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LIMITED

Basement Impact Assessment: Hydrology and Geology Report

at
211 Sumatra Road, Camden, London NW6 1PF

for
Drawing and Planning Limited

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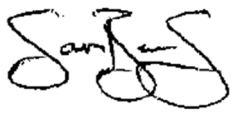

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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

Drawing and Planning Limited commissioned Soils Limited to undertake a Basement Impact Assessment: Hydrology and Geology Report on land at 211 Sumatra Road, Camden, London NW6 1PF. The scope of the investigation was outlined in the Soils Limited quotation reference Q17786/NJL/1 dated 9th June 2016.

This document comprises the Basement Impact Assessment: Hydrology and Geology Report and incorporates the results, discussion and conclusions.

Standards

The site works, laboratory testing and reporting were undertaken in accordance with the following standards:

- BS 5930:2015 and BS EN ISO 22476-2 2005+A1:2011
- BS EN 1997-1:2004+A1:2013 Eurocode 7
- BS EN ISO 14688-1:2002+A1:2013
- BS EN ISO 14688-2:2004+A1:2013

The geotechnical laboratory testing was performed by GEO Site & Testing Services Ltd (GSTL) in accordance with the methods given in BS 1377:1990 Parts 1 to 8 and their UKAS accredited test methods.

For the preparation of this report, the relevant BS code of practice was adopted for the geotechnical laboratory testing technical specifications, in the absence of the relevant Eurocode specifications (ref: ISO TS 17892).

The chemical analyses were undertaken by QTS Environmental Limited in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce a trial hole.

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Section 1 Introduction

1.1 Objective of Investigation

Drawing and Planning Limited commissioned Soils Limited to undertake a Basement Impact Assessment: Hydrology and Geology Report for the site. The objective of this investigation was to establish the impact and risk on the site and environs of the proposed basement at 211 Sumatra Road, Camden, London NW6 1PF.

The report provides details on the ground and groundwater conditions onsite and the potential impact of the proposed development on neighbouring properties. In addition, the report provides a qualitative risk assessment of the potential impacts the proposed development might have on groundwater levels, surface water flows and flooding.

It is recognised that any Basement Impact Assessment: Hydrology and Geology Report is a live document and that further detailed assessments will be ongoing, if appropriate, as the design and construction progresses.

1.2 Limitations and Disclaimers

Soils Limited was commissioned by Drawing and Planning Limited to undertake a Basement Impact Assessment: Hydrology and Geology Report to supply a risk based impact assessment with regard to hydrology, hydrogeology and land stability.

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Section 2 Site Context

2.1 Location

The site was located at 211 Sumatra Road, Camden, London NW6 1PF. The approximate O.S Land Ranger Grid Reference was TQ 254848.

The site location plan is given in Figure 1.

2.2 Site Details

The site comprised a 2/3-storey terraced house with existing basement and small gardens to the front and rear. The house was of brick construction with a pitched tiled roof. The property was neighboured by houses on both sides with Sumatra Road to the north, and commercial property to the south. The surrounding area was predominately residential with occasional commercial land-use and a railway line approximately 25m to the south.

The site was largely occupied by the house, with a hard landscaped garden to the front and a small area of soft landscaping to the rear, as well as a patio area. Bush and shrub vegetation was noted in the rear garden, which was generally overgrown.

2.3 Proposed Development

The proposed redevelopment is to comprise an extension to the rear elevation of the ground floor and refurbishment of the existing basement. The extension comprises lightwells to the front and rear of the existing basement. The rear lightwell will replace the existing garden area, and will service the proposed playroom in the basement, as well as the kitchen, living and dining areas within the proposed ground floor extension. The proposed rear patio will have planted borders, but no other soft landscaping is proposed within the development.

The lightwells will be founded at the same depth as the existing basement, assumed to be approximately 2.5m bgl. Therefore, the proposed excavations for the lightwell construction were anticipated to a depth of ~3.0 m below existing ground level.

In compiling this report reliance was placed on a series of architectural drawings prepared and supplied by the Client, drawing Nos. SMTRR_L001, E001-002, P-000-005, S001-002, L201, E201, E203, P201-205 and S200-202. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

The proposed development layout as provided by the client is included in Appendix B.

2.4 Topography

The site sloped downwards to the south, with the wider topography sloping at a shallow gradient downward in a south / southwest direction, with an average gradient of <2°.

2.5 Published Geological Data

The 1:50,000 BGS map showed the site to be located on bedrock of the London Clay Formation with no overlying superficial geology recorded. The London Clay is underlain by the Lambeth Group, Thanet Sand Formation and the Chalk Group, in sequence.

2.5.1 London Clay Formation

The London Clay Formation comprises stiff grey fissured clay, weathering to brown near surface. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required.

The lowest parts of the formation are sandy beds with black rounded gravel and occasional layers of sandstone.

In the north London area the upper part of the London Clay has been disturbed by periglacial processes and may contain pockets of sand and gravel.

2.6 Unpublished Geology

A borehole approximately 360m east of the site (BGS Reference: TQ28SE46), provided by the BGS website, records the London Clay Formation to a depth of approximately 74 m bgl, the Lambeth Group to approximately 88 m bgl and the Thanet Sand Formation to 96 m bgl, before reaching the Chalk Group.

2.6.1 Groundwater

Groundwater was not recorded on the above borehole log, which was drilled to a depth of 177.09m bgl. Groundwater was recorded in another nearby borehole (BGS Reference: TQ28NE/129) at a depth of 11.1m bgl on 27th August 1981.

2.7 Hydrology

The nearest surface water feature was Whitestone Pond, on the edge of Hampstead Heath, recorded approximately 1.60km northeast of the site.

The site was recorded at an elevation of approximately 55 m AOD, and Whitestone Pond was at approximately 134 m AOD.

2.8 Hydrogeology

The Environment Agency has produced an aquifer designation system consistent with the requirements of the Water Framework Directive. The designations have been set for superficial and bedrock geology and are based on the importance of aquifers for potable water supply and their role in supporting water bodies and wetland ecosystems.

Information presented by the Environment Agency classifies the London Clay Formation bedrock as an Unproductive Strata.

Any water infiltrating the London Clay Formation will generally tend to flow vertically downwards at a very slow rate. Due to the predominantly cohesive nature of the soils, the groundwater flow rate is anticipated to be very slow. Published permeability data for the London Clay Formation indicates the horizontal permeability to generally range between 10^{-10} m/s and 10^{-8} m/s, with an even lower vertical permeability.

2.9 Flood Risk

The site does not lie within a flood risk zone. The nearest flood risk zone associated with rivers or the sea relates to Prince Charles Drain, recorded approximately 3.6km northwest of the site. The nearest flood risk associated with flooding from reservoirs is recorded approximately 1.8km northeast of the site, at Hampstead Ponds. The EA records a very low risk of surface water flooding associated with drainage issues in the area.

However, the document “Camden Planning Guidance – Basement and Lightwells, CPG4”, shows that Sumatra Road was among a number of roads in Camden that were flooded in 1975 and 2002 (Ref: http://www.camden.gov.uk/ccm/cms-service/stream/asset/;jsessionid=FEF1637103D7CD67C5B4CE7A61B96903?asset_id=3346904&).

2.10 Underground Infrastructure

There is no known information with regards to buried infrastructure in close proximity to the site.

There are no reported Network Rail or London Underground Limited assets within the site’s vicinity.

Section 3 Screening

3.1 Introduction

The Ove Arup 2008 Scoping Study prepared for the London Borough of Camden requires that any development proposal that includes a subterranean basement should be screened to determine whether or not a full BIA is required.

A number of screening tools are included in the Arup document (Ref: Camden geological, hydrogeological and hydrological study, Issue01/November 2010), which includes a series of questions within a screening flowchart for three categories; surface water flow, groundwater flow and land stability. Responses to the questions are tabulated below.

3.2 Surface Flow and Flooding Screening Assessment

The response to the Surface Flow and Flood Screening Assessment is given in Table 3.1.

Table 3.1 – Surface Flow and Flooding Screening

Question	Response
1. Is the site within the catchment of the pond chains of Hampstead Heath?	**No**– It was located 1.60 km to the south-west and down-gradient of the nearest part of the pond chains on Hampstead Heath.
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	**No** – Drainage will be taken to combined sewers in public highway.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	**Yes** – The proposed development will comprise an extension to the existing house, including a lightwell servicing the basement, within an area of the rear garden, which is currently soft landscaping.
4. Will the proposed basement development 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** – The increase of impermeable area to the rear of the house could increase the peak flow to existing surface water drainage, however there will be negligible impact to adjacent properties or downstream watercourses.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	**No** – All surface water will be taken to combined sewers in public highway not to a watercourse. Additionally, there were no Surface Water Features within a radius of 1.60 km, which could be affected by the development.
6. Is the site in an area known to be at risk from surface water flooding?	**Yes** – The site is not recorded on a floodplain according to the Environment Agency website. However, the document "Camden Planning Guidance – Basement and Lightwells, CPG4" *, shows that Sumatra Road was among a number of roads in Camden that were flooded in 1975 and 2002.

*Available at: http://www.camden.gov.uk/ccm/cms-service/stream/asset/;jsessionid=FEF1637103D7CD67C5B4CE7A61B96903?asset_id=3346904&

3.3 Subterranean (Groundwater) Screening Assessment

The response to the Subterranean (Groundwater) Screening Assessment is given in Table 3.2.

Table 3.2 – Subterranean (Groundwater) Screening

Question	Response
1a. Is the site located directly above an aquifer?	**No** – Geological maps show the site is located directly on bedrock of the London Clay Formation, an Unproductive Stratum.
1b. Will the proposed basement extend beneath the water table surface? **It must be mentioned that Appendix F2 of the Camden geological, hydrogeological and hydrological study by ARUP (Issue 01/November 2010) suggest that should the answer of Question 1a is "No", Question 1b could be omitted.**	**Unknown** – It is considered unlikely given the setting of the site but it may be that the proposed basement extends beneath the water table surface. It will need to be confirmed by a ground investigation.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	**No** – The nearest Surface Water Feature a pond located ~1.60 km to the northeast, located at the south-western portion of Hampstead Heath.
3. Is the site within the catchment of the pond chains of Hampstead Heath?	**No** – It was located 1.60 km to the south-west and down-gradient of the nearest part of the pond chains on Hampstead Heath.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	**Yes** – The proposed development will comprise an extension to the existing house, including a lightwell servicing the basement, within an area of the rear garden, which is currently soft landscaping.
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	**No** – The area is **not** underlain by an aquifer; thus any increase will not impact upon the groundwater flow or levels. Furthermore, drainage will be taken to combined sewers in public highway.
6. 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 or spring line?	**No** – The nearest Surface Water Feature a pond located ~1.60 km to the northeast, located at the south-western portion of Hampstead Heath.

3.4 Stability Screening Assessment

The response to the Stability Screening Assessment is given in Table 3.3.

Table 3.3 – Stability Screening

Question	Response
1. Does the existing site include slopes, natural or manmade, greater than 7°?	**No –** The site was noted to have a gentle fall from north to south of <2°.
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	**No** – The proposed basement is not to alter existing site landscaping elevations.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	**No –** The wider area was noted to have a general slope downwards to the south and southwest that was typically 2-3°. A railway station was noted ~20m south of the site. I.e. not neighbouring.
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	**No –** The wider area was noted to have a general slope downwards to the south and southwest that was typically 2-3°.
5. Is the London Clay the shallowest strata at the site?	**Yes** – The London Clay Formation is recorded as the shallowest strata, to be confirmed by the ground investigation.
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	**No –** It is understood that no trees will be felled during the development.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	**Unknown** – Anticipated geology was London Clay Formation, which would potentially be subject to shrink-swell subsidence. There was no visual evidence of subsidence at the site or properties in the vicinity.
8. Is the site within 100 m of a watercourse or potential spring line?	**No** – The nearest Surface Water Feature a pond located ~1.60 km to the northeast, located at the south-western portion of Hampstead Heath.
9. Is the site within an area of previously worked ground?	**No** – The relevant geological map did not show any Made Ground or Worked Ground within or in close proximity to the site.
10. Is the site within an aquifer?	**No** – Geological maps show the site is located on bedrock of the London Clay Formation, an Unproductive Stratum.
11. Is the site within 50 m of the Hampstead Heath ponds?	**No** – It was located 1.60 km from the nearest part of the pond chains on Hampstead Heath.
12. Is the site within 5 m of a highway or pedestrian right of way?	**Yes** – The site is adjacent to Sumatra Road to the north.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	**Yes** – The proposed basement extension (lightwells) is under an existing terraced house with properties to both sides.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	**No** – the site is located ~30 m to the north of a railway line. The nearest tunnel was noted ~620 m to the east of the site.

3.5 Summary

Based on the screening exercise, further stages of the Basement Impact Assessment: Hydrology and Geology Report are required. A summary of the Basement Impact

Assessment: Hydrology and Geology Report requirements has been provided in Table 3.4, Table 3.5 and Table 3.6.

Table 3.4 – Surface Flow and Flooding

Item	Description
Q3.	The proposed development will comprise an extension to the existing house, including a lightwell servicing the basement, within an area of the rear garden, which is currently soft landscaping.
Q6.	The site is not recorded on a floodplain according to the Environment Agency website. However, the document "Camden Planning Guidance – Basement and Lightwells, CPG4" *, shows that Sumatra Road was among a number of roads in Camden that were flooded in 1975 and 2002.

Table 3.5 – Subterranean (Groundwater Flow)

Item	Description
Q1b.	It is considered unlikely given the setting of the site but it may be that the proposed basement extends beneath the water table surface. It will need to be confirmed by a ground investigation.
Q4.	The proposed development will comprise an extension to the existing house, including a lightwell servicing the basement, within an area of the rear garden, which is currently soft landscaping.

Table 3.6 – Ground Movement (Land stability)

Item	Description
Q5.	The London Clay Formation is recorded as the shallowest strata, to be confirmed by the ground investigation.
Q7.	Anticipated geology was London Clay Formation, which would potentially be subject to shrink-swell subsidence. There was no visual evidence of subsidence at the site or properties in the vicinity.
Q12.	The site is adjacent to Sumatra Road to the north.
Q13.	The proposed basement extension (lightwells) is under an existing terraced house with properties to both sides.

Section 4 Intrusive Investigation

4.1 Ground Conditions

The scoping intrusive investigation was carried out on the 28th July 2016 and comprised two windowless sampler boreholes (WS1 and WS2) and a single dynamic probe (DP1), as agreed with the Client. Groundwater monitoring wells were installed into the windowless sampler boreholes. The trial hole locations are presented in Figure 3.

Table 4.1 outlines the depths of each trial-hole.

Table 4.1 – Investigatory Depths of Trial-holes

Trial-hole (WS/DP)	Final Depth (m bgl)
WS1	5.00
WS2	4.50
DP1	8.00

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the borehole logs and quoted in this report were measured from ground level directly adjacent to the boreholes.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots, or has been identified as part of the *in-situ* weathering profile, it has been described as Topsoil both on the logs and within this report. Where the soil has, in general, been found to have the same composition as the 'Topsoil' but also incorporated a minor constituent, e.g. less than an estimated 5%, of possibly non-naturally occurring material, or is of uncertain origin, the soil has been described as Topsoil/Made Ground both on the log and within this report. Where man has clearly either placed the soil, or the composition has been altered to a degree greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the logs and within this report.

For more complete information about the soils encountered within the general area of the site reference should be made to the detailed records given within Appendix A, but for the purposes of discussion, the succession of conditions encountered in the trial-holes, in descending order, are:

Made Ground (MG)
London Clay Formation (LC)

Table 4.2 summarises the ground conditions encountered.

Table 4.2 Ground Conditions

Stratum	Age	Depth Range (m bgl)		Thickness (m)	Description
		Top	Bottom		
MG	Recent	GL	0.90 – 1.40	1.10	Firm brown and grey silty CLAY with frequent fragments of brick, flint, clinker, slate and ash.
LC	Ypresian	0.90 – 1.40	4.50[1] – 5.00[1] (8.00)[2]	Not proven	Firm becoming stiff brown, locally orange and grey, silty CLAY, locally with selenite crystals and claystone bands.

Notes: [1]Base of trial hole. [2]Inferred from dynamic probe hole

4.1.1 Made Ground

Made Ground was encountered in both of the boreholes (WS1 and WS2) to depths of 1.40 and 0.90m bgl, respectively. The Made Ground typically comprised firm brown and grey silty CLAY with frequent fragments of brick, flint, clinker, slate and ash.

4.1.2 London Clay Formation

The soils of the London Clay Formation were encountered directly beneath the Made Ground and recorded to the full depth of the investigation at depths of 5.00 and 4.50m bgl, respectively, and inferred to the maximum depth of the probe at a depth of 8.00m bgl in DP1. The London Clay Formation typically comprised firm becoming stiff brown, locally orange and grey, silty CLAY, locally with selenite crystals and claystone bands.

4.1.3 Roots

Roots were encountered in one of the two boreholes (WS2) to a depth of 0.90 m bgl. The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation prior to the construction of foundations. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data or any trees, bushes or shrubs removed prior to or following the site survey.

Where trees are mentioned in the text this means existing trees, substantial bushes or shrubs, recently removed trees (approximately 20 years to full recovery on cohesive soils) and those planned as part of the site landscaping).

4.1.4 Groundwater

Groundwater equilibrium conditions may only be conclusively established if a series of observations are made via groundwater monitoring wells. Groundwater monitoring wells were installed into the windowless sampler boreholes to approximately 5.00 and 4.50m bgl, respectively.

Groundwater was encountered as a seepage in WS2 at a depth of 3.10m bgl

during drilling, which is likely to relate to a thin granular horizon recorded between 3.10 and 3.30m bgl (likely to be claystone).

Subsequent monitoring undertaken on 26th August 2016 recorded groundwater at depths of 2.95 and 1.86m bgl, respectively.

The intrusive investigation and monitoring visit were conducted in July and August (2016) respectively, when groundwater levels should be falling towards their annual minimum (i.e. lowest) elevation, which typically occurs around September. Isolated pockets of groundwater may be perched within any Made Ground found at other locations around the site.

4.2 Atterberg Limit Tests

Atterberg Limit tests were performed on four samples obtained from the cohesive soils of the London Clay Formation, a summary of the results has been presented in Table 4.3.

Table 4.3 Atterberg Limit Test Interpretation

Stratum	Moisture Content (%)	Plasticity Index (%)	Passing 425μm Sieve (%)	Modified Plasticity Index (%)	Soil Classification	Volume Change Potential	
						BRE	NHBC
LC	12 – 31	18 – 27	72 – 100	13 – 27	CI – CH/MH	Low to medium	Low to medium

Note: BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results). NHBC Volume Change Potential refers to NHBC Standards Chapter 4.2 Soils Classification based on British Soil Classification System

The most common use of the term clay is to describe a soil that contains enough clay-sized material or clay minerals to exhibit cohesive properties. The fraction of clay-sized material required varies, but can be as low as 15%. Unless stated otherwise, this is the sense used in Digest 240. The term can be used to denote the clay minerals. These are specific, naturally occurring chemical compounds, predominately silicates. The term is often used as a particle size descriptor. Soil particles that have a nominal diameter of less than 2 μm are normally considered to be of clay size, but they are not necessarily clay minerals. Some clay minerals are larger than 2 μm and some particles, 'rock flour' for example, can be finer than 2 μm but are not clay minerals.

(The Atterberg Limit Tests were undertaken in accordance with BS 1377:Part 2:1990 Clauses 3.2, 4.3 and 5)

The results from Atterberg Limit Tests confirmed that the cohesive soils of the London Clay Formation had **low to medium volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

4.3 Foundation Scheme

Foundations **must not** be constructed within any Made Ground due to the likely variability and potential for large load induced settlements both total and differential.

Roots were encountered in one of the two boreholes at a depth of 0.90m bgl. If roots are encountered during the construction phase foundations **must not be placed within any live root penetrated** or desiccated **cohesive soils or those with a volume change potential**. Should the foundation excavations reveal such materials, the excavations **must** be extended to greater depth in order to bypass these unsuitable soils.

Excavations must be checked by a suitable person prior to concrete being poured.

Considering the proposed development includes an extension at ground floor level and extending the existing basement to incorporate lightwells to the front and rear, a strip / deepened strip foundation solution was considered the most suitable.

4.3.1 Shallow Foundations into the London Clay Formation

Based on a 5.00 by 0.75m (l x b) strip foundation, using commercial software Table 4.4 shows the calculated bearing values and anticipated settlement characteristics. The maximum encountered depth of Made Ground was 1.40m bgl, NET bearing capacities were calculated below this depth.

Table 4.4 Allowable Bearing Capacities within the London Clay Formation

Depth (m bgl)	Size (m)	NET Bearing Capacity (kPa)	Anticipated Settlement (mm)
1.50	5.00 x 0.75	65	10
2.00		70	<10
2.50		220	<25
3.00		180	<20

For the allowable bearing value given above, settlements should not exceed the presented values, provided that excavation bases are carefully bottomed out and blinded, or concreted as soon after excavation as possible and kept dry. Foundations must not be constructed over former structures and other hard spots. The foundations design must be suitable for the conditions present at the site.

The anticipated settlement includes both elastic settlement and long-term drained settlement (in the case of cohesive soils).

Anticipated settlements may be taken as proportional to the bearing capacity adopted (for the same configuration of foundation), therefore if the bearing value is halved the anticipated settlement will halve.

All loose material and soft spots must be removed from the base of the excavations, these excavations then being either concreted or blinded as soon after excavation as possible. Failure to do so could results in increased settlements.

4.3.2 Shallow Foundations within Basement

If the foundation is to include lateral load from retained soil, then the distribution of loads on the foundation will be trapezoidal and the maximum pressure will be at the toe of the foundation. In such cases additional appropriate analyses must be requested by the client.

During the construction of the proposed lightwells, an excavation 3.00m deep would remove an overburden pressure of 54kPa, based on a unit weight of

18kN/m^3, for the overlying soil.

A "**net**" allowable bearing capacity of **180kPa** was calculated, as provided in Table 4.4, founding at a minimum depth of 3.00m bgl within the London Clay Formation, based on a 5m by 0.75m strip foundation.

Taking account of the removed overburden pressure the "**gross**" bearing value could be taken as **230kPa**.

For the allowable bearing value given above, settlements **should not** exceed **20mm**, provided that excavation bases are carefully bottomed out and blinded, or concreted as soon after excavation as is possible and kept dry. Settlements may be taken as proportional to the applied foundation pressure for the given size of the foundations.

4.3.3 Underpinning

The party walls between the two adjoining properties will require underpinning to facilitate the construction of the basement. Underpinning must be undertaken to a prescribed sequence and adjoining bays must not be excavated prior to the concrete, in the adjoining bay, having reached the required strength stipulated by the structural Engineers.

The bearing values given in Table 4.4 may be adopted in the design of the underpinning works.

4.3.4 Anticipated Heave

Given the anticipated volume of soil being excavated and loads applied, long term heave would be minimal, anticipated to be <5mm. Immediate heave is likely to have a minimal effect as it would take place soon after excavation and any immediate heave is likely to be removed during the excavation of the basement slab in order to achieve the correct dig level prior to casting the slab.

It **must** be mentioned that it was assumed that excavations will be kept dry and either concreted or blinded as soon after excavation. If water is allowed for even a short time to enter excavations, not only will a greater heave be experiencing owing to the soil increasing in volume by taking up water, but the shear strength, and hence the bearing capacity, will also be reduced.

Notes: For the calculations of the immediate heave, the Ey (Young's Modulus) for uploading was taken as equal to the Ey for loading, which is considered to be a conservative approach. For the calculations of the long term swelling, the ratio of swelling index (Cs) compression index (Cc) was taken as Cs=Cc/5 *(Reference: Simon & Menzies, Foundation Engineering)*

4.4 Subsurface Concrete

Sulphate concentration measured in 2:1 water/soil extracts fell into Class **DS-1** of the

BRE Special Digest 1 2005, *'Concrete in Aggressive Ground'.* Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of **AC-1**. The pH of the soils tested was 7.9. The classification given was determined using the mobile groundwater case, in view of groundwater being encountered. The laboratory results are presented in Appendix B.

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, *'Concrete in Aggressive Ground'* taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

Section 5 Conclusions and Recommendations

5.1 General

The findings of this report are informed by site investigation data and information provided by the client. The analysis is undertaken on the assumption of high quality workmanship.

The formation level of the basement will be constructed within the London Clay Formation, at a similar level to groundwater seepage encountered during the ground investigation. Subsequent monitoring recorded groundwater at depths of 2.95 and 1.86m bgl in WS1 and WS2, respectively. Where claystone bands are encountered on site, increased groundwater flows would be anticipated during excavation. Given the London Clay is considered an Unproductive Strata and there is only a minor change to the footprint of the basement (addition of lightwells) it is unlikely that the proposed development will have an adverse effect on local groundwater conditions.

The existing rear garden of the property is partly soft landscaped and partly patio area. The proposed lightwell and ground floor extension will cover the area currently occupied with soft landscaping and part of the patio. The remaining part of the patio area will be broadly the same, with border panting proposed around its edges. The net effect on the proportion of soft landscaping is considered to be very low, and given the low permeability soils underlying the site, the proposed basement is likely to have a negligible effect on surface water flow or flooding.

The EA indicates that the site does not lie within a flood risk zone. However, the document “Camden Planning Guidance – Basement and Lightwells, CPG4”, shows that Sumatra Road was among a number of roads in Camden that were flooded in 1975 and 2002. As such, a separate flood risk assessment (FRA) may be required.

Soils of the London Clay Formation were encountered directly underneath the Made Ground at depths of 0.90 to 1.40m bgl. The laboratory testing indicated a low to medium volume change potential in the soils of the London Clay Formation. The foundations and basement should be designed in accordance with NHBC and BRE guidance in respect of volume change potential soils.

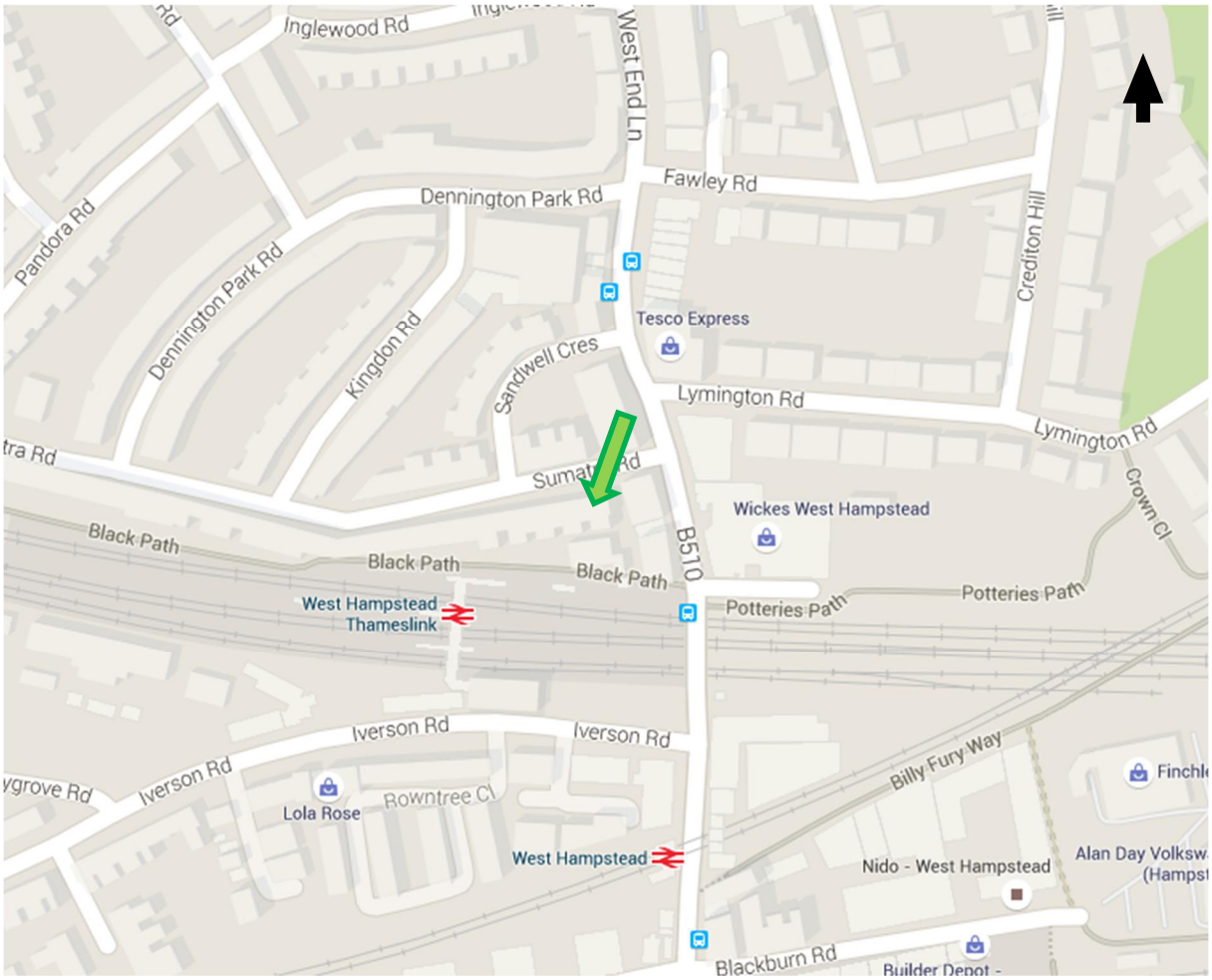
As the formation level of the basement will be around the level of seepage recorded on site, groundwater control measures may be required to keep isolated underpin excavations dry prior to concrete placement.

It is recommended that all perimeter party wall foundations are propped prior to excavation commencing below them. The underpins should also be propped at regular intervals as construction progresses. This is required to control horizontal deflection and prevent rotation and sliding of underpins prior to the basement and ground floor slab being cast.

It is proposed that an appropriate monitoring regime be adopted to manage risk and potential damage to the neighbouring structures as construction progresses onsite.

List of Figures

List of Appendices



Scale: NTS

Figure number	Title
1	Site Location Map

Project	Date
211 Sumatra Road, Camden, London NW6 1PF	September 2015

Client	Job Number
Drawing and Planning Limited	15717

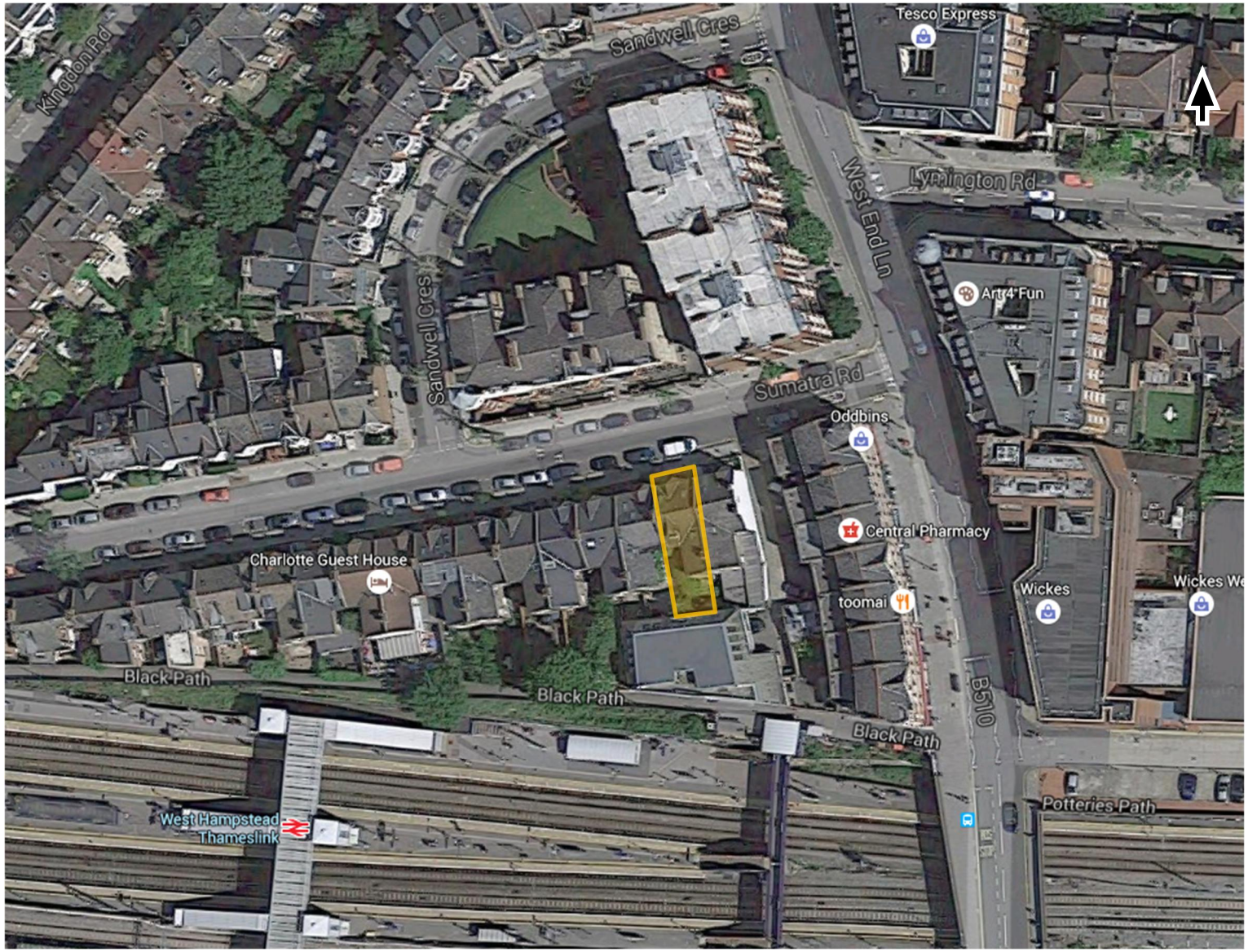


Figure number
2

Project
211 Sumatra Road, Camden, London NW6 1PF

Client
Drawing and Planning Limited

Title
Aerial Photograph

Date
September 2015

Job Number
15717

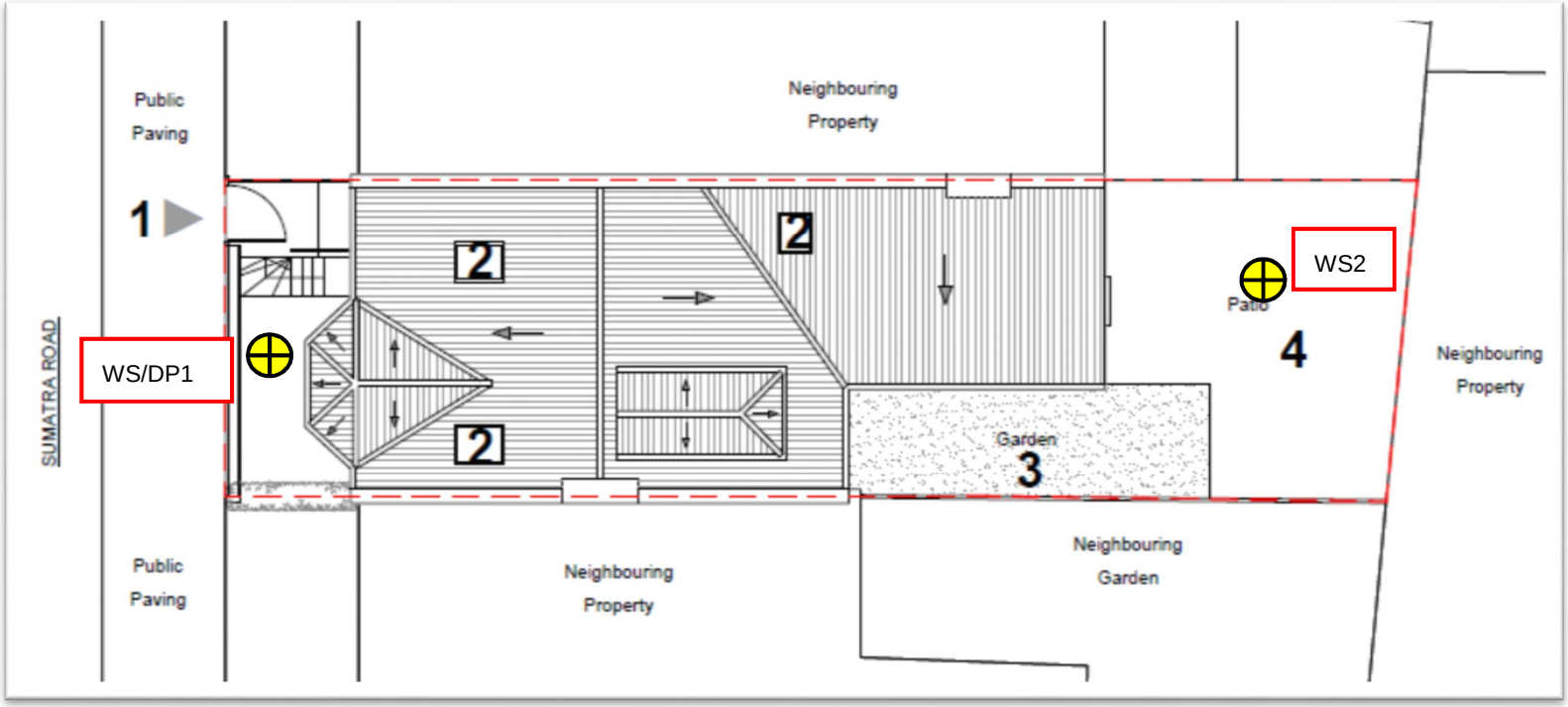


Figure number
3

Project
211 Sumatra Road, Camden,
London NW6 1PF

Client
Drawing and Planning Limited

Title
Trial Hole Location Map

Date
September 2015

Job Number
15717

Appendix A Field Work

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Borehole Log

Borehole No. **WS1**
Sheet 1 of 1

Project Name: 211 Sumatra Road,	Project No.: 15717	Co-ords:	Hole Type WS
Location: London, NW6 1PF		Level:	Scale 1:50
Client: Drawing and Planning Limited		Dates: 28/07/2016	Logged By OSI

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.20	J+D		0.30			Dark brown and grey brown silty CLAY with frequent fragments of brick, flint, clinker. MADE GROUND
		0.50	D					Firm to stiff brown and grey brown CLAY with abundant fine to coarse fragments of brick, flint, slate, clinker and ash. MADE GROUND
		1.00	D					
		1.50	D		1.40			Firm becoming stiff orange brown veined grey silty CLAY.
		2.00	D					
		2.50	D					
		3.00	D					Band of fine to medium sub-angular claystone gravel between 2.80-3.00m bgl.
		4.00	D					
		5.00	D		5.00			End of Borehole at 5.00m

General Remarks:
No roots observed. No groundwater encountered.

Groundwater Remarks:

Borehole Type
CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types
D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing
SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Borehole Log

Borehole No. **WS2**
Sheet 1 of 1

Project Name: 211 Sumatra Road,	Project No.: 15717	Co-ords:	Hole Type WS
Location: London, NW6 1PF		Level:	Scale 1:50
Client: Drawing and Planning Limited		Dates: 28/07/2016	Logged By OSI

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.25	J+D		0.30			Dark brown silty CLAY with roots, rootlets and fine fragments of flint, brick and glass. MADE GROUND
		0.50	D					Firm brown CLAY with roots and frequent fine to medium fragments of flint, mortar and clinker. MADE GROUND
		1.00	D		0.90			Firm dark grey and orange brown silty CLAY. (POSSIBLE MADE GROUND)
		1.50	D		1.40			Stiff greyish brown veined bluish grey silty CLAY locally with some fine selenite crystals.
		2.00	D					
		2.50	D					
	▼	3.00	D					Band of fine sandy claystone gravel from 3.10-3.30m bgl.
								Becoming very stiff from 3.50m bgl.
		4.00	D					
		4.50	D		4.50			End of Borehole at 4.50m

General Remarks:
Roots observed to 0.90m bgl. Groundwater seep in gravel band at 3.10m bgl.

Groundwater Remarks:

Borehole Type
CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types
D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

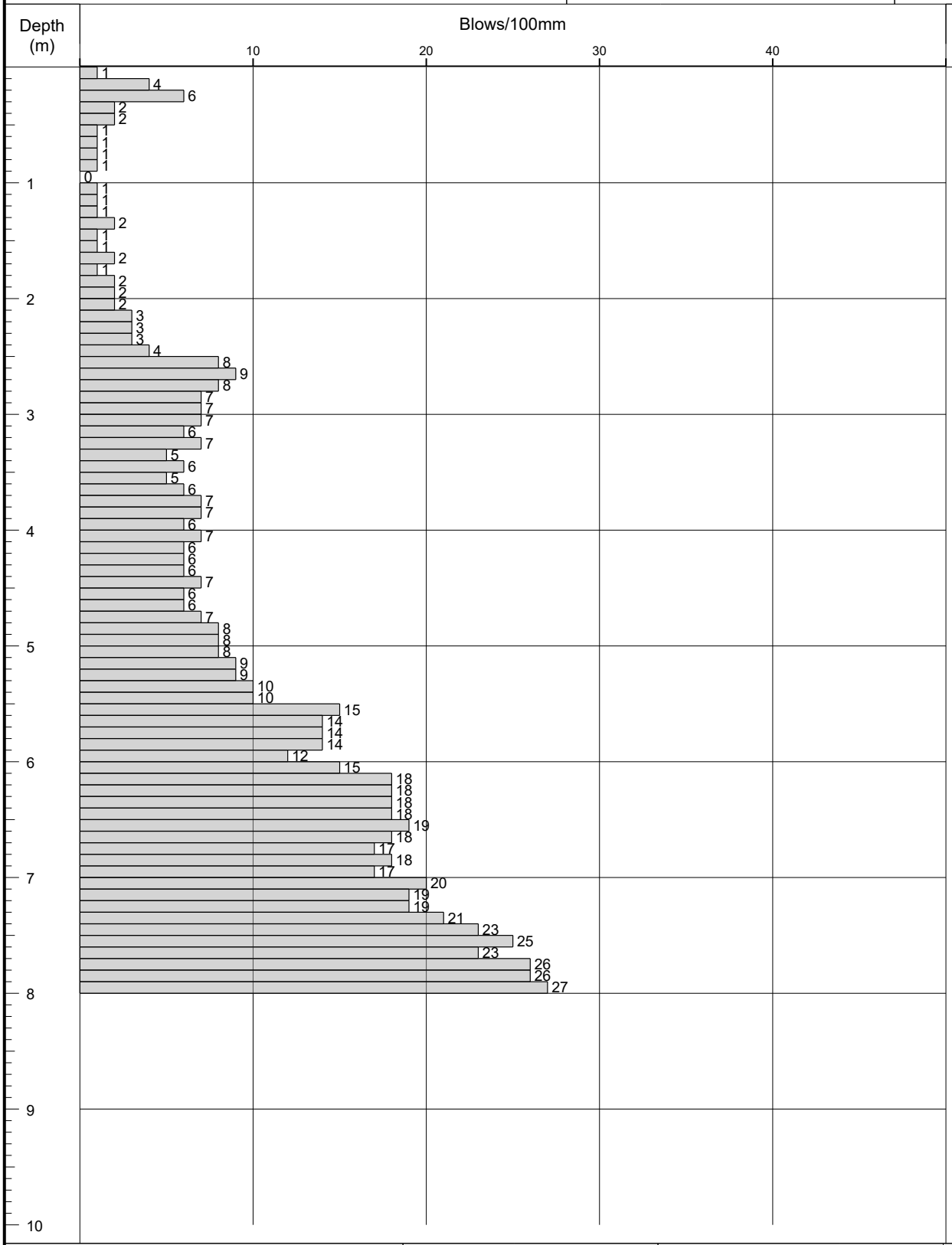
In-Situ Testing
SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

soils LIMITED
Geotechnical & Environmental Consultants

Probe Log

Borehole No.
DP1
Sheet 1 of 1

Project Name: 211 Sumatra Road,	Project No. 15717	Co-ords: -	Hole Type DP
Location: London, NW6 1PF		Level:	Scale 1:50
Client: Drawing and Planning Limited		Dates: 28-07-2016 - 28-07-2016	Logged By



Remarks	Fall Height	Cone Base Diameter	
	Hammer Wt	Final Depth	7.90
	Probe Type	Log Scale	1:50

AGS

Appendix B Geotechnical Laboratory Results

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 31974

Client's Reference: **15717**

Report Date: **15-08-2016**

Client **Soils Limited**
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

Contract Title: **Sumatra Road**

For the attention of: **Sam Bevins**

Date Received: **11-08-2016**

Date Commenced: **11-08-2016**

Date Completed: **15-08-2016**

Test Description	Qty
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	4
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	4
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Jon Tatam (Administrative/Quality Assistant) - Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

GEO Site & Testing Services Ltd
Unit 4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Client ref: 15717

Location: Sumatra Road

Contract Number: 31974

Hole Number	Sample Number	Type	Depth (m)	Description of Sample*
WS1		D	1.50	Brown silty CLAY.
WS1		D	3.00	Brown fine to medium gravelly silty CLAY.
WS2		D	2.00	Brown clayey SILT.
WS2		D	4.00	Brown silty CLAY.

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory

GSTL
GEO SITE & TESTING SERVICES LTD

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

Date: 15.8.16

UKAS TESTING
2788

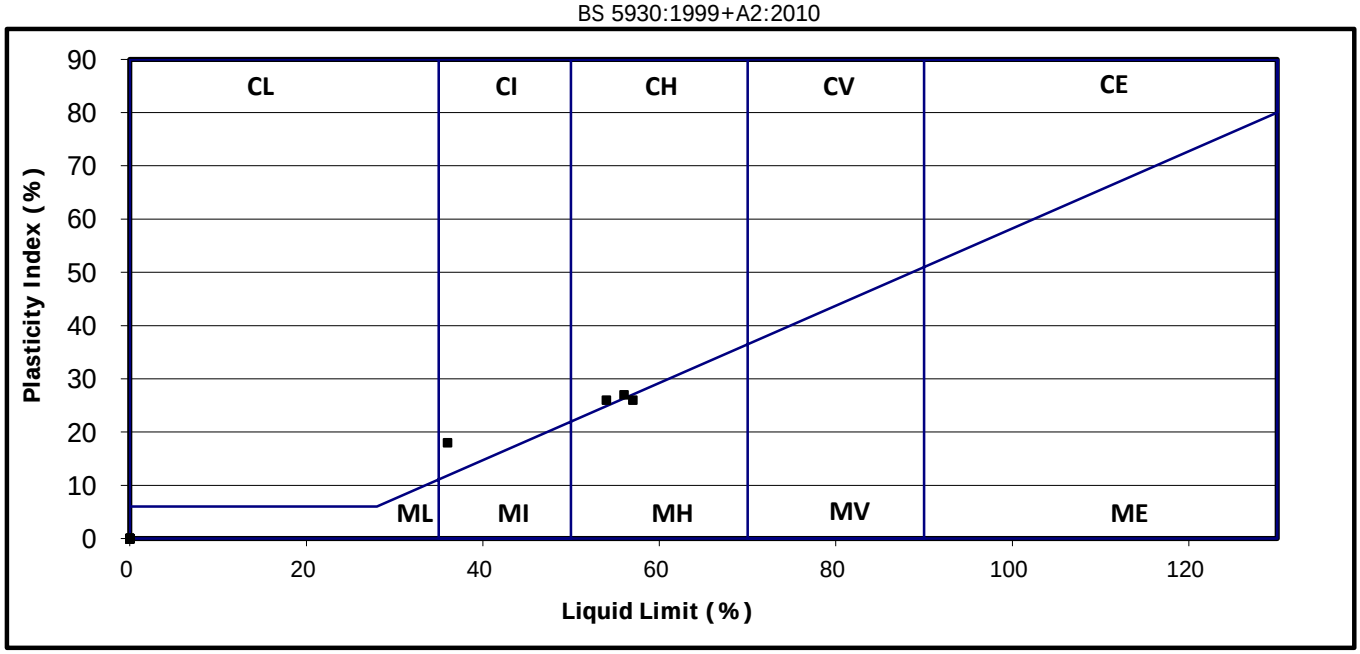
Test Report: **Method of the Determination of the plastic limit and plasticity index**
BS 1377 : Part 2 : 1990 Method 5

Client ref: 15717
Location: Sumatra Road
Contract Number: 31974

Hole / Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3 / 4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
WS1	D	1.50	28	56	29	27	100	CH High Plasticity
WS1	D	3.00	12	36	18	18	72	CI Intermediate Plasticity
WS2	D	2.00	29	57	31	26	100	MH High Plasticity
WS2	D	4.00	31	54	28	26	100	CH High Plasticity

Symbols: **NP : Non Plastic** **# : Liquid Limit and Plastic Limit Wet Sieved**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)
Date: 15.8.16

UKAS TESTING 2788

Sam Bevins
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 16-47639

Site Reference:	Sumatra Road
Project / Job Ref:	15717
Order No:	15717/SB
Sample Receipt Date:	05/08/2016
Sample Scheduled Date:	05/08/2016
Report Issue Number:	1
Reporting Date:	11/08/2016

Authorised by:

Kevin Old
Associate Director of Laboratory

Authorised by:

Russell Jarvis
Associate Director of Client Services

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate						
QTS Environmental Report No: 16-47639	**Date Sampled**	28/07/16				
Soils Ltd	**Time Sampled**	None Supplied				
Site Reference: Sumatra Road	**TP / BH No**	WS2				
Project / Job Ref: 15717	**Additional Refs**	None Supplied				
Order No: 15717/SB	**Depth (m)**	3.00				
Reporting Date: 11/08/2016	**QTSE Sample No**	221184				

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	7.9				
Total Sulphate as SO_4	mg/kg	< 200	NONE	701				
Total Sulphate as SO_4	%	< 0.02	NONE	0.07				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	63				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.06				
Total Sulphur	%	< 0.02	NONE	0.02				
Ammonium as NH_4	mg/kg	< 0.5	NONE	144				
Ammonium as NH_4	mg/l	< 0.05	NONE	14.40				
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	14				
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	7.1				
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS	58				
Water Soluble Nitrate (2:1) as NO_3	mg/l	< 1.5	MCERTS	29				
W/S Magnesium	mg/l	< 0.1	NONE	6.8				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Analysis carried out on the dried sample is corrected for the stone content
Subcontracted analysis $^{(S)}$

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 16-47639	
Soils Ltd	
Site Reference: Sumatra Road	
Project / Job Ref: 15717	
Order No: 15717/SB	
Reporting Date: 11/08/2016	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
221184	WS2	None Supplied	3.00	16	Light brown clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

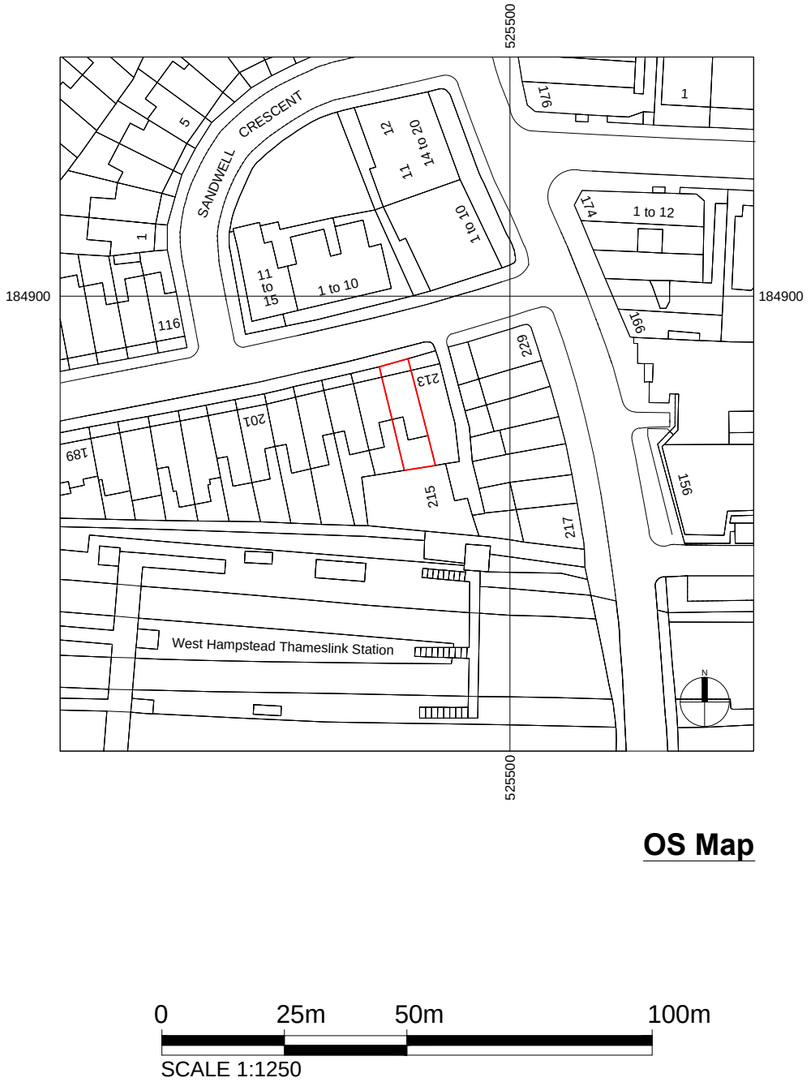
Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 16-47639
Soils Ltd
Site Reference: Sumatra Road
Project / Job Ref: 15717
Order No: 15717/SB
Reporting Date: 11/08/2016

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Appendix C Information Provided by the Client



OS Map

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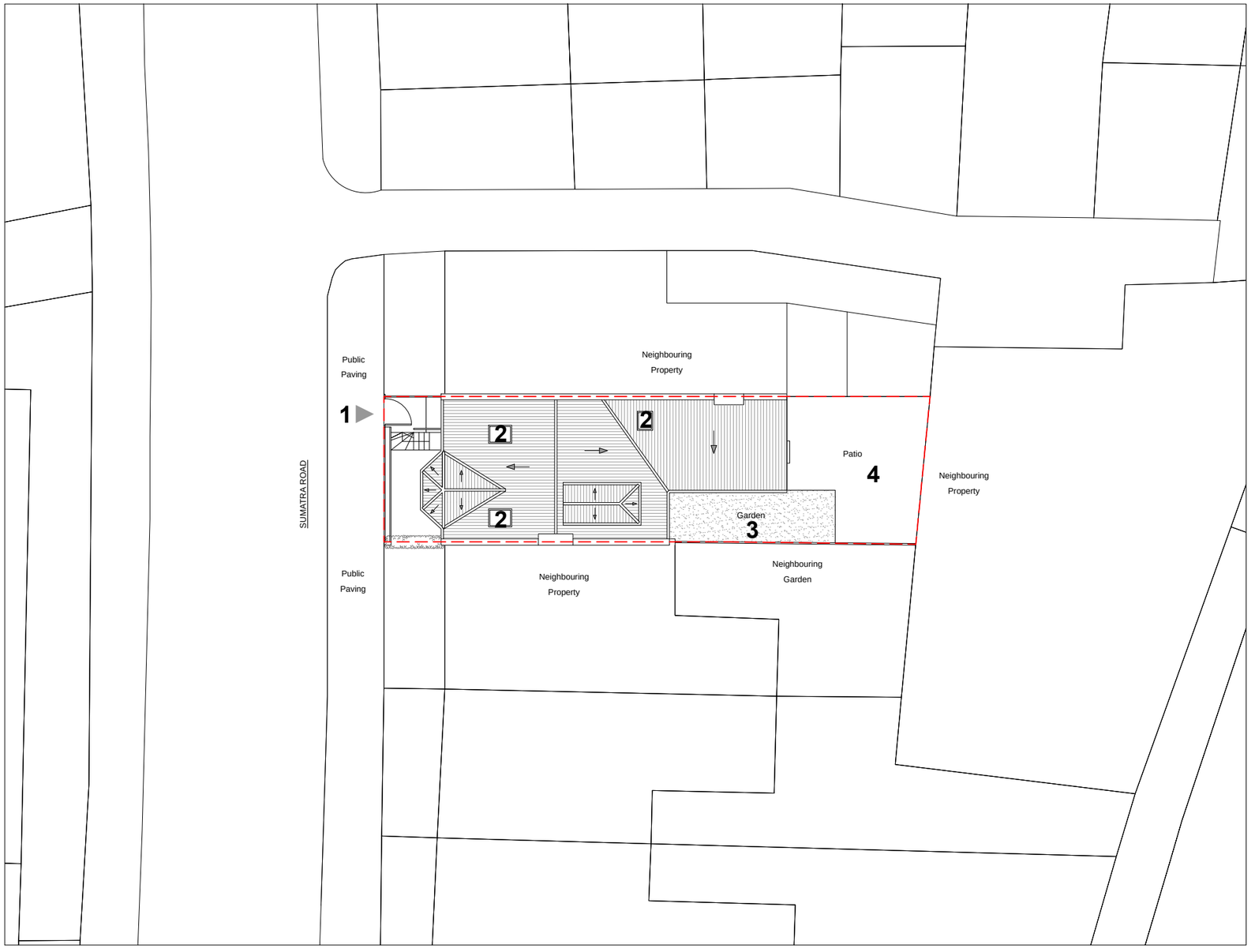


KEY

1 Entrance
2 Rooflight
3 Garden
4 Patio

Property Boundary

Site Plan

N

0 1m 5m 10m 20m

SCALE 1:200

Dimensions Written dimensions to be taken in preference to scaled dimensions. The Contractor is responsible for checking all dimensions before work starts.

Local Authority All work is to be carried out to the requirements, and to the satisfaction of the Local Authority. These drawings are for planning purposes only.

Discrepancies Any discrepancies to be brought to the attention of Drawing And Planning Ltd. Immediately.

REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

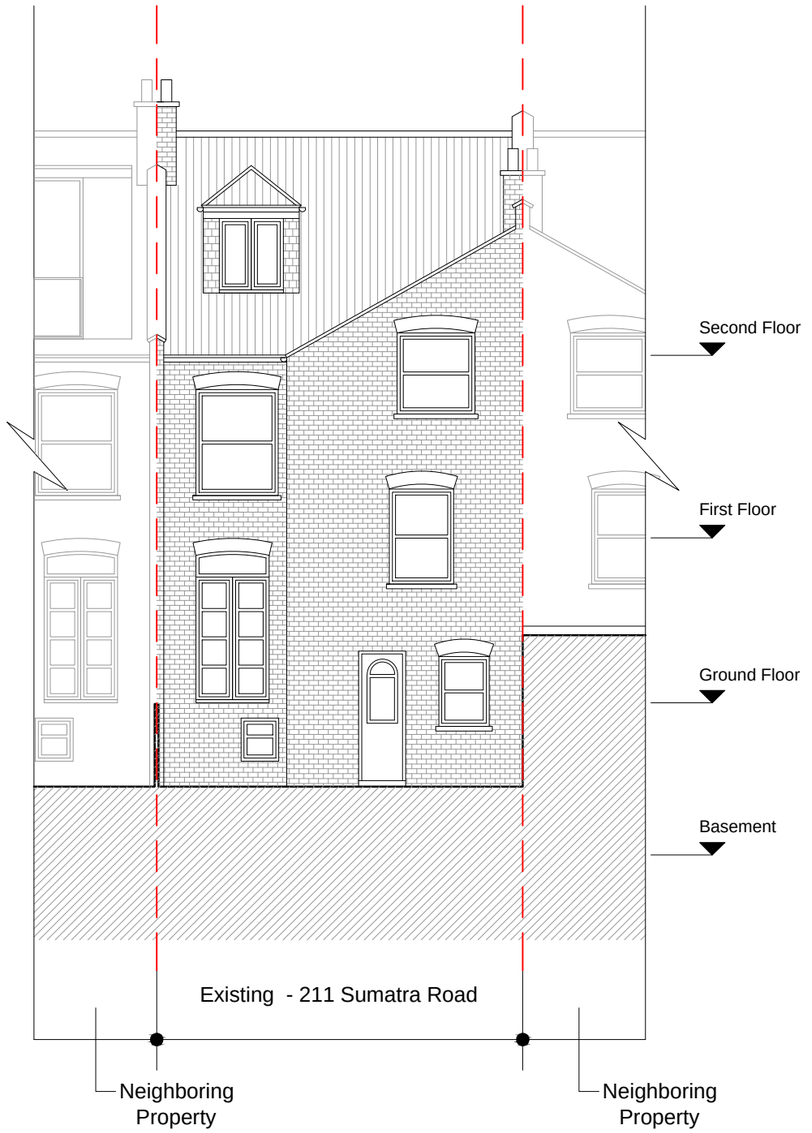
DRAWING TITLE
Existing - Location Plans

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-L001	1:1250 / 1:200

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665

Front Elevation



Rear Elevation

Dimensions Written dimensions to be taken in preference to scaled dimensions. The Contractor is responsible for checking all dimensions before work starts.

Local Authority All work is to be carried out to the requirements, and to the satisfaction of the Local Authority. These drawings are for planning purposes only.

Discrepancies Any discrepancies to be brought to the attention of Drawing And Planning Ltd. Immediately.

REVISIONS

REV	DATE	DESCRIPTION	BY	CH

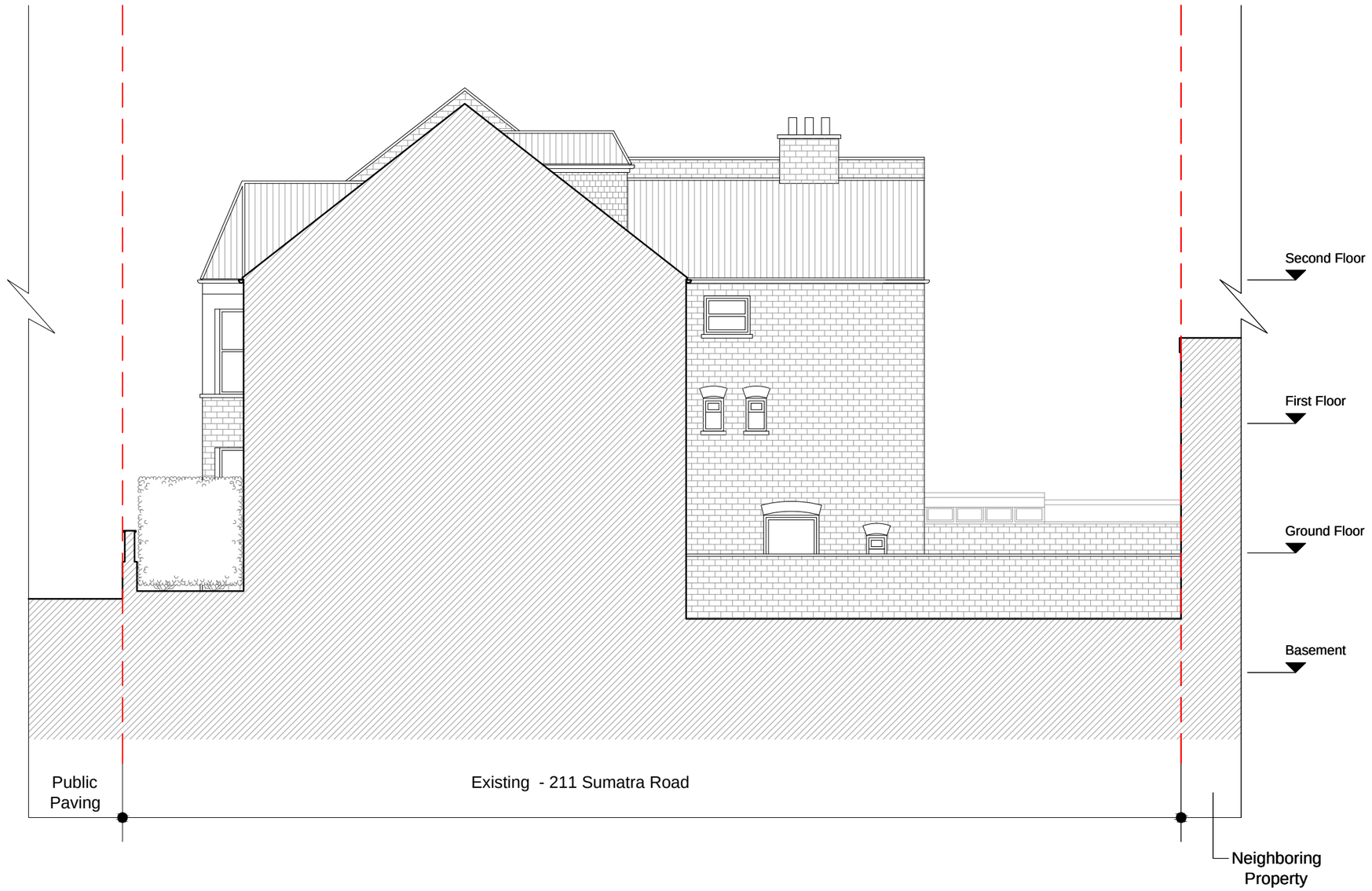
PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing-Front & Rear Elevation

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-E001	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665



Dimensions Written dimensions to be taken in preference to scaled dimensions. The Contractor is responsible for checking all dimensions before work starts.

Local Authority All work is to be carried out to the requirements, and to the satisfaction of the Local Authority. These drawings are for planning purposes only.

Discrepancies Any discrepancies to be brought to the attention of Drawing And Planning Ltd. Immediately.

REVISIONS

REV	DATE	DESCRIPTION	BY	CH

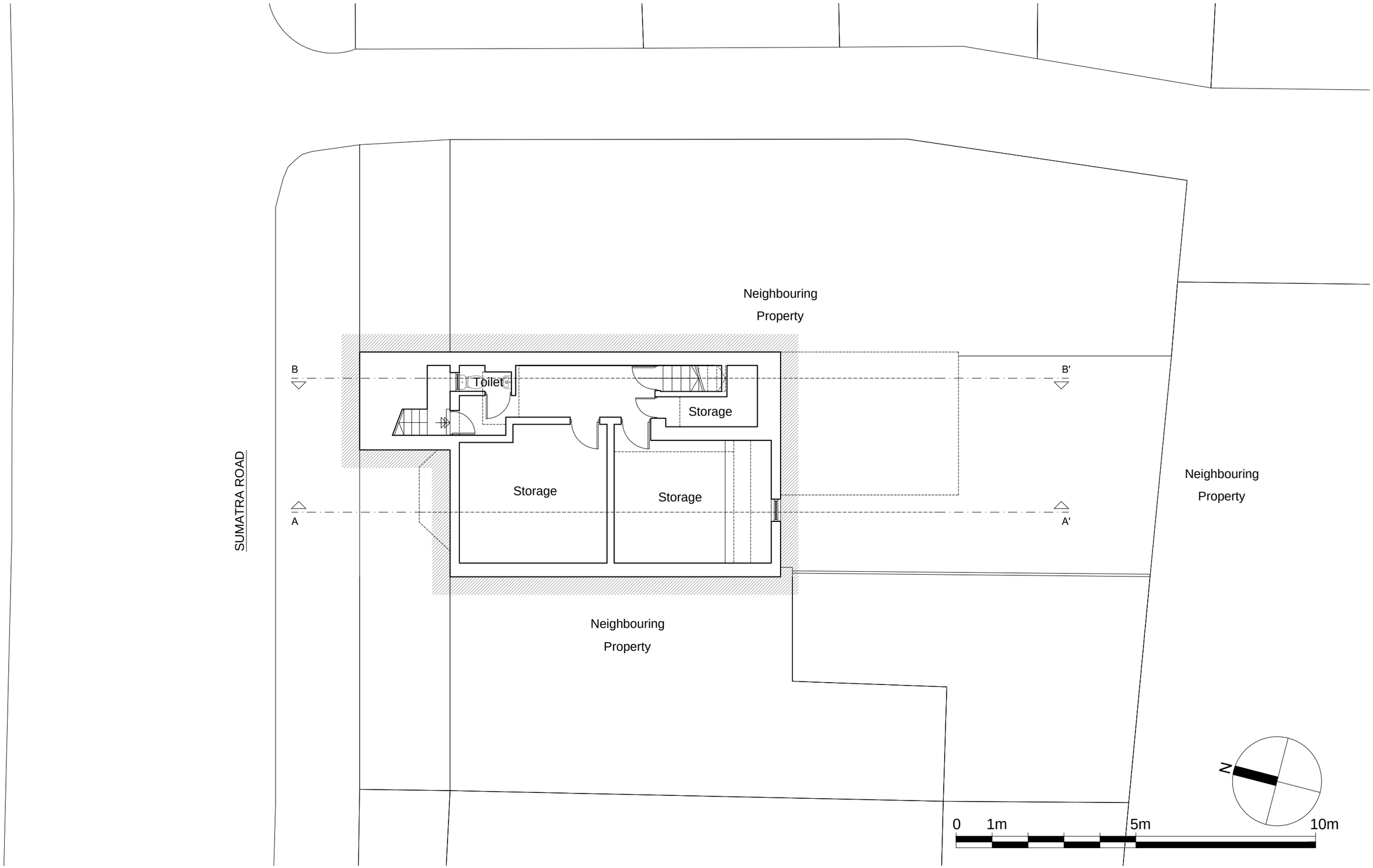
PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing- Side Elevation

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-E002	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665



Dimensions Written dimensions to be taken in preference to scaled dimensions. The Contractor is responsible for checking all dimensions before work starts.

Local Authority All work is to be carried out to the requirements, and to the satisfaction of the Local Authority. These drawings are for planning purposes only.

Discrepancies Any discrepancies to be brought to the attention of Drawing And Planning Ltd. Immediately.

REVISIONS

REV	DATE	DESCRIPTION	BY	CH

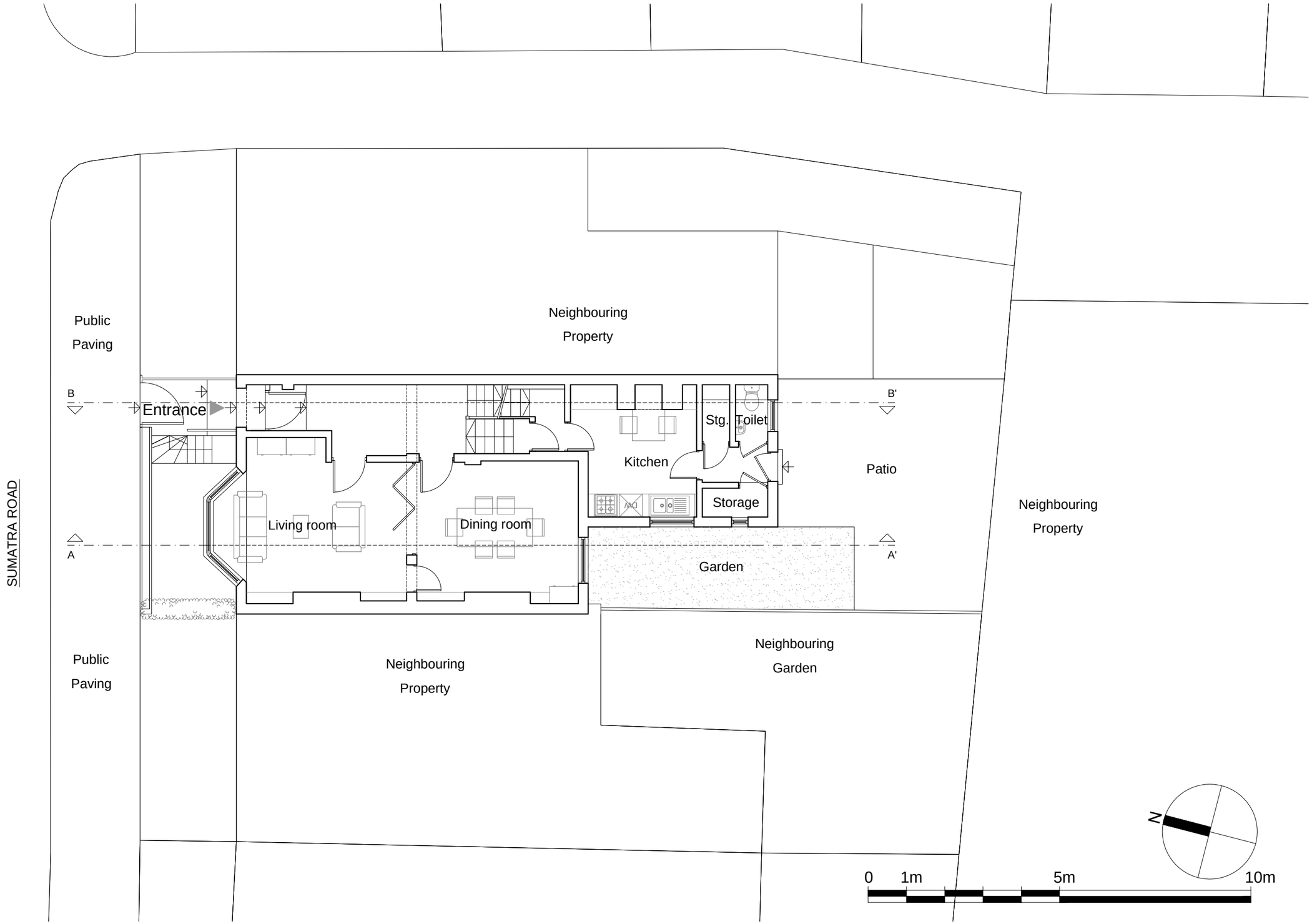
PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing - Basement

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P000	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665



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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing - Ground Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P001	1:100

DRAWINGANDPLANNING
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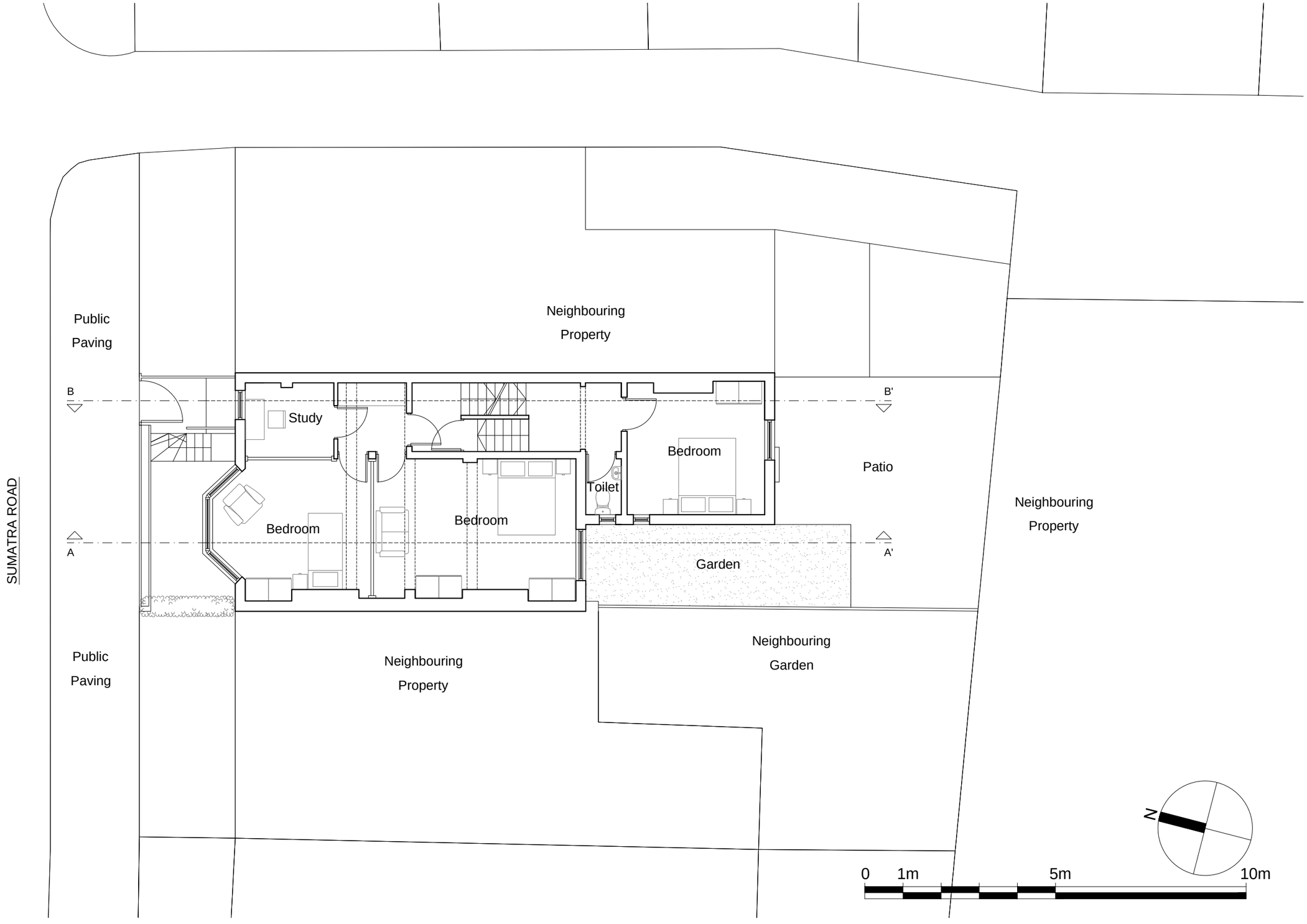
0208 202 3665



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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing - First Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P002	1:100

DRAWINGANDPLANNING
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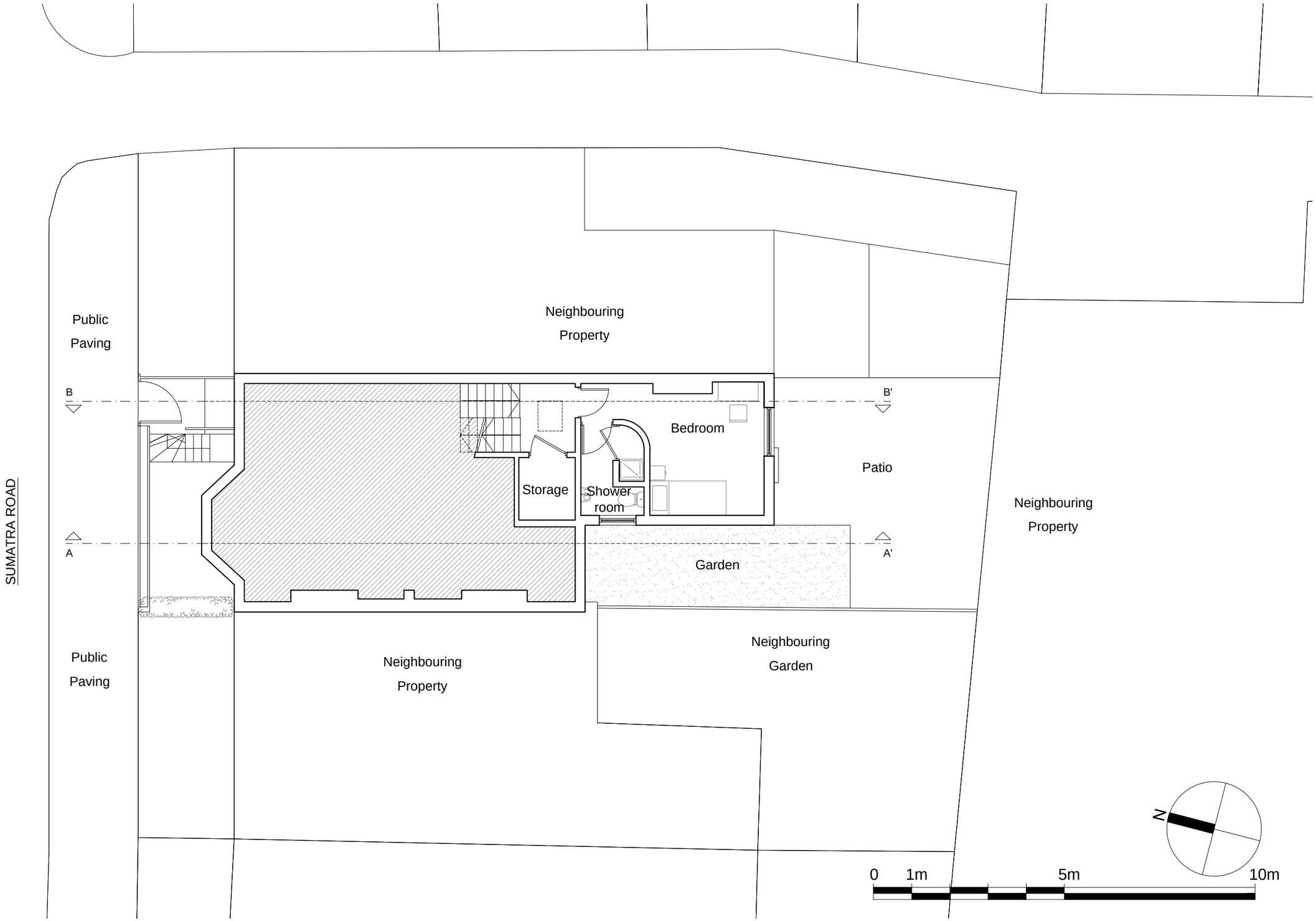

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing - Upper First Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P003	1:100

DRAWINGANDPLANNING
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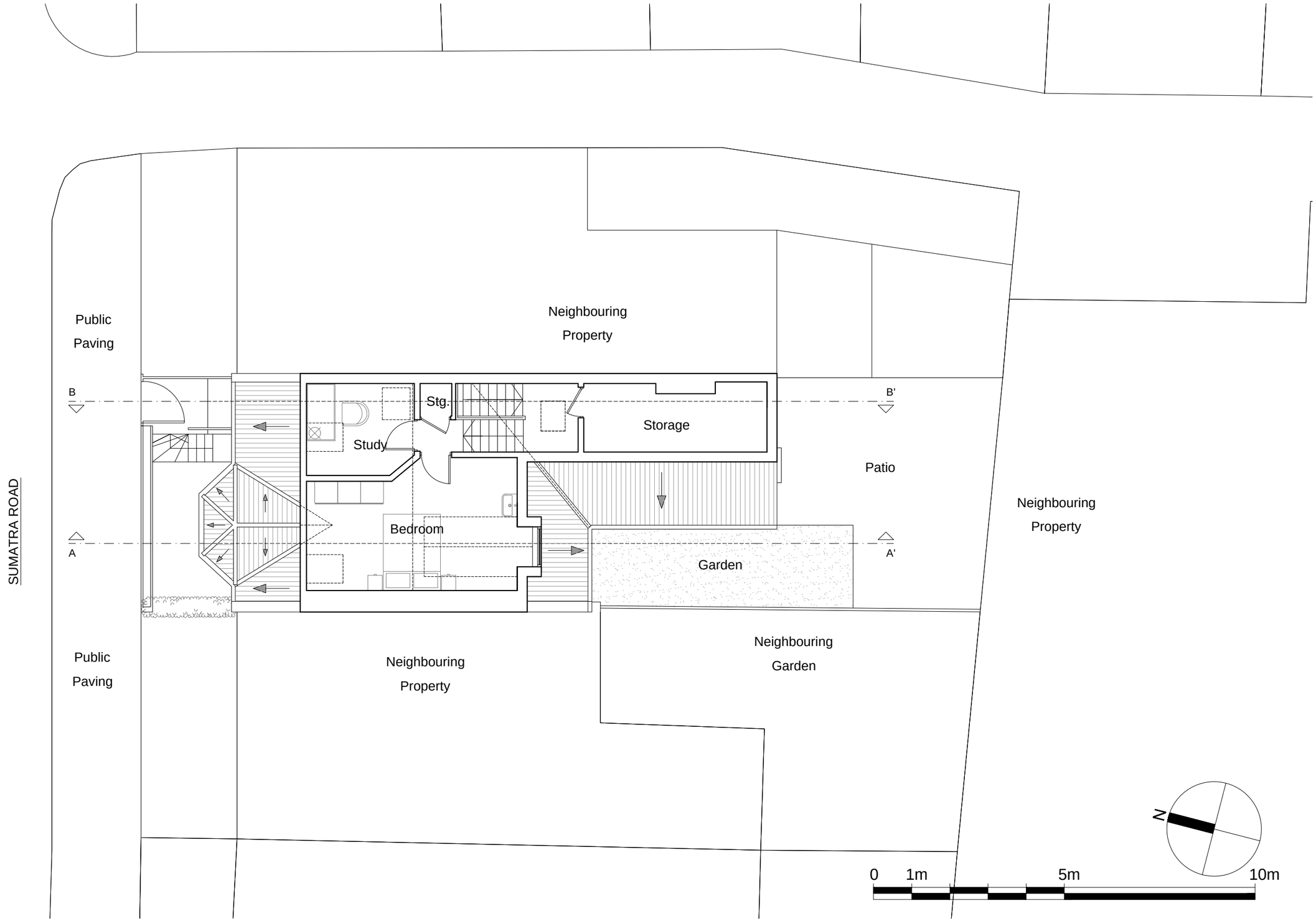
0208 202 3665



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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing - Second Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P004	1:100

DRAWINGANDPLANNING
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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

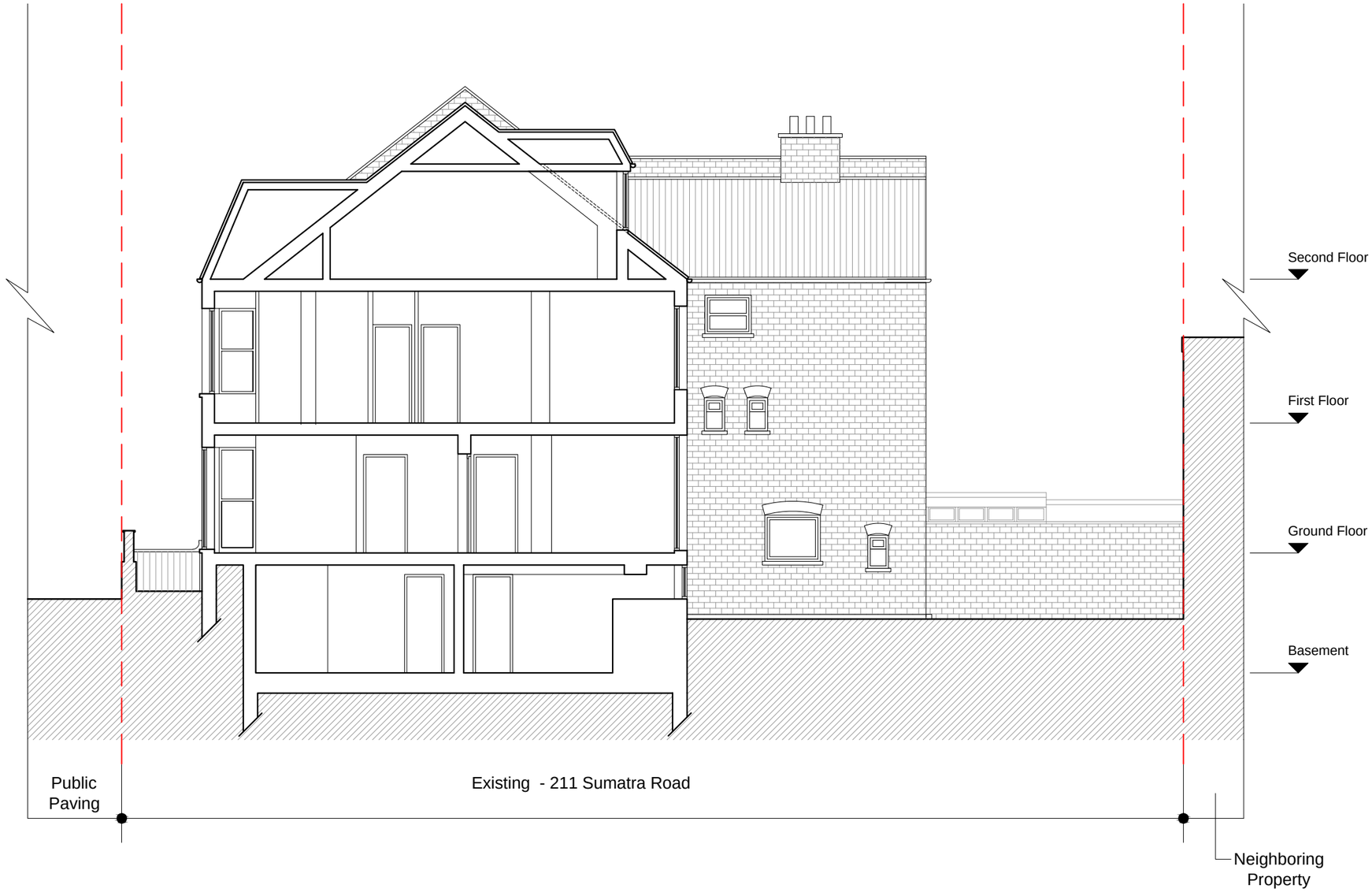
PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing - Roof Plan

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P005	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665



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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing- Section AA'

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-S001	1:100

DRAWINGANDPLANNING
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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Existing- Section BB'

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-S002	1:100

DRAWINGANDPLANNING
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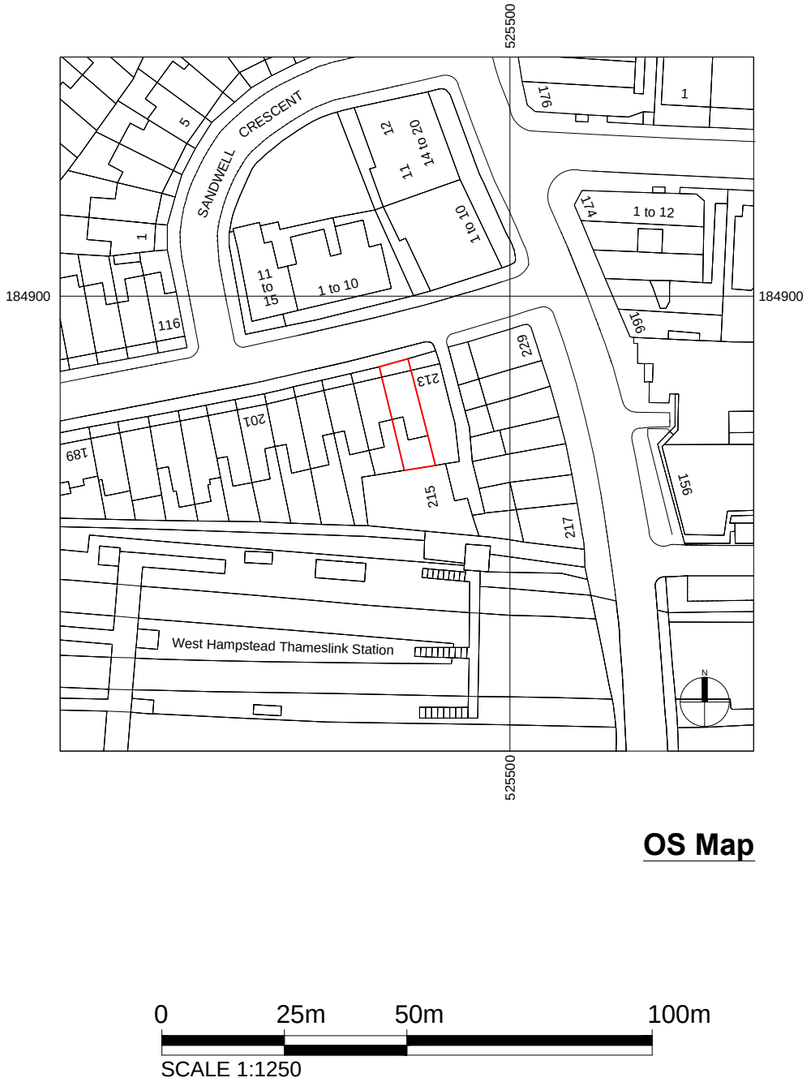
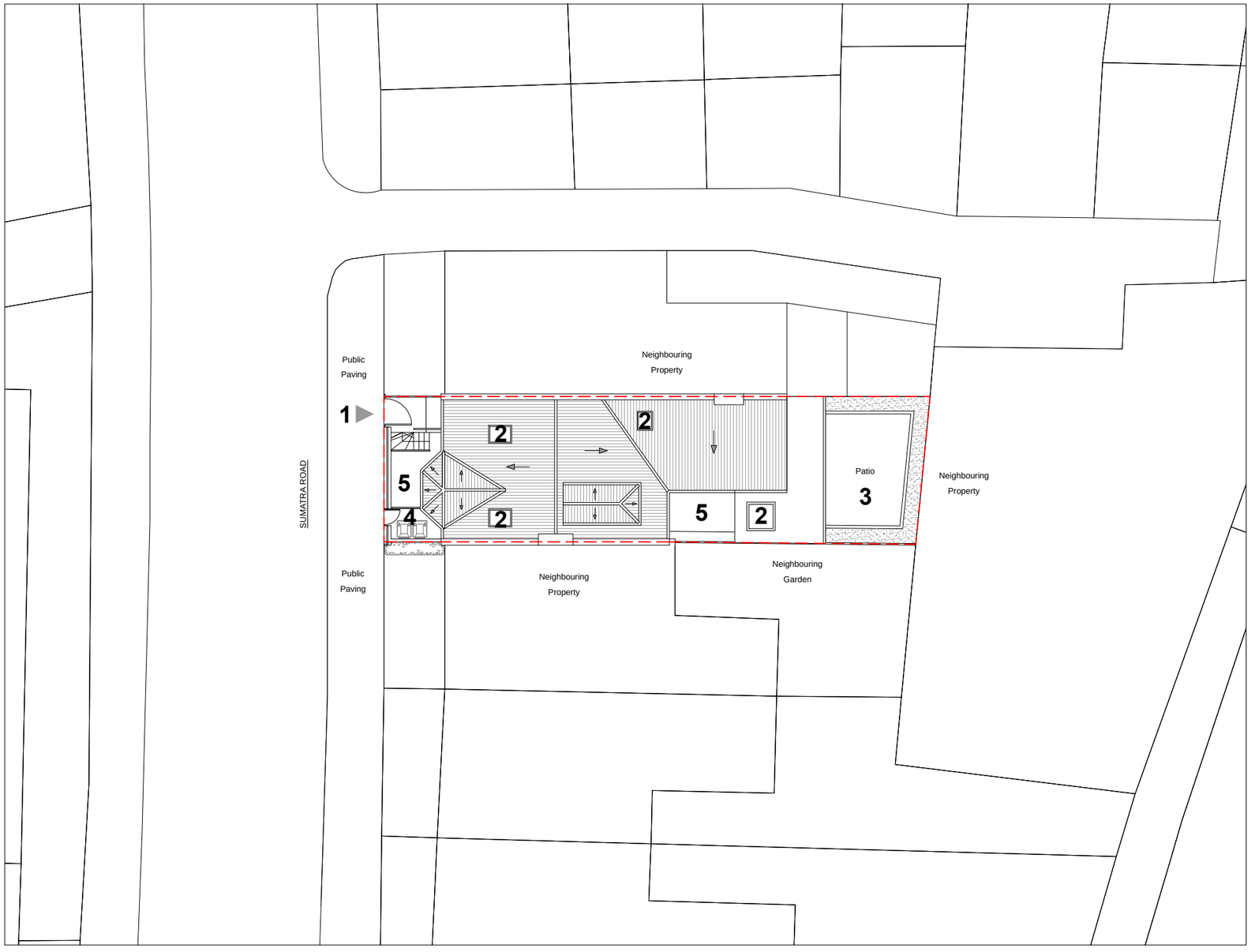


OS Map

0 25m 50m 100m

SCALE 1:1250



KEY

1 Entrance
2 Rooflight
3 Patio/Garden
4 Refuse Bins
5 Lightwell

Property Boundary

Site Plan

N

0 1m 5m 10m 20m

SCALE 1:200

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - Location Plans

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-L201	1:1250 / 1:200

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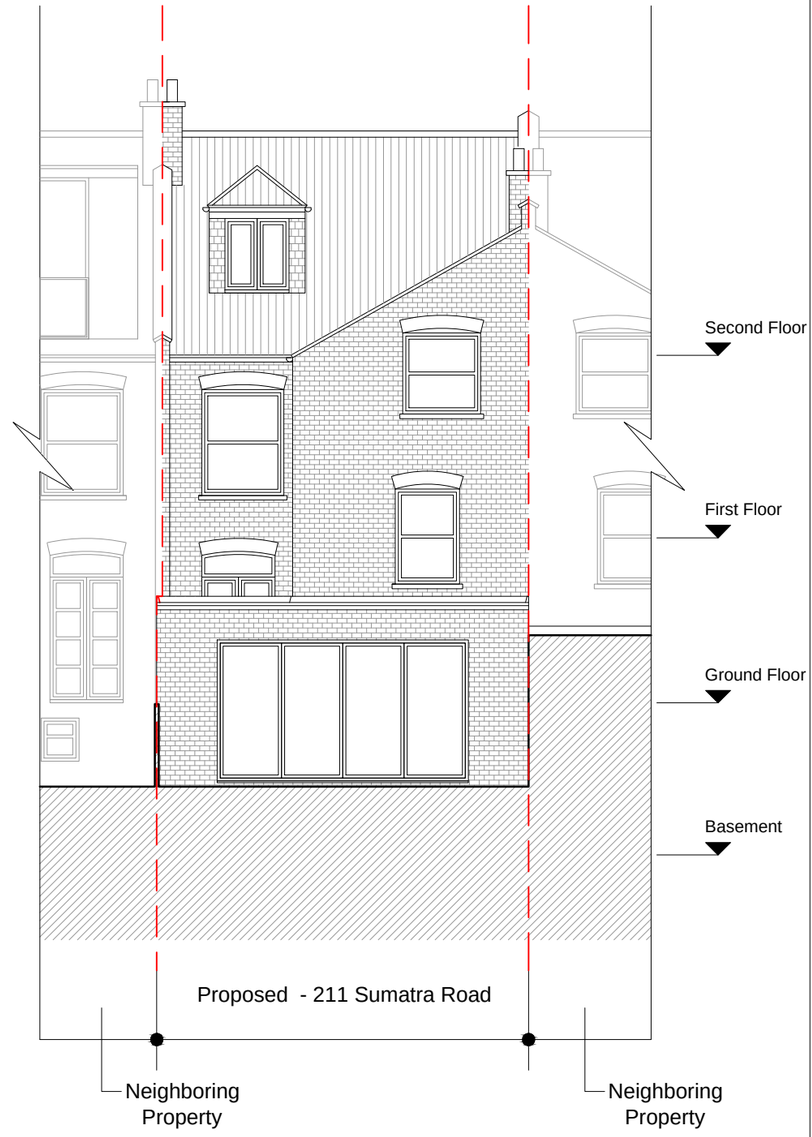
Front Elevation

Section CC'



Rear Elevation

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed-Front&RearElev.&SectionCC'

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-E201	1:100

DRAWINGANDPLANNING
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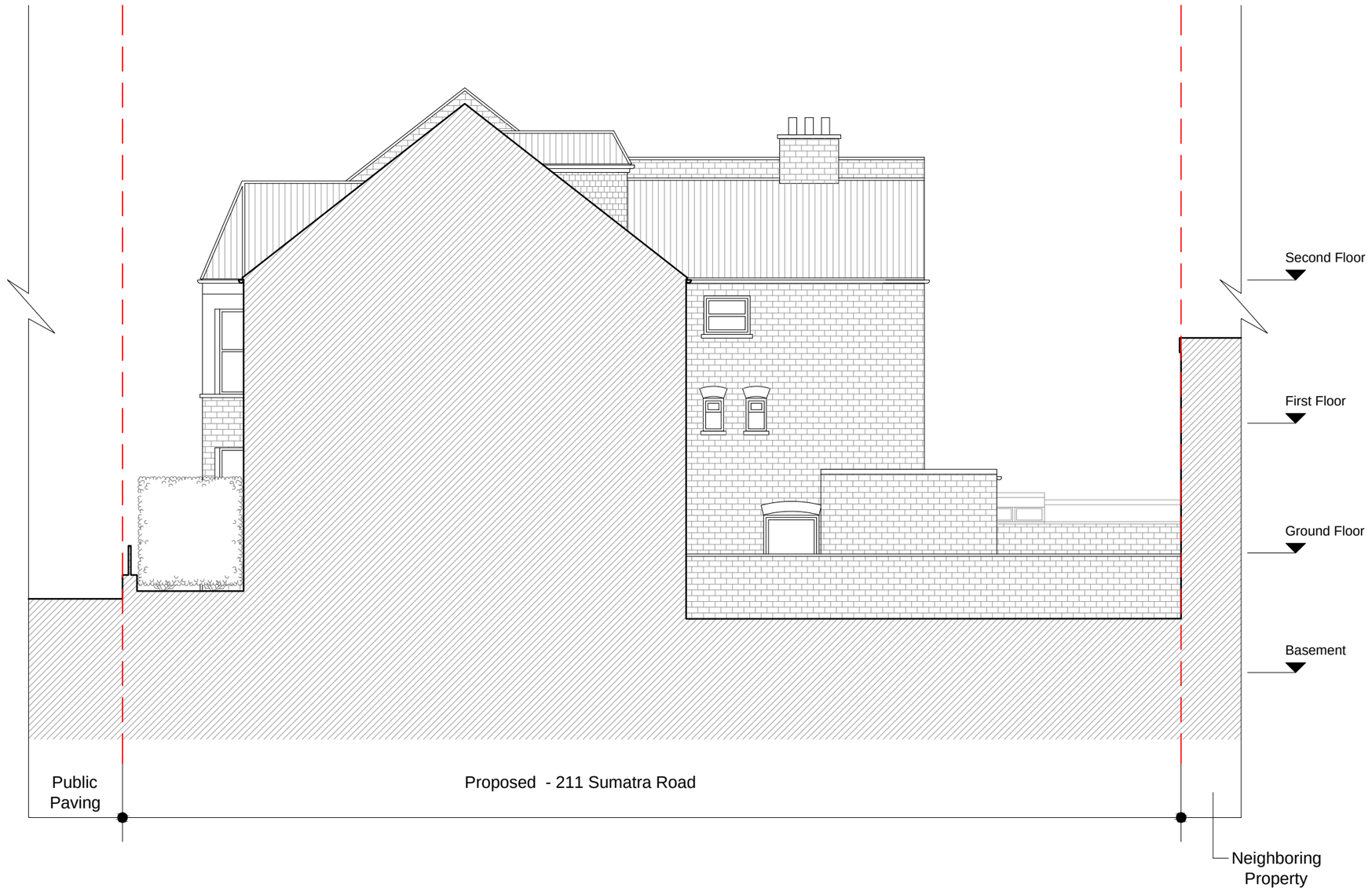

0 1m 5m 10m

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed- Side Elevation

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-E203	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
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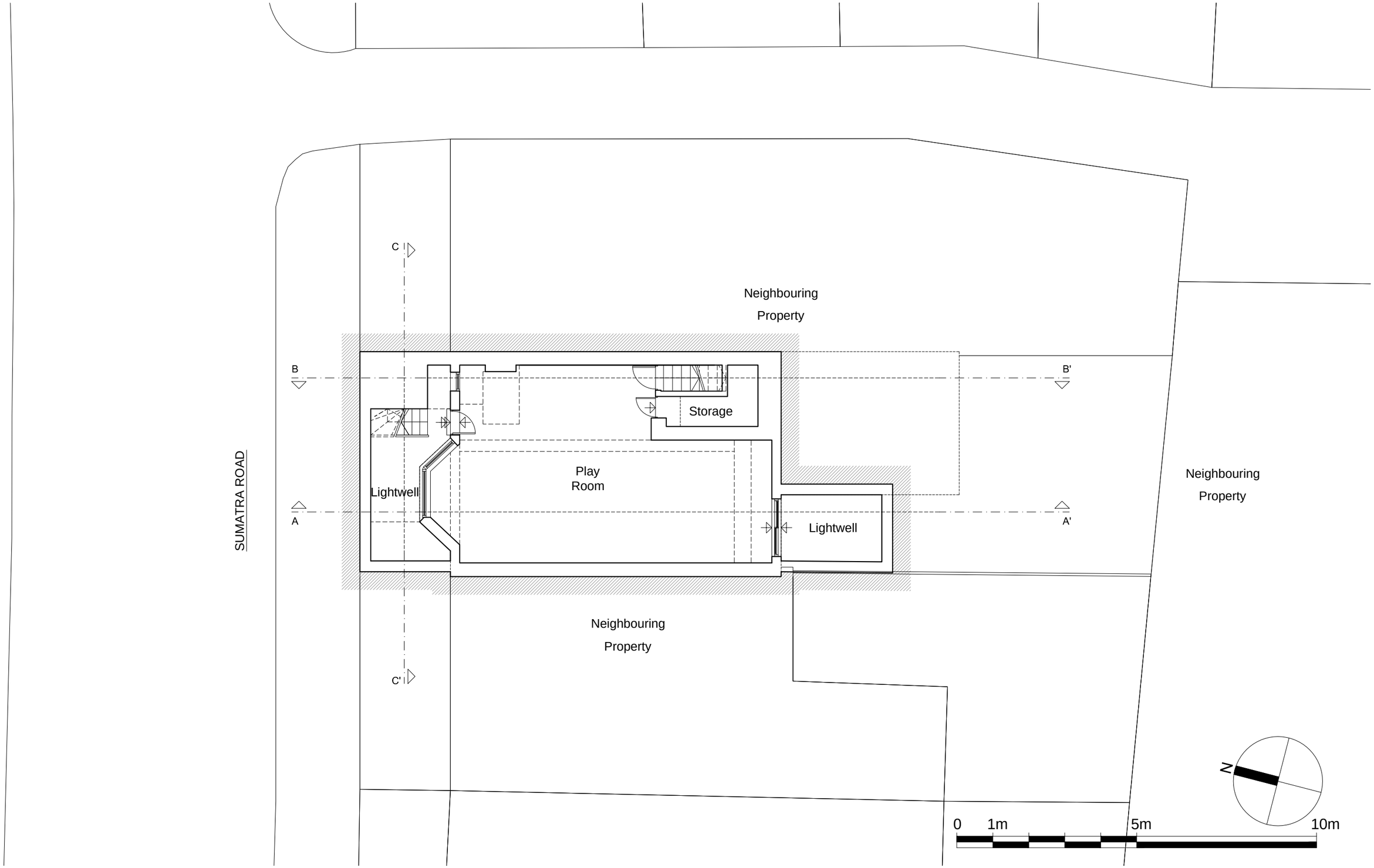

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - Basement

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P200	1:100

DRAWINGANDPLANNING
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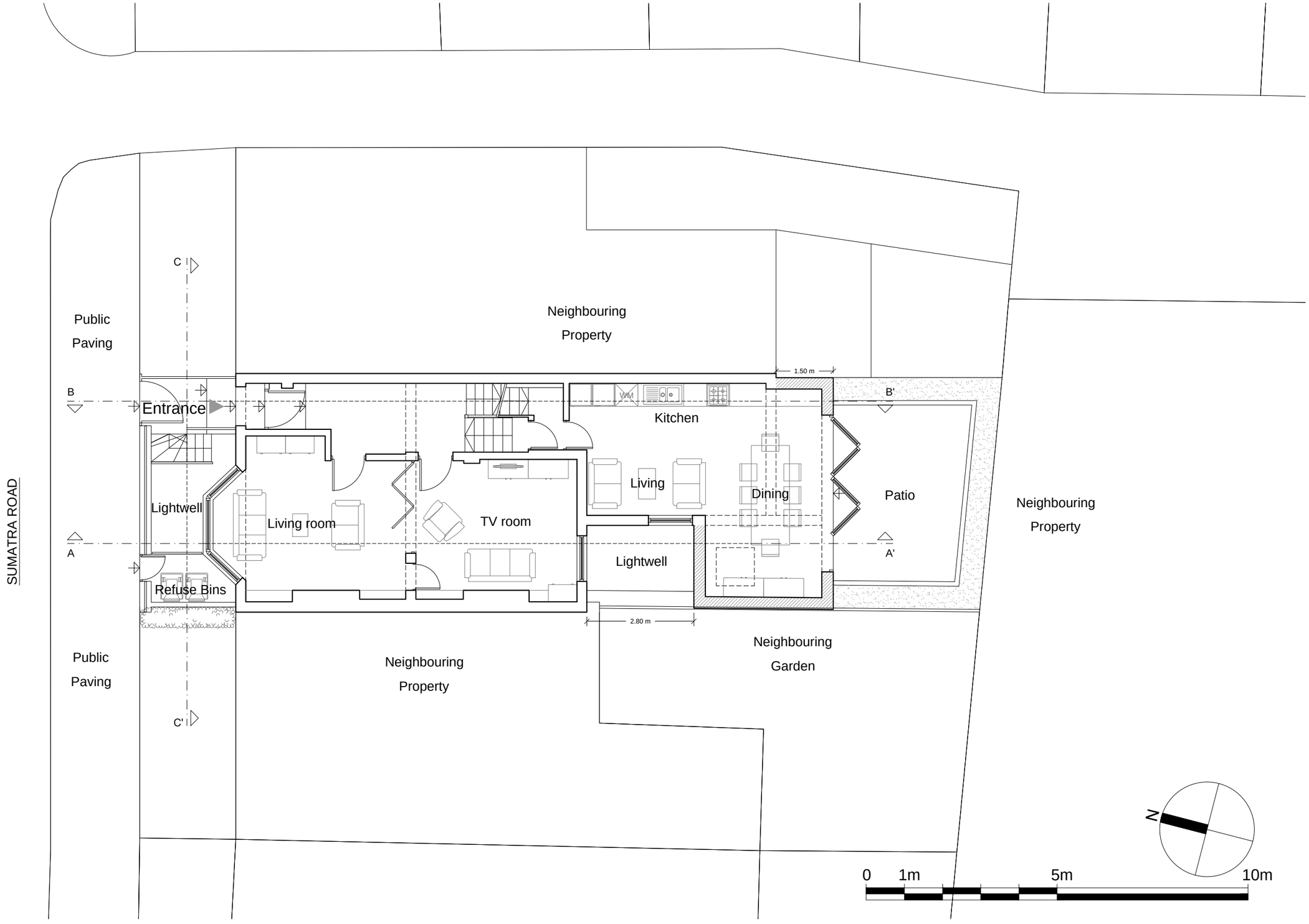

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - Ground Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P201	1:100

DRAWINGANDPLANNING
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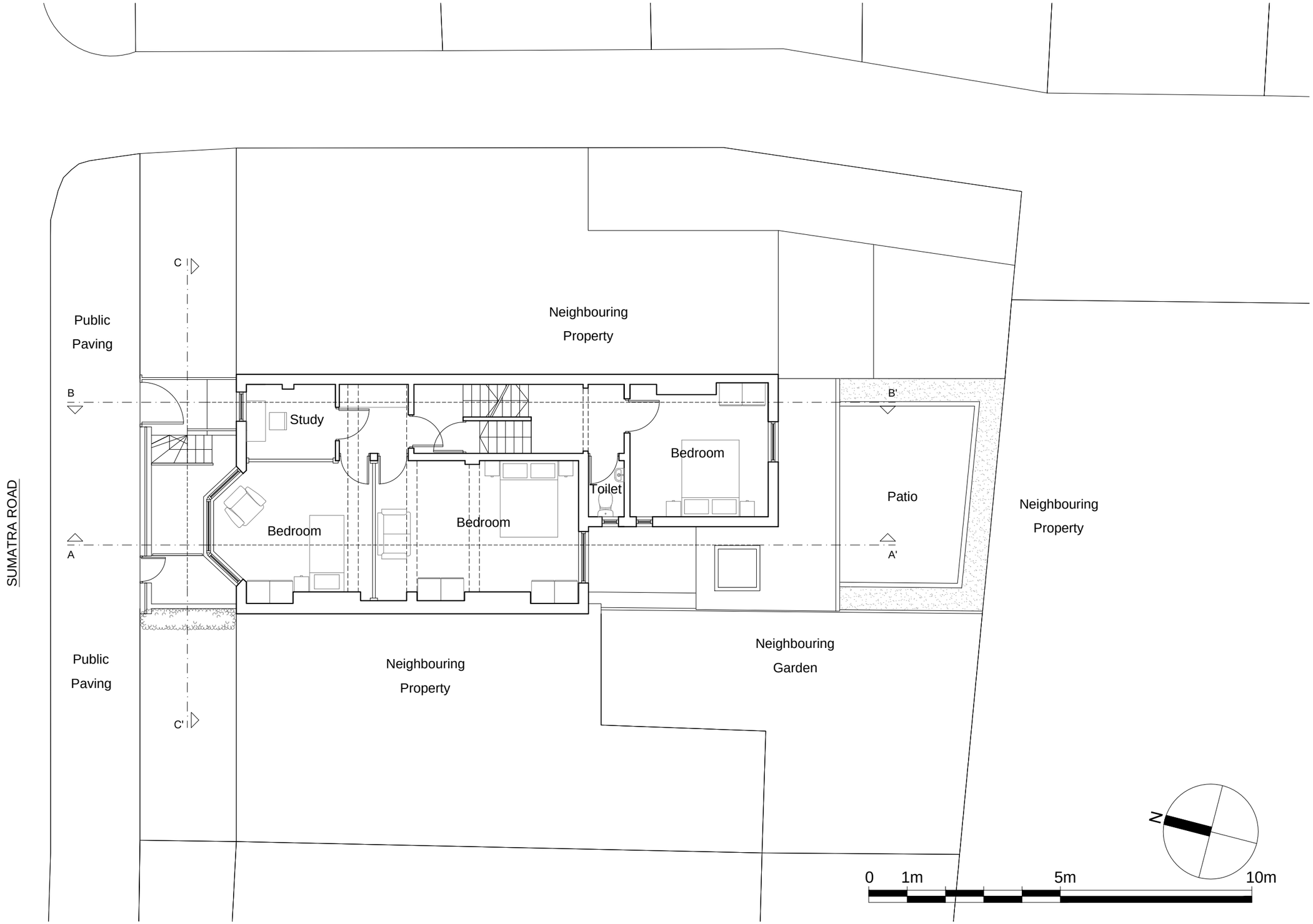

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - First Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P202	1:100

DRAWINGANDPLANNING
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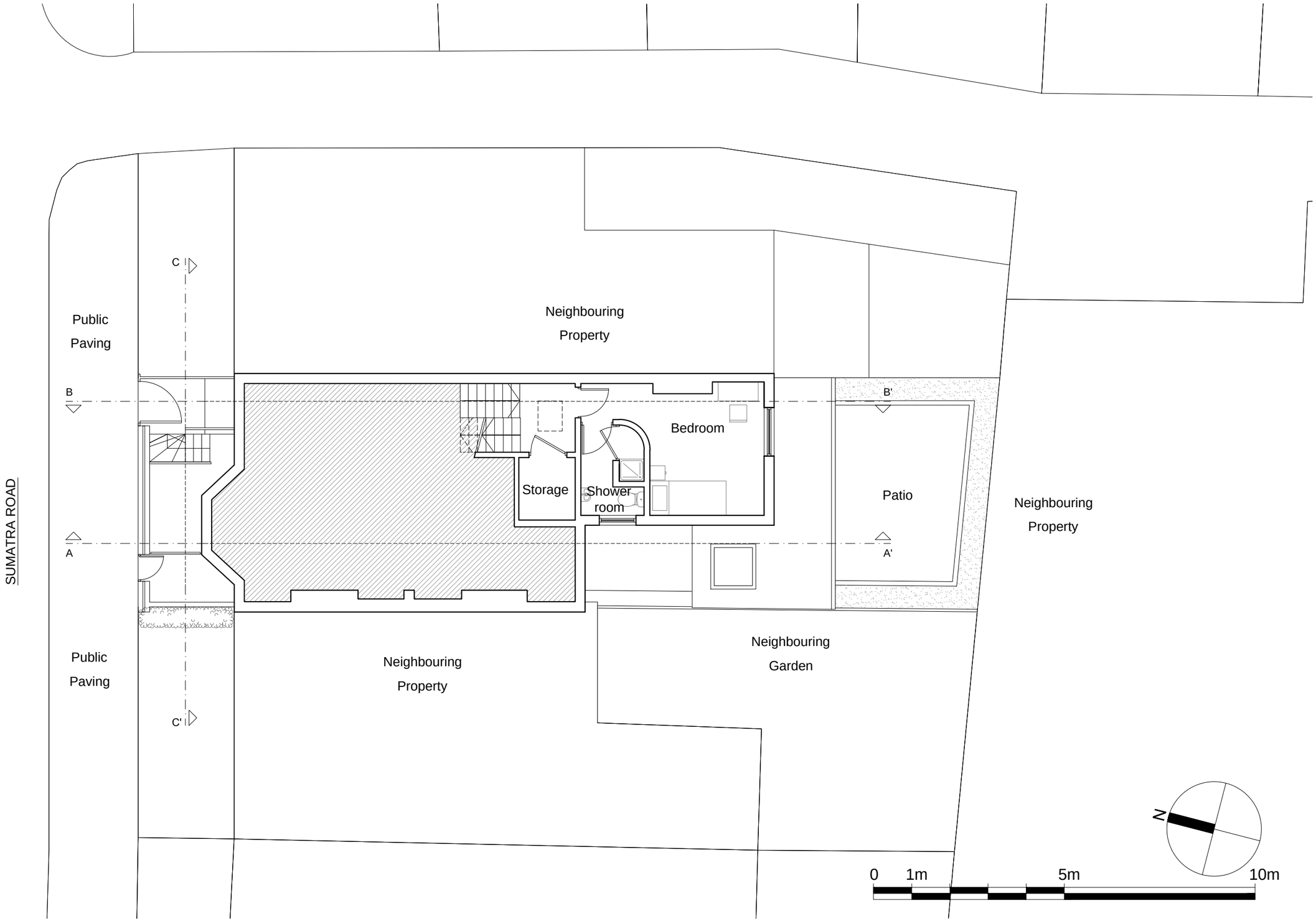
0208 202 3665



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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

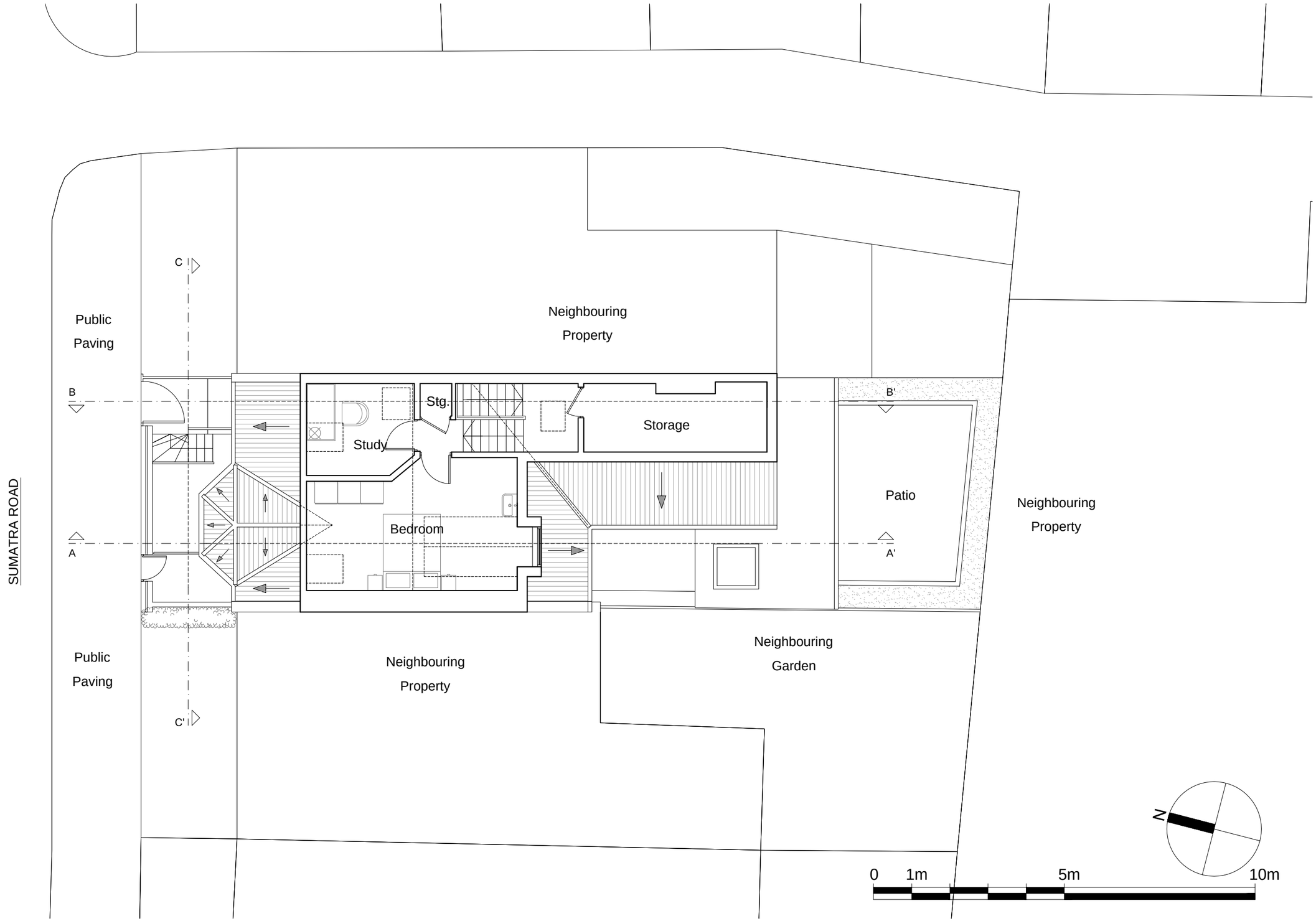
PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - Upper First Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P203	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665



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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - Second Floor

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P204	1:100

DRAWINGANDPLANNING
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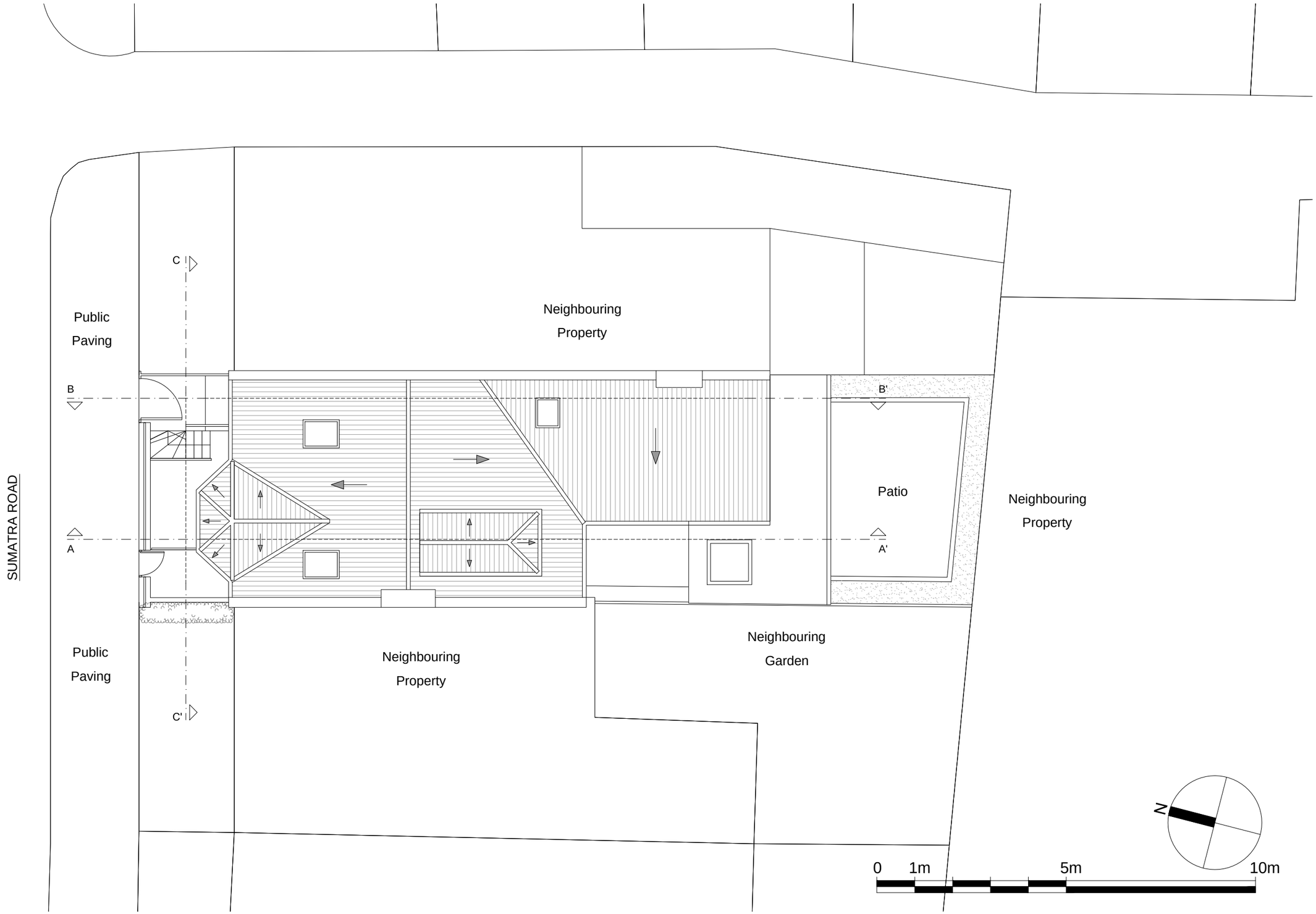

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed - Roof Plan

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-P205	1:100

DRAWINGANDPLANNING
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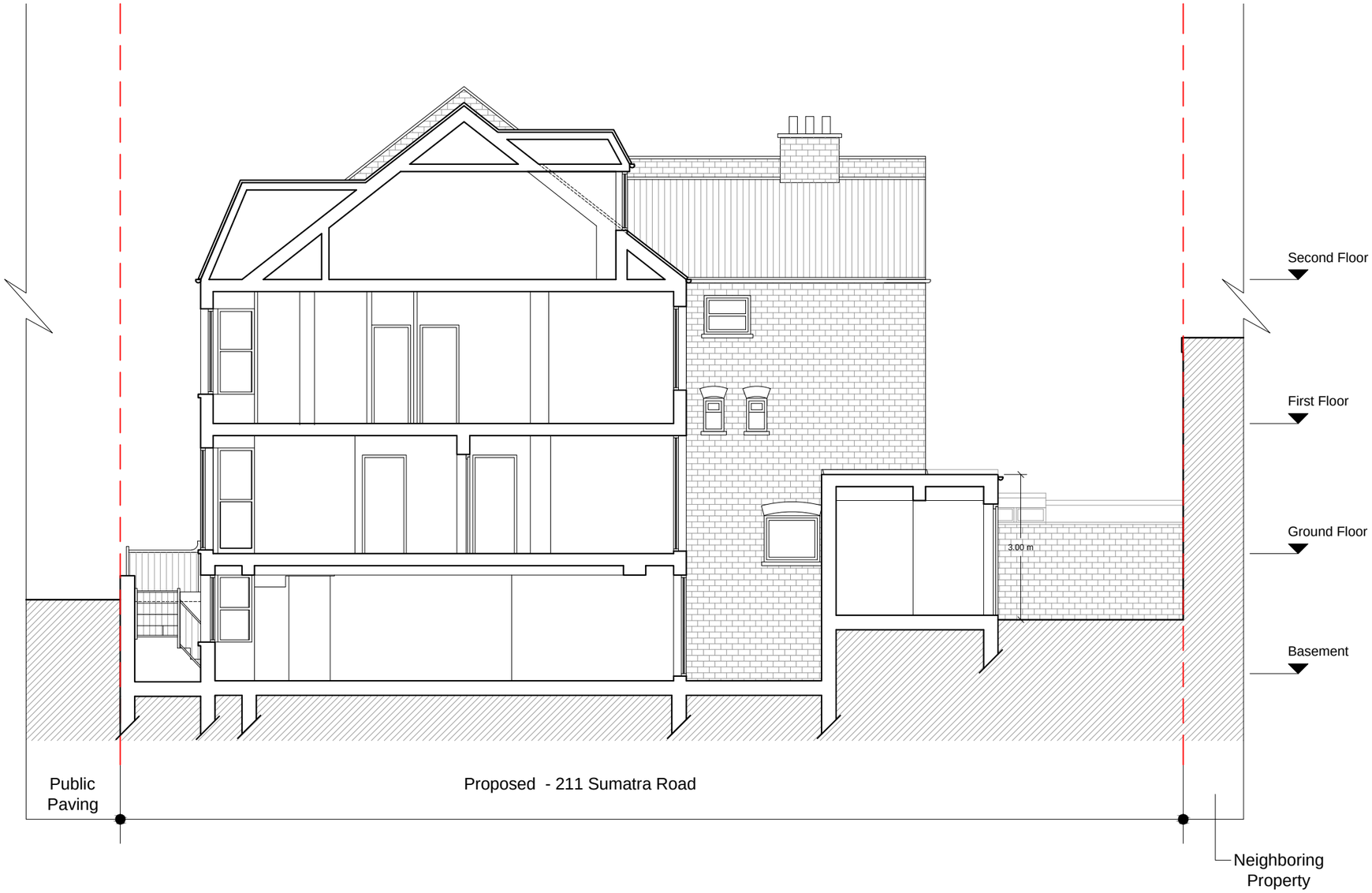

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

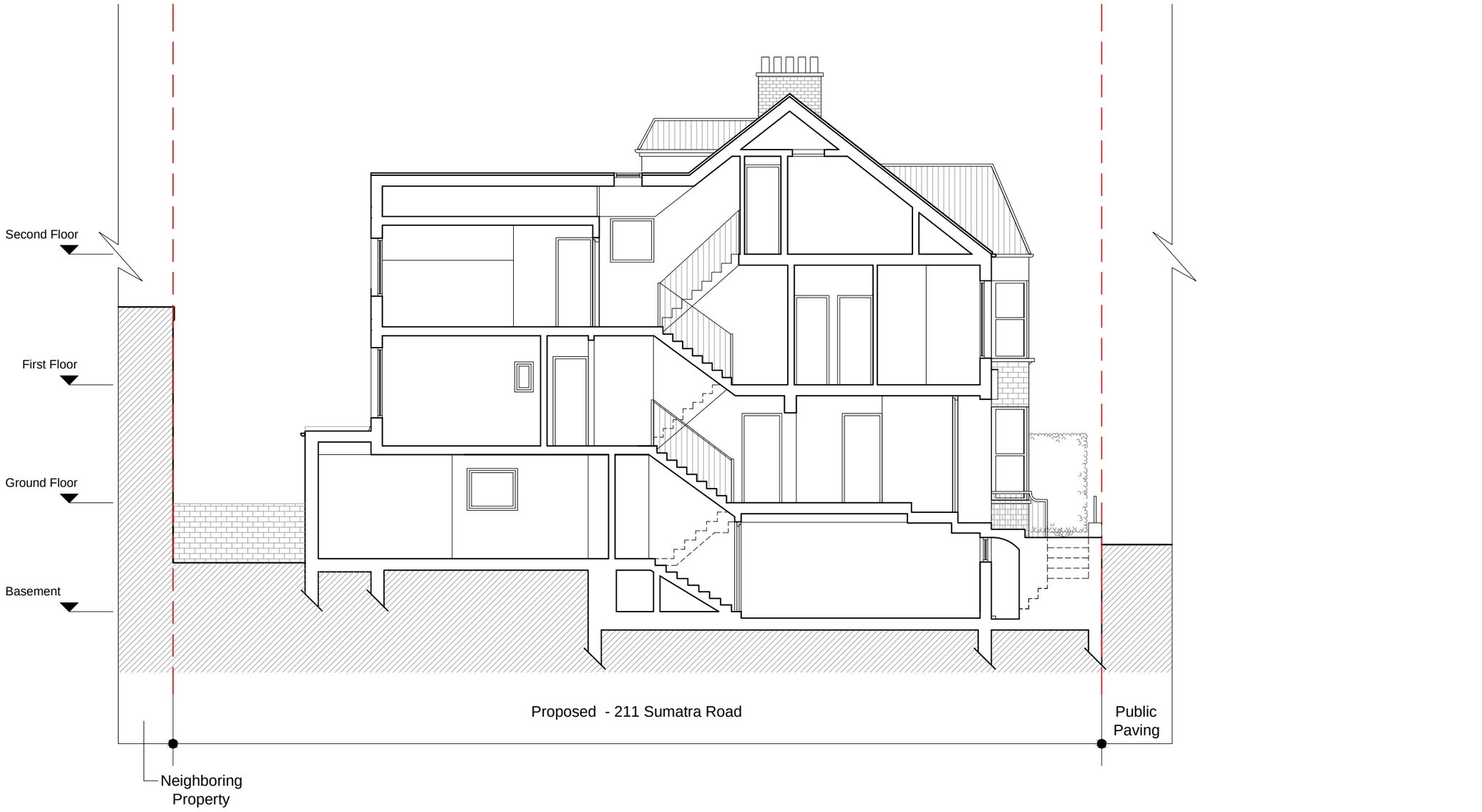
PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed- Section AA'

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-S201	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665



0 1m 5m 10m

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REVISIONS

REV	DATE	DESCRIPTION	BY	CH

PROJECT TITLE
211 Sumatra Road

DRAWING TITLE
Proposed- Section BB'

CLIENT
RLA Homes Limited

DATE	REVISION	DRAWING No.	SCALE @ A3
Jun 2016	/	SMTRR-S202	1:100

DRAWINGANDPLANNING
www.drawingandplanning.com
0208 202 3665

Soils Limited
Geotechnical & Environmental Consultants

Newton House
Cross Road, Tadworth
Surrey KT20 5SR

T 01737 814221
W soilslimited.co.uk