FLOOD RISK ASSESSMENT &
DRAINAGE STRATEGY
9 THE MOUNT, HAMPSTEAD
LONDON, NW3 6SZ

MR & MRS BARNETT

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Prepared for

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FLOOD RISK ASSESSMENT
INCLUDING DRAINAGE STRATEGY

VERSION CONTROL

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ACRONYMS AND ABBREVIATIONS

AOD	Above Ordnance Datum
CIRIA	Construction Industry Research and Information Association
CL	Cover Level
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
ha	Hectares
IL	Invert Level
LLFA	Lead Local Flooding Authority
LPA	Local Planning Authority
m	Metres
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance to the National Planning Policy Framework
NTS	Non-statutory Technical Standards
LFRA	Local Flood Risk Assessment
SuDS	Sustainable Drainage Systems
LBC	London Borough of Camden
PPG	Planning Practise Guide
BGS	British Geological Society
TE2100	Thames Estuary 2100
SPZ	Source Protection Zone
CDA	Critical Drainage Area

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SECTIONS 1
INTRODUCTION

1. INTRODUCTION

1.1. Appointment and Brief

This Surface and Foul Water Drainage Strategy (DS) including a Flood Risk Assessment (FRA) has been prepared by Constructure Ltd on behalf of Charlton Brown Architecture & Interiors ("The Applicant"), for the Proposed Development at 9 The Mount, Hampstead, London, NW3 6SZ (hereby referred to as the 'Site'). The Site is located within the London Borough of Camden.

The purpose of this document is to outline the development of the proposed DS, providing sufficient detail to enable both a thorough review of design principles adopted and further refinement of the design as part of the ongoing development of the project.

It aims to demonstrate the foul and surface water management at the Application Site, as follows:

- By providing an analysis of the impact of the proposed development on surrounding foul water infrastructure and identify the constraints present on the site in terms of suitability of conventional gravity drainage; and
- By demonstrating the principles of surface water management in terms of constraints on discharge, permitted discharge rates and required volumes of attenuation (where required), describing how these can be accommodated within the development proposals.

The proposed DS outline below may be subject to further detailed analysis at design stage.

1.2. Aims and Objectives

The DS has been prepared with reference to the following requirements:

- The DS must:
  - Ensure that flood risk to the Application Site and surrounding area is not increased over the lifetime of the Proposed Development;
  - Conform with all relevant national and local flood risk polices;

  - Adopt current design standards; and
  - Consider long-term maintenance with respect to practicality, ownership and funding.

- The DS should:
  - Mimic the existing drainage characteristics of the Application Site as far as is practical;
  - Look for opportunities to provide a reduction in flood risk to the Application Site and the surrounding area;
  - Adhere to current best practice guidance;
  - Contribute to the enhanced amenity and aesthetic value of the Application Site; and
  - Propose opportunities for biological enhancement and provide habitats for wildlife in urban areas.

1.3. Limitations

The purpose of this report is as outlined in Section 1.2, together with those related matters specifically referred to, and it is not intended to be used for any other purposes. The report is for the sole benefit and may only be relied upon by the addressee, to whom we will owe a duty of care. The report and any part of it is confidential to the addressee and should not be disclosed to any third party for any purpose, without the prior written consent of Constructure Ltd as to the form and context of such disclosure. The granting of such consent shall not entitle the third party to place reliance on the report, nor shall it confer any third-party rights pursuant to the Contracts (Rights of Third Parties) Act. The report may not be assigned to any third party.

1.4. Reference Information

The following information has been obtained and interrogated as part of this study:

- Charlton Brown Drawing Ref: 21041 EX-00-100 & 101 – Existing Lower Ground & Ground Floor Plans.
- British Geological Society – Geological Maps.
- UK SUDS HR Wallingford – Surface Water Storage Requirements;
- DEFRA / EA Interactive online mapping (magic.defra.gov.uk); and
- BS EN 752: 2017 Drain and sewer systems outside buildings

In addition, the following documents have been consulted:

- Communities and Local Government Document. (2021). The National Planning Policy Framework;
- Environment Agency. (2016). Flood Risk Assessments: Climate Change Allowances;
- Environment Agency. (2013). Rainfall Runoff Management for Developments;
- Environment Agency. (2019). Flood Risk Assessments: Climate Change Allowances;
- CIRIA. (2015). C753 – The SuDS Manual;
- Secretary of State. (2015). Building Regulations Approved Document H;
- Butler & Davies. (2012). 2nd Ed. Urban Drainage;
- Department for Environment, Food and Rural Affairs. (2015). Non-Statutory Technical Standards for Sustainable Drainage Systems;
- Department for Environment, Food and Rural Affairs & Environment Agency. (2017). Flood Risk Assessment for Planning Applications;
- London Borough of Camden Basements – January 2021;
- North London Strategic Drainage Strategy – August 2008;
- London Borough of Camden Design Strategic Flood Assessment;
- London Borough of Camden Design Water & Flooding – March 2019.
- London Borough of Camden (LoDEG pro forma)

SECTION 2

PROJECT BACKGROUND

2. PROJECT BACKGROUND

2.1. Site Location and Existing Land Use

The Application Site is situated off The Mount. Specifically, the Site is located close to the junction with Heath Street. The Ordinance Survey (OS) grid reference is 51° 33' 31" N 000° 10' 44" W (55.55863°N, 0.17904°W), and the post code is NW3 6SZ.

The Site is currently a residential property located within its own gardens. Where the orientation of the house is adjusted to the North:-

- The North elevation abuts a pedestrian alley way and No. 12, 'Holly Cottage', a residential property;
- The East elevation faces onto The Mount itself;
- The South elevation abuts a residential dwelling No. 8 The Mount; and
- The West elevation abuts a residential dwellings Nos. 4 - 14 The Mount.

2.2. Existing Drainage Infrastructure

The Sewerage Undertaker for the area is Thames Water and review of their asset records (see appendices) suggests the following public infrastructure within close vicinity of the Application Site:

- To the East Elevation:
  - 300mm diameter foul water sewer flowing North to South along The Mount (Northern side). Its depth adjacent to the Site is not known. However, further up the road at MH 3003 the cover level (CL), is 125.8m AOD and has an invert level (IL) of 121.59m AOD, this makes its depth 4.21m below road level.
  - There are no dedicated surface water sewers

The existing Application Site is not known to have any surface water flow restriction or benefit from existing SuDS features. It discharges both foul and surface water drainage to the public combined sewer network. A CCTV survey has been carried and its route is shown in **Appendix E**

2.3. Topography

Currently there is no topographical survey drawing available. However, the Site appears to be approximately 120m Above Ordnance Datum and is on a gradient from North to South. It is approximately 340m² in area and therefore below the 1.0ha trigger for a Flood Risk Assessment. However, this is being undertaken as there is an existing basement/lower ground floor, that it is proposed be extended. Whilst not containing any bedrooms, it is thought prudent to provide a Flood Risk Assessment.

2.4. Geology and Hydrogeology

British Geological Survey (BGS) online mapping indicates that the Application Site is situated on a bedrock of Bagshot Formation. This is a fine to coarse grain sand which can be locally clayey.

It is likely that due to this Bedrock, the Environment Agency's online groundwater mapping confirms that the site is not located within a Source Protection Zone (SPZ). It is, however, within a high-risk zone of potential flooding from Ground Water. This is likely due to the Sand being porous in nature and possibly subject to artesian pressure.

Trial pits will be able to confirm at what level, if any, this water table may be. See Hydrology below.

See borehole logs Appendix K

2.5. Hydrology

From Thames Waters sewer records, there appears to be a foul/combined sewer in The Mount. It is to this (300mm) that the Application Site is likely to connect. Unfortunately, the sewer records do not provide invert or cover levels.

A 4" (100mm) water main also exists within the curtilage of the footway. There are no major water mains in the area.

It is assumed that surface water currently generated by properties surrounding the Application Site is combined with the foul water and discharge to the foul/combined sewer, as was normal practice in London. As this is likely to be the case, the separation of surface

chamber prior to it leaving the Site. This is subject to Thames Waters' agreement under a Section 106 Application Agreement despite the Site benefiting from an existing connection.

The British Geological Survey maps show that Bagshot Formation is present. This may enable infiltration to take place at a high level depending on the level of the Ground Water Table present. This is the preferred method of surface water disposal, at source, in the SuDS hierarchal tree.

On site infiltration testing should therefore be carried out to provide:

- An insight as to a safe method of excavation should a high water table be found;
- And if not, its' reliable infiltration capabilities.

The Site currently has an underground tunnel linking the lower ground floor/basement with its garage. One of the proposals is to remove this tunnel by excavation and provide new underground storage vaults and other spaces, whilst still linking to the garage. Therefore, there is likely to be limited space for infiltration devices such are soakaways. In fact, current Building Regulations state that any infiltration chamber should be at least 5.0m away from any building or permanent structure. This requirement will effectively preclude the use of such infiltration devices on this Site.

Thus, for the purposes of this report, infiltration techniques will be largely ignored as not being a practical solution. Attention will be focussed on attenuation instead.

Greenfield Runoff Rates

Greenfield runoff rates have been estimated for the site using the Institute of Hydrology Report 124 method, in accordance with the latest Environment Agency Guidance, as summarised below and are included within the appendices of this study:

CATCHMENT	AREA	1:1 AEP EVENT	1:30 AEP EVENT	1:100 AEP EVENT
Total Site	0.034 Ha	0.1l/s	0.3 l/s	0.4 l/s

Peak Existing Runoff Rates

Peak existing runoff rates have been calculated using the Modified Rational Method and obtained from the Causeway Flow simulation model Flow+ for the 1:1 AEP, 1:30 AEP and 1:100 AEP events respectively with a 20 % and 40 % climate change allowances included to the 1:100 AEP event.

The following design inputs were adopted in accordance with guidance contained within the Flow Design software:

- Storm Duration: 60 Minutes.
- Volumetric Runoff Coefficient (Cv): 0.75
- Routing Coefficient (Cr): 1.30

Findings as summarised below and included within the appendices of this study:

CATCHMENT	AREA	% IMPERMEABLE	1:1 AEP EVENT	1:30 AEP EVENT	1:100 AEP EVENT	1:100 AEP + 1.2 CC	1:100 AEP + 1.4 CC
Total Site	0.034Ha	90 %	5.6 l/s	10.0 l/s	12.2 l/s	13.0 l/s	13.0 l/s

2.6. Proposed Development

This project whilst undertaking many internal changes to the existing property removes the underground tunnel to the existing garage by excavating a large void and creating large vaults and other storage areas, maintaining an underground connection to the existing garage. Therefore, no major visible changes will appear once completed.

The scheme as outlined on the proposed layouts (**Appendix B**) proposes the removal of the existing linking tunnel between the existing lower ground floor/basement and the existing garage by excavating it out. New underground storage vaults and other spaces are to be created with a corridor connecting to the existing garage.

The basement could house an infiltration/attenuation structure beneath, providing a relaxation of the Building Regulation requirement of ‘No soakaway within 5.0m of a structure’

is given, but this is unlikely. If an attenuation tank was to be located there then this would require pumping to reach the invert level of the termination inspection chamber.

This is not a satisfactory solution given that any fixed volume and discharge rate designed may be exceeded at any time by climate change and or failure of the pump equipment giving rise to flooding of the basement.

The roof layout of the existing structure will remain unchanged and therefore the introduction of blue, green or brown roofs are not suitable for this development.

There is an opportunity to provide a water butt locate next to one of the down pipes to enable the irrigation of the small area of the existing garden, however, due to the limited space available this is likely to encroach.

See 3.6 later in this document.

SECTION 3

ANALYSIS OF NATIONAL AND LOCAL POLICY

3. ANALYSIS OF NATIONAL AND LOCAL POLICY

3.1. National Policy

National Planning Policy Framework (NPPF)

Communities and Local Government Document. (2021). *The National Planning Policy Framework* requires any Planning Application to demonstrate that the Proposed Development will be safe for the duration of its' design life, taking into account the vulnerability of its' users and without increasing flood risk elsewhere and reducing flood risk overall, where possible.

Non-Statutory Technical Standards for Sustainable Drainage Systems

Department for Environment, Food and Rural Affairs. (2015). *Non-Statutory Technical Standards for Sustainable Drainage Systems* state that the peak rate of discharge from a redevelopment during the 1:1 year and 1:100 year rainfall events should be as close as reasonably practical to the corresponding greenfield runoff rate, but should never exceed that of the pre-development state.

The standards also recommend that, where reasonably practicable, the runoff volume generated from the 1:100 year, 6 hour rainfall event should be constrained to the corresponding greenfield runoff volume.

Building Regulations Approved Document H

Secretary of State. (2015). *Building Regulations Approved Document H* establishes a hierarchy for surface water disposal and encourages a SuDS approach. The hierarchy stipulates that surface water runoff which is not collected for re-use must be discharged in the following order of priority:

1. Discharge to ground via infiltration; or, where not reasonably practicable;
2. Discharge to a surface water body (i.e. river, watercourse or the like); or, where not reasonably practicable:
3. Discharge to a surface water sewer, highway drain or other surface water drainage system; or, where not reasonably practicable:
4. Discharge to a combined sewer.

3.2. London Plan

The London Plan recognising that due to the way in which London has historically developed over its history, it is not practically possible to return sites, which are generally small in nature, to match Greenfield rates of run off.

It has therefore, been decreed that where possible a 50% reduction in existing discharge rates is acceptable.

3.3. Local Policy

Lead Local Flood Authority SUDS Policy Statement

The London Borough of Camden, in their role as Lead Local Flood Authority (LLFA), stipulates the required standards for sustainable drainage systems for all major developments within their jurisdiction. A minor development such as this one creates little opportunity to play a major role in reducing the quantities of water from the neighbouring systems to help ease the burden of flooding elsewhere in its neighbourhood. However, every opportunity must be looked at to see what can be implemented in order to assist in this National requirement.

The London Borough of Camden Strategic Flood Risk Assessment **DP27 Basements and Lightwells** outlines the following main policies, and in line with the London Plan Policy si 13 relevant to the development of the DS, as follows:

- Developments will be expected to incorporate Sustainable Drainage Systems (SuDS) to reduce the risk of surface water flooding, both to the site in question and to the surrounding area;
- Any proposed development must attempt to make use of and work within the constraints of the existing site topography where possible;
- Any SuDS system must consider the effects of climate change and reduce the potential for environmental damage both on and off site;

- Preference should be for the adoption of SuDS systems which enhance public realm, wherever possible;
- Drainage Strategies must assess the hydrology of the site along with landform, geology, drainage and flood risk and incorporate this within the adopted SuDS proposal; and
- Recommendations given within national policy (as outlined above) should be adhered to in full, avoiding adversely affecting drainage and run-off or causing other damage to the water environment unless demonstrated to be inappropriate.

3.4. Assessing Flood Risk

The Department for Environment, Food and Rural Affairs & Environment Agency (2017). *Flood Risk Assessment for Planning Applications* confirms that detailed flood risk assessment is required where the Application Site is:

- Located in Flood Zone 2 or 3, including minor development and change of use; or
- More than 1 hectare (Ha) in Flood Zone 1; or
- Less than 1 Ha in Flood Zone 1, including change of use in a development type to a more vulnerable class, where the development could be affected by sources of flooding other than by rivers and the sea; or
- In an area within Flood Zone 1 that has critical drainage problems as notified by the Environment Agency.

The Government's online Flood Map for Planning indicates that the Proposed Development is situated within Flood Zone 1. In accordance with Table 1 (Flood Zones) of the NPPF, this classifies the site of having a less than 1:1000 annual probability of river or sea flooding. See appendices.

Table 2 (Flood Risk Vulnerability Classification) of the NPPF classifies the existing basement this is classed as 'More Vulnerable'.

Table 3 (Flood Risk Vulnerability and Flood Zone Compatibility) of the NPPF states that More Vulnerable development is compatible within Flood Zone 1 and therefore the Sequential Test is considered to be satisfied and an Exception Test is not required here.

Finally, the site is within Flood Zone 1 and the total area for the Application Site has been determined as 0.034 hectares (340m²), that falls below the trigger criteria for a formal Flood Risk Assessment

Therefore, on this basis provision of a full formal Flood Risk Assessment is not considered to be required for the Proposed Development and it is felt that flood risk does not represent a constraint to the development of the Site. However, as a basement is in existence it was felt prudent to provide an outline guide and as such one has been produced.

3.5. Strategic Flood Risk Assessment and Sources of Flooding

There are a number of key potential sources of flooding that can put Sites at risk. These include fluvial (rivers), tidal (the sea), ground water, sewer, surface water and infrastructure failure (including reservoirs, canals industrial process, burst water mains and blocked sewers or failed pumping stations). Each of these will now be considered in turn and the risk posed to the Site considered.

Definition of the flood Hazard source	LIKELIHOOD - Very Likely, Possible, Negligible, Very Unlikely
Fluvial	The Site is within a flood zone 1 and as stated in 3.4 of the SFRA there is no risk Flood Risk – Very unlikely
Coastal - Sea	This area is not near the coast Flood Risk – Very unlikely
Coastal- Estuarine	This area is not near the coast Flood Risk – Very unlikely
Pluvial/ Sheet run off	The property sits above the local Highway and many walls exist that cut off possible overland flows Flood Risk – Very unlikely

Sewer – SWS, FWS, CS	Thames Water have indicated no surcharge within their network locally Flood Risk - Negligible
Groundwater	Bagshot formation – Sands/Gravels Flood Risk – Possible
Dam Breach	No Dams near by Flood Risk – Very Unlikely
Canal	No Canals near by Flood Risk – Very unlikely
Major Water Main	Thames Water shows no major trunk water mains in The Mount only a 4" (100mm) Flood Risk – very unlikely

3.6. Easements and Other Constraints

A limited number of Utilities records have been obtained for the site and included within the Appendices. They suggest the presence of an existing water main within the immediate vicinity of the Application Site. It is highly likely that Gas, Telecommunications and Cable are also present. It is unlikely that any of these benefit from easements within the Site and therefore will not impact on the future development of the Application Site and DS, during the course of the ongoing design development.

3.7. Below Ground Drainage Diversions and Other Constraints

No diversions of publicly owned drainage infrastructure are known to be present at the Application Site at the time of writing.

Similarly, no other notable constraints are envisaged apart from the size of the proposed footprint and the area available for SuDS structures.

3.8. Opportunities

The changes being made to the Application Site still present an opportunity to contribute to a reduction in flood risk by reducing the current rate of discharge to the public sewer network. Further, whilst not decreasing the overall volume discharged, the any reduction in rate will ease the immediate burden on the sewerage network during the peak of storm events.

The incorporation of some form of attenuation within the Proposed Development would seek to offer a reduction in such peak runoff rates in accordance with both the national and local policies described above. Subsequently, a reduction in peak flow rates would result in a lower surface water flood risk downstream of the Proposed Development.

Surface water generated by the Application Site is believed to discharge un-treated directly to the public surface water network. However, the main catchment for the surface water element is the roof water with little else contributing and Subsequently, the management of surface water in accordance with the requirements of local policy and CIRIA. (2015). *C753 – The SuDS Manual* would not result in an great increase in the quality of the surface water generated by the Application Site as a result of the Proposed works.

SECTION 4

FOUL WATER MANAGEMENT

4. FOUL WATER MANAGEMENT

4.1. Existing Discharge Rates and Points of Connection

Currently, the Application Site features an existing domestic property, and this will not change due to the proposed works. Therefore, whilst there might be an slight increase in water usage, and therefore foul water disposal, it will not be possible to determine exactly what this would be or adversely affect the increase in foul waste disposal that would make a significant increase to its current state.

A CCTV survey shows that the existing system runs through to the garage before discharging to the public sewerage system.

4.2. Proposed Discharge Rates and Points of Connection

As mentioned above the proposed foul discharge rates will not significantly increase due to the works being proposed.

4.3. Analysis

The Proposed Development will not generate a measurable net increase in foul water volume and therefore demand to the public foul water sewer network.

The relatively small nature of the increased flow, assuming a conventional gravity discharge, would be unlikely to exceed the capacity of the existing public sewer network. However, this will be discussed with Thames Water at the time of S106 application.

SECTION 5

SURFACE WATER MANAGEMENT

5. SURFACE WATER MANAGEMENT

5.1. Proposed Drainage Catchments

Owing to the relatively small area of the Application Site (less than 1.0ha), it is proposed to utilise a single drainage catchment for the purposes of the surface water analysis.

5.2. SuDS Management Train

In accordance with the discharge hierarchy identified in Section 3, ideally surface water generated by the Proposed Development should be discharged to ground via infiltration, where practicable to do so.

Infiltration / percolation testing in accordance with BRE Digest 367 could be undertaken at the application site as part of intrusive site investigation. This test comprises the formation of a trial pit to a depth of 1.00 m below ground level, squaring of the pit sides and subsequent rapid filling with potable water. The fall in water level from 75 % to 25 % effective fill depth is then timed to ascertain an infiltration rate in m/s.

In the case of the Application Site, an infiltration method of disposal is unlikely to be accepted due to the current Building Regulation requirement that a minimum of 5.0m should be maintained between a soakaway and a structure.

Similarly, the presence of a watercourse as a method of disposal is not available and therefore, the Public Combined Sewer to the East of the Application Site is believed the most likely receptive point into which surface water could be discharged.

Therefore, it is proposed that the Application Site will continue to dispose of surface water into the public combined system, re-utilising existing connections where possible or via new appropriately designed connections if needs be. This is subject to seeking appropriate approvals from Thames Water.

5.3. Catchment Contributing Areas

A breakdown of the contributing areas for the proposed surface water drainage system, are as follows:

CATCHMENT	OPEN SPACE	DEVELOPABLE AREA	%IMPERMEABLE	IMPERMEABLE / DESIGN AREA
Total Site	0.004 Ha	0.030 Ha	88.0 %	**0.030 Ha**

An area of soft landscaping appears to the East, over the extended basement and as described earlier, as such a minimal depth of top and sub-soil is to be provided but ignored as permeable for the purposes of the calculations.

5.4. Allowance for Climate Change

Table 2 (Peak Rainfall Intensity Allowance in Small and Urban Catchments) of Environment Agency. (2019). Flood Risk Assessments: Climate Change Allowances confirms the climate change allowance of 40% should be adopted for the Application Site, assuming a lifespan of 100 years for residential development as recommended within the NPPF.

5.5. Allowable Discharge Rates

In accordance with the national and local policies outlined within Section 3 the Proposed Development should seek to limit the peak flow rate to the greenfield runoff rates, wherever practicable. Where this cannot be achieved, a betterment rate may be considered acceptable.

As has already been confirmed in Section 2, the greenfield runoff rate for the Application Site has been determined as 5.6 l/s for the 1:1 AEP event and it is not considered practicable to limit the discharge rate to 50% as required by the London Plan in this instance. A discharge rate of **5.0l/s** however, will be set for all storms thus reducing the peak flow when it is likely that the local sewerage network will be in greater demand.

Environment Agency. (2013). *Rainfall Runoff Management for Developments* stipulates that a minimum discharge rate of **5.0 l/s** should be adopted to mitigate risks associated with blockage of the flow control device.

However, commercially available flow control technologies have since been developed which can better this minimum value, with published minimum flow rates of 0.7 l/s being achievable using vortex-flow systems, for design head values as low as 0.4 m.

Notwithstanding this, a clear balance must be struck between limiting discharge flows, maintaining practicality of construction, minimising ongoing maintenance requirements, and ensuring the scheme remains commercially viable.

Owing to the constraints present at the Application Site due to its small plan area and likely space restrictions, it is considered prudent, from a design perspective, to ensure a constant discharge flow to minimize attenuation volume requirements and mitigate flood risk.

This limits the choice of available flow control devices to that of a float operated system as other types (i.e. vortex systems, throttle pipes, orifice plates etc.) are reliant upon the generation of head pressure to develop the specified peak discharge rates. In simple terms, these systems require a larger volume of water behind the device to activate the peak discharge flows and hence require larger attenuation volumes.

It is therefore proposed to limit the discharge from the Proposed Development to **5.0 l/s**.

Limiting the maximum discharge rate from the Proposed Development to this value would present a reduction in peak discharge rates for the key design events and an overall betterment of:

- **61.5%** during the 1:100 AEP event, including the 40 % allowance for climate change.
- **59.0 %** during the 1:100 AEP event.
- **50.0 %** during the 1:30 AEP event.

5.6. Proposed SUDS Features

Due to the constraints imposed on the Proposed Development, the incorporation of above-ground SuDS features offering complementary benefits is not considered feasible. However, it may be possible, and subject to Client acceptance, to reduce the size of any attenuation

tank proposed, by promoting the use of rainwater gardens over the new basement feature where limited top/sub-soil will be available. This also provides additional benefits as it promotes biodiversity.

Similarly, owing to the limited area of proposed external works, it is not considered feasible to adopt permeable surfaces at the Proposed Development.

Options available are either;

- To install an attenuation tank within the limited area of existing garden. The attenuation tank will discharge with a controlled outflow to the termination inspection chamber. It will discharge at a rate of no more than 5.0l/s or;
- To provide a rainwater garden over the proposed basement to reduce the volume of the attenuation tank. This needs to be discussed with the Client and their Landscape Architect

The required attenuation volume has been determined for a range of storm events in accordance with the requirements of the non-statutory standards for sustainable drainage systems. See **Appendix D**

Estimated attenuation volumes have been calculated in two stages. Firstly, an anticipated range has been determined using the Quick Storage Estimate function of an Industry Standard design package, to inform further rigorous assessment. Secondly, a preliminary model has then been developed using that package to determine a more refined attenuation estimate as summarised in the table below, with calculations given in the **Appendix D**.

The preliminary model is based upon a single attenuation tank ignoring for now the possible provision of a rainwater garden, the discharge from surface water generated from Site will be limited to 5.0 l/s to the existing combined sewer in The Mount. This will represent an improvement to the existing conditions, it must be remembered that foul discharge adds to the total flow but as stated there is unlikely to be any measurable increase from existing flows.

Following a storage estimate exercise, a minimum volume of 3.04 m^3 will be required in order to provide the maximum achievable betterment of 61.5% during the 1:100 AEP event plus a 40% allowance for climate change, as outlined above. The proposed attenuation tank has been appropriately sized to ensure that no flooding occurs during the 1:100yr +40% CC

6 hour storm event to prevent the possibility of flood water finding its way into the basement/lower floor

It should also be understood that the during storm events the neighbourhood might be experiencing the controlled discharge from the Site will not contribute immediately and as such the peak in the receiving sewer may have already passed.

As there is minimal change in impermeable area, there would be little increase in existing discharge volumes as a result of the 1:100 AEP 6-hour event however, this has been considered as it is an opportunity to provide some benefit to the neighbourhood.

STORM EVENT	CONTRIBUTING AREA	MAXIMUM DISCHARGE	ATTENUATION VOL (RANGE)	ATTENUATION VOL (OPTIMISED)
1:1 AEP	0.030 Ha	5.0 l/s	0.0-1.0 m^3	0.0m^3
1:30 AEP	0.030 Ha	5.0 l/s	2.0-4.0 m^3	0.0m^3
1:100 AEP	0.030 Ha	5.0 l/s	3.0-6.0 m^3	2.0m^3
1:100 AEP + 20% CC	0.030 Ha	5.0 l/s	4.0-7.0 m^3	2.5m^3
1:100 AEP + 40% CC	0.030 Ha	5.0 l/s	5.0-9.0m^3	3.8m^3

During the analysis it has been necessary to ensure that a minimum pipe size of a 150mm Ø connects to the attenuation tank otherwise the restriction of a smaller pipe size will cause flooding whilst the tank remains only partially filled.

The use of a Hydroslide CTL VS unit has been used in the analysis to limit the volume/size of the attenuation tank.

With the above in consideration, the Proposed Development would therefore contribute to a reduction in flood risk associated with the exceedance of the public surface water sewer network in the vicinity of the Application Site. But it would provide a significant reduction in peak runoff rates and avoid an increase in the total runoff volume during the critical period.

As a summary of the principles being incorporated:

Item	Feasible (Y/N/TBC)	Comments
1. Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)	N	The existing pitched roof will not change and therefore it is considered that the use of blue roofs is not suitable. Likewise, there is no intention to carried out a major overhaul of the existing plumbing system enabling the installation or a grey water tank
2. Rainwater infiltration to ground at or close to source	N	The site has limited area and could not meet the Building Regulation requirement
3. Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)	TBC	The existing pitched roof will not change and therefore it is considered that the use of Green or broen roofs are not suitable. It may be possible to divert an existing rainwater down pipe to the soft landscaped area over the proposed basement vaults and create a rainwater garden during the design stage
4.Discharge rainwater direct to a watercourse	N	None available
5. Controlled rainwater discharge to a surface water sewer or drain	N	No dedicated surface water sewer available

5.7. Water Quality

The Proposed Development would utilise existing connections to the public surface water sewers in the immediate vicinity of the site, wherever possible.

As there is a little in significant change of use of the Proposed Development which is mainly roof water considered ‘clean’, it would not greatly reduce pollutant loading and subsequently the vulnerability of the existing surface water sewer is considered to be negligible.

5.8. Ownership and Maintenance

To ensure the long-term performance of the proposed DS, the on-site drainage system will be owned and maintained by the site operator or a maintenance company (MC) in accordance with the indicative schedule below:

ELEMENT / DRAINAGE COMPONENT	OWNERSHIP / ADOPTION	MAINTENANCE REQUIREMENTS
Pumping stations (Basement toilet)	Freeholder	To be monitored electronically and be on a maintenance regime with a professional service team. **Inspection and service annually**.
Rain Water Pipes	Freeholder	Clearance of leaves / debris from guttering and hopper inlets. Rodding points provided to clear blockages via conventional rodding methods. **Inspection annually and before / after extreme storm events.**
Soil Vent Piles / “Stub Stacks”	Freeholder	Rodding points to be provided to clear blockages via conventional rodding methods. **Inspection annually**.
Gullies (Internal & External)	Freeholder	To be monitored for silt build-up and cleaned as required. Where provided, ensure air traps are primed and sealed to prevent smells. **Inspection quarterly.**
Surface Water Drainage Channels	Freeholder	To be monitored and cleaned via jetting when any debris / silt reduces the cross-sectional area by 25% or more. Inspection to include both the channel and silt trap / gulley outlets. **Inspection annually and before / after extreme storm events**.

Below Ground Pipework Generally	Freeholder	To be inspected for reduction in cross-sectional area (i.e due to blockage, silt or debris build-up, root ingress etc) general condition of materials, pipe displacement and the like. **Inspection annually and where appropriate before / after extreme storm events**.
Manholes / Inspection Chambers Generally	Freeholder	To be inspected for debris and integrity of chambers and covers generally. **Inspection annually and where appropriate before / after extreme storm events.**
Attenuation tank including flow control device	Freeholder	To be monitored for silt build-up and cleaned as required **Inspection annually and before/after extreme storm events.**
Rainwater Garden	Occupier	To reduce weeds and remove wind blown debris etc, as and when **Inspection as moving in and out of the house**

SECTION 6
CONCLUSIONS

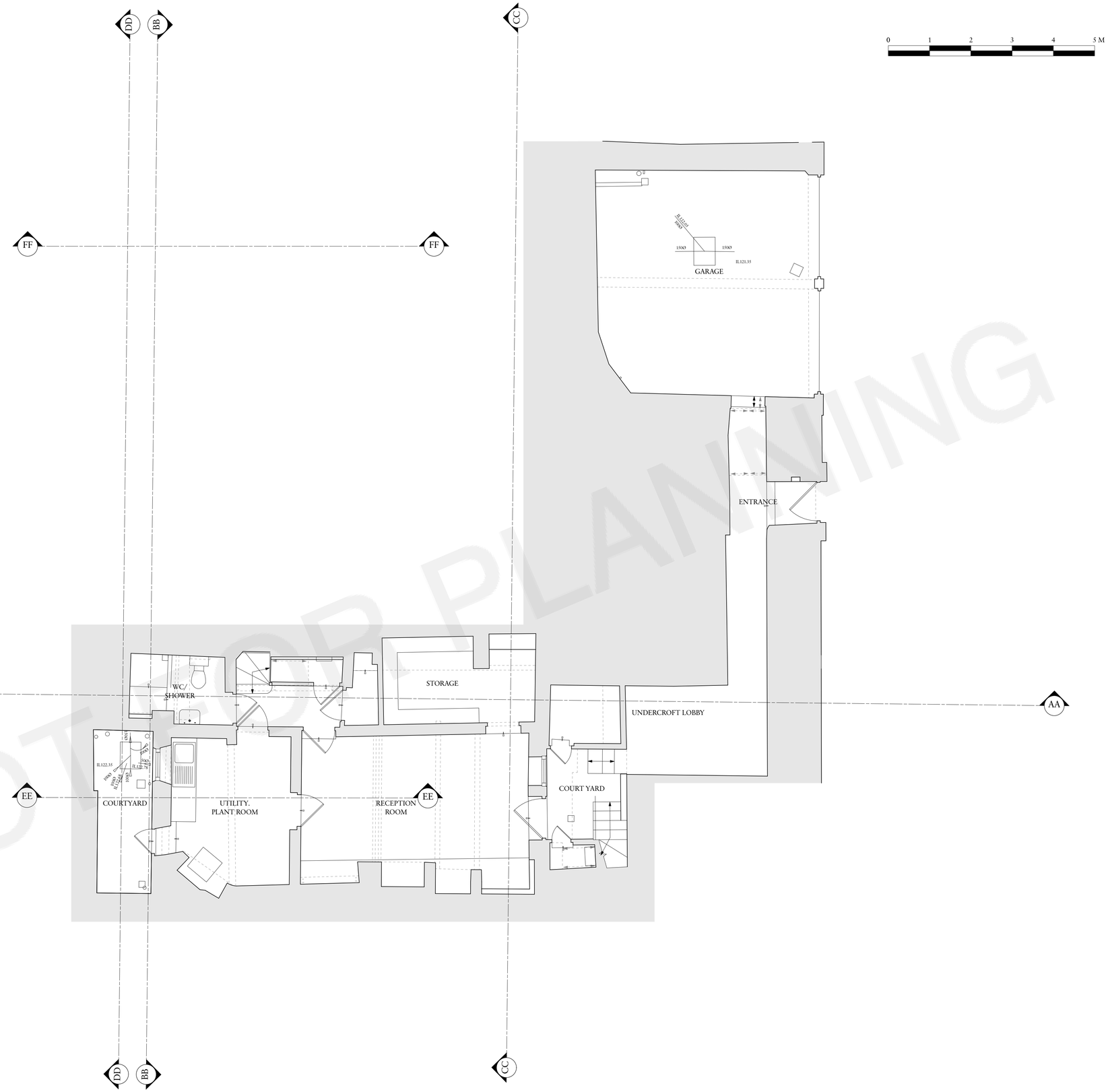
6. CONCLUSIONS

- The scheme proposes many internal changes to the existing dwelling with the main construction being the removal of an existing tunnel between the existing basement and the garage by excavation. Extending the basement up to the garage.
- It is assumed that both surface and foul water sewer currently generated by the Site is discharged to the combined public sewer network in The Mount. The CCTV has proven a single connection to the combined public sewer.
- Due to the proximity of the foundations and adjacent structures, the incorporation of a soakaway or other infiltration devices is not considered to be appropriate.
- The peak greenfield runoff rate at the site has been determined as being well below the minimum practicable discharge rates for commercially available flow restriction devices. A discharge limit of **5.0 l/s** has been adopted as the minimum. it is not considered practicable to limit discharge from the development to the greenfield runoff rate in accordance with SuDS Policy 14.
- The discharge from the site post-development will be limited to a maximum rate of **5.0 l/s** during all events up to and including the 1:100 AEP event including a 40% allowance for climate change. This would provide a significant betterment to the existing condition without introducing an additional source of flood risk.
- To achieve the above limitations of discharge, a 3.0m^3 of attenuation will be provided under the existing garden
- The development proposal is unlikely to increase the peak foul water flows from the site. However, given the relatively small flow rates, it would be unlikely that the public sewer network would not have sufficient capacity to cater for the Proposed Development. Clarification has not been sought from Thames Water at the time of writing.
- The development proposal will contribute to a reduction in flood risk associated with the exceedance of the public surface water sewer network in the vicinity of the site by providing a significant reduction in both peak discharge rates and reducing volume during peak storm intensities.
- The proposed Drainage Strategy has been prepared to be robust and to demonstrate that it is possible to drain the site in a sustainable manner in keeping with local policy requirements without increasing flood risk to or from the Proposed Development. It should be noted that this

strategy presents one possible solution to demonstrate that the Proposed Development can be sustainably drained and should not be interpreted as the definitive solution.

APPENDIX A

EXISTING SITE PLAN



Important note

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All dimensions and conditions are to be checked on site by the contractor prior to preparing drawings or commencing any work. The contractor is responsible for checking that there is no conflict between site dimensions and drawn dimensions.

In the event of any detail or dimensional conflict between Charlton Brown Architects drawings, the matter must be referred back to Charlton Brown Architects for clarification

N

Rev	Date	Details	By

Charlton Brown
Architecture & Interiors

The Belvedere, 2 Back Lane, Hampstead, London, NW3 1HL

Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

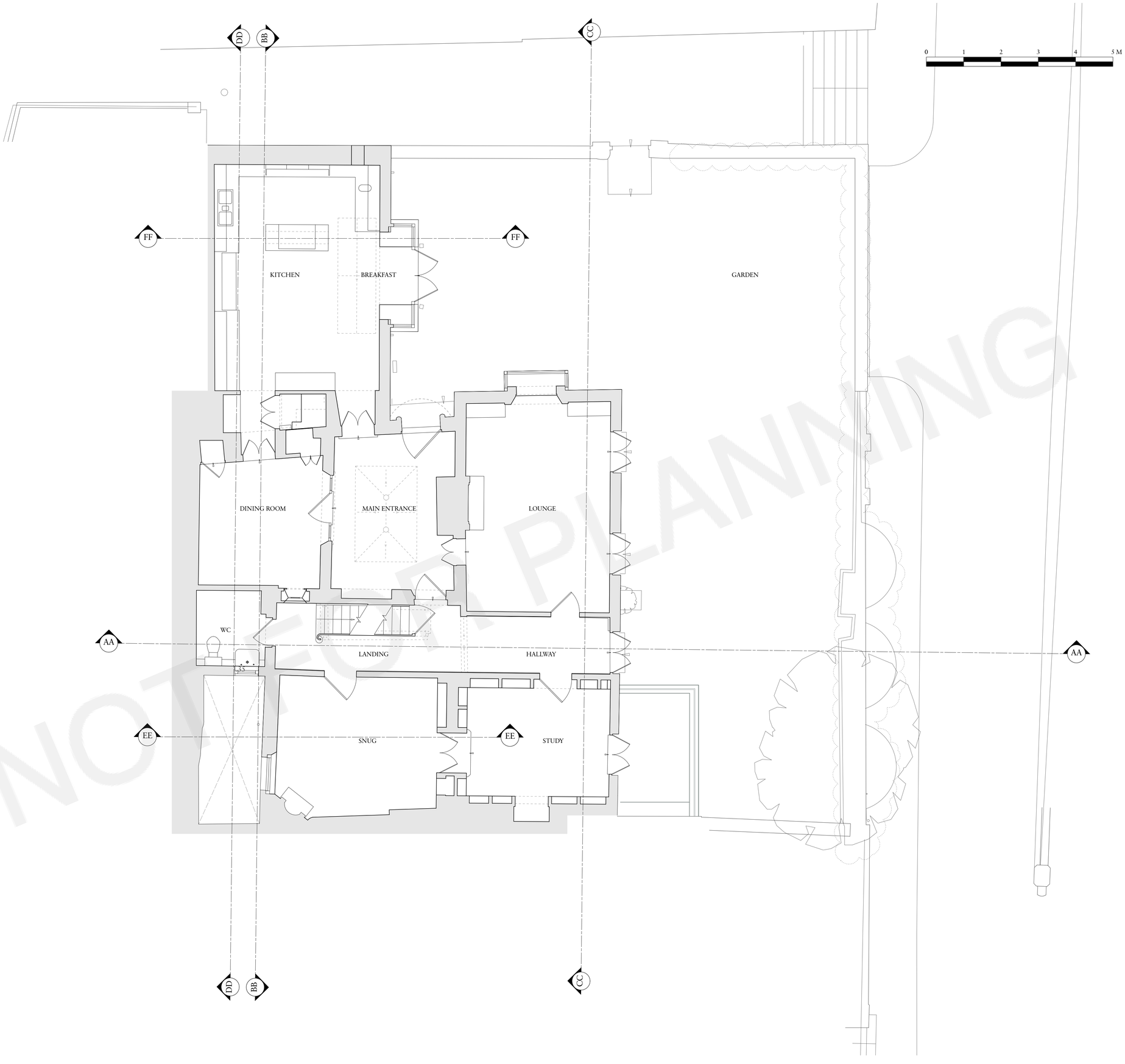
Drawing Title
Existing Lower Ground Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	EX-00-100	



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Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

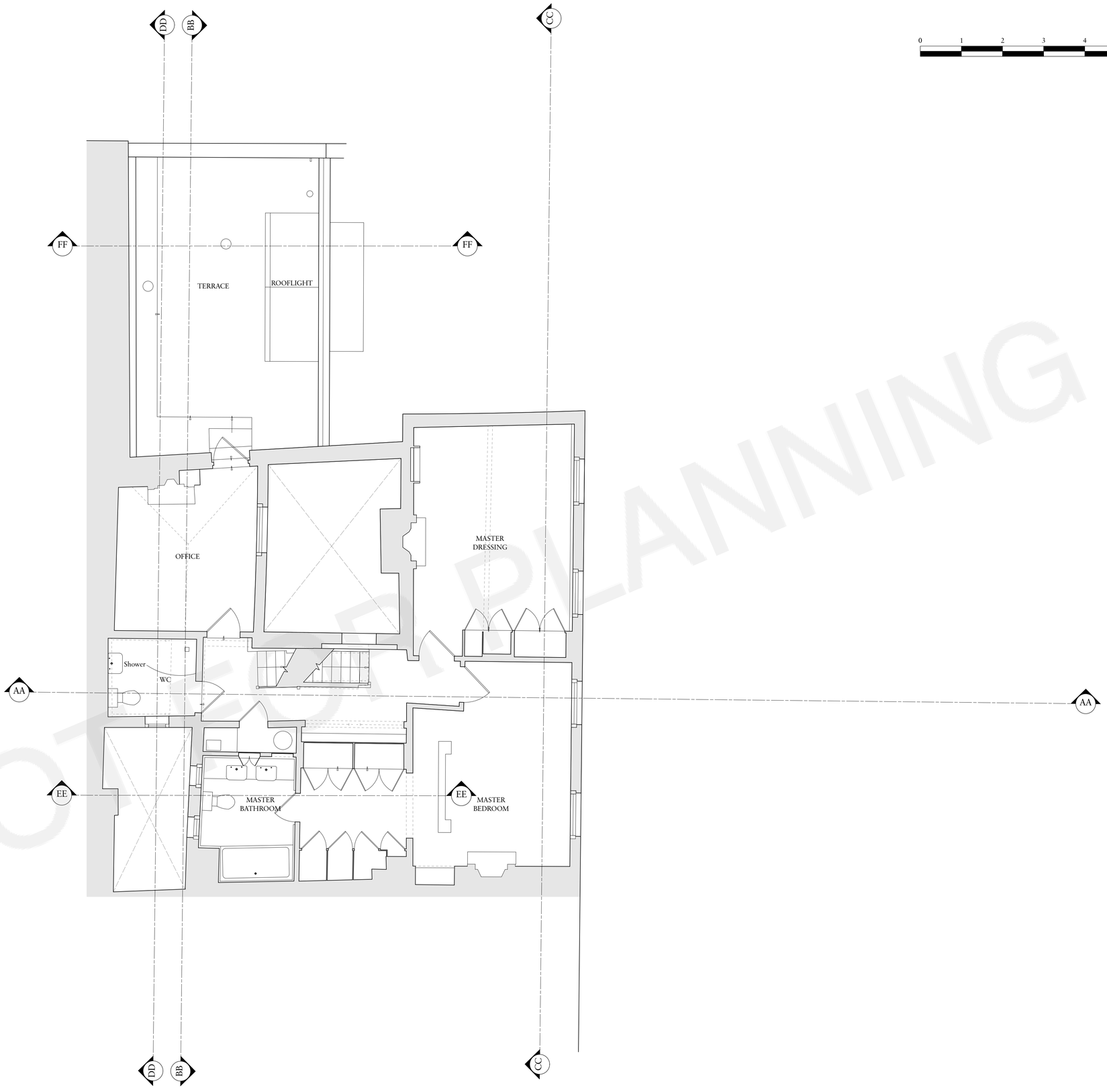
Drawing Title
Existing Ground Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	EX-00-101	



0 1 2 3 4 5 M

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Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

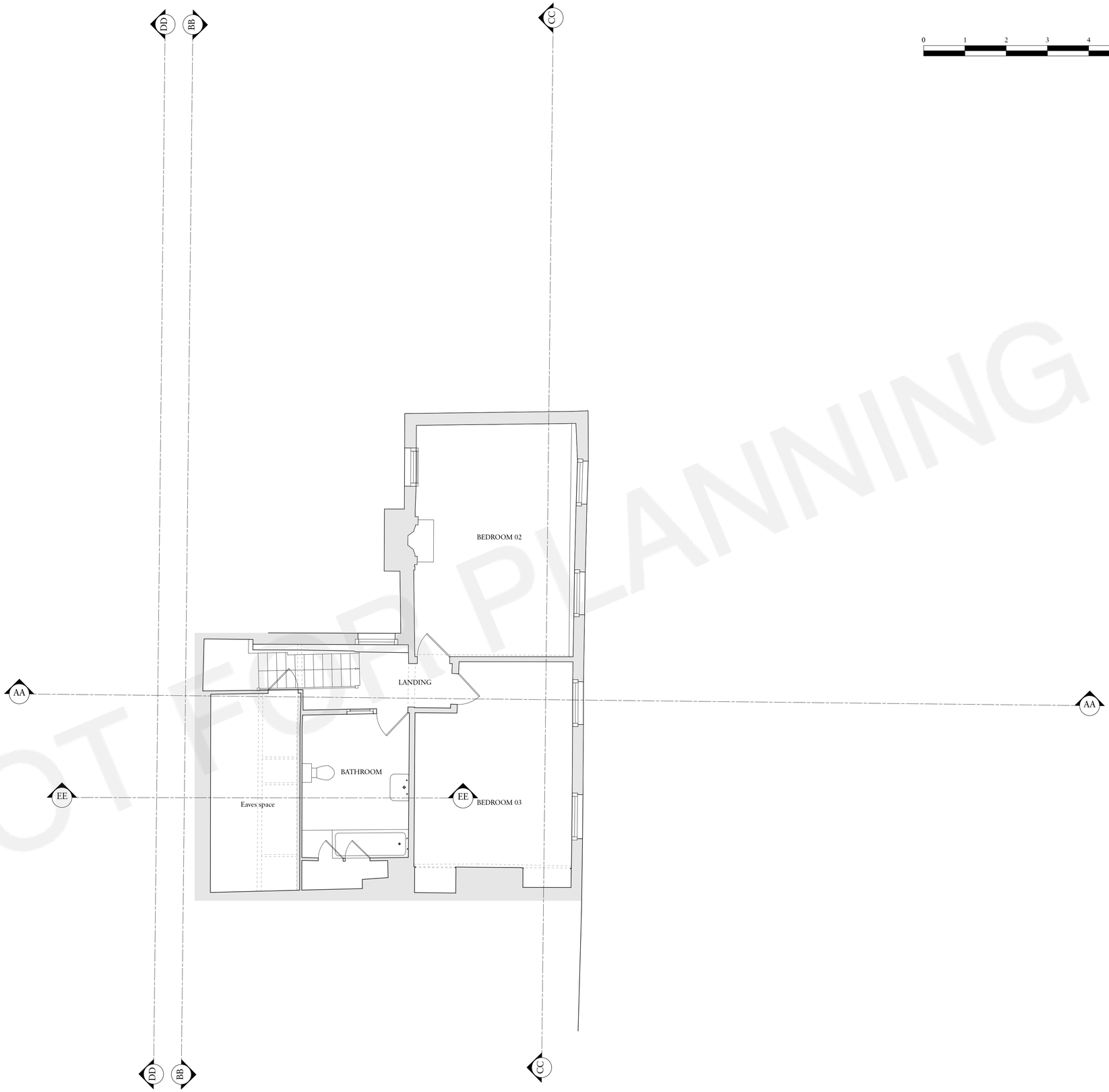
Drawing Title
Existing First Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	EX-00-102	



0 1 2 3 4 5 M

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Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

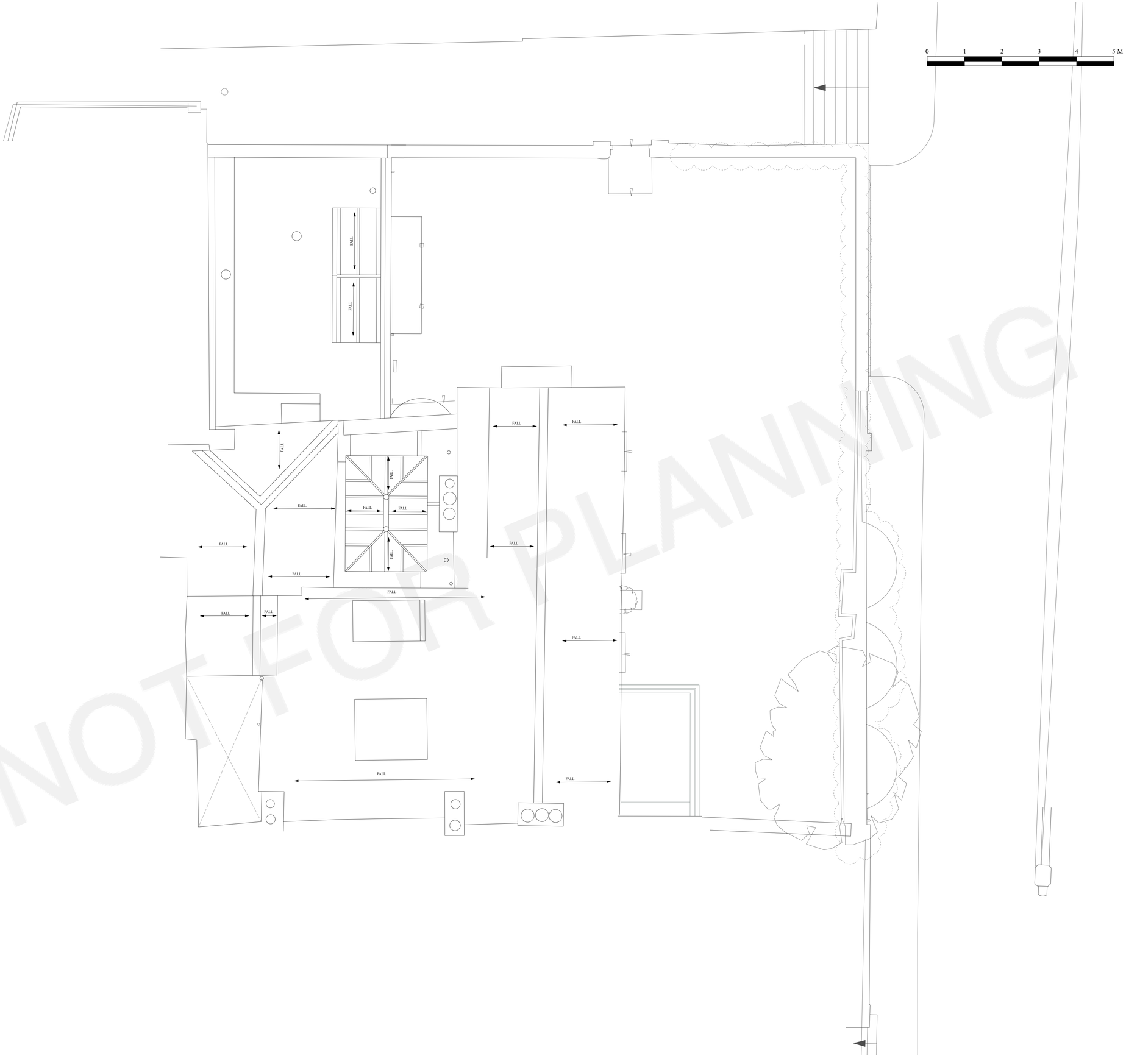
Drawing Title
Existing Second Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	EX-00-103-C	



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Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

Drawing Title
Existing Roof Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

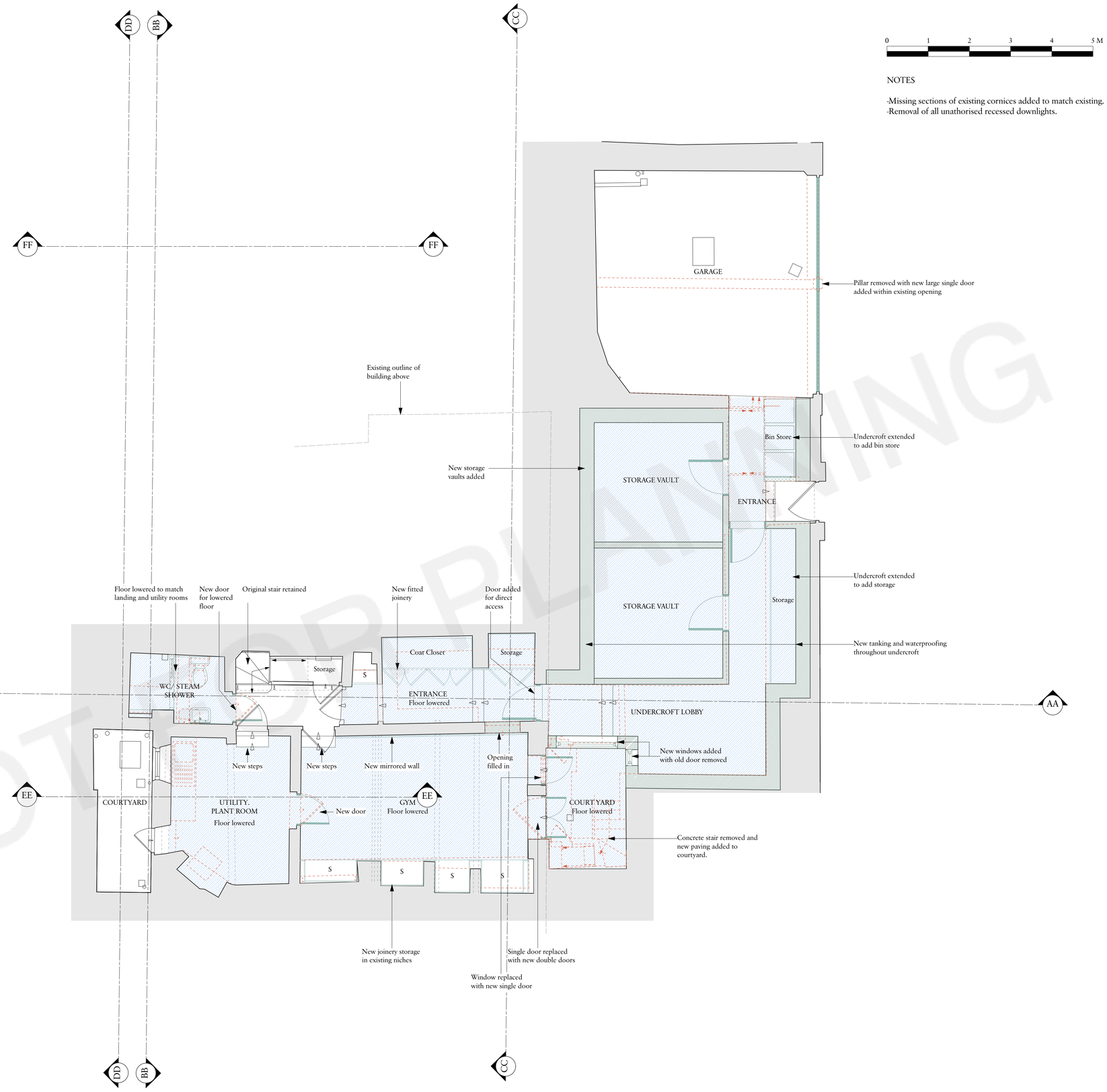
Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	EX-00-104	

APPENDIX B

PROPOSED SITE PLANS



NOTES

-Missing sections of existing cornices added to match existing.
-Removal of all unathorised recessed downlights.

Key:

- Demolish
- New
- Floor lowered
- Floor level raised or lowered

Important note

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Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

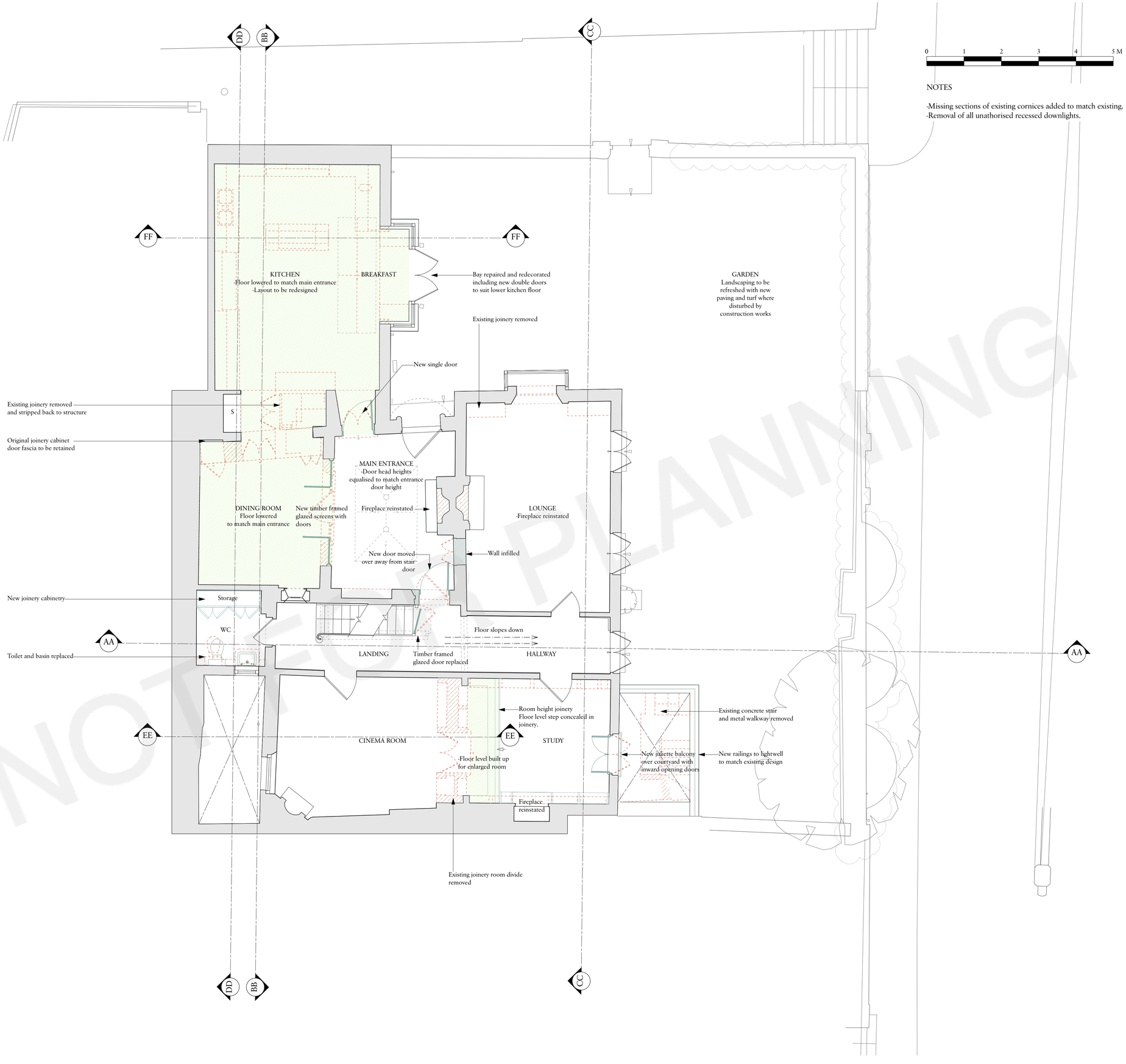
Drawing Title
Lower Ground Floor Plan

Date 22/03/2022 Drawn JLB Checked LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number 21041 Drawing Number PL-00-100 Revision



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Key:

- Demolish
- New
- Floor lowered
- Floor level raised or lowered

Rev	Date	Details	By

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The Belvedere, 2 Back Lane, Hampstead, London, NW3 1HL

Telephone +44(0)20 7794 1234
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Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

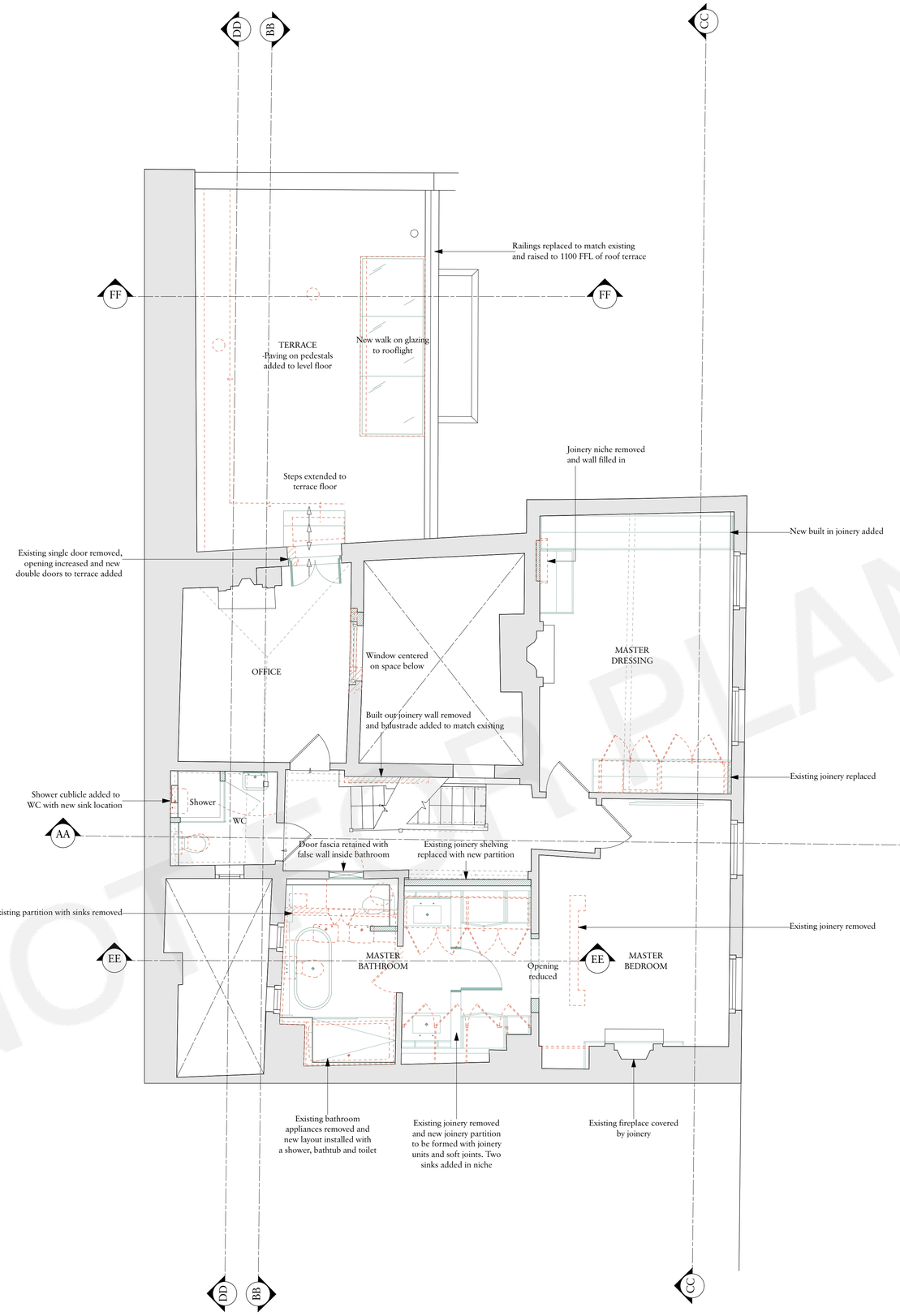
Drawing Title
Ground Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	PL-00-101	



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Key:

- Demolish
- New
- Floor lowered
- Floor level raised or lowered

Rev	Date	Details	By

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Architecture & Interiors

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Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

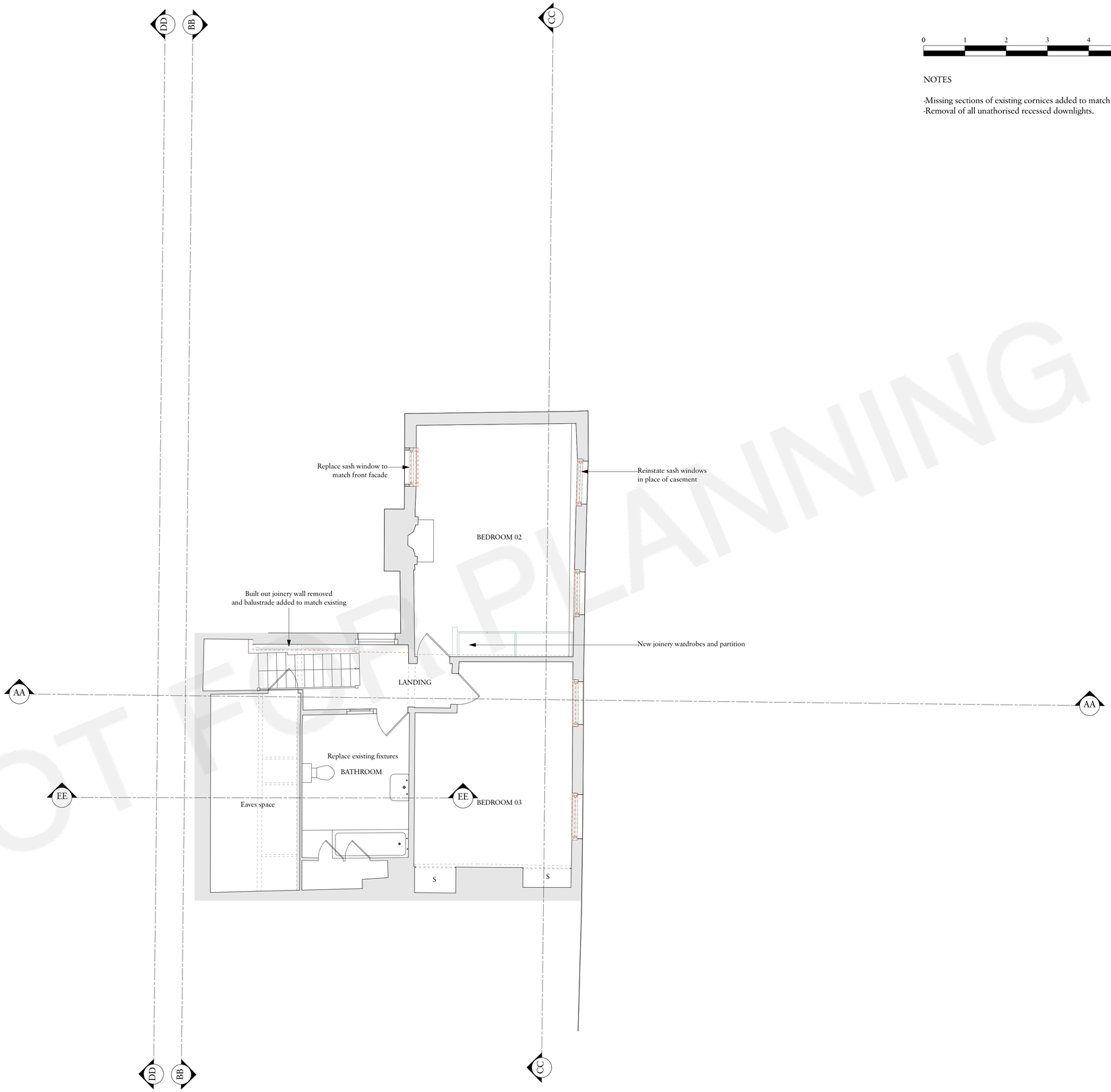
Drawing Title
First Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	PL-00-102	



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Key:

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Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

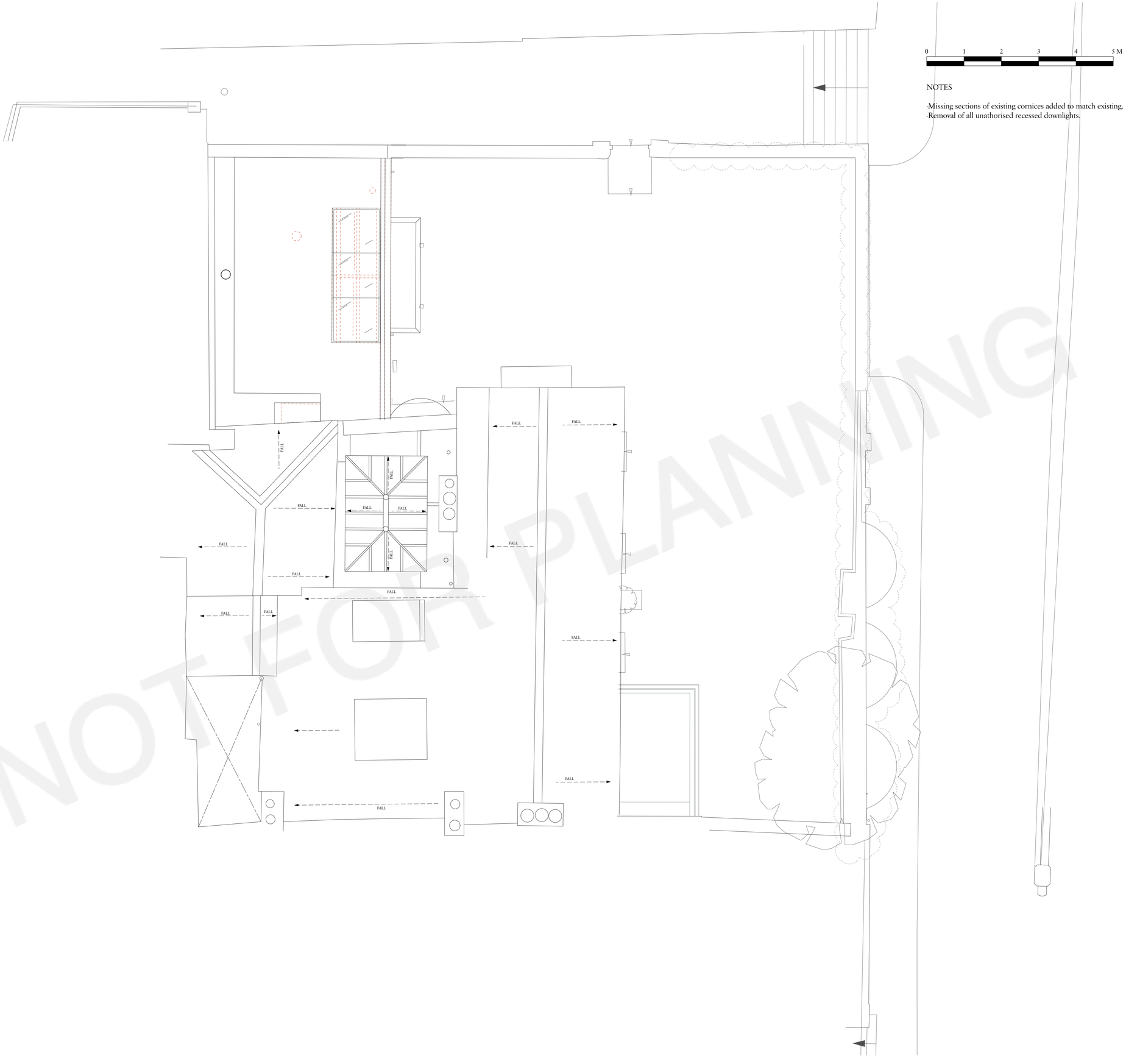
Drawing Title
Second Floor Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	PL-00-103-C	



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Key:

- Demolish
- New
- Floor lowered
- Floor level raised or lowered

Rev	Date	Details	By

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Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

Drawing Title
Roof Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	PL-00-104	

APPENDIX C

THAMES WATER

ASSET PLANS

Asset location search

Property Searches

Constructure Ltd
Bell Yard Mews
15Bermondsey Street
LONDON
SE1 3TY

Search address supplied 9
The Mount
London
NW3 6SZ

Your reference 2230

Our reference ALS/ALS Standard/2022_4702854

Search date 16 August 2022

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset location search

Property Searches

Search address supplied: 9, The Mount, London, NW3 6SZ

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

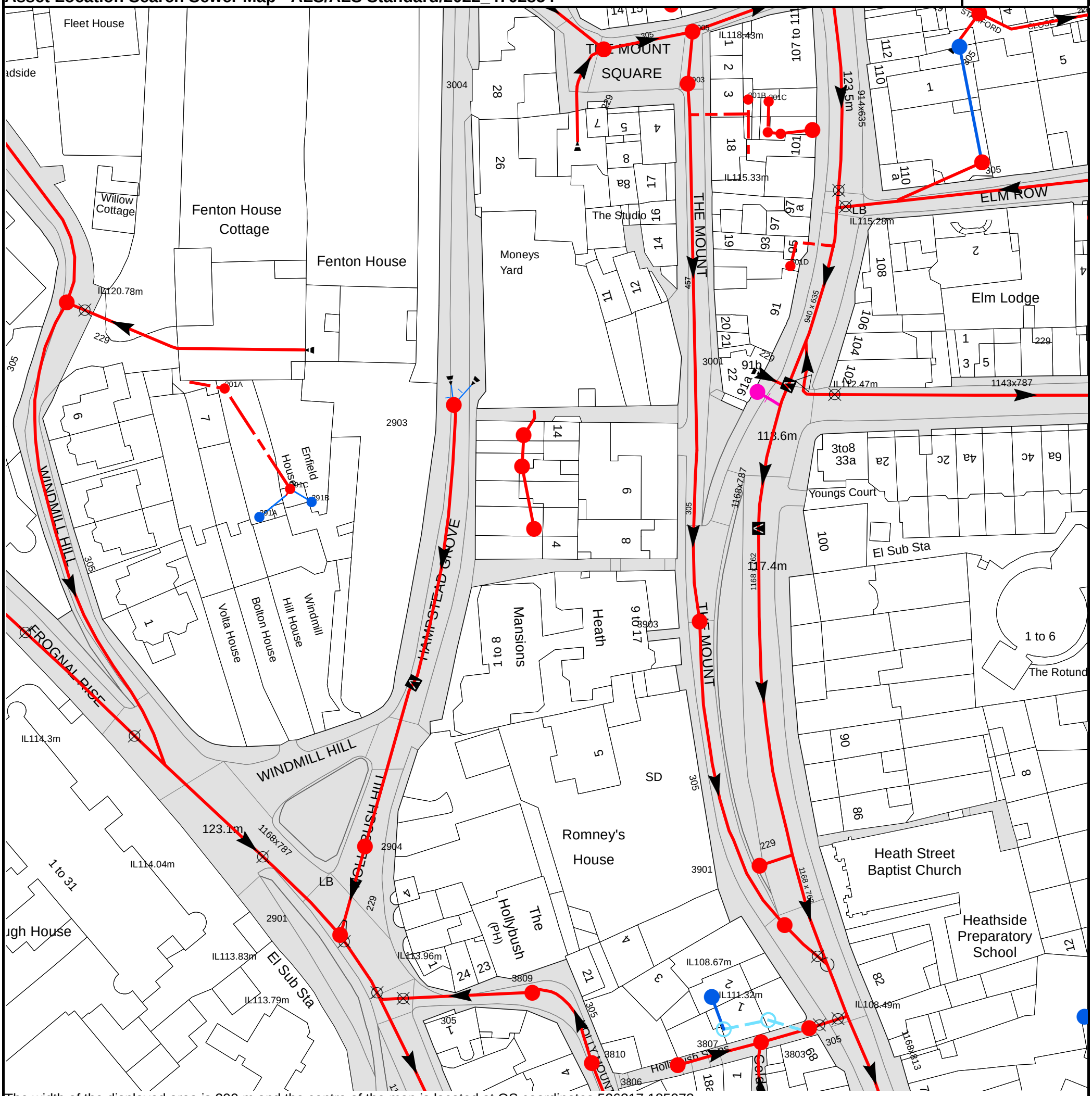
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4702854



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 526317,185973

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
38GA	n/a	n/a
38GB	n/a	n/a
3901	n/a	n/a
3807	117.06	113.66
38GC	n/a	n/a
3902	n/a	n/a
3803	116.12	n/a
48CI	n/a	n/a
3903	n/a	n/a
39AJ	n/a	n/a
291A	n/a	n/a
291B	n/a	n/a
291C	n/a	n/a
39BA	n/a	n/a
39BB	n/a	n/a
2903	n/a	n/a
3001	n/a	n/a
301D	n/a	n/a
401D	n/a	n/a
401C	n/a	n/a
30DE	n/a	n/a
30EF	n/a	n/a
30EE	n/a	n/a
30EH	n/a	n/a
301C	n/a	n/a
301B	n/a	n/a
3003	125.8	121.59
3004	127.12	122.96
30DD	n/a	n/a
3005	125.99	120.75
3006	121.79	119.81
30GB	n/a	n/a
2901	n/a	113.83
2904	n/a	n/a
3809	123.06	116.05
3810	123.02	n/a
3806	120.89	119.98
2001	123.76	120.01
201A	n/a	n/a

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Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

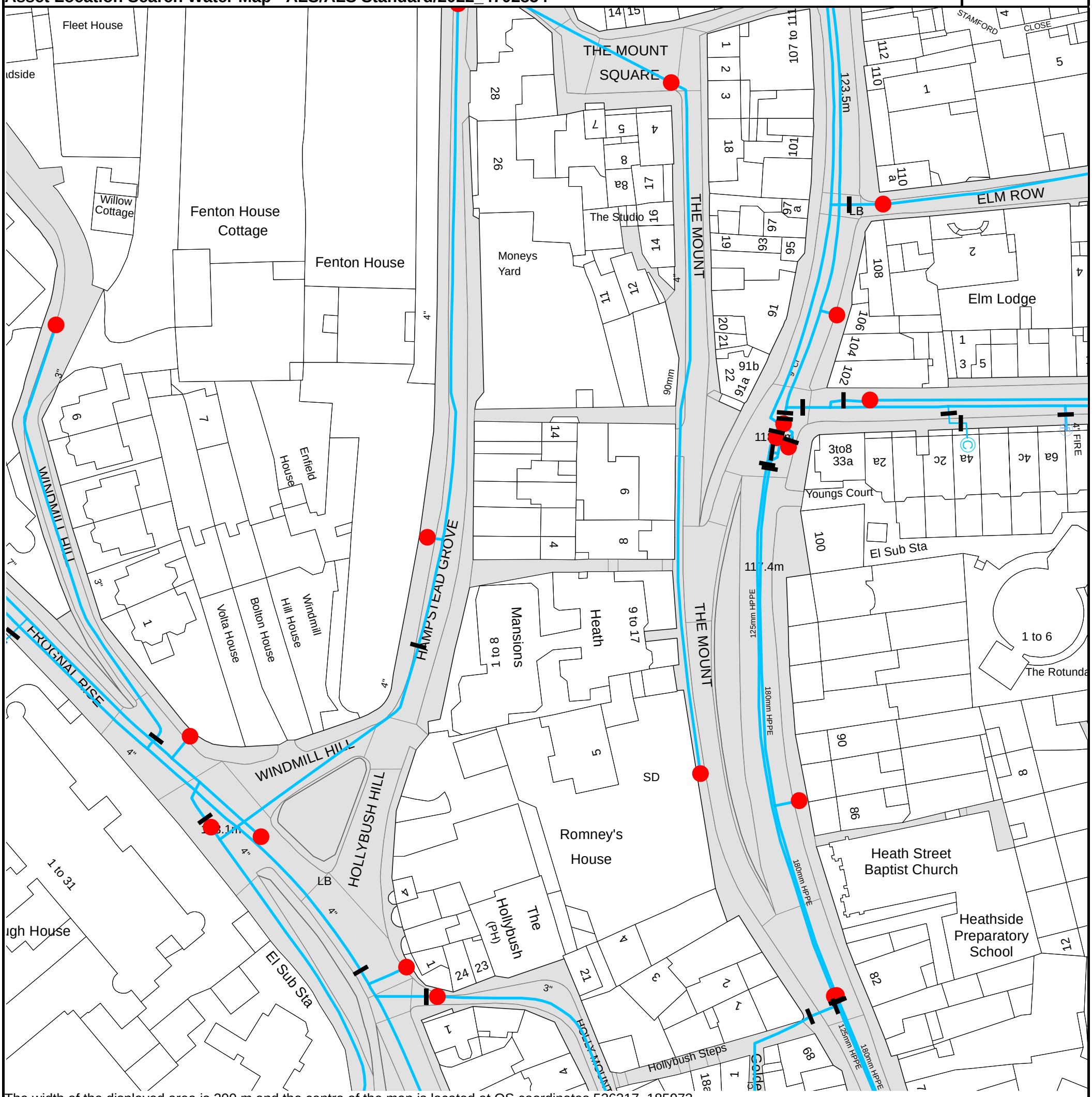
Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2022_4702854



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 526317, 185973.

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

Casement: Ducts may contain high voltage cables. Please check with Thames Water.

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

APPENDIX D

SURFACE WATER CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	2.00	Enforce best practice design rules	✓

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.030	2.00	121.000	1200	640	95.397	82.375	1.000
2			121.000	1200	640	38.470	63.713	1.250
Sewer			120.000			-10.729	46.560	1.250

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	20.000	0.600	120.000	119.750	0.250	80.0	100	3.00	50.0
1.001	2	Sewer	10.000	0.600	119.750	118.750	1.000	10.0	100	3.87	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.861	6.8	4.1	0.900	1.150	0.030	0.0	56	0.900
1.001	2.458	19.3	4.1	1.150	1.150	0.030	0.0	31	1.939

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	0.1
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.1
Summer CV	0.750	30 year (l/s)	0.3
Winter CV	0.840	100 year (l/s)	0.4
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year +40% 360 minute (m³)	14

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	0.034	Betterment (%)	0
SAAR (mm)	650	QBar	0.2
Soil Index	4	Q 1 year (l/s)	0.1
SPR	0.47	Q 30 year (l/s)	0.3
Region	6	Q 100 year (l/s)	0.4
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	40
Positively Drained Area (ha)	0.034	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.469
CWI	97.778	Runoff Volume (m^3)	14

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	120.079	0.078	5.6	0.0605	0.0000	OK
15 minute summer	2	9	119.788	0.038	5.6	0.0289	0.0000	OK
15 minute summer	Sewer	9	118.787	0.037	5.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	5.6	1.185	0.826	0.0928	
15 minute summer	2	1.001	Sewer	5.6	2.096	0.288	0.0266	1.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	120.534	0.534	13.8	0.4118	0.0000	SURCHARGED
15 minute summer	2	10	119.803	0.053	10.0	0.0405	0.0000	OK
15 minute summer	Sewer	10	118.801	0.051	10.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	10.0	1.461	1.474	0.1201	
15 minute summer	2	1.001	Sewer	10.0	2.434	0.519	0.0411	4.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	120.859	0.859	17.9	0.6623	0.0000	FLOOD RISK
15 minute summer	2	10	119.810	0.060	12.2	0.0460	0.0000	OK
15 minute summer	Sewer	10	118.808	0.058	12.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	12.2	1.719	1.802	0.1272	
15 minute summer	2	1.001	Sewer	12.2	2.545	0.632	0.0480	5.5

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	121.000	1.000	21.4	0.7710	0.5075	FLOOD
15 minute winter	2	10	119.813	0.063	13.0	0.0481	0.0000	OK
15 minute summer	Sewer	10	118.811	0.060	13.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	13.0	1.816	1.930	0.1299	
15 minute winter	2	1.001	Sewer	13.0	2.581	0.676	0.0506	7.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	9	121.000	1.000	22.3	0.7710	0.8260	FLOOD
15 minute summer	2	10	119.813	0.063	13.0	0.0481	0.0000	OK
15 minute summer	Sewer	10	118.811	0.060	13.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	13.0	1.816	1.930	0.1299	
15 minute summer	2	1.001	Sewer	13.0	2.581	0.676	0.0506	6.9

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	2.00	Enforce best practice design rules	✓

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.030	2.00	121.000	1200	640	95.397	82.375	1.000
2			121.000	1200	640	38.470	63.713	1.250
Sewer			120.000			-10.729	46.560	1.250

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	20.000	0.600	120.000	119.750	0.250	80.0	150	3.00	50.0
1.001	2	Sewer	10.000	0.600	119.750	118.750	1.000	10.0	100	3.87	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.125	19.9	4.1	0.850	1.100	0.030	0.0	46	0.886
1.001	2.458	19.3	4.1	1.150	1.150	0.030	0.0	31	1.939

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	0.1
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.1
Summer CV	0.750	30 year (l/s)	0.3
Winter CV	0.840	100 year (l/s)	0.4
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year +40% 360 minute (m³)	14

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	20	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	0.034	Betterment (%)	0
SAAR (mm)	650	QBar	0.2
Soil Index	4	Q 1 year (l/s)	0.1
SPR	0.47	Q 30 year (l/s)	0.3
Region	6	Q 100 year (l/s)	0.4
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	40
Positively Drained Area (ha)	0.034	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.469
CWI	97.778	Runoff Volume (m^3)	14

Node 2 Online Hydroslide Control

Flap Valve	x	Design Depth (m)	1.000	Diameter (m)	0.100
Replaces Downstream Link	✓	Design Flow (l/s)	5.0	Max Head (m)	1.350
Invert Level (m)	119.750	Model	CTL VS	Min Node Dia (mm)	1200

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	119.750
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	14

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	4.0	0.0	0.800	4.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	8	120.055	0.055	5.6	0.0421	0.0000	OK
15 minute summer	2	10	119.836	0.086	5.6	0.3945	0.0000	OK
15 minute summer	Sewer	1	118.750	0.000	4.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	5.6	0.921	0.282	0.1490	
15 minute summer	2	Hydroslide	Sewer	4.1				1.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	120.114	0.114	12.3	0.0877	0.0000	OK
15 minute winter	2	12	120.100	0.350	11.9	1.5997	0.0000	SURCHARGED
15 minute summer	Sewer	1	118.750	0.000	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	11.9	0.996	0.598	0.3193	
15 minute winter	2	Hydroslide	Sewer	5.0				4.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	120.316	0.316	15.9	0.2439	0.0000	SURCHARGED
15 minute winter	2	12	120.295	0.545	14.1	2.4882	0.0000	SURCHARGED
15 minute summer	Sewer	1	118.750	0.000	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	14.1	1.021	0.709	0.3521	
15 minute winter	2	Hydroslide	Sewer	5.0				6.3

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	120.498	0.498	19.1	0.3837	0.0000	SURCHARGED
15 minute winter	2	13	120.476	0.726	16.6	3.3163	0.0000	SURCHARGED
15 minute summer	Sewer	1	118.750	0.000	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	16.6	1.092	0.833	0.3521	
15 minute winter	2	Hydroslide	Sewer	5.0				7.5

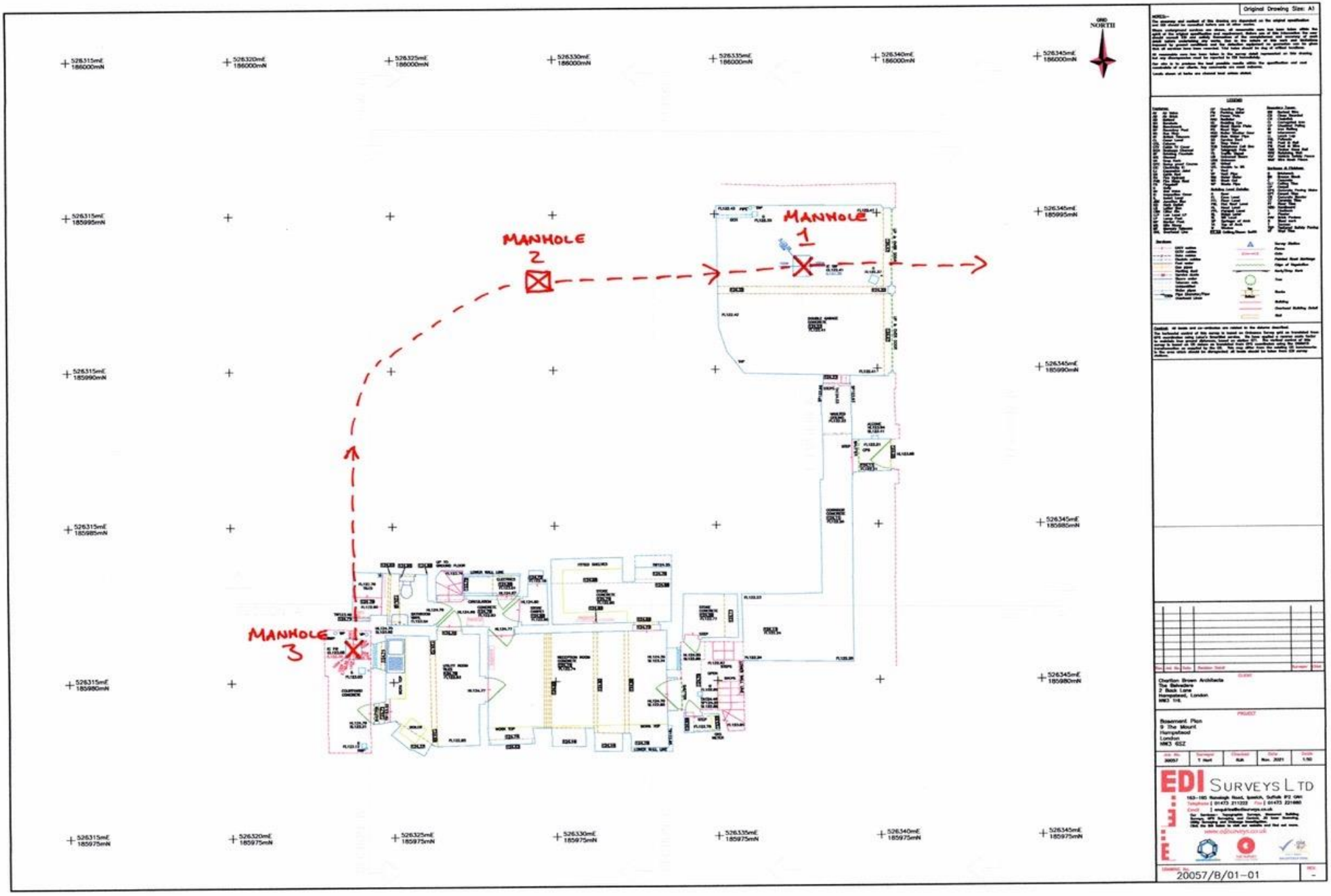
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	120.901	0.901	22.2	0.6949	0.0000	FLOOD RISK
15 minute winter	2	13	120.885	1.135	19.2	3.9134	0.0000	FLOOD RISK
15 minute summer	Sewer	1	118.750	0.000	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	19.2	1.139	0.964	0.3521	
15 minute winter	2	Hydroslide	Sewer	5.0				8.8

APPENDIX E

EXISTING DRAINAGE LAYOUT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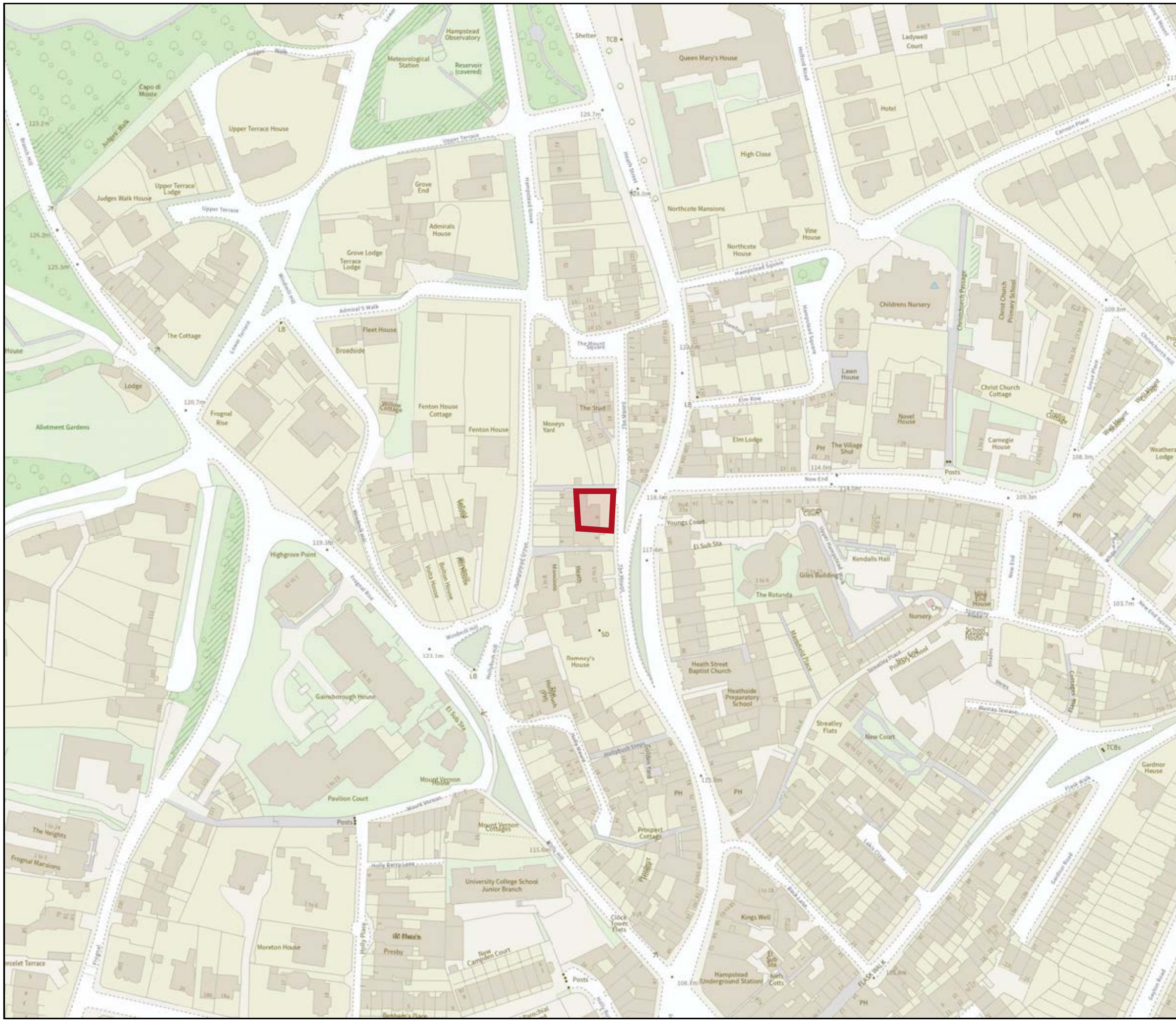
526315mE 185975mN
526320mE 185975mN
526325mE 185975mN
526330mE 185975mN
526335mE 185975mN
526340mE 185975mN
526345mE 185975mN
MANHOLE 1
MANHOLE 2
MANHOLE 3
Original Drawing Size: A1
Charlton Brown Architects
The Belvedere
7 Rock Lane
Hampstead, London
NW3 1HL
Basement Plan
9 The Mount
Hampstead
London
NW3 6SZ
EDI SURVEYS LTD
20057/B/01-01

APPENDIX F

ENVIRONMENT AGENCY

FLOOD MAP



Environment Agency

Flood map for planning

Your reference
9 The Mount

Location (easting/northing)
526331/185987

Scale
1:2500

Created
13 Aug 2022 12:43

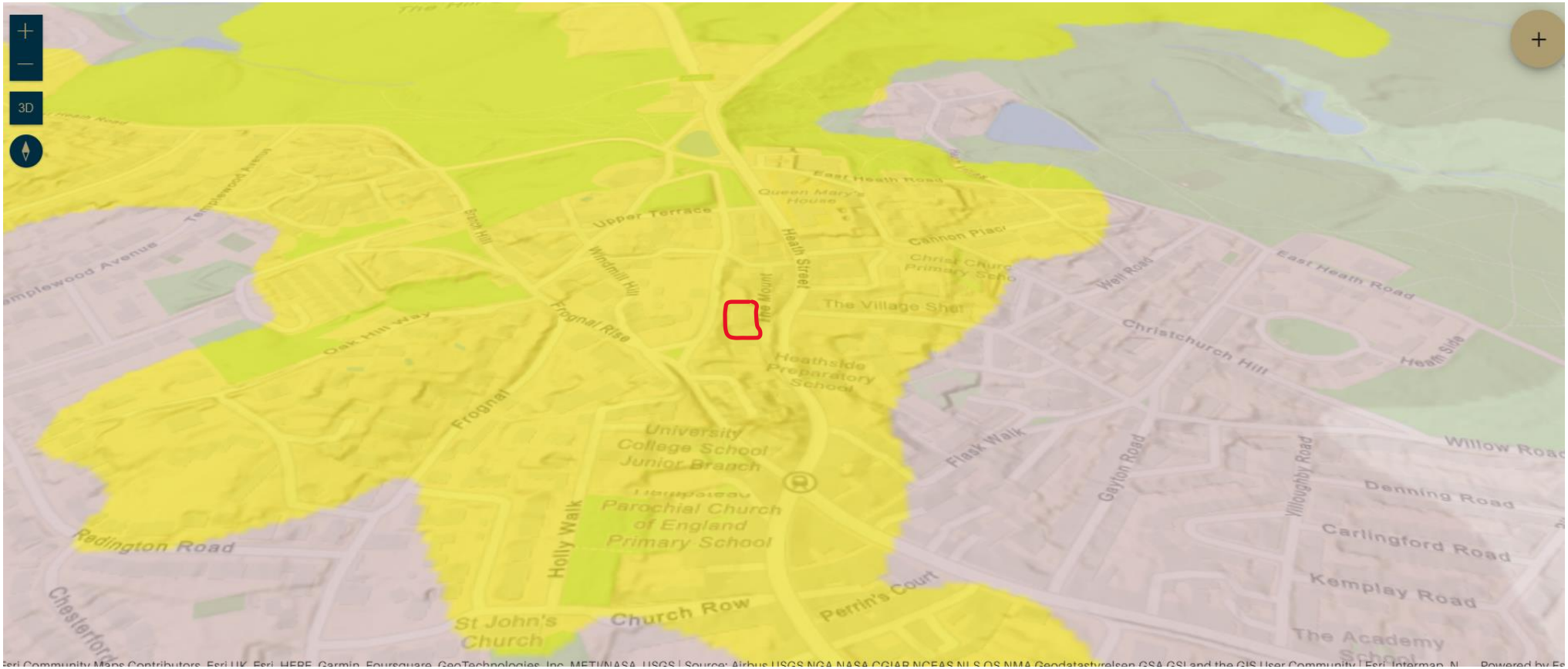
- Selected area
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

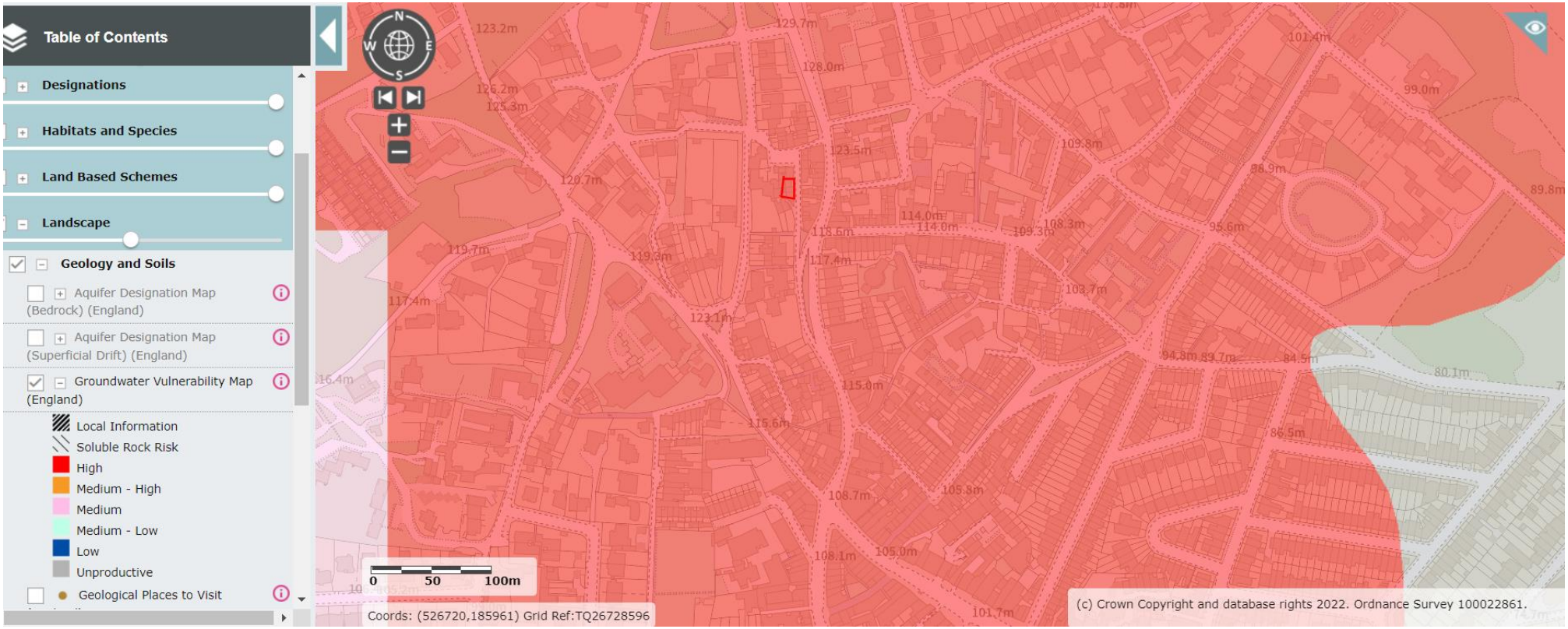
APPENDIX G

BRITISH GEOLOGICAL SURVEY

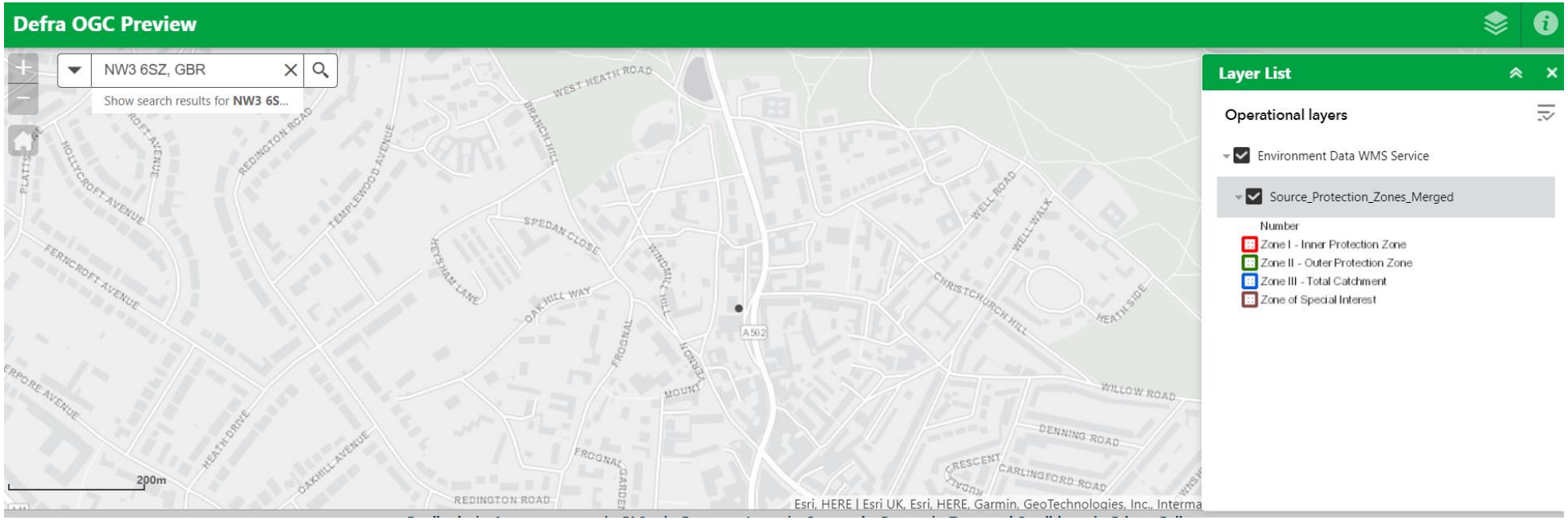
SOIL MAP



Most of the Bagshot Formation is composed of pale yellow-brown to pale grey or white, locally orange or crimson, fine- to coarse-grained sand that is frequently micaceous and locally clayey, with sparse glauconite and sparse seams of gravel. The sands are commonly cross-bedded but some are laminated.



Ground Water Vulnerability Map
(High)

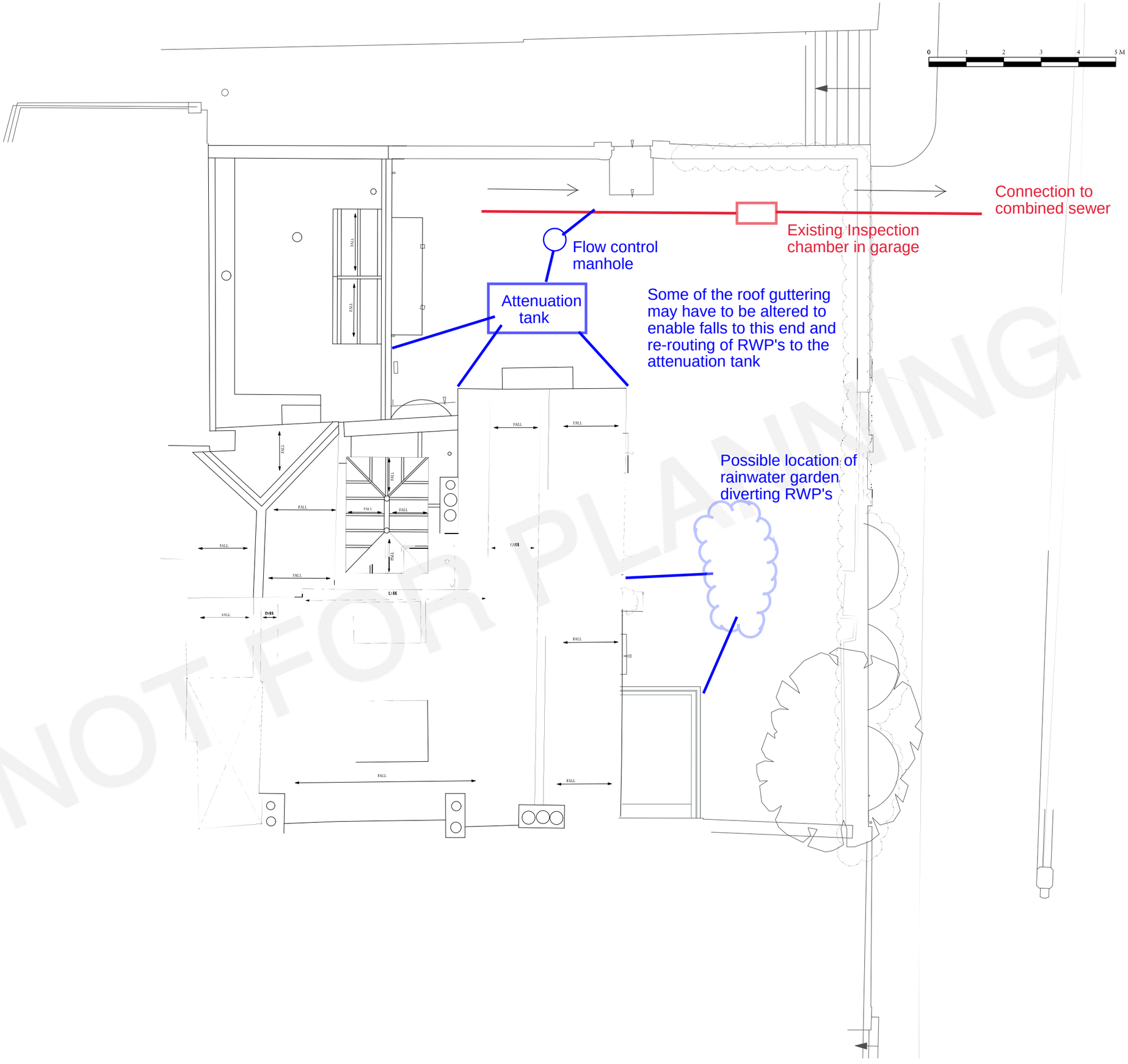


Site is not within a SPZ

(Source Protection Zone)

APPENDIX H

POSSIBLE DRAINAGE LAYOUT



Important note

All dimensions in millimetres. Where dimensions are not given, drawings must not be scaled and the matter referred back to Charlton Brown Architects.

All dimensions and conditions are to be checked on site by the contractor prior to preparing drawings or commencing any work. The contractor is responsible for checking that there is no conflict between site dimensions and drawn dimensions.

In the event of any detail or dimensional conflict between Charlton Brown Architects drawings, the matter must be referred back to Charlton Brown Architects for clarification

Rev	Date	Details	By

Charlton Brown
Architecture & Interiors

The Belvedere, 2 Back Lane, Hampstead, London, NW3 1HL

Telephone +44(0)20 7794 1234
Email office@charltonbrown.com
Website www.charltonbrown.com

Client
Alex and Emma Barnett

Project
9 The Mount

Drawing Title
Existing Roof Plan

Date	Drawn	Checked
22/03/2022	JLB	LS

Scale
1:50 @ A1

Issue Status
NOT FOR PLANNING

Project Number	Drawing Number	Revision
21041	EX-00-104	

APPENDIX I

STORAGE VOLUME ESTIMATE

HR WALINGFORD

Print | Close Report

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	jon burgess
Site name:	9 The Mount
Site location:	Hampstead

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.55863° N
Longitude:	0.17904° W
Reference:	41566421
Date:	Aug 13 2022 13:42

Site characteristics

Total site area (ha):	0.034
Significant public open space (ha):	0
Area positively drained (ha):	0.034
Impermeable area (ha):	0.017
Percentage of drained area that is impermeable (%):	50
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.03
Net impermable area for storage volume design (ha):	0.02
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	101.64
FEH / FSR conversion factor:	1.32	1.32
SAAR (mm):	650	650
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.62	1.62
Growth curve factor 30 year:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Q_{BAR} for total site area (l/s):	0.15	0.15
Q_{BAR} for net site area (l/s):	0.15	0.15

Site discharge rates	Default	Edited	Estimated storage volumes	Default	Edited
1 in 1 year (l/s):	2	2	Attenuation storage 1/100 years (m^3):	4	4
1 in 30 years (l/s):	2	2	Long term storage 1/100 years (m^3):	0	0
1 in 100 year (l/s):	2	2	Total storage 1/100 years (m^3):	4	4

APPENDIX J

LONDON SUSTAINABLE DRAINAGE PRO FORMA

Camden GREATERLONDONAUTHORITY LoDEG

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	
Address & post code	9 The Mount, Hampstead
OS Grid ref. (Easting, Northing)	E 0.17904 W
	N 55.55863
LPA reference (if applicable)	
Brief description of proposed work	Extension of existing basement and internal changes
Total site Area	340 m^2
Total existing impervious area	40 m^2
Total proposed impervious area	40 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	no
Existing drainage connection type and location	to combined sewer
Designer Name	Jon Burgess
Designer Position	Principal Infrastructure Engineer

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	None
Bedrock geology classification	Bagshot Sands
Site infiltration rate	0 m/s
Depth to groundwater level	unkown m below ground level
Is infiltration feasible?	No

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	y	N
2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
3 attenuate rainwater in ponds or open water features for gradual release	Y	Y
4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
5 discharge rainwater direct to a watercourse	N	N
6 discharge rainwater to a surface water sewer/drain	N	N
7 discharge rainwater to the combined sewer.	Y	Y

2c. Proposed Discharge Details

Proposed discharge location	Existing
Has the owner/regulator of the discharge location been	no

	Designer Company	Constructure Ltd		consulted?	

Camden GREATERLONDONAUTHORITY LoDEG

3. Drainage Strategy

3a. Discharge Rates & Required Storage

	Greenfield (GF) runoff rate (l/s)	*Existing discharge rate (l/s)*	*Required storage for GF rate (m^3)*	*Proposed discharge rate (l/s)*
Qbar	0.2			
1 in 1	0.1	5.6	3	5
1 in 30	0.3	10	3	5
1 in 100	0.4	12.2	3	5
1 in 100 + CC			3	5
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Hydroslide		

3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0.5
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	0		2.5
Total	**0**	**0**	**3**

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	No due to within 5.0m of structure failing Building Regulation requirements
Drainage hierarchy (2b)	water garden to reduce size of atte
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	existing connection
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Appendix D
Proposed SuDS measures & specifications (3b)	Appendix D
4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Appendix H
Detailed drainage design drawings, including exceedance flow routes	Strategy to be designed
Detailed landscaping plans	None available
Maintenance strategy	in report
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	All roof water so clean
b) biodiversity?	rainwater garden
c) amenity?	Attenuation

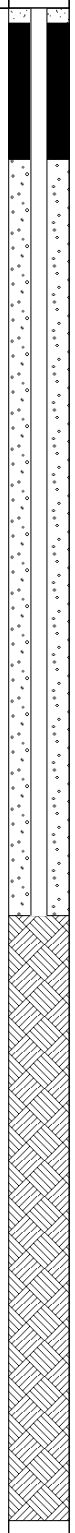
APPENDIX K
BOREHOLE LOGS

soils LIMITED

Contract Name:		Client:			Hole ID:
9 The Mount, Hampstead, LONDON, NW3 6SZ					**BH1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
20353	25/08/22 - 26/08/22	SW		PRELIM	**BH**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Cutdown	23/09/2022	1:50

Weather: Fine | Termination: | SPT Hammer: N/R, Energy Ratio: N/R | Sheet 1 of 2

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.20	D			(0.40)		Brown sandy SILT. Occassional to frequent fine to medium subrounded to angular flint brick and clinker gravel. Frequent rootlets. MADE GROUND		
0.50	D			0.40		Soft brown sandy CLAY. Occasional fine to medium subrounded toangular flint and brick fragments. Presence of ash. MADE GROUND		
0.50 - 1.00	B							
1.00	D							
1.50	SPT	N=17 (2,2/3,4,5,5)		(2.10)				
	D							
1.50 - 2.00	B							
2.00	D							
2.50	SPT	N=12 (2,2/2,3,3,4)		2.50		Yellowish brown slighlty gravelly fine to coarse SAND. Gravel is fine to medium subrounded to subangular flint.		
	D							
2.50 - 3.00	B			(0.50)				
3.00	D			3.00		Fine Brownish yellow SAND		
3.50	SPT	N=14 (2,2/3,4,4,3)						
	D							
4.00	D							
4.50	SPT	N=14 (2,4/3,4,3,4)						
	D							
5.00	D							
5.50	D			(5.00)				
6.00	SPT	N=16 (2,3/4,3,4,5)						
	D							
6.50	D							
7.00	D							
7.50	SPT	N=20 (3,4/3,5,6,6)						
	D							
8.00	D			8.00		Soft brownish yellow sandy CLAY		
8.50	D							
9.00	SPT	N=20 (3,3/4,5,5,6)		(4.00)				
	D							
9.50	D							
10.00	D							



Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth (m)	Dia (mm)
15.00	200

Remarks:

Chiselling

From (m)	To (m)	Duration	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	33
1.00	6.00	PLAIN	33

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	Watter added to aid drilling. Any water strike are likely to have been masked.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
9 The Mount, Hampstead, LONDON, NW3 6SZ					**BH1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
20353	25/08/22 - 26/08/22	SW		PRELIM	**BH**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Cutdown	23/09/2022	1:50

Weather: Fine | Termination: | SPT Hammer: N/R, Energy Ratio: N/R | Sheet 2 of 2

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
						Soft brownish yellow sandy CLAY		
10.50	SPT D	N=20 (3,4/3,5,6,6)						
11.00	D							
11.50	D							
12.00	SPT D	N=29 (7,7/7,6,8,8)		12.00		Yellowish orange fine to medium SAND		
12.50	D							
13.00	D							
13.50	SPT D	N=30 (4,6/7,8,7,8)		(3.45)				
14.00	D							
14.50	D							
15.00	SPT D	N=31 (3,5/6,8,8,9)						
				15.45		End of Borehole at 15.45m		

11 12 13 14 15 16 17 18 19 20

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
							15.00	200

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)
				0.00	1.00	PLAIN	33
				1.00	6.00	PLAIN	33

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	Watter added to aid drilling. Any water strike are likely to have been masked.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:				Hole ID:
9 The Mount, Hampstead, LONDON, NW3 6SZ						**WS1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:		Hole Type:
20353	31/08/22	GJB		PRELIM		**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:		Scale:
			HHWS	13/09/2022		1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				0.25		Dark brown clayey fine to medium SAND with frequent rootlets and occasional fine to medium flints. MADE GROUND		
				(0.65)		Dark orange/brown clayey fine to medium SAND with fine to medium flints and fine brick fragments. MADE GROUND		
				0.90				
				1.00		Light brown clayey fine to medium sandy fine to medium angular flint GRAVEL. Fine brick traces. MADE GROUND		
1.20	D ES					Fine to coarse light orangish brown slightly clayey SAND. Rare rootlets. Rare fine sub-rounded flint gravel.		
1.50	D ES			(1.10)				
2.00	D			2.10		Soft dark orange brown sandy becoming very CLAY. Rare occasional intermittent pockets of light grey brown fine to coarse sand.		
2.50	D			(1.20)				
3.00	D							
				3.30		Fine to coarse medium orangish grey brown slightly clayey SAND. Rare intermittent bands of medium orange brown fine to coarse sand.		
3.50	D							
				(1.00)				
4.00	D							
				4.30		Soft medium orangish grey brown slightly sandy CLAY. Rare rootlets. Rare intermittent bands of medium orange brown fine to coarse sand.		
4.50	D			(0.30)				
				4.60		Fine to coarse light yellowish grey brown SAND.		
5.00	D							
				(1.40)				
5.50	D							
6.00	D			6.00		End of Borehole at 6.00m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
9 The Mount, Hampstead, LONDON, NW3 6SZ					**WS2**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
20353	31/08/22	GJB		PRELIM	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			HHWS	13/09/2022	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				0.00		Dark orange/brown clayey fine to medium SAND with fine to medium flints and fine brick fragments. MADE GROUND		
				(0.70)				
				0.70		Light brown clayey fine to medium sandy fine to medium angular flint GRAVEL. Fine brick traces. MADE GROUND		
				(0.30)				
				1.00		Dark orangish grey brown slightly clayey silty SAND. Rare rootlets. Rare fine ash, brick fragments. Rare fine angular to sub-rounded flint gravel. Occasional rare intermittent bands of light orange brown fine to coarse sand. MADE GROUND.		
1.20	D ES			(0.80)				
1.70	D ES			1.80		Dark orange brown slightly clayey slightly silty fine to coarse SAND. Rare fine brick, ash fragments. Rare fine angular to sub-angular to sub-rounded flint gravel. MADE GROUND		
2.20	D ES			(0.70)				
2.60	D ES			2.50		Soft dark orangish grey brown slightly gravelly sandy CLAY. Rare fine ash fragments. Occasional fine to coarse angular to sub-angular flint gravel.		
				2.70		Dark orangish grey mottled brown clayey fine to coarse SAND. Rare rootlets. Rare intermittent bands of light orange brown fine to coarse sand.		
				(0.50)				
3.10	D ES			3.20		Light yellowish fine to coarse grey SAND.		
3.60	D			(1.10)				
4.10	D			4.30		Soft dark yellowish grey brown sandy CLAY.		
4.40	D			4.50		Soft light orange grey mottled brown sandy CLAY.		
4.90	D			(1.20)				
5.40	D			5.70		Soft light orange grey mottled brown sandy CLAY.		
				(0.30)				
6.00	D			6.00		End of Borehole at 6.00m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

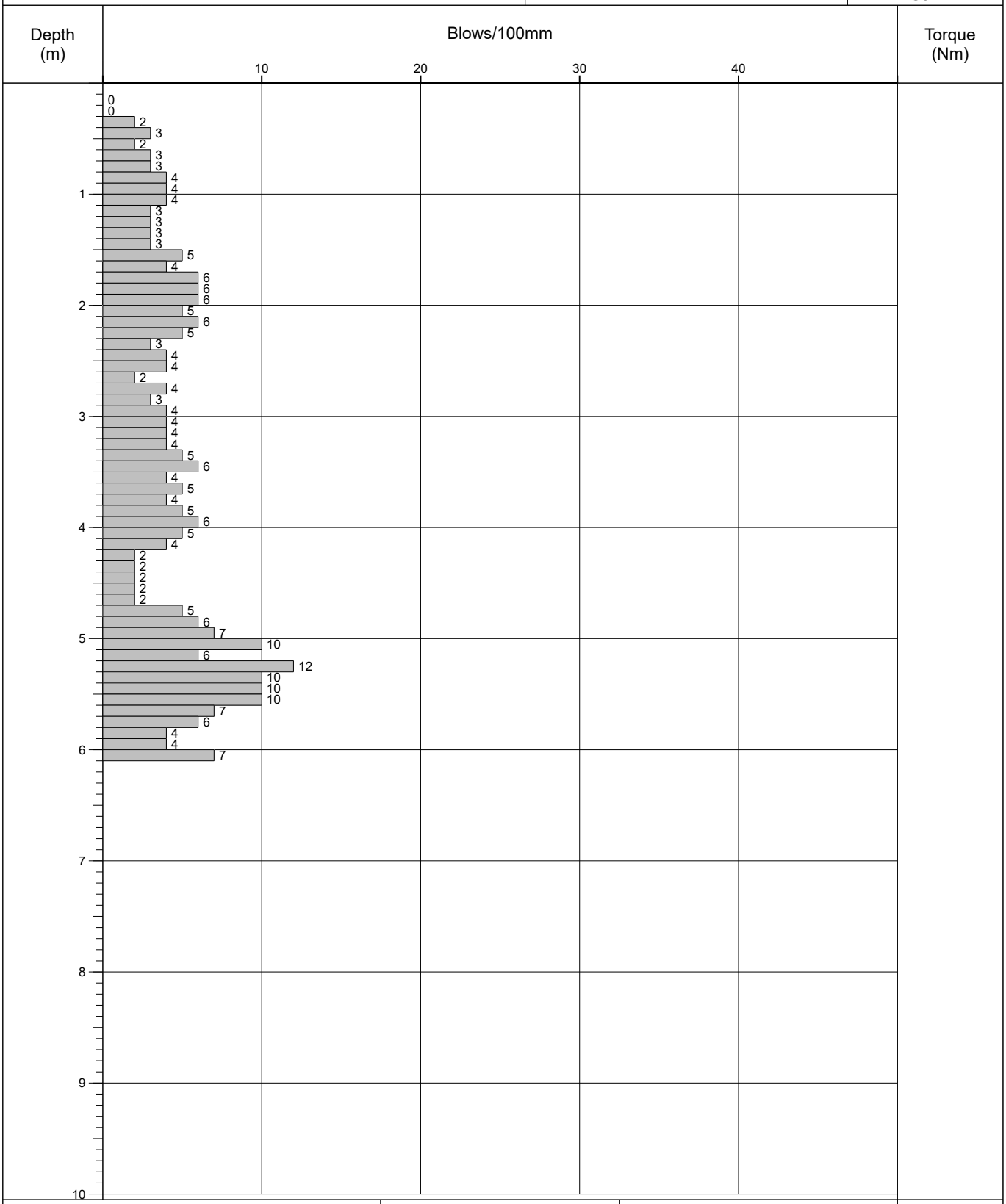
Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk	**Probe Log**	Probe No. **DP1** Sheet 1 of 1

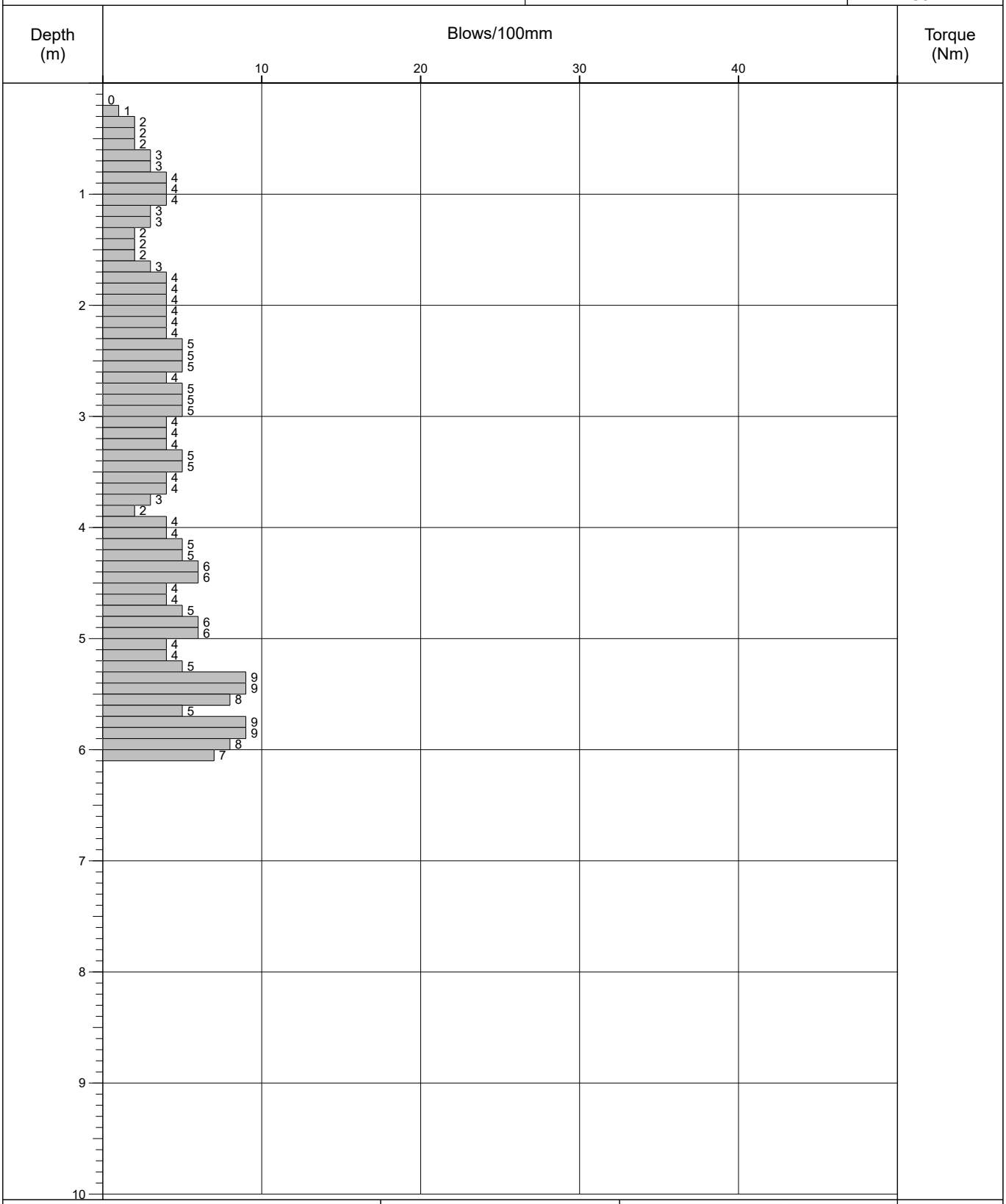
Project Name:	9 The Mount, Hampstead, LONDON, NW3 6SZ	Project No. 20353	Co-ords:	Hole Type DP
Location:	9 The Mount, Hampstead, LONDON, NW3 6SZ		Level: m AOD	Scale 1:50
Client:			Dates: 30/08/2022	Logged By GJB



Remarks	Fall Height	760mm	Cone Base Diameter	52mm	AGS REGISTERED USER 2020
	Hammer Weight	63.5kg	Final Depth	6m	
	Probe Type	DPSH	Energy Ratio (Er)	73.7%	

Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk	**Probe Log**	Probe No. **DP2** Sheet 1 of 1

Project Name:	9 The Mount, Hampstead, LONDON, NW3 6SZ	Project No. 20353	Co-ords:	Hole Type DP
Location:	9 The Mount, Hampstead, LONDON, NW3 6SZ		Level: m AOD	Scale 1:50
Client:			Dates: 30/08/2022	Logged By GJB



Remarks		Fall Height	760mm	Cone Base Diameter	52mm
		Hammer Weight	63.5kg	Final Depth	6m
		Probe Type	DPSH	Energy Ratio (Er)	73.7%

AGS REGISTERED USER 2020