GREEN STRUCTURAL ENGINEERING

34 Queens Grove
NW8 6HN

DESIGN PHILOSOPHY

March 2015

Project Ref: 12686

REVISION HISTORY

Rev	Purpose	Date	Issued By	Approved
Rev 0	Initial report	30.03.15	GG	BC

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INTRODUCTION

Green Structural Engineering has been involved in numerous successful basement designs in a number of London Boroughs on behalf of private clients, developers and contractors.

The basement projects previously undertaken successfully have been of a similar size to that proposed in this application and quite often on a much larger scale and complexity.

Green Structural engineering also undertakes the temporary works design and sequencing for a number of contractors who operate in RBKC, LBHF and Westminster.

This experience has positioned GSE at the forefront of basement design and indeed temporary works design for basement construction. This experience has led to an in-depth understanding and appreciation of the design parameters that should be considered for all basement construction projects.

GSE holds £2million in professional indemnity insurance and is a member of the ACE.

SCOPE OF WORKS

A new single story basement is to be created under the footprint of the existing property and both the front and rear gardens. The proposed basement will create a wine store, larder, media store, sports equipment store, winter and summer closet, archives and storage room, and changing room. Both front and rear lightwells will be created to provide natural light and ventilation to the basement.

DESCRIPTION OF 34 QUEENS GROVE AND ADJOINING PROPERTIES

The existing property has five stories ranging from lower ground to the existing loft conversion at fifth floor level. The property is semi-detached sharing a party wall with number 35 Queens Grove.

It is of traditional construction; loadbearing masonry walls supporting timber floors to all levels and a timber rafter roof.

The adjoining properties are of similar construction and look to be in sound condition from an external non – intrusive visual examination.

GEOLOGY AND HYDROLOGY CONDITIONS **(see also report in Appendix A)**

A site – specific borehole has been sunk to 6.0m depth below lower ground level which is below the proposed formation level. This confirms that ground conditions are generally consistent with those expected for the area. Specifically this comprises of dark brown clayey made ground to depth of 0.8m underlain by mid brown clay containing grey mottle (London Clay) to 6.0m where the borehole terminates. Please see appendix A for the full geotechnical and hydrological report.

The borehole was noted to be dry on completion and as such it is unlikely groundwater will be affected by the basement development.

The basement will be designed with the recommendations of BS8102:1990; Protection of structures against water from the ground. Clause 3.4 states that a water table should be assumed at 1.0 metre below ground level.

The design bearing pressure will be limited to 175kN/m^2 which, given the in-situ testing noted from the borehole, we consider conservative. Therefore at formation level, the existing geology at the depth of the proposed basement will be capable of supporting the loads generated by the new structure.

Any effect on surface water will be negligible as the rear basement will have 1.0m of soil above the basement slab allowing free drainage of surface water.

The site – specific borehole has identified a limited amount of ground water within the zone of the new structure. Ground water will be able to flow around and under the proposed basement within the permeable sand and gravel layer identified in the site investigation and so the impact on ground water flows and levels will be negligible.

PROPOSED WORKS

As can be seen from the proposed drawings in appendix C, the proposed works involve the construction of a retrofit basement under the rear garden.

The underpins will be constructed using reinforced concrete (RC) as will the new basement slab and retaining walls for the light well. The ground floor support will be via steel beams positioned under the existing load bearing walls. Any new floor structure at ground level will be constructed from timber joists or beam and block as specified by the client depending on their requirements.

The proposed basement under the existing property will be formed using an underpinning method, constructed in sections each no wider than 1000mm, with no adjacent underpins constructed within a 48 hour period. This method of construction reduces the amount of potential ground movement and so minimises the effects of settlement of the adjacent structures.

DESIGN PRINCIPALS AND PHILOSOPHY

Design Philosophy

The design of the structural elements will be carried out in such a way to limit the impact of the structural works on the existing building construction and that of the neighbouring properties.

Deflection Limits

Beams supporting existing masonry	= span/500 Total Load
Beams supporting new structure	= span/360 Live Load

New Basement Structure

The existing load – bearing structure will be underpinned in a traditional ‘1 to 5’ sequence. The underpins will comprise of a vertical stem which will be immediately beneath the existing wall and will be at least the same thickness as the existing wall. In the case of a party wall, the rear face of the stem will be in line with the face of the wall above so as not to encroach into the adjacent

property's space, should they wish to construct a similar basement in the future. The reinforcement in the stems will be designed for bending about the top of the base in the permanent case.

The vertical loads applied to the underpin stems from the existing structure will be calculated according to the thickness and height of the existing structure above.

The underpins will be designed for the temporary and permanent cases, as follows: In the temporary case, the underpins will be designed for soil pressures and a surcharge. The factor of safety against overturning and sliding will be taken as 1.5.

In the permanent case, the underpins will be designed for soil pressures, a surcharge and water pressures calculated at 1 m below the retained height. The new basement slab will be structurally connected to the underpinning bases using dowel bars, therefore it will be assumed that the new basement slab will restrain the under pins against sliding.

Surcharge on the underpins will be taken as follows:

Internal live load (e.g. floors) = 10.0 kN/m^2
Space underneath existing timber joists = 10.0 kN/m^2
External: gardens, footpaths, driveways = 10 kN/m^2
External: up to or within 1.0m of the highway = 20 kN/m^2

The basement slab will be designed for uplift due to water pressure, spanning between the bases of opposite underpins. The net uplift pressure is taken as the head of water minus the dead load of the basement slab and any permanent finishes, e.g. screed.

Geotechnical Design

The retaining walls will be designed using 'active' pressures (where movement of the retaining wall is likely and acceptable), as opposed to 'at rest' pressures (where movement of the retaining wall is unlikely or unacceptable). The underpinning process, where soil is excavated underneath an existing load – bearing wall and a vertical shear face of soil is exposed, allows the excavated face of soil to move, thus mobilizing the 'active' pressures. In addition, once the underpin has been constructed and is working as a retaining wall, the retaining wall is likely to deflect, thus mobilizing the 'active' pressures. These movements will be very slight and will most likely have a negligible effect on the vertical settlement of the retained soil behind the underpinning / retaining walls. These movements are considered acceptable.

Ground – bearing pressures below the underpinning bases will be calculated for the temporary condition. In the permanent condition, the new basement slab will be tied in to the retaining wall bases, hence the entire substructure will act as a raft foundation. Ground – bearing pressures will not be an issue in this condition.

Water Table

The site specific borehole log shows some ground water to be present. The ground water will not be affected by the construction of the basement as the ground water will simply flow around and underneath the proposed basement.

An assumed accidental case will be used at 1.0 m below ground level for design of uplift on the slab and lateral forces on the retaining walls.

POTENTIAL IMPACT ON ADJOINING PROPERTIES

The underpinning of the perimeter walls and lowering of the floor slab will be carried out using an underpinning method, with each pin constructed no wider than 1000mm, with no adjacent underpins constructed within a 48 hour period.

The proposed works, if executed correctly and in accordance with the appointed Engineer's details and procedures, will pose no significant threat to the structural stability of the property or indeed adjoining properties.

SLOPE STABILITY

The site is located on ground that can be classified as flat (less than 7º) and so geological slope instability is not applicable to this site.

The proposed works will not alter the slope of the site profile to greater than 7º so geological slope instability will not become applicable to this site.

The presence of made ground to the depth of 0.8m below lower ground level does not constitute a cause for concern as this is less than a storey height and so will be removed as part of the basement construction.

DESIGN PRINCIPAL DRAWINGS

See drawings GA01, D01 in the Appendices. GA01 is a general basement plan showing the proposed underpinning bays and suggested underpinning sequence while D01 shows a section taken through the proposed underpinning to each of the party walls.

SPECIFICATION

Please see appendix F for the underpinning specification.

Prepared By

E. Alexander
B. Eng

Approved

Brian Cochrane

BEng, CEng, MIStructE.

APPENDICES

The following appendices are included with this report.

Appendix A	-	Site Investigation
Appendix B	-	Existing floor plans
Appendix C	-	Proposed floor plans
Appendix D	-	Design calculations
Appendix E	-	Construction Principal Drawings GA/01, D/01
Appendix F	-	Underpinning Specification

APPENDIX A

SITE INVESTIGATION

Geotechnical Survey Report

FSI Ref:	9144
Issue Date:	December 2014
Address:	34 Queens Grove London NW8
Engineer:	David Kavanagh / Dan Vickerstaff
Company:	Cranbrook Basements

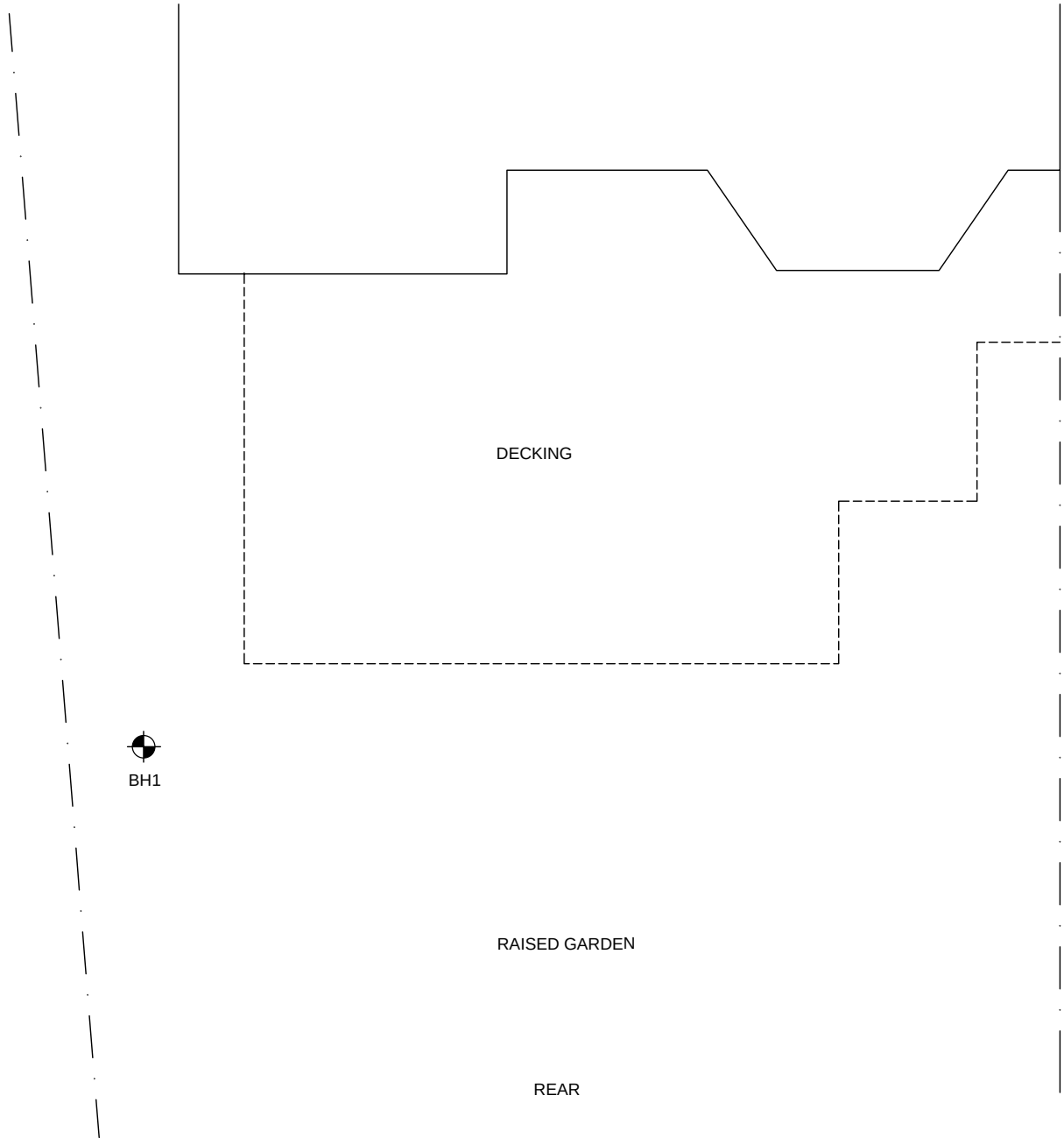
Director:	Martin Rush MSc FGS
Office Manager:	Louise Hiscock BSc (Hons)
Report Writer:	Perry Martin AMCIHT
Laboratory Manager:	Lara Knight

FASTRACK
Tyndales Farm, Southend Road, Woodham Mortimer,
Maldon, Essex, CM9 6TQ
Telephone: 0844 3358908
Fax: 0844 3358907
Email:enquiries@fastrackgroup.co.uk
Web: www.fastrackgroup.co.uk

Appendix No: 1
FSI Ref: 9144

SITE PLAN

Property Address: 34 Queens Grove, London, NW8
Client Claim Ref: 34 Queens Grove
Survey date: 10/12/2014
Operative: SE1



Scale:	Drawn by:	Key:
NTS	LK	Trial Pit, Borehole, Manholes, Rain Water Pipe, Soil & Vent Pipe, Surface Water Gully, Foul Water Gully, Shrub, Tree (Conifer), Tree (Deciduous)

FASTRACK
Tyndales Farm, Southend Road, Woodham Mortimer
Maldon, Essex, CM9 6TQ
Tel: 0844 3358908
Fax: 0844 3358907
Email: enquiries@fastrack-geotechnical.co.uk
Web: www.fastrack-geotechnical.co.uk

Appendix No: 2
FSI Job No: 9144

BOREHOLE LOG

Property Address: 34 Queens Grove, London, NW8
Client Claim Ref: 34 Queens Grove **Survey date:** 10/12/2014 **Operative:** SE1

Borehole ID: BH1 Hole Type: FA Scale: 1:35

Water Strikes	Samples Type	Samples Depth (m)	Insitu Tests Type	Insitu Tests Results	Depth (m)	Legend	Stratum Description and Observations
							Dark brown Topsoil
					0.30		Dark brown clayey MADE GROUND containing brick and gravel
					0.80		Mid brown CLAY containing grey mottle Noted to contain orange sand pockets from 0.80m to 2.20m
		1.00	V	104.00 104.00			
		2.00	V	118.00 122.00			
		3.00	V	140.00			
		4.00	V	140.00			
		5.00	V	140.00			
		6.00	V	140.00	6.00		End of Borehole at 6.00 m

1 2 3 4 5 6

Key: ▽ Water Strike D Disturbed Sample V Insitu vane test (kPa) MP Mackintosh Probe Test

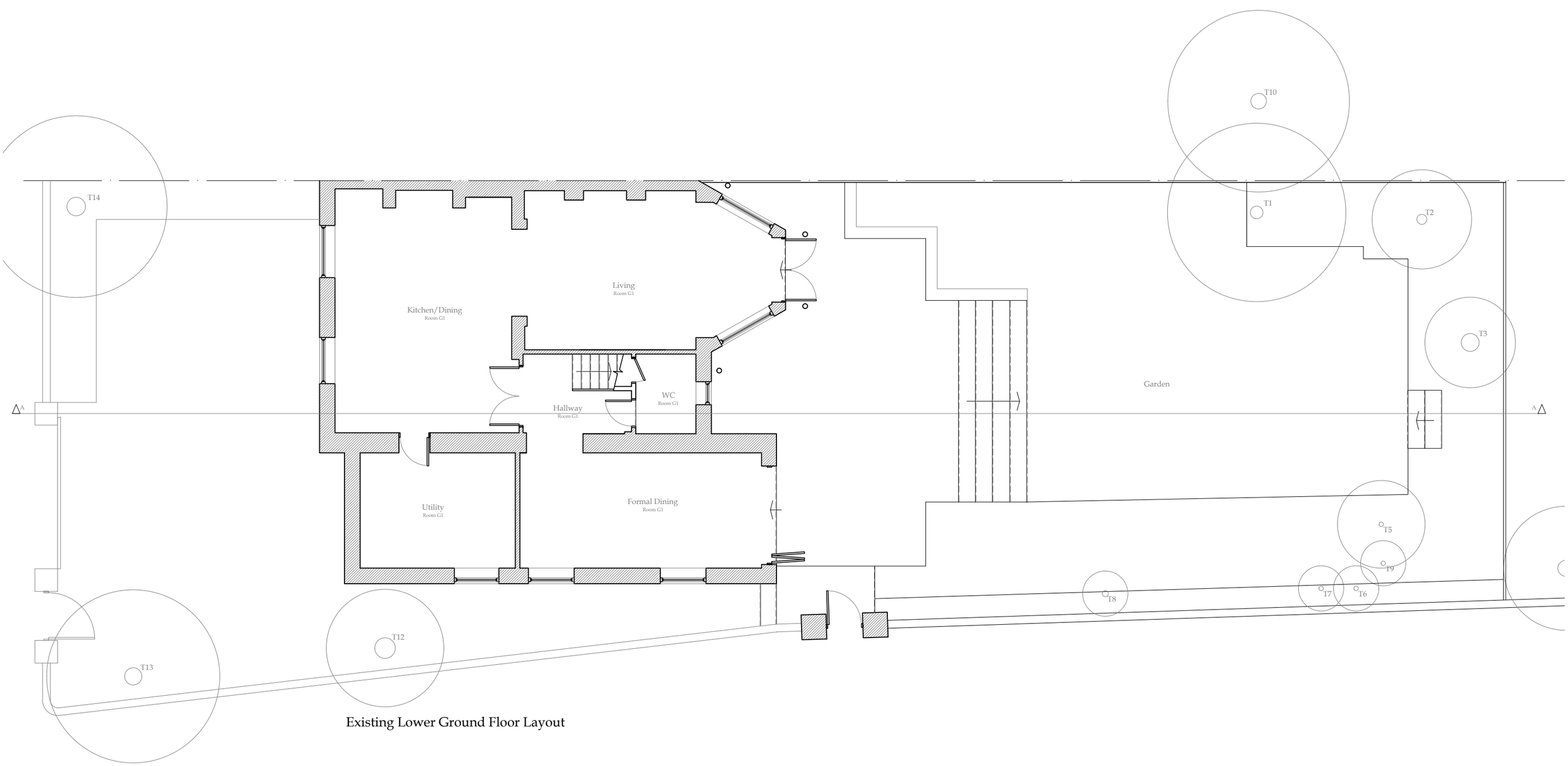
Remarks: Borehole was closed at 6.00m as requested. Borehole was noted to be dry on completion.

N.b. Unless otherwise stated small vane paddle used. To convert MP to SPT divide average blows for 75mm by 1.5

AGS

APPENDIX B

EXISTING PLANS



Existing Lower Ground Floor Layout

METRES

0 5

SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Existing Lower Ground Floor Layout

Scale : 1:100 @ A3

Date : 9 Jan 15

Status : DESIGN

Rev :

Dwg No : 2238-100

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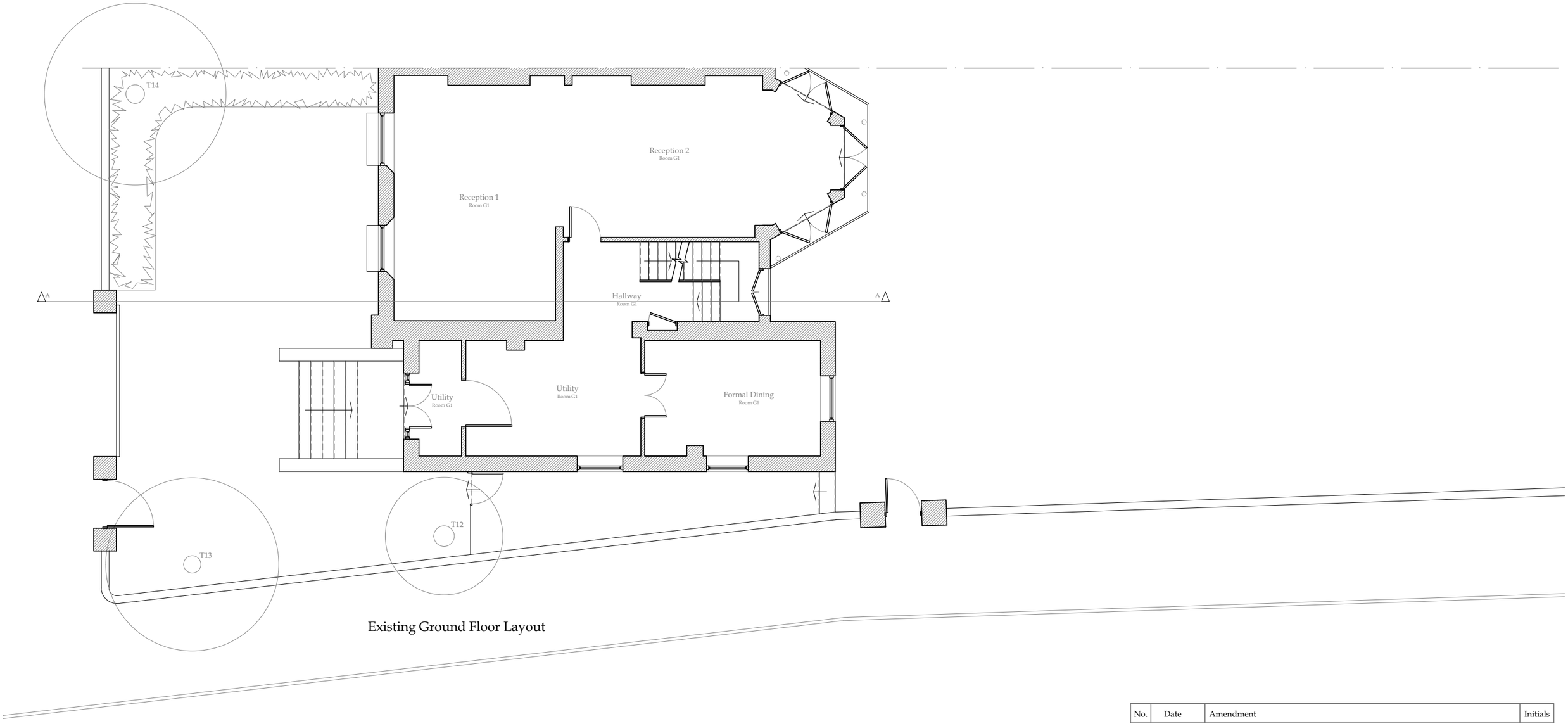
26-28 Hammersmith Grove,
Hammersmith,
London, W7 7BA
T +44 (0)208 551 5555
F +44 (0)208 551 1580
admin@cranbrook.co.uk
www.cranbrook.co.uk



Existing Ground Floor Layout

METRES

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SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Existing Ground Floor Layout

Scale : 1:100 @ A3

Status : DESIGN

Rev :

Date : 9 Jan 15

Dwg No : 2238-101

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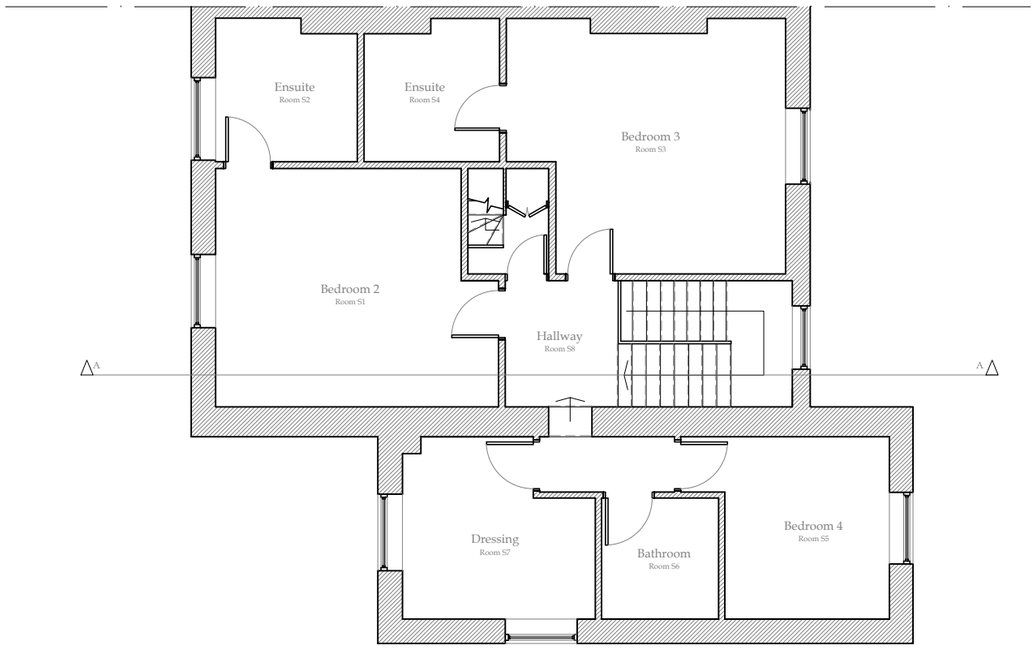
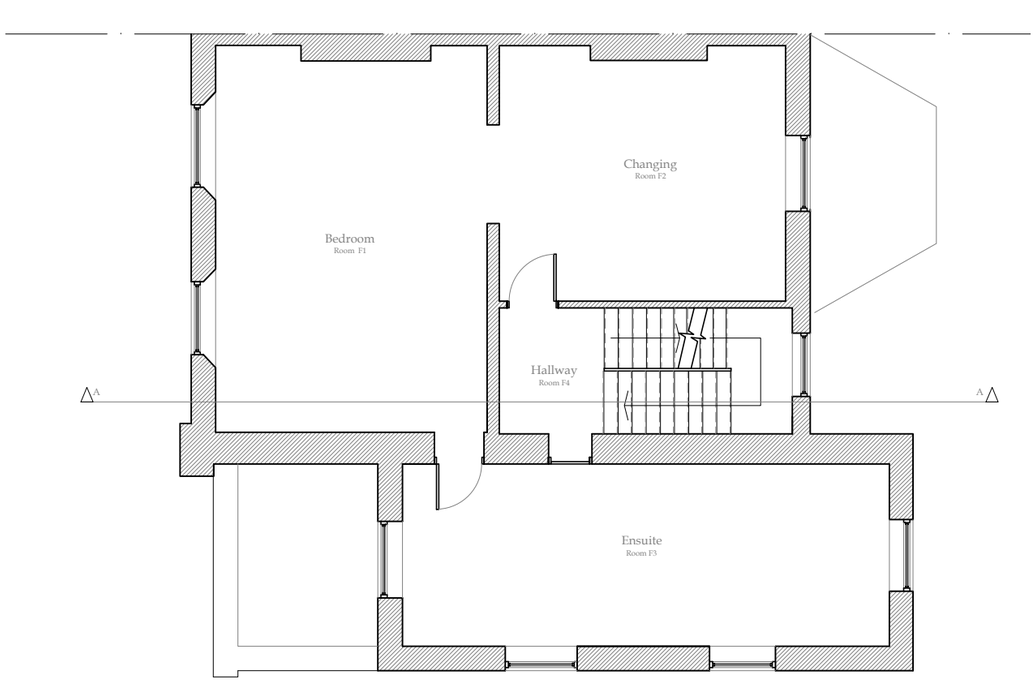


Existing Second Floor Layout



Existing First Floor Layout

METRES

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SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Existing First and Second Floor Layouts

Scale : 1:100 @ A3

Status : DESIGN

Rev :

Date : 9 Jan 15

Dwg No : 2238-102

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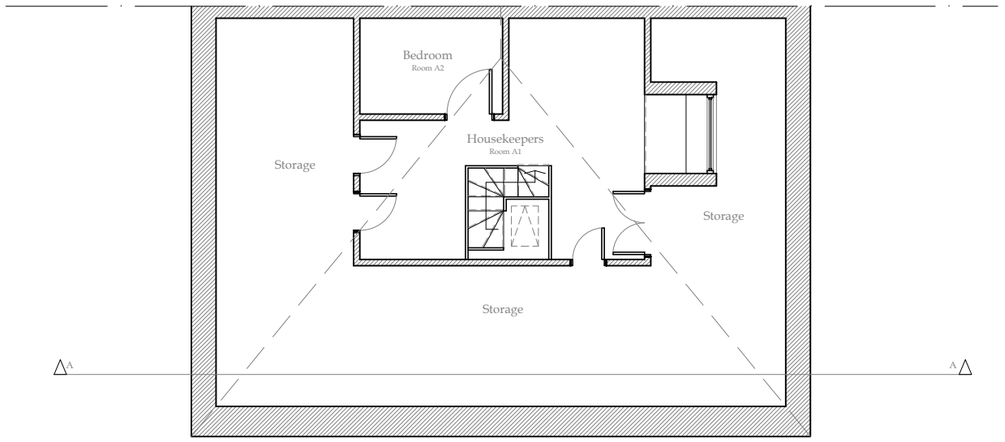

Existing Attic Layout

METRES

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SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Existing Attic Layout

Scale : 1:100 @ A3

Status : DESIGN

Rev :

Date : 9 Jan 15

Dwg No : 2238-103

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F +44 (0)208 551 1580
admin@cranbrook.co.uk
www.cranbrook.co.uk

Existing Front Elevation

Existing Rear Elevation

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Existing Front and Rear Elevations

Scale : 1:100 @ A3

Status : DESIGN

Rev :

Date : 9 Jan 15

Dwg No : 2238-104

METRES

0 5

SCALE

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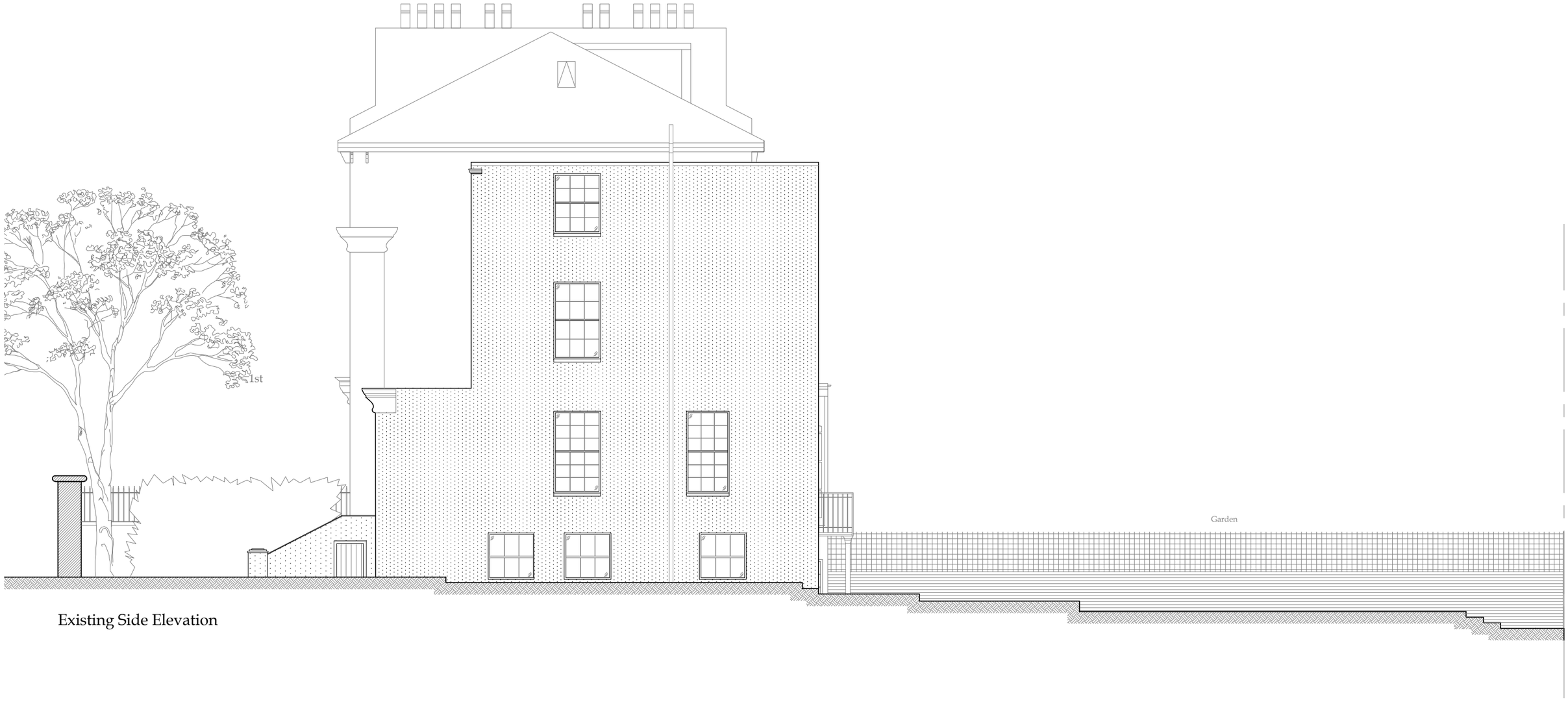

Existing Side Elevation

METRES

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SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Existing Side Elevation

Scale : 1:100 @ A3

Status : DESIGN

Rev :

Date : 9 Jan 15

Dwg No : 2238-105

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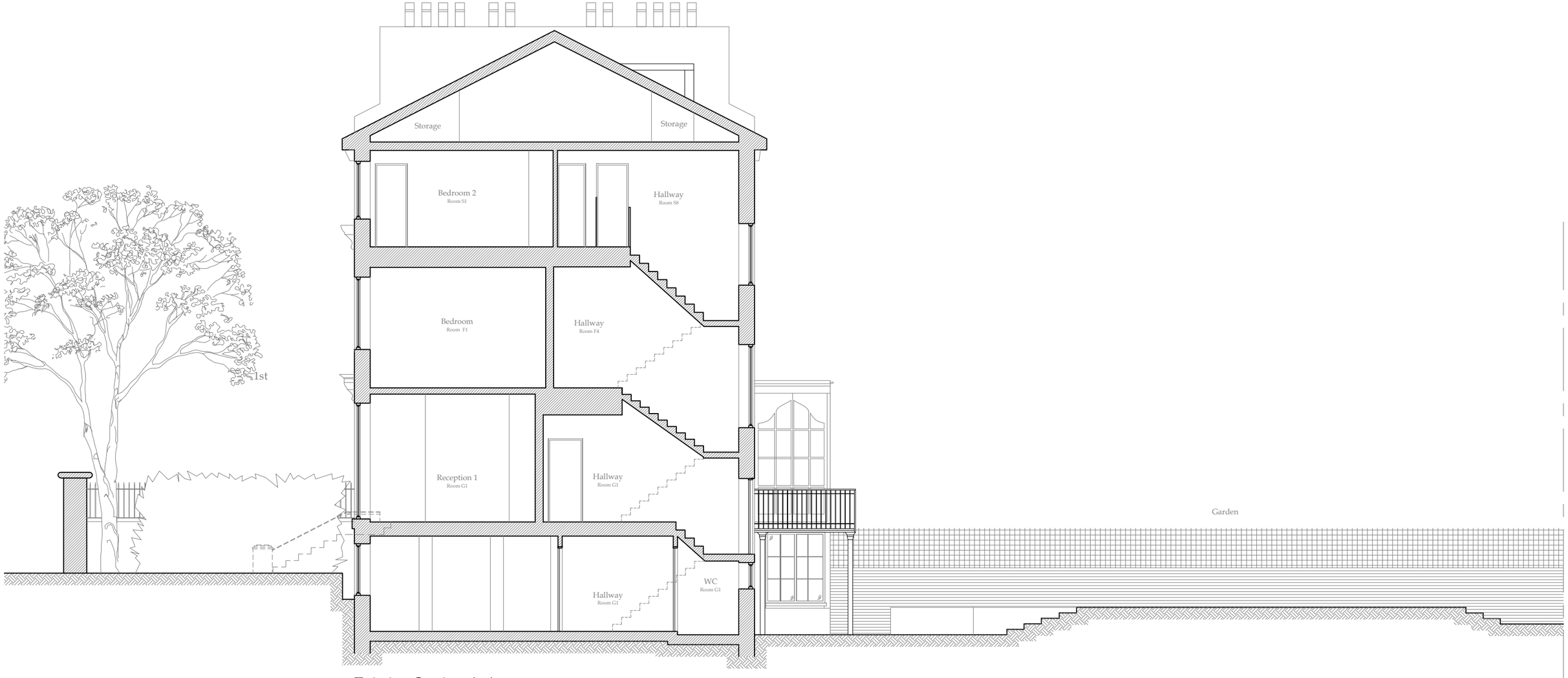

Existing Section A-A

No.	Date	Amendment	Initials

Client :	Ms L Clarke
Project :	34 Queen's Grove London NW8 6HN
Drawing :	Existing Side Elevation
Scale : 1:100 @ A3	Status : DESIGN / Rev :
Date : 9 Jan 15	Dwg No : 2238-105

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Hammersmith,
London, W7 7BA
T +44 (0)208 551 5555
F +44 (0)208 551 1580
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METRES
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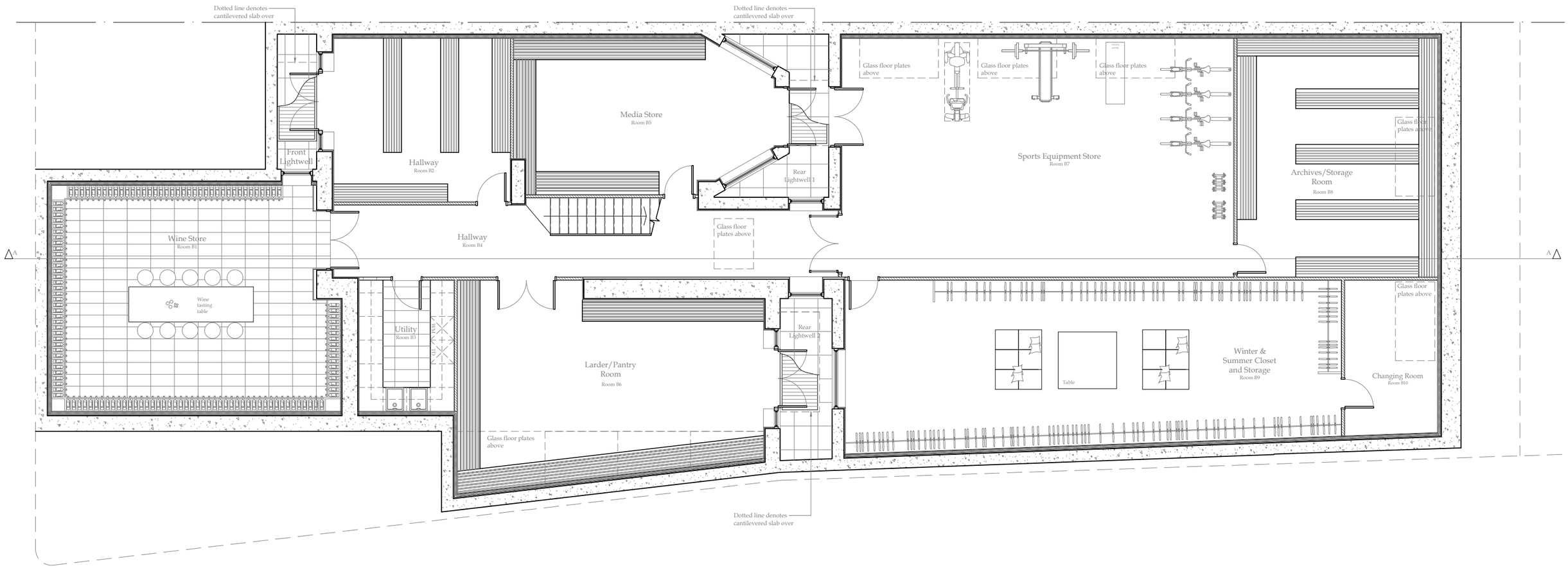
SCALE

APPENDIX C

PROPOSED PLANS



Proposed Basement Layout

METRES

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SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : Proposed Basement Layout

Scale : 1:100 @ A3

Date : 29 Jan 15

Status : DESIGN

Rev :

Dwg No : 2238-200

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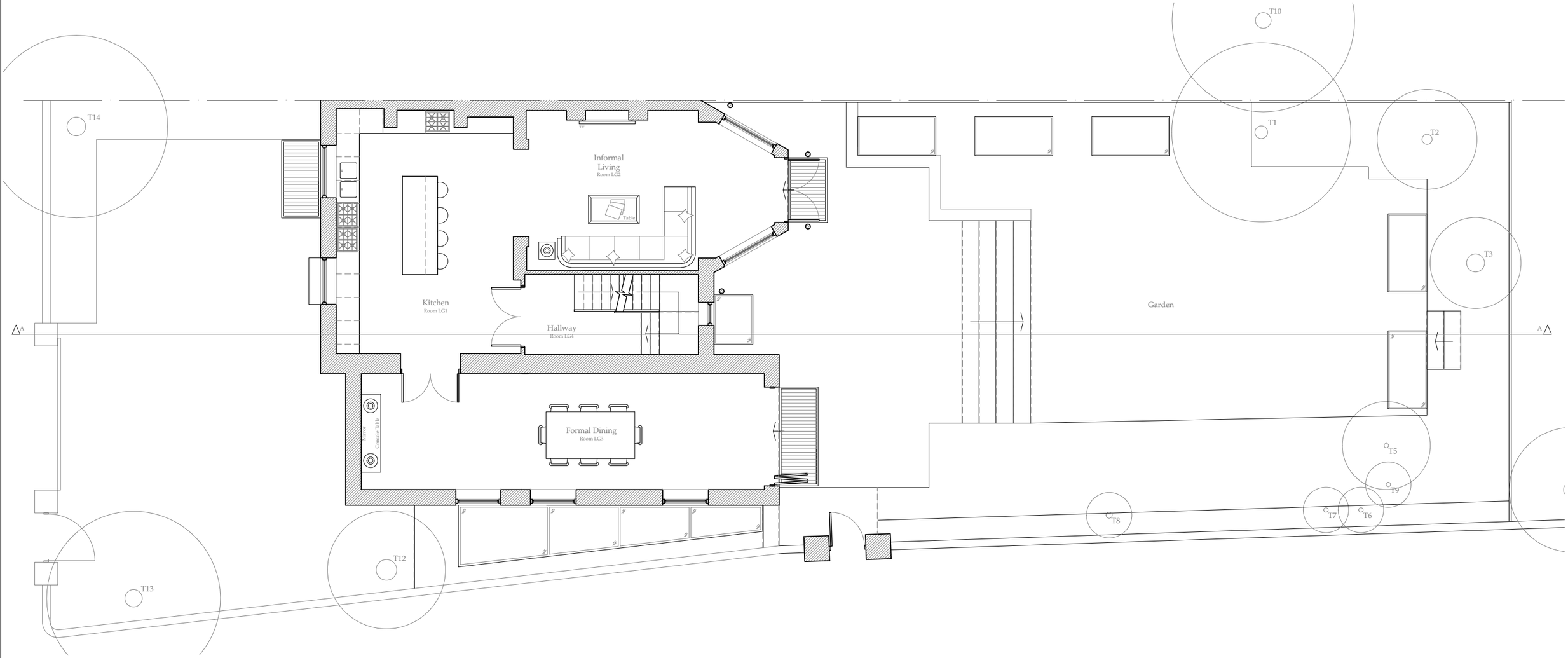

Proposed Lower Ground Floor Layout

METRES

0 5

SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
London
NW8 6HN

Drawing : ProposedLower Ground Floor Layout

Scale : 1:100 @ A3

Date : 07 Jan 15

Status : DESIGN

Rev :

Dwg No : 2238-201

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Existing Front Elevation
(As proposed)

Existing Rear Elevation
(As Proposed)

METRES
0 5
SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
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Drawing : Proposed Front & Rear Elevations

Scale : 1:100 @ A3

Date : 29 Jan 15

Status : DESIGN

Rev :

Dwg No : 2238-202

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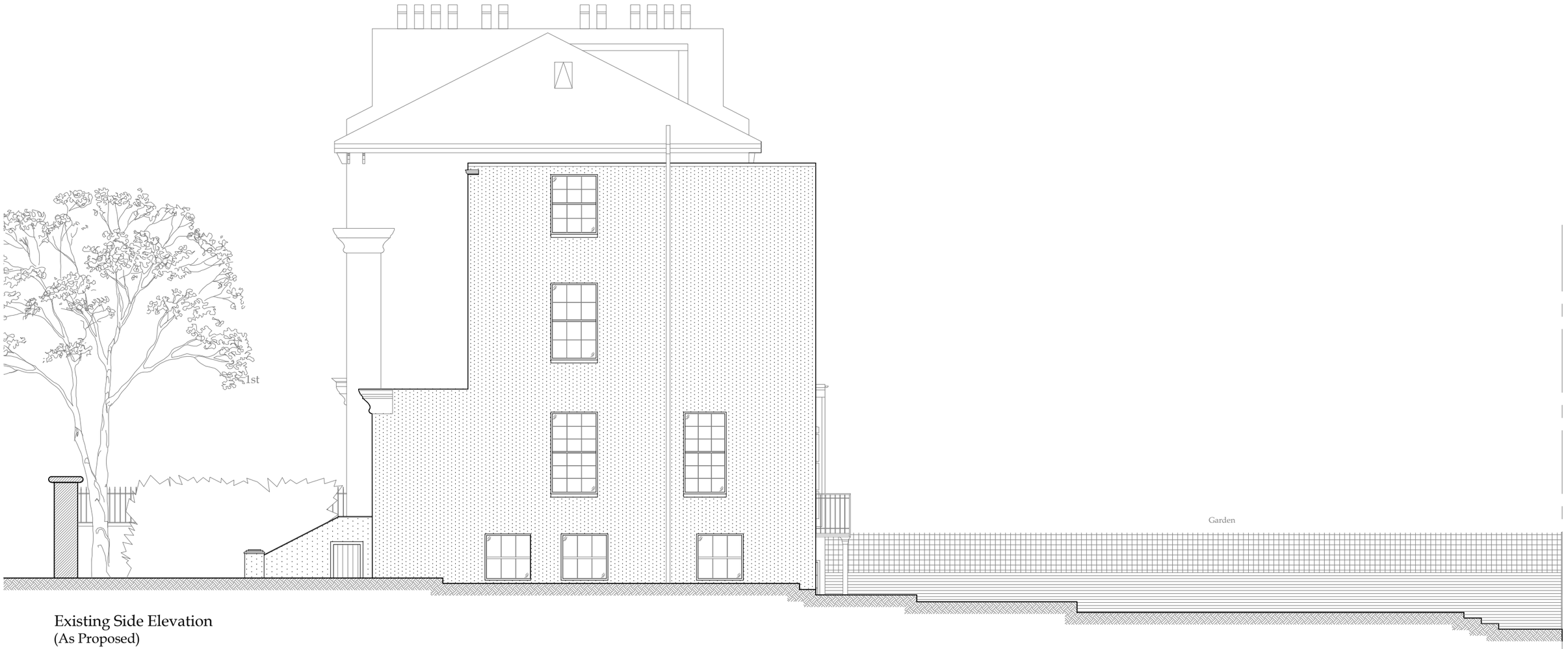

Existing Side Elevation
(As Proposed)

METRES
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SCALE

No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
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NW8 6HN

Drawing : Proposed Side Elevation

Scale : 1:100 @ A3

Date : 29 Jan 15

Status : DESIGN

Dwg No : 2238-203

Rev :

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No.	Date	Amendment	Initials

Client : Ms L Clarke

Project : 34 Queen's Grove
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Drawing : Proposed Section

Scale : 1:100 @ A3

Date : 29 Jan 15

Status : DESIGN

Rev :

Dwg No : 2238-204

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METRES

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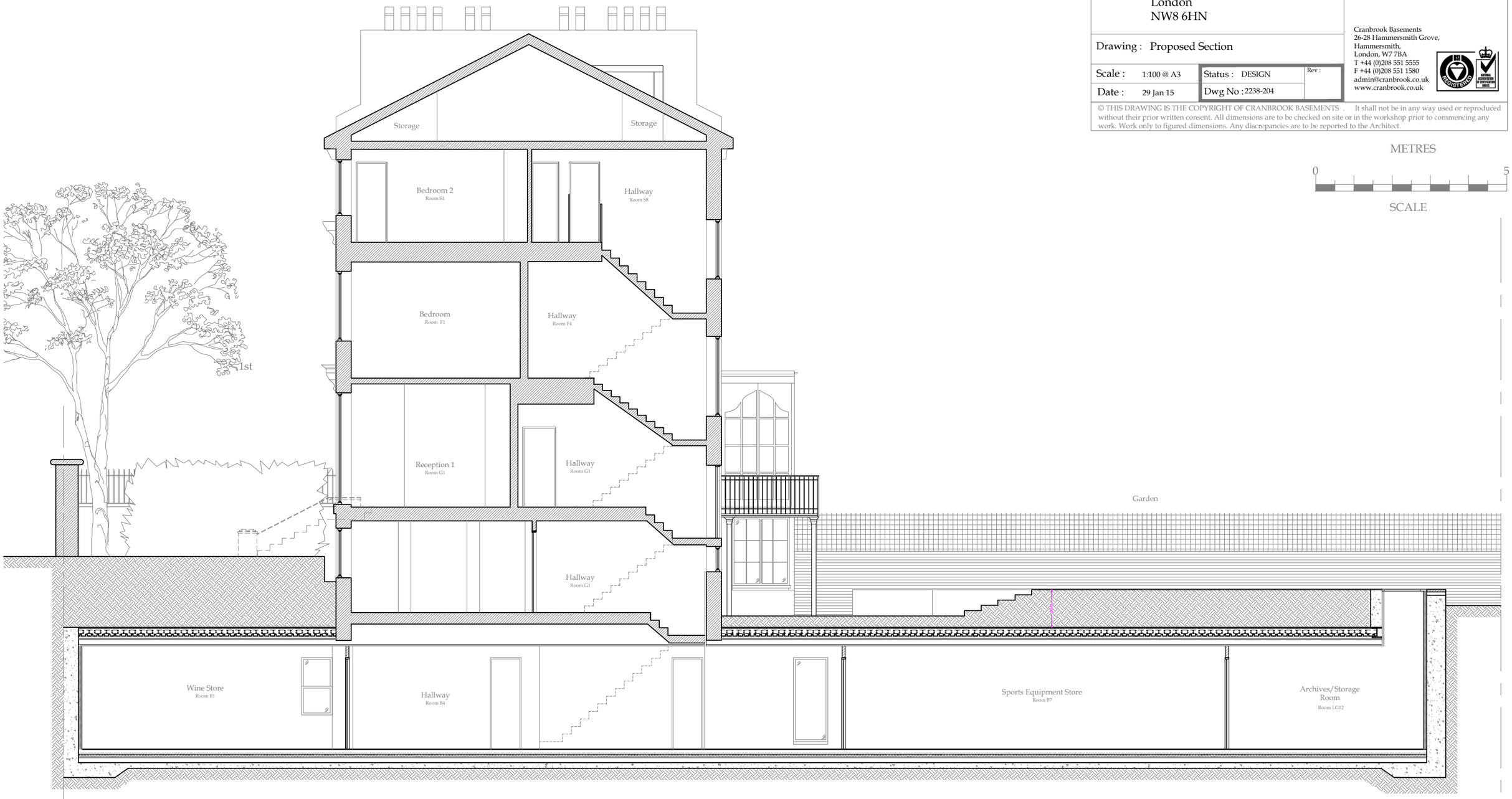
SCALE



Proposed Section A-A