Basement Impact Assessment

in connection with proposed redevelopment at

5a Mornington Terrace
Camden
NW1 7RR

for

Mr. Joseph Middleton

LBH4464 Ver 1.1

May 2017

LBH WEMBLEY

ENGINEERING

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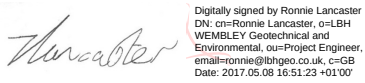

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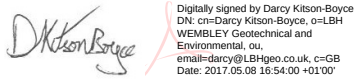

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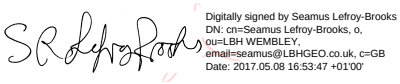

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Foreword-Guidance Notes

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBH Wembley Engineering disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH Wembley Engineering has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

VALIDITY

Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in the future and any such reliance on the report in the future shall again be at the client's own and sole risk. LBH Wembley Engineering should in all such altered circumstances be commissioned to review and update this report accordingly.

THIRD PARTY INFORMATION

The report may present an opinion on the disposition, configuration and composition of soils, strata and any contamination within or near the site based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

DRAWINGS

Any plans or drawings provided in this report are not meant to be an accurate base plan, but are used to present the general relative locations of features on, and surrounding, the site.

1. Introduction

1.1 Background

Planning application 2016/5846/P has been submitted to London Borough of Camden in December 2016 for the following development:

"Extension of existing basement to rear and erection of 2 storey upper ground and lower ground floor rear extension. Alterations to lower ground floor front windows and reconfiguration of external front staircase."

An initial Basement Impact Assessment (BIA) was previously submitted by the structural engineer.

An audit of the BIA was subsequently prepared by Campbell Reith(CRH) (Rev D1, dated Feb 2017) and has been considered as the basis for this new BIA.

1.2 Brief

LBH WEMBLEY have been appointed by Mr. Joseph Middleton to complete a new BIA for submission to London Borough of Camden in order address the queries raised in the audit review document by Campbell Reith.

The CRH checklist and an audit tracker has been provided in the Appendix of this BIA to confirm how the queries have been addressed in this document.

1.3 Planning Policy

The CPG4 Planning Guidance on Basements and Lightwells refers primarily to Planning Policy DP27 on Basements and Lightwells.

The DP27 Policy reads as follows:

In determining proposals for basement and other underground development, the Council will require an assessment of the scheme's impact on drainage, flooding, groundwater conditions and structural stability, where appropriate. The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability. We will require developers to demonstrate by methodologies appropriate to the site that schemes:

a) maintain the structural stability of the building and neighbouring properties;
b) avoid adversely affecting drainage and run-off or causing other damage to the water environment;
c) avoid cumulative impacts upon structural stability or the water environment in the local area;

and we will consider whether schemes:

d) harm the amenity of neighbours;
e) lead to the loss of open space or trees of townscape or amenity value;
f) provide satisfactory landscaping, including adequate soil depth;
g) harm the appearance or setting of the property or the established character of the surrounding area; and
h) protect important archaeological remains.

The Council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding. In determining applications for lightwells, the Council will consider whether:

i) the architectural character of the building is protected;
j) the character and appearance of the surrounding area is harmed; and
k) the development results in the loss of more than 50% of the front garden or amenity area.

In addition to DP27, the CPG4 Guidance on Basements and Lightwells also supports the following Local Development Framework policies:

Core Strategies:

- CS5 Managing the impact of growth and development
- CS14 Promoting high quality places and conserving our heritage
- CS15 Protecting and improving our parks and open spaces & encouraging biodiversity
- CS17 Making Camden a safer place
- CS18 Dealing with our waste and encouraging recycling

Development Policies:

- DP23 Water
- DP24 Securing high quality design
- DP25 Conserving Camden's heritage
- DP26 Managing the impact of development on occupiers and neighbours

1.4 Report Structure

The report commences with a comprehensive desk study and characterisation of the site, before progressing to BIA screening and scoping assessments, whereby consideration is given to identifying the potential hydrogeological, hydrological and stability impacts to be associated with the proposed development. Following this the findings of an intrusive ground investigation are reported and a ground model is developed, followed by a discussion of the geotechnical issues.

Finally, an Impact Assessment is presented, including an assessment of the ground movements associated with the proposed works, along with consideration of the potential damage to the host building and neighbouring structures.

1.5 Documents Consulted

The following documents have been consulted during the preparation of this document:

1. Basement Impact Assessment of 5a Mornington Terrace Revision C by Blue Engineering, dated 2nd December 2016, project number 3134.
2. Basement Impact Assessment Audit of Flat A, 5 Mornington Terrace by Campbell Reith, revision D1, dated February 2017, project number 12466-41.
3. Existing Drawings of 5a Mornington Terrace by ZCD Architects, dated 25th Oct 2016
4. Proposed Drawings of 5a Mornington Terrace by ZCD Architects, dated 23rd March 2017, Rev A
5. Proposed Section BBpa of 5a Mornington Terrace by ZCD Architects, dated 31st March 2017, Rev B
6. Proposed Lower and Upper Ground Floor Drawings of 5a Mornington Terrace by ZCD Architects, dated 28th March 2017, Rev C

7. Construction Methodology of 5a Mornington Terrace by Blue Engineering, dated 5th May 2017, Issue No. 7
8. Movement Monitoring of 5a Mornington Terrace by Blue Engineering, dated 5th May 2017, Rev A
9. Drainage Layout Sketch of 5a Mornington Terrace by Anonymous (not dated)
10. Camden Planning Guidance 4, Basements and Lightwells, 2015
11. Camden Development Policies DP27 – Basements and Lightwells, 2010
12. London Borough of Camden Geological, Hydrogeological and Hydrological Study (CHGGS), by Ove Arup & Partners Limited, dated 18th November 2010, Issue 01

2. The Site

2.1 Site Location

The site is situated on the eastern side of Mornington Terrace, which borders a railway cutting that runs to London Euston Railway Station roughly 750m to the south of the site.

The site may be located approximately by postcode NW1 7RR or by National Grid Reference 528969, 183302.

2.2 Topographical Setting

The site lies at approximately +30m OD on a relatively gentle slope falling to the south, towards the River Thames.

It should be noted that the site survey has not been related to OS Datum and instead has been referenced to a Standard Datum (SD) of +10m SD, which appears to be street level.

2.3 Site Description

The site is currently occupied by a two-bedroom maisonette occupying the lower and upper ground floors of a five-storey mid-19th Century terrace house. The lower and upper ground floors are situated at approximately +7.95m SD and +10.4m SD respectively. Directly above this property, a flat is situated at 5b Mornington Terrace.

A small garden is present to the rear of 5a Mornington Terrace, which is split into three levels. The lower level garden is hard-surfaced and is situated roughly 0.6m above the lower ground floor (+8.55m SD). This lower level steps up to the middle level garden, which is also hard-surfaced and is placed at roughly +9m SD. Similarly, this section steps up to an upper level garden consisting of decking boards, which is surrounded by soft landscaping. This level of the garden is bordered by a brick wall and is placed at around +9.25m SD.

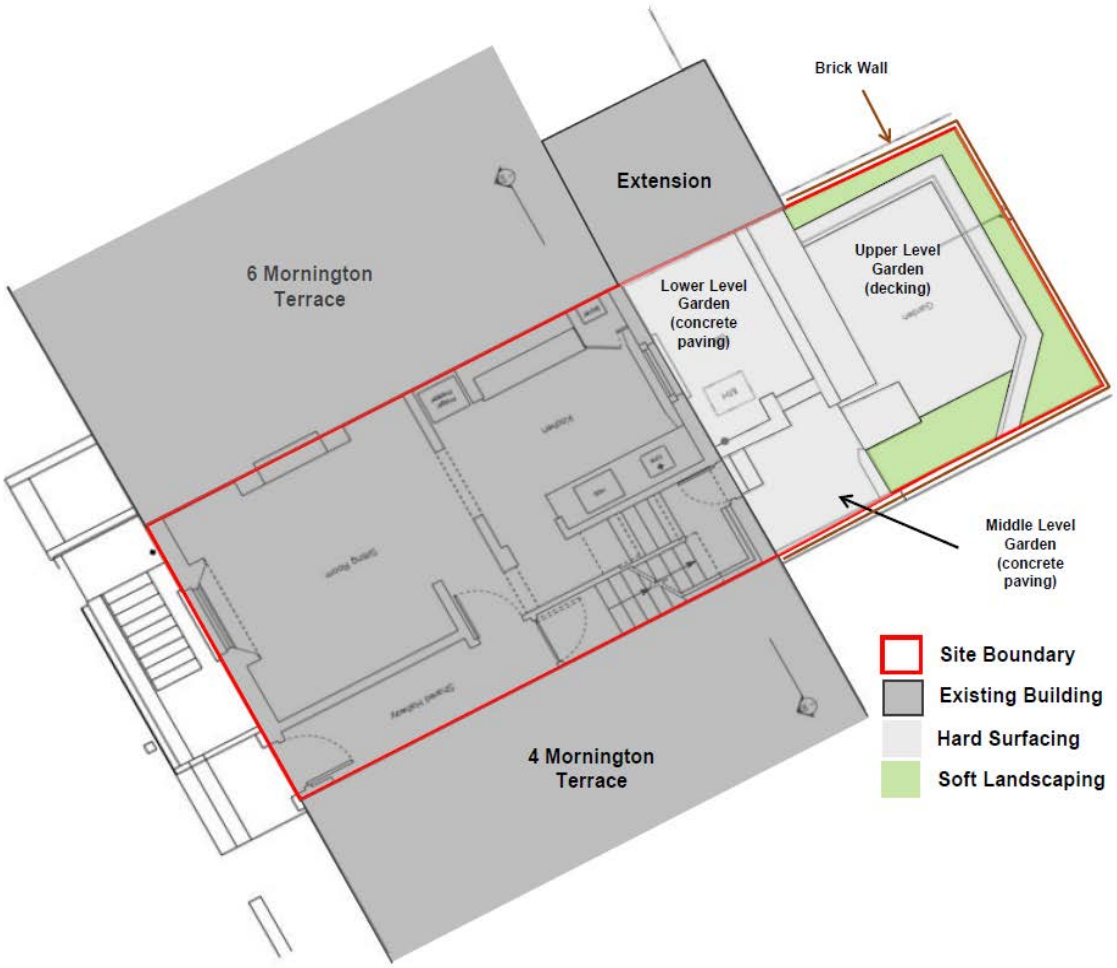
The site is adjoined to the northwest and southeast by terraced properties at No 6 and No 4 Mornington Terrace respectively. These dwellings appear to have lower ground floors situated at approximately the same elevation of the lower ground floor at 5a Mornington Terrace.

In addition 6 Mornington Terrace comprises a three storey rear extension that is adjacent to the lower level garden. This extension also appears to be situated at around the same elevation of the lower ground floor at 5a Mornington Terrace

To the northeast, the site is bordered by rear gardens of houses fronting onto Albert Street.

Left: View from upper ground floor of upper level garden and brick boundary wall.

Right: View from upper level garden of neighbouring rear extension



Site plan showing existing features

2.4 Proposed Development

It is proposed to extend the lower and upper ground floors to the rear of the dwelling, with associated lightwells to the rear of the new extension.

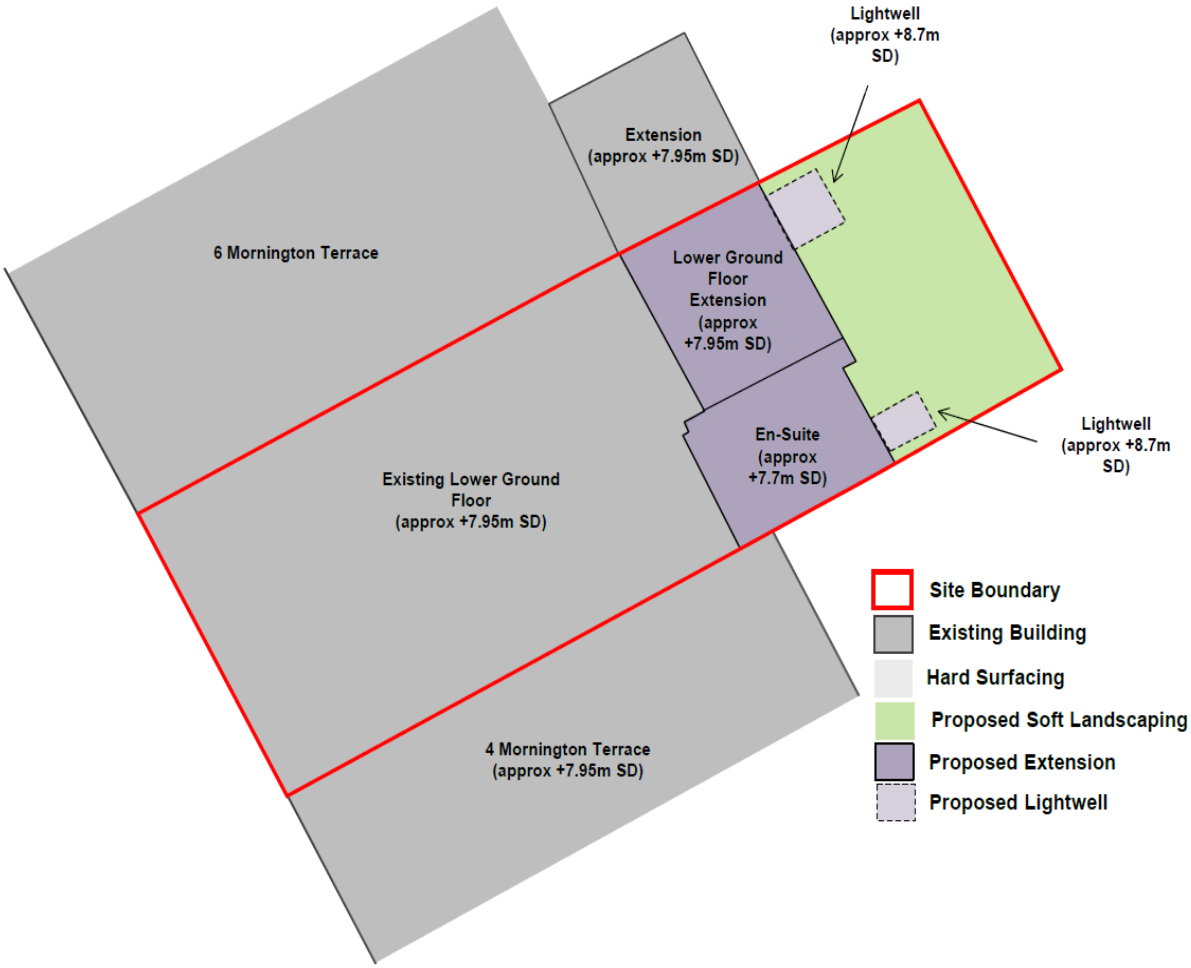
The lower ground floor will laterally extend around 3m from the rear of the house, coincident with the rear extension to 6 Mornington Terrace.

The lower ground floor will be situated at around the same elevation of the existing lower ground floor (+7.95m SD), roughly 0.6m below the existing lower level garden.

However, a slightly deepened area of lower ground floor is proposed for an en-suite and will be placed at around +7.7m SD, some 1.3m below the existing middle level garden.

In the case of the proposed lightwells, which will be located to the rear of the new extension, these will be situated at around +8.7m SD, roughly 1m below the existing upper level garden.

Soft landscaping will also be introduced to the rear of new extension and lightwells.



Site plan showing proposed development

3. Desk Study

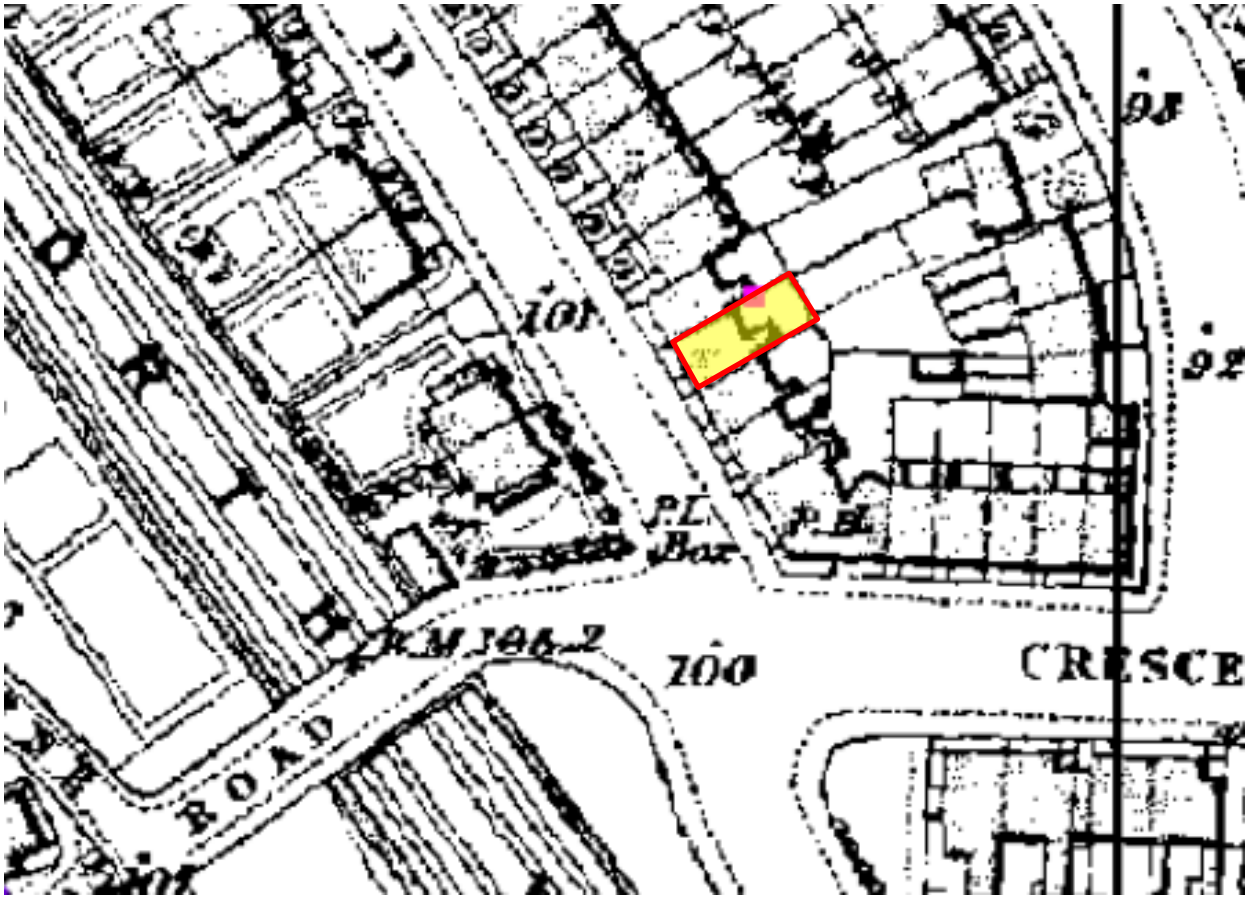
3.1 Site History

During the early 19th Century, the site appeared to have been vacant land, which was situated nearby a railway cutting (London & North Western Railway), located around 30m to the southwest of the site. This railway lane ran in a north-west to south-east direction, towards Euston Railway Station, which opened in 1837.

Several kilns were situated to the northeast of the site, near Regent's Canal. It appears that the surrounding area was generally occupied by brick fields for the purpose of clay extraction until significant development occurred in this area in the 19th Century.

By the mid-19th Century, terraced housing, including the existing house on site was built along the eastern side of Mornington Terrace (then known as Mornington Road). The existing public house was also present on the corner of Mornington Terrace and Morning Crescent, some 10m from the site.

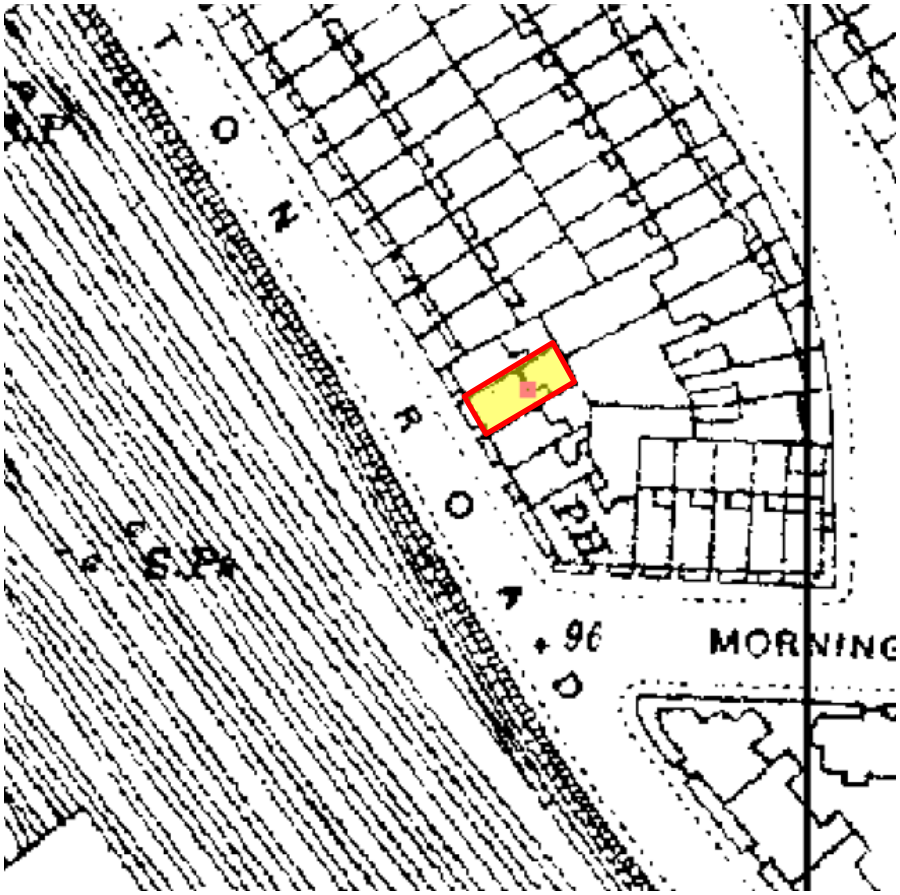
Semi-detached houses were also built along the western side.



1876

At the start of the 20th Century, the semi-detached houses on the western side of Morning Terrace were demolished. The railway line subsequently expanded to allow the construction of carriage sheds either side of the railway line, which was now present some 15m from the site.

During the First World War, a Zeppelin Raid on the 8th September 1915 is recorded to have passed nearby to the site, although no explosives are recorded to have landed on or surrounding the site.



1916

During the Second War, the area suffered from bombing and the houses along Mornington Terrace, including the house on site, appear to have suffered blast damage.

Since then, the site and surrounding area has remained relatively unchanged.

3.2 Geological Information

The British Geological Survey (BGS) records indicate that the site is underlain by worked ground, which is subsequently underlain by the London Clay Formation.

It appears that the worked ground relates to clay extraction in the surrounding area in the 19th Century.

3.3 Hydrogeological / Hydrological Information

The permeability of any worked ground is likely to be inherently variable but limited because of the absence of any continuity of fabric. The London Clay Formation may be considered virtually impermeable.

The Environment Agency (EA) classifies the London Clay Formation as Unproductive Strata.

The site is not located in the vicinity of a Groundwater Source Protection Zone and there are no reported groundwater abstractions located within 500m of the site.

3.4 Other Environmental Information

Information provided by the BGS and National Geoscience Information Service (NGIS), indicates that the property is located in a lower probability radon area with less than 1% of homes expected to be above the action level. It is further reported that no radon protective measures are necessary in the construction of new dwellings or extensions in this area.

4. Screening & Scoping Assessments

The Screening & Scoping Assessments have been undertaken with reference to Appendices E and F of the CGHSS, which is a process for determining whether or not a BIA is usually required.

4.1 Screening Assessment

The Screening Assessment consists of a series of checklists that identifies any matters of concern relating to the following:

- Subterranean (groundwater) flow
- Surface flow and flooding
- Slope stability

4.1.1 Screening Checklist for Subterranean (Groundwater) Flow

Question	Response	Justification
Is the site is located directly above an aquifer?	**No**	The Environment Agency (EA) maps indicate that the site is not directly underlain by an aquifer.
Will the proposed basement extend beneath the water table surface?	**No**	
Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	**No**	The nearest watercourse is the River Tyburn, roughly 600m to the west of the site.
Is the site within the catchment of the pond chains on Hampstead Heath?	**No**	The site is not within catchment of the Hampstead Heath Ponds
Will the proposed development result in a change in the area of hard-surfaced/paved areas?	**Yes**	An increase in the amount of soft landscaping is proposed to the rear of the extension.
Will more surface water (e.g. rainfall and run-off) than at present will be discharged to the ground (e.g. via soakaways and/or SUDS)?	**No**	There is not expected to be any change to discharge.
Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than the mean water level in any local pond?	**No**	

4.1.2 Screening Checklist for Surface Flow and Flooding

Question	Response	Justification
Is the site within the catchment area of the pond chains on Hampstead Heath?	**No**	The site is not within catchment of the Hampstead Heath Ponds
As part of the site drainage, will surface water flows (e.g. rainfall and run-off) be materially changed from the existing route?	**No**	Surface water will be disposed of by the existing means
Will the proposed basement development result in a change in the proportion of hard-surfaced/paved areas?	**Yes**	At most there will be a minimal increase in the amount of soft landscaping proposed to the rear of the extension.
Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface-water being received by adjacent properties or downstream watercourses?	**No**	Surface Water Drainage is to be to the sewer as per existing patio
Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	**No**	Surface Water Drainage is to the sewer as per existing patio..
Is the site in an area known to be at risk from surface water flooding, or is it at risk from flooding for example because the proposed basement is below the static water level of a nearby surface water feature?	**No**	Environment Agency (EA) maps indicate that the site is also identified as being at a very low risk of surface water flooding.

4.1.3 Screening Checklist for Stability

Question	Response	Justification
Does the existing site include slopes, natural or manmade, greater than 7 degrees?	**No**	There are no slopes greater than 7 degrees within the site.
Does the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees?	**No**	No re-profiling is planned at the site.
Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	**No**	The nearest railway cutting is situated around 25m from the proposed basement.
Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	**No**	The general slope of the wider hillside is less than 7 degrees.

Is London Clay the shallowest strata at the site?	**No**	The British Geological Survey (BGS) records indicate that the site is underlain by worked ground.
Will trees be felled as part of the proposed development and/or are works proposed within tree protection zones where trees are to be retained?	**No**	There are no trees within the site.
Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	**No**	No evidence of cracks or building movements was evident upon visiting the site.
Is the site within 100m of a watercourse of a potential spring line?	**No**	The nearest watercourse is the River Tyburn, roughly 600m to the west of the site.
Is the site within an area of previously worked ground?	**Yes**	The British Geological Survey (BGS) records indicate that the site is underlain by worked ground.
Is the site within an aquifer?	**No**	The Environment Agency (EA) maps indicate that the site is not directly underlain by an aquifer,
Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	**No**	
Is the site within 50m of the Hampstead Heath ponds?	**No**	The site is more than 3000m from the Hampstead Heath Ponds.
Is the site within 5m of a highway or pedestrian right of way?	**Yes**	The front of the site is bound by a pedestrian right of way; however the proposed lower ground floor is situated over 10m from away from the pedestrian right of way.
Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?	**Yes**	The proposed en-suite will be situated 0.5m below the lower ground floor of the neighbouring 4 Mornington Terrace.
Is the site over (or within the exclusion zone of) tunnels, e.g. railway lines?	**No**	The site is not within any exclusion zones or over tunnels.

4.2 Scoping Assessment

Where the checklist is answered with a “yes” or “unknown” to any of the questions posed in the flowcharts, these matters are carried forward to the scoping stage of the BIA process.

The scoping produces a statement which defines further the matters of concern identified in the screening stage. This defining should be in terms of ground processes, in order that a site specific BIA can be designed and executed (Section 6.3 of the CGHHS).

4.2.1 Scoping for Subterranean (Groundwater) Flow

- **Will the proposed development result in a change in the area of hard-surfaced/paved areas?**

The guidance advises that the sealing off of the ground surface by pavements and buildings to rainfall will result in decreased recharge to the underlying ground. In areas underlain by an aquifer, this may impact upon the groundwater flow or levels. In areas of non-aquifer (i.e. on the London Clay), this may mean changes in the degree of wetness which in turn may affect stability.

4.2.2 Scoping for Surface Flow and Flooding

- **Will the proposed development result in a change in the area of hard-surfaced/paved areas?**

The guidance advises that a change in proportion of hard surfaced or paved areas of a property will affect the way in which rainfall and surface water are transmitted away from a property. This includes changes to the surface water received by the underlying aquifers, adjacent properties and nearby watercourses. Changes could result in decreased flow, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding.

4.2.3 Scoping for Stability

- **Is the site within an area of previously worked ground?**

The guidance advises that previously worked ground may be less homogeneous than natural strata, and may include relatively uncontrolled backfill zones.

- **Is the site within 5m of a highway or pedestrian right of way?**

The guidance advises that excavation for a basement may result in damage to the road, pathway or any underground services buried in trenches beneath the road or pathway.

- **Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?**

Excavation for a basement may result in structural damage to neighbouring properties if there is a significant differential depth between adjacent foundations.

5. Stage 3 – Site Investigation

An investigation comprising window sampler boreholes was carried out in April 2017, in order to assess the ground conditions and recover samples for geotechnical laboratory testing.

The site plan below indicates the approximate positions of the exploratory boreholes, while the associated borehole records and laboratory test results are appended.

Site plan showing exploratory position

5.1 Ground Conditions

The ground investigation indicates that the site is underlain by approximately a metre of made ground over the London Clay Formation.

5.2 Made Ground

Made ground is present to roughly 0.5m depth and, beneath the hard surfacing, generally comprises dirty brown silty clay with extraneous material including brick, concrete and ash.

However, in the case of the upper level garden, made ground is present to around 1m depth, which suggests that the rear of the garden has previously been raised. This material consists of dirty brown silty clay with abundant rootlets and flint gravel with extraneous material including brick, slate, wood and ash.

MADE GROUND

5.3 London Clay Formation

The London Clay Formation underlies the made ground and consists of typical firm becoming stiff grey fissured silty clay with occasional claystones and selenite crystals.

The results of the plasticity index testing indicate that these soils are of high plasticity.

CUT SAMPLE OF LONDON CLAY

5.4 Groundwater

No groundwater was encountered during the investigation and a shallow groundwater table is not present beneath the site.

6. Discussion of Geotechnical Issues

6.1 Basement Proposals

It is proposed to laterally extend the existing lower ground floor (+7.95m SD), around 3m from the rear of the house, coincident with the rear extension to 6 Mornington Terrace.

A slightly deepened area of lower ground floor is proposed for an en-suite, which will be placed at around +7.7m SD, less than 0.5m below than the existing lower ground floor.

Two lightwells are also proposed to the rear of the lower ground floor extension and will be placed at around +8.7m SD.

It is proposed to construct the perimeter wall to the new basement extension by a combination of conventional foundation construction and underpinning.

6.2 Stability of Neighbouring Structures

The adjoining buildings at 4 Mornington Terrace and 6 Mornington Terrace appear to have lower ground floors with similar configurations to the existing lower ground floor at 5a Mornington Terrace. 6 Mornington Terrace comprises a rear extension that also appears to be situated at approximately the same elevation.

These walls are assumed to be supported by strip foundations placed at (or below) the existing lower ground floor level (+7.95m SD).

As the proposed lower ground floor extension will be set at +7.95m SD, the differential depth of foundations relative to the adjoining 6 Mornington Terrace is not expected to be significantly increased.

However, as the proposed en-suite, which will be constructed adjacent to 4 Mornington Terrace, will be placed at a slightly lower elevation of +7.7m SD, the differential depth of foundations in this case will be slightly increased.

6.3 New Foundations

The basement excavation will by-pass the made ground and extend down into the London Clay Formation.

The structural loads applied by the basement extension will be accommodated by the perimeter walls.

Outside the zone of influence of any trees, the new underpinning should be placed in suitably firm London Clay Formation expected at the depth of the proposed basement, and may be designed to apply a net allowable bearing pressure 120kN/m^2.

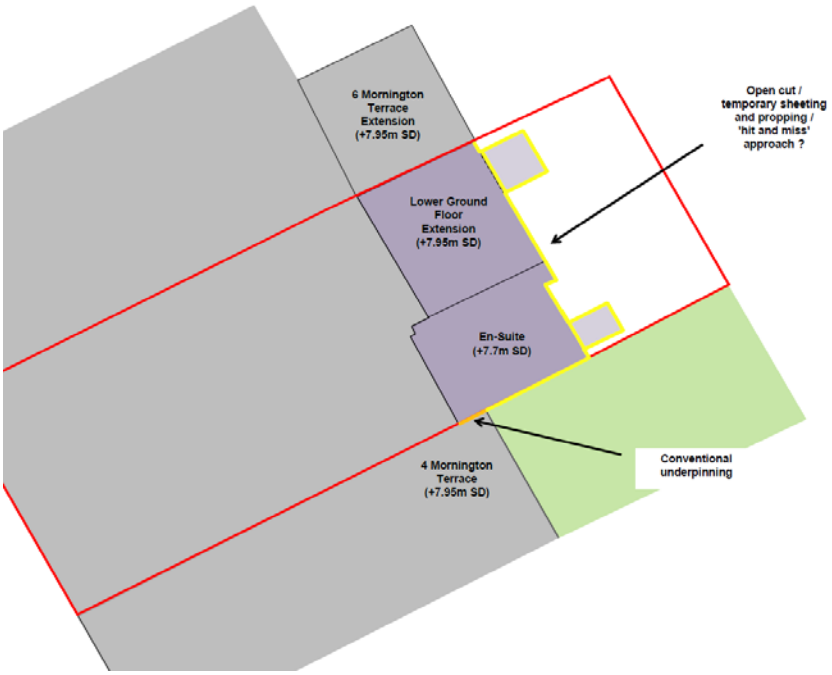
6.3.1 Neighbouring Properties

As indicated on the sketch below, it is proposed to underpin a short section of the party wall to 4 Mornington Terrace (unless the existing foundations are found to extend to a sufficient depth) by up to approximately 0.5m below the existing lower ground level.

As the existing lower ground floor to the rear extension to 6 Mornington Terrace is already situated at approximately the same elevation as the proposed lower ground floor, it is envisaged that the new wall adjacent to 6 Mornington will not require the use of underpinning.

6.3.2 Rear Garden / Lightwells

Following the necessary agreement of the neighbours at No.4, the new basement retaining wall on this side of the basement extension abutting the garden may best be formed following removal of the existing garden wall. Alternatively, if this cannot be removed, conventional underpinning techniques will be required.



The rear wall of the new basement may, subject to further on-site assessments of stability, be potentially formed in an open cut. If a greater degree of temporary stability is required then consideration could be given to the use of some form of temporary sheeting and propping or even to use of 'hit and miss' excavation methods that are normally adopted for underpinning.

6.4 Basement Flooring

Following excavation, loading will be reapplied to the soil as a result of the weight of the new extension. It is envisaged that there will be a slight mismatch between the weight of the soil that is to be removed and the weight of the new structure that is to replace this. This is discussed in the Ground Movement Assessment section.

6.5 Basement Waterproofing

Groundwater was not encountered within the envisaged depth of the basement excavation. Nevertheless, there is potential for water to collect around the basement structure in the long term unless perimeter and under floor drainage is assured. Hence, it is recommended that the basement should be fully waterproofed and designed to withstand hydrostatic pressures in accordance with Guidance provided in BS8102:2009, Code of Practice for the Protection of Below-Ground Structures against Water from the Ground. An assumed groundwater level at +6.95m SD would be prudent for the purposes of assessing hydrostatic pressures in order to allow for the possibility of surface water flooding due to a water main burst or similar.

6.5.1 Retaining Walls

The following parameters may be considered in the design of the retaining walls:-

Stratum	Bulk Density	Effective Cohesion	Effective Friction Angle
	(kg/m^3)	(c' - kN/m^2)	(ϕ'- degrees)
Made Ground	1800	Zero	20
London Clay Formation	1900	Zero	20

6.6 Foundation Concrete

The results of chemical analyses carried out on selected samples of the soils encountered indicate soluble sulphate concentrations falling within Class DS-2 as defined by BRE Special Digest 1 (2005). The recommendations of that guidance for Class DS-2 sulphate conditions should therefore be followed, assuming an Aggressive Chemical Environment for Concrete (ACEC) site classification of AC-2 for mobile groundwater.

7. Impact Assessment

The screening and scoping stages have identified potential effects of the development on those attributes or features of the geological, hydrogeological and hydrological environment. This stage is concerned with evaluating the direct and indirect implications of each of these potential impacts.

7.1 Potential Hydrogeological Impacts

No groundwater is present at the site and given the clay nature of the soils; no significant groundwater flow is envisaged.

Therefore, the development is not expected to have any impact upon groundwater flow and there is expected to be no significant cumulative impact.

7.2 Potential Hydrological Impacts

The new development is expected to result in at most a minimal increase in the amount of soft landscaping.

It is therefore envisaged that the new development will not adversely affect the amount of infiltration and amount of surface water run-off leaving the site.

A SUDS assessment will be undertaken and the new drainage scheme is to include attenuation in accordance with LBC and TW guidance and CPG4 Section 3.51.

7.3 Potential Stability Impacts

7.3.1 Worked Ground

The site history and ground investigation does not appear to indicate that site is underlain by previously worked ground.

7.3.2 Pedestrian Right of Way

The proposed lower ground floor extension lies over 10m from the pedestrian right of way.

In addition, the theoretical 45° zone of support to the pedestrian right of way is not expected to be comprised by the development.

7.3.3 Ground Movement Assessment

The key factor to consider when undertaking a ground movement assessment for the development is that the design of the new basement construction will need to preserve the stability of the adjacent buildings, both during excavation and construction and in the permanent situation.

7.3.3.1 Neighbouring Structures

7.3.3.1.1 4 Mornington Terrace

4 Mornington Terrace is a four storey terraced building that is present immediately to the south of the development, which was constructed at around the same time as 5a Mornington Terrace.

The party wall has been assumed to be founded at the existing lower ground floor (+7.95m SD) in order to represent a worst case scenario.

7.3.3.1.2 6 Mornington Terrace

6 Mornington Terrace is a four storey terraced building that is present immediately to the north of the development, which was constructed at around the same time as 5a Mornington Terrace. In addition, a three storey rear extension was constructed at the turn of the 21st Century.

As the existing lower ground floor to the rear extension is estimated to be at the same elevation as the proposed lower ground floor, the ground movements at this depth are expected to be negligible and cannot be meaningfully modelled.

7.3.3.2 Modelled Ground Conditions

Excavation of the basement will result in unloading of the clay leading to theoretical heave movement of the underlying soil in both the short and long term, depending upon the reapplication of loading.

Therefore, an analysis of the vertical movements has been carried out for a modelled situation, based on a soil model devised from the results of the ground investigation together with published information on the London Clay Formation.

The relation between the undrained shear strength (C_u) and depth (z) from the top of the London Clay Formation is therefore assumed to be $C_u = 50 + 8z$.

The soil layers of this model are detailed in the table below.

Analysis Layer:	Upper Boundary (+m SD)	Thickness (m)	Average C_u (kN/m²)	Soil Stiffness (kN/m²)	
				E_u	E’
London Clay Formation	8.00	2	50	22500	12500
London Clay Formation	6.00	2	66	29700	16500
London Clay Formation	4.00	2	82	36900	20500
London Clay Formation	2.00	2	98	44100	24500
London Clay Formation	0.00	3	114	51300	28500
London Clay Formation	-3.00	3	138	62100	34500
London Clay Formation	-6.00	3	162	72900	40500
London Clay Formation	-9.00	3	186	83700	46500
Assumed Rigid Boundary	-12.00				

The Undrained Modulus of Elasticity (Eu) has been based upon an empirical relationship of Eu = 450 x Cu, and the Drained Modulus of Elasticity (E') has been based upon an empirical relationship of 250 x Cu.

Poisson's Ratios of 0.5 and 0.2 have been used for short term (undrained) and long term (drained) conditions respectively.

Based on the above parameters and loading/unloading and ignoring any benefit gained from the loading of previous buildings on site, the potential vertical displacements and the post construction movements have been analysed.

The analysis uses classic modified Boussinesq elastic theory, assuming a fully flexible foundation applying a uniform loading/unloading to a semi-infinite elastic half-space, using the above parameters for stratified homogeneity and with the introduction of an assumed rigid boundary at approximately 20m depth (-12.00m OD).

The programme calculates the theoretical Boussinesq elastic stress increase/decrease due to the applied net loadings/unloadings (over the given loaded/unloaded areas) at the mid-level of each stratum.

Short-term and long-term displacements are then calculated at each calculation point for each stratum, using the given values of Stiffness Moduli and Poisson's Ratio of the whole area of the site on a 0.5m calculation grid.

7.3.3.3 Movements to Neighbouring Structures

There are two components of short term movements that might potentially interact to affect 4 Mornington Terrace. These are settlements associated with the underpinning process and theoretical elastic heave movements from excavation of the basement.

7.3.3.3.1 Underpinning

It is not possible to rigorously model the party wall settlements arising from conventional underpinning. However, experience indicates that the potential movements are very much dependent on workmanship.

In view of the limited depth of underpinning excavation (< 0.25m) in combination with the limited length of party wall that is to be underpinned (< 1m), the vertical movement expected at the party wall is predicted to be negligible.

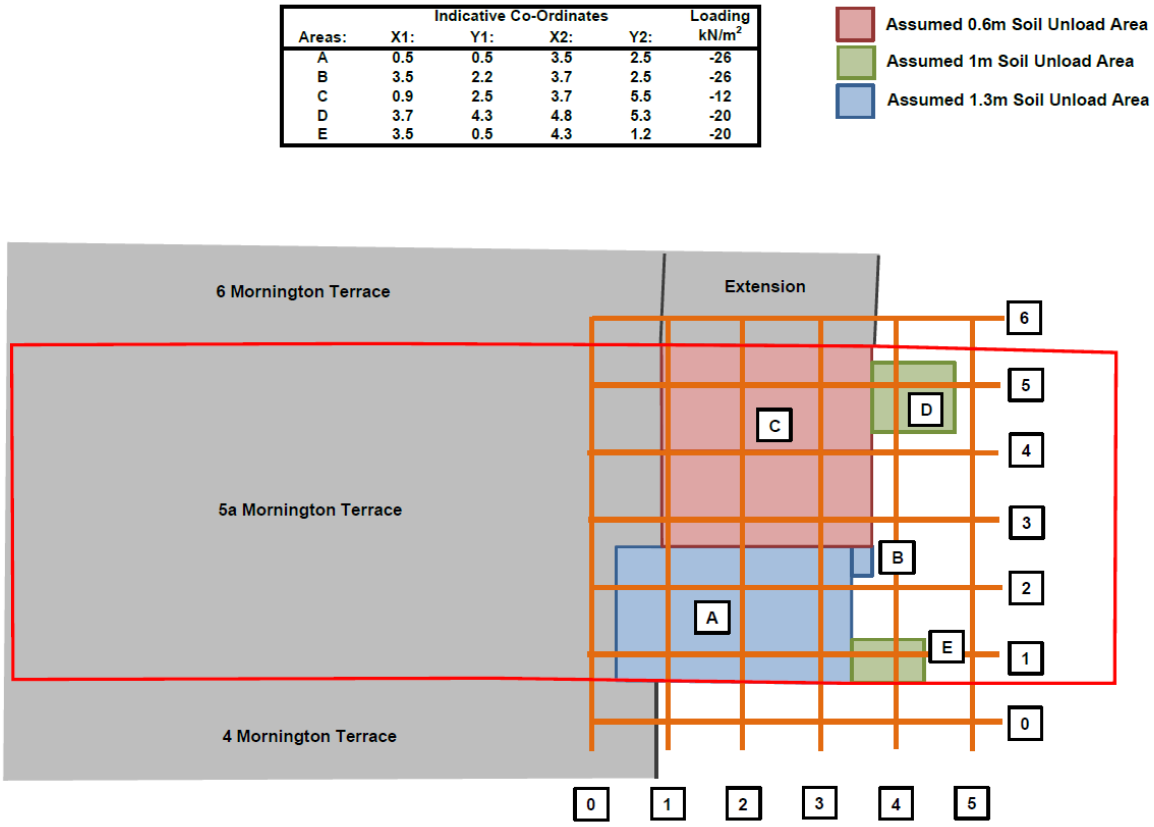
The subsequent ground horizontal movements that may occur due to yielding of the underpinned wall during the basement excavation may also be estimated. As a first approximation, the magnitude of the horizontal movement is assumed to be equal to the vertical movement at the underpinned wall; hence the horizontal movement expected at the party wall is also predicted to be negligible.

7.3.3.3.2 Excavation

It is envisaged that the excavation will generally extend to roughly between 0.5m and 1.5m beneath the proposed extension.

As a result, the potential effect of the basement excavation has been considered by applying a net unloading of up to -12kN/m^2 due to soil loading beneath the extension, increasing to -26kN/m^2 where the excavation extends to around 1.3m beneath the proposed en-suite.

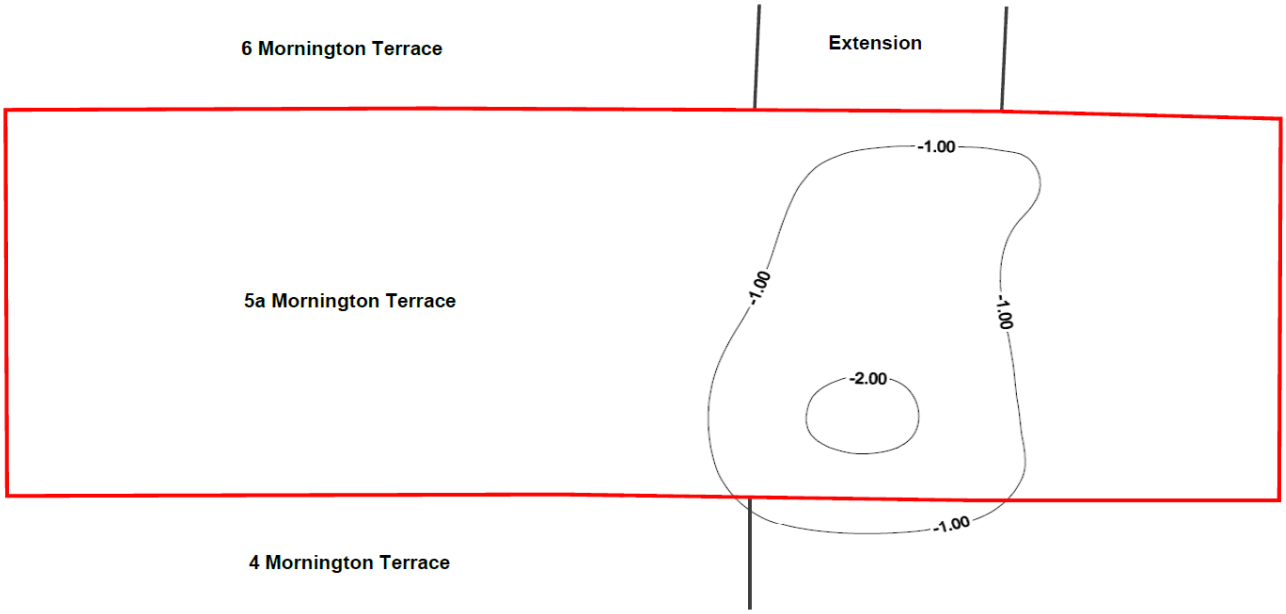
Areas:	Indicative Co-Ordinates X1:	Y1:	X2:	Y2:	Loading kN/m²
A	0.5	0.5	3.5	2.5	-26
B	3.5	2.2	3.7	2.5	-26
C	0.9	2.5	3.7	5.5	-12
D	3.7	4.3	4.8	5.3	-20
E	3.5	0.5	4.3	1.2	-20



Plan showing modelled unload areas due to soil excavation

The potential effect of this soil excavation may be approximately 1mm of short term soil heave, increasing up to around 2mm beneath the proposed en-suite, where greater excavation is required.

It can be seen that a maximum of approximately 2mm of short term soil heave is theoretically predicted to occur beneath the party wall with 4 Mornington Terrace.



Plan showing theoretical short term heave (mm) due to excavation

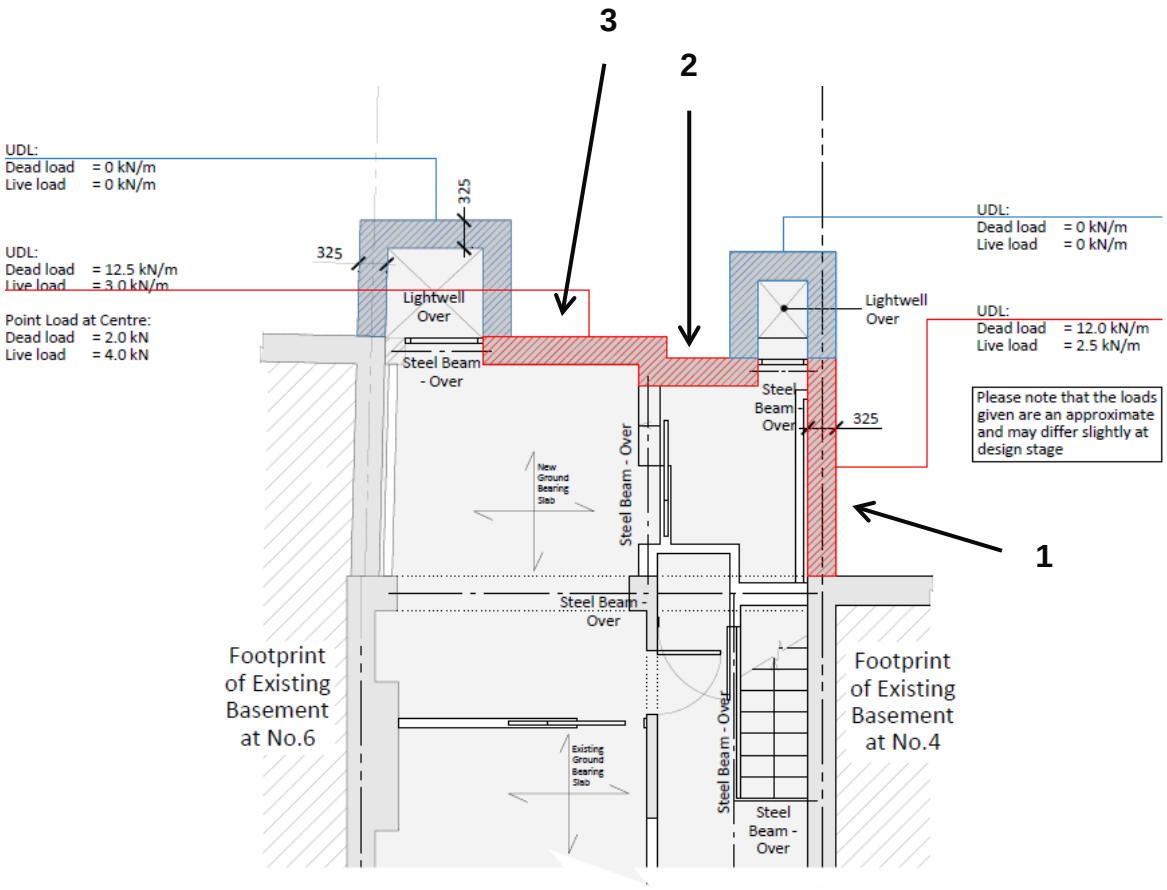
7.3.3.3.3 Impact on 4 Mornington Terrace

Despite the potential soil heave described in the above section, the expectation of vertical movements affecting the party wall to 4 Mornington Terrace as a result of the proposed underpinning is predicted to be negligible.

Therefore, the degree of movement due to underpinning has been assessed as Burland scale Category 0 (negligible) for 4 Mornington Terrace.

7.3.3.4 Long Term Movements

As part of the redevelopment, some new areas of foundation loading will be applied to the soil in positions shown on the following plan:



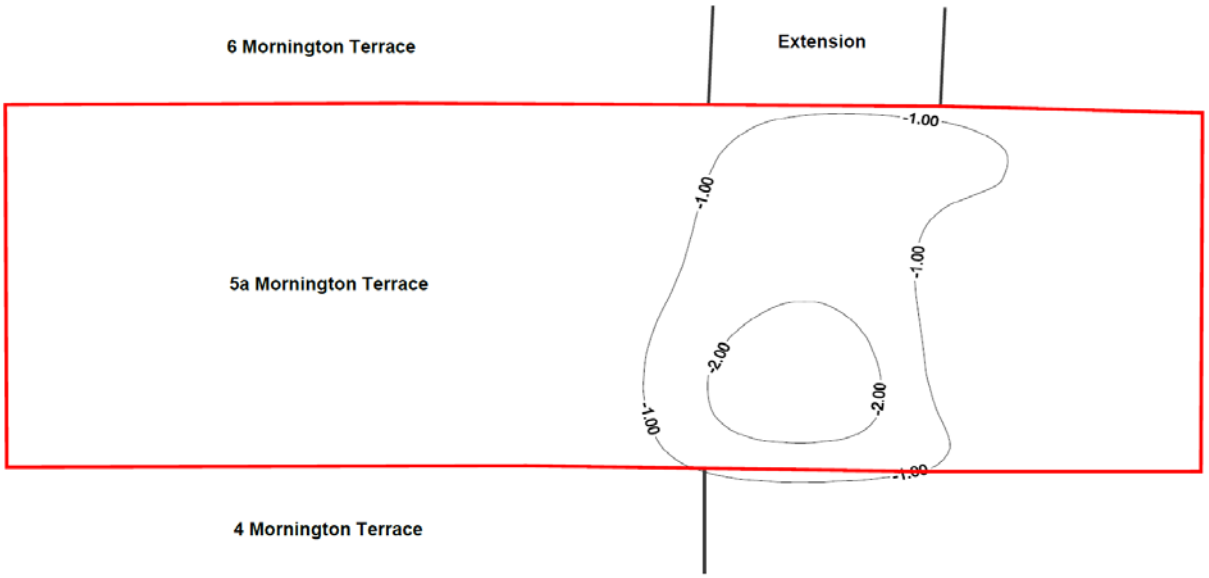
Areas:	Indicative Co-Ordinates X1:	Y1:	X2:	Y2:	Loading kN/m^2
1	0.5	0.175	3.5	0.5	38.8
2	3.5	1.2	3.825	2.2	40.8
3	3.7	2	4.025	4.3	40.8

Plan showing approximate vertical loading (Blue Engineering Dwg No. 3134 Rev. T1)

By convention, when considering the average loading condition, the loading is assumed to be 100% dead load plus 25% live load.

Due to the bulk of the soil excavation occurring beneath of the existing house, there will potentially be a slight component of long term heave in this area that could proceed after completion of the new development.

The analysis suggests that an additional long term heave of around 2mm could occur beneath the proposed extension, decreasing to around 1mm beneath the neighbouring houses, which may be regarded as minimal.



Plan showing theoretical long term heave (mm) due to excavation and construction

7.3.4 Residual Impacts

It is concluded that the proposed lower ground floor extension will have no residual unacceptable impacts upon the surrounding structures, infrastructure and environment. Given the essentially impermeable nature of the soils, that the new lower ground floor will be replacing, no cumulative impacts are envisaged.

8. Conclusion

This BIA has demonstrated that each of the potential impact and issues can be satisfactorily addressed through the use of appropriate engineering design and construction measures, and that the proposed construction can be successfully completed without detriment to the environment, flooding or ground instability.

Having reviewed the adequate design and construction methodology, it is envisaged that the basement construction will have no significant detrimental impact on the stability of the neighbouring structures and can be achieved without any cumulative impact.

Appendix

CRH Checklist and Audit Tracker

Exploratory Logs

Geotechnical Test Results

Existing Drawings

Proposed Drawings

Construction Methodology

Structural Movement Monitoring Document

Utility Drawings

Envirocheck (separate file)

CRH Checklist

	Checklist from Campbell Reith BIA Audit Ref 12466-41 Rev D1 (based on BIA by Blue Engineering, ref 3134, Rev C, dated Dec 2016)		Response (see BIA by LBH Wembley, ref LBH 4464, Rev 1.1, Dated May 2017)
Item	**Yes/No/NA**	**Campbell Reith Comment**	**LBH Wembley Response**
Are BIA Author(s) credentials satisfactory?	No	In accordance with CPG4 guidelines the authors should demonstrate relevant qualifications and experience in hydrology, hydrogeology and engineering geology.	The LBH Wembley author demonstrates relevant qualifications and experience in hydrology, hydrogeology and engineering geology.
Is data required by Cl.233 of the GSD presented?	No	Insufficient desk study information is provided as required in line with GSD Appendix G1 and data required by Cl.233 of the GSD has not been presented. Utility companies have not been approached with regards to underground infrastructure.	Desk study information is now included (see section 3) Utility information included (see appendix)
Does the description of the proposed development include all aspects of temporary and permanent works which might impact on geology, hydrogeology and hydrology?	No	The BIA is based on assumptions. Outline designs, movement and damage assessments, etc, required.	A damage assessment has now been undertaken against the proposed construction methodology shown in the structural engineers drawings(see section 7.3 and appendix)
Are suitable plans/maps included?	No	A site location plan along with existing and proposed plans have been provided. However no further plans such as historical maps or geological maps are provided.	Further plans are now provided (see the Envirocheck report)
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	Insufficient plans and maps included	Additional plans and maps are now included (see the Envirocheck report)
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA report - section 3.3. No consultation of historical maps or geological maps, that would indicate the site lies within an area of 'worked ground'.	Appropriate data sources have now been consulted (refer to Section 4.1.3)
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA report - section 3.2. No reference of appropriate mapping. The Screening process makes assumptions about the drainage design.	Appropriate data sources have now been consulted (refer to Section 4.1.1)
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA Report - section 1.6 and 3.4. No reference of appropriate mapping. However, it is accepted the site has a very low risk of surface water flooding. The Screening process makes	Appropriate data sources have now been consulted (refer to Section 4.1.2)

		assumptions about the drainage design and discharge flow which require further assessment.	
Is a conceptual model presented?	No		A conceptual model is now described in section 5.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Scoping not provided given that all responses to screening were 'No'. However, screening had not been informed by a desk study. Additional investigation is required to confirm the site ground conditions.	Refer to Section 4.2.3
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Scoping not provided given that all the responses to screening were 'No'. However, screening had not been informed by a desk study. Additional investigation is required to confirm the site ground conditions.	Refer to Section 4.2.1
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Scoping not provided given that all responses to screening were 'No'. However, screening had not been informed by a desk study. Attenuation drainage references need further detailing to assess.	Refer to Section 4.2.2
Is factual ground investigation data provided?	No	Within section 3 of the BIA, a reference is made relating to a BGS borehole log 150m from the site on Arlington Road. Site specific data should be provided.	A site specific ground investigation has been undertaken (Section 5).
Is monitoring data presented?	No		There is no shallow groundwater table beneath the site; hence no groundwater monitoring is required.
Is the ground investigation informed by a desk study?	N/A		Refer to Section 3.
Has a site walkover been undertaken?	Yes		Refer to Section 2.3.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 1.3 states that there are existing lower ground floors to both sides of 5 Mornington Terrace. Adjacent foundations / basement depths should be confirmed.	Refer to Section 7.3.3.1. GMA is based on worst case scenario w.r.t. foundation depths.
Is a geotechnical interpretation presented?	No	No site investigation provided or geotechnical data presented. Assumptions made on foundation bearing pressures.	Refer to Section 6.
Does the geotechnical interpretation include information on retaining wall design?	No	Retaining wall design referred to in section 4.3 and section 6 of BIA but no calculations provided.	Refer to Section 6.

Are reports on other investigations required by screening and scoping presented?	No	No site investigation provided.	See section 5
Are baseline conditions described, based on the GSD?	No	No site investigation provided.	See section 5
Do the base line conditions consider adjacent or nearby basements?	Yes	Adjacent foundations / basement depths should be confirmed.	Refer to Section 7.3.3.1. GMA is based on worst case scenario w.r.t. foundation depths.
Is an Impact Assessment provided?	No		Refer to Section 7.
Are estimates of ground movement and structural impact presented?	Yes	Assessment calculations should be presented	Refer Section 7.3.3.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	No impact assessment is submitted.	Refer to Section 7.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	A temporary works sequence indicating propping is presented, although without movement / damage assessments no conclusion can be reached as to adequacy. Groundwater and drainage have not been addressed.	Refer to Section 7
Has the need for monitoring during construction been considered?	No	More information is required on the proposed construction including a construction programme in line with the CPG4.	A Monitoring Movement document has been prepared by Blue Engineering, dated 5th May, Rev A. Refer to appendix Information on the proposed construction has been prepared in the form of a set of structural drawings by Blue Engineering (Issue 7, 5th May 2017). Refer to appendix
Have the residual (after mitigation) impacts been clearly identified?	No	Additional assessments required, as indicated.	Refer to Section 7.3.4.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	No structural calculations provided. Site investigation, ground movement assessment, damage impact assessments required,	A GMA is prepared in Section 7.3.3.

Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Not proven. No proposed drainage plans have been provided. Attenuation in line with CPG4 3.51 should be proposed.	Refer to Section 7.2.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Further consideration of the site conditions required. A ground movement assessment is required which should assess the impact on all of the structures within the zone of influence.	Consideration of the site conditions have been provided in the GMA (Section 7.3.3) and an assessment of the impact of the development on neighbouring structures has been provided.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	No	However, no ground movement assessment has been provided with the report.	Refer to Section 7.3.3.
Are non-technical summaries provided?	No	However, the BIA is written so as to be understandable.	The BIA information is clearly laid out and easy to follow.

Audit Query Tracker

Query No	Subject	Query	Status/Response	LBH Response
1	Author's qualifications	The author's qualifications for the BIA are not in accordance with CPG4 guidelines.	Open – to be provided as 4.1	The LBH Wembley author demonstrates relevant qualifications and experience in hydrology, hydrogeology and engineering geology.
2	Desk Study	Relevant information be provided in accordance with CPG4 / GSD G1	Open – to be provided as 4.2 to 4.4	Desk Study Information in Section 3.
3	Site investigation	No site investigation or interpretative geotechnical information, no groundwater monitoring, in line with GSD G2 / G3	Open – to be provided as 4.4 to 4.6, 4.11	A site specific investigation has been undertaken (Section 5) and a geotechnical assessment is provided (Section 6)
4	Stability	Retaining wall designs, temporary works update, groundwater control, construction programme	Open – to be provided as 4.5, 4.8 to 4.11	See Section 6 Construction Methodology is provided in the appendix.
5	Surface Water Flow	Attenuation SUDS assessment	Open - to be provided as 4.7	See Section 7.2.
6	Stability	Ground Movement Assessment and Damage Assessment	Open – to be provided as 4.12 and 4.13	See Section 7.3.3.
7	BIA Format	Impact assessment should be presented for issues carried through scoping.	Open – to be provided	See Section 7.
8	BIA Format	Impact mitigation measures (e.g. GMA / damage impacts, drainage, groundwater control etc)	Open – to be provided	See Section 7.
9	BIA Format	Non-technical summaries	Open – to be provided	The BIA information is clearly laid out and easy to follow.

PROJECT: 5a Mornington Terrace | LBH4464

CLIENT: Mr Joseph Middleton | 04/05/2017

BOREHOLE BH1

BORING METHOD: Modular Window Sampler Rig | Date: 12/04/2017

GROUND WATER: No Groundwater Observed

REMARKS:

G.L +9.25m SD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.15	MADE GROUND (dark brown silty clayey loam with abundant roots and rootlets
						MADE GROUND (dirty brown silty clay with abundant rootlets, flint gravel and fragments of brick, slate, wood and ash)
					1.10	
	SPT	1.30	5			Firm brown silty CLAY with occasional claystones
1	D	1.50				
	SPT	2.30	6			
2	D	2.50				
						…sand parting at 2.7m and scattered selenite crystals below 2.7m
						…becoming firm to stiff at 3.0m
	SPT	3.30	8			
3	D	3.60				
						…becoming stiff fissured silty clay at 3.8m
	SPT	4.30	11			
4	D	4.50				

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

LBH WEMBLEY ENGINEERING

PROJECT: 5a Mornington Terrace	LBH4464	**BOREHOLE**
CLIENT: Mr Joseph Middleton	04/05/2017	**BH1**

BORING METHOD:	Modular Window Sampler Rig	Date: 12/04/2017
GROUND WATER:	No Groundwater Observed	

REMARKS:

G.L +9.25m SD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
	SPT	5.30	14		5.45	Stiff brown fissured silty CLAY with occasional claystones and selenite crystals

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

LBH WEMBLEY ENGINEERING

PROJECT: 5a Mornington Terrace | LBH4464

CLIENT: Mr Joseph Middleton | 04/05/2017

BOREHOLE BH2

BORING METHOD: Modular Window Sampler Rig | Date: 12/04/2017

GROUND WATER: No Groundwater Observed

REMARKS:

G.L +8.55m SD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.05	MADE GROUND (paving slab)
					0.40	MADE GROUND (concrete)
					0.55	MADE GROUND (dirty brown silty clay with occasional brick, concrete and ash)
						Firm brown silty CLAY with occasional claystones
	SPT	1.40	6			
1	D	1.50				
	SPT	2.40	8			…scattered selenite crystals at 2.4m
2	D	2.50				
						…becoming stiff fissured silty clay at 2.9m
	SPT	3.40	17			
3	D	3.70				
	SPT	4.40	15			
4	D	4.60				

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

LBH WEMBLEY ENGINEERING

PROJECT: 5a Mornington Terrace | LBH4464

CLIENT: Mr Joseph Middleton | 04/05/2017

BOREHOLE BH2

BORING METHOD: Modular Window Sampler Rig | Date: 12/04/2017

GROUND WATER: No Groundwater Observed

REMARKS:

G.L +8.55m SD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
	SPT	5.40	16		5.45	Stiff brown fissured silty CLAY with occasional claystones and selenite crystals

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

PROJECT: 5a Mornington Terrace

CLIENT: Mr Joseph Middleton

Project No

LBH4464

SPT RESULTS

Borehole No	Depth at Start of Test (m)	Spoon or Sone	Blow for each successive 75mm penetration						Water Level (m)	Is Hole Blowing?	N Value
1	1.00		1	1	1	1	1	2	None	No	5
	2.00		1	1	1	1	2	2	None	No	6
	3.00		1	1	2	2	2	2	None	No	8
	4.00		2	2	2	3	3	3	None	No	11
	5.00		2	2	3	3	4	4	None	No	14
2	1.10		1	1	1	1	2	2	None	No	6
	2.10		1	1	2	2	2	2	None	No	8
	3.10		2	2	2	4	6	5	None	No	17
	4.10		3	3	3	4	4	4	None	No	15
	5.10		4	4	4	4	4	4	None	No	16

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone:- 01327 860947/860060 Fax:- 01327 860430 Email: groundtech@listersgeotechnics.co.uk

PROJECT INFORMATION		SAMPLE INFORMATION		
Site Location:-	5A Mornington Terrace Camden London NW1 7RR	**Laboratory Tests Undertaken:-**		
		TEST TYPE	**TEST METHOD**	**TESTED**
		Natural Water Contents (WC%)	(BS 1377:Part 2:1990 Clause 3.2)	✓
		Liquid Limits (%)	(BS 1377:Part 2:1990 Clause 4.3)	✓
		Plastic Limits (%)	(BS 1377:Part 2:1990 Clause 5.3)	✓
		Plasticity Index (%)	(BS 1377:Part 2:1990 Clause 5.4)	✓
		Linear Shrinkage (%)	(BS 1377:Part 2:1990 Clause 6.5)	
		PSD - Wet Sieving	(BS 1377:Part 2:1990 Clause 9.2)	
Client Reference:-	-	Engineering Sample Descriptions	(BS 5930 : Section 6)	
		Passing 425/63 (μm)	-	✓
		Hydrometer	(BS 1377:Part 2:1990 Clause 9.5)	
Date Samples Received:-	21st April 2017	Loss on Ignition (%)	-	
Date Testing Completed:-	28th April 2017	Soil Suctions (kPa)	BRE Digest IP 4/93, 1993	
		Bulk Density (Mg/m^3)	(BS 1377:Part 2:1990 Clause 7.2)	
		Strength Tests	(BS 1377:Part 7:1990 Clause 8 & 9)	
		Soluble Sulphate Content (SO_4g/l)	(BS 1377:Part 3:1990 Clause 5.3)	✓
		pH value	(BS 1377:Part 3:1990 Clause 9.4)	✓
		California Bearing Ratios (CBR)	(BS 1377:Part 4:1990 Clause 7)	
		Compaction Tests	(BS 1377:Part 4:1990 Clauses 3.0-3.6)	
The results relate only to the samples tested				

Laboratory testing in accord with BS EN ISO/IEC 17025-2000 and Quality Management in accord with ISO 9001

Signed on behalf of GroundTech Laboratories:- _____ **Technical Signatory**

Quality Assured to ISO 9001

GEOTECHNICAL LABORATORY TEST RESULTS

Report No: 17.04.016

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone: 01327 860947/860060 Fax: 01327 860430 Email: groundtech@listersgeotechnics.co.uk

Quality Assured to ISO 9001

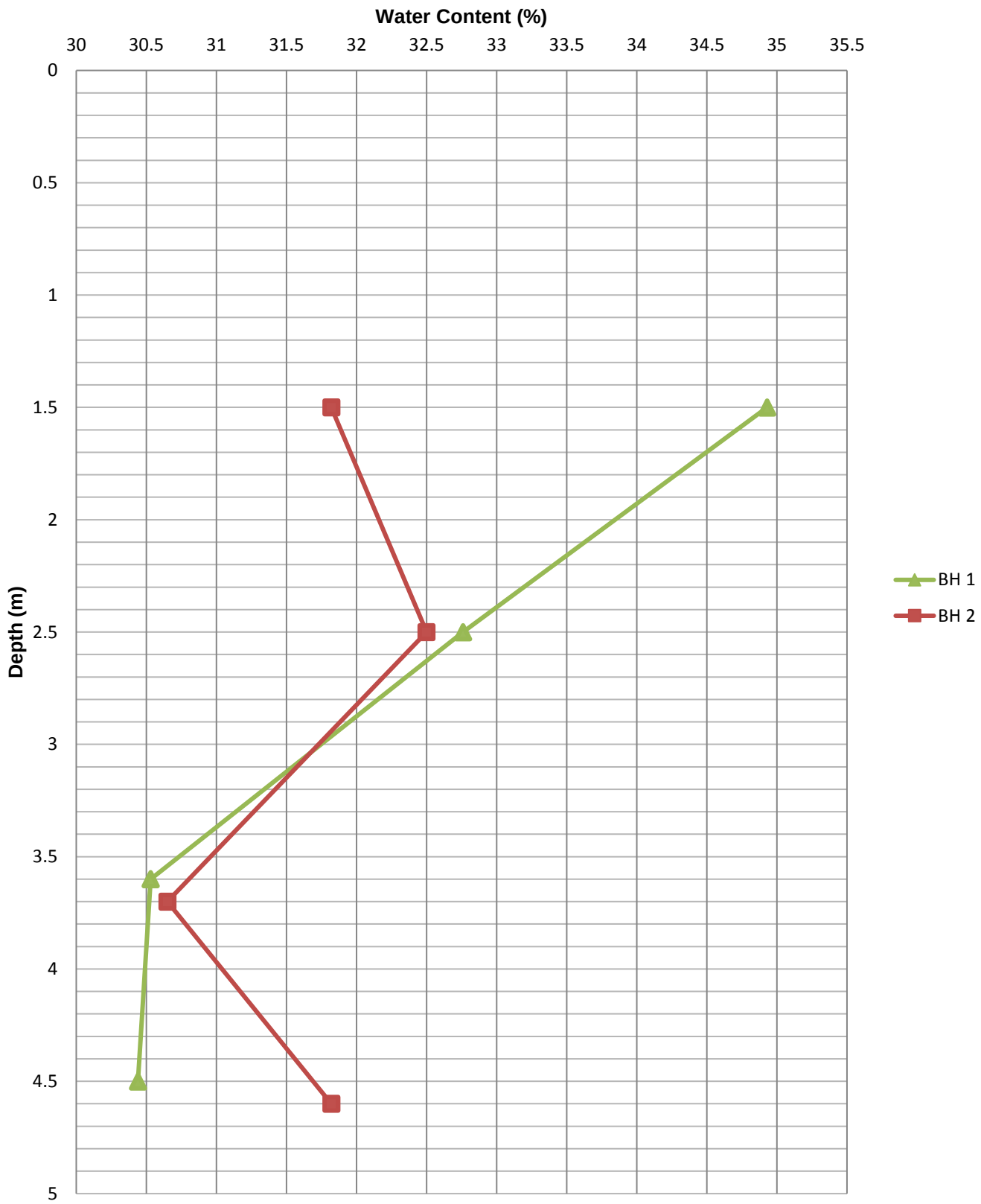
SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS	
Test Location	Sample Type	Sample Depth -m	Test Type	WC %	LL %	PL %	PI %	Passing 425 µm %	Modified PI %	Class	Passing 63 µm %	WC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m3	Test Type	Cell Pressure kN/m2	Deviator Stress kN/m2	Apparent Cohesion kN/m2	ϕ	pH Value	Soluble Sulphate Content SO4 g/l
BH 1	D	1.50		35																				
	D	2.50	PI/63	33	73	29	44	100	44	CV	98	0.45	31	0.09									7.5	0.42
	D	3.60		31																				
	D	4.50		30																				
BH 2	D	1.50		32																				
	D	2.50		32																				
	D	3.70	PI/63	31	74	29	45	100	45	CV	98	0.42	31	0.04									7.4	1.17
	D	4.60		32																				

Symbols:

U	Undisturbed Sample	R	Remoulded	PI	Plasticity Index	T	Triaxial Undrained	L	100mm specimen
D	Disturbed Sample	63	Passing 63µm	F	Filter Paper Suction Tests	M	Multistage Triaxial	S	38mm specimen
B	Bulk Sample	H	Hydrometer	CC	Continuous Core	HP	Hand Penetrometer		
W	Water Sample	PSD	Wet Sieving			V	Vane Test		

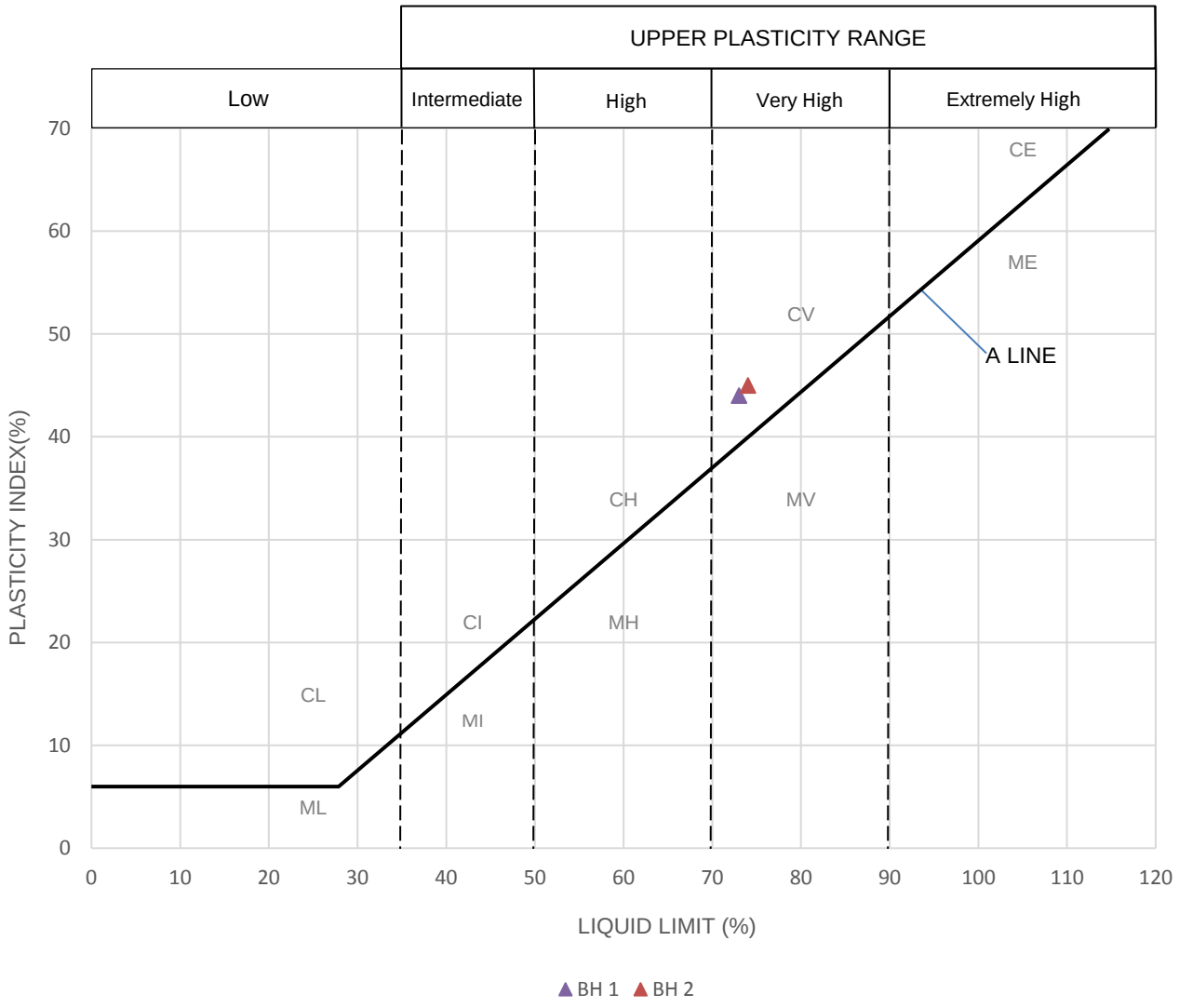
LABORATORY TEST RESULTS

Project Reference
17.04.016



WATER CONTENT v DEPTH

Report:
17.04.016



PLASTICITY CHART

Report:
17.04.016

NOTES

REVISIONS

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Existing Block Plan

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-002
SCALE	1:500 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
CHECKED	CW

ZCD Architects

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info@zcdarchitects.co.uk
www.zcdarchitects.co.uk

No. 4

No. 5A

No. 6

NOTES

REVISIONS

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Existing Front Elevation

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-020
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
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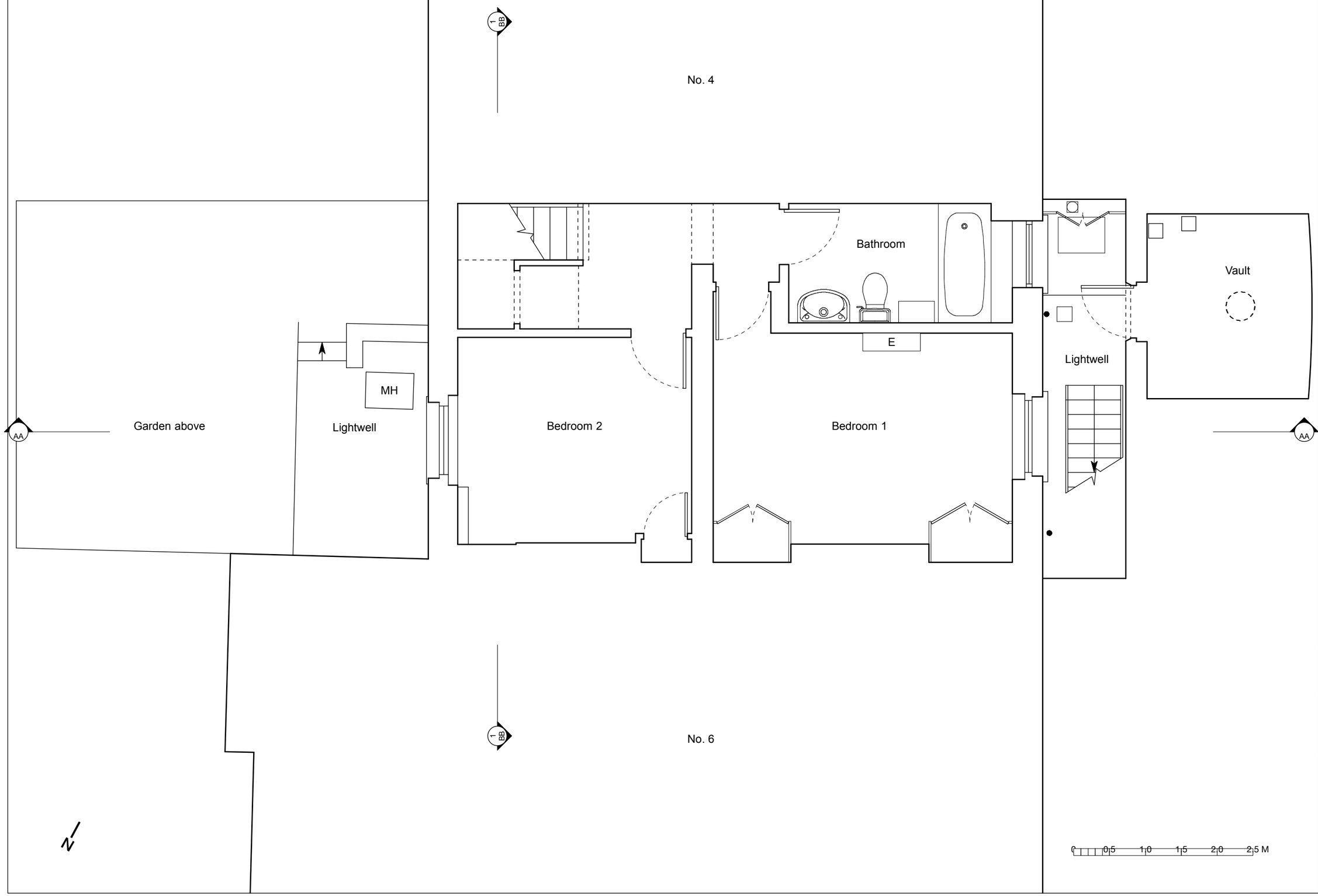
NOTES

REVISIONS



PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Lower Ground Floor Plan
Existing

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-010
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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NOTES

REVISIONS

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Existing Rear Elevation

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-021
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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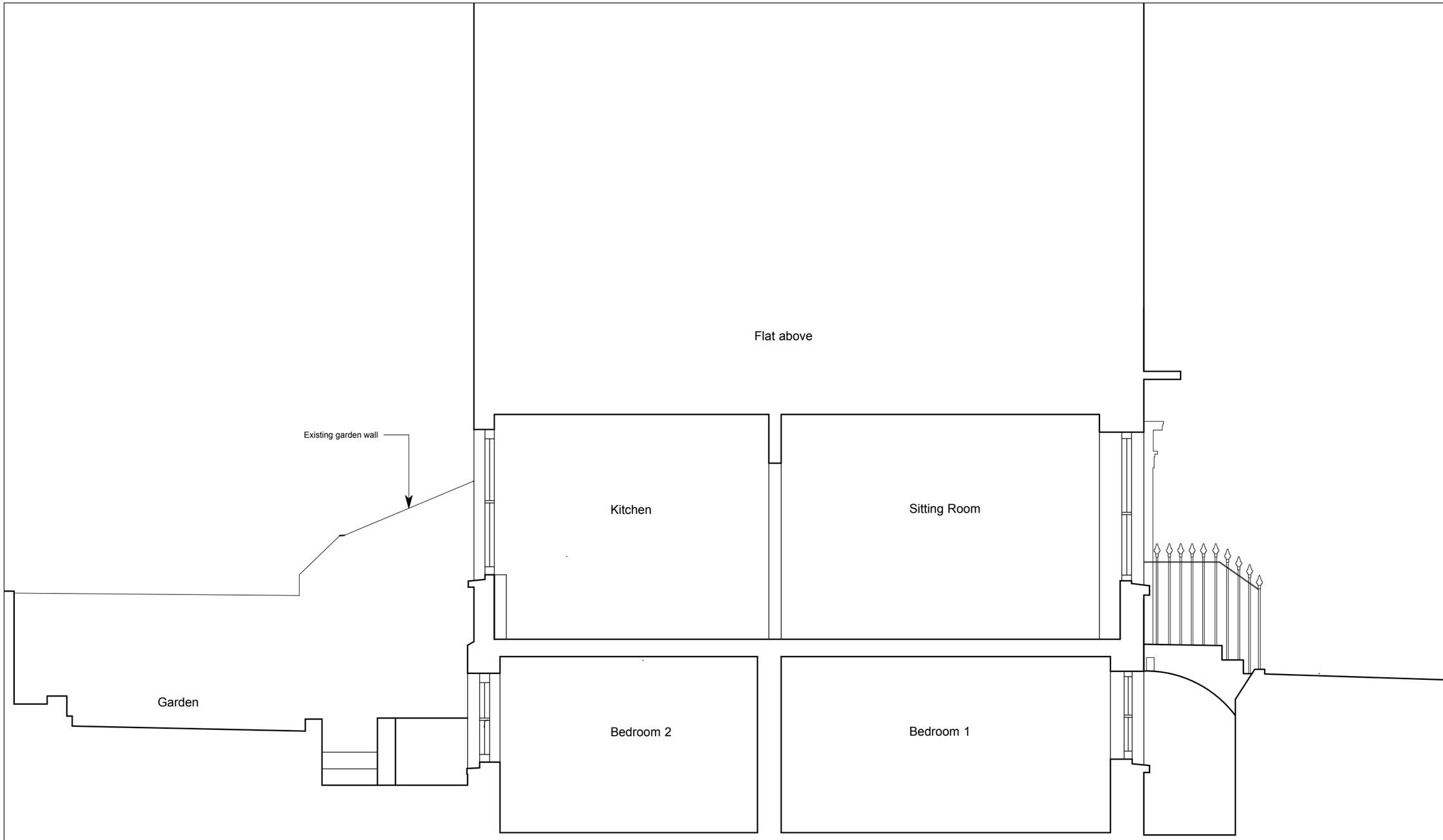

NOTES

REVISIONS

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Existing Section AA

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-030
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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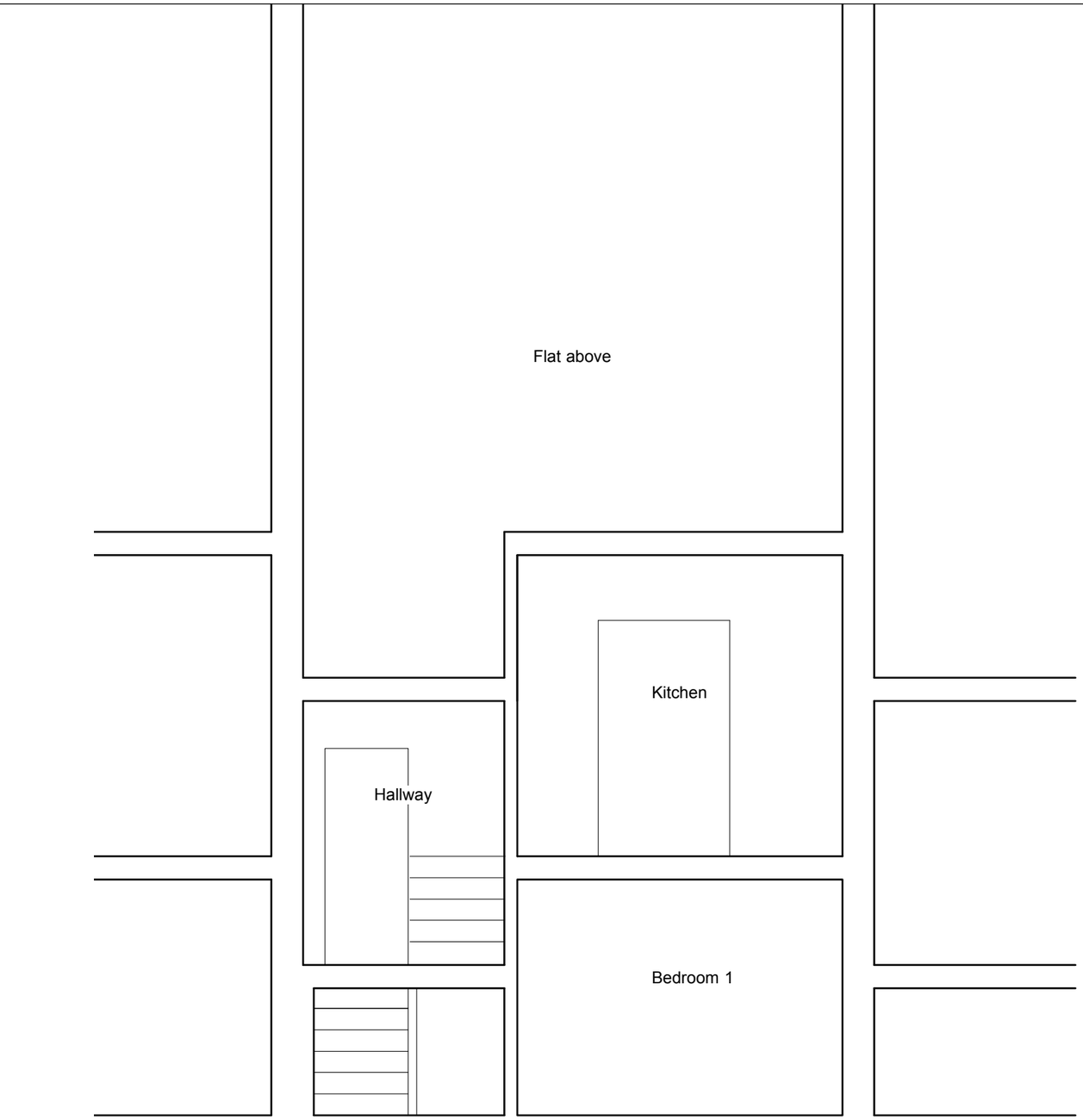

NOTES

REVISIONS

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Existing Section BB

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-031
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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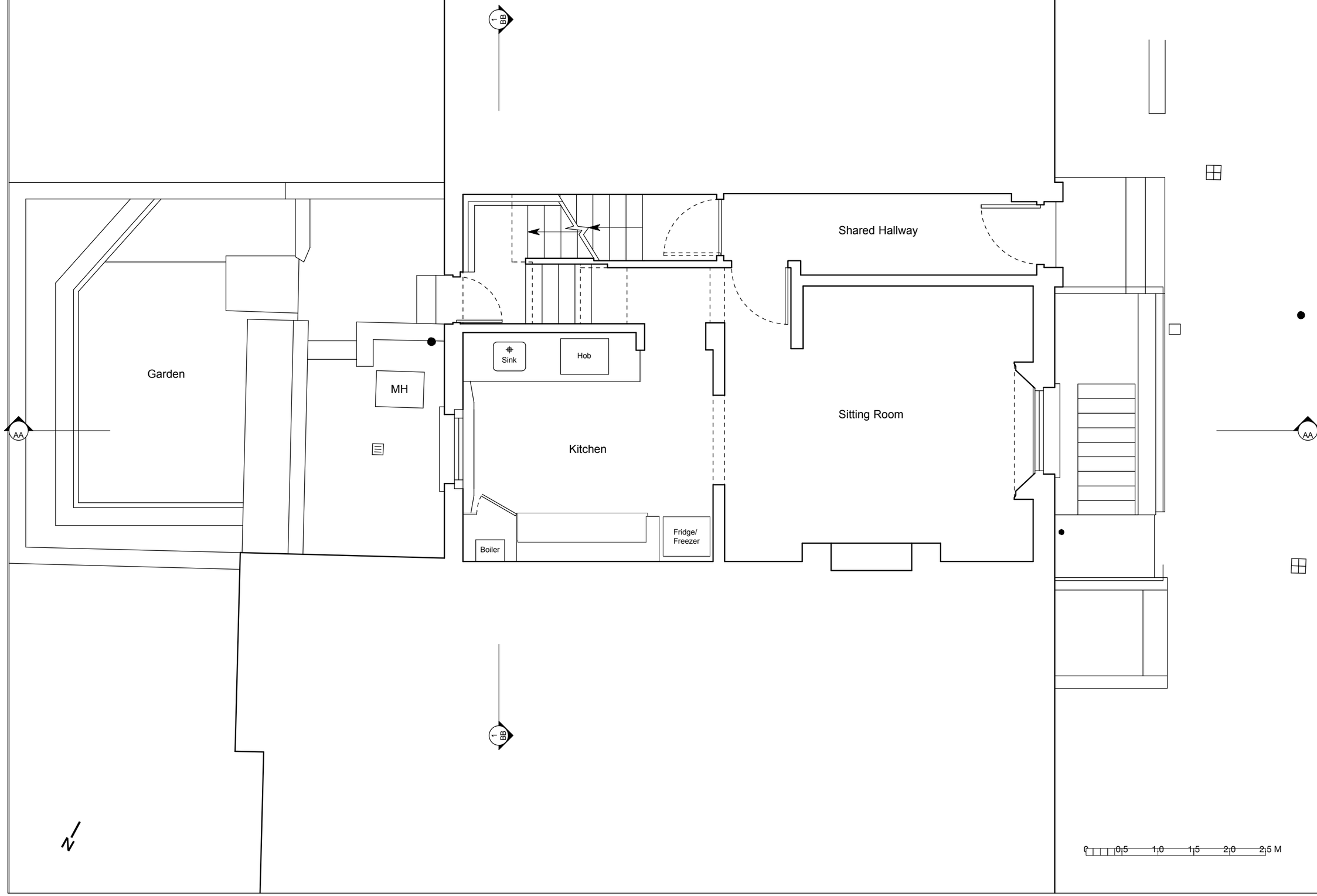
NOTES

REVISIONS



PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Existing UGF Plan

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-010
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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CHECKED	CW

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NOTES

REVISIONS

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Lower Ground Floor Plan
Existing

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-010
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
CHECKED	CW

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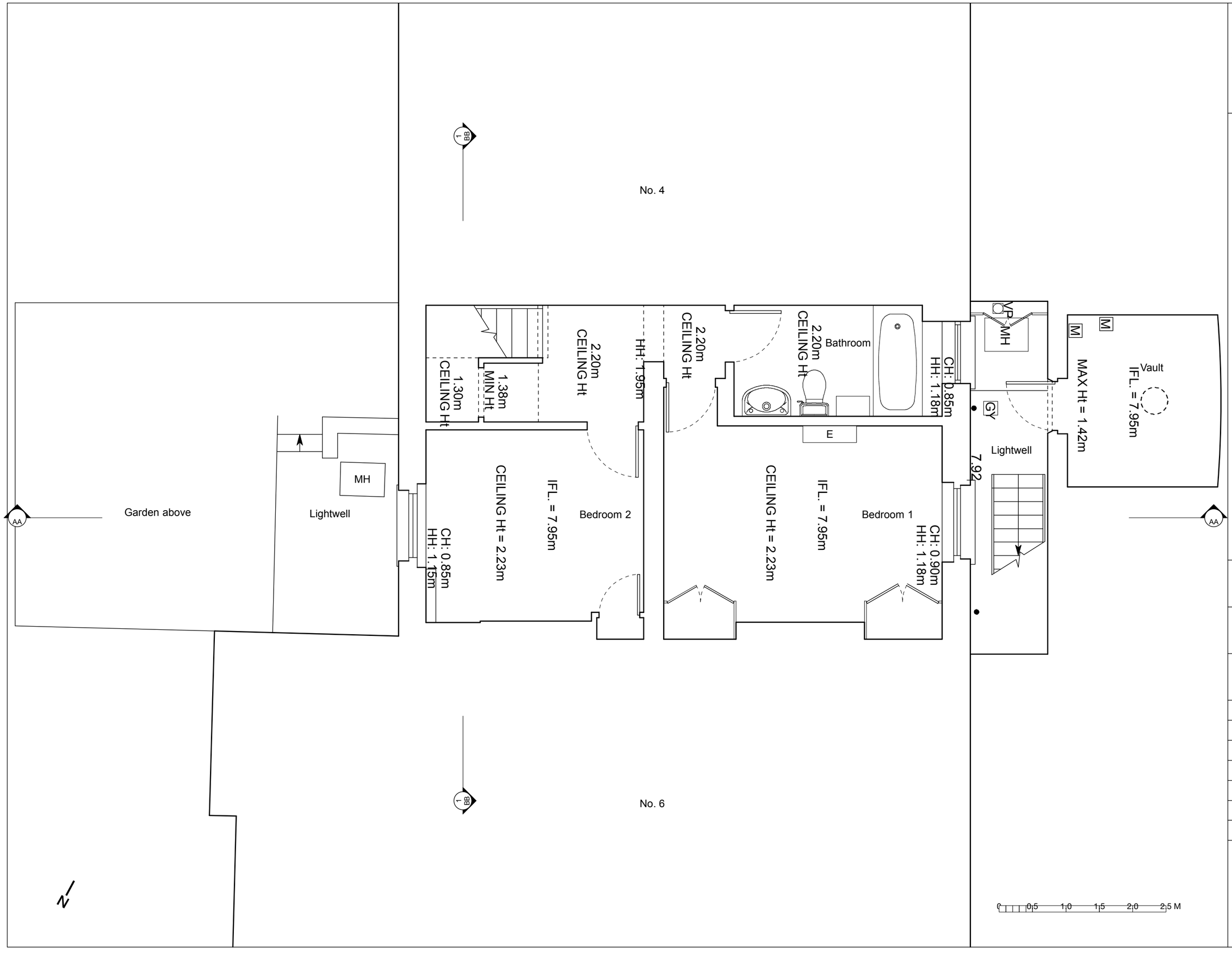

NOTES

REVISIONS

PROJECT 5A Mornington Terrace

CLIENT Joseph Middleton

DRAWING TITLE Existing UGF Plan

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-010
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
CHECKED	CW

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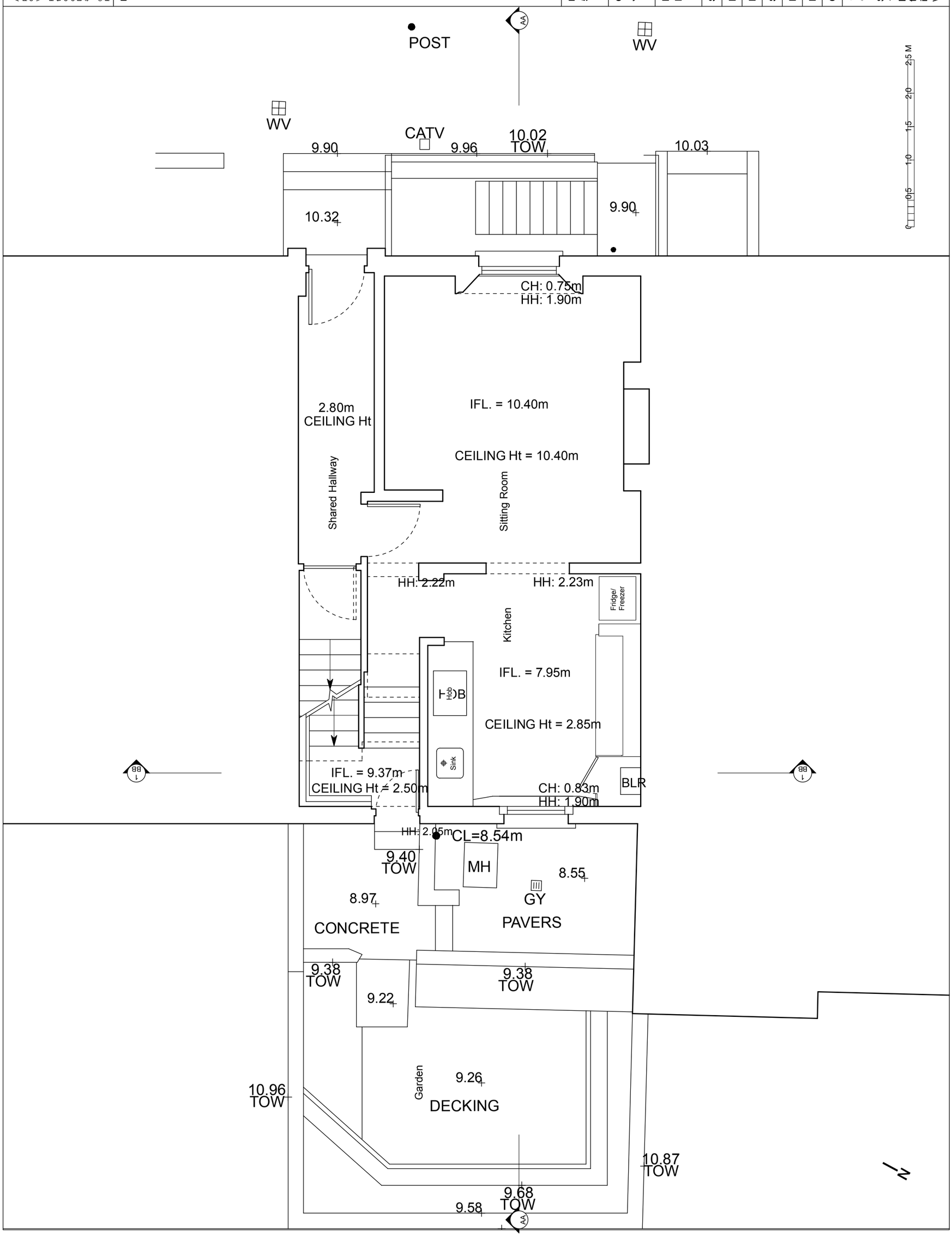

NOTES

C 28/3/17 Glass ceiling over bedroom removed
B 23/3/17 Grills shown over lightwells
A 20/3/17 Stair from Bedroom to Garden removed, replaced with shallow lightwell. Single step down to Ensuite, step shown in ceiling above
REVISIONS

Drying Room - heated towel radiator and extractor installed

Step above

Existing casement replaced with new thermally efficient timber casement window

lightwell -1065

Shower Room -2085

Washing machine

shelving

Hallway -1865

Master Bedroom -1865

Walk-in Wardrobe -1865

Master Bedroom

lightwell -1065

Existing opening widened and cill lowered - dimensions to match neighbouring property no. 6. New timber thermally efficient casement window installed.

1 BB

1 AA

0 1.0 2.0 3.0 4.0 5.0 M

PROJECT	5A Mornington Terrace
CLIENT	Joseph Middleton
DRAWING TITLE	Lower Ground Floor Plan
STATUS	Planning
PROJ NO.	1656
DWG NO.	P-110
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
CHECKED	CW

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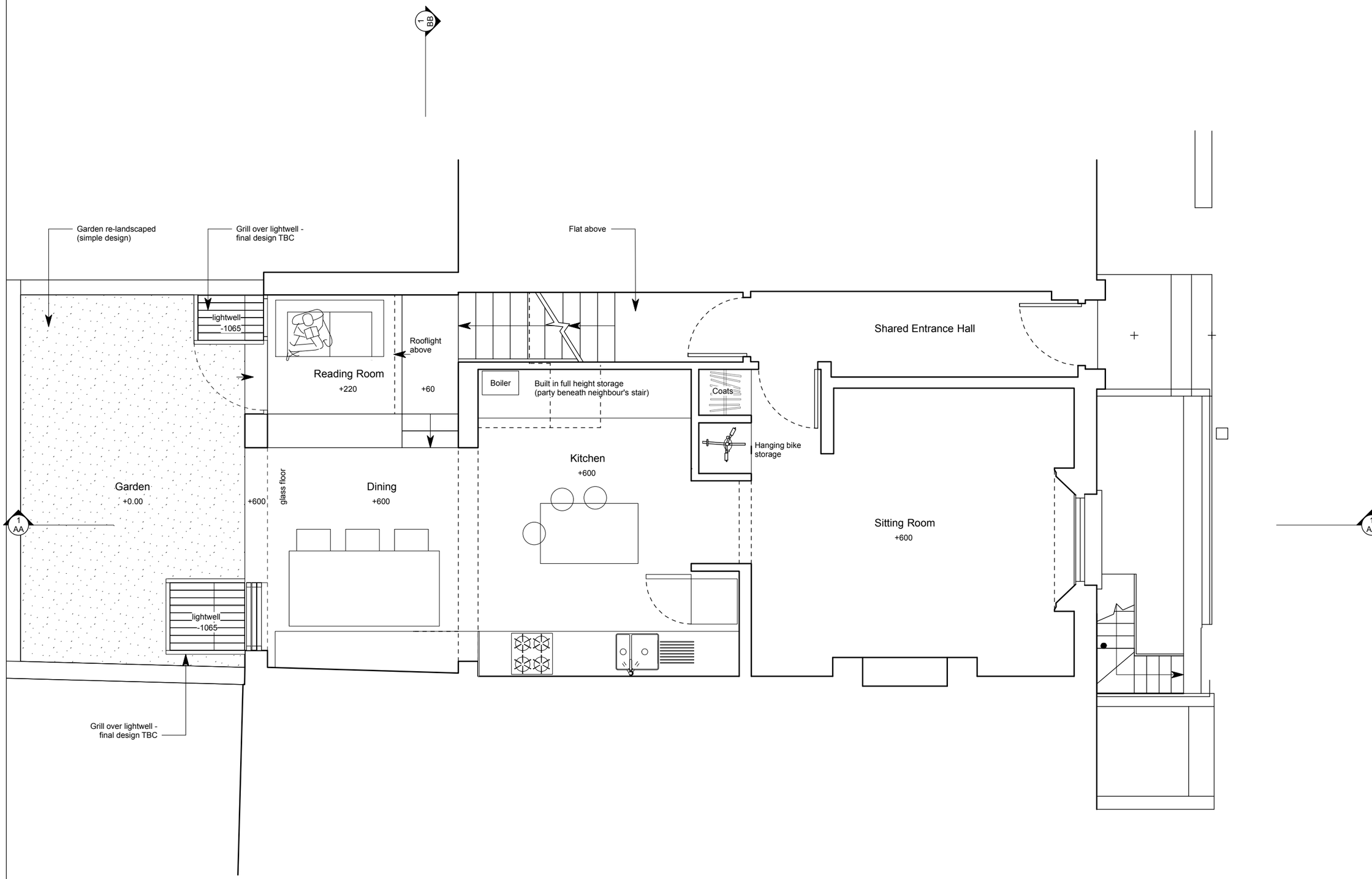

NOTES

REVISIONS	
C	28/3/17 Glass ceiling over bedroom removed
B	23/3/17 Grills shown over lightwells, rooflight over Dining Room omitted
A	20/3/17 Stair from Bedroom to Garden removed, replaced with shallow lightwell. Single step down to Ensuite, step shown in ceiling above

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Proposed Upper Ground

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-111
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
CHECKED	CW

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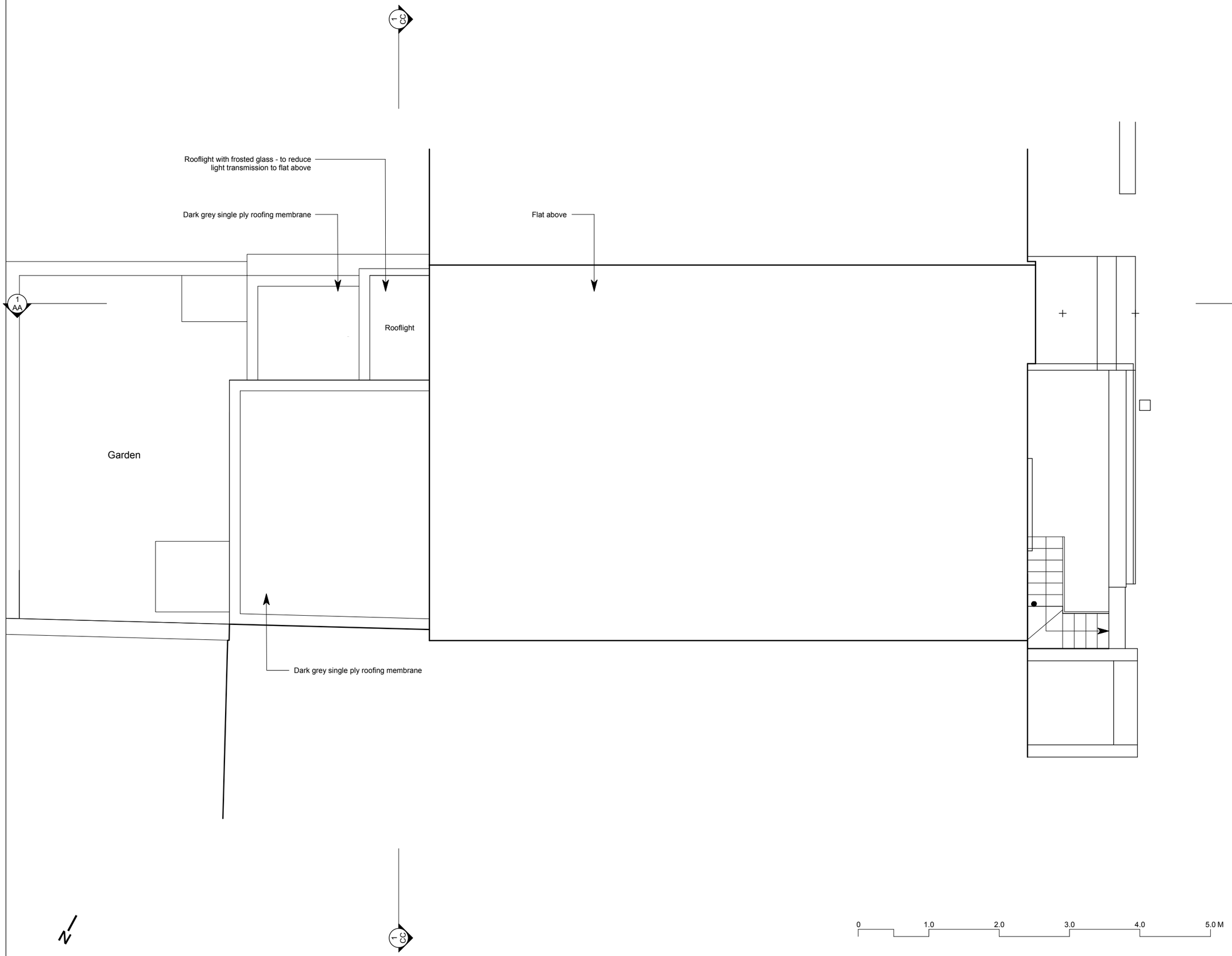

NOTES

REVISIONS
A 23/3/17 Rooflight over Dining Room omitted, glass for Reading Room rooflight stated as frosted, rear lightwells updated, proposed front external stairs shown corrected

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Proposed Roof Plan

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-112
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
CHECKED	CW

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LEGEND

1. Fascia:'Amol polished 00360' anodised aluminium in bronze colour powder coat finish
2. 'Velfac' or similar thermally efficient hinged door in beige red powder coat finish
3. Frameless fixed rooflight - 'Culmax' or similar
4. Frameless 'Skyframe' or similar sliding doors with high performance double glazing
Horizontal track members in metallic grey powder coat finish to match brickwork
5. Grey engineering bricks laid in soldier course
6. Zinc coping in anthracite grey
7. 'Velfac' or similar thermally efficient hinged door in metallic grey/ blue powder coat
finish to match brickwork
8. 'Culmax' or similar thermally efficient frameless fixed glazing

4 5A 6

NOTES

REVISIONS
A 24/3/17 Door/ external stairs to Lower Ground Floor removed replaced with window. Level of Ensuite and Reading Room raised to reduce excavation

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Proposed Rear Elevation

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-121
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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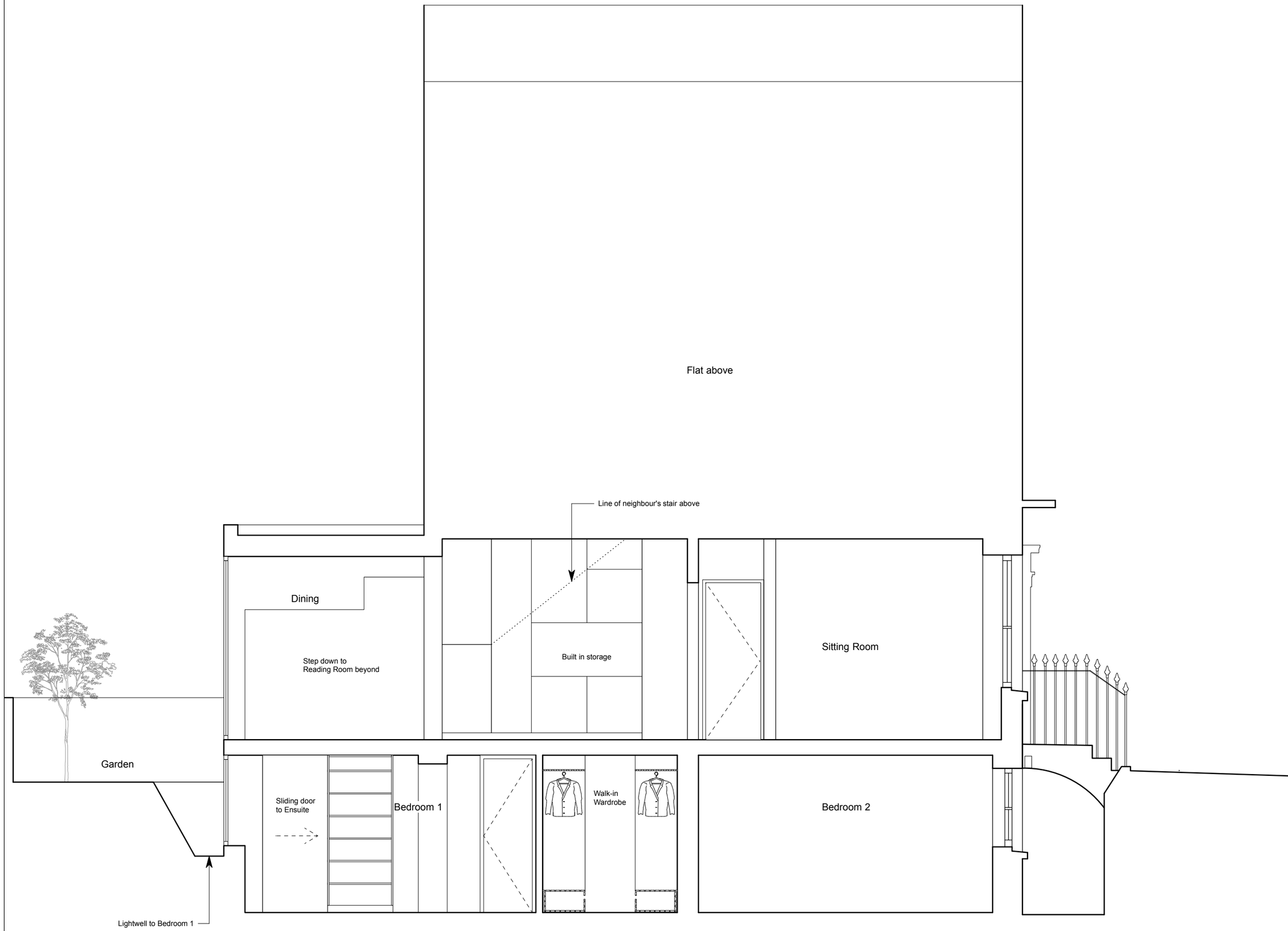
NOTES

A 22/3/17 External stair from basement to garden omitted, replaced with shallow lightwell
REVISIONS



PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Proposed Section AA

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-130
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
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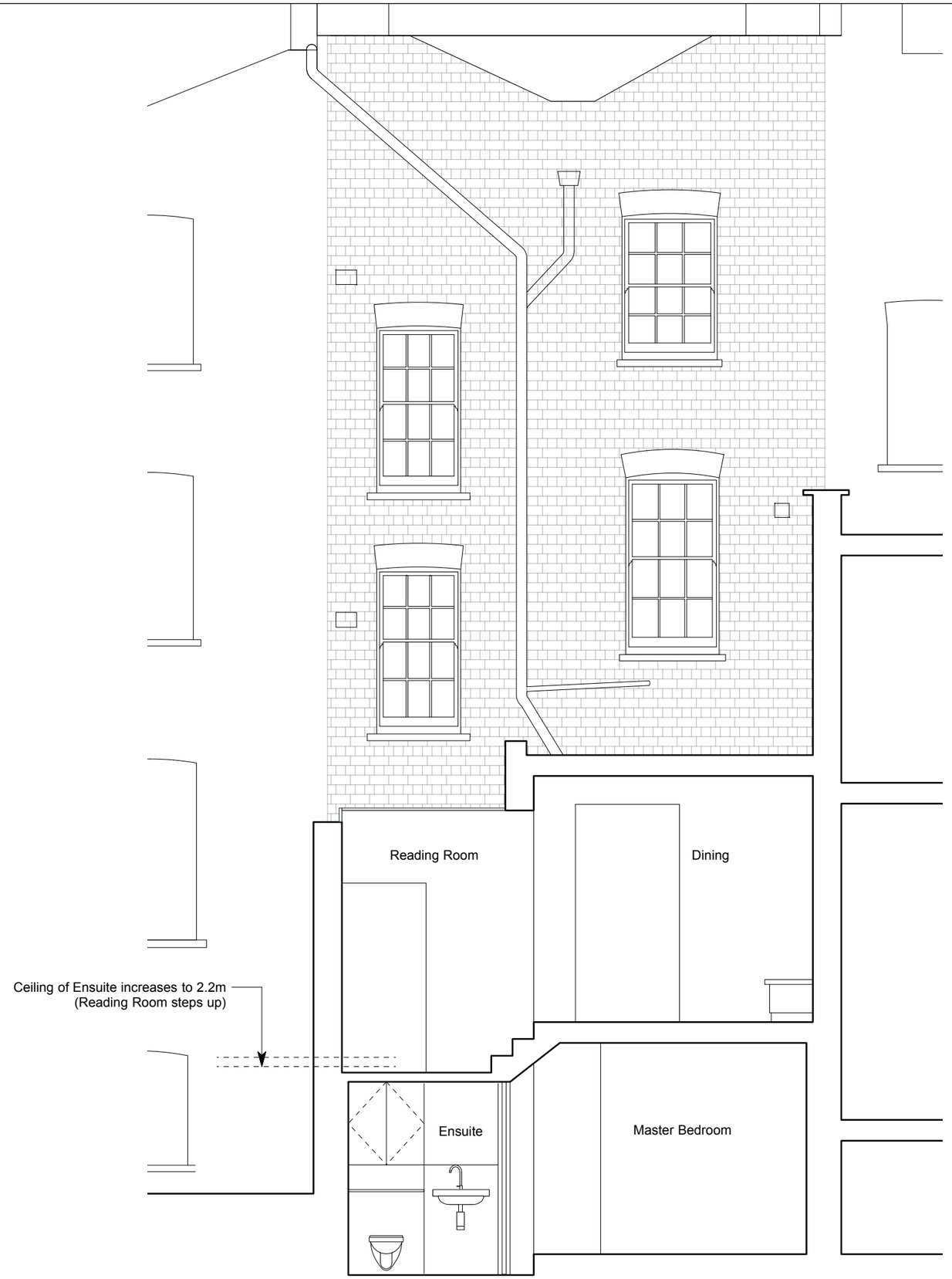

NOTES

REVISIONS
A 20/3/17 Number of steps down to Ensuite reduced to 1, step added to Reading Room
B 31/3/17 Rooflight shown omitted

PROJECT
5A Mornington Terrace

CLIENT
Joseph Middleton

DRAWING TITLE
Proposed Section BB

STATUS	Planning
PROJ NO.	1656
DWG NO.	P-131
SCALE	1:50 @ A3
FIRST ISSUED	25 Oct '16
DRAWN BY	RA
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Date	25.11.16	29.11.16	02.12.16	24.04.17	27.04.17	03.05.17	05.05.17											
Issue	1	2	3	4	5	6	7											

Drawing Number	Document Title	Scale	Paper Size	Revision														
200	BIA - GA's & Sections	1:100/ 50	A3	P1	P2	-	-	T1	T2	-								
201	Sequence of Works	1:50	A3	P1	-	-		T1	-	T2								
202	Approximate Vertical Loading	1:50	A3	-	-	-	P1	T1	T2	-								
-	Basement Impact Assessment	-	A4	A	B	C	-	-	-	-								

Distribution — Issue (E denotes electronic issue)

ZCD Architect's	E	E	E	-	E	E	E											
LBH Wembley	-	-	-	E	E	E	E											

Revision prefixes: P — Preliminary T — Tender C — Construction R — Record

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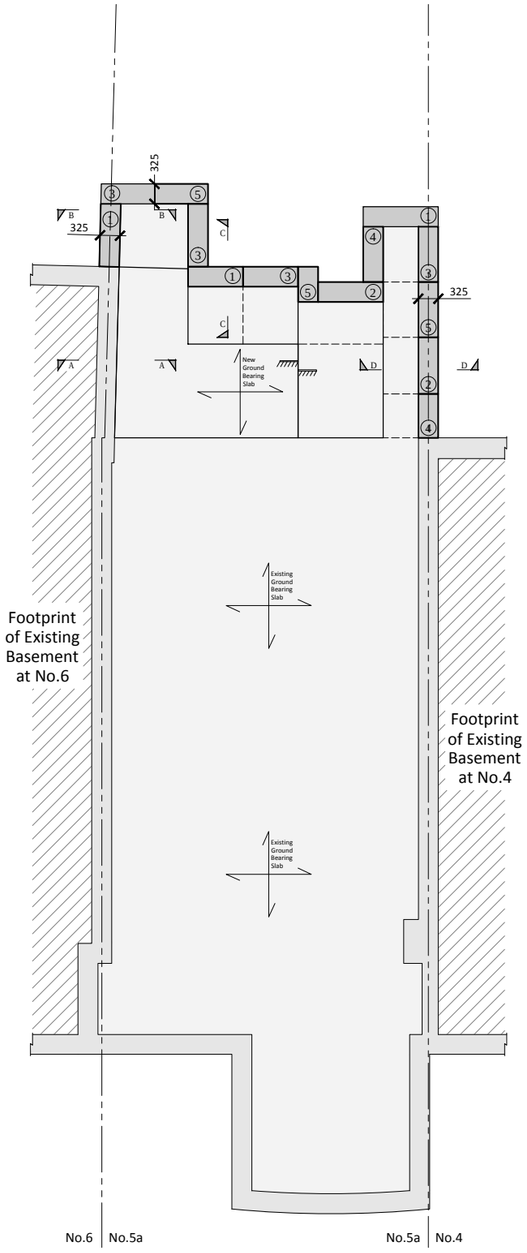
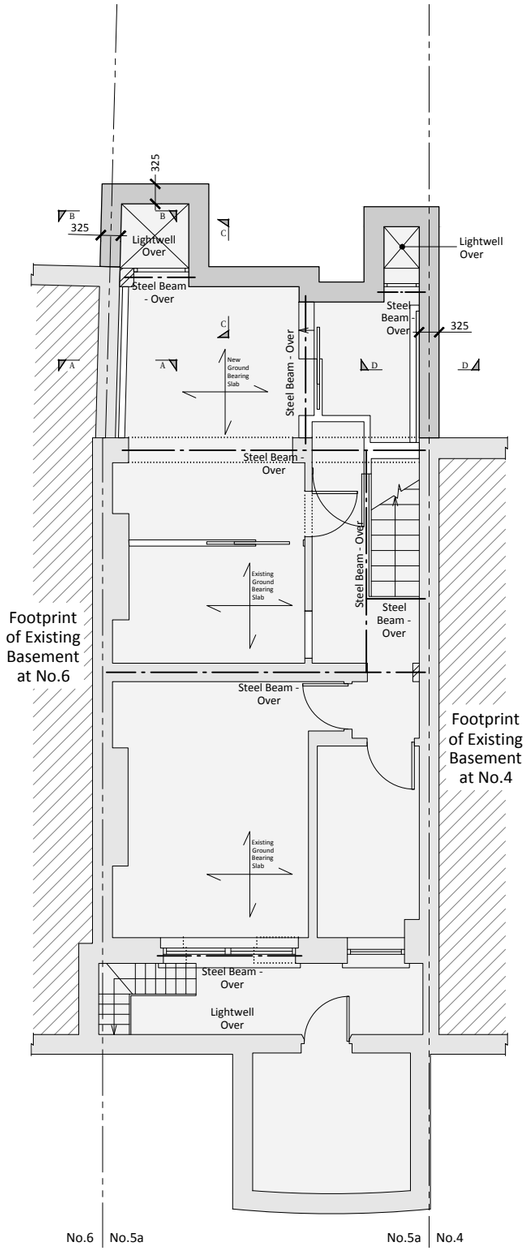
Title:		Issue:
Document Register		7
Project:		Job No:
5a Mornington Terrace		3134
By:	Sheet:	Date:
CW	1 of 1	05.05.17

Scale 1:50

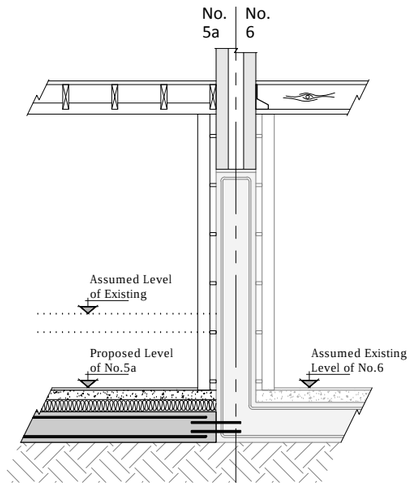


Underpinning Sequence
Scale 1:100

Scale 1:50



Basement Plan
Scale 1:100



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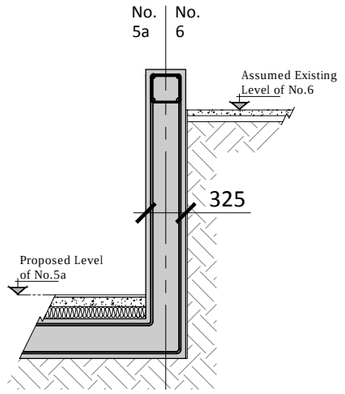

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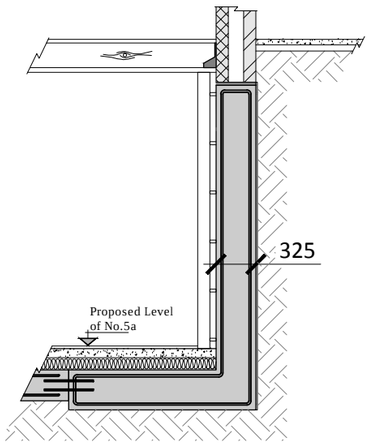

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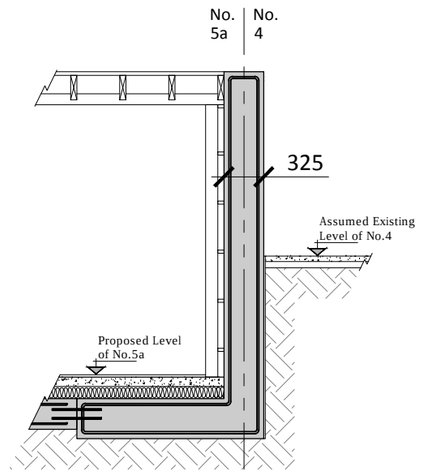

Section D
Scale 1:50

A3

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DO NOT SCALE FROM THIS DRAWING

All dimensions to be verified on site before commencing work. All error and omissions are to be reported to the Engineer. This drawing is to be read in conjunction with all relevant Design Team drawings and specifications

Drawing History

Rev	Date	Description	Drawn	Checked
P1	25.11.16	For Comment	HP	LEN
P2	29.11.16	For Comment	HP	LEN
T1	27.04.17	For Tender	CW	LEN
T2	03.05.17	For Tender	CW	LEN

Title
Basement Impact Assessment
GA's & Sections

Project
5a Mornington Terrace,
NW1 7RR

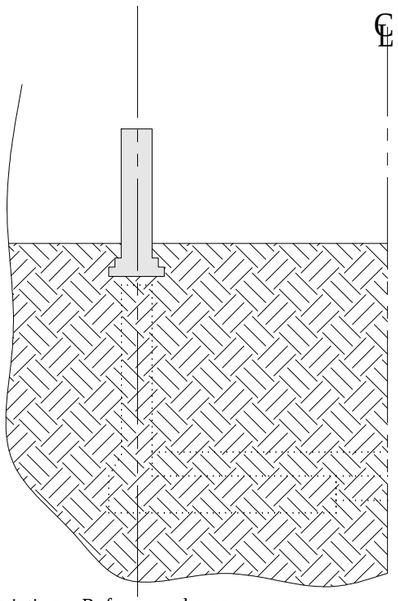
Client
Joseph Middleton

Job No.
3134

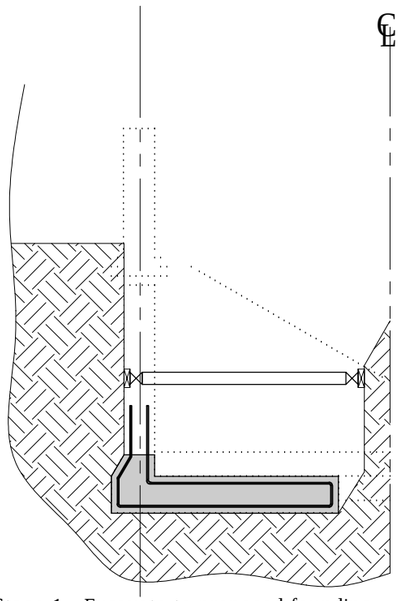
Drawing No.
200

Revision
T2

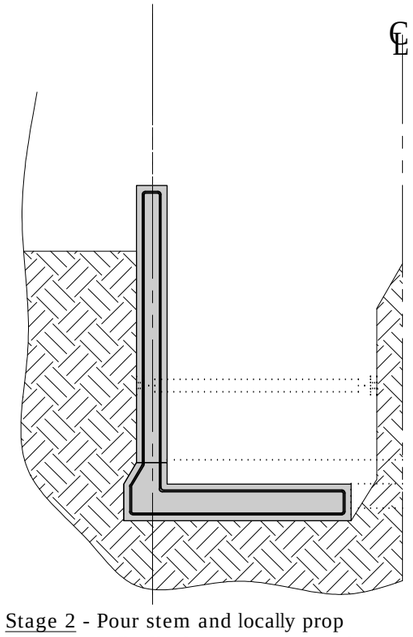
Scale
1:100/50 at A3



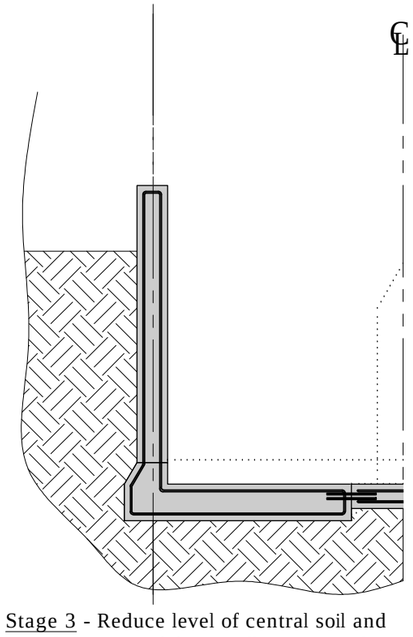
Existing - Before works commence



Stage 1 - Excavate to proposed founding depth. Prop any loose material as required. Pour base of retaining wall and form kicker



Stage 2 - Pour stem and locally prop retaining wall off adjacent pins or soil as appropriate



Stage 3 - Reduce level of central soil and pour basement slab. Install waterproofing system, internal insulation, screed, etc. Basement structural works completed

A3

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Drawing History

Rev	Date	Description	Drawn	Checked
P1	25.11.16	For Comment	HP	LEN
P2	29.11.16	For Comment	HP	LEN
T1	27.04.17	For Tender	CW	LEN
T2	05.05.17	For Tender	CW	JN

Title
Basement Impact Assessment Sequence of Works

Project
5a Mornington Terrace, NW1 7RR

Client
Joseph Middleton

Job No.
3134

Drawing No.
201

Revision
T2

Scale
1:50 at A3

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Drawing History

Rev	Date	Description	Drawn	Checked
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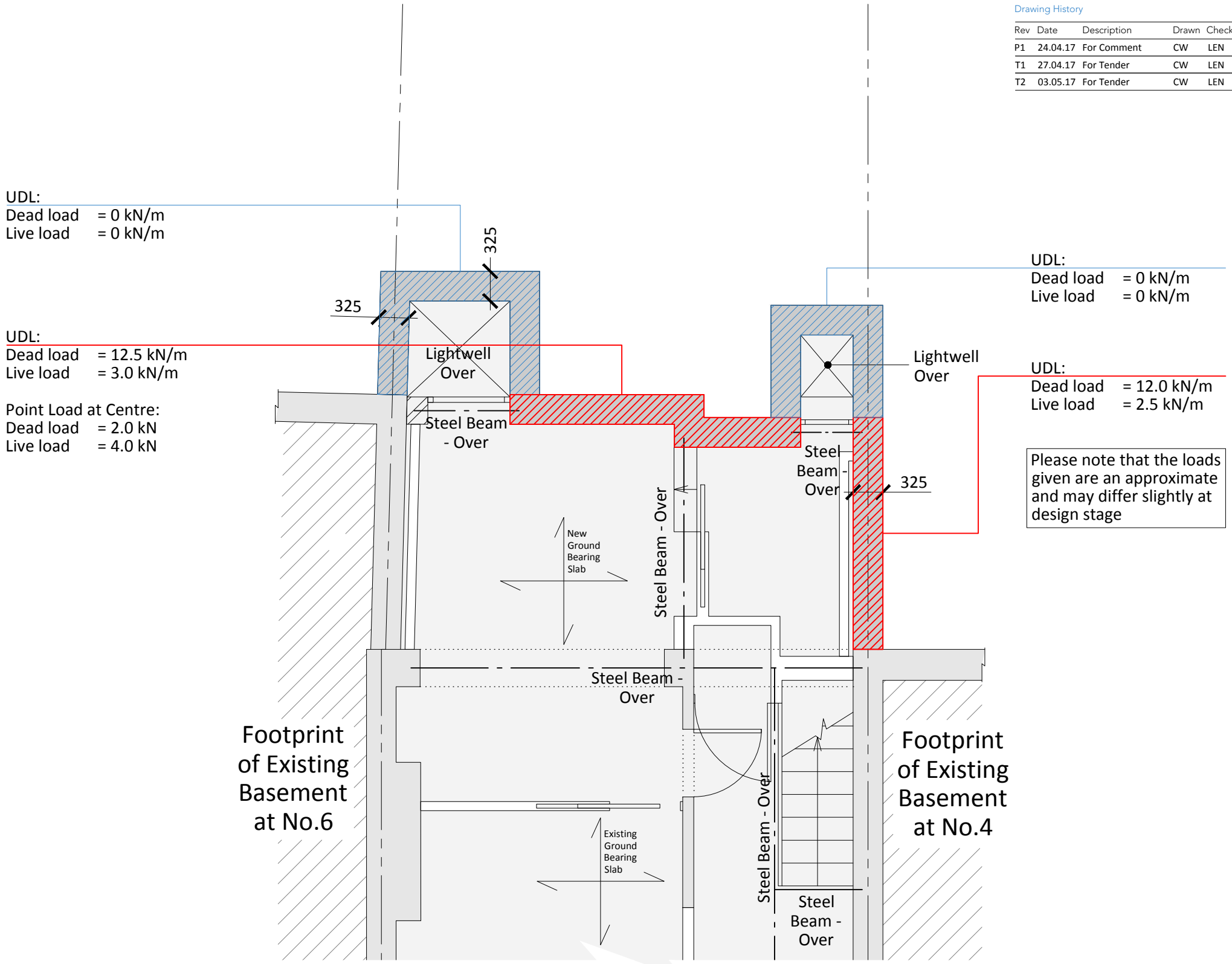
T1	27.04.17	For Tender	CW	LEN
T2	03.05.17	For Tender	CW	LEN



Title
Approximate Vertical Loading

Project
5a Mornington Terrace,
NW1 7RR

Client
Joseph Middleton

Job No.
3134

Drawing No.
202

Revision
T2

Scale
1:50 at A3

A3

MOVEMENT MONITORING

5a Mornington Terrace, NW1 7RR

Project Number: 3134

Revision A

5 May 2017

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Registered Office: 911 Green Lanes London N21 2QP United Kingdom
Partnership No: OC366872 – Registered in England | VAT No: 119 413 233

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This document is to be read in conjunction with all other planning documents submitted.

MOVEMENT MONITORING PROPOSAL:

The proposed excavations are to be directly adjacent to the adjoining properties, to seek to mitigate the potential for movement it is proposed that a monitoring points are installed.

Position of monitoring points and specification is to be agreed with the Contractor, Party Wall Surveyors and ourselves prior to commencement of works on site. Below is a standard specification for movement monitoring which will form the basis for the final agreement.

MONITORING STRATEGY

To monitor the neighbour's structure reflective distometer targets are to be installed specified positions on the property. The targets shall be used as a basis for remote distance measurements. Positioning of the targets needs to be such that they are not obscured by any of the temporary or permanent works. The targets will enable assessment of specifically the party wall as well as the adjacent structure.

The positions of the monitoring targets are to be measured relative to all three axes.

The results from each reading are to be recorded and issued to the engineers for assessment.

The frequency of the readings at each stage will be as follows:

Pre-construction – Monitor once

During construction – Take readings from all targets once a fortnight

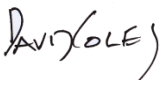
Post-construction – Once a month for 3 months

REPORTING ON RESULTS AND TRIGGER LEVELS

A 'traffic lights' system will be employed for the monitoring of the movement of the boundary walls. See below for the proposed limiting displacement values and the actions to be taken:

Total displacement	Category	Action
0mm-5mm	Green	No action required
5mm-8mm	Amber	Surveyors, engineers and contractor meet onsite and agree suitable action All relevant work stops onsite
>8mm	Red	Surveyors, engineers and contractor meet onsite and agree suitable action All work stops onsite

Report by



David Coles BEng (Hons) CEng MIStructE
Partner at Blue Engineering

Asset location search

Property Searches

LBH Wembley Geotechnical & Environmental
Unit 12Little Balmer
BUCKINGHAM
MK18 1TF

Search address supplied 5
Mornington Terrace
London
NW1 7RR

Your reference LBH4464

Our reference ALS/ALS Standard/2017_3543797

Search date 6 April 2017

Notification of Price Changes…

From **1 September 2016** Thames Water Property Searches will be increasing the prices of its Asset Location Searches. This will be the first price rise in three years and is in line with the RPI at 1.84%. The increase follows significant capital investment in improving our systems and infrastructure.

Enquiries received with a higher payment prior to 1 September 2016 will be non-refundable. For further details on the price increase please visit our website at

www.thameswater-propertysearches.co.uk

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

0845 070 9148

searchcode

Asset location search

Search address supplied: 5, Mornington Terrace, London, NW1 7RR

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 0845 070 9148, 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.

Asset location search

Property Searches

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: 0845 850 2777
Email: developer.services@thameswater.co.uk

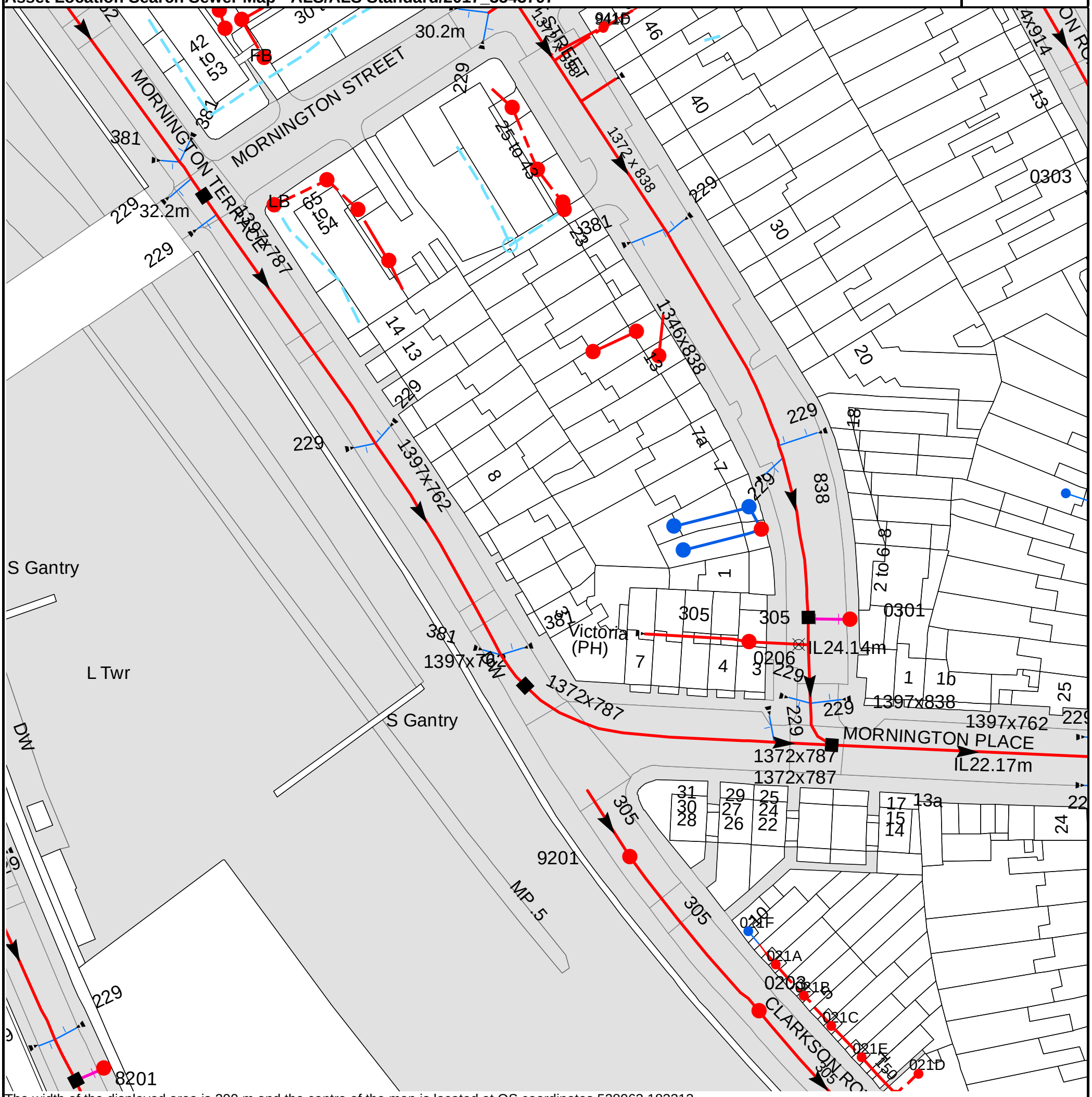
Clean Water queries

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: 0845 850 2777
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2017_3543797



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528963,183313

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
031A	n/a	n/a
93DF	n/a	n/a
93CI	n/a	n/a
93CJ	n/a	n/a
93DA	n/a	n/a
93DB	n/a	n/a
93EG	n/a	n/a
941D	n/a	n/a
941F	n/a	n/a
93EH	n/a	n/a
93EJ	n/a	n/a
03AC	n/a	n/a
9201	28.72	25.55
93DI	n/a	n/a
93DJ	n/a	n/a
021F	n/a	n/a
0206	n/a	n/a
0203	28.02	24.92
03AB	n/a	n/a
021A	n/a	n/a
021B	n/a	n/a
021C	n/a	n/a
0301	n/a	n/a
021E	n/a	n/a
021D	n/a	n/a
8201	n/a	n/a
94CA	n/a	n/a
94CB	n/a	n/a
94CC	n/a	n/a
94DC	n/a	n/a
93CC	n/a	n/a
93CB	n/a	n/a
93CA	n/a	n/a
93BJ	n/a	n/a

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.

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

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

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

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.

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

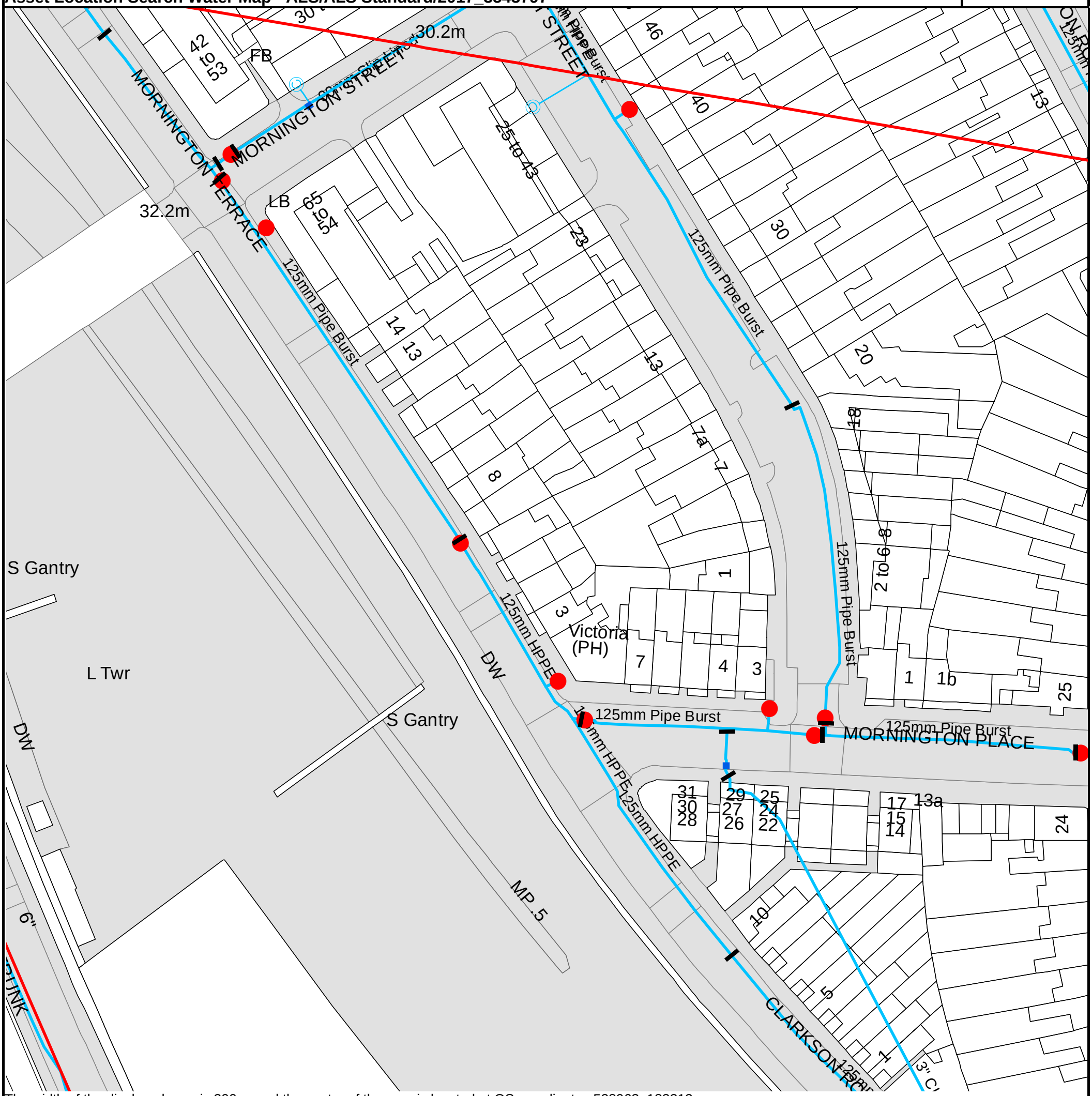
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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 level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. 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 present on the plan, please contact a member of Property Insight on 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2017_3543797



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528963, 183313.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

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

16"

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.

3" SUPPLY

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

3" FIRE

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

3" METERED

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.

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

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')

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 him 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 **0845 070 9148** quoting your invoice number starting CBA or ADS.	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**

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

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

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

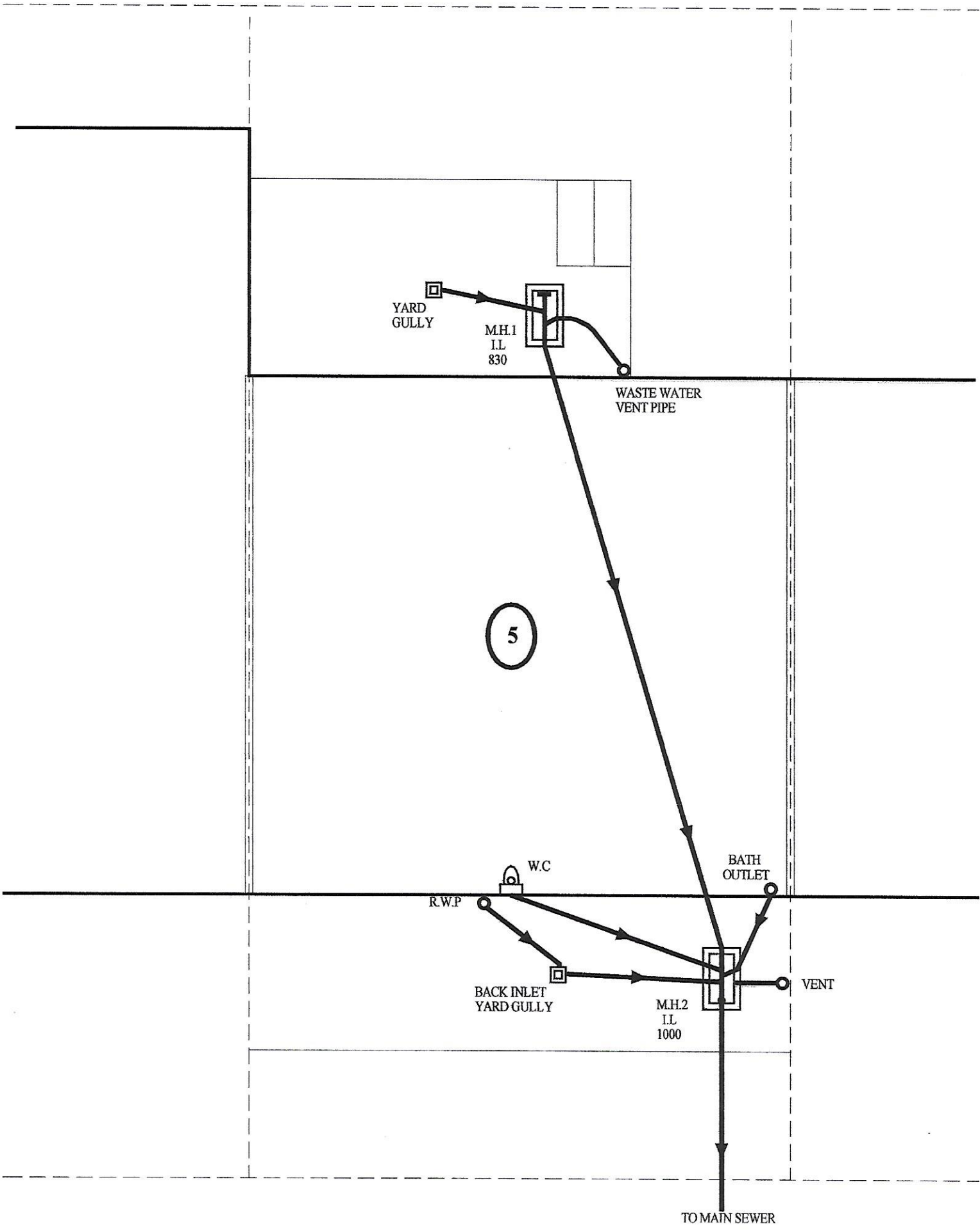
TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

ALL PIPEWORK 100 *mm.* ϕ UNLESS
OTHERWISE INDICATED ON THE DRAWING



5a MORNINGTON TERRACE - LONDON - NW1
DRAINAGE LAYOUT SKETCH - N.T.S - 561CC