GeoSmart Information

FloodSmart Plus

Flood Risk Assessment

Site Address

73 Castelnau Barnes
London
Greater London
SW13 9RT

Grid Reference

522478, 177130

Report Prepared for

Laura Jane Shelley
73 Castelnau Barnes
London
Greater London
SW13 9RT

Date

2022-11-18

Report Status

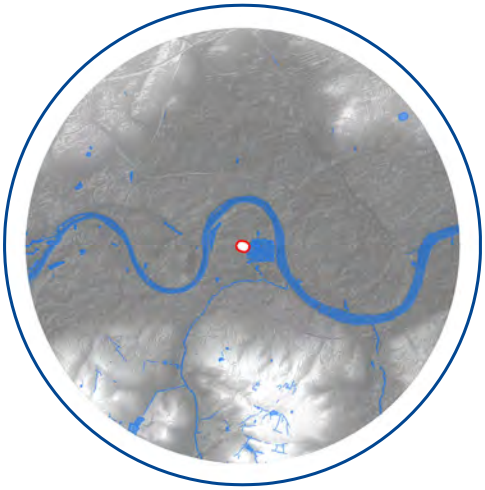
FINAL

Site Area

0.13 ha

Report Reference

77625R1



RISK – Very Low to Moderate

The Site is located in Flood Zone 3, this equates to a High probability of flooding from rivers and the sea, although the River Thames flood defences in place reduce the flooding risks to Very Low. Surface water (pluvial) flood risks are Very Low. Groundwater flood risks are Moderate and flooding risks from artificial sources (i.e. canals, reservoirs and sewers) are Low. Mitigation measures are recommended in this report to reduce the risks to an acceptable level over the lifetime of the development.

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1. Executive summary

A review has been undertaken of national environmental data sets to assess the flood risk to the Site from all sources of flooding in accordance with the National Planning Policy Framework (NPPF) (2021) and National Planning Practice Guidance (NPPG) (Published in 2014 and updated in August 2022). A site-specific flood risk assessment, to assess the flood risk to and from the development Site, is provided within this concise interpretative report written by an experienced GeoSmart consultant. Baseline flood risk and residual risks that remain after the flood risk management and mitigation measures are implemented are summarised in the table below.

Site analysis

Source of Flood Risk	Baseline*	Final **
Estuarine (fluvial/coastal/tidal) flooding	Very Low	Low
Surface water (pluvial) flooding	Very Low	N/A
Groundwater flooding	Moderate[1]	Low
Other flood risk factors present	Yes	Yes
Is any other further work recommended?	Yes	No (see below)

*BASELINE risks have been calculated for the whole Site, using national risk maps, including the benefit of EA flood defences.**FINAL RISK RATING Includes a detailed analyses of flooding risks over the lifetime of the proposed development, including allowances for climate change AND assumes recommended mitigation measures are implemented. N/A indicates where mitigation is not required. 1 The baseline groundwater flood risk rating is Low, but on the basis of the site-specific assessment, inducing the elevated risk to the basement, the groundwater flood risk is considered to be Moderate.

Summary of existing and proposed development

The Site is located in 73 Castelnau Barnes, London, Greater London, SW13 9RT in a setting of residential land use at National Grid Reference TL 522478, 177130.

The Site is currently used within a residential capacity as a residential dwelling. Development proposals comprise a rear extension and pool house.

Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

River (fluvial) and Sea (Estuarine/Coastal) flooding

- According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located within a tidal Flood Zone 3 (High probability) .
- The Site benefits from the presence of flood defences, designed to provide a 1 in 1000 year event standard of protection.
- According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a Very Low risk of flooding from the nearby watercourse, the River Thames.
- Baseline mapping indicates a High risk, however a review of the flood model data additional information indicates the risk is likely to be lower.
- Modelled flood data obtained from the EA has been analysed in line with the most up to date guidance on climate change (EA, 2022), to confirm a maximum "design" flood level at the Site.

  During a 1 in 200 year 2005 scenario tidal flood event, where a breach in the tidal flood defences occurred, the flood level at the Site would be 5.25 mAOD.

  During a 1 in 200 year in 2100 scenario tidal flood event, where a breach in the tidal flood defences occurred, the flood level at the Site would be 5.89 mAOD.

  During this event, flood depths in the area proposed for development could be up to 1.18m. Flood mitigation measures are included in the next section.

  Emergency evacuation routes are available to the south. In the event of a flood, safe refuge can be taken on the 1st floor levels and above.

Surface water (pluvial) flooding

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site has a Very Low risk of pluvial flooding.

Groundwater flooding

- Groundwater Flood Risk screening data indicates there is a Low potential risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.
- It is understood the Site contains an existing basement. The existing basement is set c. 1.5 m bgl. The risks are higher for basements, buried infrastructure and soakaway systems which may be affected by high groundwater levels.

  Baseline mapping indicates a Low risk, however a review of the flood model data, local topography and borehole data indicates the risk is likely to be Moderate.

Artificial sources of flooding

- The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:
    - The EA's Risk of Flooding from Reservoir map confirms the Site is at risk of reservoir flooding. The potential for a breach of a reservoir to occur and flooding affecting the Site is low.
    - Ordnance Survey (OS) data confirms there are no canals near to the Site.
    - The Strategic Flood Risk Assessment (SFRA)(Metis, 2021) has identified 10 to 20 incidences of flooding as a result of surcharging sewers within the SW13 9 postcode.

  The risk of flooding from artificial sources is considered to be Low.

The proposed development is an extension to the existing property which comprises a rear extension and pool house and is therefore defined as minor development.

Paragraph 168 of the NPPF states: *"Applications for some minor development should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments."* (NPPF, 2021).

The NPPG (2022) defines a 'minor development' as *"householder development and small non-residential extensions (with a footprint of less than 250 m^2)."*

As a result, as the proposals are defined as "minor development – householder development" they are not subject to the Sequential Test or an Exception Test.

Recommendations

Recommendations for flood mitigation are provided below, based upon the proposed development and the flood risk identified at the Site.

Estuarine flood risk

Raising minimum floor levels

It is not possible to raise FFL's to above the tidal flood level as an extension is proposed to extend the habitable living accommodation of the existing building. It would be more appropriate to set FFL's to the same level as existing and incorporate standard flood resistance and resilient measures.

Appropriate Mitigation

A water exclusion strategy for flood depths up to 0.3 m in line with the EA's Standing Advice should be adopted. A water exclusion strategy, using avoidance and resistance measures, is appropriate where floods are expected to last for short durations. Potential water exclusion strategies include:

- Passive flood door systems;

- Temporary flood barriers;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.

Avoidance and resistance measures are unlikely to completely prevent floodwater entering a property, particularly during longer duration flood events. Therefore, it is recommended that the following flood resilience measures are also considered.

- Flood resilient materials and designs:
    - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
    - Hard flooring and flood resilient metal staircases;
    - The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
    - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
    - Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

As flood depths could potentially exceed 0.6 m at the Site (where a breach occurred in the River Thames flood defences in the 2100 scenario), a water entry strategy should be adopted to preserve building integrity and to promote flood resilience rather than resistance (which is more difficult to achieve for significant flood depths). A structural engineer should be consulted to confirm this would be a suitable strategy for the proposed development, to ensure flood flows would not impact the structural integrity of the building. Potential strategies include:

- Ground floors designed to permit water passage at high flood depths;
- Hard flooring and flood resilient metal staircases;
- Heating systems, electrical sockets and utility meters should be raised above the predicted flood level where possible; and
- Sump and pump.

Groundwater flood risk

It is likely the flood mitigation measures recommended for estuarine flood risk will reduce the groundwater flood risk at the development. However specific additional groundwater measures that may also be considered for the Moderate risk identified include:

- Waterproof tanking of the ground floor and basement;
- Interceptor drains;
- Automatic sump to extract flood water; and

- Non-return flap valves on the proposed foul and surface water sewer lines.

Further mitigation

- A Flood Warning and Evacuation Plan (FWEP) is recommended to ensure persons using the Site can evacuate safely on receipt of a Flood Warning.
  - Occupants of the Site should also be signed up to receive EA Flood Alerts and Flood Warnings.
- The ongoing management and maintenance of existing and any proposed drainage networks, under the riparian ownership of the developer, should be undertaken in perpetuity with the development.
- A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff from the proposed development.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

2. Introduction

Background and purpose

A site-specific flood risk assessment has been undertaken, to assess the flood risk to and from the development Site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the NPPF (2021) and the source(s) of any flood risk present, guided by the NPPG (Published in 2014 and updated in August 2022). Finally, a preliminary assessment of the steps that can be taken to manage flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2021) and NPPG (2022).

"*The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied*" (NPPF, 2021).

The NPPF (2021) and NPPG (2022) promote a sequential, risk based approach to the location of development. This also applies to locating a development within a Site which has a variable risk of flooding.

"*The 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*" (Paragraph: 023. NPPG, 2022).

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

Report scope

In accordance with the requirements set out within NPPG 2022 (Paragraph: 021 Reference ID: 7-021-20220825), a thorough review of publicly and commercially available flood risk data and EA supplied data indicating potential sources of flood risk to the Site from rivers and coastal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from the EA and a review of the London Borough of Richmond upon Thames Strategic Flood Risk Assessment (SFRA) March 2021 used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2021).

The existing and future flood risk to and from the Site from all flood sources is assessed in line with current best practice using the best available data. The risk to the development has been assessed over its expected lifetime, including appropriate allowances for the impacts of climate change. Residual risks that remain after the flood risk management and mitigation

measures are implemented, are considered with an explanation of how these risks can be managed to keep the users of the development safe over its lifetime.

An indication of whether the Site will potentially increase flood risk elsewhere is provided, including where the proposed development increases the building footprint at the Site. A drainage strategy to control runoff can be commissioned separately if identified as a requirement within this report.

Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

The basemap used is the OS Street View 1:10,000 scale, however the Site boundary has been drawn using BlueSky aerial imagery to ensure the correct extent and proportion of the Site is analysed.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

Datasets

The following table shows the sources of information that have been consulted as part of this report:

Table 1. Datasets consulted to obtain confirmation of sources of flooding and risk

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency	Thames Water	OS Data
Historical	X	X	X		
River (fluvial) / Sea (tidal/coastal)	X	X	X		

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency	Thames Water	OS Data
Surface water (pluvial)	X	X	X		
Groundwater	X	X			
Sewer		X			
Culvert/bridges		X			X
Reservoir		X	X		

*Local guidance and policy, referenced in Section 6, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

Local policy and guidance

For this report, several documents have been consulted for local policy and guidance and relevant information is outlined below:

London Borough of Richmond upon Thames Local Plan (London Borough of Richmond upon Thames, 2018)

The Local Plan It sets out policies and guidance for the development of the borough over the next 15 years, up to 2033. The following policies relate to flooding:

Policy LP 21 – Flood Risk and Sustainable Drainage

- All developments should avoid, or minimise, contributing to all sources of flooding, including fluvial, tidal, surface water, groundwater and flooding from sewers, taking account of climate change and without increasing flood risk elsewhere.
- Development will be guided to areas of lower risk by applying the 'Sequential Test' as set out in the national policy guidance, and where necessary, the 'Exception test' will be required.
- In Flood Zones 2 and 3, all proposals on sites of 10 dwellings or more or 1,00m2 of non residential development or more, or on any other proposal where safe access/egress cannot be achieved, a Flood emergency Plan must be submitted.

- Where a Flood Risk Assessment is required, on-site attenuation to alleviate fluvial and/or surface water flooding over and above the Environment Agency's floodplain compensation is required where feasible.
- Basements within flood affected areas of the borough represent a particularly high risk to life, as they may be subject to very rapid inundation. Applicants will have to demonstrate that their proposal complies with the policy.
- The use of SuDS should be demonstrated in all development proposals:
    - A reduction in surface water discharge to greenfield run-off rates wherever feasible.
    - Where greenfield run-off rates are not feasible, the minimum requirement is to achieve at least a 50% attenuation of the site's surface water runoff at peak times based on the levels existing prior to the development.
- In terms of flood defenced, the following have to be demonstrated:
    - Retain the effectiveness, stability and integrity of flood defences, river banks and other formal and informal flood defence infrastructure.
    - Ensure the proposal does not prevent essential maintenance and upgrading to be carried out in the future.
    - Set back developments from river banks and existing flood defence infrastructure where possible (16 metres for the tidal Thames and 8 metres for other rivers).
    - Take into account the requirements of the Thames Estuary 2100 Plan and the River Thames Scheme, and demonstrate how the current and future requirements for flood defences have been incorporated into the development.
    - The removal of formal or informal flood defences is not acceptable unless this is part of an agreed flood risk management strategy by the Environment Agency.

The policy requires developments to be guided to areas with the lowest risk in line with the revised NPPF. It includes Flood Risk Assessment (FRA) guidance for developers and applicants and outlines requirements for the following areas:

- Basements and subterranean developments
- Flood defences
- Sustainable drainage It provides details on the Sequential and Exception Tests, functional floodplain, and flood emergency plans.

London Borough of Richmond upon Thames Surface Water Management Plan (Metis, 2021):

The Surface Water Management Plan (SWMP) was published in June 2011. The document helps LLFAs meet certain requirements as outlined in the FRR 2009, as it can provide the evidence based to inform PFRAs and help fulfil the requirement for FRMPs. The London Borough of Richmond upon Thames SWMP was created as part of the Drain London project to outline the preferred management strategy for surface water runoff for each borough.

The SWMP describes predicted and historic flooding from various sources which may impact upon surface water flood risk, including sewers, drains, groundwater plus runoff from land, small watercourses and ditches. It is broken down into a four-phase approach: Phase 1 – Preparation; Phase 2 – Risk Assessment; Phase 3 – Options; and Phase 4 – Implementation and Review.

As part of the Risk Assessment phase, the SWMP defined Critical Drainage Areas (CDAs) for the London Borough of Richmond upon Thames. CDAs are geographical areas (usually hydrological catchments) where multiple and cumulative sources of flood risk have the potential of causing flooding in one or more Local Flood Risk Zones. The impact of this potential flooding could affect people, property, and local infrastructure. The SWMP identified seven CDAs in the Borough:

- CDA 001: Twickenham
- CDA 005: Petersham
- CDA 002: St Margarets
- CDA 006: Teddington
- CDA 003: Strawberry Hill
- CDA 007: Hampton Wick
- CDA 004: Richmond and Mortlake

As part of the Options phase, the SWMP recommends potential mitigation options that could be incorporated into future CDA flood alleviation schemes. Full details regarding these options can be viewed in Section 4.3 of the SWMP.

London Borough of Richmond upon Thames Strategic Flood Risk Assessment (Metis, 2021):

The Strategic Flood Risk Assessment (SFRA) provides a strategic overview of all forms of flood risk throughout the borough, now and in the future. This document, and the associated web-based mapping delivered as part of the SFRA, is designed to help address local requirements, manage development requirements, and manage the risk of flooding posed to both residents and buildings. The local requirements addressed as part of this SFRA include climate change impacts, localised flood issues, and specific policies and interpretations of the Flood Zones.

The Site is identified as being located within SFRA Flood Zone 3a, outside the Environment Agency historic flood outline, an EA Area Benefitting from Flood Defences (ABD) and within the EA tidal breach inundation extent.

London Borough of Richmond upon Thames Article 4 Direction on Basement Developments

An Article 4 Direction is in place to manage basement development in areas potentially at risk of fluvial or tidal flooding. The purpose of the Direction is to monitor and, if necessary, restrict

the development of basements in areas where basement development may increase the risk to life due to flooding. This would remove the permitted development rights granted by Schedule 2 (Article 3) of the Town and Country Planning (Development Management Procedure) (England) Order 2015 in the area specified in the Direction. The Direction would apply to all types of basement developments including extensions, conversion and change of use to a higher 'vulnerability' classification as set out in PPG.

Basements represent a particularly high risk to life within flood hazard areas as they may be subject to very rapid inundation as floodwater moves across the floodplain. This rapid inundation could result in a risk to life. The Article 4 Direction does not prevent basement developments from occurring, but requires the applicant to apply for planning permission. In order to be granted permission, developers and applicants need to submit a site-specific FRA to demonstrate that the development can manage flood risk effectively and prevent an increase in the risk to life. The Article 4 Direction boundary is comprised of the tidal defence breach hazard and fluvial hazard extents for tidal and fluvial flood risk respectively.

Guidance

Strategic Flood Risk Assessments are carried out by local authorities, in consultation with the Environment Agency, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (NPPF, 2021).

3. Site analysis

Site information

The Site is located in 73 Castelnau Barnes, London, Greater London, SW13 9RT in a setting of residential land use at National Grid Reference TL 522478, 177130. Site plans and drawings are provided in Appendix A.

Figure 1. Aerial imagery of the Site (Bluesky, 2022)

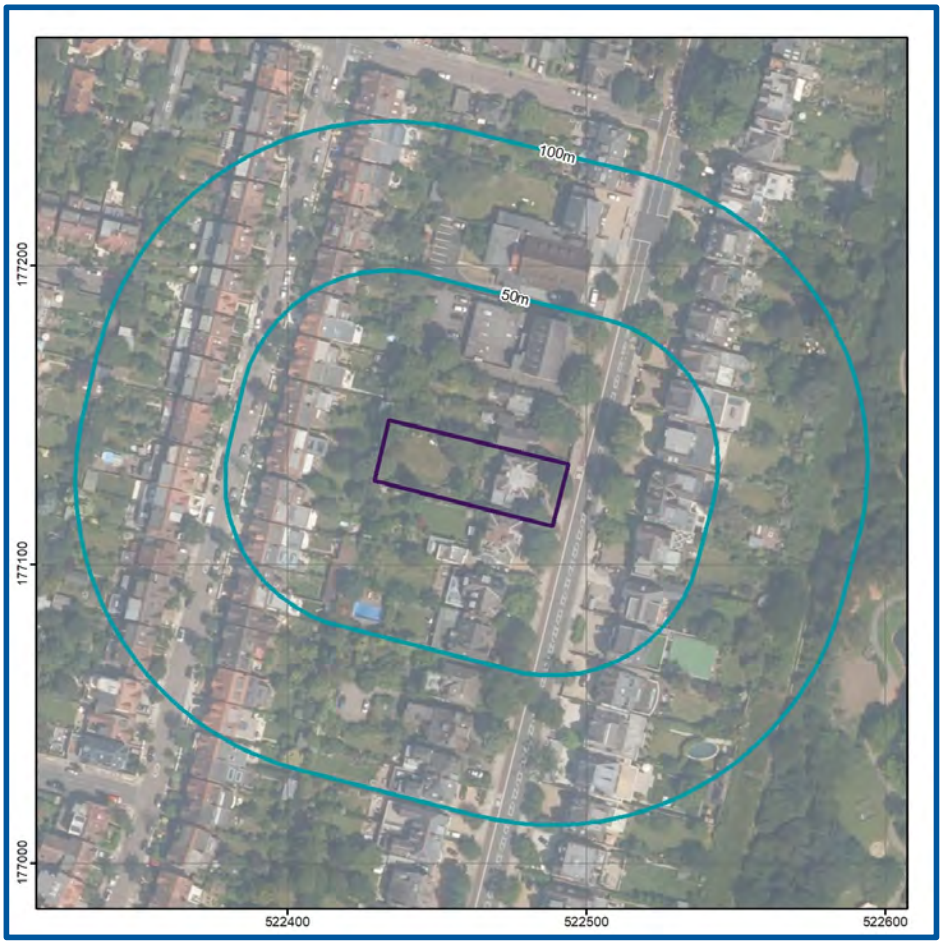
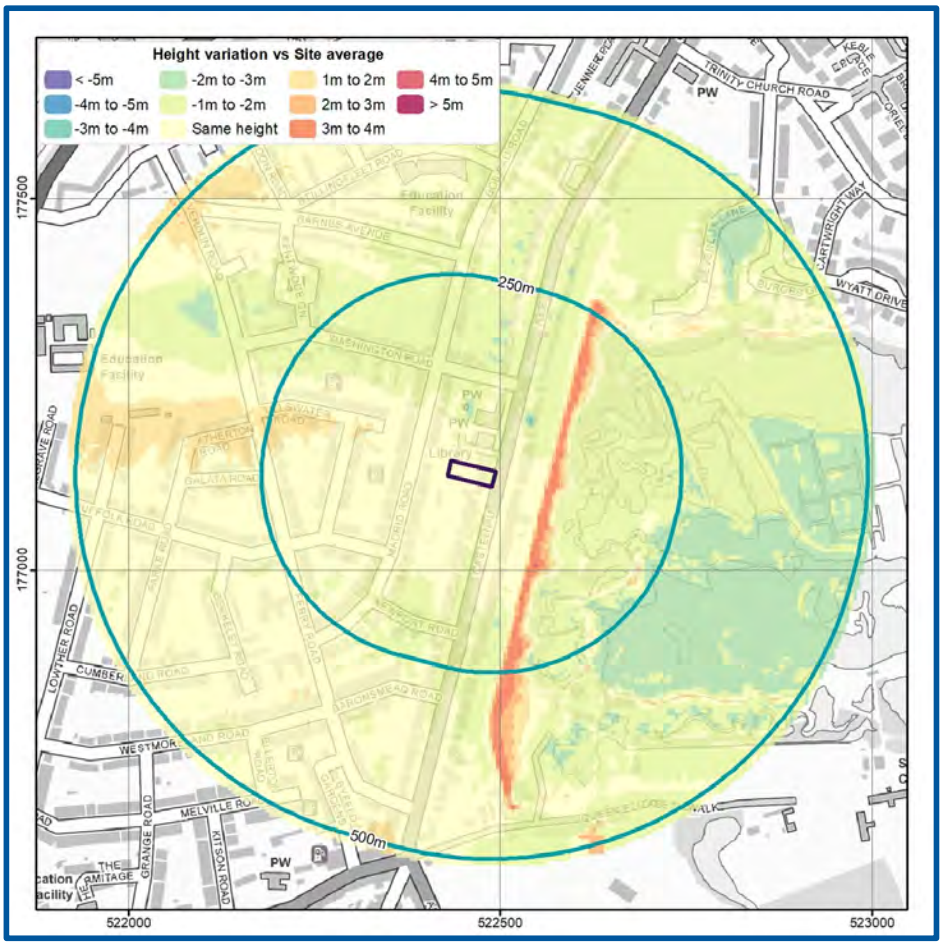


Figure 2 indicates ground levels within 500m of the Site fall in an easterly direction

The general ground levels on the Site are between 4.71-5.51 mAOD with the Site falling gradually in a westerly direction. This is based on EA elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ±0.15 m.

Figure 2. Site Location and Relative Elevations (GeoSmart, 2022)



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Development

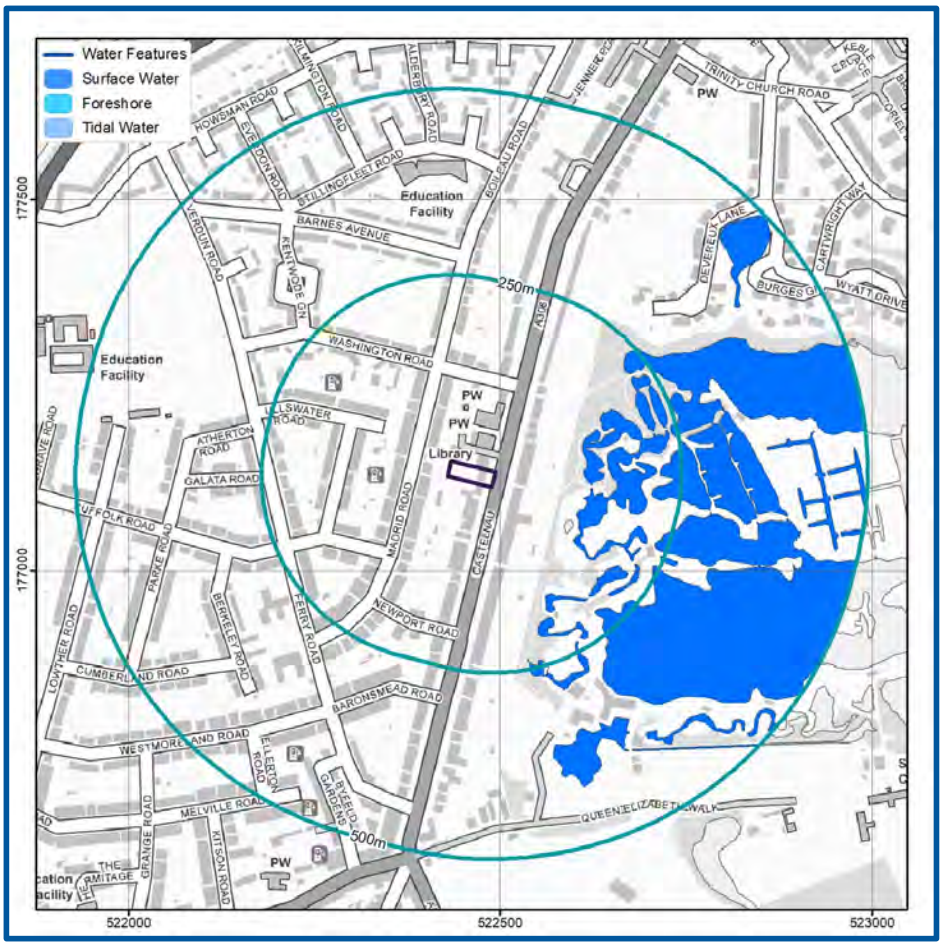
The Site is currently used within a residential capacity as a residential dwelling. Development proposals comprise a rear extension and pool house. Site plans are included within Appendix A.

The effect of the overall development will not result in an increase in number of occupants and/or users of the building and will not result in the change of use, nature or times of occupation. According to Annex 3 of the NPPG (2022), the vulnerability classification of the existing development is More Vulnerable and proposed development is More Vulnerable. The estimated lifespan of the development is 100 years.

Hydrological features

According to Ordnance Survey (OS) mapping included in the following figure, there are numerous surface water features within 500 m of the Site.

Figure 3. Surface water features (EA, 2022)



There are several unnamed reservoirs located approximately 140m to the east of the Site.

Leg O'Mutton Reservoir is located approximately 690m to the west of the Site.

The River Thames is located approximately 790m to the east of the Site and 800m west of the Site.

The Beverley Brook is located approximately 800m to the south of the Site.

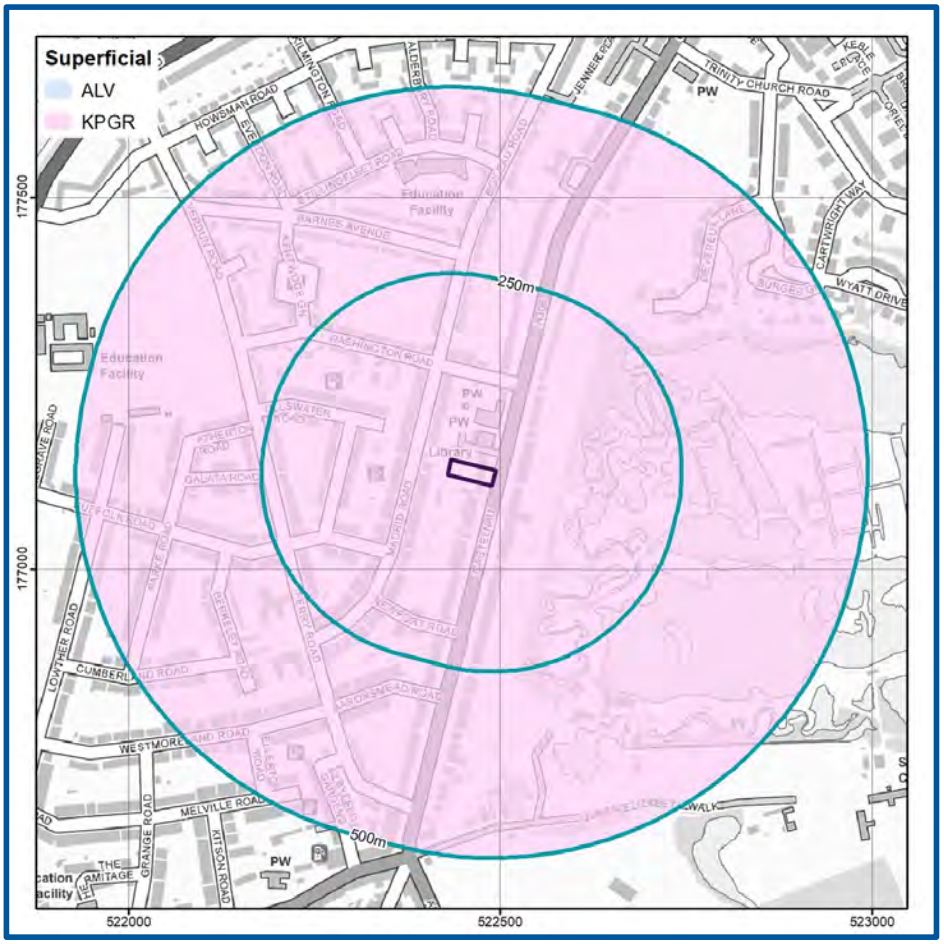
Proximity to relevant infrastructure

There are no relevant bridges/culverts within the vicinity of the Site that may become blocked.

Hydrogeological features

British Geological Survey (BGS) mapping indicates the underlying superficial geology (Figure 4) consists of Kempton Park Gravel Member (KPGR), comprising of sand and gravel (BGS, 2022) and is classified as a Secondary (A) Aquifer (EA, 2022).

Figure 4. Superficial Geology (BGS, 2022)



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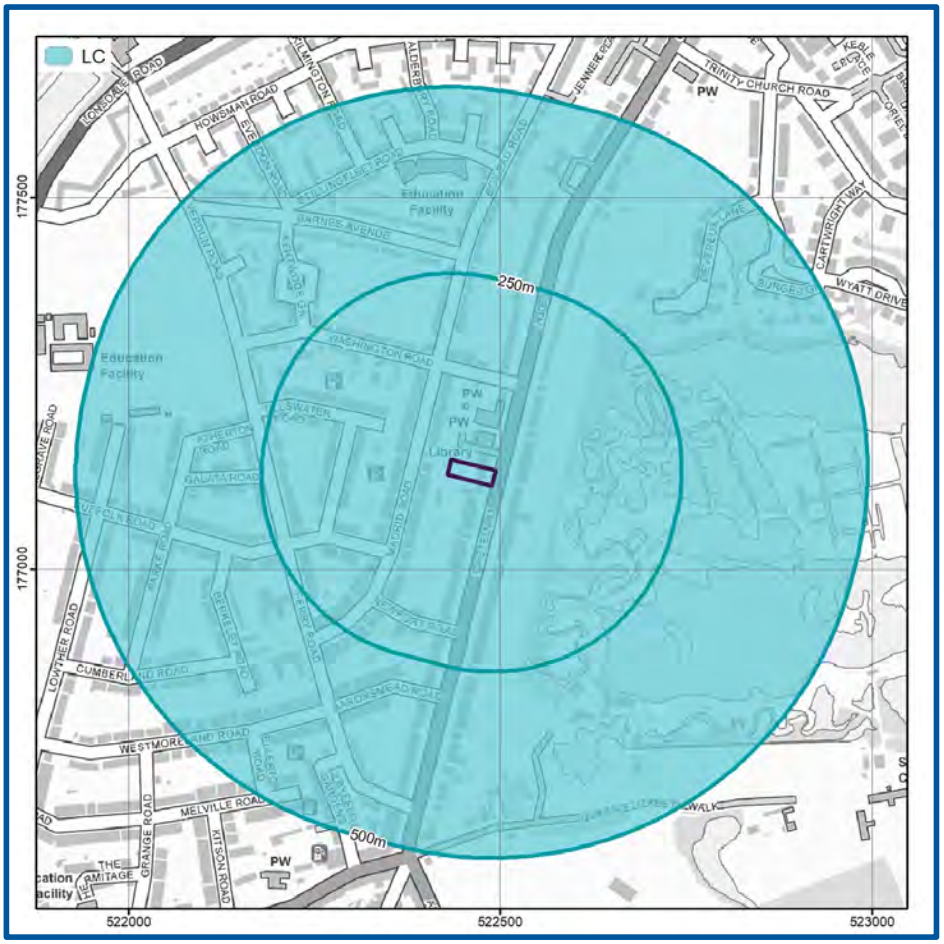
BGS mapping indicates the underlying bedrock geology (Figure 5) consists of the London Clay Formation (LC), comprising of clay and silt (BGS, 2022) and is classified as a Unproductive Strata (EA, 2022).

Figure 5. Bedrock Geology (BGS, 2022)



Geological conditions

A review of the BGS borehole database (BGS, 2022) indicates the nearest and most relevant borehole to the Site (ref: TQ27NW308) is located 140 m to the south east of the Site boundary at an elevation of 7.30 mAOD, and indicates the underlying geology to consist of sand and gravel overlying London Clay.

Groundwater

Groundwater levels were not recorded.

4. Flood risk to the development

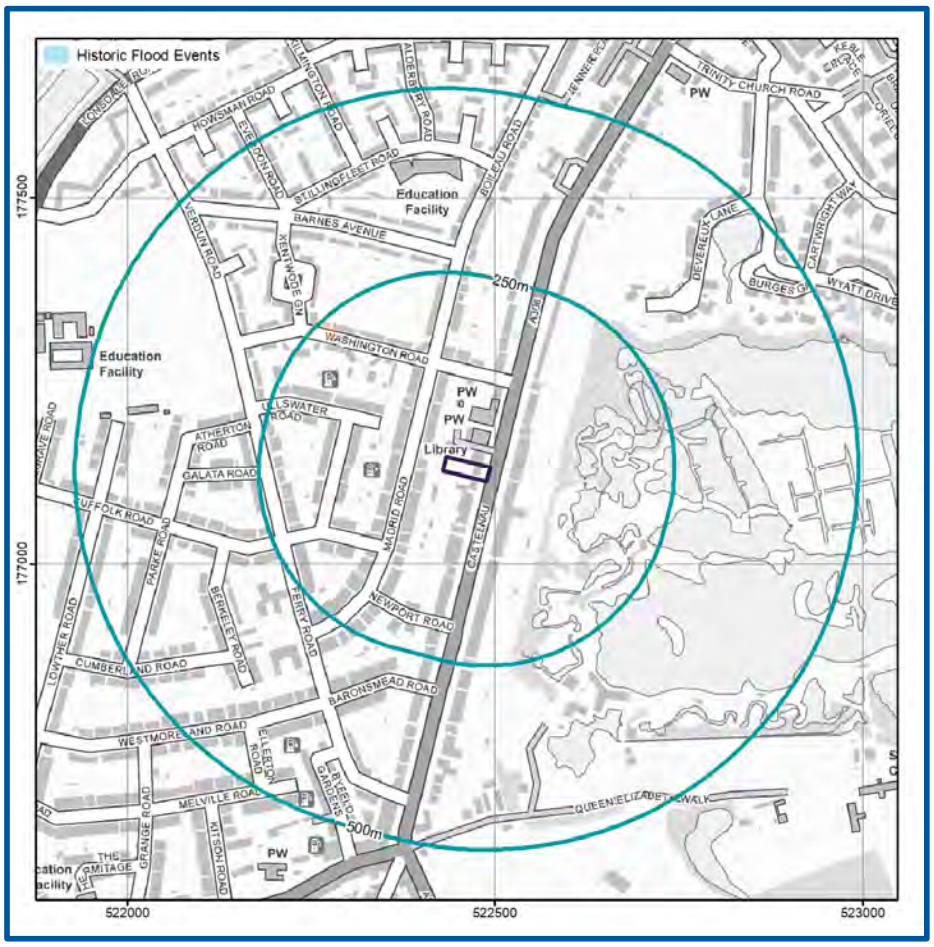
Historical flood events

According to the EA's Historical Flood Map (Figure 6) there have been no flooding events affecting the Site.

The London Borough of Richmond SFRA (Metis, 2021) shows that the Site is located outside the Environment Agency historic flood outline.

The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on-Site or that flooding will never occur at the Site.

Figure 6. EA historic flood map



Estuarine (tidal) flooding

The Site is located in an estuarine location and flooding could occur from a combination of the sea, termed as coastal flooding and from rivers, termed as fluvial flooding. There may be a predominant effect from either the sea or from the river.

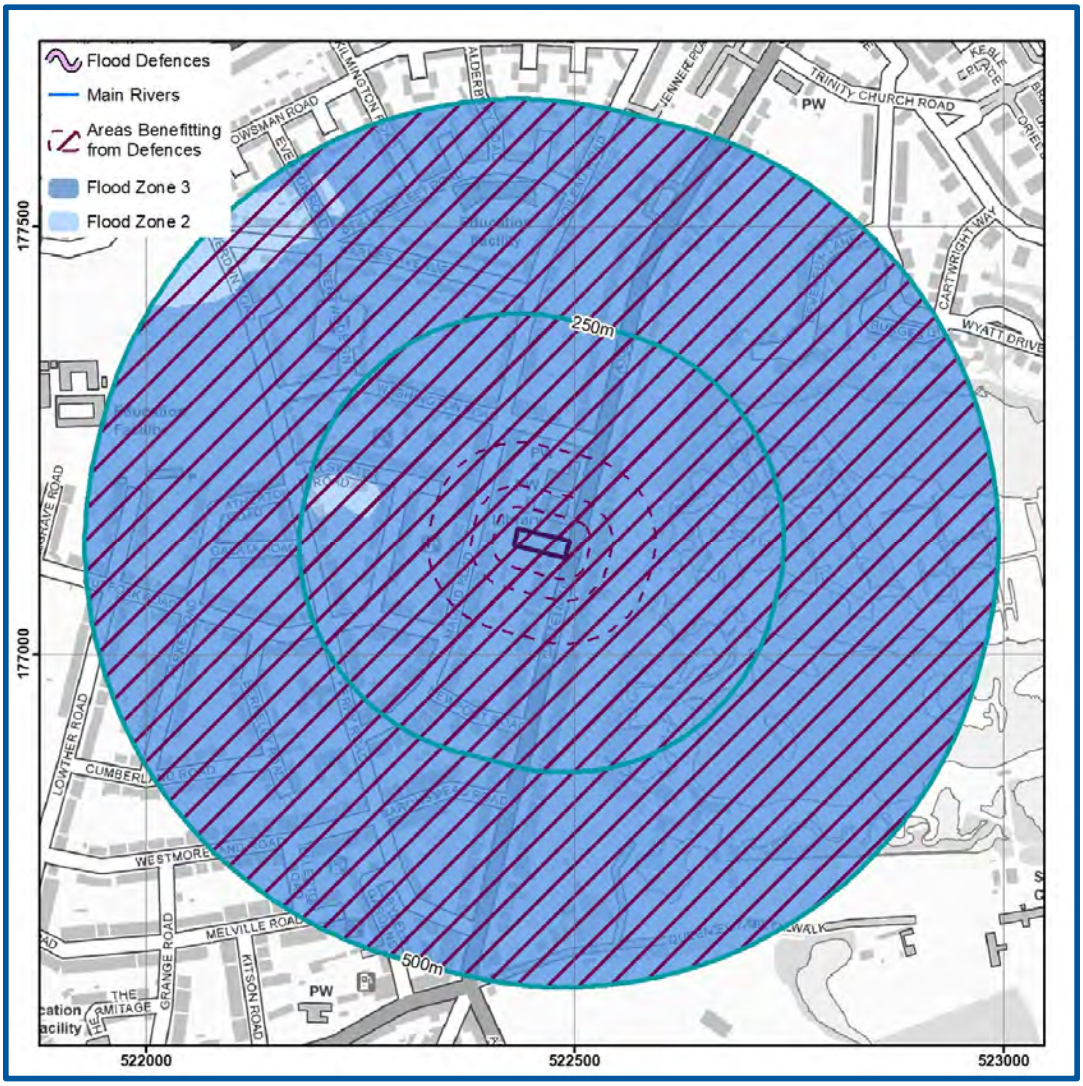
Estuarine flooding can occur from a combination of the sea, termed as coastal flooding and from rivers, termed as fluvial flooding. There may be a predominant effect from either the sea or from the river, through the following processes:

- High tide levels – variations in tidal levels due to gravitational effects of the sun and moon can result in higher sea levels – there is an approximate twice daily variation between high and low tide, onto which is superimposed a spring-neap tide cycle when extra high and low tides occur.
- Surge – an increase in sea level above tidal level caused by low atmospheric pressure which may be exacerbated by the wind acting on the sea. Tidal flooding is of greatest risk when tidal surges combine with high tides;

The Thames Estuary is one of the United Kingdom's major east-coast estuaries. It extends from the tidal limit of the River Thames at Teddington Lock in the west, through the heart of London, out to the North Sea. The character of the flooding changes from a fluvial dominance in the upstream reaches to the hazards posed by storm surges and waves in the downstream reaches.

According to the EA's Flood Map for Planning Purposes (Figure 7), the Site is located within fluvial and tidal Flood Zone 3 and is therefore classified as having a High probability of fluvial and tidal (coastal) flooding from the River Thames.

Figure 7. EA Flood Map for Planning Purposes (EA, 2022)



Guidance

As defined in the NPPF (2021):

Ignoring the presence of any defences, land located in a Flood Zone 3 is considered to have High probability of flooding with a 1 in 100 year or greater annual probability of fluvial flooding or a 1 in 200 or greater annual probability of coastal flooding in any one year.

Development of "Water-Compatible" and "Less Vulnerable" land uses are suitable for this zone with "More Vulnerable" and "Essential Infrastructure" requiring an Exception test to be passed prior to development taking place. (see glossary for terminology).

Flood defences

Guidance

Sites that are located close to flood defences are likely to be zones where rapid inundation will occur in the event of the flood defences being overtopped or breached. A Site located close to flood defences (within 250 m) may require a more detailed FRA subject to local topography.

Existing flood defences

- The Site is in the EA's Area Benefitting from Flood Defences (ABD). [1]
- The nearest flood defences are c. 710m east along the river Thames.

Information from the EA relating to the flood defences is outlined below.

- According to the EA (2021) the flood defences in place for this area are designed to defend up to a 1 in 1000 year flood event.
- The nearest and most applicable formal flood defences are raised and man-made with a minimum crest level of 5.54 mAOD.
- The Thames Tidal Barrier was constructed specifically to prevent the tidal surge passing upstream into the built up areas of London.
- The TE2100 plan notes that the preferred protection policy up to the year 2070 is therefore to improve the standard of exiting defences along the River Thames (i.e. 'hold the line'). Therefore, it may be assumed that, although the severity of floods predicted in the future, the site will continue to be defended against flooding all events up to and including the 1 in 1000 year (plus climate change) event.

Model data (Tidal)

As the Site is located within the EA's tidal floodplain, modelled flood elevation data was obtained from the EA. This data is more up to date than that which is included in the London Borough of Richmond SFRA (Metis, 2021) and has been used to assess flood risk and to provide recommendations for mitigation for the proposed development.

[1] The EA maps Areas which Benefit from the presence of Defences (ABD) in a 1 in 100 (1%) chance of flooding each year from rivers; or 1 in 200 (0.5 %) chance of flooding each year from the sea. If the defences were not there, these areas would flood in a 1 in 100 (1%)/ 1 in 200 (0.5 %) or larger flooding incident. The EA do not show all areas that benefit from all flood defences, some defences are designed to protect against a smaller flood with a higher chance of occurring in any year, for example a flood defence which protects against a 1 in 30 chance of flooding in any year. Such a defence may be overtopped in a flood with a 1 in 100 (1%)/ 1 in 200 (0.5%) chance of occurring in any year, but the defence may still reduce the affected area or delay (rather than prevent) a flood, giving people more time to act and therefore reduce the consequences of flooding.

Thames Estuary 2100 (TE2100)

The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels - for which the Barrier would normally shut for the 2008 epoch - will have to be allowed through to ensure the barrier is not shut too often. For this reason, levels upriver of the barrier will increase and the tidal walls will need to be heightened to match.

The Environment Agency's present day water levels for the tidal River Thames at the Site are as follows:

- The current extreme water level is 4.96 mAOD and flood defences are 5.54 mAOD therefore will prevent overtopping occurring in this scenario.

The proposed flood defence levels to allow for future 2100 predictions are 6.70 mAOD with the predicted 2100 plus climate change water levels rising to 5.89 mAOD. When compared with the existing defence heights and proposed (2100) defence raising, the data confirms even if the water level in the River Thames rises due to climate change, the defences are going to be raised too and therefore the Site will always be defended (EA, 2022).

Table 2. EA Modelled flood data level for Node Point 2.21

Ground Levels at the area proposed for development (mAOD)	Present day and future modelled in-channel water (1 in 200 year and flood defence levels (mAOD)			
	2015 water level*	Present day defence level*	Modelled 2100 water level*	2100 defence level*
4.71 – 5.51	4.96	5.54	5.89	6.70
Flood depths (m)	No Flooding		No Flooding	

*Taken from the nearest node point 2.21 to the Site

Residual Tidal Flood Risk

The tidal flood assessment in this section represents the likelihood of flooding from overtopping at the Site, where flood defences are in good condition and are fully maintained. The Site is not at risk of overtopping, however there is a residual risk related to a breach in the Thames flood defences.

Thames Tidal Upriver Breach Inundation Modelling Study (May, 2017)

Modelled breach flood level data has been taken from the Thames Tidal Upriver Breach Assessment (Teddington Weir to Thames Barrier) (Atkins, 2017) to assess flood risk and provide recommendations for mitigation measures.

The breach flood level data has been extracted from the EA's 2D floodplain grid data using QGIS (v3.16.10).

The mapped data indicates the Site would not flood in the 2005 scenario, but would flood in the 2100 breach flood scenario.

Table 3. Modelled Breach Flood Levels

Ground levels on-Site (mAOD)	1 in 200 year scenario breach flood level (mAOD)	
	2005	2100
4.71 – 5.51	5.25	5.89
Flood depths (m)	No Flooding	Up to 1.18

As ground levels at the Site are between 4.71 – 5.51 mAOD, the 2100 flood depth at the Site would be up to approximately 1.18 m.

Climate change factors

The EA's *Flood risk assessments: climate change allowances* guidance (Published 19 February 2016 and updated May, 2022) has been used to inform a suitable increase in sea level rise for the proposed development. The updated guidance confirms 'More Vulnerable' developments are required to undertake a Basic assessment approach.

As the Site is located within the Thames River Basin and the proposed development is classed as More Vulnerable, where the proposed lifespan is approximately 100 years, the Higher 13.1 mm allowance have been used to determine a suitable climate change factor to apply to sea levels. The climate change allowances relevant to the proposed development have already been modelled and are provided in the table below.

Table 4. Modelled flood levels plus climate change allowances

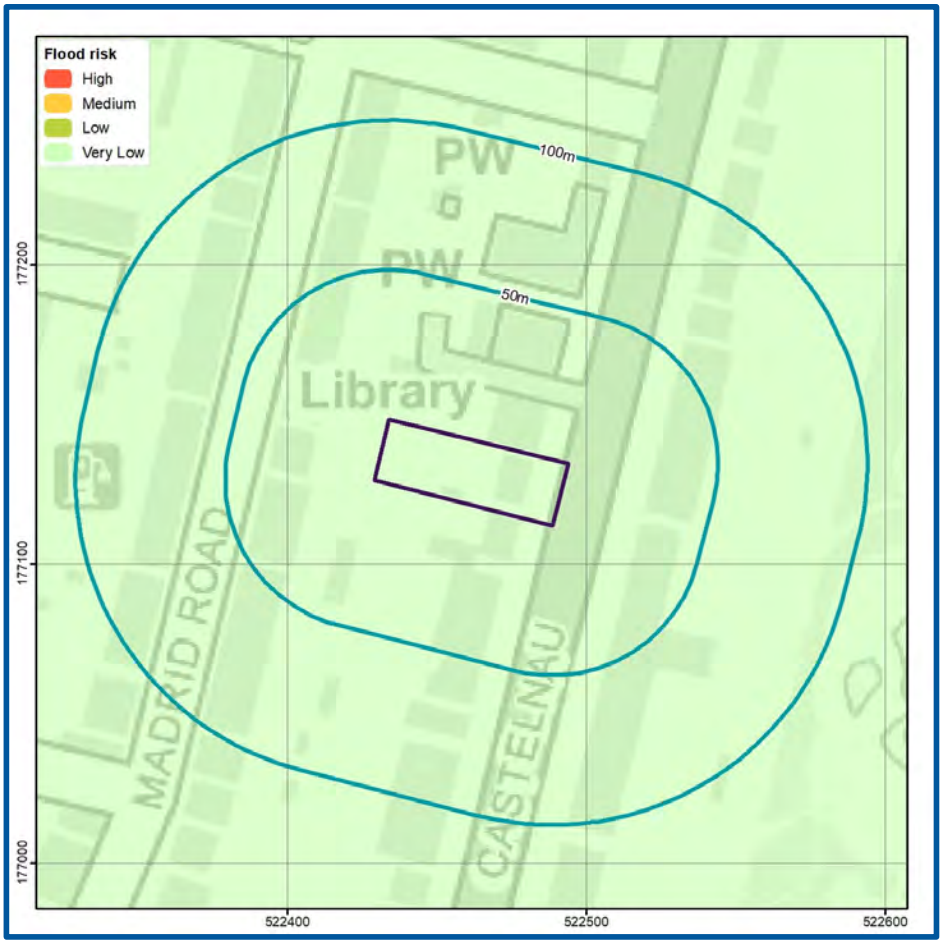
Ground levels on-Site development (mAOD)	Modelled Flood Levels (mAOD)
	1 in 200 year 2100 scenario flood level plus climate change (mAOD)
4.71 – 5.51	5.89
Flood depths (m)	Up to 1.18

Flood risk including the benefit of defences

The type and condition of existing flood defences influence the 'actual' risk of fluvial flooding to the Site, albeit the long-term residual risk of flooding (ignoring the defences) should be considered when proposing new development.

According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map (Figure 8), which considers the type, condition and crest height of flood defences, the Site has a Very Low risk of flooding.

Figure 8. Risk of Flooding from Rivers and Sea map (EA, 2022)



Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and coastal floodplains.

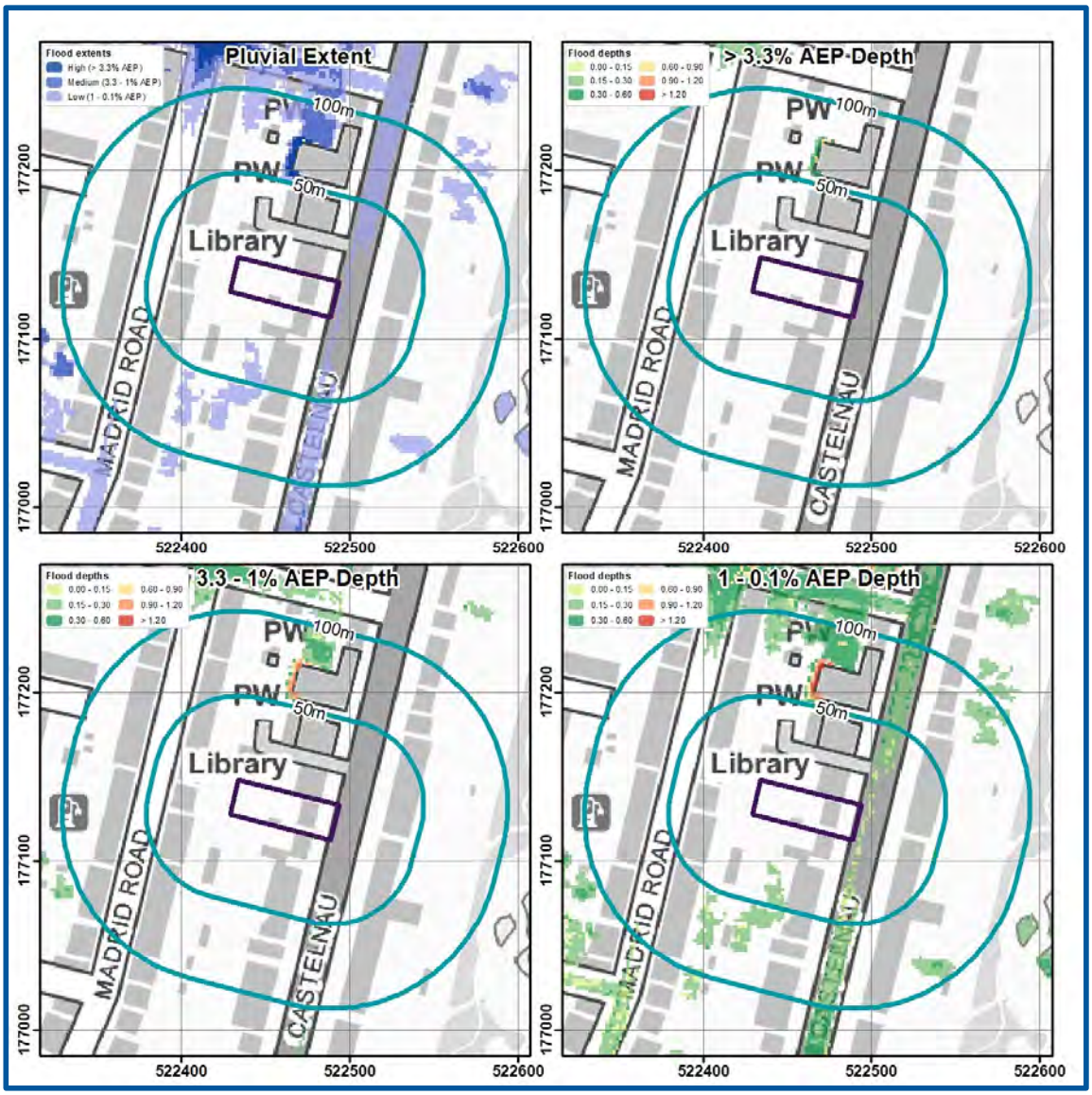
The SFRA does not indicate reported incidents of historical surface water flooding within 100 m of the Site and confirms the Site is not located within a Critical Drainage Area (CDA)[2] (Metis, 2021).

- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping (Figure 9), the Site has a Very Low risk of pluvial flooding[3].

[2] A Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF, 2021). CDA's are specific to Flood Zone 1, defined as areas where runoff can and may have historically contributed to flooding downstream, although they are not necessarily areas where flooding problems may occur. Where a Site is located in Flood Zone 1 and within a CDA, a Flood Risk Assessment (FRA) is required and the Council may also request Sustainable Drainage Scheme (SuDS) features to be included within the proposed development.

[3] Environment Agency. April 2019. What is the Risk of Flooding from Surface Water map? Version 2.0. Accessed from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/842485/What-is-the-Risk-of-Flooding-from-Surface-Water-Map.pdf

Figure 9. EA surface water flood extent and depth map (EA, 2022)



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Guidance

According to EA's surface water flood risk map the Site is at:

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).

Flooding depths of up to 0.15 m are mapped adjacent to the Site, but these are likely to be contained within the highway of Castelnau Street so are unlikely to affect the Site.

Climate change factors

Paragraph 002 of the National Planning Practice Guidance (August, 2022) requires consideration of the 1% AP (1 in 100 year) event, including an appropriate allowance for climate change.

As the Site is located within the London Management Catchment and the proposed development is classed as More Vulnerable, where the proposed lifespan is approximately 100 years. years, the Central (17%) allowance is required to determine a suitable climate change factor to apply to rainfall data.

The 0.1% AP (1 in 1000 year) surface water flooding event has been used as a proxy in this instance for the 1% AP (1 in 100 year) plus climate change event.

The EA's pluvial flow route mapping in the 1 in 1000 year (Low probability) event confirms the Site would not be impacted by surface water (pluvial) flooding.

Surface water flooding flow routes

Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000 year (Low probability) event confirms the Site is not located on a potential overland flow route.

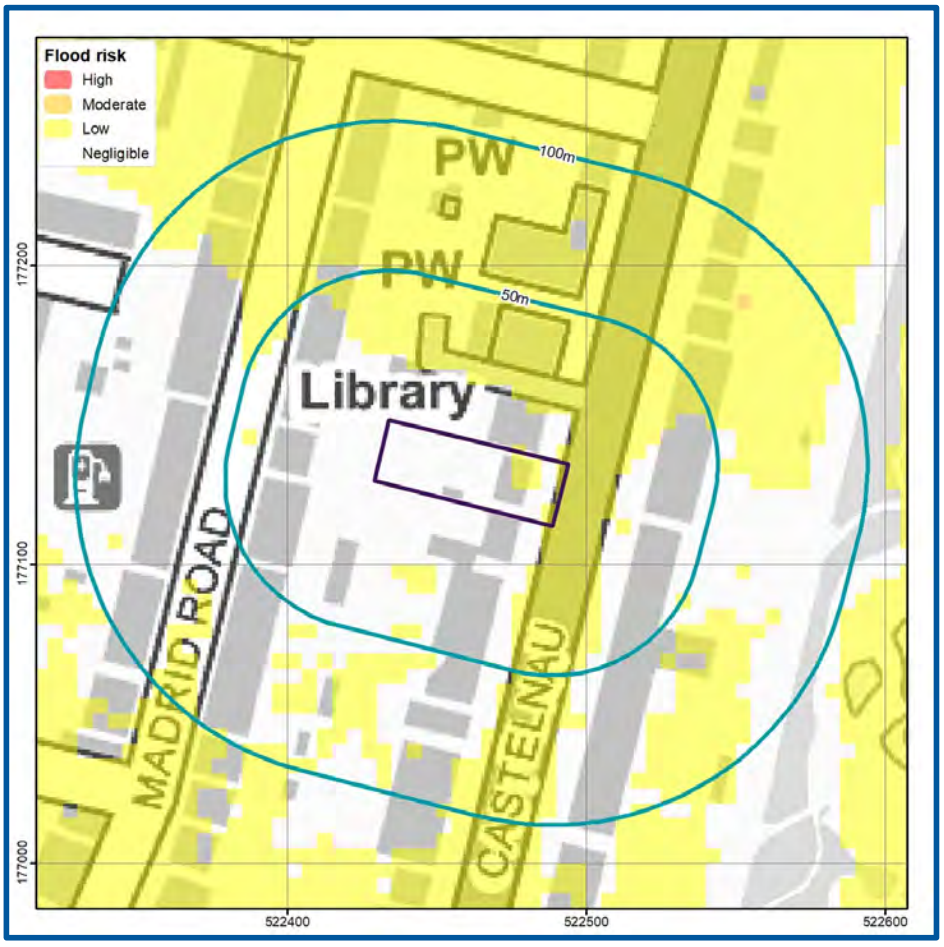
A review of the Site plans, topography and the EA's Risk of Flooding from Surface Water Direction mapping indicates any overland flows on the Site would not be obstructed by the proposed development and occur across non-essential areas of the Site.

Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 10) indicates there is a Low risk of groundwater flooding at surface in the vicinity from permeable superficial deposits during a 1 in 100 year event.

Figure 10. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2022)



Mapped classes within the screening map combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local factors may reduce groundwater flood risk to land and property even where it lies within

mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area.

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) including BGS borehole data and the EA's fluvial and tidal floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

It is understood the Site contains an existing basement. The existing basement is set c. 1.5 m bgl. The risks are higher for basements, buried infrastructure and soakaway systems which may be affected by high groundwater levels.

Permeable Kempton Park Gravel Member (KPGR), comprising of sand and gravel (BGS, 2022), has been identified overlying low permeability London Clay Formation.

According to a review of the hydrogeology (Section 3), as the Site is underlain by permeable superficial deposits above low permeability bedrock, a shallow groundwater table could potentially exist above the contact between the superficial and bedrock layers, resulting in a 'perched' groundwater table. Groundwater levels may rise in the superficial aquifer in a seasonal response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years.

Groundwater levels may also rise in the superficial aquifer in response to high river events due to the potential hydraulic continuity with the nearby River Thames.

It is noted groundwater flooding may occur in response to prolonged high water levels, by-passing flood defences even if overtopping does not occur

The design of the property should consider the groundwater pathway through permeable formations.

According to a review of the hydrogeology (Section 3), there are no nearby boreholes from which the underlying groundwater depth can be inferred in detail.

The hydrogeological characteristics suggest there is potential for a groundwater table beneath the Site.

The baseline groundwater flood risk rating is Low, but on the basis of the site-specific assessment the groundwater flood risk is considered to be Moderate.

Guidance

Moderate Risk - There will be a significant possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. Rainfall recharge patterns will vary regionally resulting in changes to

average groundwater levels. A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment. Sea level rises of between 0.4m and 1m are predicted by 2100, leading to a rise in average groundwater levels in the adjacent coastal aquifer systems, and potential increases in water levels in the associated drainage systems. The 'backing up' of groundwater levels from both coast and tidal estuary locations may extend a significant distance inland and affect infrastructure previously constructed above average groundwater levels.

The impact of climate change on groundwater levels beneath the Site is linked to the predicted rise in average sea level.

Flooding from artificial sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.)

Sewer flooding

The London Borough of Richmond SFRA (Metis, 2021) has identified 10 to 20 incidents reported incidences of flooding as a result of surcharging sewers within the SW13 9 postcode. However, it is recognised that this four digit postcode covers a large area and instances of flooding are not specific to the Site.

Guidance

Properties classified as "at risk" are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

Canal failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact the local water supplier (Thames Water).

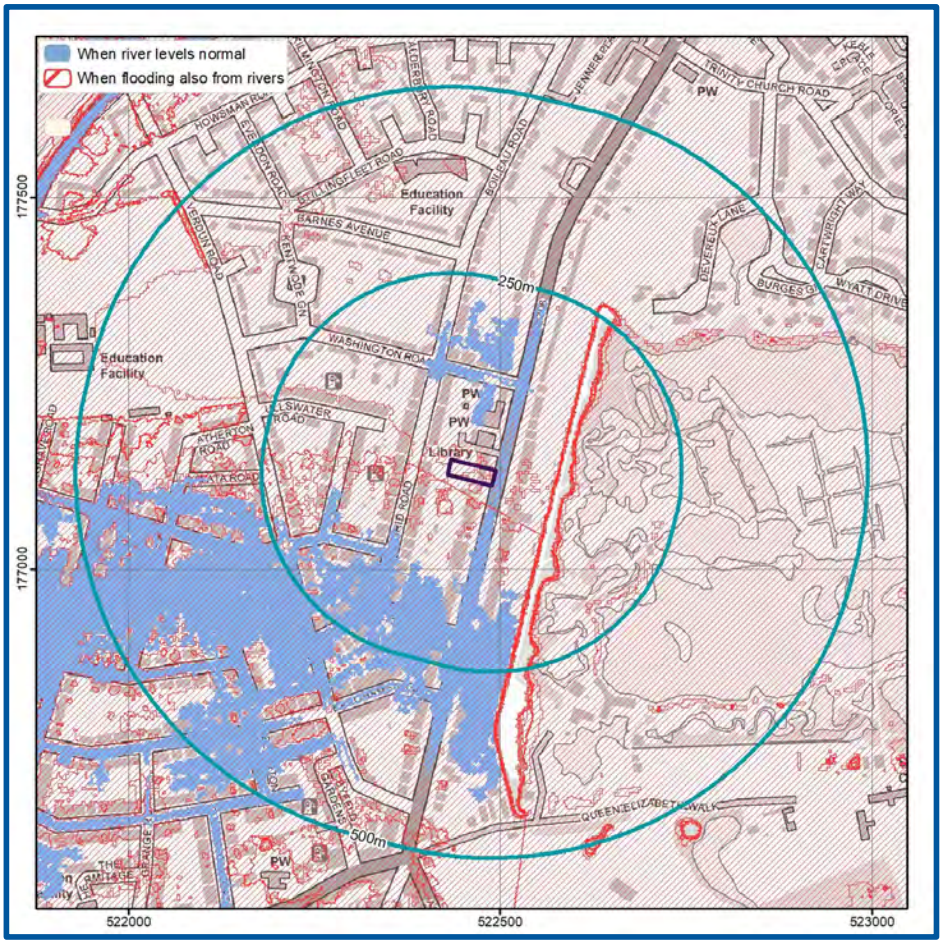
Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is at risk of flooding in the "wet day" scenario, from the following reservoirs (Figure 11) (EA, 2022).

The Site is considered to be at risk of flooding from The Queen Mother Reservoir, Wraysbury Reservoir, the King George VI Reservoir, Staines Reservoir, Queen Mary Reservoir, Knight Reservoir, Bessborough Reservoir, the Queen Elizabeth II Reservoir and Island Barn Reservoir located upstream of the Site.

A "dry day" scenario predicts the flooding that would occur if the dam/reservoir failed when rivers are at normal levels. The "wet day" scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood. The event of a reservoir breach is considered extremely unlikely.

Figure 11. EA Risk of Reservoir Flooding (EA, 2022)



Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m^3 of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2022).

Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

Culverts and bridges have not been identified within 50 m of the Site.

5. Flood risk from the development

Floodplain storage

Where flood storage from any source of flooding is to be lost as a result of development, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on site, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked.

The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal.

The development is located within a tidal Flood Zone 3 and involves an increase in the proposed building footprint. However, in tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage is not considered to be necessary (CIRIA C624 (2004)).

Drainage and run-off

Based on the topography and low surface water flood risk in the vicinity, interference or interaction with overland flow paths and inflows from off-Site is considered unlikely.

The proposed development involves an Choose an item. of impermeable surfaces at the Site. An estimation of run-off is therefore required to permit effective Site water management and prevent any increase in flood risk to off-Site receptors from the Site.

The potential surface water run-off generated from the Site during a 1 in 100 year return period should be calculated, using FEH 2013 rainfall data from the online Flood Estimation Handbook (FEH), developed by NERC (2009) and CEH (2016).

The NPPF (2021) recommends the effects of climate change are incorporated into FRA's. As per the most recent update to the NPPG (May 2022) the applicable climate change factor for the 1 in 30 (≥ 3.3% AEP) and 1 in 100 (< 3.3 to 1% AEP) year event to apply to surface water flooding is dependent upon the management catchment.

As the proposed development is being changed to residential, the lifespan of the development and requirements for climate change should allow up to the 1% AEP upper end allowance. As the Site is located within the London Management Catchment the following peak rainfall allowances are to be applied.

Table 5. Climate change rainfall allowances

London Management Catchment	3.3% Annual exceedance rainfall event		1% Annual exceedance rainfall event	
	2050s	2070s	2050s	2070s

Upper end	35%	35%	25%	40%
Central	20%	20%	20%	40%

Sustainable Drainage System (SuDS)

It is recommended that attenuation of run-off is undertaken on-Site to compensate for proposed increases in impermeable surface areas. Attenuation may comprise the provision of storage within a Sustainable Drainage System (SuDS). SuDS can deliver benefits from improving the management of water quantity, water quality, biodiversity and amenity. Potential SuDS options are presented in the table below, subject to further investigation:

Table 6. SuDS features which may be feasible for the Site

Option	Description
Rainwater harvesting	Rainwater harvesting can collect run-off from the roofs for use in non-potable situations, using water butts for example.
Permeable paving	Permeable pavements can be used for driveways, footpaths and parking areas to increase the amount of permeable land cover. Suitable aggregate materials (angular gravels with suitable grading as per CIRIA, 2007) will improve water quality due to their filtration capacity. Plastic geocellular systems beneath these surfaces can increase the void space and therefore storage but do not allow filtration unless they are combined with aggregate material and/or permeable geotextiles.
Swales	Shallow, wide and vegetated channels that can store excess run-off whilst removing any pollutants.
Soakaways	An excavation filled with gravel within the Site. Surface water run-off is piped to the soakaway.

6. Suitability of the proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

National policy and guidance

The aims of the national planning policies are achieved through application of the Sequential Test and in some cases the Exception Test.

Guidance

Sequential test: The aim of this test is to steer new development towards areas with the lowest risk of flooding (NPPF, 2021). Reasonably available sites located in Flood Zone 1 should be considered before those in Flood Zone 2 and only when there are no reasonably available sites in Flood Zones 1 and 2 should development in Flood Zone 3 be considered.

Exception test: In some cases, this may need to be applied once the Sequential Test has been considered. For the exception test to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Suitability of the proposed development, and whether the Sequential and Exception Tests are required, is based on the Flood Zone the Site is located within and the flood risk vulnerability classification of the existing and proposed development. Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

This report has been produced to assess all development types, prior to any development. The vulnerability classification and Flood Zones are compared within the table overleaf (Table 2 of the NPPG (2022)).

As the Site is located within Flood Zone 3a and the proposed development is defined as More Vulnerable; the proposals are acceptable, but may be subject to the Sequential and Exceptions Test.

The proposed development is an extension to the existing property which comprises a rear extension and pool house and is therefore defined as minor development.

Paragraph 168 of the NPPF states: *"Applications for some minor development should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments."* (NPPF, 2021).

The NPPG (2022) defines a 'minor development' as *"householder development and small non-residential extensions (with a footprint of less than 250 m^2)."*

As a result, as the proposals are defined as "minor development – householder development" they are not subject to the Sequential Test or an Exception Test.

Table 7. Flood risk vulnerability and flood zone 'incompatibility (taken from NPPG, 2022)

Flood risk vulnerability classification		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone	Zone 1 – low probability	✓	✓	✓	✓	✓
	Zone 2 – medium probability	✓	✓	Exception test required	✓	✓
	Zone 3a - high probability	Exception test required	✓	X	Exception test required*	✓
	Zone 3b – functional flood plain	Exception test required	✓	X	X	X

*As the development proposals are for a minor development the Sequential and Exception Tests are not required.

EA Flood Risk Standing Advice for vulnerable developments located in Flood Zones 2 or 3 (February, 2022)

The proposed development is considered to be a minor extension, this is defined as a household or non-domestic extension with a floor space of no more than 250 m^2.

In line with the 'Minor extensions standing advice'

- A plan is required showing the finished floor levels and the estimated flood levels.
- Floor levels are either no lower than existing floor levels or 0.3 m above the estimated flood level. If your floor levels aren't going to be 0.3 m above existing flood levels, you need to check with your local planning authority if you also need to take flood resistance and resilience measures.

Surface water management

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

- Surface water management plan where available; OR
- Strategic flood risk assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than $5m^2$.

Access and evacuation

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:

- Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;
- Basement rooms have clear internal access to an upper level, e.g. a staircase;
- Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

Floor levels

The following should be provided:

- average ground level of your site
- ground level of the access road(s) next to your building
- finished floor level of the lowest room in your building

Finished floor levels should be a minimum of whichever is higher of 300mm above the:

- average ground level of the site
- adjacent road level to the building
- estimated river or sea flood level

You should also use construction materials that have low permeability up to at least the same height as finished floor levels.

If you cannot raise floor levels to meet the minimum requirement, you will need to:

- raise them as much as possible
- consider moving vulnerable uses to upper floors
- include extra flood resistance and resilience measures

When considering the height of floor levels, you should also consider any additional requirements set out in the SFRA. Flood water can put pressure on buildings causing structural issues. If your design aims to keep out a depth of more than 600mm of water, you should get advice from a structural engineer. They will need to check the design is safe.

Extra flood resistance and resilience measures

Follow the guidance in this section for developments in flood risk areas where you cannot raise the finished floor levels to the required height. You should design buildings to exclude flood water where possible and to speed recovery in case water gets in.

Make sure your flood resilience plans for the development follow the guidance in the CIRIA Property Flood Resilience Code of Practice. Please note that the code of practice uses the term 'recovery measures'. In this guide we use 'resilience measures'.

Flooding can affect the structural stability of buildings. If your building design would exclude more than 600mm of flood water, you should get advice from a structural engineer. They will need to check the design is safe. Only use resistance measures that will not cause structural stability issues during flooding. If it is not possible to safely exclude the estimated flood level, exclude it to the structural limit then allow additional water to flow through the property.

The design should be appropriately flood resistant and resilient by:

- using flood resistant materials that have low permeability to at least 600mm above the estimated flood level
- making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level
- using flood resilient materials (for example lime plaster) to at least 600mm above the estimated flood level
- by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level
- making it easy for water to drain away after flooding such as installing a sump and a pump
- making sure there is access to all spaces to enable drying and cleaning
- ensuring that soil pipes are protected from back-flow such as by using non-return valves

Temporary or demountable flood barriers are not appropriate for new buildings. Only consider them for existing buildings when:

- there is clear evidence that it would be inappropriate to raise floor levels and include passive resistance measures
- an appropriate flood warning or other appropriate trigger is available

If proposals involve the development of buildings constructed before 1919, refer to Flooding and Historic Buildings guidance produced by Historic England.

Environment Agency pre-application response:

The EA were contacted as part of this FloodSmart report in order to obtain site-specific feedback on the proposed development. However, a response was not received within the timeframe of this report.

7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

Estuarine (fluvial/coastal/tidal) flood mitigation measures

The Site is located within an area which is affected by flooding from tidal flooding, the following table confirms the flood depths associated with the area proposed for development.

Table 8. EA Modelled flood data level for Node Point 2.21

Ground Levels at the area proposed for development (mAOD)	Present day and future modelled in-channel water (1 in 200 year and flood defence levels (mAOD)				
	2015 water level*	Present day defence level*	Modelled 2100 water level*	2100 defence level*	Modelled 2100 water level plus CC allowance
4.71 – 5.51	4.96	5.54	5.89	6.70	5.89
Flood depths (m)	No Flooding		No Flooding		No Flooding

*Taken from the nearest node point 2.21 to the Site

Table 9. Modelled Breach Flood Levels

Ground levels on-Site (mAOD)	1 in 200 year scenario breach flood level (mAOD)	
	2005	2100
4.71 – 5.51	5.25	5.89
Flood depths (m)	No Flooding	Up to 1.18

As ground levels at the Site are between 4.71 – 5.51 mAOD, the 2100 flood depth at the Site would be up to approximately 1.18 m.

Raising minimum floor levels

It is not possible to raise FFL's to above the tidal flood level as an extension is proposed to extend the habitable living accommodation of the existing building. It would be more appropriate to set FFL's to the same level as existing and incorporate standard flood resistance and resilient measures.

Appropriate Mitigation

A water exclusion strategy for flood depths up to 0.3 m in line with the EA's Standing Advice should be adopted. A water exclusion strategy, using avoidance and resistance measures, is appropriate where floods are expected to last for short durations. Potential water exclusion strategies include:

- Passive flood door systems;
- Temporary flood barriers;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.

Avoidance and resistance measures are unlikely to completely prevent floodwater entering a property, particularly during longer duration flood events. Therefore, it is recommended that the following flood resilience measures are also considered.

- Flood resilient materials and designs:
    - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
    - Hard flooring and flood resilient metal staircases;
    - The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
    - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
    - Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

As flood depths are expected to exceed 0.6 m at the Site, a water entry strategy should be adopted to preserve building integrity and to promote flood resilience rather than resistance (which is more difficult to achieve for significant flood depths). A structural engineer should be consulted to confirm this would be a suitable strategy for the proposed development, to ensure flood flows would not impact the structural integrity of the building. Potential strategies include:

- Ground floors designed to permit water passage at high flood depths;
- Hard flooring and flood resilient metal staircases;

- Heating systems, electrical sockets and utility meters should be raised above the predicted flood level where possible; and
- Sump and pump.

Where flood depths are expected to be between 0.3-0.6 m both water exclusion and water entry strategies should be adopted depending on a structural assessment of the building.

If these mitigation measures are implemented this could reduce the flood risk to the development from High to Medium.

Surface water (pluvial) flood mitigation measures

As the Site is not identified as being at risk of pluvial flooding, mitigation measures are not required.

Groundwater flood mitigation measures

It is likely the flood mitigation measures recommended for estuarine flood risk will reduce the groundwater flood risk at the development. However specific additional groundwater measures that may also be considered for the Moderate risk identified include:

- Waterproof tanking of the ground floor and basement;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water sewer lines.

If these mitigation measures are implemented this could reduce the flood risk to the development from Moderate to Low.

Reservoir flood mitigation measures

There would be a relatively high rate and onset of flooding associated with a reservoir breach, it is therefore unlikely that safe access could be achieved unless a long warning period was provided. Therefore, occupants should get to the highest level of the building as possible and contact the emergency services.

Other flood risk mitigation measures

As the Site is not identified as at risk from other sources, mitigation measures are not required.

Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation

measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here: http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

www.knowyourfloodrisk.co.uk

Emergency evacuation - safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'more vulnerable' developments and, where possible, development in general (including basements), should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

Flood warnings

The EA operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. The Site is located within an EA Flood Warning coverage area (quick dial: 174101) so is able to receive warnings (Figure 12). All warnings are also available through the EA's 24 hour Floodline Service 0345 988 1188.

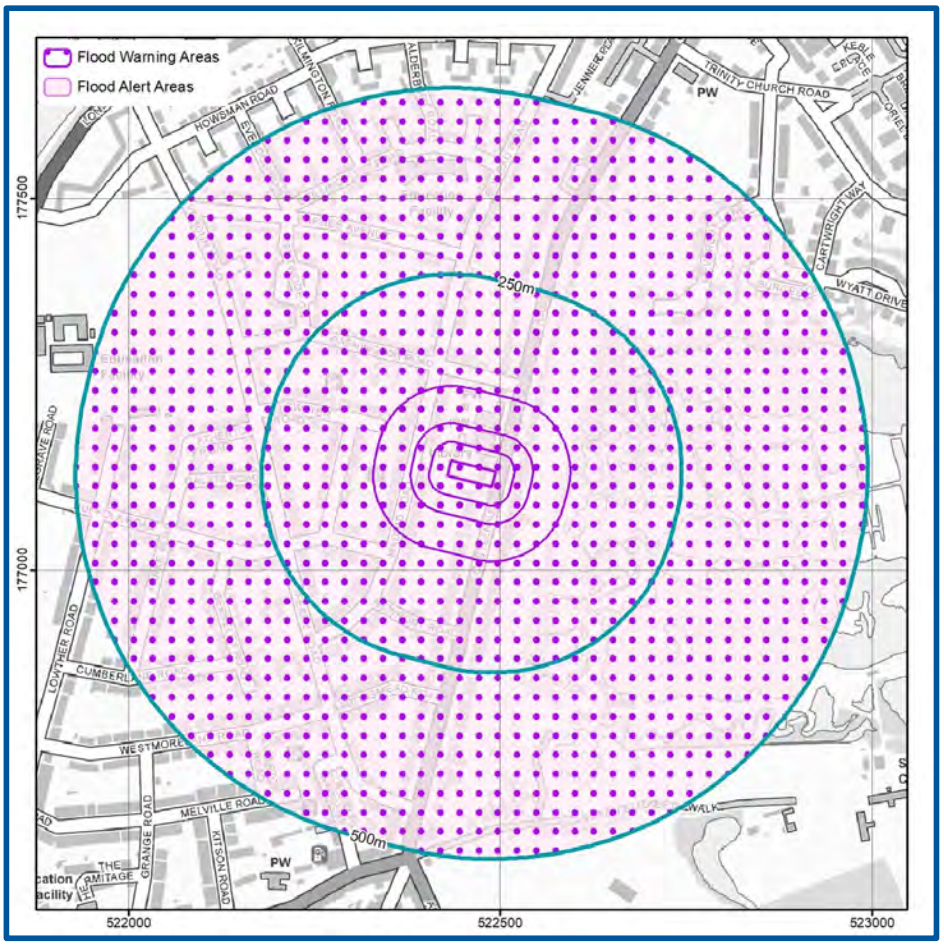
The EA aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

Emergency evacuation

Where possible, a safe access and egress route with a 'very low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

Based on the EA's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is along Castelnau A306 leading to Rock's Lane (c.1.5 km south – direct measurement). It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that residents prepare to evacuate as soon as an EA Flood Warning is issued in order to completely avoid flood waters.

Figure 12. EA Flood Warning Coverage for the local area (EA, 2022).



On-Site refuge

Evacuation should be the primary action in preference, however safe refuge could be sought at first floor level in a worst-case scenario as the residential areas of the development are situated on the first and second floor.

Other relevant information

A Flood Warning and Evacuation Plan (FWEP) is recommended, and occupants should be signed up to receive EAs Flood Warnings.

Registration to the Environment Agency's flood warning scheme can be done by following this link: https://www.gov.uk/sign-up-for-flood-warnings.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

8. Conclusions and recommendations

Table 10. Risk ratings following Site analysis

Source of Flood Risk	Baseline[1]	After analysis[2]	After Mitigation[3]
Estuarine (fluvial/coastal/tidal) flooding	High	High	Low
Surface water (pluvial) flooding	Very Low	Very Low	N/A
Groundwater flooding	Low	Moderate	Low
Other flood risk factors present	Yes	Yes	Yes
Is any other further work recommended?	Yes	Yes	No (see below)

1 BASELINE risks assigned for the whole Site, using national risk maps, including the benefit of EA flood defences.2 AFTER ANALYSIS modification of risk assessment based on detailed site specific analysis including some or all of the following: flood model data, high resolution mapping, building location, access routes, topographic and CCTV surveys. Reasons for the change in classification are provided in the text.3 AFTER MITIGATION risks include risks to proposed development / asset and occupants if mitigation measures recommended in this report are implemented, including the impacts of climate change. *N/A indicates where mitigation is not required.

The table below provides a summary of where the responses to key questions are discussed in this report. Providing the recommended mitigation measures are put in place it is likely that flood risk to this Site will be reduced to an acceptable level.

More vulnerable developments in a Flood Zone 3 are acceptable according to the NPPF and providing the recommended mitigation measures are put in place (see previous sections) it is likely that flood risk to this Site will be reduced to an acceptable level.

Table 11. Summary of responses to key questions in the report

Key sources of flood risks identified	Estuarine, groundwater (see Section 4).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).
Is any further work recommended?	No (See exec summary and section 7)

9. Further information

The following table includes a list of additional products by GeoSmart:

Additional GeoSmart Products			
✓	Additional assessment: SuDSmart Report		The SuDSmart Report range assesses which drainage options are available for a Site. They build on technical detail starting from simple infiltration screening and work up to more complex SuDS Assessments detailing alternative options and designs. Please contact info@geosmartinfo.co.uk for further information.
✓	Additional assessment: EnviroSmart Report		Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective. Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements. Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions. Please contact info@geosmartinfo.co.uk for further information.

10. References and glossary

References

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Ministry of Housing, Communities & Local Government (2022). Planning Practice Guidance (NPPG). Flood Risk and Coastal Change. Accessed from https://www.gov.uk/guidance/flood-risk-and-coastal-change on 26/10/22.

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London Borough of Richmond upon Thames (Metis, 2021). Strategic Flood Risk Assessment. Accessed from: https://www.richmond.gov.uk/media/20529/sfra_level_1_report.pdf on 26/10/22.

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Glossary

General terms

BGS	British Geological Survey
EA	Environment Agency
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council

SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	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.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

NPPF (2021) terms

Exception test	Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
Sequential test	Aims to steer new development to areas with the lowest probability of flooding.
Essential infrastructure	Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines.

Water compatible	Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations.
Less vulnerable	Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services.
More vulnerable	More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping.
Highly vulnerable	Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2022 BlueSky copyright and database rights 2022
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2022 Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2022) Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2022
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2022 Environment Agency copyright and database rights 2022

11. Appendices

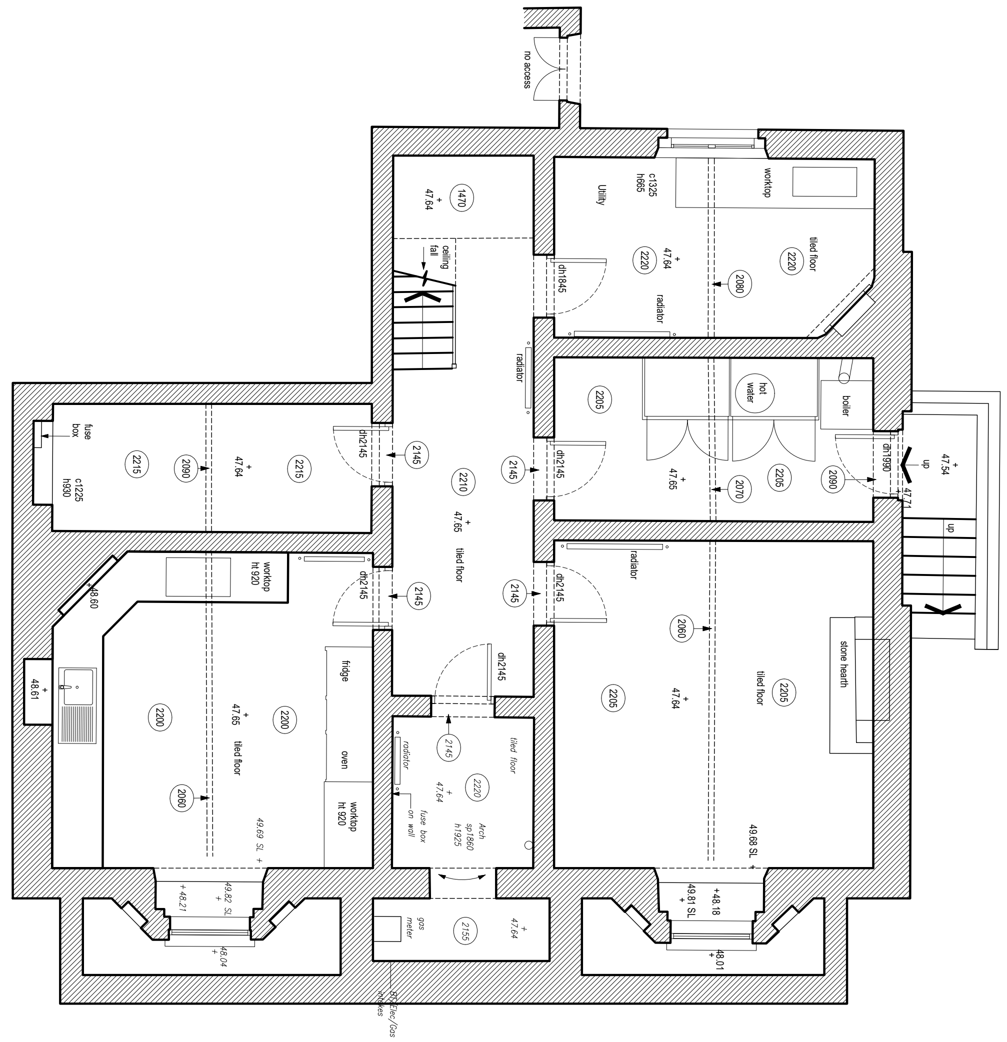
GeoSmart Information

Appendix A

Site plans

A1

A2



A2

Basement Plan
87.9 sqm

A1

NORTH:

SCALE at A3:

0m 5m.

GENERAL NOTES:

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Issued for Client Approval	21/10/2022	A
Revision Description	Date	Rev

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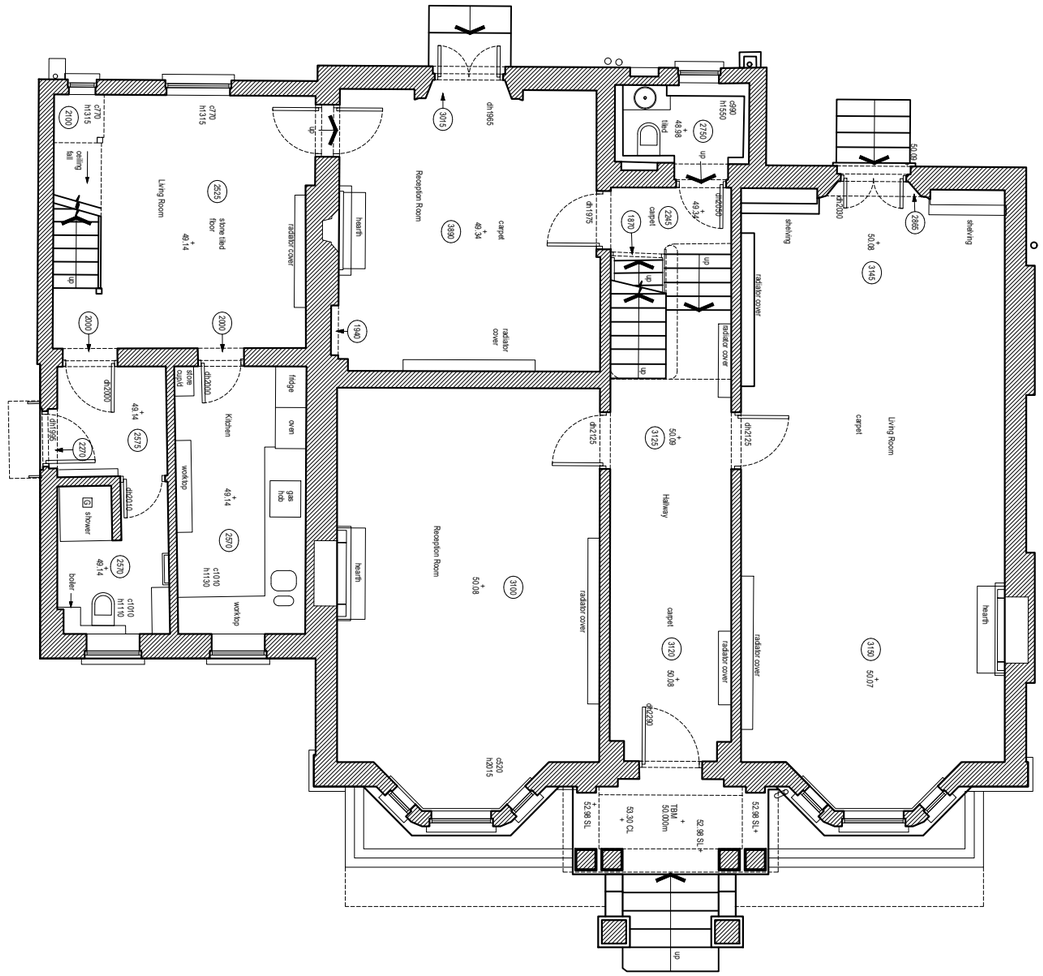
Project
73 Castelnau

Title
Existing Basement

Job No	Drg No	Revision
1087	E01	A



Ground Floor Plan
156.4 sqm

NORTH:

SCALE at A3:

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Project
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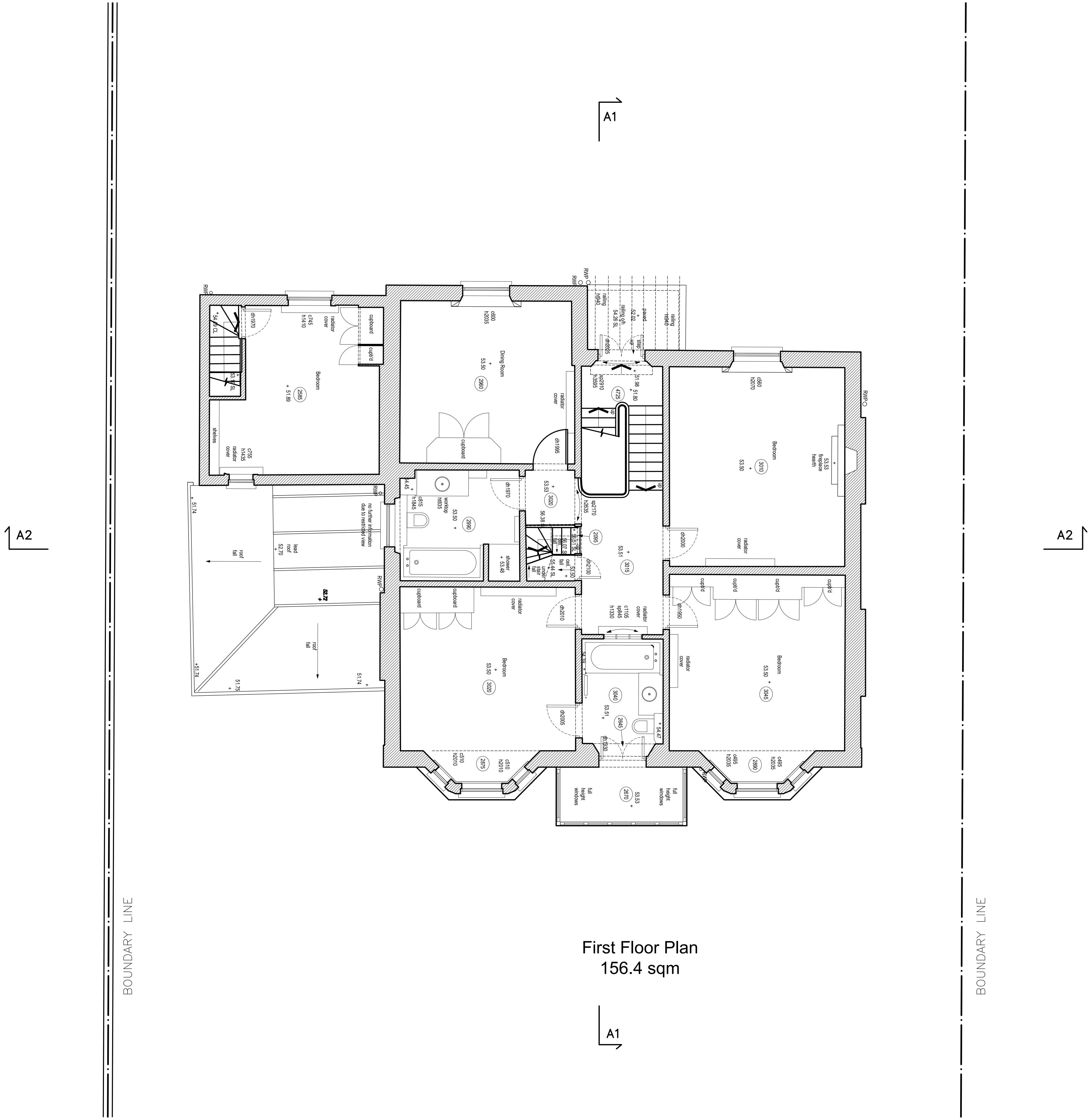
Title
Existing Ground Floor

Job No	Drg No	Revision
1087	E02	A



First Floor Plan
156.4 sqm

NORTH:

SCALE at A3:

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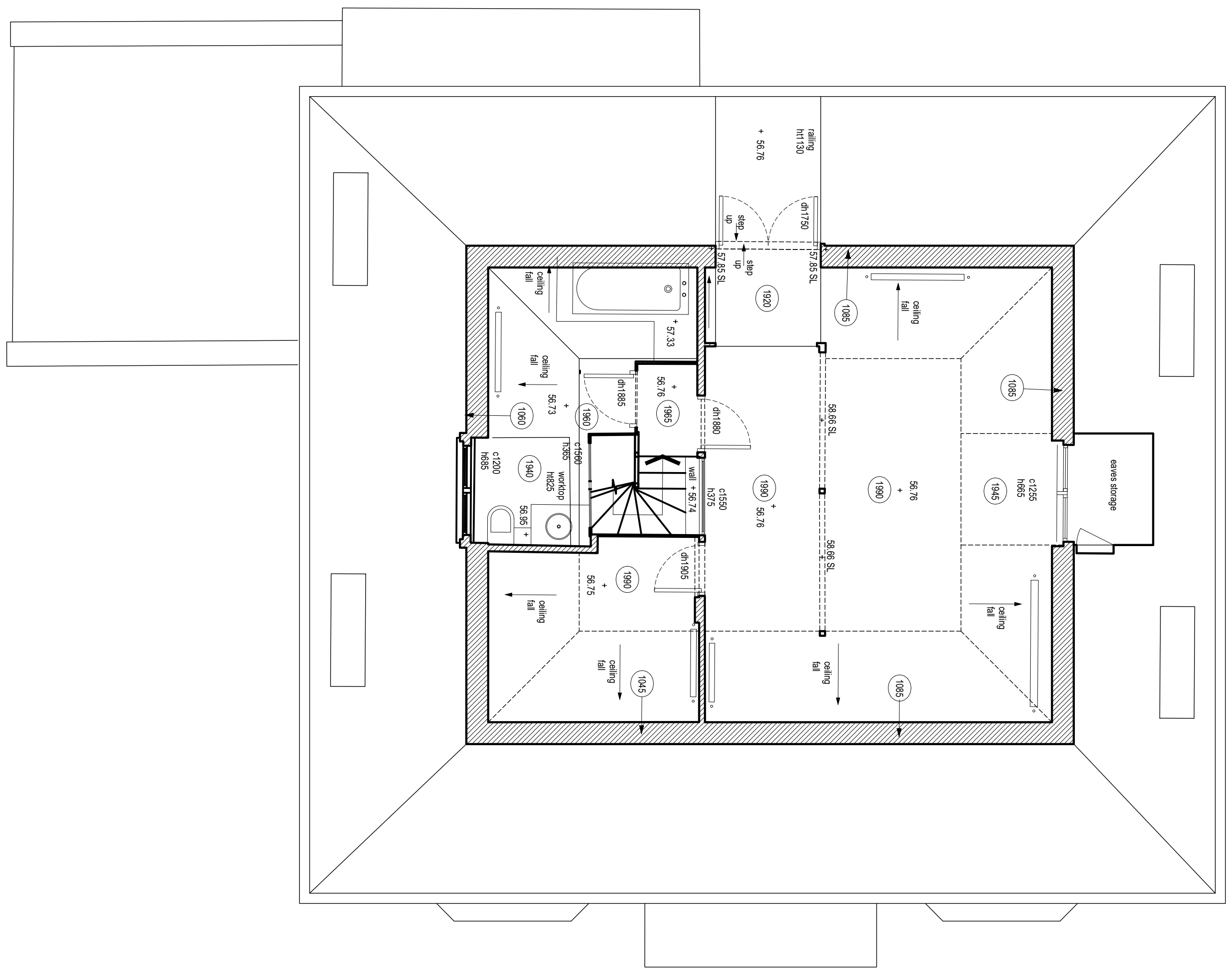
Title
Existing First Floor

Job No	Drg No	Revision
1087	E03	A

A1

A2 A2



Second Floor Plan
48.5 sqm

A1

NORTH:

SCALE at A3:

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Project
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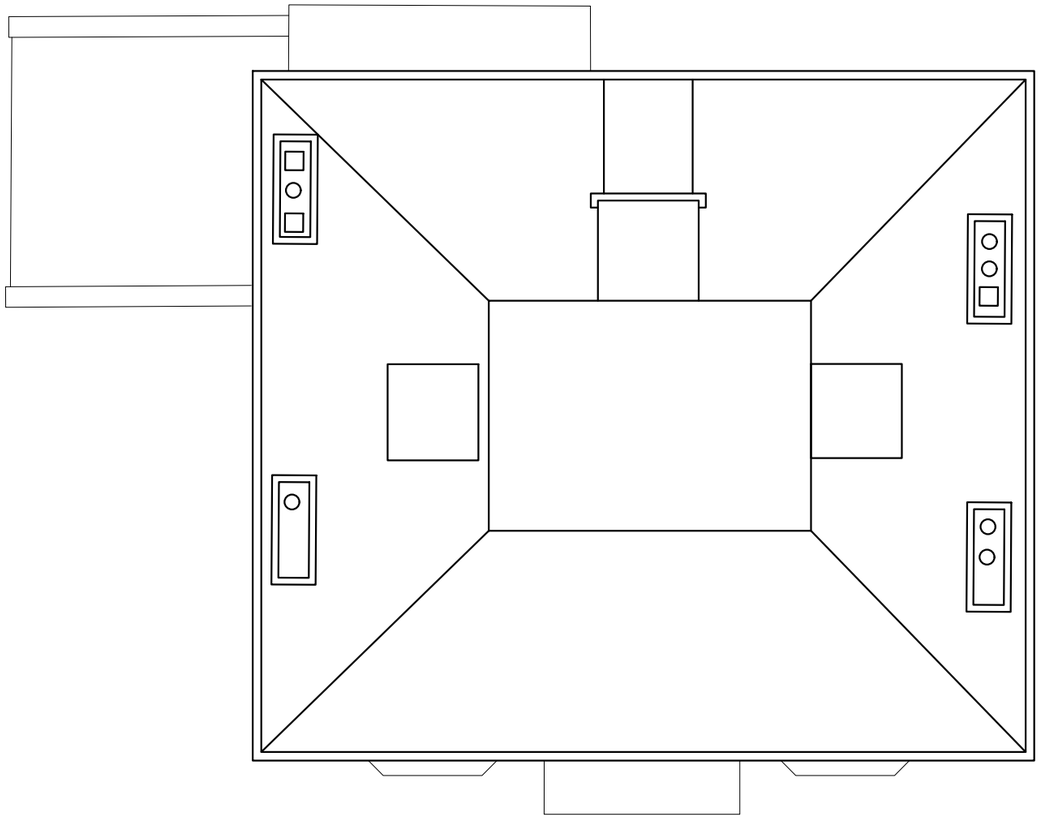
Title
Existing Second Floor

Job No	Drg No	Revision
1087	E04	A

A1

A2



A2

Roof Top

A1

NORTH:

SCALE at A3:

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Project
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Title
Existing Roof Top

Job No	Drg No	Revision
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Project
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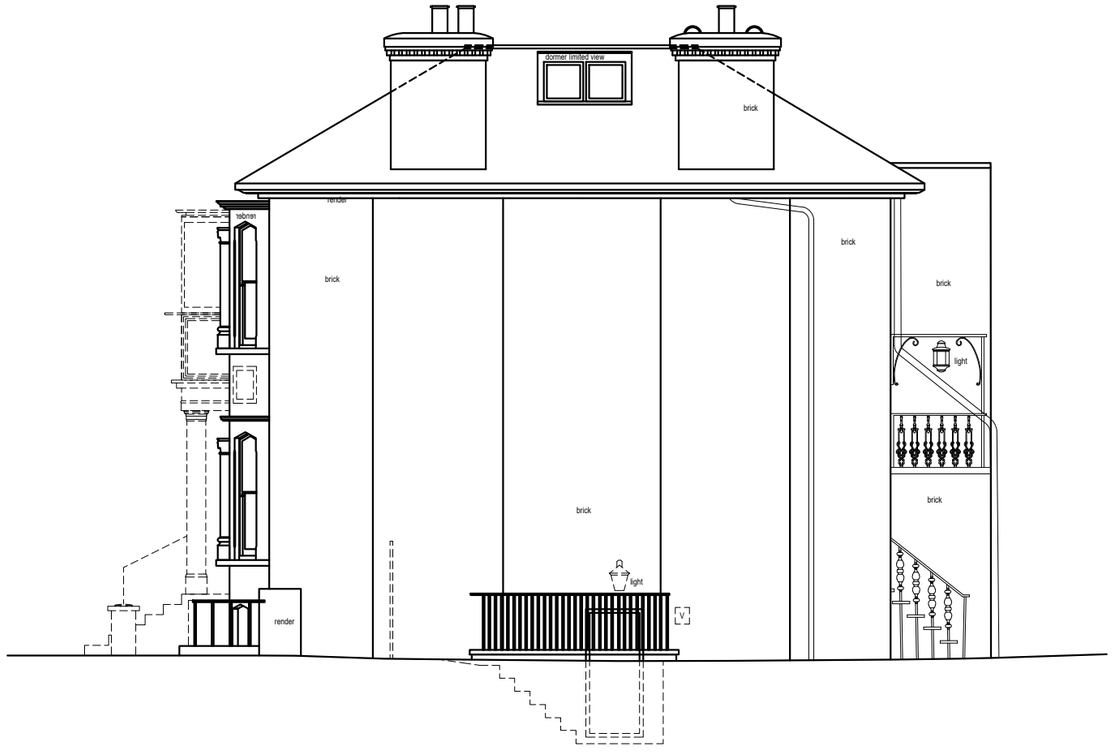
Title
Existing Elevations

Job No	Drg No	Revision
1087	E06	A



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Project
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Title
Existing Elevations

Job No	Drg No	Revision
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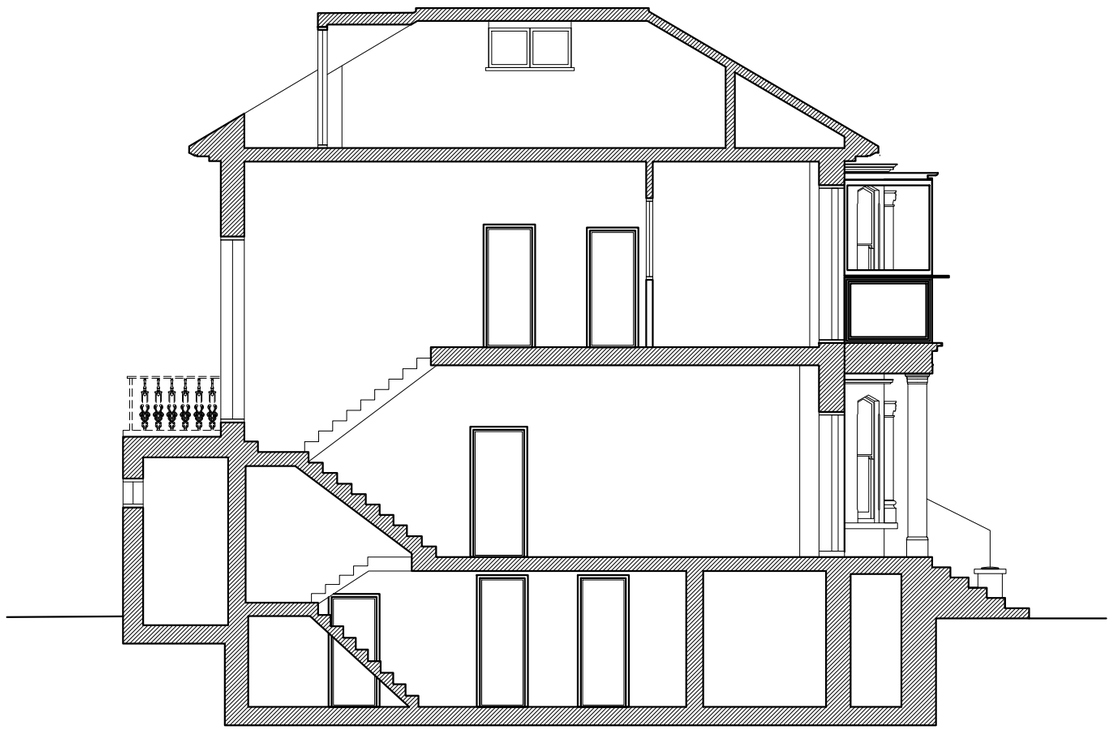

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Title
Existing Section A1

Job No	Drg No	Revision
1087	E08	A

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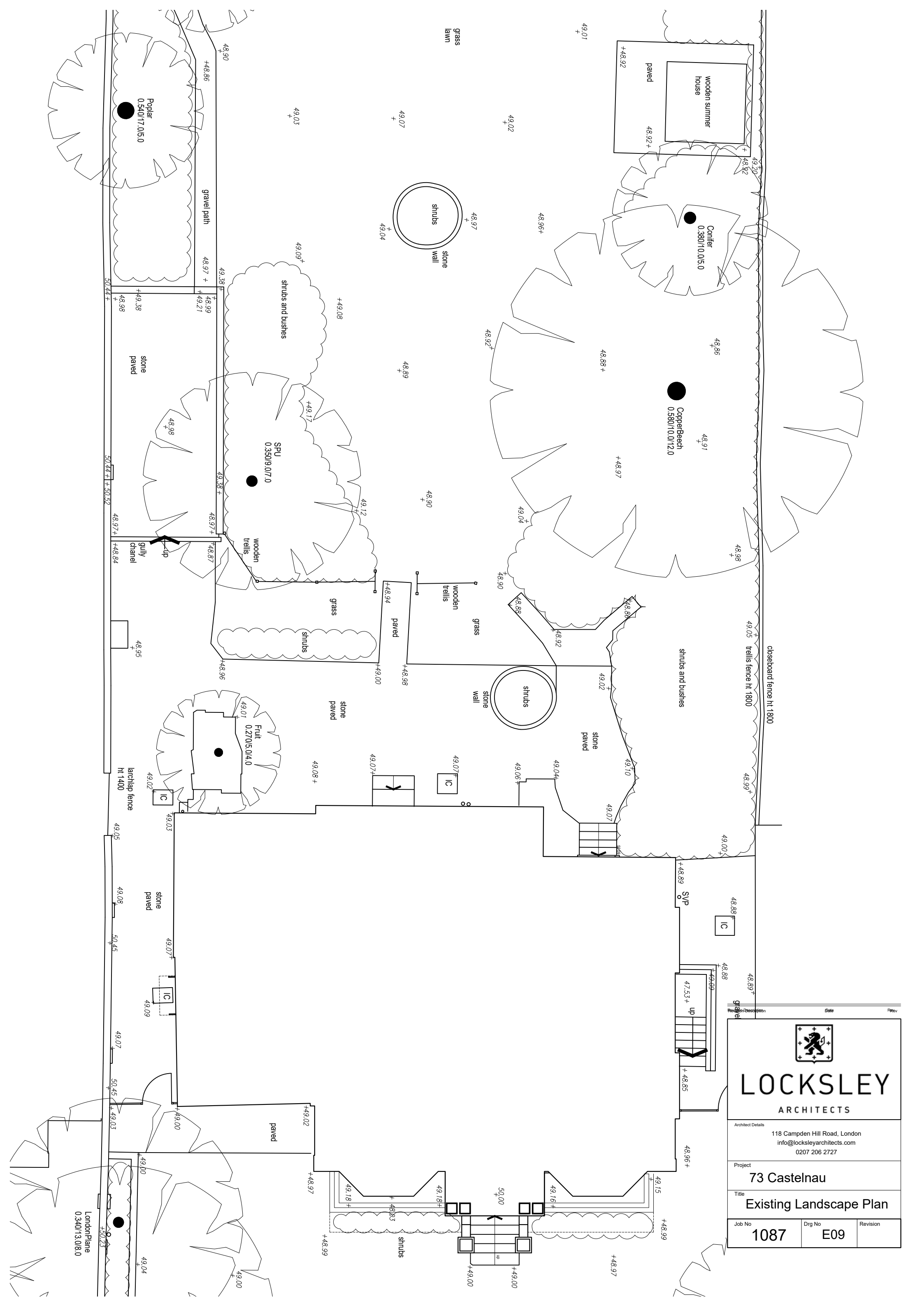
Project
73 Castelnau

Title
Existing Section A2

Job No	Drg No	Revision
1087	E09	A



LOCKSLEY
ARCHITECTS

Architect Details
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0207 206 2727

Project
73 Castelnau

Title
Existing Landscape Plan

Job No	Drg No	Revision
1087	E09	

500 Y

closeboard fence ht 1800
trellis fence ht 1800
Conifer 0.350/8.0/8.0
Poplar 0.500/17.0/5.0
Poplar 0.520/17.0/5.0
shrubs and bushes
Gum 0.430/10.0/8.0
grass lawn
Conifer 0.380/9.0/9.0
paved
wooden store shed
shrubs and bushes
wooden summer house
paved
Conifer 0.380/10.0/5.0
CopperBeech 0.580/10.0/12.0
shrubs and bushes
shrubs
stone wall
grass
wooden trellis
paved
shrubs and bushes
Fruit 0.240/5.0/4.0
gravel path
gravel path
Poplar 0.540/17.0/5.0
SPU 0.350/9.0/7.0
shrubs and bushes
wooden trellis
stone paved
grass
shrubs
stone paved
Fruit 0.270/5.0/4.0
gully chanel
stone paved
larchlap fence ht 1400
closeboard fence ht 1800
trellis fence ht 1800
shrubs and bushes
SVP
gravel
up
brick wall
picket fence
S.P.U 0.370/5.0/6.0
shrubs and bushes
gravel drive
stone paved
shrubs
gravel drive
paved
brick retaining wall
Lime 0.630/16.0/11.0
paved footpath
brick retaining wall
shrubs
gravel drive
paved
LondonPlane 0.340/13.0/8.0
Lime 0.480/13.0/10.0
hoarding
Temporary hoarding
Elec post
BT
CTV
WV
IC
up

NORTH:

SCALE at A3:

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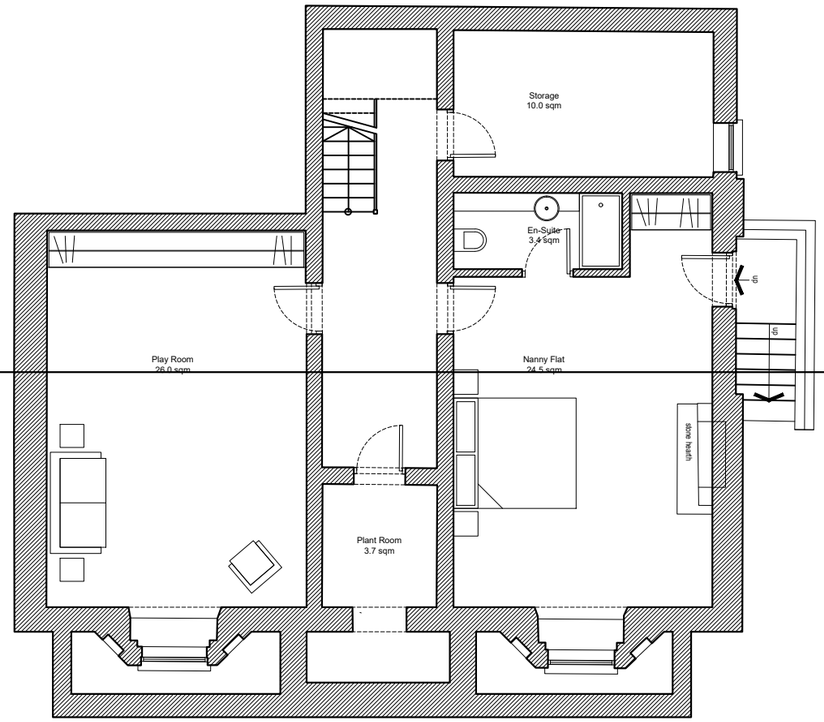
PROJECT NOTES:

A1

A2



A2

A1

Basement Plan
87.9 sqm

Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
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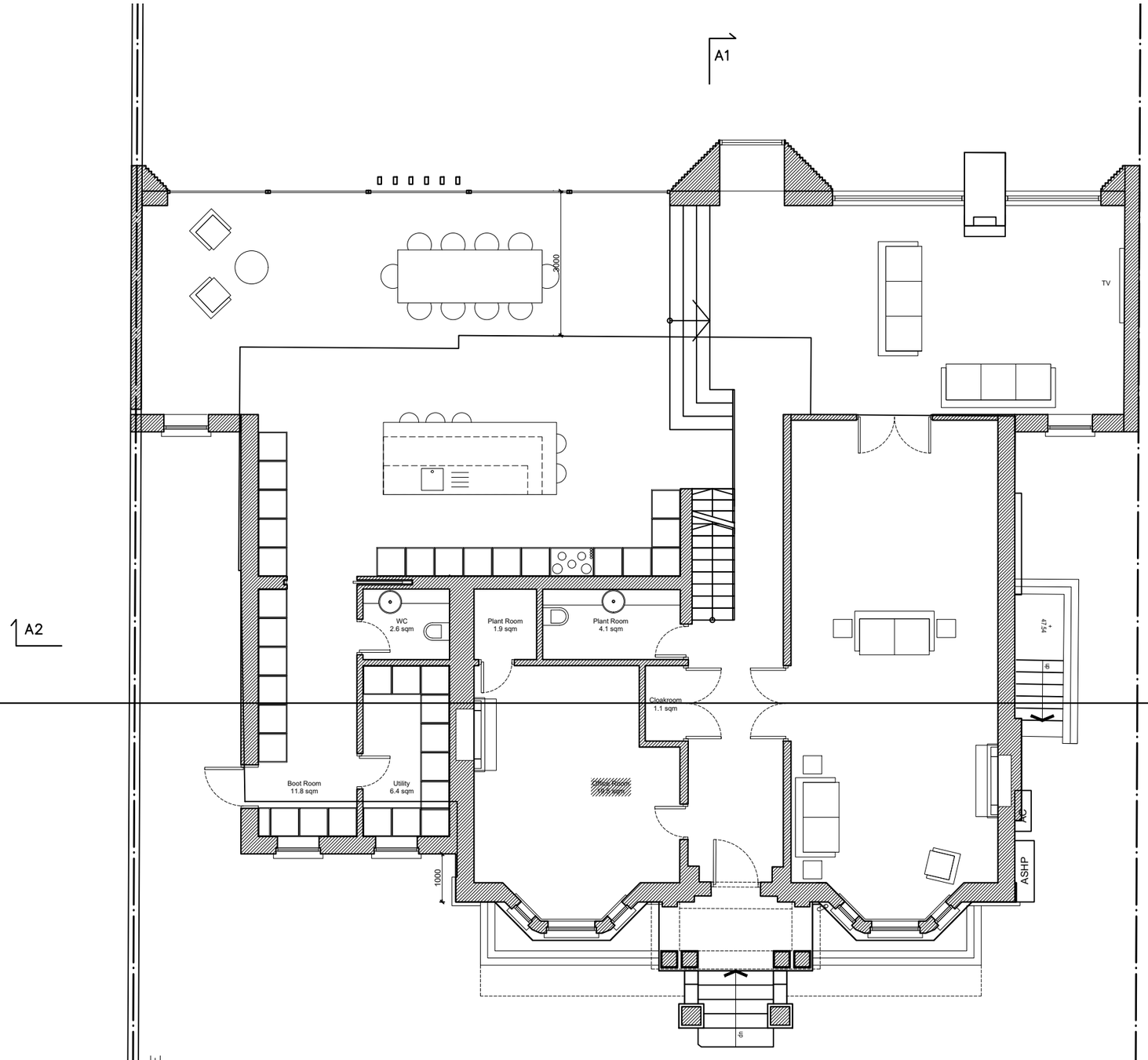
0207 206 2727

Project
73 Castelnau

Title
Proposed Basement

Job No	Drg No	Revision
1087	P01	



Ground Floor Plan
246.1 sqm

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev

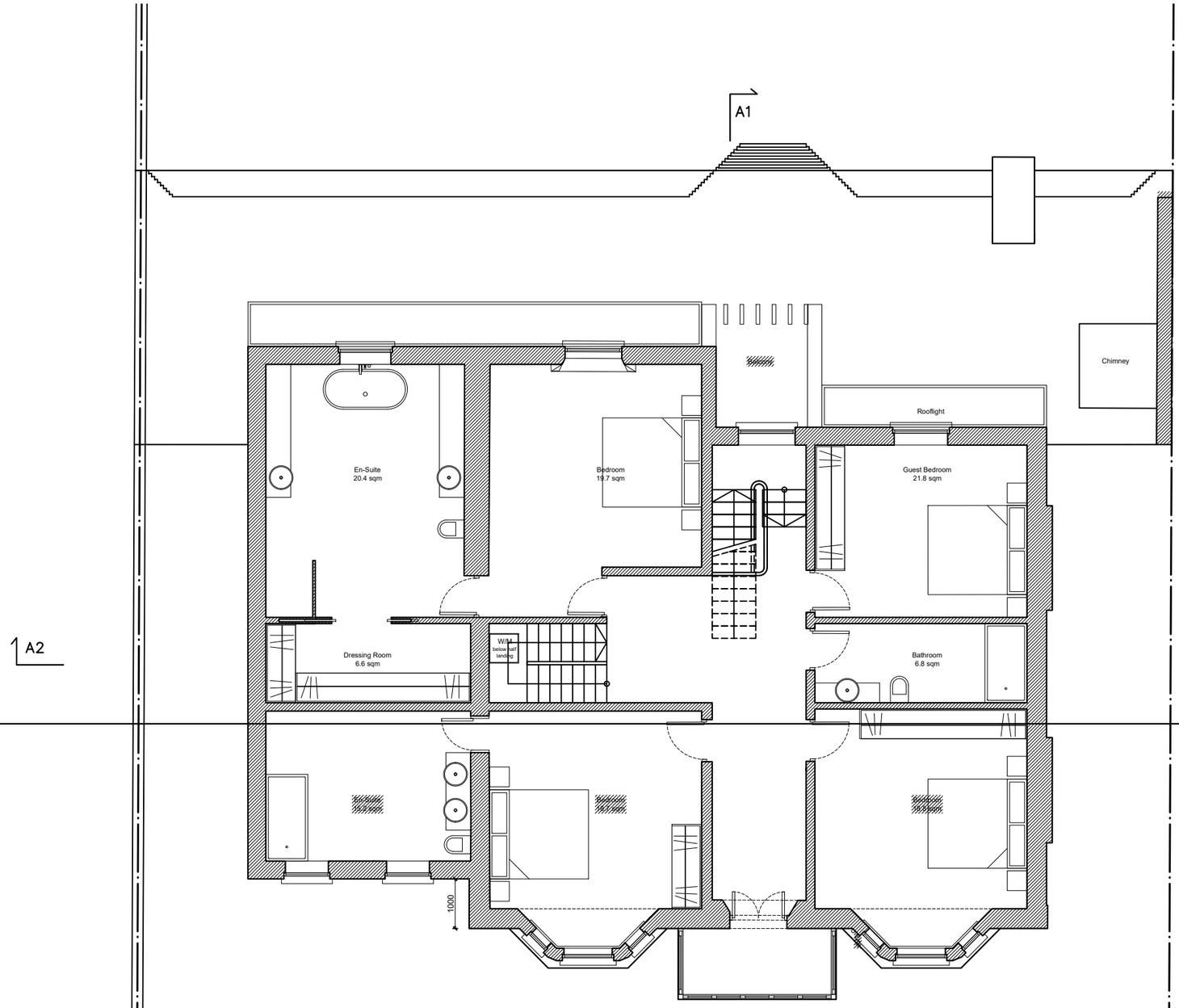
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Ground Floor

Job No	Drg No	Revision
1087	P02	



First Floor Plan
170.7 sqm

NORTH:

SCALE at A3:

0m 5m.

GENERAL NOTES:

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PROJECT NOTES:

Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed First Floor

Job No	Drg No	Revision
1087	P03	

NORTH:

SCALE at A3:

0m 5m.

GENERAL NOTES:

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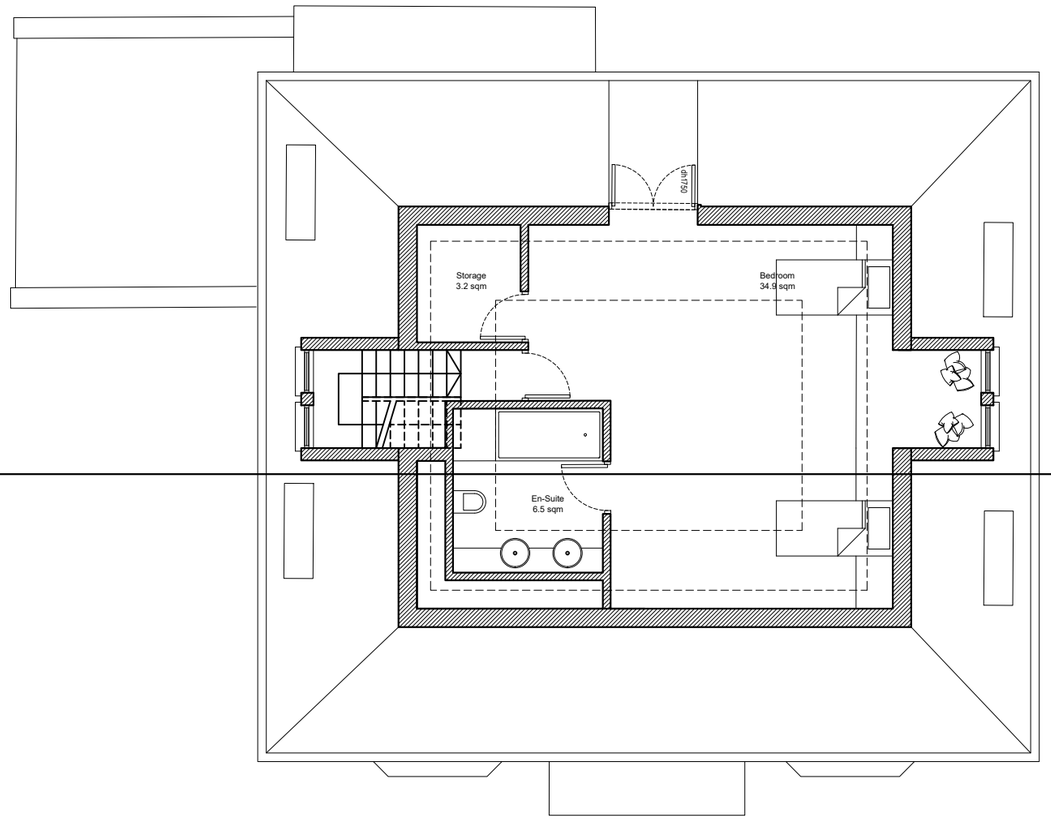
PROJECT NOTES:

A1

A2

A2



Second Floor Plan
48.5 sqm

A1

Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Second Floor

Job No	Drg No	Revision
1087	P04	

NORTH:

SCALE at A3:

0m 5m.

GENERAL NOTES:

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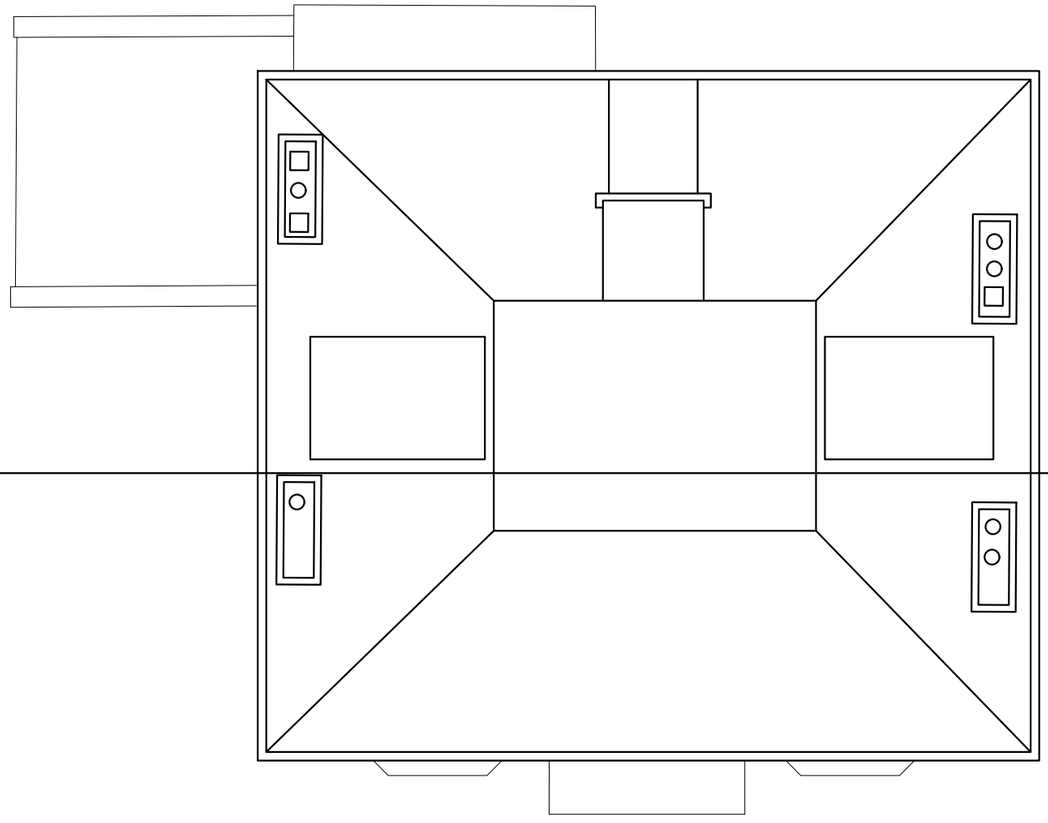
PROJECT NOTES:

A1

A2



A2

Roof Top

A1

Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Roof Top

Job No	Drg No	Revision
1087	P05	

No.71 Castelnau

No.73B Castelnau

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev

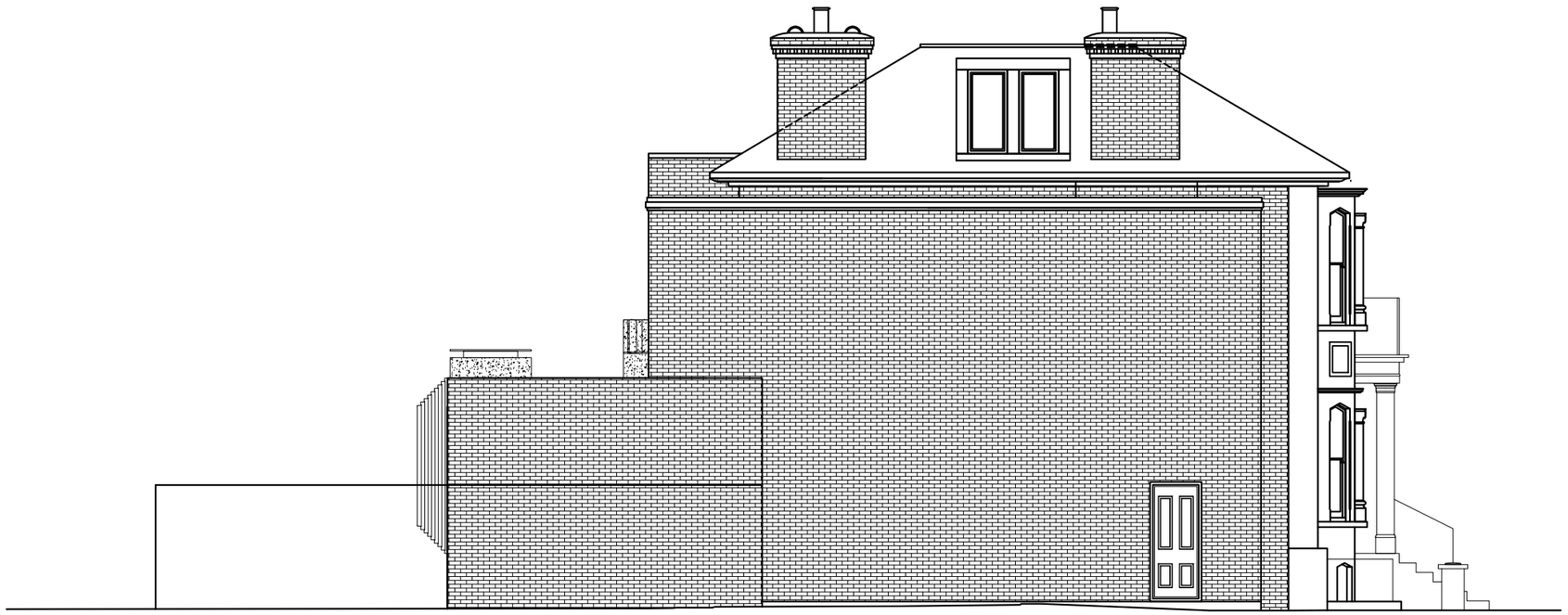
LOCKSLEY ARCHITECTS

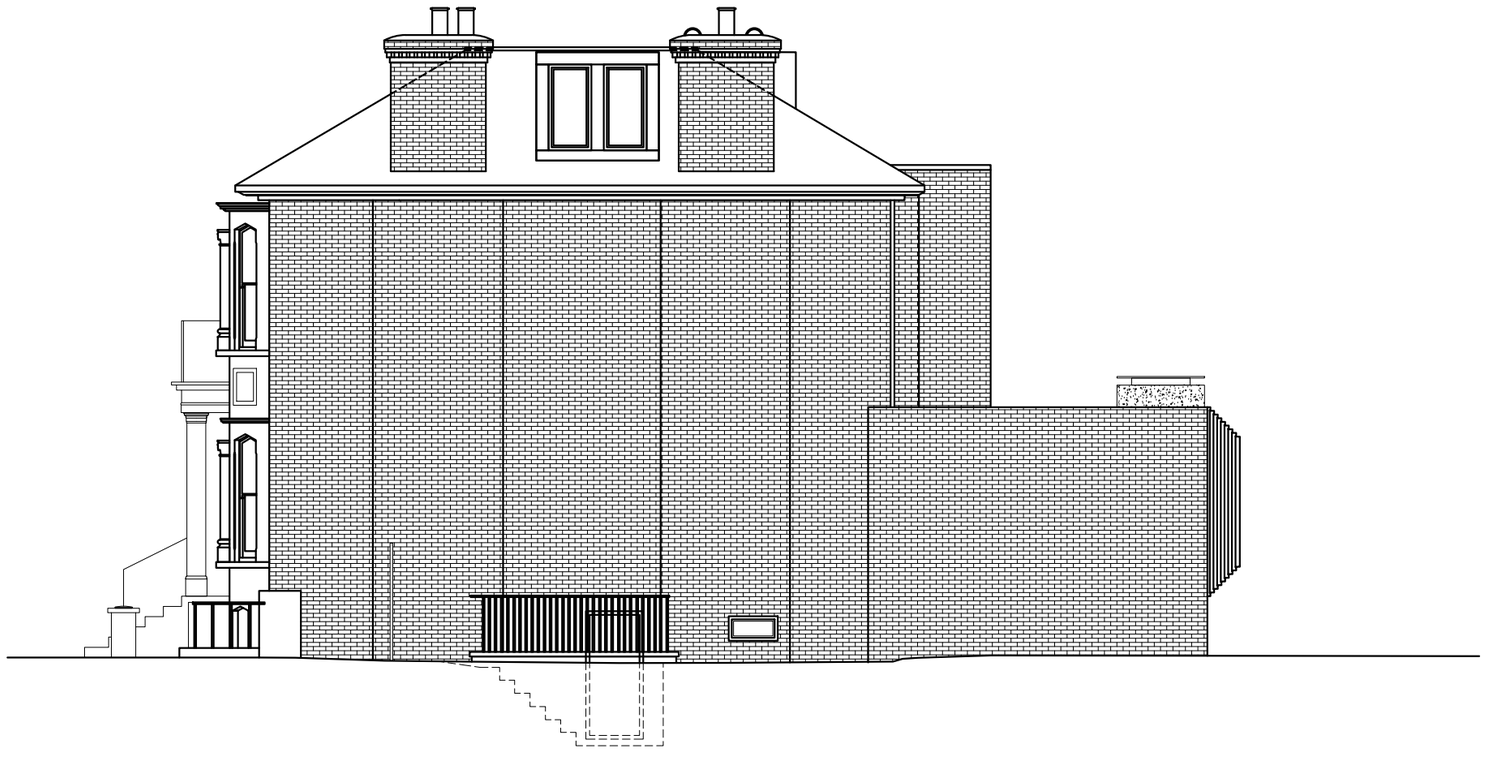
Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Elevations

Job No	Drg No	Revision
1087	P06	





NORTH:

SCALE at A3:

0m 5m.

GENERAL NOTES:

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PROJECT NOTES:

Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Elevations

Job No	Drg No	Revision
1087	P07	

NORTH:

SCALE at A3:

0m 5m.

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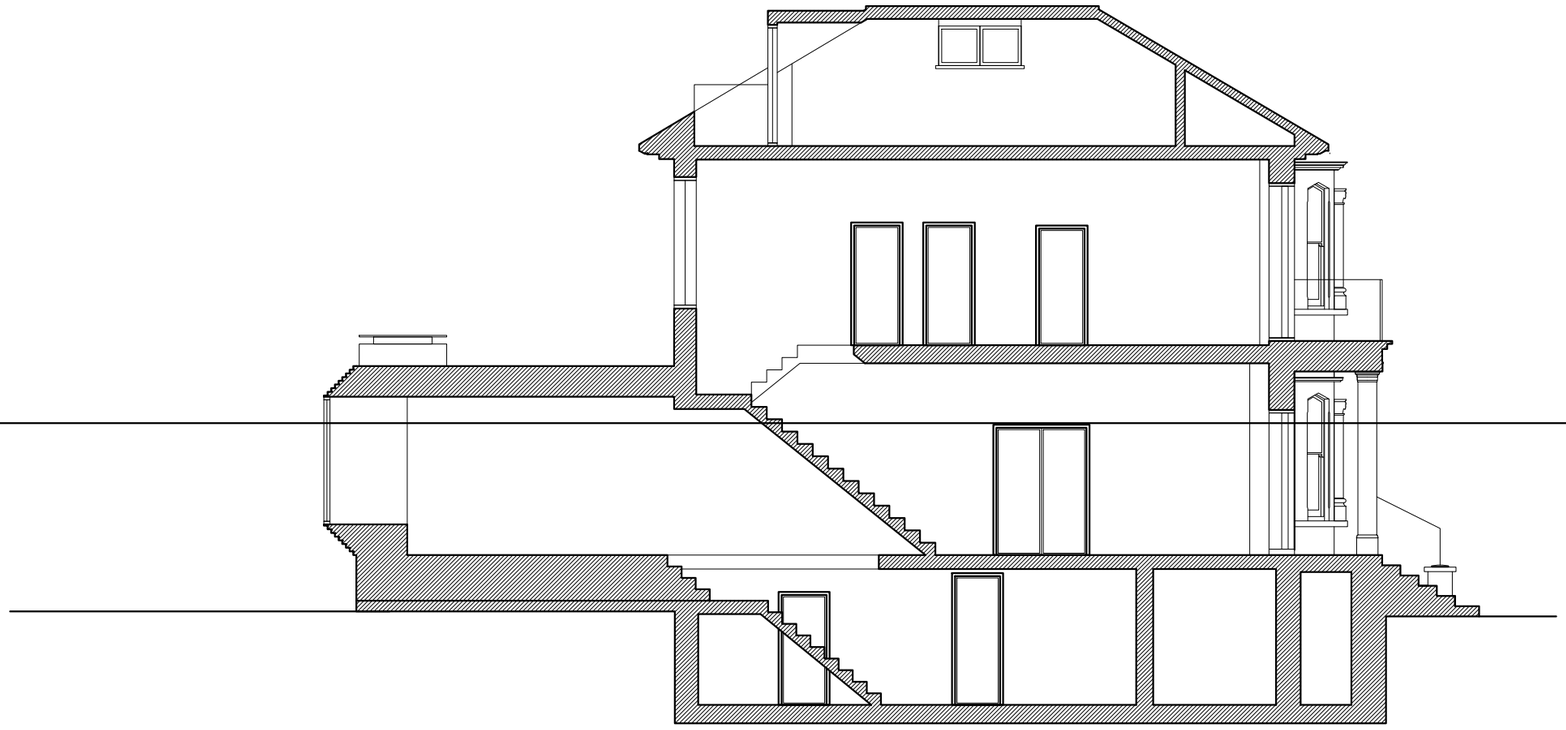
PROJECT NOTES:



Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Section A1

Job No	Drg No	Revision
1087	P08	

NORTH:

SCALE at A3:

0m 5m.

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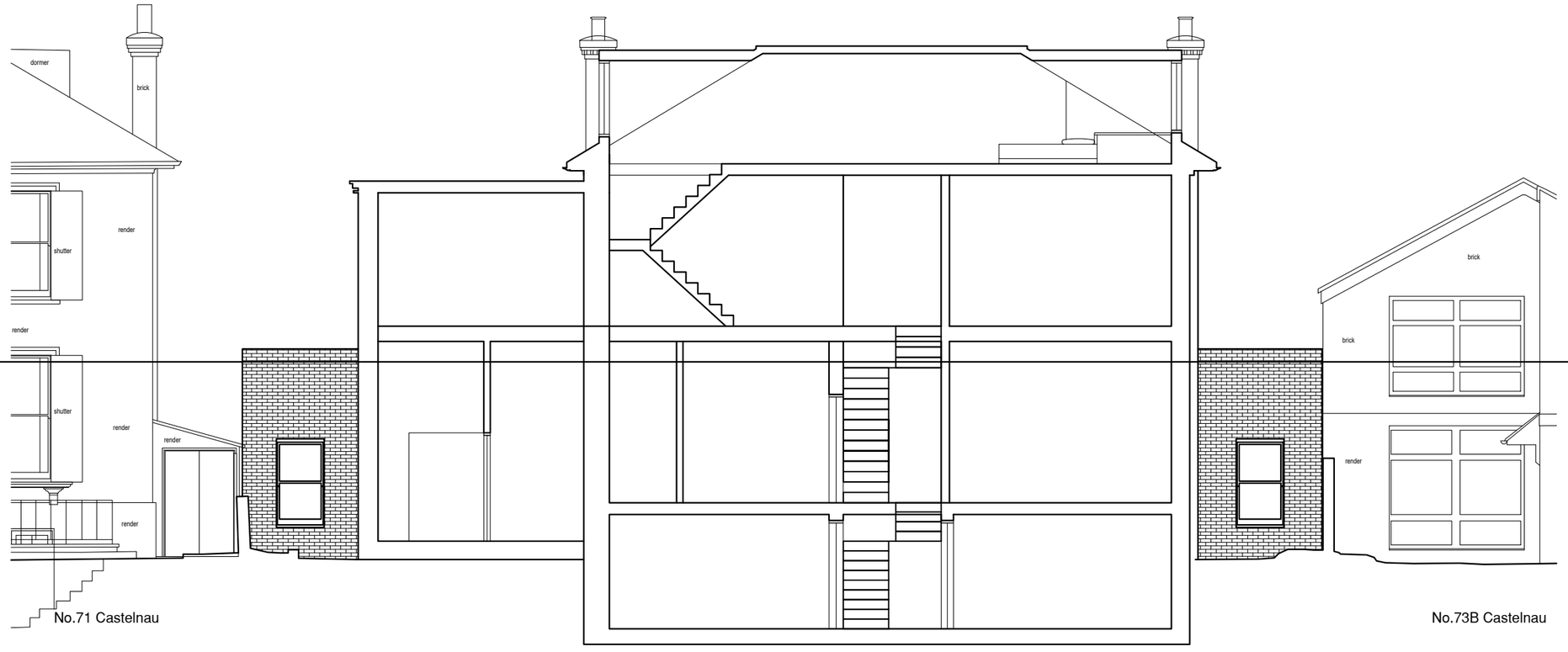
PROJECT NOTES:



No.71 Castelnau

No.73B Castelnau

Revision Description	Date	Rev

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Section A2

Job No	Drg No	Revision
1087	P09	

NORTH:

SCALE at A3:

0m 5m.

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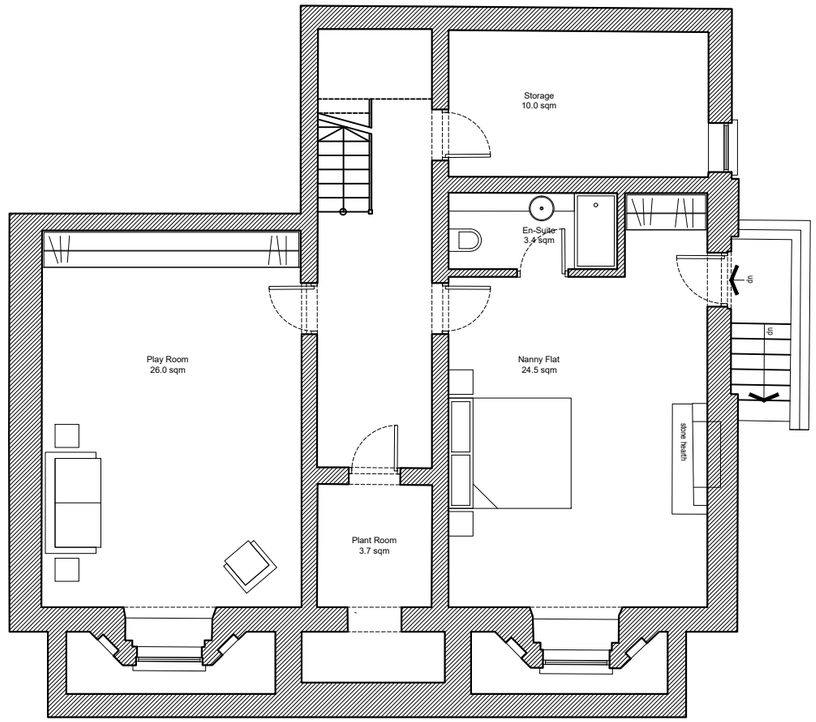
PROJECT NOTES:

A1

A2



A2

A1

Basement Plan
87.9 sqm

Issued for Client Approval	21/10/2022	A
Revision Description	Date	Rev

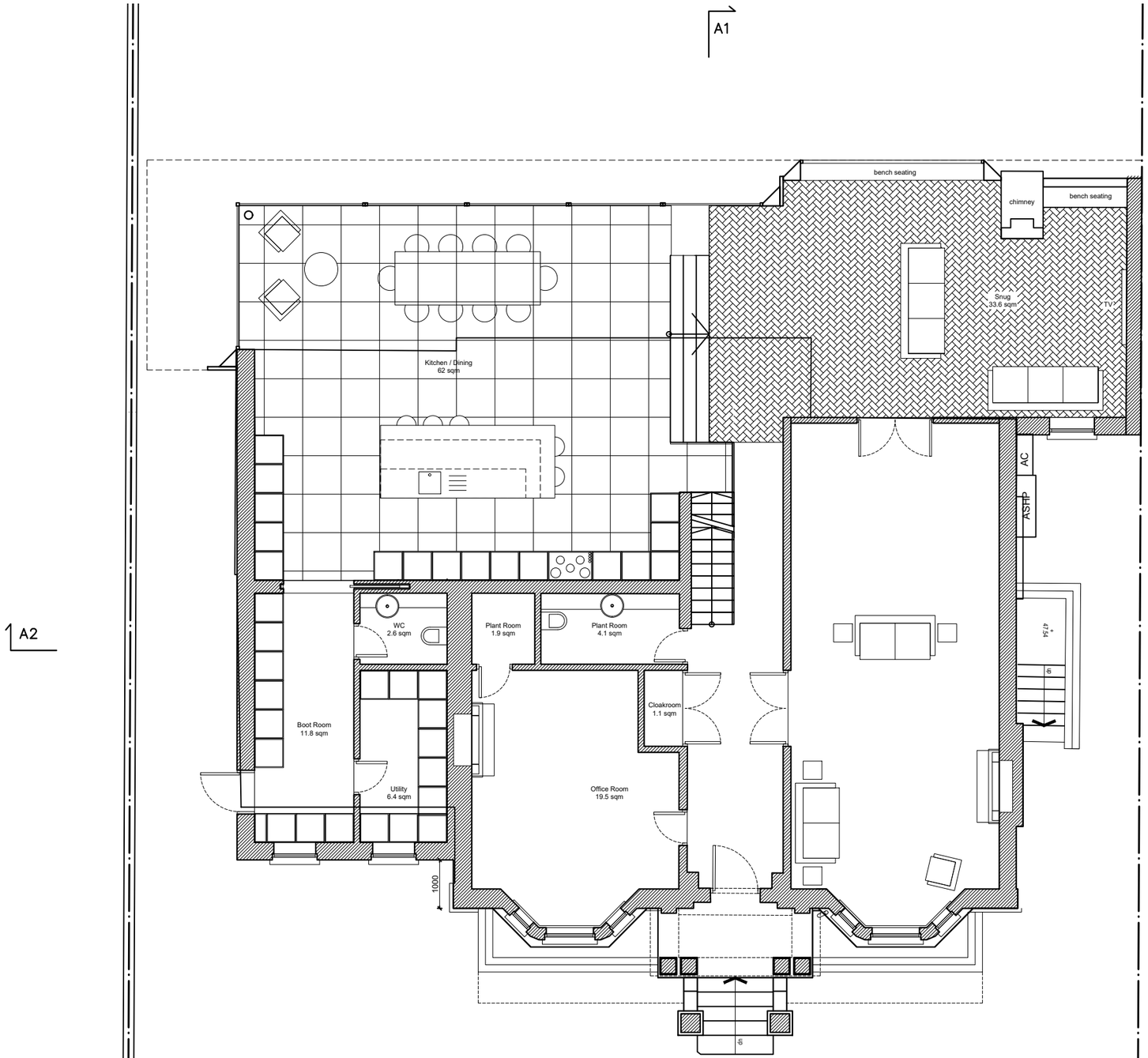
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Basement

Job No	Drg No	Revision
1087	P01	A



Ground Floor Plan
246.1 sqm

A1

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

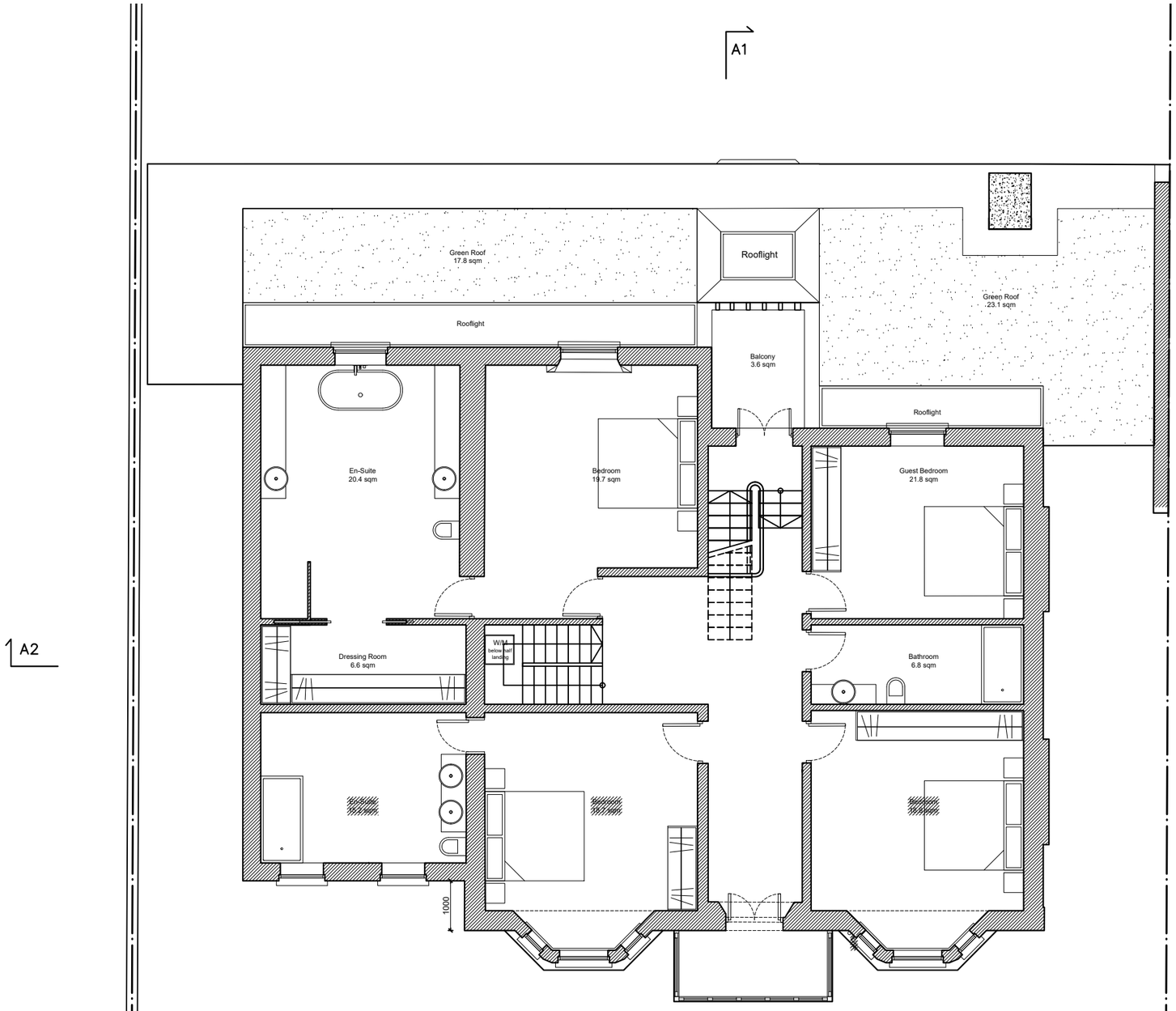
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Ground Floor

Job No	Drg No	Revision
1087	P02	A



First Floor Plan
170.7 sqm

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

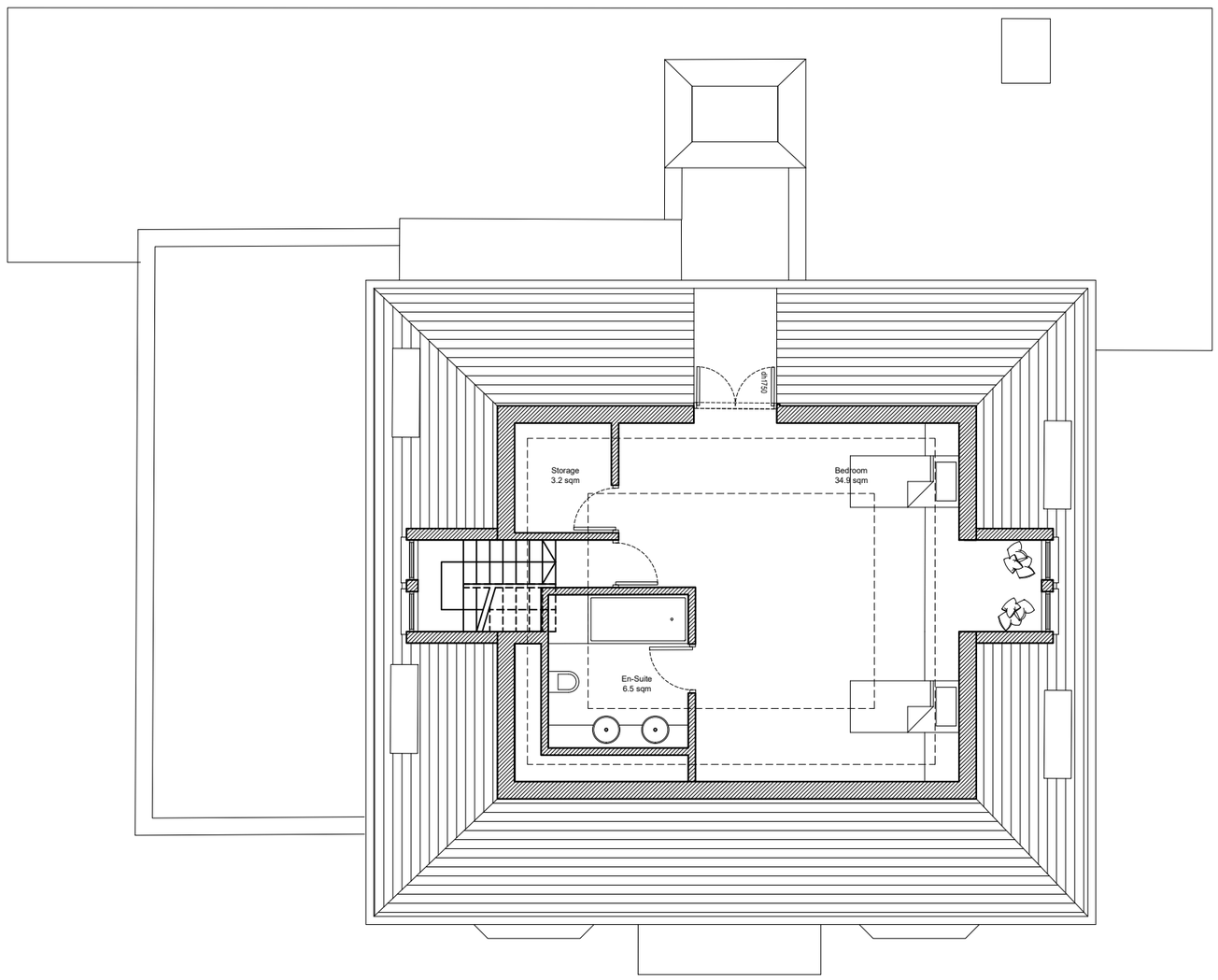
Project
73 Castelnau

Title
Proposed First Floor

Job No	Drg No	Revision
1087	P03	A

A1

A2



A2

Second Floor Plan
48.5 sqm

A1

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

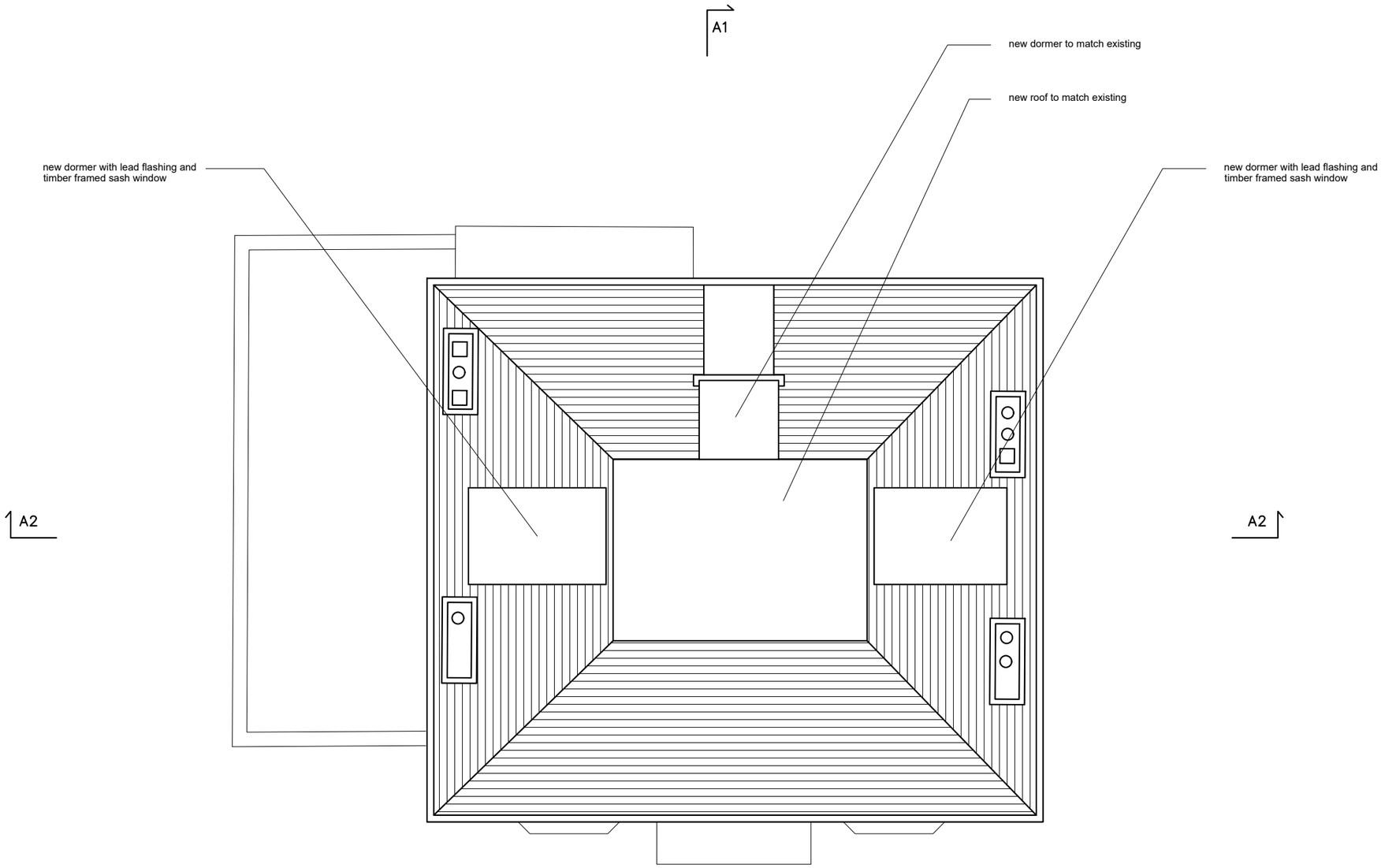
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Second Floor

Job No	Drg No	Revision
1087	P04	A



Roof Top

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Roof Top

Job No	Drg No	Revision
1087	P05	A

NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

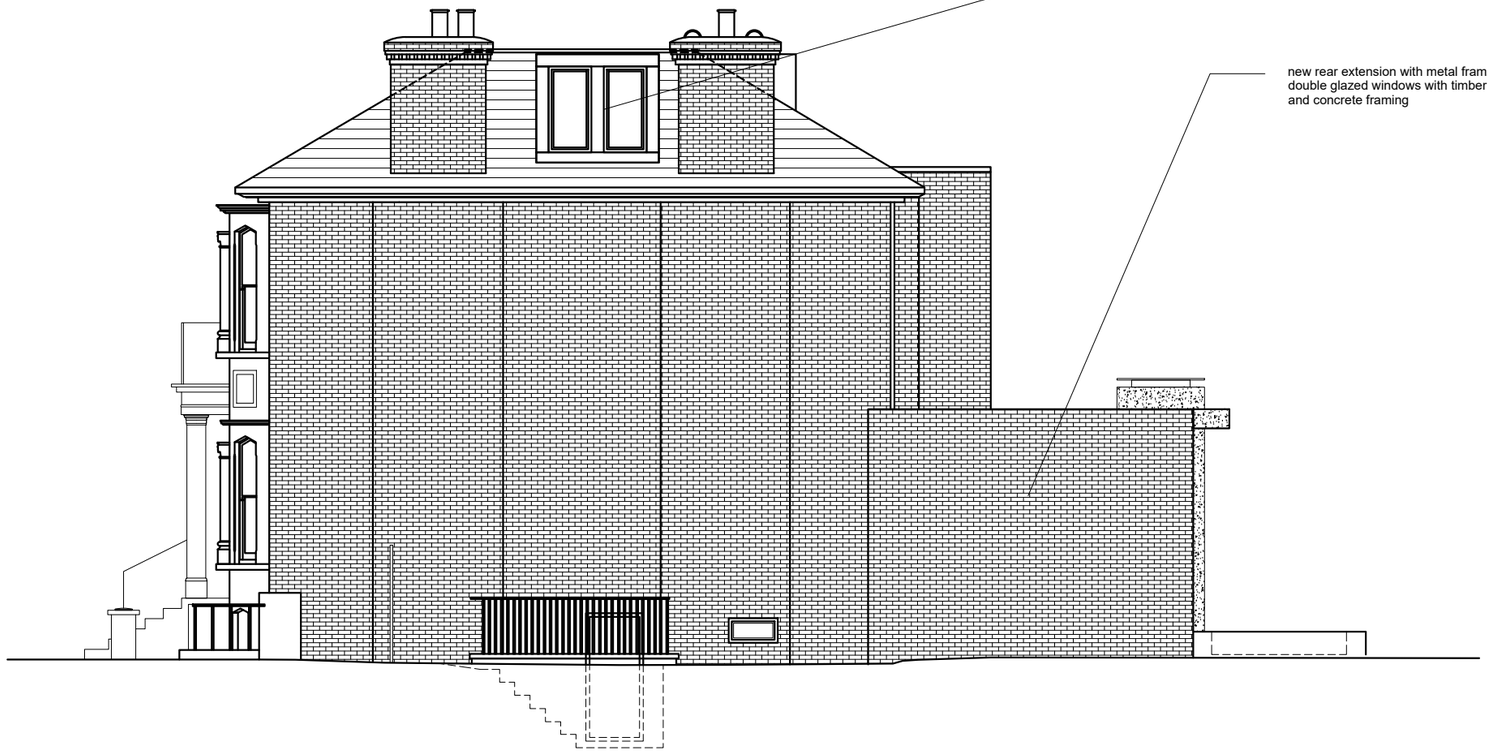
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Elevations

Job No	Drg No	Revision
1087	P06	A



NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

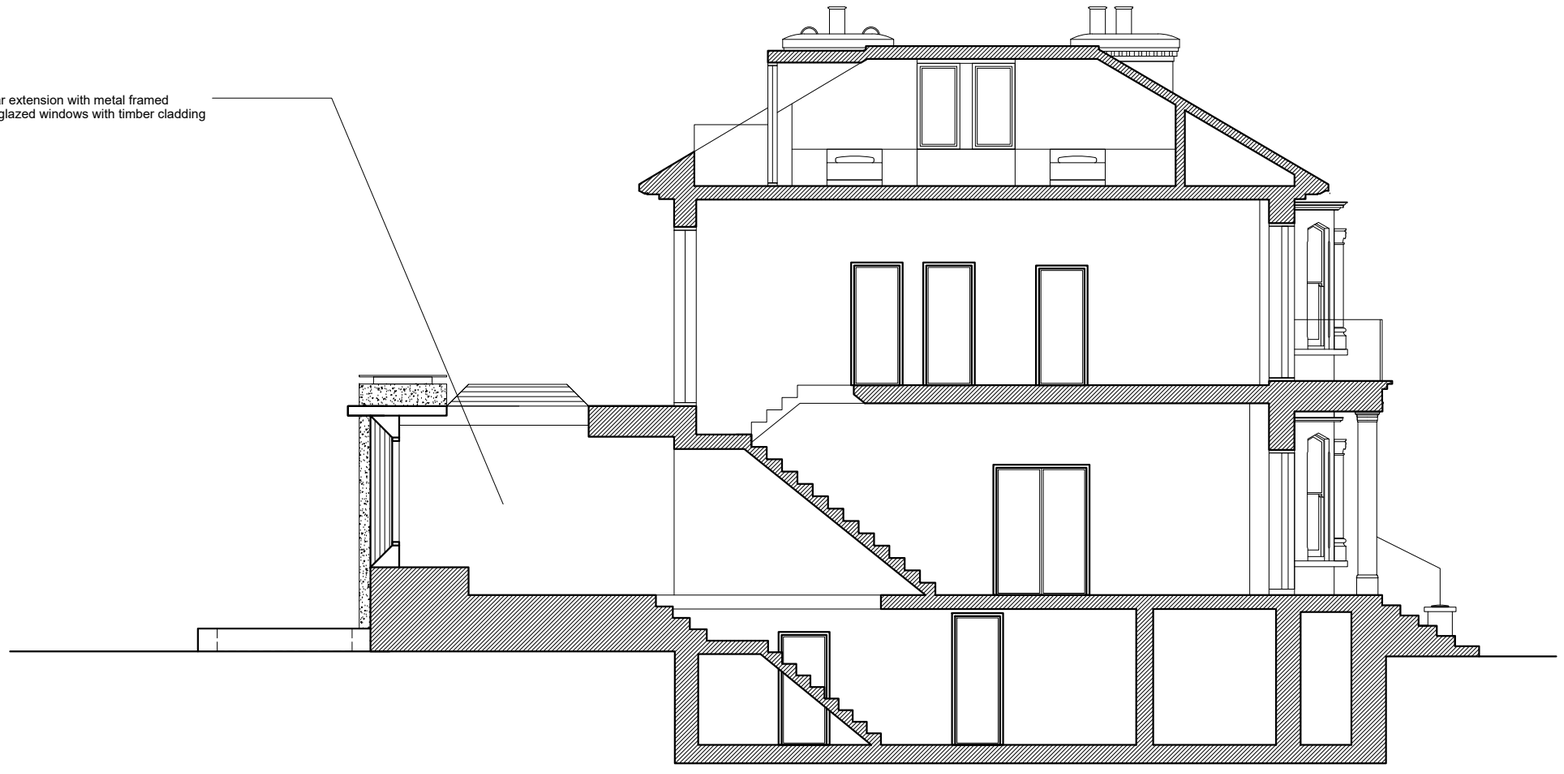
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Elevations

Job No	Drg No	Revision
1087	P07	A



NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

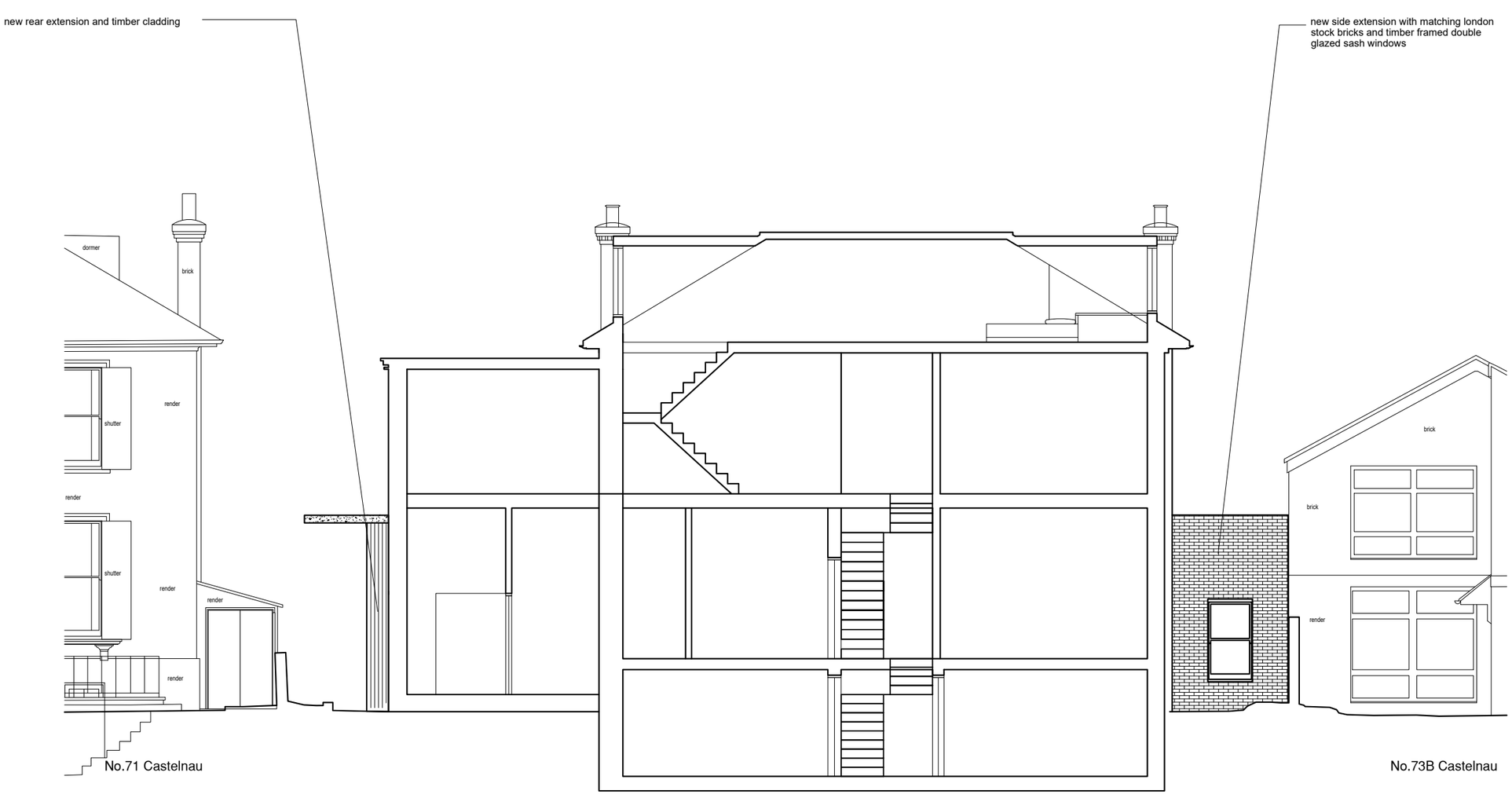
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Section A1

Job No	Drg No	Revision
1087	P08	A



NORTH:

SCALE at A3:

0m 5m.

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PROJECT NOTES:

Revision Description	Date	Rev
Issued for Client Approval	21/10/2022	A

LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Section A2

Job No	Drg No	Revision
1087	P09	A

paved

wooden summer house

shrubs

0.380/10.0/5.0
Conifer

0.580/10.0/12.0
CopperBeech

0.350/9.0/7.0
Magnolia Grandiflora

3000

TV

WC
2.6 sqm

Plant Room
1.9 sqm

Plant Room
4.1 sqm

Cloakroom
1.1 sqm

Boot Room
11.8 sqm

Utility
6.4 sqm

Office Room
10.5 sqm

1000

ASHP

AC

IC

4754

up

dn

shrubs

shrubs

LondonPlane
0.340/13.0/8.0

Revision Description | Date | Rev

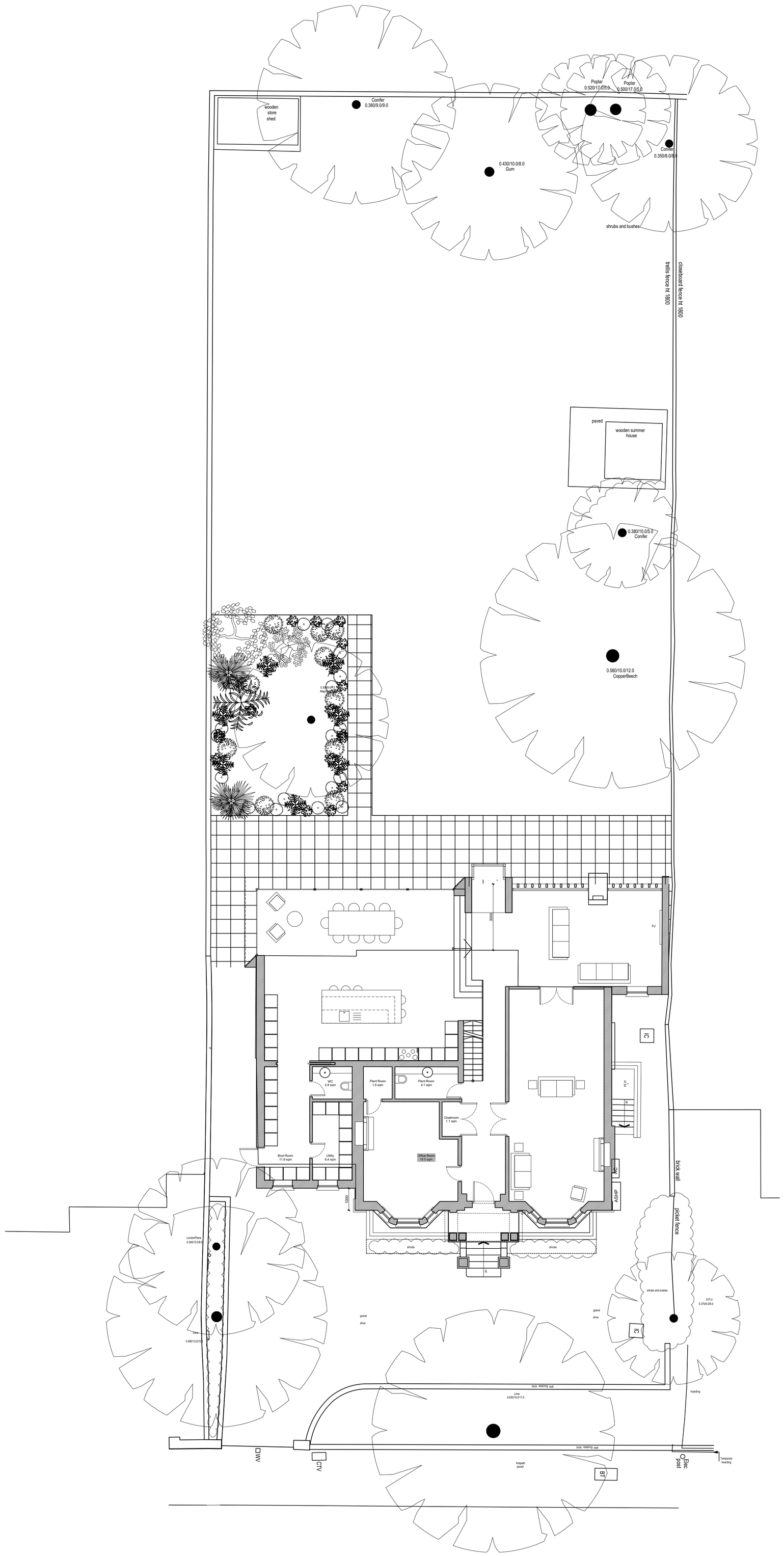
LOCKSLEY
ARCHITECTS

Architect Details
118 Campden Hill Road, London
info@locksleyarchitects.com
0207 206 2727

Project
73 Castelnau

Title
Proposed Landscape Plan

Job No	Drg No	Revision
1087	P09	


wooden store shed
Conifer
0.380/9.0/9.0
0.430/10.0/8.0
Gum
Poplar
0.520/17.0/5.0
Poplar
0.500/17.0/5.0
Conifer
0.350/8.0/8.0
shrubs and bushes
trellis fence ht 1800
closeboard fence ht 1800
paved
wooden summer house
0.380/10.0/5.0
Conifer
0.580/10.0/12.0
CopperBeech
3000
TV
WC
2.6 sqm
Plant Room
1.9 sqm
Plant Room
4.1 sqm
Cloakroom
1.1 sqm
Boot Room
11.8 sqm
Utility
6.4 sqm
1000
ASHP
AC
shrubs
shrubs
brick wall
picket fence
LondonPlane
0.340/13.0/8.0
Lime
0.480/13.0/10.0
gravel
drive
gravel
drive
shrubs and bushes
S.P.U
0.370/5.0/6.0
brick retaining wall
Lime
0.630/16.0/11.0
brick retaining wall
hoarding
Temporary hoarding
Elec post
BT
footpath
paved
GW
CTV

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Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

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- sets out minimum standards which firms compiling and selling search reports have to meet.
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
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- at all times maintain adequate and appropriate insurance to protect consumers.
- conduct business in an honest, fair and professional manner.
- handle complaints speedily and fairly.
- ensure that products and services comply with industry registration rules and standards and relevant laws.
- monitor their compliance with the Code.

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If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award up to £5,000 to you if the Ombudsman finds that you have suffered actual financial loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk. Please ask your search provider if you would like a copy of the search code

Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

martinlucass@geosmartinfo.co.uk

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http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/