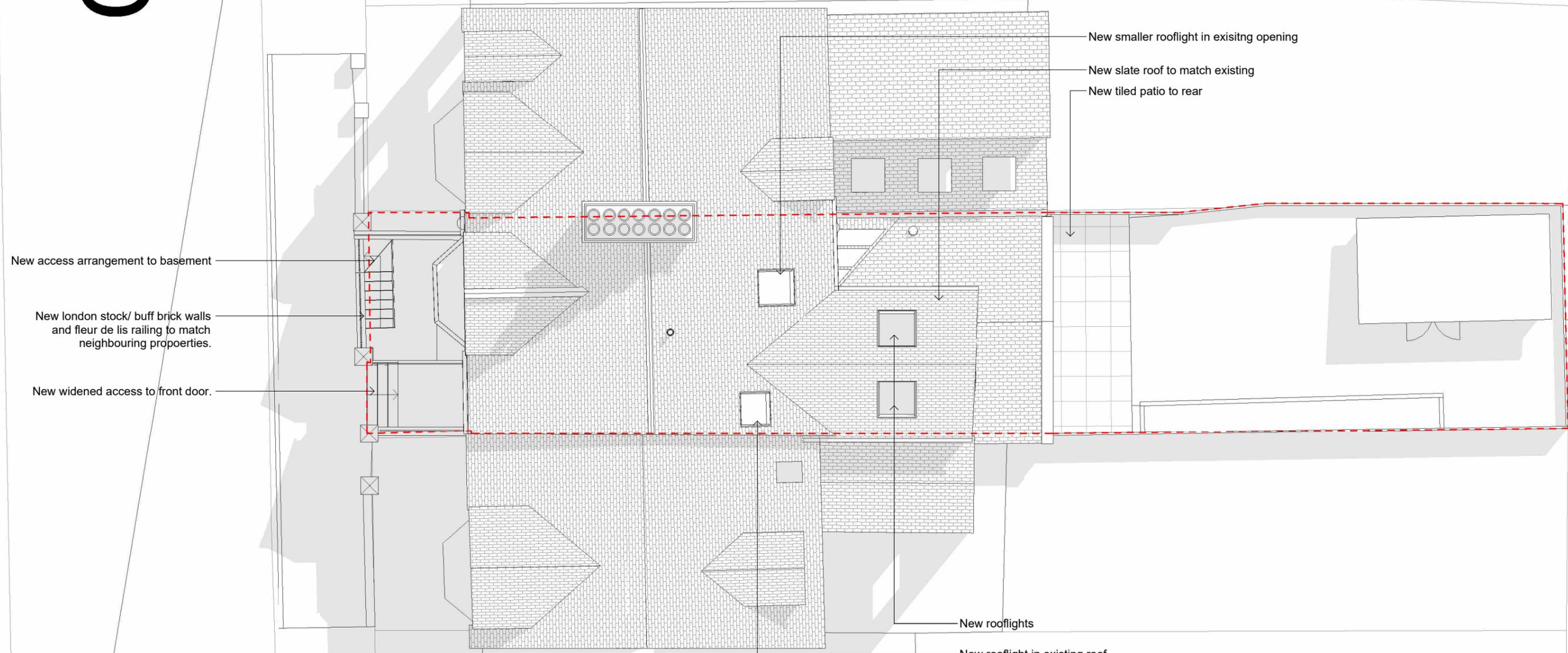
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Checked Checker

Issue

**Survey**

OAD

26



New access arrangement to basement

New london stock/ buff brick walls and fleur de lis railing to match neighbouring properties.

New widened access to front door.

New smaller rooflight in existing opening

New slate roof to match existing

New tiled patio to rear

New rooflights

New rooflight in existing roof



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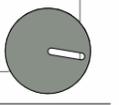
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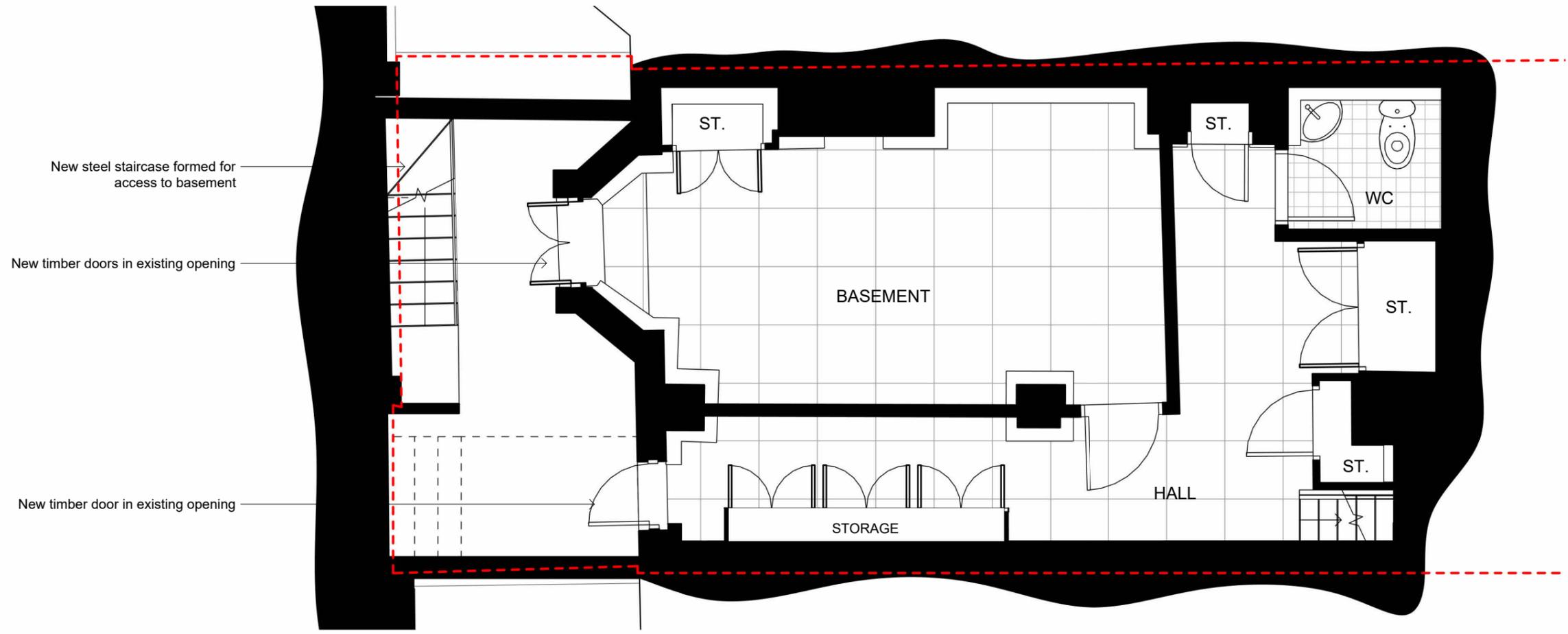
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Checked JSJ

Drawing Number  
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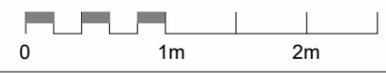
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Project number  
**4211**

Drawing Title  
**Proposed Basement Floor Plan**

Drawing Number  
**110**

Client



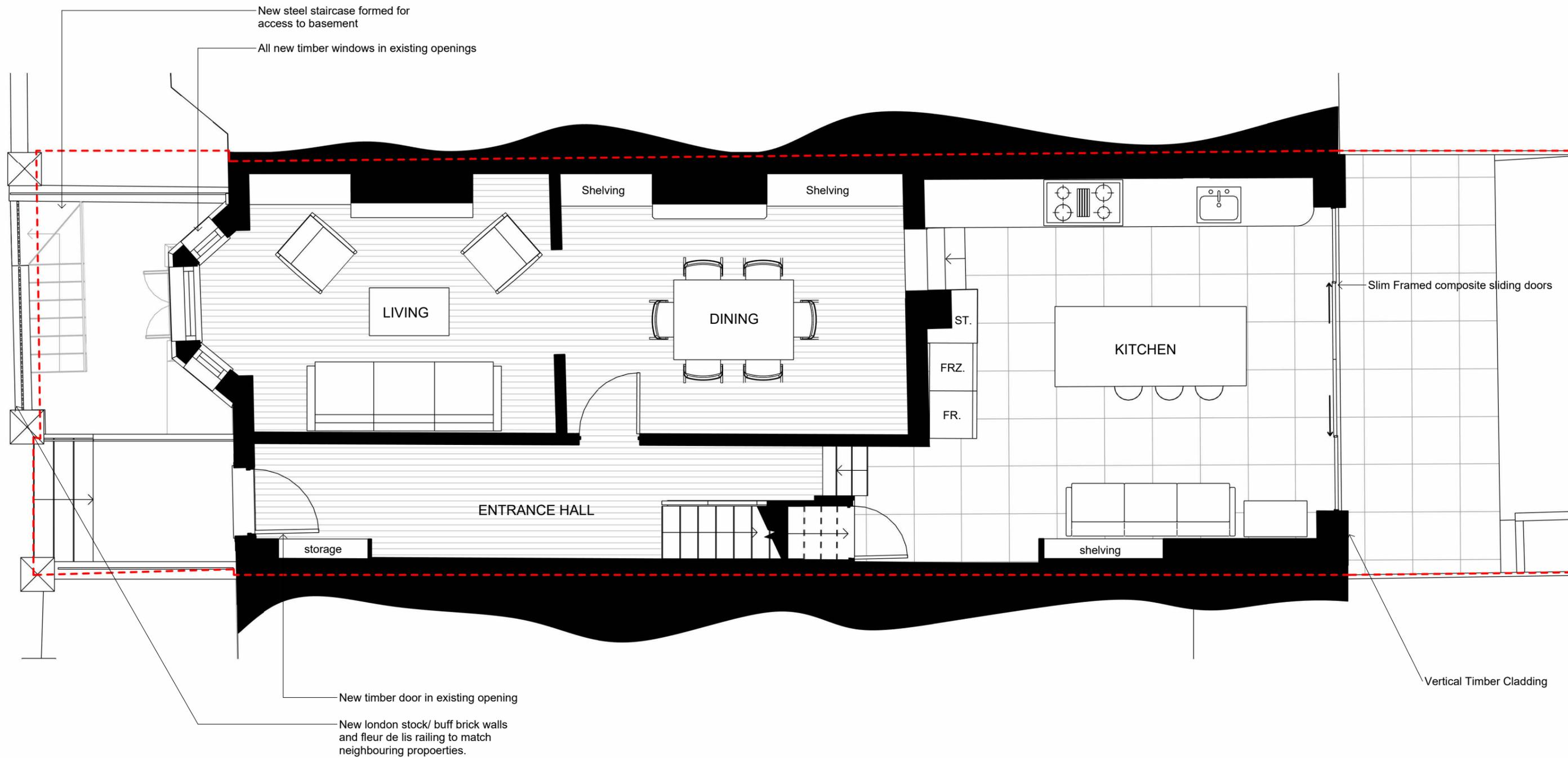
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Project  
**22 Western Road**

Project number  
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Drawing Title  
**Proposed Ground Floor and Kitchen Plan**

Drawing Number  
**111**



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Drawn GP  
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**Planning**



GA COMPUTER FILE  
 NOTES  
 ALL DIMENSIONS TO BE CHECKED ON  
 SITE  
 PRIOR TO CONSTRUCTION

LEGEND  
 THIS DRAWING IS FOR PLANNING  
 PURPOSES  
 ONLY AND IS SUBJECT TO FURTHER  
 DETAILED  
 DESIGN

REV	DATE	DESCRIPTION
		Planning

CLIENT

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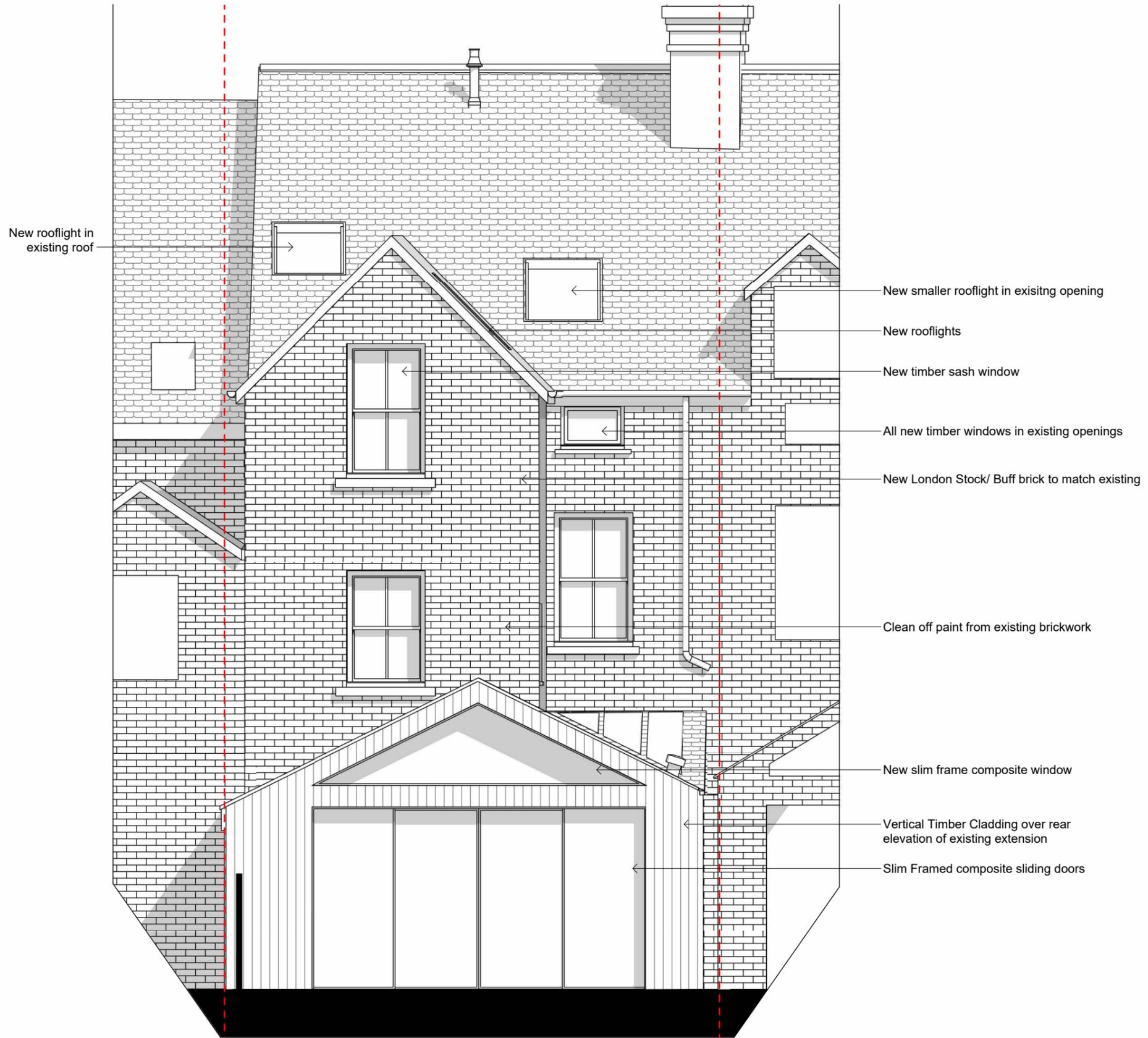
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PROJECT TITLE  
 22 Western Road, Grandpont,  
 Oxford OX1 4LG

DRAWING TITLE  
 Proposed Section AA

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DATE	CHECKED
01/23/23	JSJ
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Project number  
**4211**

Drawing Title  
**Rear Elevation**

Drawing Number  
**121**

Client



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Date 03/20/23  
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Issue

**Planning**

# Flood map for planning

Your reference  
<Unspecified>

Location (easting/northing)  
451370/205419

Created  
11 Apr 2023 16:52

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

## This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see [www.gov.uk/guidance/flood-risk-assessment-standing-advice](http://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.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

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## Flood map for planning

Your reference  
**<Unspecified>**

Location (easting/northing)  
**451370/205419**

Scale  
**1:2500**

Created  
**11 Apr 2023 16:52**

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

