RIDGE

LEVEL 2 FLOOD RISK ASSESSMENT
BRANCH HILL HOUSE

ALMAX GROUP
October 2019

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BRANCH HILL HOUSE, LONDON
ALMAX GROUP

October 2019

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1. INTRODUCTION

1.1. Background

Ridge and Partners have been commissioned by Almax Group to undertake a Flood Risk Assessment (FRA) to support a planning application for development of a 5-storey residential building with a single storey of basement, adjacent to the existing Branch Hill House. The existing site is currently occupied by a large area of hardstanding, numerous unoccupied outbuildings as well as grassed and wooded areas.

Appendix A provides an illustration of the scheme layout.

1.2. Level of Study

The National Planning Policy Framework (2018) states that where a site-specific Flood Risk Assessment is required, the level of detail of the study should be proportionate to the scale and nature of the development in conjunction with its vulnerability classification.

The levels of study are outlined as follows, in accordance with CIRIA. Publication C624. Development and Flood Risk – Guidance for the Construction Industry. (2004):

Level 1 Screening Study

The purpose of the study is to identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. This should be based on readily available existing information and will be used to ascertain whether an FRA level 2 or 3 is required.

The above information is typically obtained via ‘open source’ Government and Environment Agency records and in conjunction with liaison with the appropriate bodies.

Level 2 Scoping Study

The study is typically progressed to Level 2 if the Level 1 FRA indicates that the site may lie within an area that is at risk of flooding, or the site may increase flood risk off-site due to increased run-off. At this stage, the purpose of the study is to confirm the sources of flooding which may affect the site and should include:

- An appraisal of the availability and adequacy of existing information;
- A qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere; and
- An appraisal of the scope of possible measures to reduce flood risk to acceptable levels.

Typically, information to complete this study can be obtained via record searches in conjunction with liaison with appropriate Government and Statutory bodies in addition to undertaking site-based investigations and research.

Level 3 Detailed Study

If there is insufficient qualitative information to conclude an appropriate FRA for the scale and nature of the proposed development, then the study must progress to Level 3. As part of this, full qualitative analysis is undertaken to assess flood risk issues related to the development estate and should include:

- Quantitative appraisal of the potential flood risk to the development;
- Quantitative appraisal of the potential impact of the development site on flood risk elsewhere; and

- Quantitative demonstration of the effectiveness of any proposed mitigation measures.

As part of this study, it is likely that site specific hydrological and hydraulic modelling analyses would be required to demonstrate the full magnitude of flood risk on the development and that any proposed development mitigates flood risk both on and off-site.

1.3. Objectives of the Flood Risk Assessment

Ridge have been commissioned to undertake a Level 2 Scoping Study to evaluate the impact of flooding on the site, with consideration for plans for future development.

This FRA has been undertaken for the Branch hill House project. In accordance with the requirements of the National Planning Policy Framework (NPPF, see Section 2.1.1) this FRA:

- Includes an assessment of the flood risk to the proposed development, demonstrating that the intended use is appropriate in terms of flood risk;
- Includes an assessment of the predicted impact of the development upon flood risk;
- Demonstrates that the development will not have a deleterious impact upon flood risk to other parties; and
- Summarises any mitigation measures required to achieve this outcome.

1.4. Flood Risk Assessment Methodology

This Flood Risk Assessment (FRA) assesses the risk of all forms of flooding to and from the development and sets out how they can be managed. Conventionally the identification of flood mechanisms and mitigation options is based upon the Source-Pathway-Receptor model.

This model is used to identify the causes (or sources) of flooding to and from a development with identification based upon a review of available information, local conditions and consideration of the effects of climate change.

The nature and likely extent of flooding arising from any source is will be reviewed, considering, for example, whether such flooding is likely to be fast or slow to occur, localised to a specific area of the site, or widespread.

It should be noted that the presence of a flood source does not always imply a flood risk as it is the pathway or ‘flooding mechanism’ which determines the risk to the receptor and the consequences as a result of exposure. As an example, sewer flooding will not necessarily increase the risk of flooding unless the sewer is local to the site and the current topography allows this water to pond.

The varying effect of flooding on receptors depends largely on the sensitivity of the proposed development and for this purpose the vulnerability classification referred to in the National Planning Policy Framework (2018) should be used.

Receptors typically will include occupants, people and buildings within the range of the flood source, which can be demonstrated as being connected to the source of flooding via a pathway.

In order for there to be a flood risk, all elements of the conceptual model (i.e. a flood source, a pathway and a receptor) must be present. Furthermore, effective mitigation can be provided by the elimination of one element of this model, such as the removal of the pathway or the receptor.

Once flood risk has been established, mitigation measures can be proposed where necessary and potential options for managing residual risks can be determined.

1.5. Assessment of Flood Risk to Receptors

If a source and pathway of flooding is identified, the assessment of flood risk to the receptor is determined by combining the probability of the flood event occurring versus the consequences or severity of the flood event, were it to occur.

The probability of a flood event occurring is usually determined from historical records of flood events, available hydrological or hydraulic modelling information and the standard and condition of any infrastructure associated with the source of flooding.

For more rigorous assessments, hydrological or hydraulic simulation modelling may be used to determine the frequency of flood events occurring, or for a more detailed appraisal of flooding from a specific flood source.

The severity of the impact of the flood event is determined by analysing a combination of the type of flood source, the flood mechanism and the layout, design and vulnerability of the receptor.

The approach used within this FRA involves a desk-based review of available information to establish:
The likely flooding sources;

- The potential flooding pathways, or mechanisms of flooding;
- The probability of a flood event occurring; and
- The severity and impact of a flood event to the site.

In summary, for a flood risk to be identified all elements of the Source-Pathway-Receptor model must be present. Additionally, removal of a single element of this model will constitute mitigation of the risk and reduce the flood risk accordingly.

For example, flood risk can be significantly reduced by;

- Removing the pathway;
- Defending against the flood source;
- Incorporating flood management or flood resilient measures into the building receptors; or
- Providing safe flood refuge and safe access / egress with flood evacuation plans for human receptors.

It can therefore be demonstrated that several mitigation measures are available, with those which are considered most appropriate for the site location likely given within the Strategic Flood Risk Assessment, Surface Water Management Plans and Local Planning Policies for the governing authorities.

1.6. Limitations

The purpose of this report as outlined in Section 1.3, together with those related matters specifically referred to therein and it is not intended to be used for any other purposes. The report is for the sole benefit and may only be relied upon by the addressee, to whom we will owe a duty of care. The report and any part of it is confidential to the addressee and should not be disclosed to any third party for any purpose, without the prior written consent of Ridge and Partners LLP as to the form and context of such disclosure. The granting of such consent shall not entitle the third party to place reliance on the report, nor shall it confer any third-party rights pursuant to the Contracts (Rights of Third Parties) Act. The report may not be assigned to any third party.

2. FLOOD RISK POLICY

2.1. National Planning Policy

Revised National Planning Policy Framework (2019)

The Revised National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they are expected to be applied. The policy aims to avoid inappropriate development by directing it away from the areas that are at highest risk. Where development is necessary within an area designated as floodplain, it must be demonstrated to be safe without increasing the risk of flood elsewhere.

Planning policy states that a site-specific FRA is required for development proposals:

- That are located within Flood Zones 2 or 3;
- That are located within Flood Zone 1 but are greater than 1 hectare (ha) in area;
- Are located within Flood Zone 1, but are less than 1 ha in area but include a change of use in development type to a more vulnerable class (i.e. changing from commercial to residential);
- Are located within 20 m of a watercourse; and/or
- Where requested by the Local Planning Authority.

A site-specific FRA should identify and assess the risks of all sources of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe for its lifetime, taking into account climate change.

Flood Zone Definition

The Technical Guidance to the NPPF defines the flood risk zones that are published by the EA, which are as follows:

- **Flood Zone 1** – The low probability zone which is defined as having less than 0.1 % (or a 1 in 1000 year) probability of flooding each year;
- **Flood Zone 2** – The medium probability zone which is defined as having between 0.1 % - 1.0 % (or between 1 in 1000 and 1 in 100 year) probability of fluvial flooding or between 0.1 % and 0.5 % (or between 1 in 1000 and 1 in 200 year) probability of flooding from the sea each year;
- **Flood Zone 3a** – The high probability zone which is defined as having a 1 % or greater (or a 1 in 100 or greater) probability of fluvial flooding, or a 0.5 % or greater (1 in 200 or greater) probability of flooding from the sea each year;
- **Flood Zone 3b** – Functional Floodplain which is defined as land where water must flow or be stored in times of flood.

Sequential Test

In accordance with the NPPF, London Borough of Camden (LBC) use the Strategic Flood Risk Assessment to complete their Sequential Test process to inform their spatial strategies and development proposals for each of their strategic locations. The process identifies the flood risks and development vulnerability in order to assess the suitability of each development location and where possible, steers more vulnerable developments to areas of lowest flood risk, matching vulnerability of land use to flood risk.

The sequential test is undertaken in accordance with the following matrix:

FLOOD RISK VULNERABILITY CLASSIFICATION	ESSENTIAL INFRASTRUCTURE	WATER COMPATIBLE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE
FLOOD ZONE ZONE 1	Permitted	Permitted	Permitted	Permitted	Permitted
FLOOD ZONE ZONE 2	Permitted	Permitted	Exception Test Required	Permitted	Permitted
FLOOD ZONE ZONE 3A	Exception Test Required	Permitted	Not Permitted	Exception Test Required	Permitted
FLOOD ZONE ZONE 3B	Exception Test Required	Permitted	Not Permitted	Not Permitted	Not Permitted

Table 1 - Sequential Test Example

Examples of the various Flood Risk Vulnerability Classifications in accordance with the NPPF are as follows:

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons including electricity generating power stations and grid and primary substations; and water treatment works that needs to remain operation in times of flood.
- Wind turbines.

Highly Vulnerable

- Police stations, ambulance stations and fire stations, and command centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent (where there is a demonstrable need to locate such installations for bulk storage of materials with port or similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure").

More Vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.

- Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable", and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Mineral working and processing (except for sand and gravel working).
- Sewage treatment works (if adequate measures are taken to control pollution and manage sewage during flooding events are in place).

Water Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel workings.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to implementation of a specific warning and evacuation plan.

Exception Test

Where new development is necessary in such areas, policy aims to make it safe, without increasing flood risk elsewhere, and where possible, reducing flood risk overall through the application of the NPPF's Exception Test. The Exception Test allows consideration of the wider sustainability benefits of a development to be considered to justify development in a higher risk flood zone.

To ensure that the proposed development meets the requirements of the Exception test (NPPF):

- It must be demonstrated that the development provides wider sustainability benefits for the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;
- A site-specific Flood Risk Assessment must demonstrate that the development will be safe for its lifetime taking into account the vulnerability of its users, without decreasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

2.2. Climate Change

The attenuation storage of runoff from the development should be sized for the 1% (1 in 100) year) AEP event plus an allowance for climate change of +40% for rainfall intensity.

2.3. Local Flood Risk Policy

2.3.1. Local Plan – Managing Flood Risk in Camden: Sites in Zone 1

The entirety of the LBC is located within Flood Zone 1, which comprises land outside the extent of fluvial flooding in a 0.1% annual exceedance probability (AEP) event. As set out in the NPPF all types of development are considered appropriate within Flood Zone 1. Proposals for new development greater than 1 hectare in Flood Zone 1 will require a site-specific FRA to ensure that surface water generated by the site is managed in a sustainable manner and does not increase the burden on existing infrastructure and/or flood risk to neighbouring property. Due to the majority of the borough being located within a Critical Drainage Area as defined by the LBC SWMP, all opportunities should be taken during development to reduce existing runoff rates post-development. Policy 5.13 of the London Plan 55 states that all development should aim to achieve greenfield runoff rates, and where this is not possible, runoff rates post-development should not exceed those pre-development, as per the NPPF. The SWMP Critical Drainage Areas and Local Flood Risk Zones, and the Environment Agency's uFMfSW (updated flood map for surface water) dataset should be used as a starting point to indicate broad areas with a potential for surface water flood risk in the borough. In the absence of fluvial flood risk within the borough, a clear focus for new development should be a reduction in surface water runoff rates post-development, wherever practicable.

2.3.2. Strategic Flood Risk Assessment (SFRA)

In July 2014, URS, on behalf of the London Borough of Camden, produced revision 2 Level 2 Strategic Flood Risk Assessment (SFRA) for all populated areas at risk of flooding and locations being considered for future development (identified by a Level 1 SFRA). The SFRA flood maps indicate flood zones (including functional floodplain and effect of climate change on flood zones), flood incident records and localised flooding areas. The maps also illustrate watercourses.

These maps have been consulted to inform this FRA and are referred to in this document. Our development is not within any of the highlighted areas for proposed development listed within the SFRA document.

3. PROPOSED DEVELOPMENT

3.1. Location

The proposed development site is located off Spedan Close in Hampstead in North West London, NW3 7LS, Grid reference: E526124, N186047.

Figure 1 - Aerial View of the Existing Site

3.2. Proposed Works

The proposed project principally comprises the demolition of the existing 1960's extension whilst retaining the existing Branch Hill House. The retained Branch Hill House is to undergo a change in use from the current care home to residential with associated external alterations. A new 3-5 storey residential development with a single storey basement will be constructed in place of the demolished 1960's extension. The new replacement development will comprise residential accommodation on the upper floors with ancillary plant, access and servicing and car parking in the basement.

The site area is approximately 0.8 hectares. For the purposes of the assessment of the impact of climate change the design life for the development has been assumed to be 60 years. The criteria set by the NPPF.

3.3. Existing Site Characteristics

The current site arrangement comprises a 3-storey (+1 storey basement) masonry residential manor house constructed circa 1870s, with an abutting 2-storey concrete frame residential block constructed circa 1960s. The site has formerly been used as a residential facility for senior-citizens but is currently occupied by building guardians. The site is set back from the main Branch Hill road, with access via a driveway (Spedan Close).

Neighbouring along the south-west of the property is the Branch Hill Estate (approx. 15m away), a multiplex of council-owned houses built upon a complex stepped-section of hill circa 1970s. The estate is likely founded

on strip foundations and is in reasonable condition. To the north of the property is West Heath Lodge (approx. 55m away), a 5-storey apartment block, constructed circa 1980s. The block is likely founded on piled foundations given its height, anticipated loadings and condition. At the entrance to the Spedan Close driveway is a small gate house (approx. 70m away). Directly south is a residential property (approx. 70m away)

Figure 2 – Existing Site Plan

3.3.1. Topography

The site is within a wider hillside setting. Slope angles are approximately 6º which correlates to a 10m fall across the site. The site is on level ground at approximately 125m above sea level.

The site slopes from east to west and north to south. A selection of approximate site levels is outlined below:

- NW corner: 115.3m AOD
- SW corner: 115.3m AOD
- NE corner: 124.5m AOD
- SE corner: 122.7m AOD

Figure 3 - Existing buildings showing site slopes and overland flow routes

3.3.2. Geology

Ridge have undertaken a Phase II intrusive site investigation (5008338-RDG-XX-ST-DOC-C-00-GCA-01, May 2019). The following soil conditions were encountered during the investigation works.

Topsoil

Encountered in BH02 to a depth of 0.3mbgl, the Topsoil was described as brown sandy silt with abundant rootlets, on;

Macadam & Made Ground

Macadam and/or Made Ground were identified within all exploratory holes except BH02 from a depth of 0.10mbgl to a depth of 1.65mbgl. The Made Ground soils were largely described as brown occasionally orangish brown mottled dark blackish brown, speckled red, silty sand gravelly clay with coarse brick, concrete, flint and clinker, over;

Bagshot Formation

The Bagshot formation was identified within all exploratory holes except SA02 from a depth of 0.3mbgl (BH02) to a maximum depth of 15mbgl (BH02). The Bagshot Formation was largely described as loose to medium dense orangish brown and brownish orange mottled clayey silty fine and medium SAND interbedded with thinly bedded sandy CLAY, over;

Claygate Member

The Claygate Member was identified within BH01 & BH02 from a depth of 14.5mbgl (BH01) to the maximum drill depth of 30mbgl (BH02). The Claygate Member was largely described as medium dense dark grey very silty fine SAND to firm to stiff grey silty sandy CLAY.

According to BGS aquifer maps, the site is situated near a 'Secondary A Aquifer' (superficial) which, in most cases, describes permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. The bedrock is classified as a 'Secondary A' aquifer which describes permeable layers of rock which are able to support water supplies at a local rather than strategic scale. The site is not located within a groundwater source protection zone.

3.3.3. Existing Site Drainage

The existing site is assumed to be connected to the existing combined public sewerage network operated by Thames Water. However, at the time of writing this report this is yet to be confirmed. A CCTV survey of the drainage system will be undertaken to confirm.

4. EXISTING FLOOD RISK

4.1. Basis of the Assessment

In accordance with the NPPG an assessment of the flood risk to the development site has been completed based on the following sources of information:

- Flood risk information available of the Environment Agency's website;
- London Borough of Camden – Flood Risk Management Strategy;
- London Borough of Camden – Strategic Flood Risk Assessment.

The impact of the development on all sources of flood risk has been considered, including:

- Fluvial (River);
- Tidal;
- Pluvial (Surface water);
- Sewer flooding;
- Groundwater flooding;
- Artificial Sources;

4.2. Assessment of Existing Flood Risk

4.2.1. Fluvial Flood Risk

The development is located within Flood Zone 1 and is classified as 'very low' fluvial risk. As such, floodplain compensation will not be required. Please refer to an extract of the Environment Agency's Risk of Flooding from Rivers and Sea Map in Figure 4.

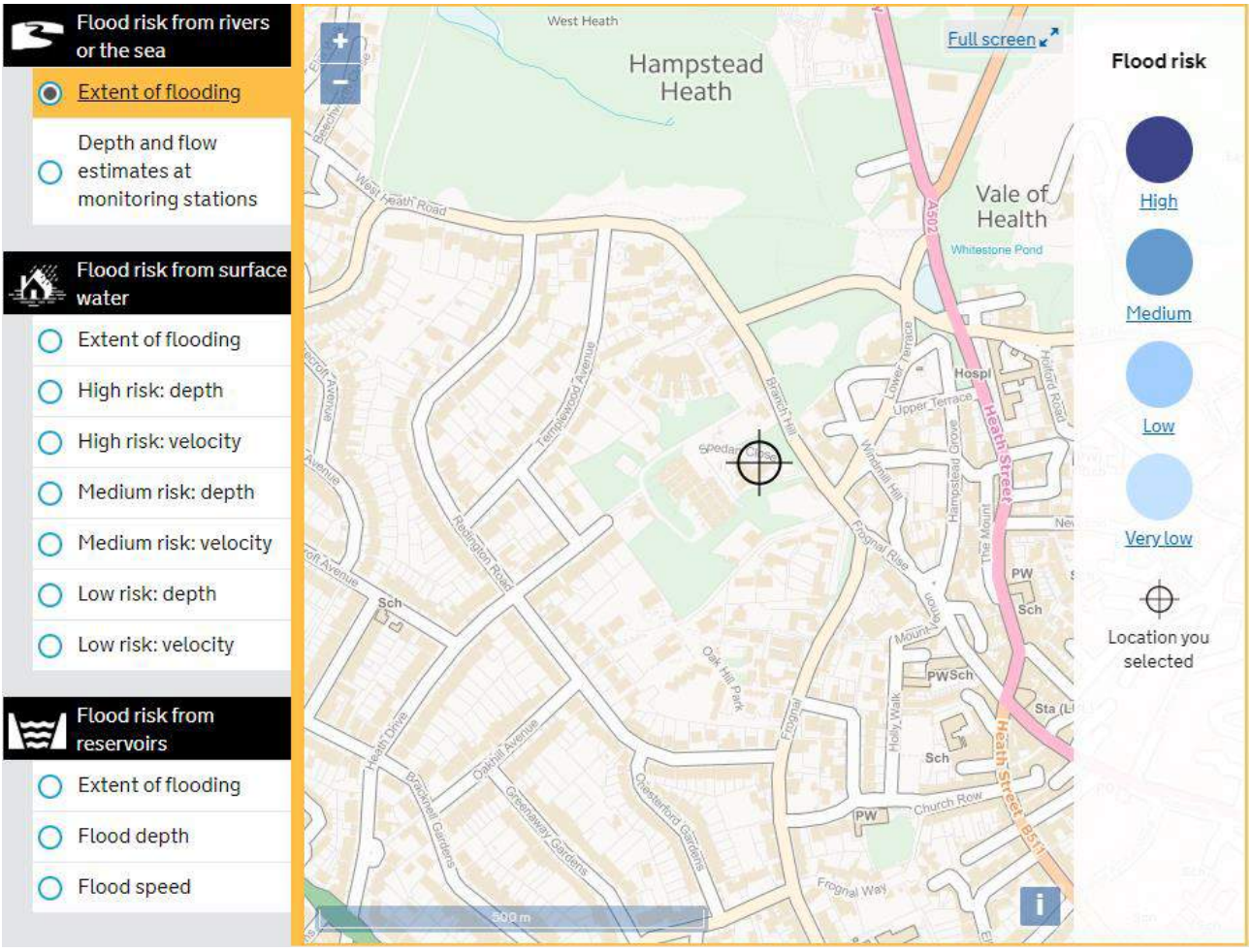


Figure 4 - Flood Zone Mapping

Given the distance of the site from the nearest area of Flood Zone 2 (approximately 3km) and with reference to point C3 of CBC SFRA guidance, it is anticipated that the site will remain within Flood Zone 1 when climate change is taken into consideration. However, further clarification has been sought from the Environment Agency. No response has been received at the time of writing this report.
The SFRA and strategic documents have not identified any historic fluvial flood events at the site.

4.2.2. Tidal Flood Risk

The site is located within EA Flood Zone 1 and 8km from the sea, therefore a very low risk from tidal flooding (see Figure 4).

4.2.3. Pluvial (Surface Water) Flood Risk

Figure 5 highlights the risk of surface water flooding at the development. The map shows a small patches of low risk flooding in the in adjacent sites.

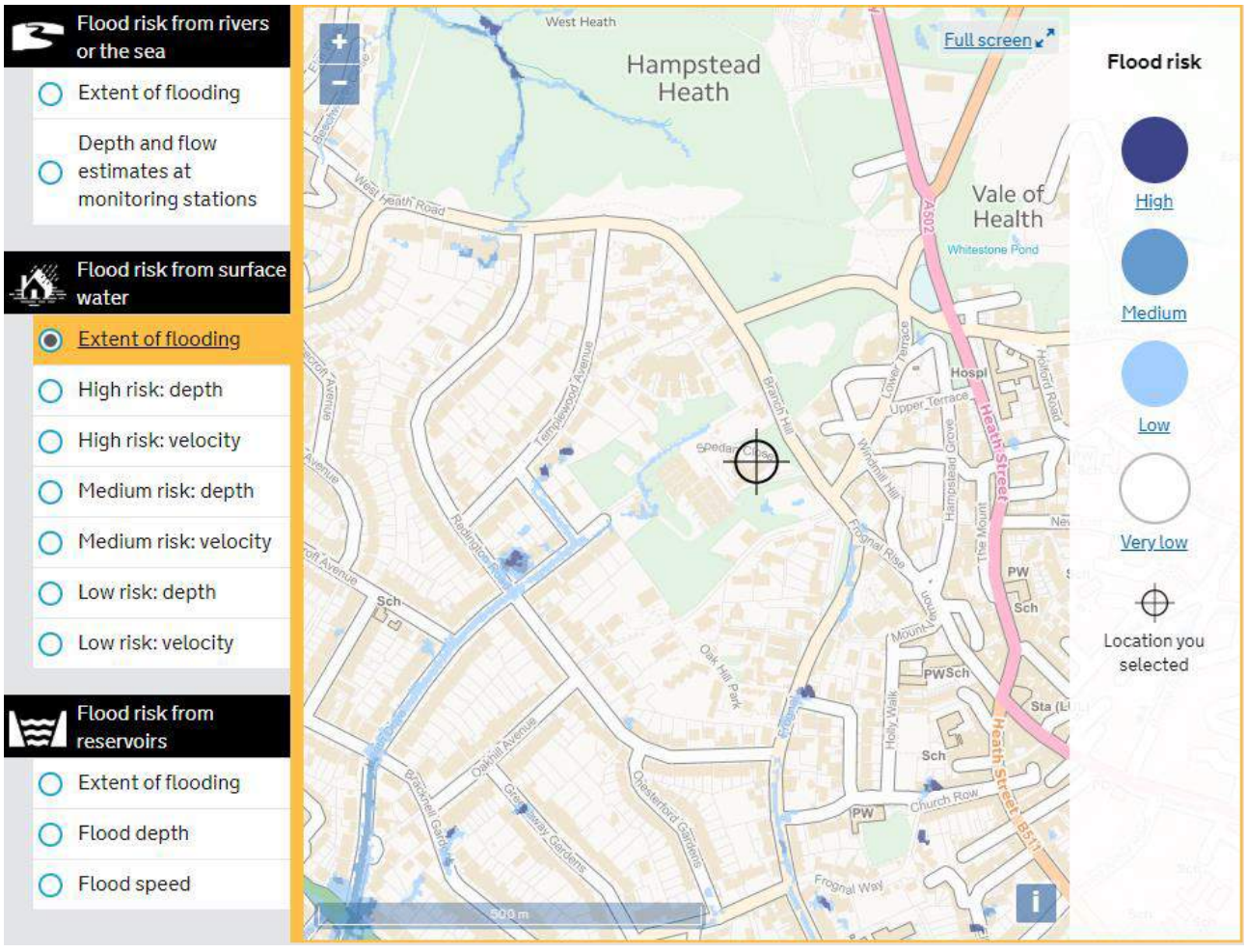


Figure 5 - Surface Water Flood Risk

Historic Pluvial (Surface Water) Flooding Events

Figure 6 highlights the historic record of surface water flooding in the Hampstead region of London. The mapping shows flooding in nearby streets back in 2002 but nothing within the redline boundary of the site and is therefore considered a very low risk.

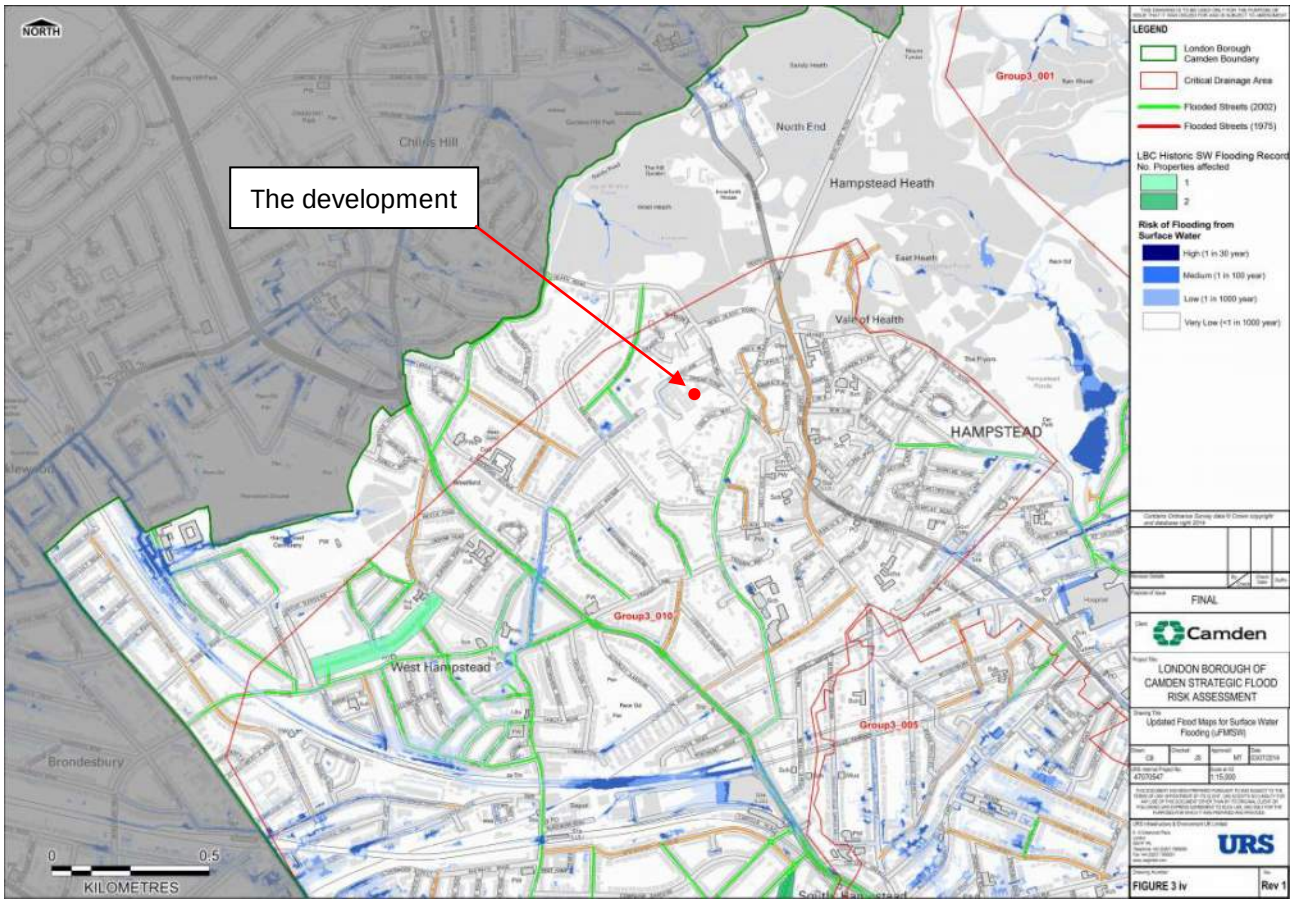


Figure 6 - Historical Surface Water Flooding

4.2.4. Sewer Flooding

The majority of LBC is served by a combined surface and foul water sewer system. Modern (post 1970) Thames Water Utilities Limited (TWUL) sewer systems are typically designed and constructed to accommodate rainfall events with a 3.3% AEP or less. Therefore, rainfall events with a return period of frequency greater than 3.3% AEP would be expected to result in surcharging of some of the sewer system. However, the North London SFRA27 identified the sewer network within Camden as being particularly old, with some sections of sewer potentially designed to only convey storms up to the 10% AEP event, as stated in the LBC SFRA. The last recorded incident of sewer flooding was in 2012 on Kilburn High Road, approximately 1.5 miles from the site.

The risk of sewer flooding on the site is therefore considered to be moderate. Current data has been requested from Thames Water to confirm this risk to the development, this not been received at the time of writing the report.

4.2.5. Groundwater Flood Risk

Based on the information available, the susceptibility of the site to groundwater flooding is considered low. The SFRA includes historic flood records, see Figure 7, some of which have been attributed/partly attributed to groundwater flooding. The nearest incident which refers to groundwater flooding as a potential cause is several hundred meters from the development. As there is no history of flooding to the site, the likelihood of groundwater flooding is considered low. Updated groundwater levels have been requested from the Environment Agency but have not been received at the time of writing this report.

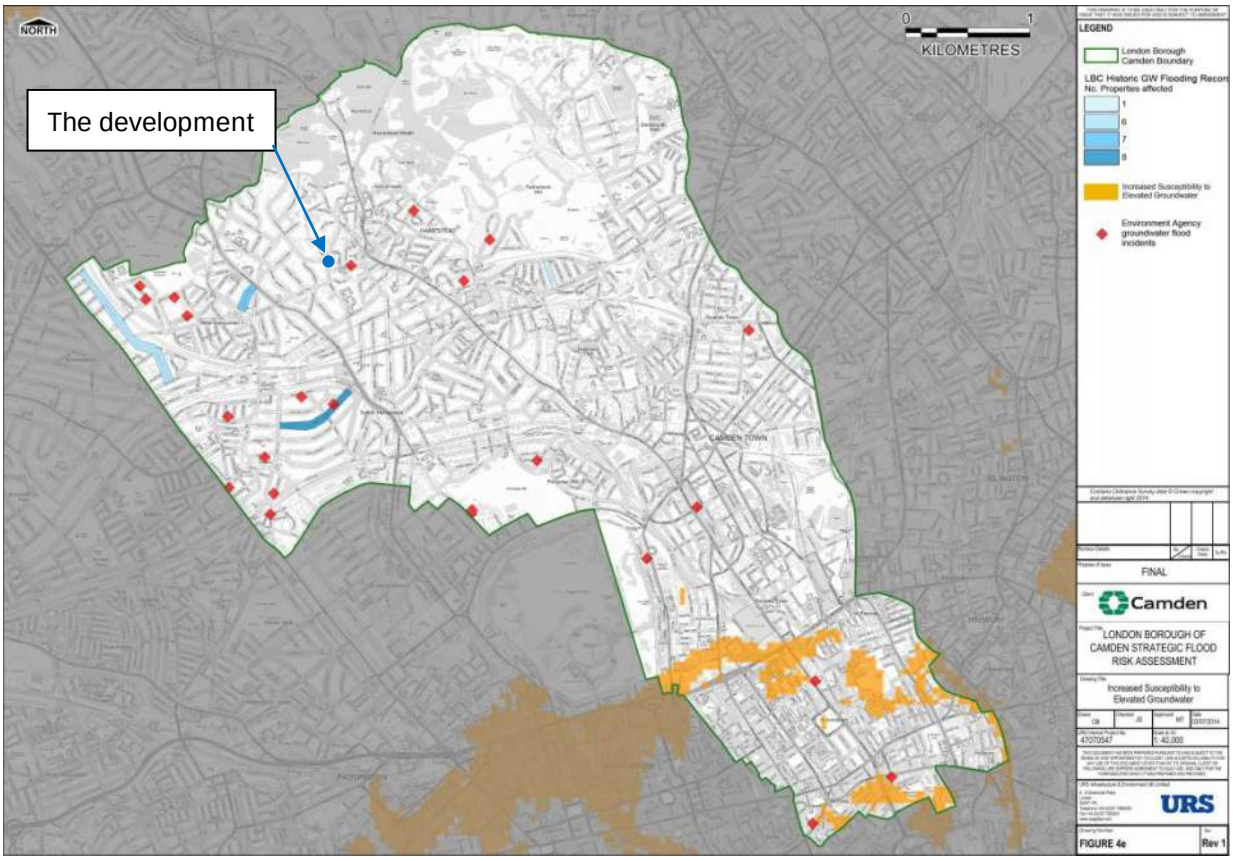


Figure 7 - Historical Groundwater Flooding

4.2.6. Artificial Sources

The Environment Agency's Risk of Flooding from Reservoirs map was reviewed online and according to this the development is not located within an area at risk of reservoir flooding.

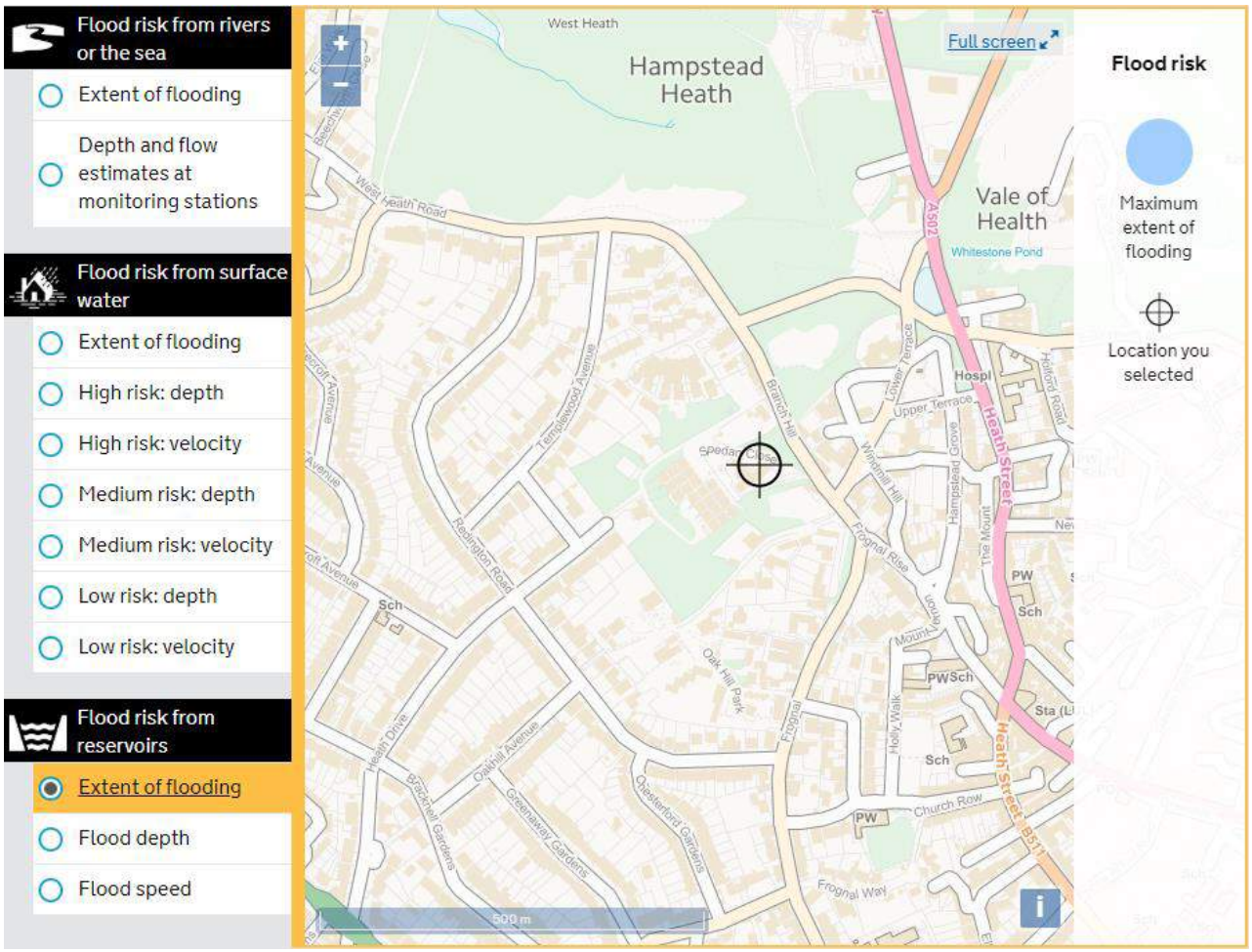


Figure 8 - Flood Risk from reservoirs

4.3. Summary

- The risk of fluvial flooding is considered to be **very low**;
- The risk of tidal flooding is considered to be **very low**;
- The risk of pluvial (surface water) flooding is considered to be **very low**;
- The risk of sewer flooding to be **moderate**;
- The risk of groundwater flooding is considered to be **low**;

5. NATIONAL PLANNING POLICY FRAMEWORK CLASSIFICATION

5.1. Vulnerability Classification

Table 2 of the Flood Zone and Flood Risk Tables section of the NPPF classifies the flood risk vulnerability of all land uses. The development has been classified as 'highly vulnerable' in accordance with Paragraph 066, Table 2 of the NPPG. The NPPG also classifies "basement dwellings" as 'highly vulnerable'.

5.1.1. The Sequential Test

Table 3 of the NPPG (substantially reproduced here as Table 2 defines appropriate land uses for each flood zone. This development is considered appropriate within Flood Zones 1 and 2 but has to pass the Exception Test if it is located within Flood Zones 3a. It should not be permitted within Flood Zone 3b.

FLOOD RISK VULNERABILITY CLASSIFICATION		ESSENTIAL INFRASTRUCTURE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE	WATER COMPATIBLE
Flood Zone	1	✓	✓	✓	✓	✓
	2	✓	Exception test required	✓	✓	✓
	3a	Exception test required	[3]	Exception test required	✓	✓
	3b	Exception test required	[3]	[3]	[3]	✓

✓ = development is appropriate, [3] = Development should not be permitted

Table 2 - Sequential Test

5.1.2. The Exception Test

The development is not required to comply with the Exception Test as it is located within Flood Zone 1.

6. FLOOD RISK FROM THE DEVELOPMENT

The risk of flooding from fluvial, tidal and groundwater has been shown to be low and as such mitigation methods are not required.

6.1. Development Considerations

In accordance with NPPF guidance, the development will need to demonstrate that it will:

- Remain operational and safe for users in times of flood;
- Result in no net loss of floodplain storage; and
- Not impede water flows and not increase flood risk elsewhere

The following sections indicate how these requirements have been met.

6.1.1. Safe Access

NPPF paragraph 103, states that the development must provide safe access and egress during times of flood. The entirety of the development is located within fluvial Flood Zone 1 which will ensure safe access and egress for flood events up to the 0.1% (1 in 1000) AEP event.

6.1.2. Temporary Works

There will be a facility constructed on the existing car park/ hard standing to the west of the site which will function as a temporary school whilst the permanent structure is completed. This is not anticipated to affect any watercourses and would not impact upon existing levels of flood risk.

6.1.3. Loss of Floodplain Storage

The development is located outside of Flood Zone 3 and there is no loss of floodplain storage. As such, floodplain compensation is not required.

7. DRAINAGE STRATEGY

A drainage strategy has been prepared by Ridge for the proposed development and is presented in a separate report titled 'Drainage Strategy', dated December 2019. A summary of the proposed drainage strategy is provided below.

It should be noted that this strategy presents one possible solution to demonstrate that the proposed development can be sustainably drained and should not be interpreted as the definitive solution.

- Both surface and foul water currently generated by the site are presumed to discharge to the public combined sewer network on Heysham Lane.
- Due to low infiltration rates recorded during the Ground Investigation of the underlying soils at the site, the disposal of surface water within the site using soakaways are not considered to be practicable.
- No watercourses or other appropriate surface water bodies are present within close proximity to the site and it is therefore proposed that the development will connect to the existing public sewer for the disposal of surface water from impermeable areas.
- The discharge from the site post-development will be limited to a maximum rate of 2 l/s during all events up to and including the 1:100 AEP event, including a 40% allowance for climate change. This would demonstrate a significant betterment) to the existing condition without introducing an additional source of flood risk.
- To achieve the above limitations, 191.0 m^3 of below ground attenuation storage tanks will be provided at the proposed development. This volume is expected to be split proportionally between the front and rear portions of the proposed development due to site topography and availability of suitable areas to store the storm events.
- The development proposals will contribute to a reduction in flood risk associated with the exceedance of the public surface water sewer network in the vicinity of the site by providing a significant reduction in peak runoff rates and by avoiding an increase in the total runoff volume.
- The proposed drainage strategy has been prepared to be robust and demonstrate that it is possible to drain the site in a sustainable manner in keeping with local policy requirements, without increasing flood risk to or from the Proposed Development.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. Development Suitability

The new development has been classified as 'highly vulnerable' development in accordance with the NPPG. The proposed site is located within Flood Zone 1 and therefore is considered appropriate in accordance with Table 2 of the NPPG.

8.2. Flood Risk to the Site

- The risk of fluvial flooding is considered to be **very low**;
- The risk of tidal flooding is considered to be **very low**;
- The risk of pluvial (surface water) flooding is considered to be **very low**;
- The risk of sewer flooding to be **moderate**;
- The risk of groundwater flooding is considered to be **low**;

8.3. Planning Requirements

In accordance with the NPPF this FRA demonstrates that the development will:

- not affect existing levels of flood risk from all sources;
- not increase flood risk elsewhere through the provision of mitigation measures such as attenuation of additional runoff to greenfield rates prior to discharge to the receiving watercourse/sewer; and
- be safe for users for its lifetime (100 years).

8.4. Recommendations

Following the assessment of flood risk as a consequence of the proposed scheme, it can be concluded that the site is appropriate for the intended use from a flood risk perspective.

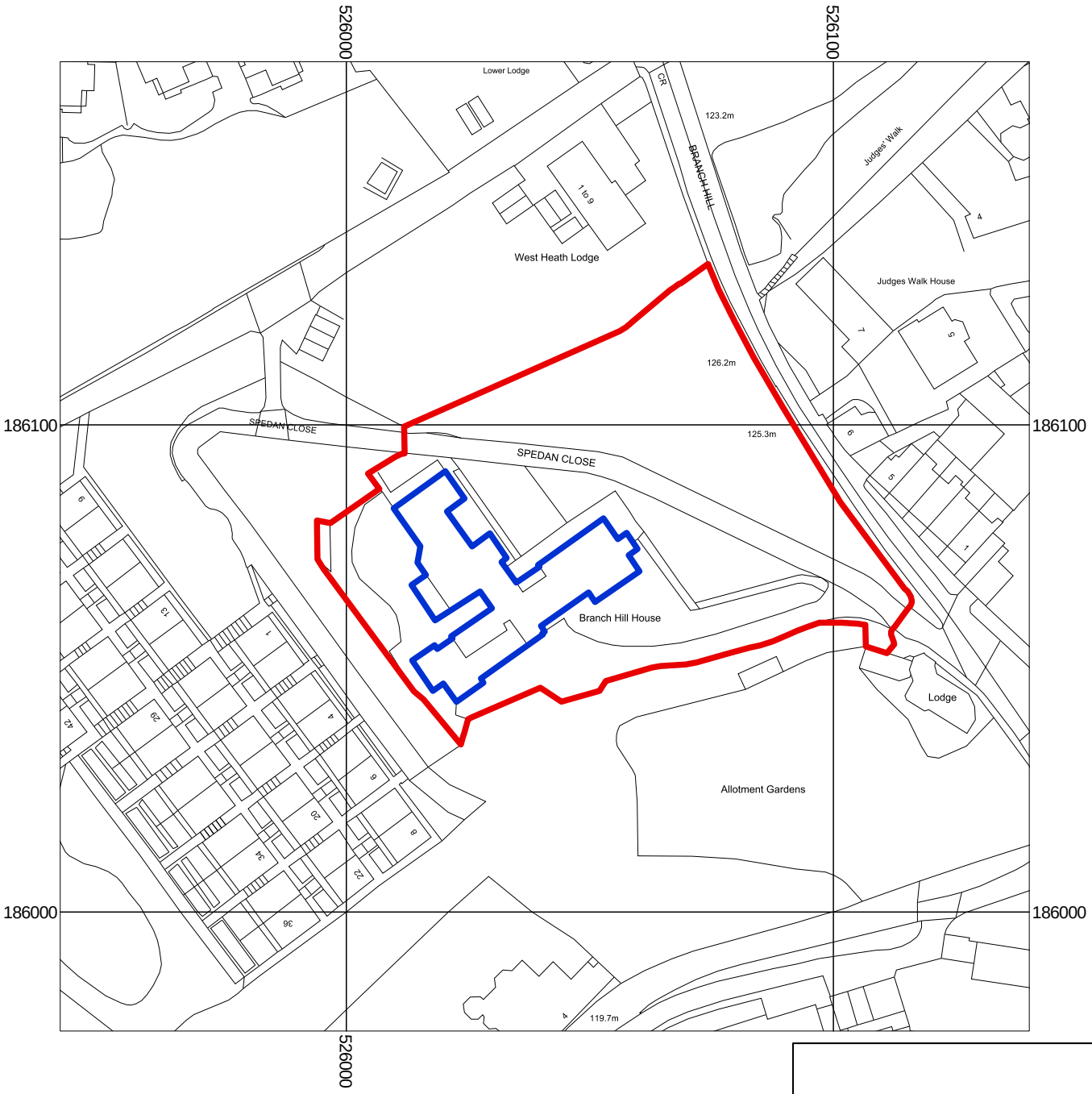
To mitigate, as much as reasonably practicable, the risk of sewer flooding, the proposed discharge from the site will be less than that of the existing. A 50% betterment of surface water (to be confirmed by Thames Water) will be achieved, reducing the discharge into the existing combined sewer network.

The low risk of surface water flooding can be incorporated into the surface water drainage design to mitigate the risk.

For any adverse impacts on flood risk to the surrounding area, mitigation measures to address the increase in surface water runoff from the development will be included within the drainage design.

APPENDIX A

Proposed Site Plan



SITE BOUNDARY

EXISTING BUILDING

BRANCH HILL HOUSE

LONDON

SITE LOCATION PLAN

DRNG No	SCALE	DATE
PL-01	1:1250 @ A4	SEPT-19

0 25m 50m 75m 100m

N

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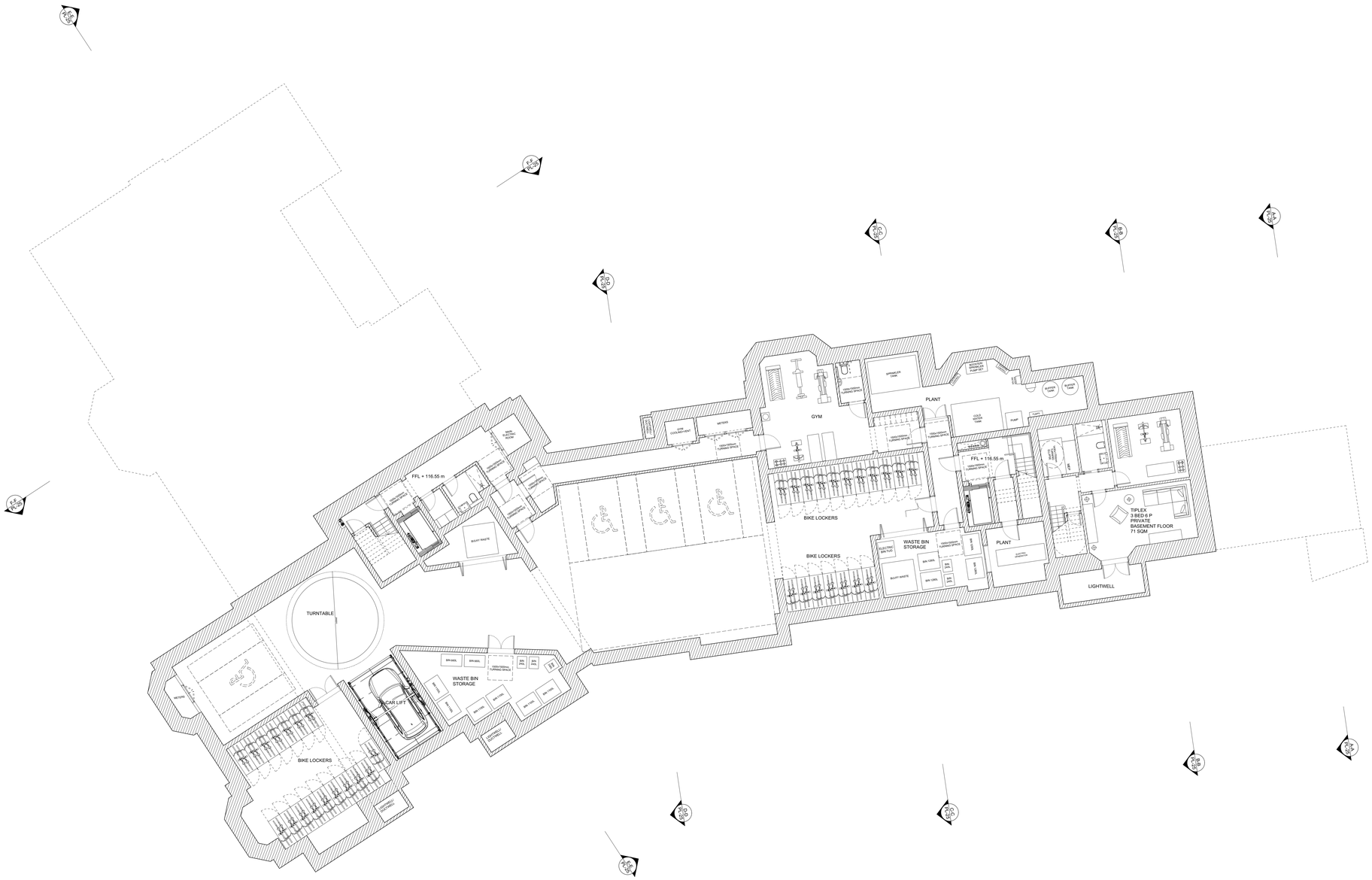

REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE
LONDON

PROPOSED BASEMENT PLAN

DRNG No	SCALE	DATE
PL-17	1:100 @ A0 1:200 @ A2	MONTH 2017

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1.5m high retaining wall

1.2m high retaining wall

Sub Station

FLAT 1
2 BED 4 P + STUDY
PRIVATE
178 SQM

FFL + 119.75 m

FLAT 2
3 BED 6 P + STUDY
PRIVATE
221 SQM

FFL + 119.75 m

FFL + 119.750 m

FLAT 3
2 BED 4 P + STUDY
PRIVATE
138 SQM

FLAT 4
2 BED 3 P
INTERMEDIATE
89 SQM

FLAT 5
3 BED 6 P + STUDY
PRIVATE
180 SQM

FFL + 119.750 m

FLAT 8
3 BED 6 P + STUDY
PRIVATE
263 SQM

FFL + 119.750 m

UNIT 6 - TRIPLEX
3 BED 6 P + STUDY
PRIVATE
GROUND FLOOR
77 SQM

FFL + 119.30 m

GATE HOUSE
PRIVATE
GROUND FLOOR 36SQM

LIGHTWELL

N

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0 1 2 3 4 5 10m

REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE

LONDON

PROPOSED GROUND FLOOR PLAN

DRNG No	SCALE	DATE
PL-18	1:100 @ A0 1:200 @ A2	DEC 2019

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REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE
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PROPOSED FIRST FLOOR PLAN

DRNG No	SCALE	DATE
PL-19	1:100 @ A0 1:200 @ A2	DEC 2019

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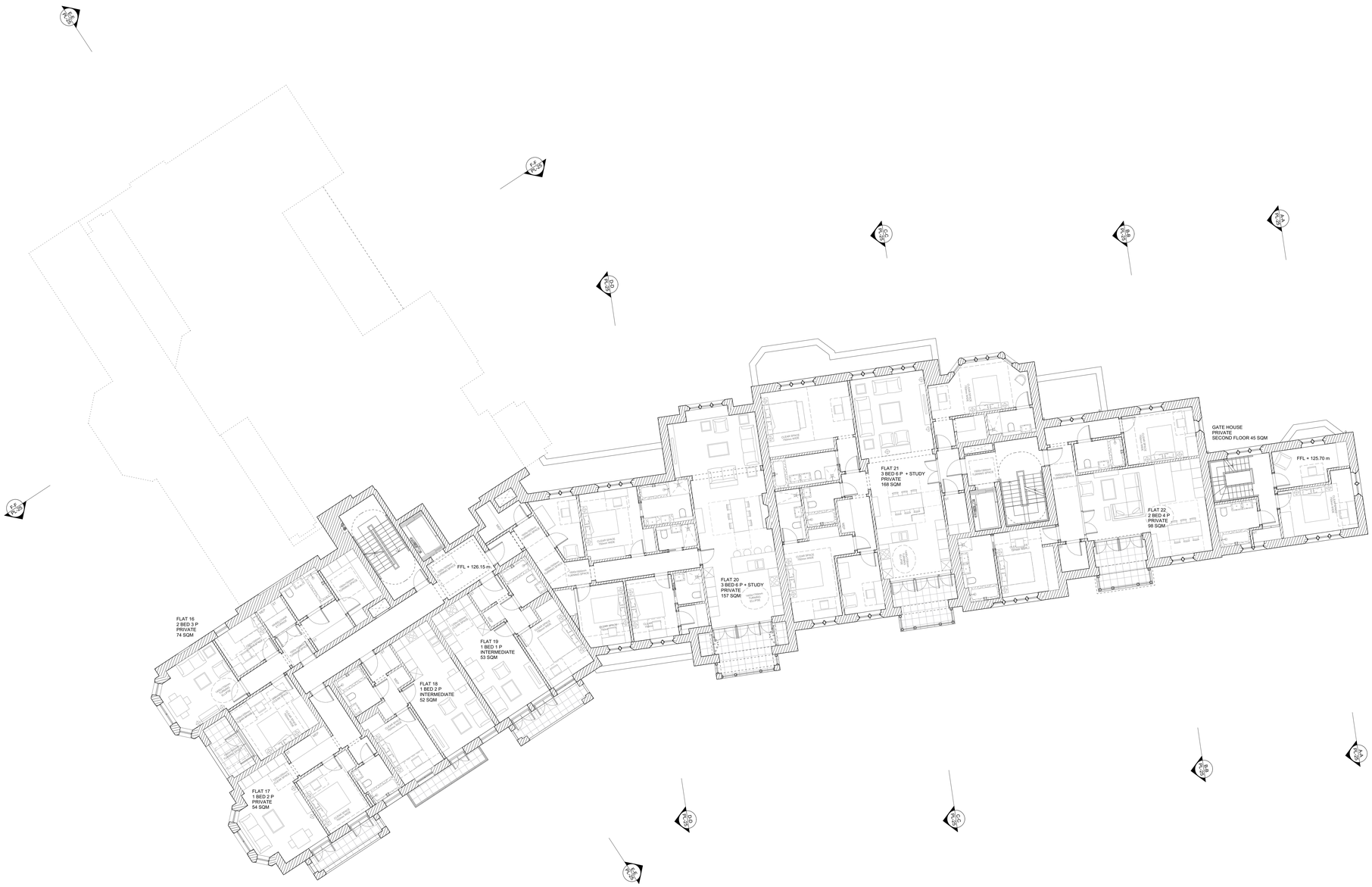

REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE

LONDON

PROPOSED SECOND FLOOR PLAN

DRNG No	SCALE	DATE
PL-20	1:100 @ A0 1:200 @ A2	DEC 2019

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N

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0 1 2 3 4 5 10m

KEY

LOW CEILING AREA (HEIGHT <2M)

REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE

LONDON

PROPOSED THIRD FLOOR PLAN

DRNG No	SCALE	DATE
PL-21	1:100 @ A0 1:200 @ A2	DEC 2019

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REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE

LONDON

PROPOSED FOURTH FLOOR PLAN

DRNG No	SCALE	DATE
PL-22	1:100 @ A0 1:200 @ A2	DEC 2019

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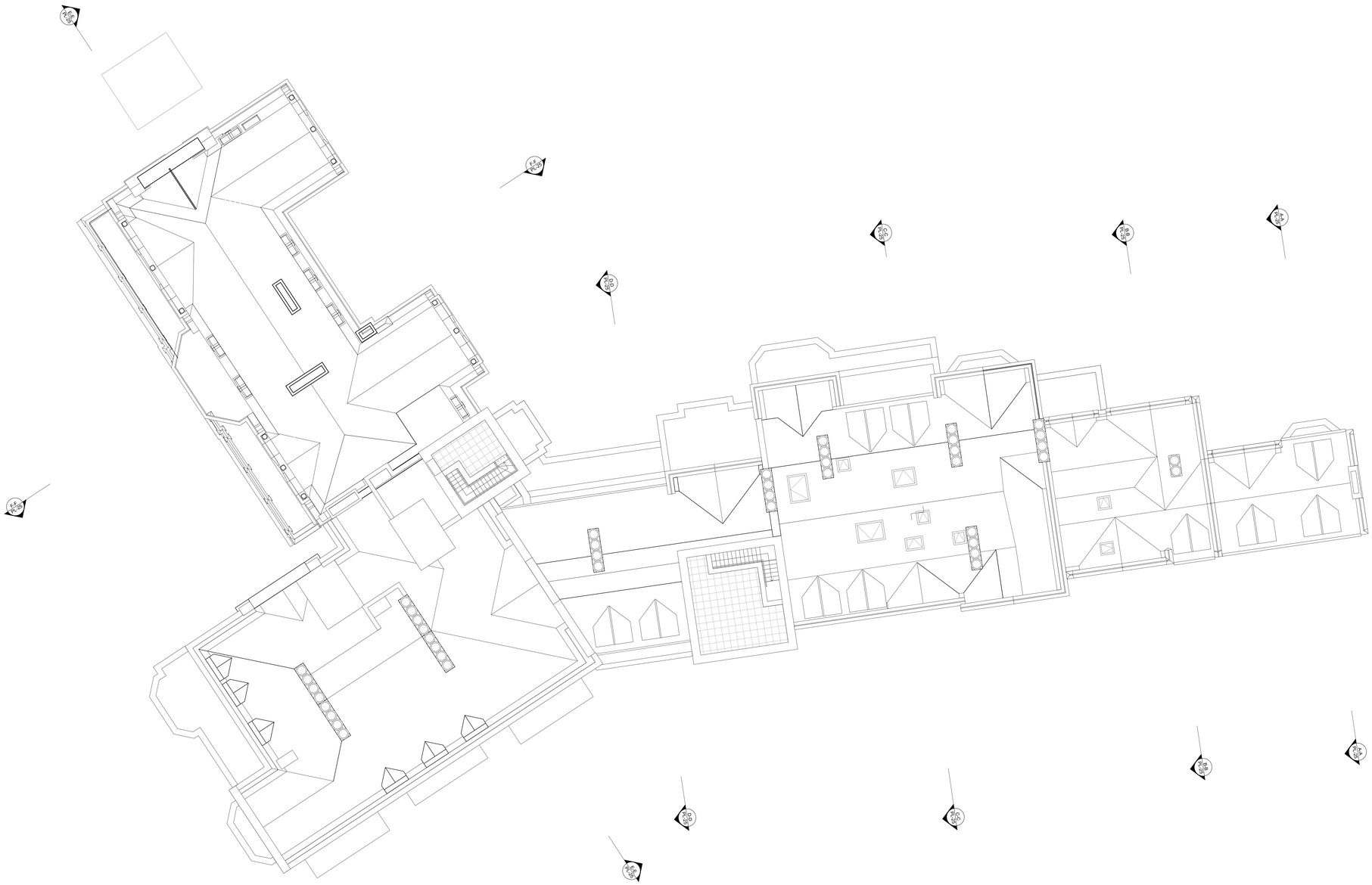

N

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0 1 2 3 4 5 10m

REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE

LONDON

PROPOSED ROOF PLAN

DRNG No	SCALE	DATE
PL-23	1:100 @ A0 1:200 @ A2	DEC 2019

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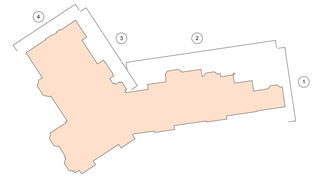
1 PL-24 PROPOSED EAST ELEVATION - GATE HOUSE
Scale: 1:100

2 PL-24 PROPOSED NORTH ELEVATION
Scale: 1:100

3 PL-24 PROPOSED EAST ELEVATION
Scale: 1:100

4 PL-24 PROPOSED NORTH - WEST ELEVATION
Scale: 1:100

0 1 2 3 4 5 10m



MATERIALS SPECIFICATION

EXISTING BUILDING REPAIRS
1. GENERALLY, ALL REPAIRS TO USE TRADITIONAL MATERIALS AND DETAILS TO MATCH EXISTING ELEMENTS
2. RETAINED FACADES ARE TO BE REPAIRED.
- BROKEN/DAMAGED BRICKS AND
- BROKEN AND DAMAGED TERRACOTTA/FAIENCE AND STONEWORK TO BE REPLACED
- MASONRY TO BE CLEANED AND WHERE NECESSARY, REPOINTED
- LEAD FLASHINGS TO BE REPLACE
- REMOVAL OF ALL NON ORIGINAL CABLING AND SERVICES
- RAINWATER GOODS TO BE REPLACED WITH NEW CAST IRON PIPES AND HOPPERS
3. EXISTING ROOF FINISHES TO BE REPLACED WITH NATURAL WELSH SLATE AND LEAD WEATHERINGS
4. EXISING WINDOWS AND FRENCH DOORS TO BE REPLACED WITH PAINTED HARDWOOD CASEMENT WINDOWS WITH SLIMLINE SEALED DOUBLE GLAZED UNITS
5. DORMER WINDOWS TO BE REPAIRED AND REDECORATED

EXISTING BUILDING ALTERATIONS AND ADDITIONS
1. ALL ALTERATIONS AND ADDITIONS TO USE TRADITIONAL MATERIALS AND DETAILS TO MATCH EXISTING ELEMENTS
2. FACADES TO BE IN HANDMADE RED-MULTI FACING BRICKWORK LAID IN FLEMISH BOND USING LIME MORTAR .
3. ARCHITECTURAL FEATURES TO BE IN TERRACOTTA / FAIENCE AND STONE (DEPENDING ON LOCATION) TO MATCH EXISTING
4. CAST IRON RAINWATER PIPES AND HOPPER HEADS
5. PAINTED HARDWOOD DORMER WINDOWS TO MATCH EXISTING
6. ROOF FINISH - NATURAL WELSH SLATE WITH LEAD WEATHERINGS
7. PAINTED HARDWOOD CASEMENT WINDOWS AND FRENCH DOORS WITH SLIMLINE SEALED DOUBLE GLAZED UNITS

NEW BUILDINGS
1. FACADES TO BE IN HANDMADE RED-MULTI FACING BRICKWORK LAID IN FLEMISH BOND USING LIME MORTAR .
3. ARCHITECTURAL FEATURES TO BE IN RECONSTITUTED STONE OR NATURAL STONE
4. CAST IRON RAINWATER PIPES AND HOPPER HEADS
5. HARDWOOD DORMER WINDOWS
6. ROOF FINISHES GENERALLY HANDMADE CLAY ROOF TILES WITH LEAD TOP AND WEATHERINGS. ROOF FINISH TO NEW SOUTH EASTERN BUILDING TO BE NATURAL WELSH SLATE WITH LEAD WEATHERINGS
7. WINDOWS TO BE SLIM STEEL FRAMED DOUBLE GLAZED UNITS, SUCH AS CRITTALL OR SIMILAR
8. PAINTED HARDWOOD FRENCH DOORS WITH SLIMLINE SEALED DOUBLE GLAZED UNITS

REV.	DATE	DESCRIPTION

BRANCH HILL HOUSE
LONDON

PROPOSED EAST, NORTH AND NORTH - WEST ELEVATIONS

DRNG No	SCALE	DATE
PL-24	1:100 @ A0 1:200 @ A2	DEC 2019

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