Our Ref: P24-0500/DC
Your Ref: DK
Direct Dial: 01279 648076
Email: dclaydon@barker-associates.co.uk
Date: 03 July 2024

Head Office
Majesty House
Avenue West
Skyline 120 Braintree
Essex CM77 7AA

Planning Case Officer
Camden Council
Planning Department
5 Pancras Square
Kings Cross
London
N1C 4AG

Dear Sirs

31 Willoughby Road– Proposed Basement Works

We confirm that the following document has been reviewed and is to be read in conjunction with the Barker Associates Design Philosophy report and associated drawings.

1. Cranbrook Basement Design and Construction Ltd – Construction Method Statement ref 2362 dated 18th April 2024.

Should you have any queries on the above or require any additional information please do not hesitate to contact us.

Yours sincerely,

Barker Associates | Daniel Claydon B.Eng (Hons) C.Eng M.I.Struct.E

31 Willoughby Road
London
NW3 1RT

Basement Engineering Method Statement

Construction Method Statement

Client: Mr J Przewozniak & Ms M Eleuteri

Document details:

Project number:	2362
Issue date:	18th April 2024
Written by:	David Kavanagh
Reviewed by:	Mr Daniel Claydon Barker Associates BEng hons CEng MIstructE
Revisions:	-

Contents:

Appendices:

1.0 Introduction

1.01 This Method Statement has been prepared for Mr J Przewozniak & Ms M Eleuteri in connection with the construction of a proposed Basement at 31 Willoughby Road NW3 1RT.

1.02 This Method Statement is based upon drawings submitted for Planning approval to Camden Council produced by Cranbrook Basement Design and Construction Ltd – drawing references relating to which are as follows; 2362/100.1/101.1/102.1/103.1/104.1/105.1/106.1/107.1/108.1/109.1 and 2362/200.1/201.1/202.1/203.1/500/501.

1.03 The Structural and Technical Details to be relied upon will be produced for the Client by Barker Associates.

1.04 A copy of the Structural Engineering calculations has been included with this planning application.

2.00 Project Overview

2.01 The subject Property is located on the Willoughby Rd, a short distance from both Hampstead High Street and Hampstead Heath.

2.02 Parking restrictions exist immediately outside the property, so parking suspensions will be required.

2.03 The Property has been constructed with existing Ground, First, Second and Third/Loft floor levels and is of brick wall construction with tiled pitched roof over.

2.04 An application will be required to Camden Council for storage of materials and appropriate enclosure licenses to execute the works.

2.05 Party Wall Notices will be served upon all of the adjoining owners.

2.06 There are no obvious structural defects visible upon initial inspection. The Property is in a good general condition, as would be expected given its age and construction.

3.00 Site Investigation

3.01 Geotechnical and Environmental Servics were commissioned to carry out a number of boreholes, including a 4.5 metre deep borehole in the front garden of the property.

3.02 The site investigation took place on 13th Jan 2016. The borehole that we refer to in this report was located within the front garden. As identified within the factual report, the borehole extended to a depth of 4.5 metres.

3.03 From the depths of 0.00m to 1.70m the ground conditions encountered were found to contain made ground (brown to dark brown sandy silty clay with gravel, ash, charcoal, rootlets and brick fragments).

3.04 From the depths of 1.70m to 2.40m made ground (orange-brown and grey mottled slightly silty clay with rare brick fragments) was encountered.

3.05 From the depths of 2.40m to 3.75m firm greenish grey and orange-brown slightly silty clay with carnbonaceous material and gravel encountered.

3.06 At a depth of 3.75 firm becoming stiff pale orange-brown becoming brownish grey slightly silty clay.

3.07 The borehole was terminated at 4.50m

4.00 Site Preparation & Enabling Works

4.01 Applications will be made to Camden Council for permission to site a builders hoarding to the front of the property.

4.02 The hoarding is to have an overall height of 2.4m and will be painted white.

4.03 Temporary water supply and electrical services are to be provided to the hoarding zone and will be retained in a safe condition for the duration of the contract period.

4.04 Form temporary access via front elevation for the location of electrical conveyor system.

4.05 Install electrically operated 450mm wide conveyor belt to provide mechanised removal of spoil from proposed basement zone. Initially the conveyor is to be located at floor level and inclined not exceeding 40° to the appropriate discharge height located directly over wait and load vehicle.

4.06 Provide proprietary 110 volt power supplier complete with associated cut out fuse and the like to the conveyor belt.

4.07 Provide flexible dust sheet protection to the discharge point on the proposed conveyor.

4.08 As the work extends to the deeper sections of the basement provide elongated conveyor sections suitably restrained to provide mechanised spoil removal from the deepening excavation.

5.00 Demolition and Strip Out

5.01 Provide twin layer dust resistant screening at first floor level to reduce the impact of site works on the unaffected areas of the first floor.

5.02 Isolate existing gas, electrical and water mains which may be running through ground floor structure.

6.00 Underpinning

6.01 Excavate for underpin bases. Individual bases are not to exceed 1.0m in width and no two adjacent sections are to be excavated simultaneously. Excavation sequence to be 'hit & miss'.

6.02 At the prescribed level form the toe section to the proposed underpin installing fabric and general reinforcement as specified on Structural Engineers details. Minimum concrete cover to reinforcement to be 50mm.

6.03 To the exposed face of the excavation provide temporary propping which is to be propped back directly to the face of the retained unexcavated central soil mound.

6.04 In circumstances where the excavated face of the vertical pin section is deemed unstable provide temporary propping back to central soil mound.

6.05 Commence dry packing to top of vertical pin sections a minimum of 48 hours after concreting. Dry packing shall not exceed 75mm thick and shall only be placed after the underside of the existing foundation has been cleaned and regularised.

6.06 The central spoil mound is to be retained during excavation to provide suitable resistance against lateral movement in underpin wall sections.

6.07 Following completion of all underpin bays excavate remainder of central soil mound whilst introducing temporary lateral propping to concrete wall sections.

a) underpin bases and vertical sections are to be connected via steel

reinforcement starter bars which are to be chemically anchored using proprietary fixing resin to the adjacent concrete underpin at 200mm centres.

6.08 Introduce 200mm thick reinforced concrete intermediate floor designed as per Structural Engineers details.

6.09 Lay fabric mesh reinforcement to form basement slab all strictly in accordance with Engineers Designs with a minimum of 50mm concrete cover to steel work. Pour concrete slab forming basement concrete floor.

6.10 Introduce structural steel framework at ground floor level complete with column sections located over thickened slab areas.

7.00 Dewatering / Hydrology

7.01 From published data and our own comprehensive understanding of the underlying ground conditions gained from the numerous Basement projects in the vicinity of the applicant site suggests that the groundwater is unlikely to be encountered.

7.02 As the formation level of the proposed works is approximately 3.5m below the ground level, groundwater is unlikely be encountered. The groundwater will flow beneath and around the existing building within the existing underlying natural soils and gravels.

7.03 Arup's Subterranean Development Scoping Study (para 5.1) June 2008, notes that the impact of subterranean development on groundwater flows is negligible as groundwater flows will find an alternative route if blocked by a subterranean structure.

7.04 In the event that ground water is encountered during the course of excavation a localised excavated sump of size 1m x 1m x 1m is to be formed at a level lower than the progressive base of excavation being carried out.

7.05 A timber perforated plywood shell is to be constructed to support the perimeter of the temporary working sump and placed within the excavated zone.

7.06 Any ground water which is present will naturally pull within the sump area and at this point a 50mm diameter semi trash water pump unit is to be introduced with a 50mm diameter discharge hose.

7.07 Once located adjacent to the excavation level sump the solids pump hose is to be routed to the nearest adjacent manhole for discharge.

8.00 Below Ground Drainage

8.01 The basic waterproofing strategy is informed by the existing building and ground conditions. It is proposed that the concrete retaining walls and new floor slab will act as the primary barrier to possible water ingress, with an internal drained cavity membrane system installed internally in order to form a watertight enclosure.

8.02 The cavity drain system will include a cavity drain sump to collect any water which will then be pumped to the main private drainage system.

8.03 Record drawings indicate that existing foul and surface water sewers lie in Willoughby Road. A survey of the existing drainage system on site will be carried out to assess its existing condition and the connection point to the public sewer. The connection to the public sewer will be retained and reused where possible.

8.04 As the basement is being constructed beneath the building, the existing drainage will potentially have to be repositioned as part of the works. The proposed basement level is likely to be lower than the level of the existing public sewer connection as such the foul effluent generated at basement level will require to be pumped to the main private drainage system. This will prevent any flooding from public sewers in case of backup.

8.05 The proposed Basement scheme will not increase existing surface water areas on the site.

8.06 Product literature for Delta MS 500 and Delta PT waterproofing solutions and Delta pumps is appended to this Method Statement for information purposes.

9.00 Conclusion

9.01 The proposed works will involve the construction of a new basement under the partial footprint of the existing dwelling and will be constructed with reinforced concrete underpinning.

9.02 Given the depths to which this basement is being constructed it is essential that intermediate lateral propping is maintained until such time as the basement floor slab is constructed to ensure that movement in the underpinned sections does not occur.

9.03 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 adjoining properties.

9.04 The proposed drainage scheme for the new basement includes a foul pumping chamber and a cavity drain sump. The proposals are relatively

straightforward and have been successfully completed on a number of similar projects in London.

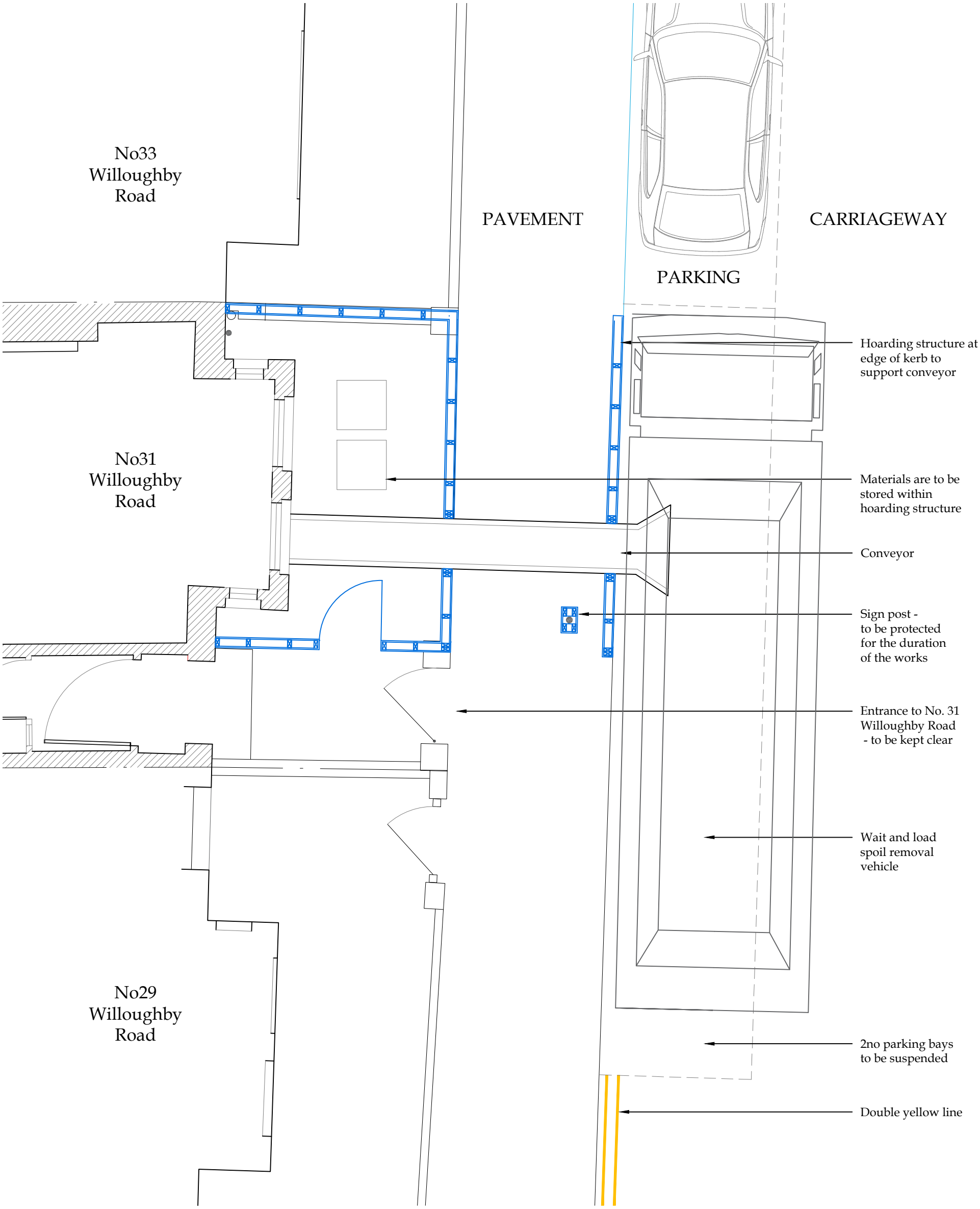
9.05 The impact of the new basement construction on the existing groundwater regime has been assessed. In this particular instance there is unlikely to be any noticeable effects on the hydrogeological environment in the area

9.06 The excavation of Basements below existing buildings is specialist work. Barker Associates have been appointed to prepare detailed designs and calculations, thereafter Barker Associates will have an on-going role during the works on site to monitor that the works are being carried out generally in accordance with their designs and specifications.

9.07 The agreed contents of this Basement Engineering Method Statement must be complied with unless otherwise agreed with the Council. The project manager shall work with the Council to review this Statement if problems arise in relation to the construction of the development. Any future revised plan must be approved by the Council and complied with thereafter.

Appendix A

Hoarding Drawings



Proposed Hoarding Plan

0 METRES 5

SCALE

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Hoarding Layout Plan

Scale : 1:50 @ A3

Status : CONSTRUCTION

Rev :

Date : 16 May 24

Dwg No : 2362-501.2

Cranbrook

Cranbrook Basements
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

Appendix B

Architectural Plans – Existing and Proposed

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing Basement Layout

Scale : 1:100 @ A3

Date : 12 Apr 24

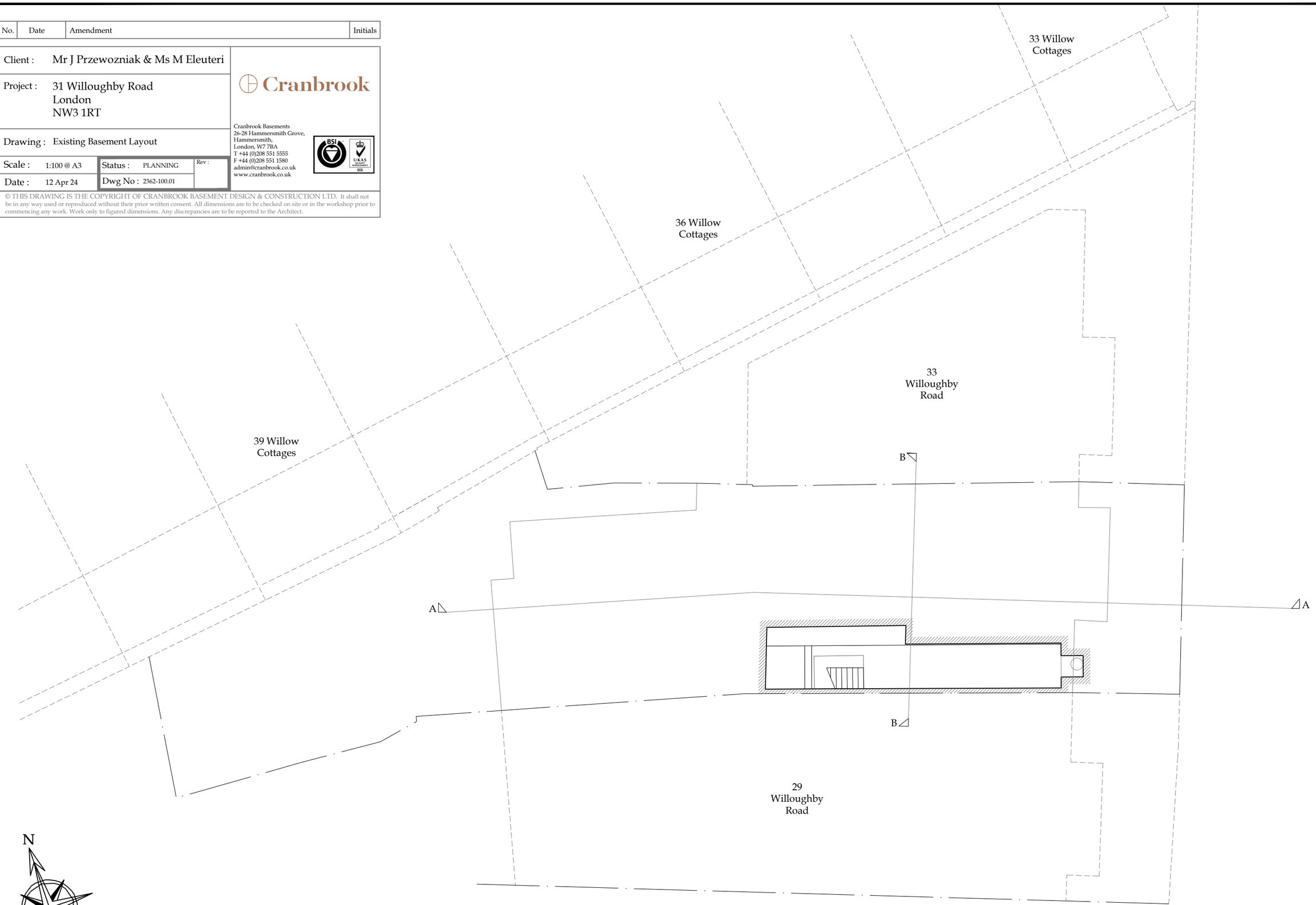
Status : PLANNING

Dwg No : 2362-100.01

Rev :

Cranbrook

Cranbrook Basements
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 Basement Layout

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Basement Layout

Scale : 1:100 @ A3

Date : 19 Apr 24

Status : PLANNING

Dwg No : 2362-200.01

Rev :

Cranbrook

Cranbrook Basements
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

33 Willow Cottages

36 Willow Cottages

39 Willow Cottages

33 Willoughby Road

29 Willoughby Road

5700

5700mm between proposed basement and rear elevation of Willow Cottages

Dotted red line indicates extent of building footprint over

A

A

B

B

Zone 01

Zone 02

Zone 03

Zone 04

Zone 05

Hallway

Storage

N

0 METRES 5

SCALE

KEY

Extent of proposed basement

Proposed Basement Layout

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing Ground Floor Layout

Scale : 1:100 @ A3

Date : 12 Apr 24

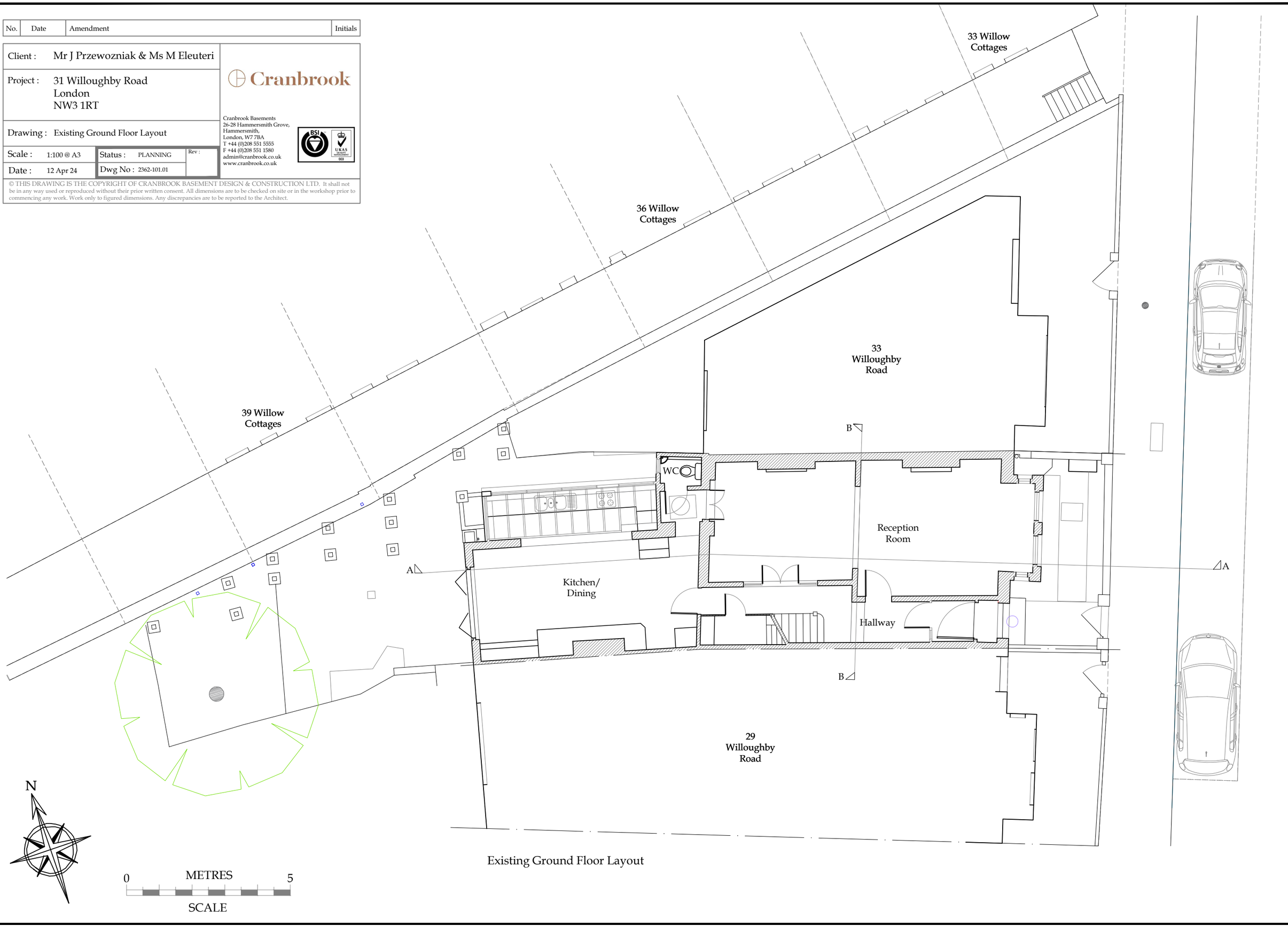
Status : PLANNING

Dwg No : 2362-101.01

Rev :

Cranbrook

Cranbrook Basements
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

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Ground Floor Layout

Scale : 1:100 @ A3

Date : 19 Apr 24

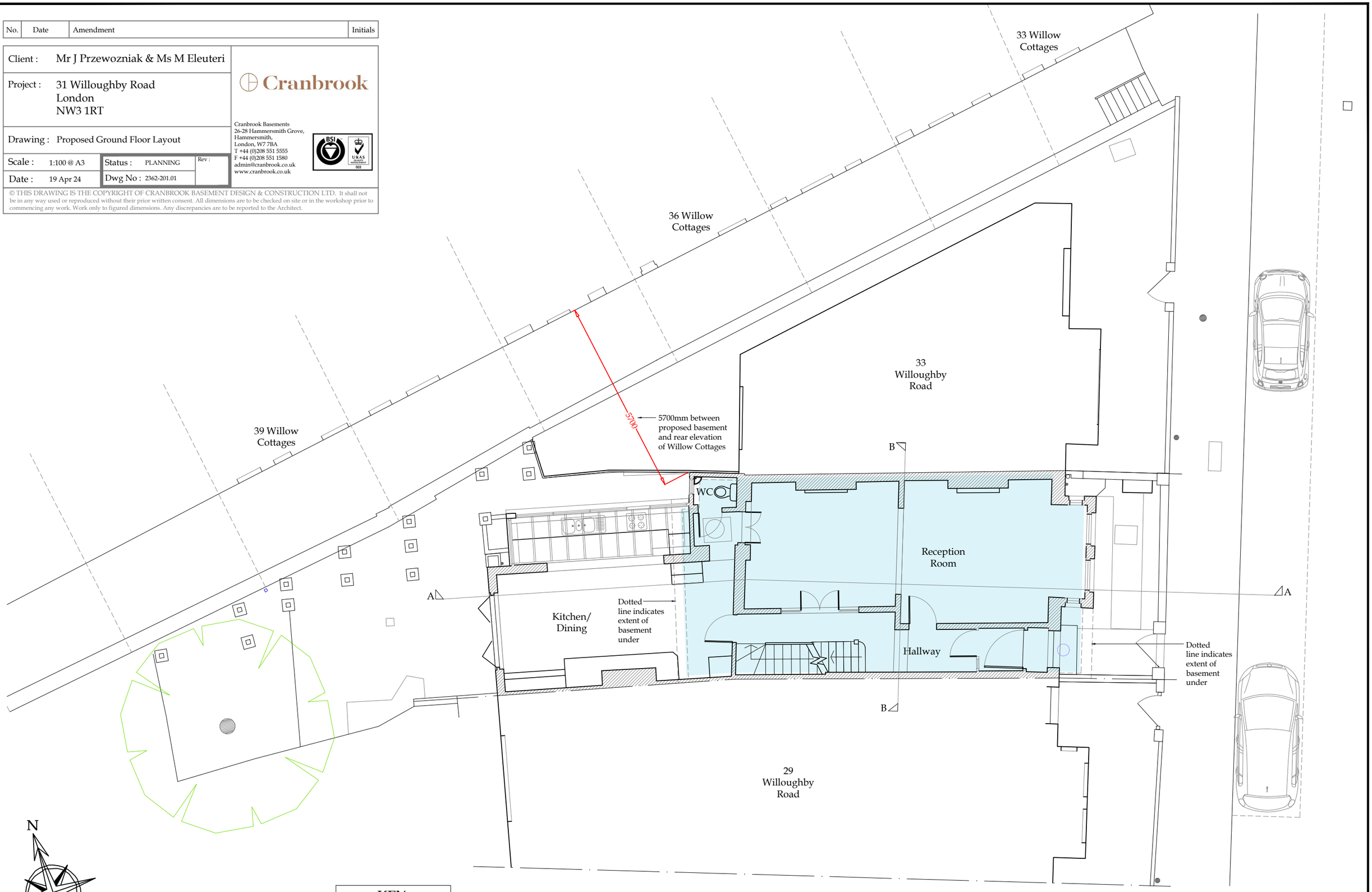
Status : PLANNING

Dwg No : 2362-201.01

Rev :

Cranbrook

Cranbrook Basements
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



Proposed Ground Floor Layout

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing & Proposed First Floor Layout

Scale : 1:100 @ A3

Date : 12 Apr 24

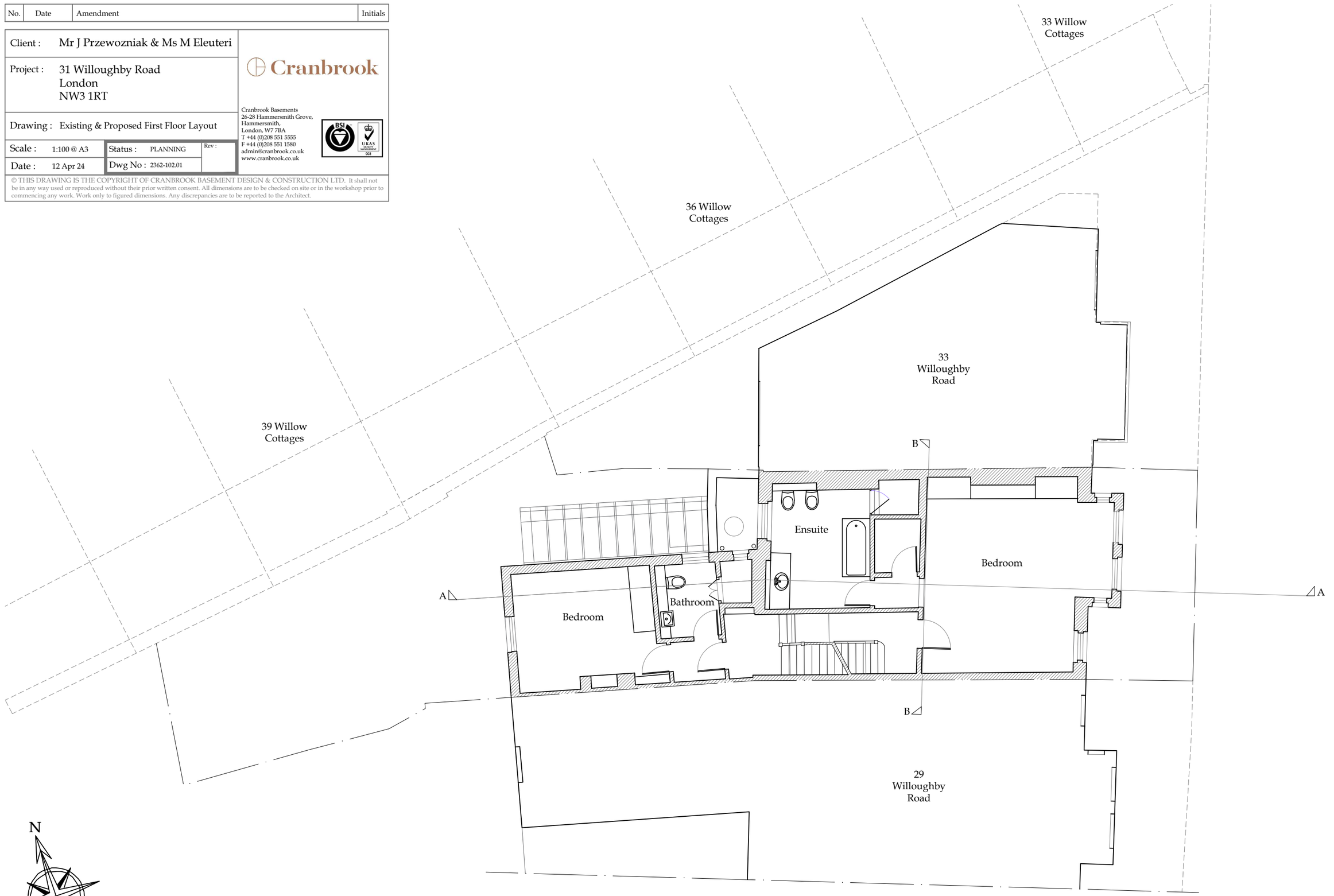
Status : PLANNING

Dwg No : 2362-102.01

Rev :

Cranbrook

Cranbrook Basements
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 & Proposed First Floor Layout

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing & Proposed Second Floor Layout

Scale : 1:100 @ A3

Date : 12 Apr 24

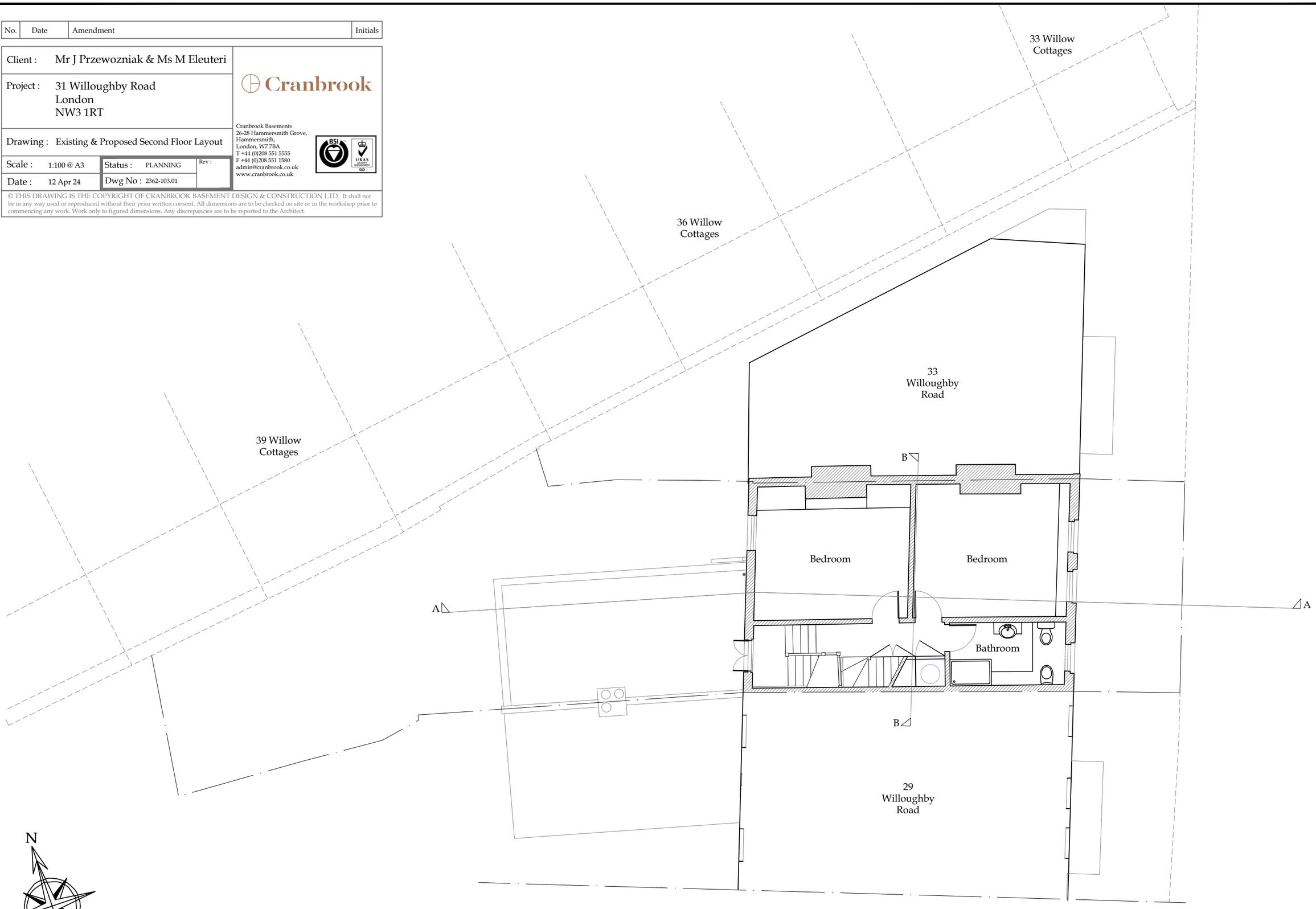
Status : PLANNING

Dwg No : 2362-103.01

Rev :

Cranbrook

Cranbrook Basements
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 & Proposed Second Floor Layout

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing & Proposed Third Floor Layout

Scale : 1:100 @ A3

Date : 12 Apr 24

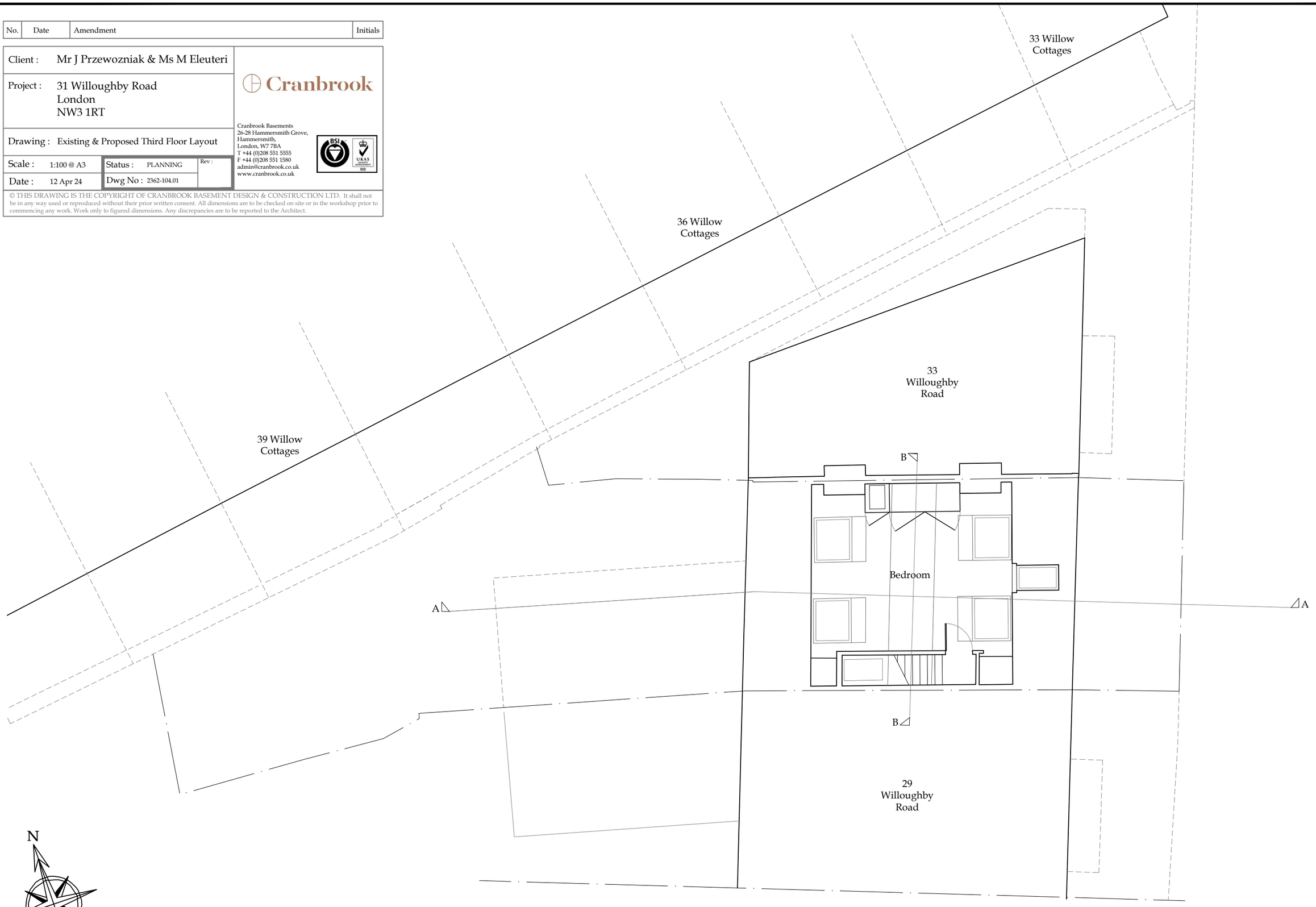
Status : PLANNING

Dwg No : 2362-104.01

Rev :

Cranbrook

Cranbrook Basements
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 & Proposed Third Floor Layout

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing & Proposed Third Floor Layout

Scale : 1:100 @ A3

Date : 12 Apr 24

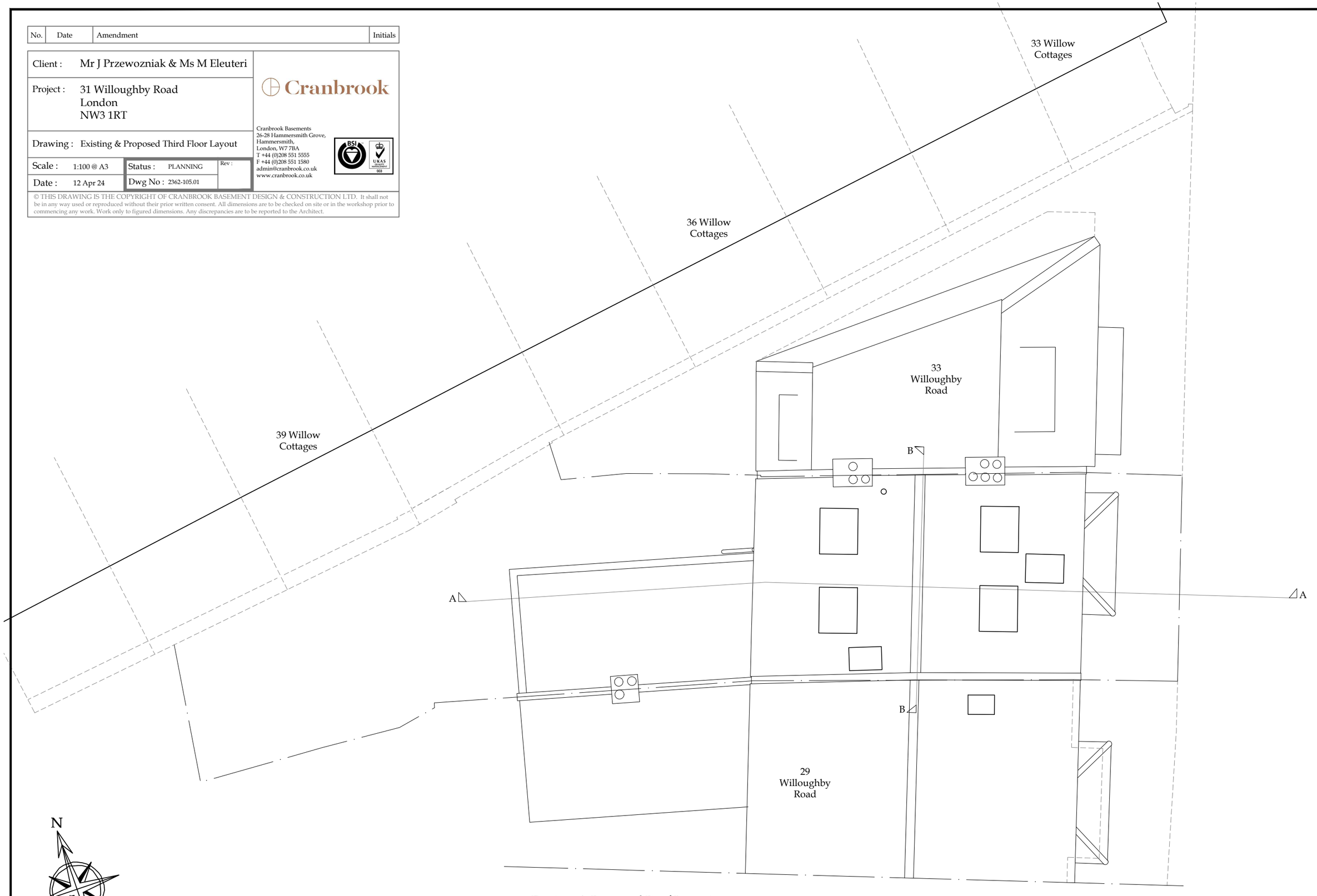
Status : PLANNING

Dwg No : 2362-105.01

Rev :

Cranbrook

Cranbrook Basements
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 & Proposed Roof Layout

0 METRES 5

SCALE

Existing Rear Elevation (South)

Existing & Proposed Front Elevation (North)

No.	Date	Amendment	Initials

Client :	Mr J Przewozniak & Ms M Eleuteri
Project :	31 Willoughby Road London NW3 1RT
Drawing :	Existing Front & Rear Elevations
Scale :	1:100 @ A3
Date :	12 Apr 24
Status :	PLANNING
Dwg No :	2362-106.01
Rev :	

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE

Proposed Rear Elevation (South)

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Rear Elevation

Scale : 1:100 @ A3

Date : 19 Apr 24

Status : PLANNING

Rev :

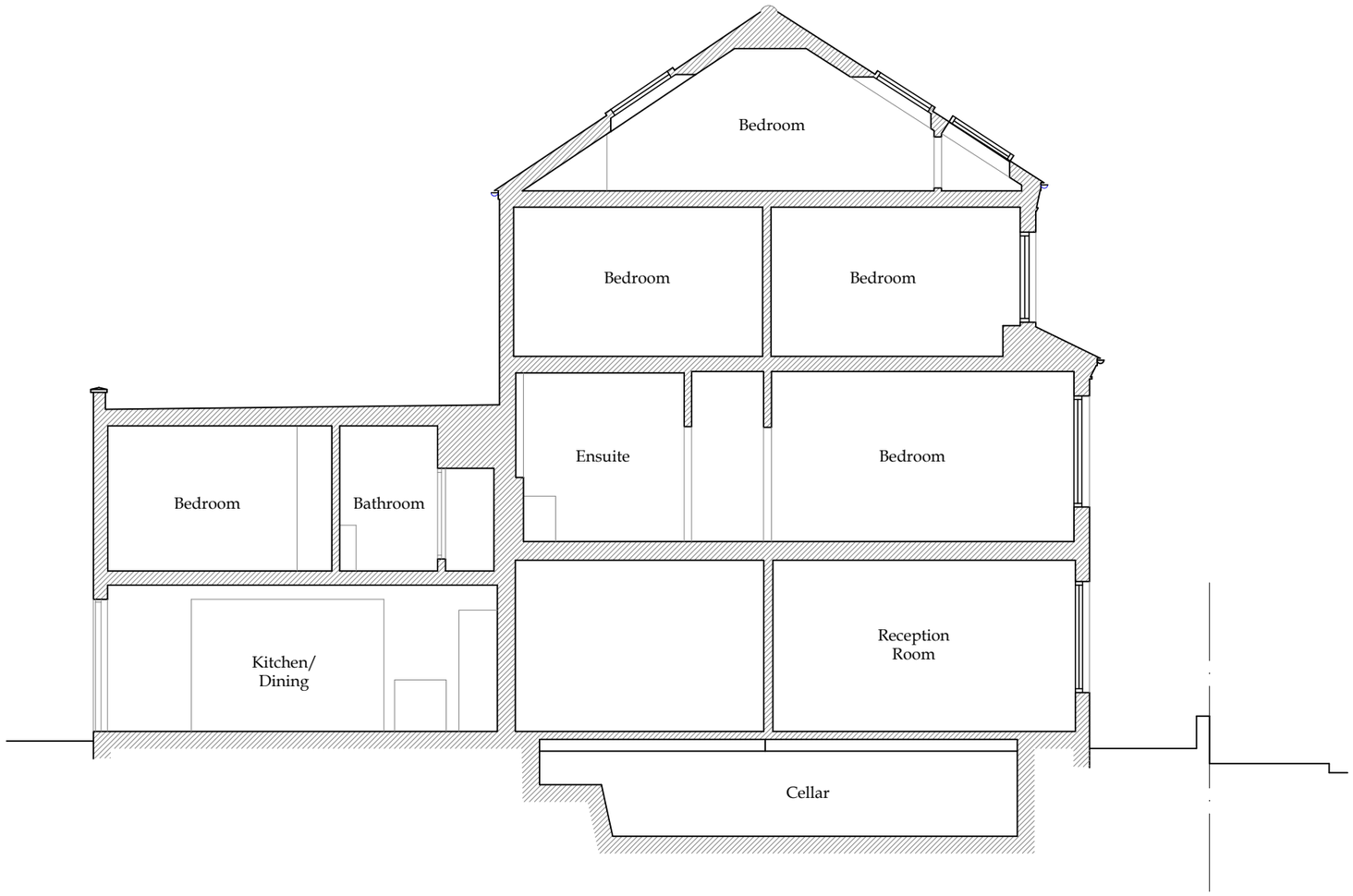
Dwg No : 2362-202.01

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE



Existing Section AA

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing Section AA

Scale : 1:100 @ A3

Date : 12 Apr 24

Status : PLANNING

Rev :

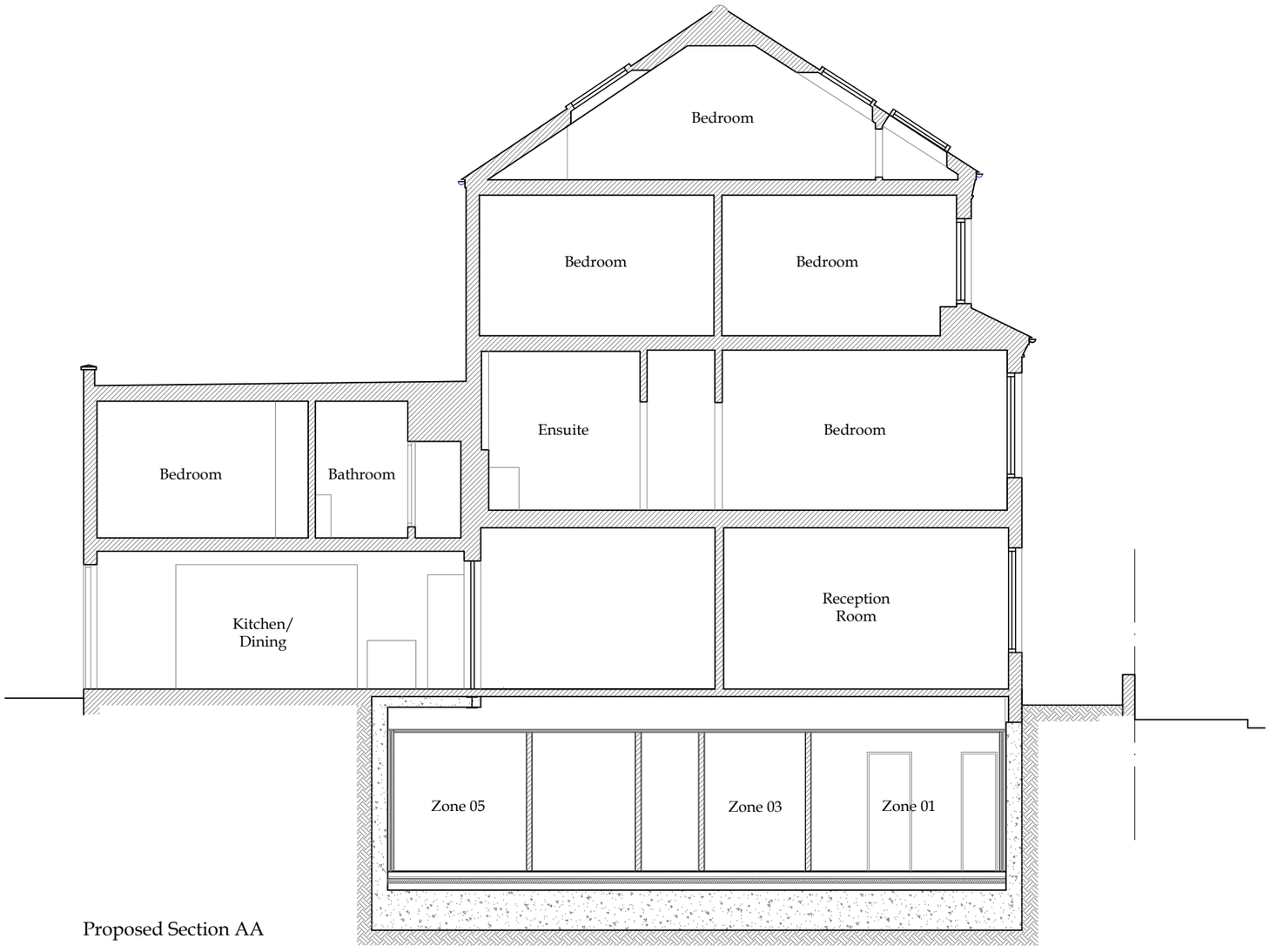
Dwg No : 2362-108.01

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE



Proposed Section AA

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Section AA

Scale : 1:100 @ A3

Date : 19 Apr 24

Status : PLANNING

Rev :

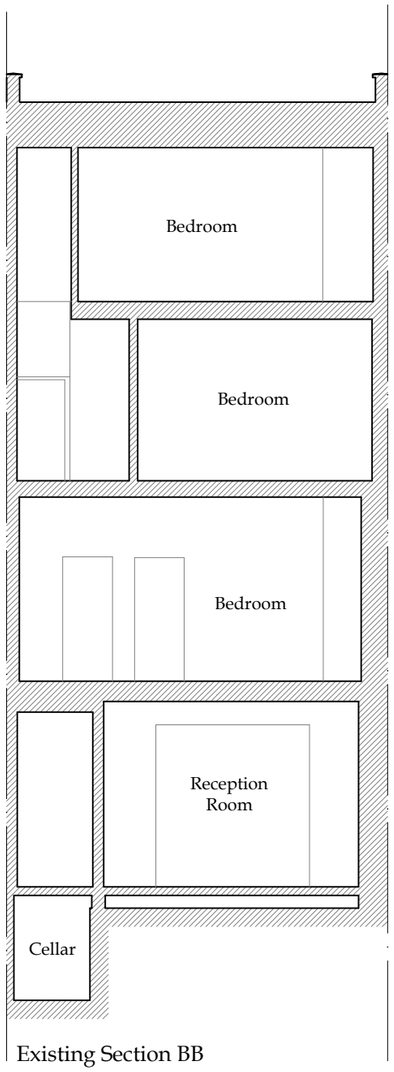
Dwg No : 2362-203.01

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE



Existing Section BB

No.	Date	Amendment	Initials

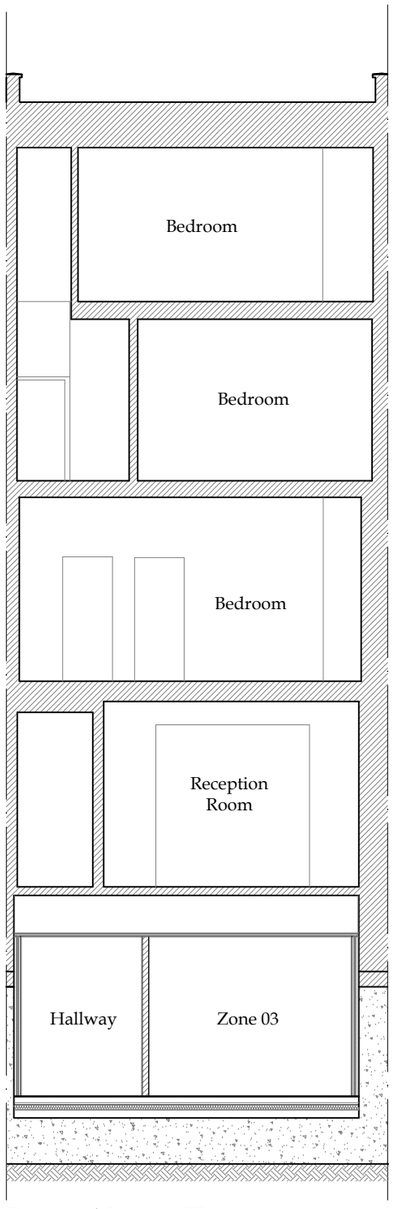
Client :	Mr J Przewozniak & Ms M Eleuteri
Project :	31 Willoughby Road London NW3 1RT
Drawing :	Existing Section BB
Scale :	1:100 @ A3
Date :	12 Apr 24
Status :	PLANNING
Rev :	
Dwg No :	2362-109.01

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE



Proposed Section BB

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Section BB

Scale : 1:100 @ A3

Date : 19 Apr 24

Status : PLANNING

Rev :

Dwg No : 2362-204.01

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE

Existing Side Elevation (West)

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Existing & Proposed Side Elevation

Scale : 1:100 @ A3

Date : 12 Apr 24

Status : PLANNING

Dwg No : 2362-107.01

Rev :

Cranbrook

Cranbrook Basements
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

0 METRES 5

SCALE

Proposed Side Elevation (West)

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Side Elevation

Scale : 1:100 @ A3

Date : 19 Apr 24

Status : PLANNING

Rev :

Dwg No : 2362-205.01

Cranbrook

Cranbrook Basements
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

N

METRES
0 10 20 30 40 50
SCALE

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Site Layout

Scale : 1:1250 @ A3

Status : PLANNING

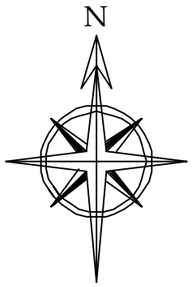
Rev :

Date : 03 Apr 24

Dwg No : 2362-500

Cranbrook

Cranbrook Basements
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



METRES

0 5 10 15 20

SCALE

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Block Plan

Scale : 1:200 @ A3

Date : 03 Apr 24

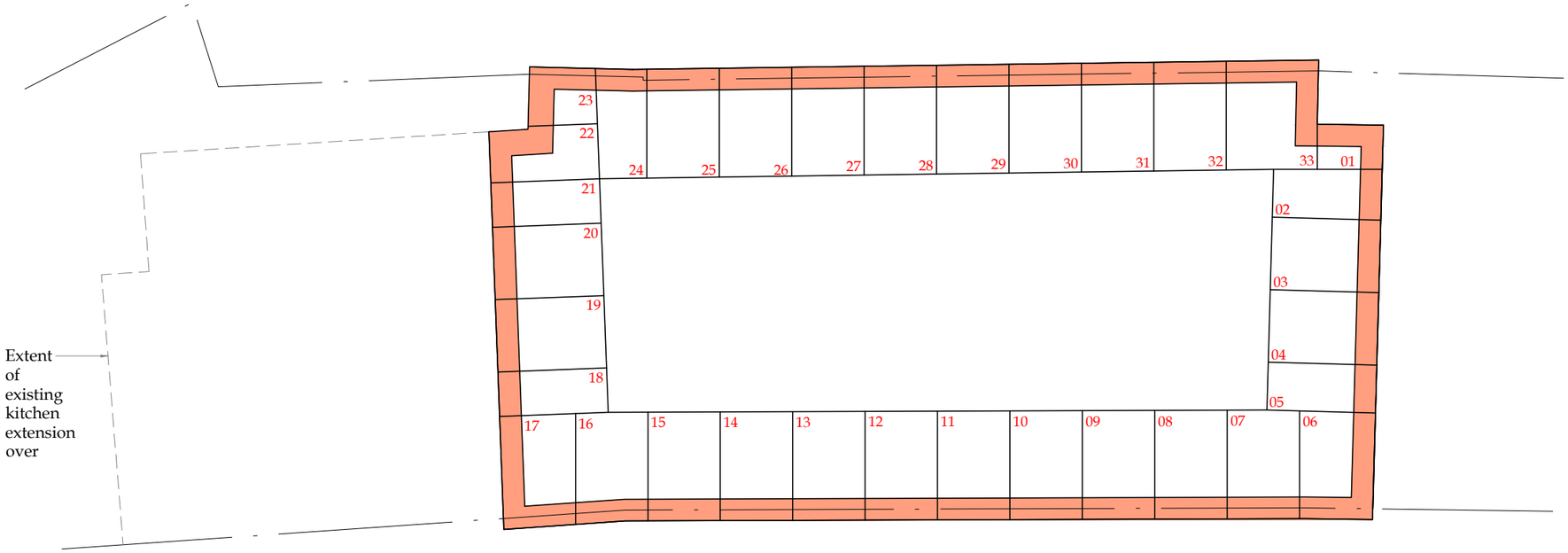
Status : PLANNING

Rev :

Dwg No : 2362-501

Cranbrook

Cranbrook Basements
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



Proposed Underpinning Layout

Note:
Underpinning is to be constructed in Numerical Sequence. For example - underpins 1 through to 6 will be constructed in the following sequence - 1, 3, 5, 2, 4, 6
This will allow suitable time for each underpin to fully cure before the next pin is constructed adjacent.

This approach will continue for the construction of the remaining underpins

Final order of underpin construction is subject to site conditions

0 METRES 5

SCALE

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Underpinning Layout

Scale : 1:75 @ A3

Status : PLANNING

Rev :

Date : 12 June 24

Dwg No : 2362-219

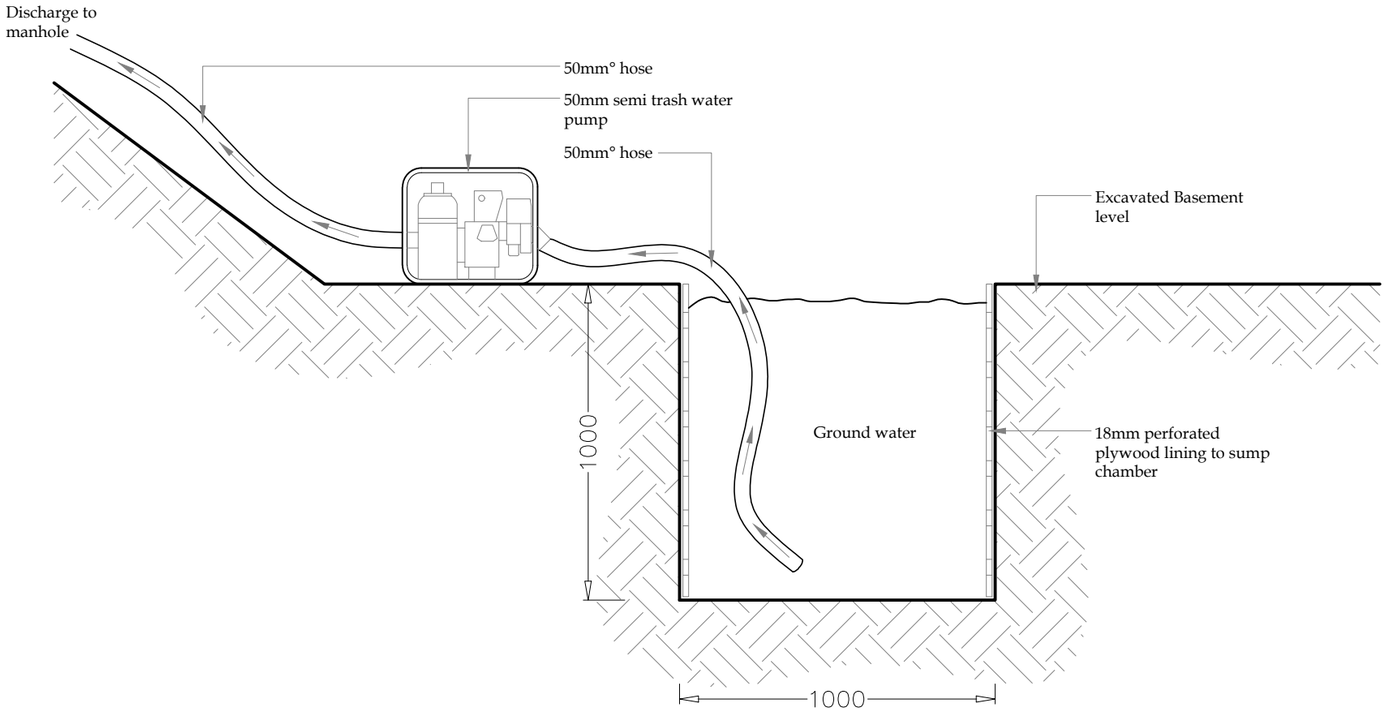
Cranbrook

Cranbrook Basements
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

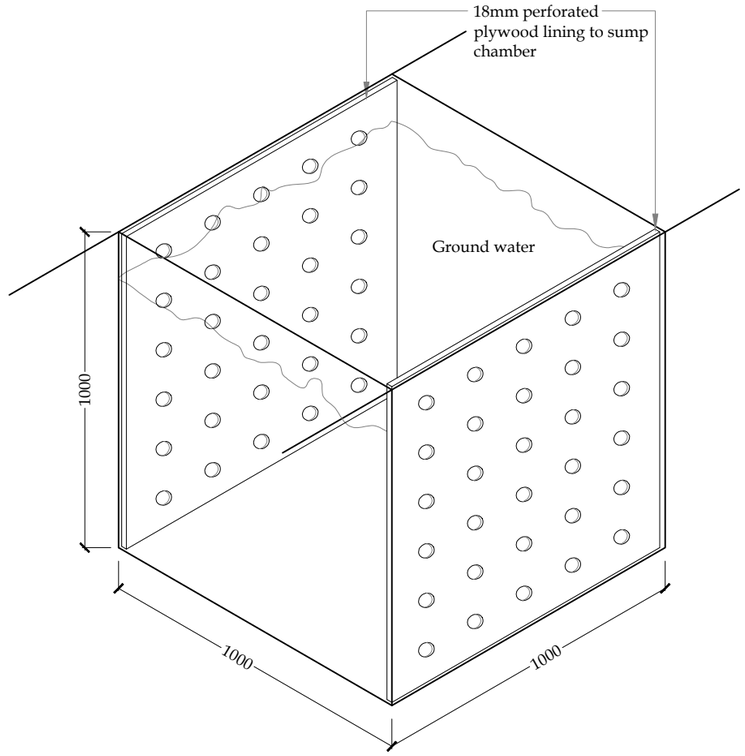
Appendix C

Dewatering Details

TD 20



Typical Sump Chamber Section



Typical Sump Chamber Isometric

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Water Pumping Detail

Scale : 1:20 @ A3

Date : 11 June 24

Status : CONSTRUCTION

Dwg No : 2362-TD 20

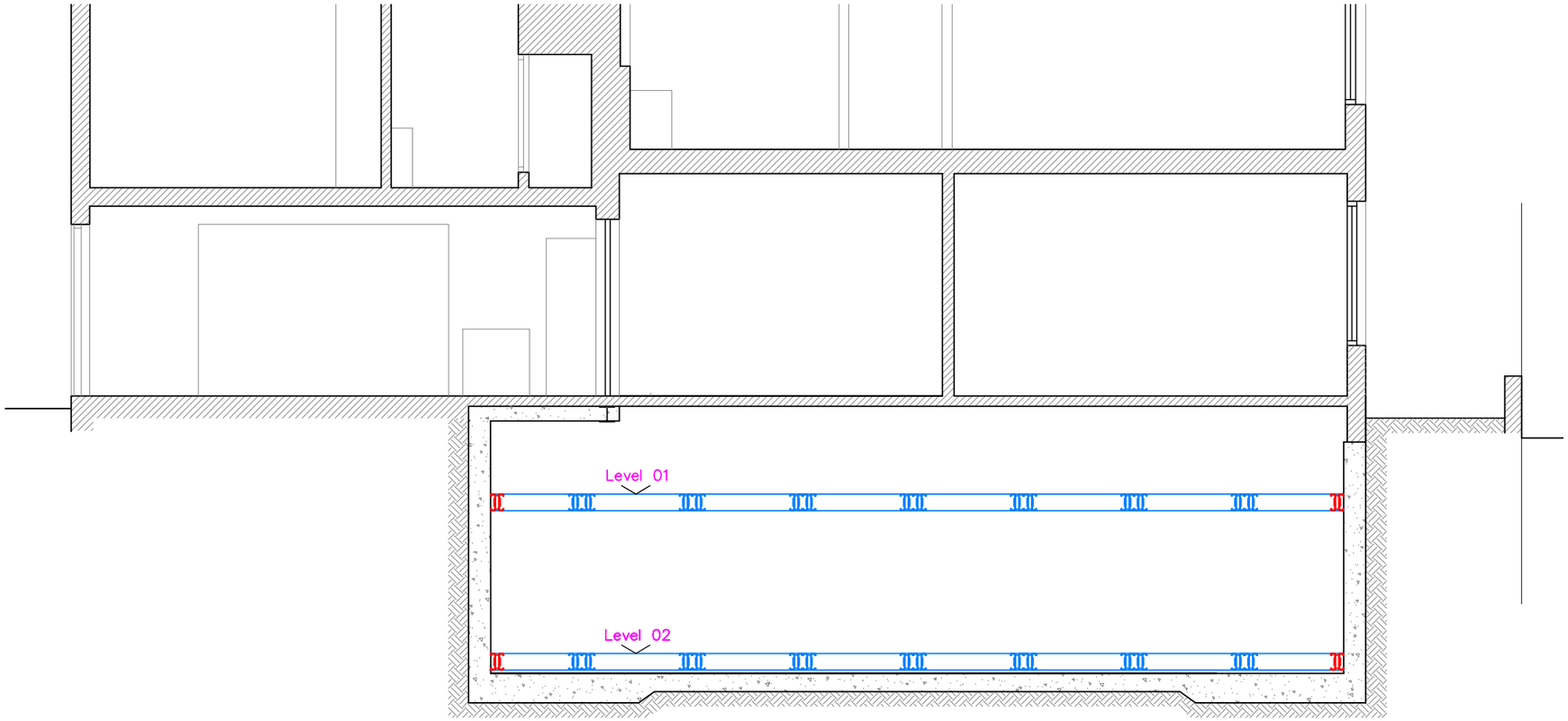
Rev :

Cranbrook

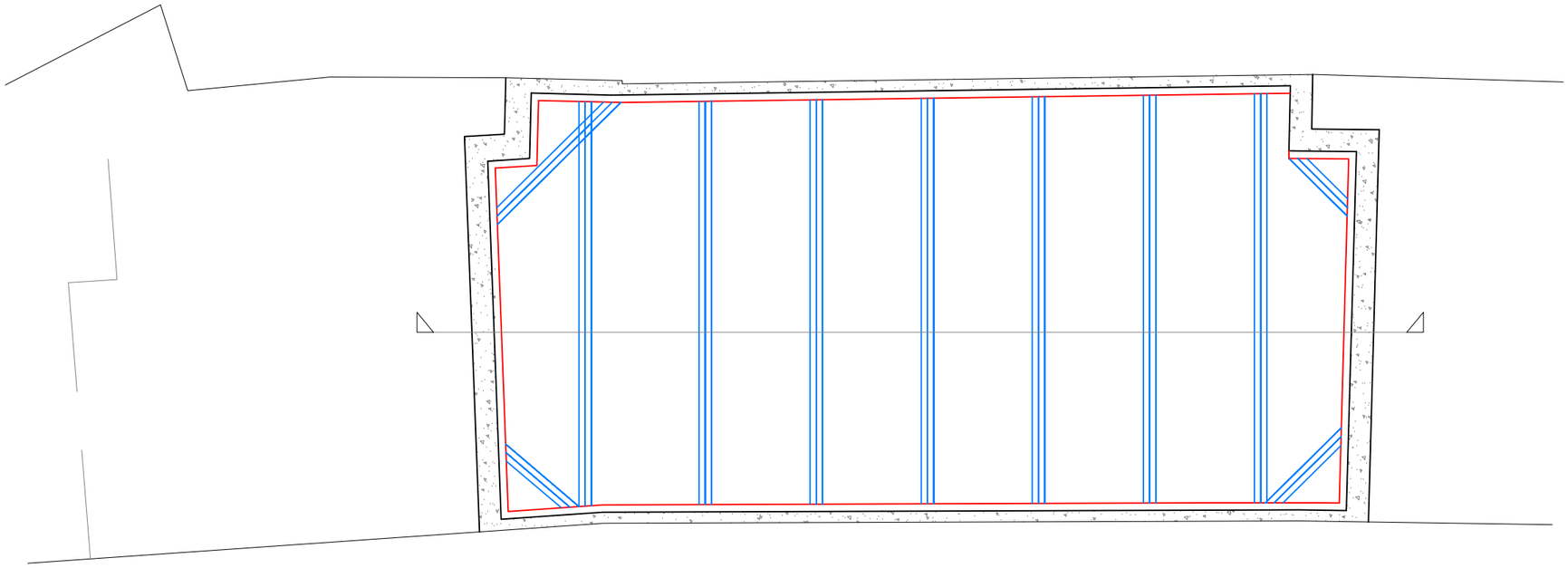
Cranbrook Basements
26-28 Hammersmith Grove,
Hammersmith,
London, W7 7BA
T +44 (0)208 551 5555
F +44 (0)208 551 1580
admin@cranbrook.co.uk
www.cranbrook.co.uk

Appendix D

Propping Details



Proposed Temporary Works Section



Proposed Temporary Works Plan

P1 - Denotes proposed RMD superslim wailing beams - to be installed to excavation as indicated, and to be propped at all connection locations

P2 - Denotes proposed double RMD superslim props to be installed @ max. 1.5m c/c and 0.5 & 2.5m above base level

0 METRES 5

SCALE

No.	Date	Amendment	Initials

Client : Mr J Przewozniak & Ms M Eleuteri

Project : 31 Willoughby Road
London
NW3 1RT

Drawing : Proposed Temporary Works Layout

Scale : 1:75 @ A3

Status : PLANNING

Rev :

Date : 18 Apr 24

Dwg No : 2362-700

Cranbrook

Cranbrook Basements
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

Appendix E

Site Investigation Report

GEA Geotechnical & Environmental Associates

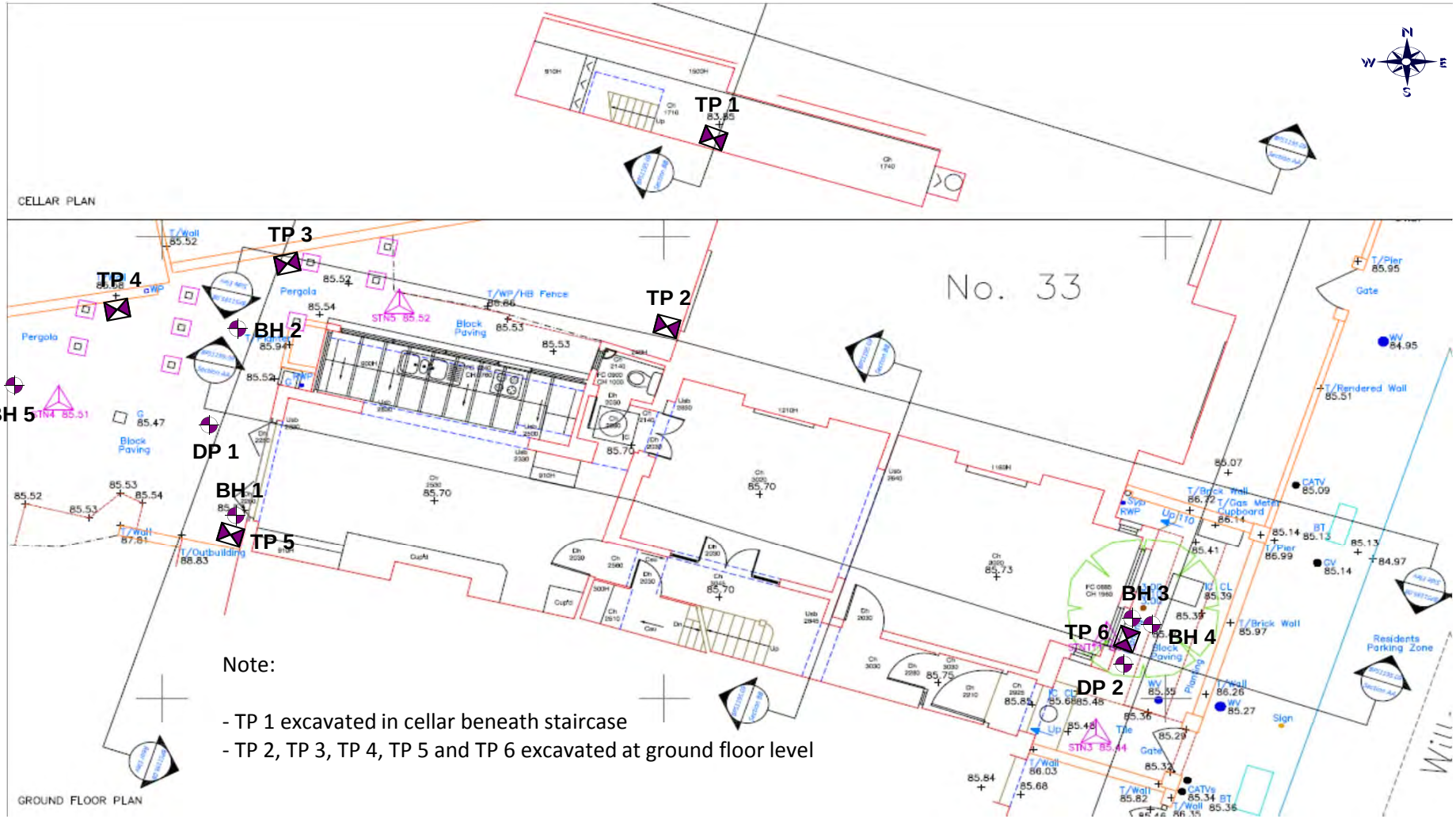
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site Plan

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1



GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Number** **BH1**
Excavation Method Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 85.55	**Client** Manuela Eleuteri	**Job Number** J15315
	Location	**Dates** 13/01/2016	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				85.45	0.10	Brick Paving		
				85.40	(0.15)			
				85.25	0.30	Made Ground (yellowish brown sand with gravel)		
						Concrete		
					(1.10)	Made Ground (brown to dark brown silty sandy clay with gravel and occasional brick fragments)		
1.20	D1			84.15	1.40			
1.50	D2					Made Ground (pale greenish grey and orange-brown slightly sandy silty clay with occasional gravel, carbonaceous material and brick fragments)		
					(0.70)			
1.90	D3							
				83.45	2.10			
2.25	D4					Made Ground (orange-brown slightly sandy silty clay with gravel; dark grey between 2.7-2.8m)		
					(1.00)			
2.75	D5							▽1
			Slow Inflow(1) at 3.00m, not sealed.	82.45	3.10	Firm becoming stiff brown becoming brownish grey silty CLAY		
3.50	D6				(0.90)			
				81.55	4.00			
						Terminated at 4.00m		

Remarks
Groundwater monitoring standpipe installed to 3.1m
Borehole completed from base of Trial Pit No 5

Scale (approx)	Logged By
1:50	JS

Figure No.
J15315.BH1

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Number** **BH2**
Excavation Method Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location	**Dates** 13/01/2016	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				85.40	0.10	Brick Paving		
				85.35	0.15	Made Ground (yellowish brown sand with gravel)		
				85.30	0.20	Concrete		
0.50	D1					Made Ground (brown, orange-brown and greenish grey silty sandy clay with gravel, rootlets and brick fragments)		
1.50	D2				(3.00)			
2.50	D3							
			Slow Inflow(1) at 3.00m, not sealed.					▽1
				82.30	3.20	Firm greenish grey to orange-brown & dark grey slightly silty CLAY with gravel and carbonaceous material		
3.35	D4				(0.30)			
				82.00	3.50	Firm mottled pale grey to bluish & orange-brown slightly silty CLAY with occasional gravel		
				81.80	3.70	Firm becoming stiff brown becoming brownish grey silty CLAY		
					(1.30)			
4.50	D5							
				80.50	5.00	Terminated at 5.00m		

Remarks
Groundwater monitoring standpipe installed to 4.0 m

Scale (approx)	Logged By
1:50	JS

Figure No.
J15315.BH2

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Number** **BH3**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Drive-in Windowless Sampler		85.40	Manuela Eleuteri	J15315
	Location	**Dates** 13/01/2016	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.70)	Made Ground (brown to dark brown sandy silty clay with gravel, ash, charcoal, rootlets and brick fragments)		
				83.70	1.70			
2.00	D1				(0.70)	Made Ground (orange-brown & grey mottled slightly silty clay with rare brick fragments)		
				83.00	2.40			
3.00	D2				(1.35)	Firm greenish grey and orange-brown slightly silty CLAY with carbonaceous material and gravel		
				81.65	3.75			
4.00-4.50	D3				(0.75)	Firm becoming stiff pale orange-brown becoming brownish grey slightly silty CLAY		
				80.90	4.50			
						Terminated at 4.50m		

Remarks
Taken from base of TP6
Groundwater not encountered
Groundwater monitoring standpipe installed at 3.0m

Scale (approx)	**Logged By**
1:50	JS

Figure No.
J15315.BH3

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Number** **BH4**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Opendrive lined percussive sampler	110mm to 1.00m	85.40	Manuela Eleuteri	J15315
	Location	**Dates** 20/01/2016	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				85.35	(0.05)			
				85.30	0.05	Paving Stone		
				85.25	(0.05)	Made Ground (orange-brown sand)		
					0.10			
					(0.05)	Concrete		
					0.15			
1.00-1.45	SPT N=7		1,2/2,1,2,2		(1.55)	Made Ground (brown to orange brown mottled grey sandy silty clay with gravel, brick fragments, charcoal, ash and roots)		
				83.70	1.70			
2.00-2.45	SPT N=6		0,0/1,2,1,2		(0.80)	Made Ground (grey and orange-brown mottled slightly silty clay with rare brick fragments and rootlets)		
				82.90	2.50			
3.00-3.45 3.00	SPT N=7 D1		0,0/1,2,2,2 Slow Inflow(1) at 3.30m, not sealed.		(1.00)	Firm pale orange-brown and greenish grey silty CLAY with occasional gravel and carbonaceous material; dark grey carbonaceous layers at 2.8 m to 3.0 m and 3.3 m to 3.4 m)		▽1
				81.90	3.50			
				81.70	(0.20) 3.70	Firm pale orange-brown mottled grey slightly silty CLAY		
4.00-4.45 4.00	SPT N=7 D2		2,1/2,1,2,2		(1.30)	Firm becoming stiff pale orange-brown becoming brownish grey slightly silty CLAY with rare selenite crystals and occasional partings of silt and sand		
4.50	D3							
5.00-5.45	SPT N=10		2,1/2,2,3,3	80.40	5.00	Stiff dark brownish grey slightly silty CLAY with occasional partings of silt and sand; claystone encountered at 6.5 m to 6.7 m		
5.50	D4							
6.00-6.45	SPT N=14		2,2/2,2,3,7					
6.50	D5							
7.00-7.45	SPT N=13		2,3/2,3,4,4					
7.50	D6				(5.00)			
8.00-8.45	SPT N=13		2,2/3,3,3,4					
8.50	D7							
9.00-9.45	SPT N=13		2,3/3,3,4,3					
9.50	D8							
10.00-10.45	SPT N=11		2,2/1,3,3,4	75.40	10.00			

Remarks
Groundwater monitoring standpipe installed at 5.0m.
SPT N results potentially impacted by proximity to BH3 and the potential effects of water softening in the base of the borehole, such that the results are not considered to represent the true in-situ strength.
The assessment of the strength for the natural soils is therefore based on a combination of the test results together with the field observations, which indicated a firm becoming stiff consitency, and not just the SPT 'N' results alone.

Scale (approx)	**Logged By**
1:50	JS

Figure No.
J15315.BH4

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Number** **BH5**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Opendrive percussive lined sampler	110mm to 1.00m	85.50	Manuela Eleuteri	J15315
	Location	**Dates** 11/07/2017	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				85.40	0.10	Brick Paving		
				85.35	0.15	Made Ground (yellowish brown sand)		
				85.30	0.20	Concrete		
						Made Ground (brown silty slightly sandy clay with occasional gravel, ash and small brick fragments)		
1.00-1.45	SPT(C) N=9	DRY	0,1/2,2,2,3		(2.00)			
2.00-2.45	SPT(C) N=8	DRY	1,1/2,2,2,2	83.30	2.20	Made Ground (brown silty clay with rare brick fragments)		
					(0.75)			
3.00-3.45	SPT(C) N=8	DRY	0,0/0,3,2,3	82.55	2.95	Made Ground (greenish brown silty clay with very rare brick fragments)		
					(0.45)			
4.00-4.45	SPT N=12	DRY	2,2/3,3,3,3	82.10	3.40	Firm becoming stiff brownish grey silty CLAY with relic root traces		
					(2.05)			
5.00-5.45	SPT N=16	DRY	2,2/3,4,5,4					
				80.05	5.45	Complete at 5.45m		

Remarks
Groundwater not encountered during drilling and borehole remained dry throughout an observation period of approximatley 4 hours.

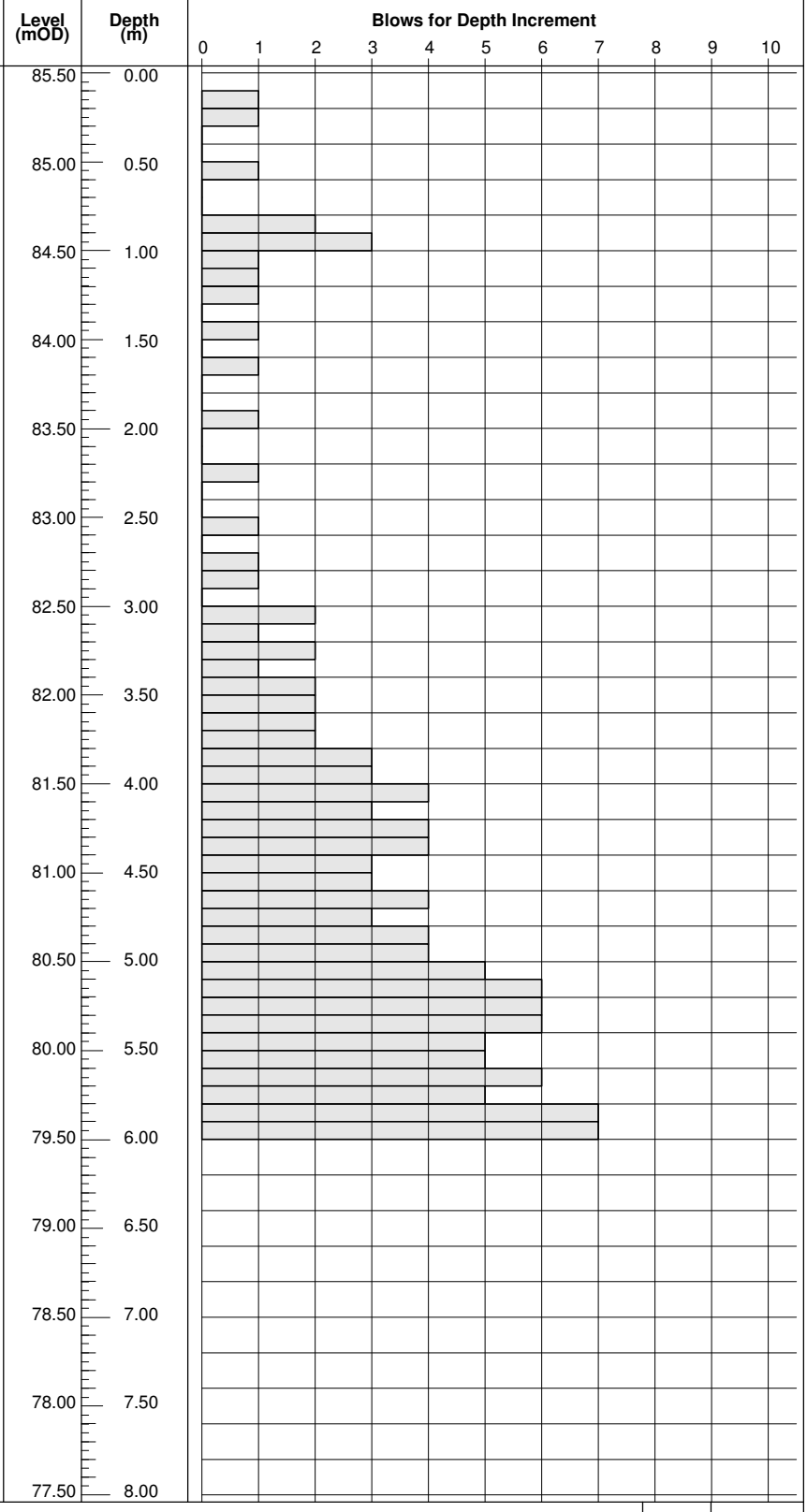
Scale (approx)	**Logged By**
1:50	MP

Figure No.
j15315.BH5

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Probe Number** **DP1**

Method DPSH	**Cone Dimensions**	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location	**Dates** 11/07/2017	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.10-0.20	1	
0.20-0.30	1	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	1	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	2	
0.90-1.00	3	
1.00-1.10	1	
1.10-1.20	1	
1.20-1.30	1	
1.30-1.40	0	
1.40-1.50	1	
1.50-1.60	0	
1.60-1.70	1	
1.70-1.80	0	
1.80-1.90	0	
1.90-2.00	1	
2.00-2.10	0	
2.10-2.20	0	
2.20-2.30	1	
2.30-2.40	0	
2.40-2.50	0	
2.50-2.60	1	
2.60-2.70	0	
2.70-2.80	1	
2.80-2.90	1	
2.90-3.00	0	
3.00-3.10	2	
3.10-3.20	1	
3.20-3.30	2	
3.30-3.40	1	
3.40-3.50	2	
3.50-3.60	2	
3.60-3.70	2	
3.70-3.80	2	
3.80-3.90	3	
3.90-4.00	3	
4.00-4.10	4	
4.10-4.20	3	
4.20-4.30	4	
4.30-4.40	4	
4.40-4.50	3	
4.50-4.60	3	
4.60-4.70	4	
4.70-4.80	3	
4.80-4.90	4	
4.90-5.00	4	
5.00-5.10	5	
5.10-5.20	6	
5.20-5.30	6	
5.30-5.40	6	
5.40-5.50	5	
5.50-5.60	5	
5.60-5.70	6	
5.70-5.80	5	
5.80-5.90	7	
5.90-6.00	7	



Remarks
Groundwater not encountered
Classification after Huntley (1990): Very Soft = <1; Soft = 1 to 2; Firm: 3 to 4; Stiff = 5 to 8; Very stiff = > 8

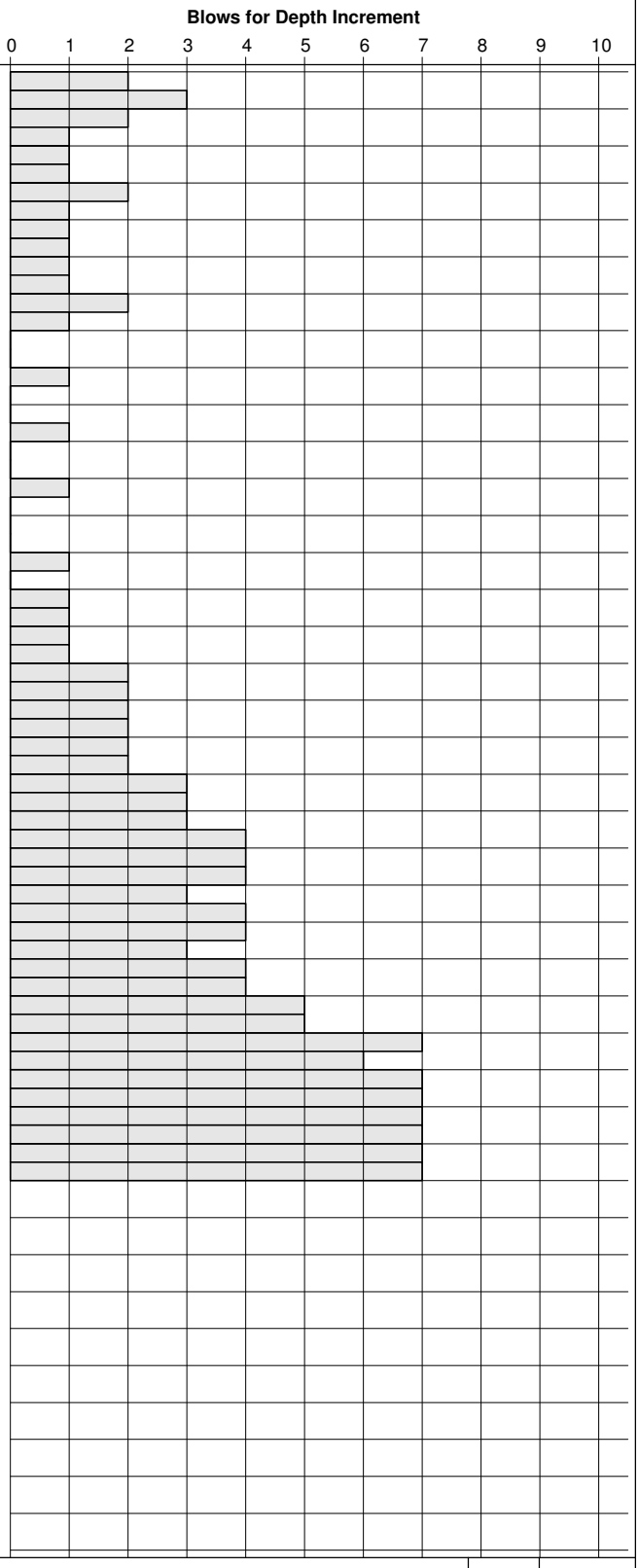
Scale (approx)	**Logged By**
1:40	MJD

Figure No.
J15315.DP1

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Probe Number** **DP2**

Method Super Heavy Dynamic Probe (DPSH)	**Cone Dimensions**	**Ground Level (mOD)** 85.40	**Client** Manuela Eleuteri	**Job Number** J15315
	Location	**Dates** 11/07/2017	**Engineer** Richard Tant Associates	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		85.40	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	1			
0.40-0.50	1			
0.50-0.60	1		84.90	0.50
0.60-0.70	2			
0.70-0.80	1			
0.80-0.90	1			
0.90-1.00	1			
1.00-1.10	1		84.40	1.00
1.10-1.20	1			
1.20-1.30	2			
1.30-1.40	1			
1.40-1.50	0			
1.50-1.60	0		83.90	1.50
1.60-1.70	1			
1.70-1.80	0			
1.80-1.90	0			
1.90-2.00	1			
2.00-2.10	0		83.40	2.00
2.10-2.20	0			
2.20-2.30	1			
2.30-2.40	0			
2.40-2.50	0			
2.50-2.60	0		82.90	2.50
2.60-2.70	1			
2.70-2.80	0			
2.80-2.90	1			
2.90-3.00	1			
3.00-3.10	1		82.40	3.00
3.10-3.20	1			
3.20-3.30	2			
3.30-3.40	2			
3.40-3.50	2			
3.50-3.60	2		81.90	3.50
3.60-3.70	2			
3.70-3.80	2			
3.80-3.90	3			
3.90-4.00	3			
4.00-4.10	3		81.40	4.00
4.10-4.20	4			
4.20-4.30	4			
4.30-4.40	4			
4.40-4.50	3			
4.50-4.60	4		80.90	4.50
4.60-4.70	4			
4.70-4.80	3			
4.80-4.90	4			
4.90-5.00	4			
5.00-5.10	5		80.40	5.00
5.10-5.20	5			
5.20-5.30	7			
5.30-5.40	6			
5.40-5.50	7			
5.50-5.60	7		79.90	5.50
5.60-5.70	7			
5.70-5.80	7			
5.80-5.90	7			
5.90-6.00	7			
			79.40	6.00
			78.90	6.50
			78.40	7.00
			77.90	7.50
			77.40	8.00



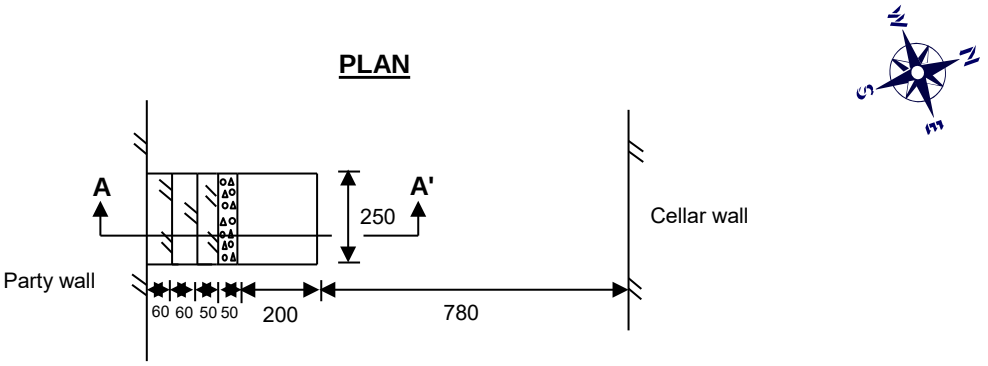
Remarks
Groundwater not encountered
Classification after Huntley (1990): Very Soft = <1; Soft = 1 to 2; Firm: 3 to 4; Stiff = 5 to 8; Very stiff = > 8

Scale (approx)	**Logged By**
1:40	MJD

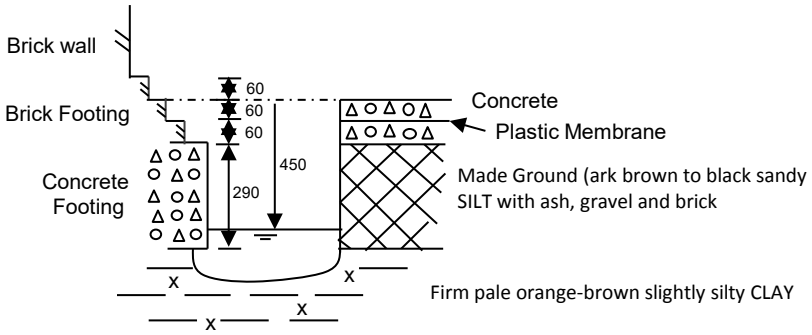
Figure No.
J15315.DP2

GEA Geotechnical & Environmental Associates Widbury Barns Widbury Hill Ware Herts SG12 7QE			**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** 1
Excavation Method Manual	**Dimensions** 250 x 420 x 500	**Ground Level (mOD)** 83.85	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 1/1

PLAN



SECTION A - A'

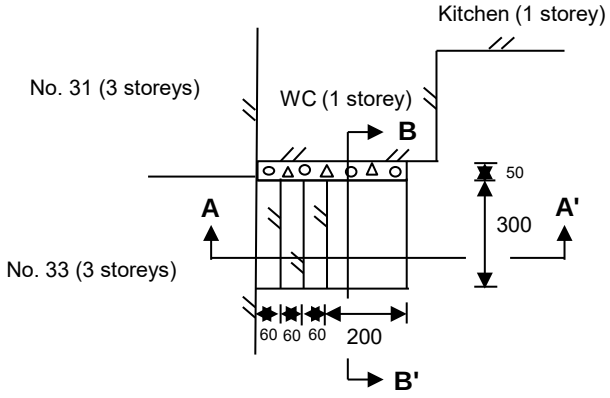


Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater encountered at a depth of 0.45 m	Scale: 1:20 Logged by: JS

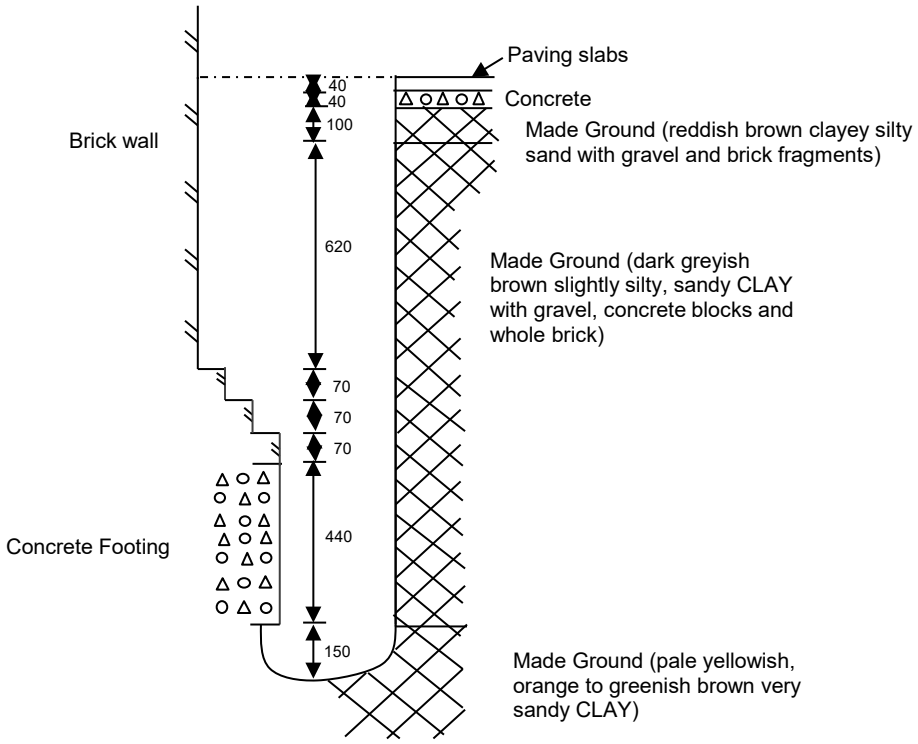
GEA Geotechnical & Environmental Associates	Widbury Barns Widbury Hill Ware Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** **2**

Excavation Method Manual	**Dimensions** 350 x 380 x 1600	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 1/2

PLAN



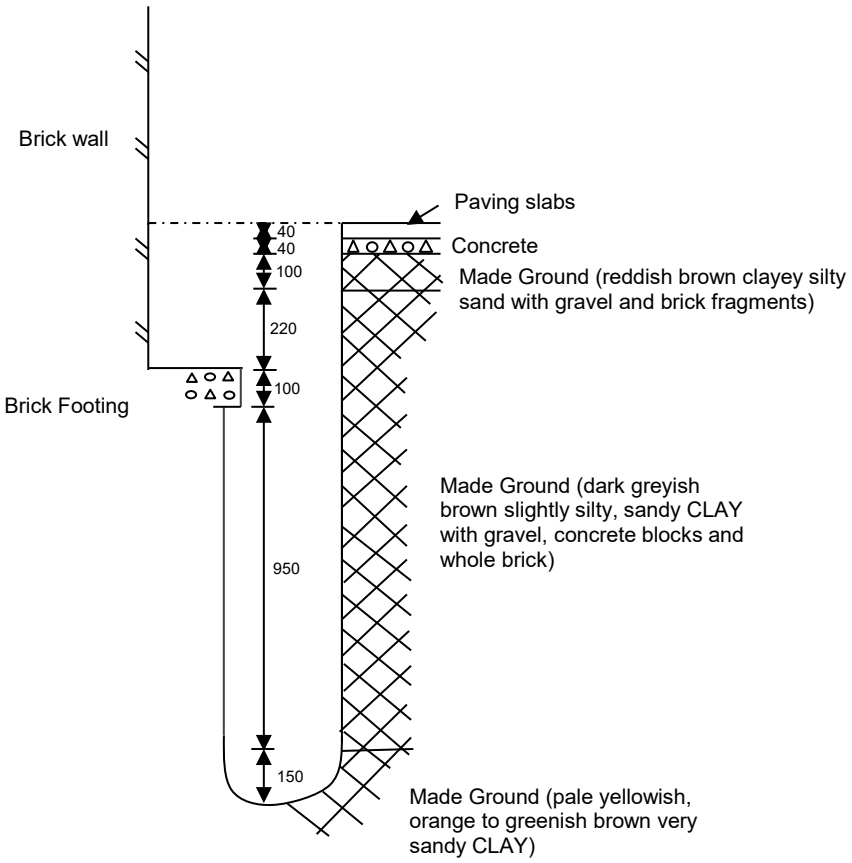
SECTION A - A'



Remarks:	Scale:
All dimensions in millimetres	1:20
Trial pit sides remained stable during excavation	Logged by:
Groundwater not encountered	JS

GEA Geotechnical & Environmental Associates Widbury Barns Widbury Hill Ware Herts SG12 7QE			**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** **2**
Excavation Method Manual	**Dimensions** 350 x 380 x 1600	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 2/2

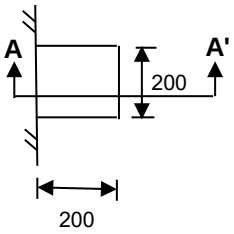
SECTION B - B'



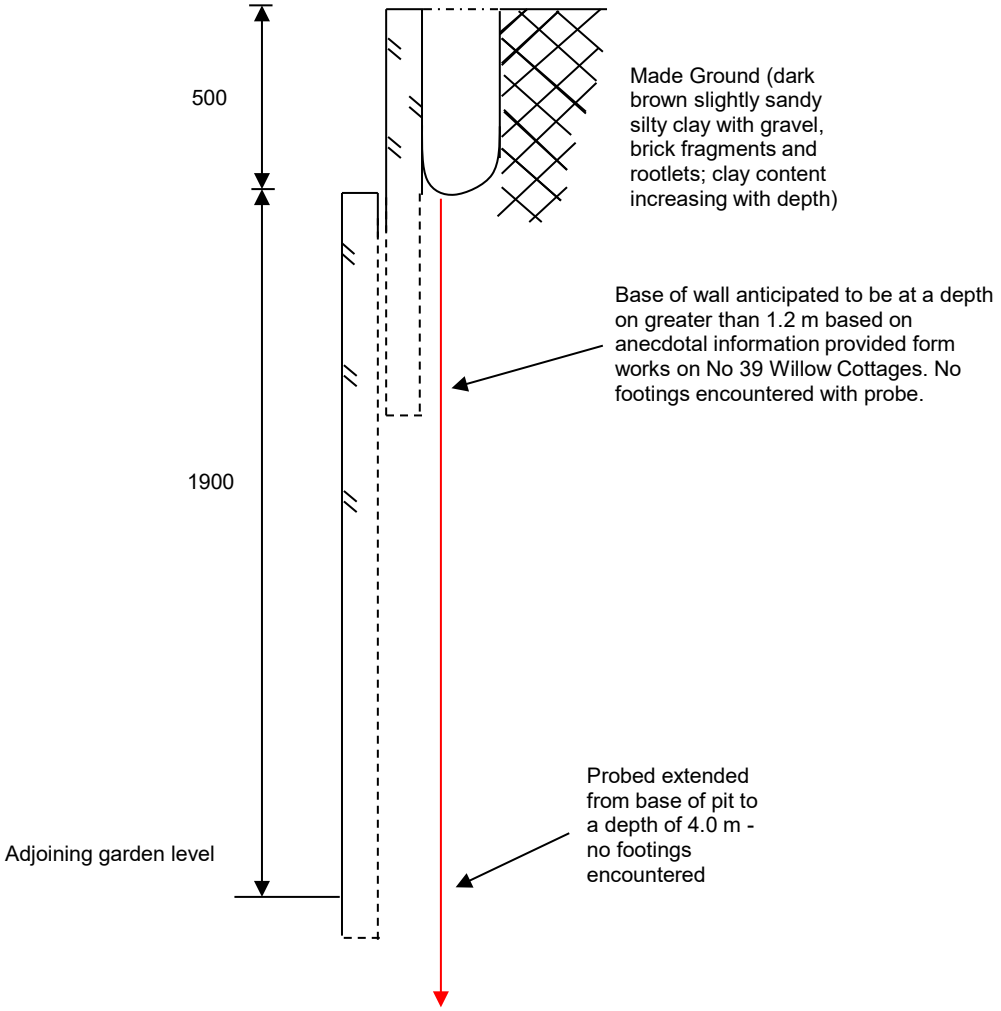
Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20 Logged by: JS

GEA Geotechnical & Environmental Associates	Widbury Barns Widbury Hill Ware Herts SG12 7QE		**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** 3
Excavation Method Manual	**Dimensions** 200 x 200 x 500	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 1/1

PLAN



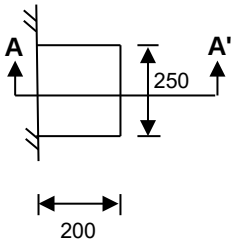
SECTION A - A'



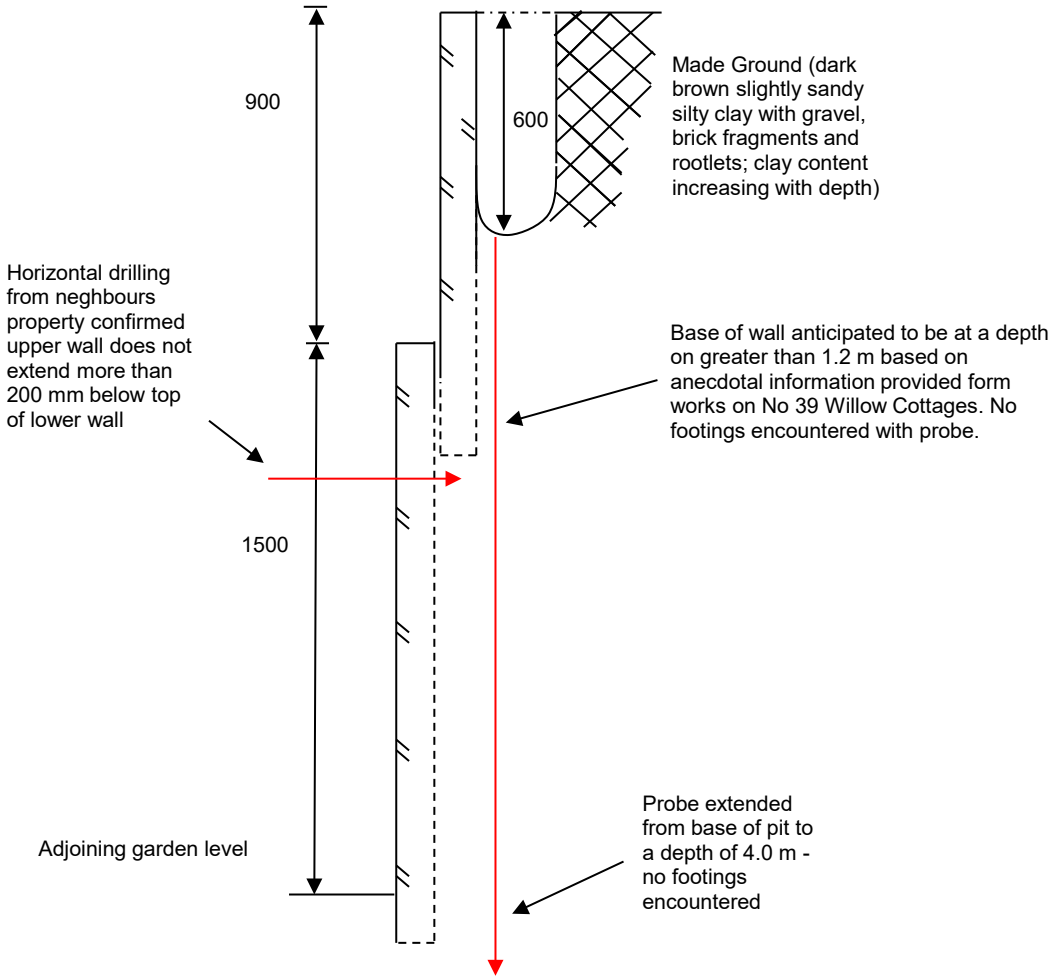
Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20 Logged by: JS

GEA Geotechnical & Environmental Associates Widbury Barns Widbury Hill Ware Herts SG12 7QE			**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** 4
Excavation Method Manual	**Dimensions** 200 x 250 x 600	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 1/1

PLAN



SECTION A - A'

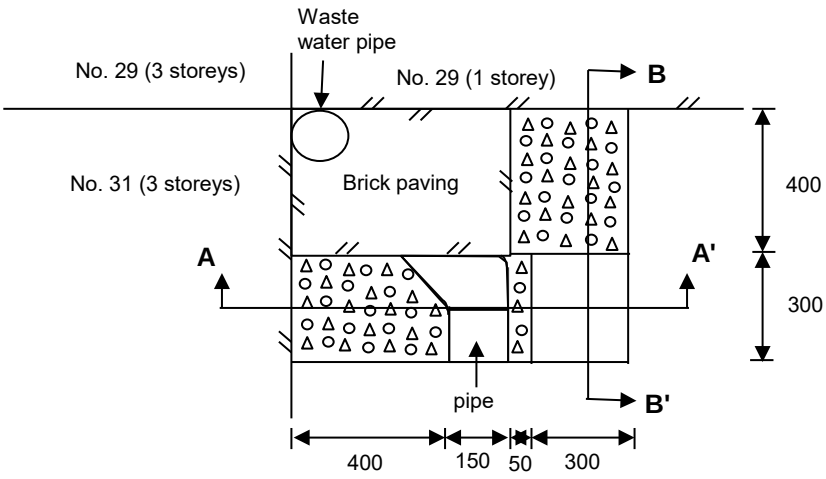


Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20 Logged by: JS

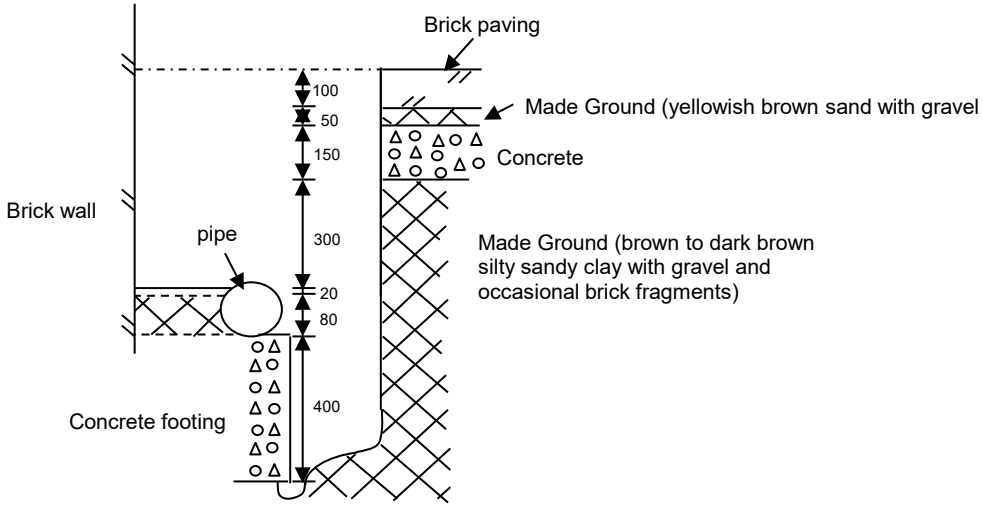
GEA Geotechnical & Environmental Associates	Widbury Barns Widbury Hill Ware Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** 5

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Manual	700 x 900 x 1200	85.50	Manuela Eleuteri	J15315
	Location	**Dates**	**Engineer**	**Sheet**
	Ground Level	12/01/16 to 13/01/16	Richard Tant Associates	1/2

PLAN



SECTION A - A'

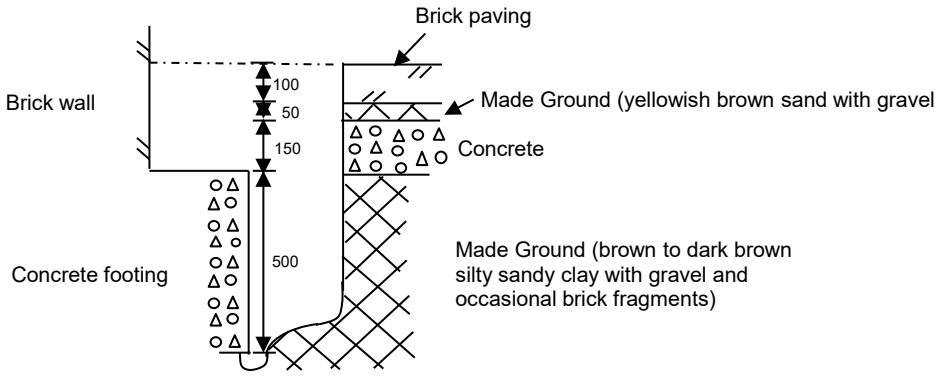


Remarks:	Scale:
All dimensions in millimetres	1:20
Trial pit sides remained stable during excavation	Logged by:
Groundwater not encountered	JS

GEA Geotechnical & Environmental Associates	Widbury Barns Widbury Hill Ware Herts SG12 7QE	**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** **5**

Excavation Method Manual	**Dimensions** 700 x 900 x 1200	**Ground Level (mOD)** 85.50	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 2/2

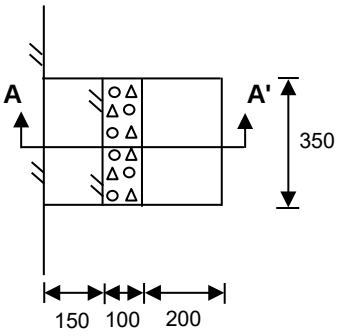
SECTION B - B'

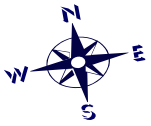


Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20 Logged by: JS

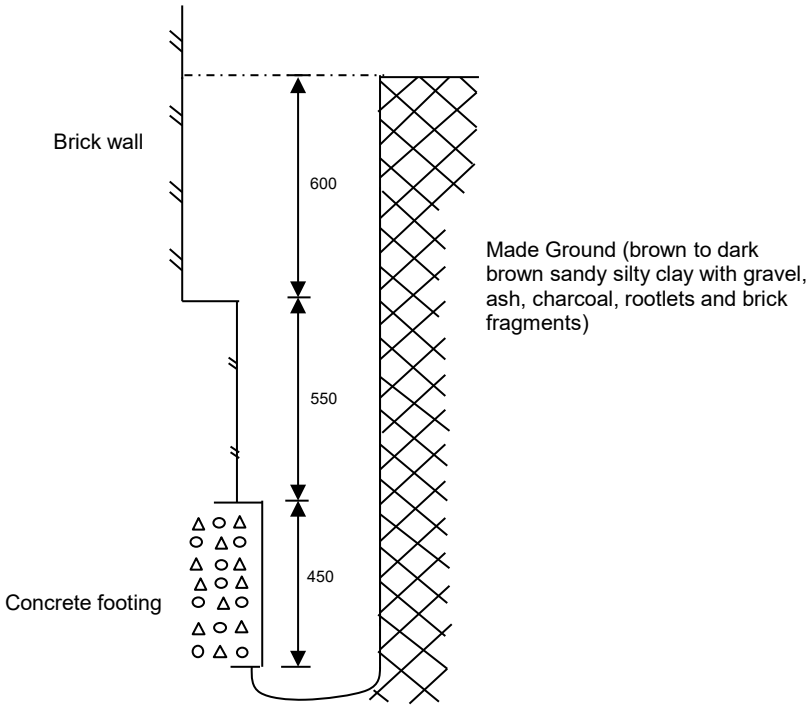
GEA Geotechnical & Environmental Associates Widbury Barns Widbury Hill Ware Herts SG12 7QE			**Site** 31 Willoughby Road, London, NW3 1RT	**Trial Pit Number** 6
Excavation Method Manual	**Dimensions** 350 x 450 x 1800	**Ground Level (mOD)** 85.40	**Client** Manuela Eleuteri	**Job Number** J15315
	Location Ground Level	**Dates** 12/01/16 to 13/01/16	**Engineer** Richard Tant Associates	**Sheet** 1/1

PLAN





SECTION A - A'



Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20 Logged by: JS

GEA Geotechnical & Environmental Associates

Widbury Barns
Widbury Hill
Ware
SG12 7QE

Trial Pit No 1

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1

View of TP1 - looking southeast

View into TP1 - looking southeast

GEA Geotechnical & Environmental Associates

Widbury Barns
Widbury Hill
Ware
SG12 7QE

Trial Pit No 2

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1

View of TP2 - looking southeast

View into TP2 - looking southeast

Geotechnical & Environmental Associates

Widbury Barns
Widbury Hill
Ware
SG12 7QE

Trial Pit No 3

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1

View of TP3 - looking northeast

View into TP3 - looking north

Geotechnical & Environmental Associates

Widbury Barns
Widbury Hill
Ware
SG12 7QE

Trial Pit No 4

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1

View of TP4 - looking northwest

Plan view of TP4 - looking northwest

GEA Geotechnical & Environmental Associates

Widbury Barns
Widbury Hill
Ware
SG12 7QE

Trial Pit No 5

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1

View of TP5 - looking southeast

View into TP5 - looking east

Geotechnical & Environmental Associates

Widbury Barns
Widbury Hill
Ware
SG12 7QE

Trial Pit No 6

Site	31 Willoughby Road, London, NW3 1RT
Client	Manuela Eleuteri
Engineer	Richard Tant Associates

Job Number J15315

Sheet 1 / 1

View of TP6 - looking northwest

View into TP6 - looking northeast

Appendix F

Membrane System

DELTA MEMBRANE SYSTEMS LTD.

DELTA SYSTEM 500

'Providing Waterproofing Solutions'

Uniclass L6814	EPIC F831
CI/SfB (13.9) Ln6 (L34)	

February 2006

BBA BRITISH BOARD OF AGRÉMENT
CERTIFICATE No 00/3742
DELTA MEMBRANE SYSTEMS

nbsPlus

RIBA · CPD PROVIDERS NETWORK

DELTA DÖRKEN

The Sealed System

In soil retaining situations such as basements and vaults etc. the **DELTA** sealed system is recommended. The membrane selection depends on the required finish and flow rate if applicable. All membrane junctions, fixing points, service entries and other protrusions are sealed with the **DELTA** range of sealing products. Where active ground water is evident or expected drainage of one form or another should be incorporated into the specification. Our technical staff are available to give advice in this respect.

The Ventilated System

In above ground situations or in areas where no free running water is expected, for example where external pavements have been built up, the ventilated system can be used. The ventilated system with air gap at top and bottom does not require sealed joints or fixings, a 200mm overlap is sufficient in this situation. This method is seen as a sympathetic solution in Heritage type properties as a general damp proofing system. The fabric of the building remains unchanged but the new internal surfaces are 'dry' and are salt and contamination free. Both dry lining or plaster direct finishes are available on the ventilated system.

Floors

As well as being a complete waterproofing and damp proofing system, the **DELTA** system is also used to upgrade damp and defective floors. With excellent crush resistance the system lends itself to a variety of different finishes which include conventional screeds, thin layer fast drying screeds and wood based floating floors. Insulation can also be used in conjunction with the system where required. The system can be linked to the D.P.C. constructed within a new wall or to an existing D.P.C.

Preparation

As the membrane systems are mechanically fixed there is no reliance on the ability of the product to bond to the substrate. The **DELTA** system can be applied

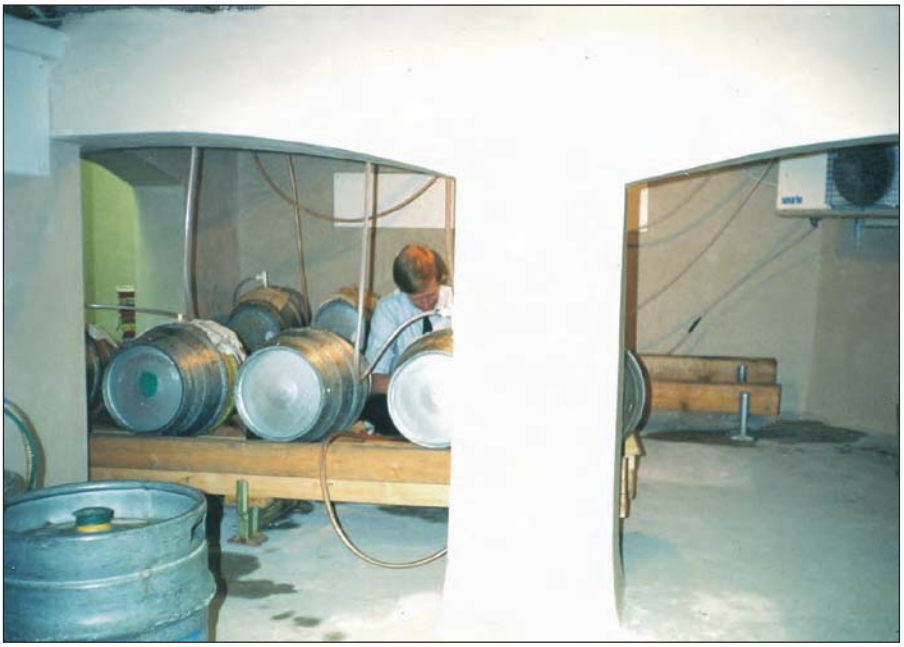
to a variety of different substrates for example over existing renders or broken down bitumen coatings, etc. This can be easily achieved without detriment to the integrity of the system.

Damp Pressure Equalisation

The studded structure of the membrane allows the dampness behind the membrane to move in all directions unhindered, therefore the whole of the wall or floor surface takes the damp loading. Break downs created by weak points are eliminated. The product does not divert the problem to other areas.

Flexibility

In structures where movement or vibration can be a problem, examples being under street vaults, railway arches, and buildings constructed with movement joints,



the **DELTA** system can cope. The **DELTA** membrane has an elongation break of greater than 50%.

Speed

As there is little or no preparation required the system is by comparison quick to install. When dry finishes are used the system is a 'fast track' solution. Decoration does not need to be delayed as there is no drying process.
DELTA Membrane Systems is the U.K. arm of the world's largest producer of cavity drain systems. The market leading **DELTA** brand has a track record approaching three decades. The **DELTA** systems have been used successfully in many situations in the U.K, from small domestic basements up to major waterproofing projects such

as London Underground stations. There is rarely a dampness or water ingress problem that falls outside the scope of the capabilities of the **DELTA** system.

What are DELTA Systems

With the introduction of British Standard BS.8102:2009 'Protection of below ground structures against water from the ground', the use of

cavity membranes has been generally accepted in the U.K. **DELTA** Systems are a complete range of products which are used together to solve many of today's problems in both new and old construction. **DELTA** Systems can easily deal with aggressive ground water conditions, where basements are liable to flooding, or indeed where simple dampness, contamination or salting problems are prevalent. Other more diverse applications include turf covered roofs, barn conversions, tunnel linings or even as a barrier against radon gas.

The main components of the system are the membranes themselves. These are manufactured from virgin high density polyethylene which is thermally and alkaline stabilised. The stud heights vary from 3mm for **DELTA-FM**, 8mm for **DELTA MS 500 & DELTA PT** to 20mm for **DELTA MS 20**. The cavity created by the membrane contains between 2.1 and 10 litres of space respectively. This is known as either the 'Air Gap' or the 'Drained Cavity', in wet situations.

The Membranes

DELTA-MS 500 This is used for walls and floors, and is supplied in 2.4, & 2m x 20m rolls. This membrane can be used for light water ingress situations, and is available yellow (**DELTA-FM**), and **clear**. The MS 500 **clear** aids the selection of good fixing points in more difficult application i.e. random stone and friable brickwork. The sealed **DELTA-Plug** or **Qwik Seal Plug** is used to secure System 500, the centre shank of this fixing is also used for subsequent dry lining applications.

DELTA PT LATH This membrane has a mesh incorporated on the internal face which is attached by a thermic welding process at the time of manufacture. The sealed PT fixing plug is used to secure the

membrane at 250mm horizontal and vertical centres. The welded mesh and fixing plugs allow for direct render 1.1.6. (cement/lime/sand), or plasters: Tarmac Whitewall, Carlite Bonding, or dab fixed plasterboard for internal applications. When this grade is used for external above ground protection polymer renders can be used as a finish. These renders are polymer modified and can also have reinforcing fibres incorporated for added strength and durability. This grade is available in clear 2.0m x 20m (40m^2),1.5m x 10m (15m^2) or 1.0m x 15m (15m^2).

DELTA MS 20 This is a heavy gauge version of System 500 with deep 20mm studs. This is used where extra drainage capacity is required, for example on deeper structures, or where a larger flow rate is required. MS 20 can also be used as a 'cavity former' for many types of new construction. The rolls are a full 2 metre width by 20 metres in length (40m^2).

Product Guarantee

DELTA membrane systems can come with a thirty year product guarantee when installed by registered installers. The guarantee covers the membrane and ancillary components. Based on experience, accelerated ageing tests and a quality manufacturing system to ISO 9001, the **DELTA** range can also be guaranteed with confidence.

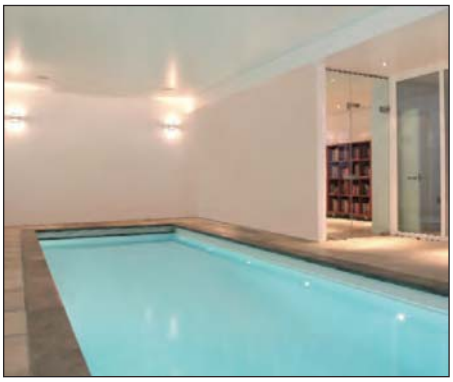
Technical site and/or office visits

Staff are available to visit site to give advice on particularly difficult or unusual situations, where appropriate specifications are prepared to assist in the correct use of the system.

Who Installs DELTA Systems

Although **DELTA** systems are by comparison, easy to install, it must be recognised that correct diagnosis of the problem is essential so that **DELTA** systems can be designed and tailored to the needs of the building, to give the best possible performance. It is therefore recommended that only competent specialist contractors, who understand dampness, and the associated problems, be employed to survey the site, install the system and thereby ensure the best possible performance of the system. **DELTA** systems are installed by a nationwide network of specialist contractors who are holders of 'Registered Installers' Certificates. These contractors also offer guarantees for their workmanship, giving peace of mind to the client.

COMPLETED BASEMENT PROJECTS



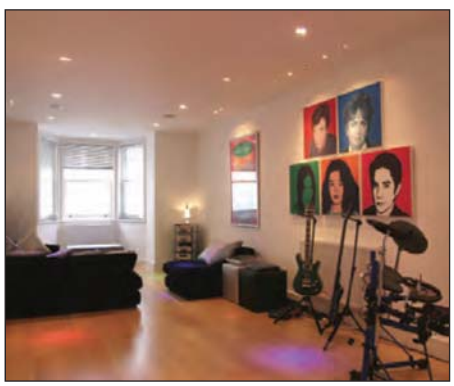
Leisure

Study

Photography Studio

Playroom

Home Cinema



Music Room

DRAINAGE OPTIONS

DELTA® SUMPS & PUMPS

When specifying a sealed cavity membrane system, full consideration must be given to drainage, when installed below ground.

The concept of the drained cavity system is to collect and manage any moisture which breaches the integrity of the structure by channelling, collecting, and discharging such free water via a suitable evacuation point.

Channels, laid to falls, can discharge passively into a sump or be connected to a drainage system but access for maintenance should be provided.

Access ports allow inspection and water jetting of channels, while sumps have a sealed access cover which allows for annual maintenance checks to be carried out, which are recommended.

If drainage has been installed, it should be flood tested before covering it up to make sure the system works.

Delta offer a choice of sump+pump stations to fit the purpose, and free advice is available from their technical staff.
Service agreements can be arranged through Delta and are maintained by PPS Ltd.

Delta Retrofit Sumps are fitted with a dual pump system and have three 110mm/160mm side inlets to take ground water, and grey water from shower, laundry and sink waste.

DELTA® CHANNEL

DELTA® AQUADUCT

Delta Channel is a water collection conduit which is bedded into a preformed channel at the floor/wall angle. Holes in the channel wall allows water to ingress at this point to drain away to a sump or soak away. Access ports are available to allow maintenance and inspection. The system is joined with a range of connectors.

Delta Aquaduct is a drainage channel which acts as a perimeter conduit bedded in at the floor/wall angle. Where appropriate, it can be laid under the slab to take off ground water to a sump or soak away, and reduce flotation pressures from bearing on the slab.

Delta Aquaduct is fully perforated for maximum performance, and incorporates an outer geotextile filter to prevent particles from entering the channel.

The product comes on a roll 150m x 60mm diameter. It is also available in 100m x 100mm dia rolls.

'FREE LIME' RISK

When new concrete forms the structure, to walls or particularly floors, there is a risk of excess free lime leaching out during the curing process.When a cavity drainage system is used in this type of application, a silicification pre-treatment of the concrete should be used to prevent the risk of free lime build up, and blockage of the drainage cavity. Delta Polysil-TG 500 is applied by spray for this purpose, and is available in 10kg drums.

POWER FAILURE?

HELP IS AT HAND

Delta Power Pack Pumps 8,100 Ltr in back up mode.

If you've installed a cavity drained system internally, one of the main design considerations is how are you going to manage the water collection and discharge. This can be done passively into existing drainage points, if available and appropriate.

However, the majority of projects require a collection sump + pump, to automatically manage the evacuation of any water ingress. This type of unit requires mains power to operate, so what can be done if the power fails, and is coincident with high water ingress? Here are two options from Delta.

High Water Level Alarm - This system gives an audible warning if a high level situation occurs. It is fitted with it's own rechargeable battery, which is trickle charged , and will still operate in the event of mains power failure.

Delta Power-Pack -This unit is designed to run the secondary pump if a power failure occurs. The unit is trickle charged under normal conditions, and will auto switch to battery power if mains power fails. The unit will pump approx. 8,100 litres in back up mode.

DELTA®-MS 500:

Cavity drainage membrane for use on walls and floors, as a waterproof system. A choice of finishes are available. Can also be used externally for waterproof protection of sub-ground structures.

Material:	high density polyethylene
Thickness:	approx. 0.6 mm
Stud height:	approx. 8 mm
Roll size:	available in clear
(With flat edge of 7 cm	2.4 x 20 m
on one side)	2.0 x 20 m
Compressive strength:	> 250 kN/m²
Drainage capacity:	approx. 2.25 l/s · m
	approx. 135 l/min · m
	approx. 8 100 l/h · m
Air volume between studs:	approx. 5.3 l/m²
Temperature resistance:	– 30°C to + 80°C
Chemical properties:	resistant to chemicals, resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	Class E

DELTA®-MS 20:

Dimpled sheeting with particularly high drainage capacity and compressive strength, suitable for high performance seepage layers in building and civil engineering construction.

Material:	high density polyethylene
Thickness:	approx. 1 mm
Stud height:	approx. 20 mm
Roll size:	2.0 x 20 m
	In the case of special requirements, also available in board format
Compressive strength:	approx. 150 kN/m²
Drainage capacity:	approx. 10 l/s · m
	approx. 600 l/min · m
	approx. 36 100 l/h · m
Air volume between studs:	approx. 14 l/m²
Temperature resistance:	– 30°C to + 80°C
Chemical properties:	resistant to chemicals, resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	Class E

DELTA®-PT:

Dimpled sheeting with plastic mesh welded on, suitable as a damp-proof base for plaster or shotcrete, e.g., as a seepage layer in tunnel construction, or for repairing basements internally.

Material:	high density polyethylene
Thickness:	approx. 0.5 mm
Stud height:	approx. 8 mm / 8mm / 4mm
Roll size:	2.0 x 20 m / 1.5 x 10 m / 1.0 x 15m
Compressive strength:	approx. 70 kN/m²
Drainage capacity:	approx. 5 l/s · m
	approx. 300 l/min · m
	approx. 18 100 l/h · m
Void between studs:	approx. 5.5 l/m²
Temperature resistance:	– 30°C to + 80°C
Chemical properties:	resistant to chemicals, resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	Class E

DELTA®-FM:

DELTA®-FM is specifically designed for floor applications, to combat dampness, and contamination. The special low stud profile (3mm) minimises changes in floor levels but still provides an air gap to achieve damp pressure equalisation.

The membrane is a fast-track application that allows various floor finishes to be achieved with zero 'down time'. The R.H. levels are isolated in the air gap, and controlled. Delta-FM can be used in new build, remedial or refurbishment projects for floors, and walls.

Material:	Virgin high-performance PE-VHD
Application:	Special low stud profile for floor. Can be used on walls
Sheet thickness:	approx. 0.6 mm
Dimple height:	approx. 3 mm
Compressive strength:	approx 140 kN/m²
Roll dimensions:	20m x 2m (40m²)
Volume between dimples:	approx 2.1 1/m²
Service temperature range:	-30degC / +80degC
Behaviour in fire:	Class E

BBA BRITISH BOARD OF AGRÉMENT
CERTIFICATE No 00/3742
DELTA MEMBRANE SYSTEMS

Delta Membrane Systems Ltd.
Bassett Business Centre, Hurricane Way, North Weald, Epping, Essex CM16 6AA
Telephone: 01992 523 811 Fax: 01992 524 046
e-mail: info@deltamembranes.com www.deltamembranes.com

DELTA DÖRKEN

08/11