42 THE DRIVE

NORTHWOOD

HA6 1HP

BOROUGH OF HILLINGDON

BASEMENT IMPACT ASSESSMENT (BIA)

WALDER/SHARP

CONSULTING STRUCTURAL ENGINEERS

CONTENTS

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1 INTRODUCTION

Walder Sharp Ltd have prepared the following report in accordance with the Borough of Hillingdon guidance and planning officer comments for the proposed subterranean development at 42 The Drive – Northwood, HA6 1HP, London.

This document should be read in conjunction with the structural basement drawings and the information prepared by DSP Architecture.

It is proposed to undertake remodelling and refurbishment works of the property and to create a new basement floor that extends under the main body of the house.

This report focuses on the practicalities of constructing the subterranean development. The report details the geology and hydrogeology local to the site, proposed forms of construction, sequencing of works and the impact the proposed works would have on the surrounding structures.

This report and accompanying drawings have been prepared for the purpose of the planning submission. For construction stage a full technical pack should be prepared by the Structural Engineer which the contractor should work to, along with the information produced by the Architect.

2 BASIS OF STRUCTURAL DESIGN

The present report is based on the following relevant standards:

- BS EN 1990:2002 + A1:2005 – Eurocode – Basis of structural design
- BS EN 1991-1-1:2002 + NA – Eurocode 1: Actions on structures – Part 1-1 : General actions – Densities, self-weight, imposed loads for buildings
- BS EN 1991-1-4:2005 + NA – Eurocode 1: Actions on structures – Part 1-4 : General actions – Wind actions
- BS EN 1991-1-7:2006 + NA – Eurocode 1 : Actions on structures – Part 1-7 : General actions – Accidental actions
- BS EN 1992-1-1 :2004 + NA – Eurocode 2 : Design of concrete structures – Part 1-1: General rules and rules for buildings
- BS EN 1993-1-1:2005 + NA – Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings
- BS EN 1993-1-8:2005 + NA – Eurocode 3: Design of steel structures – Part 1-8: Design of Joints
- BS EN 1994-1-1:2004 + NA – Eurocode 4: Design of composite steel and concrete structures – Part 1-1: General rules and rules for buildings
- Borough of Hillingdon – Officers Report

3 THE SITE AND EXISTING BUILDINGS

Refer to figures 2 and 3 in the appendices for the historic maps of the site surveyed in 1932 and 1946 respectively.

Neither of the maps shows any construction; it is understood that the building was erected after WWII.

The existing building is a two storey detached building (ground plus first floor) which is composed by a main body and extension on three sides.

Opening up works will be undertaken prior to construction to confirm the existing structural arrangement and its condition.

The Hillingdon planning portal shows a list of the most recent planning applications for the property

Reference	Location	Proposal	Received	Status
397/APP/2020/2041	42 THE DRIVE ICKENHAM UB10 8AG	Construction of front dwarf wall with brick pillars, metal gates and metal railing to front boundary	03-07-20	Approval
29969/APP/2016/4417	42 THE DRIVE NORTHWOOD	First floor rear extension, first floor side extension, 2 single storey rear extensions and raising of roof and installation of 2 rear dormers to create habitable roof space	08-12-16	Refusal
29969/APP/2015/1524	42 THE DRIVE NORTHWOOD	2 x single storey side extensions and first floor side extension	27-04-15	Approval
29969/APP/2012/981	42 THE DRIVE NORTHWOOD	Removal of condition No.4 of planning permission ref 29969/APP/2009/2452 dated 27/01/2010 to allow for the garage to be converted into habitbale space (Erection of additional single storey rear extension, first floor front extension, alterations to include new windows and roof alterations (garage))	24-04-12	Approval
29969/APP/2011/1360	42 THE DRIVE NORTHWOOD	Installation of new driveway and new landscaping	06-06-11	Approval
29969/APP/2009/2452	42 THE DRIVE NORTHWOOD	Erection of additional single storey rear extension, first floor front extension, alterations to include new windows and roof alterations (garage).	12-11-09	Approval
29969/APP/2009/870	42 THE DRIVE NORTHWOOD	Single storey rear extension and attached garage to side (Application for a Certificate of Lawfulness for a proposed use or development).	27-04-09	Approval
29969/APP/2007/3593	42 THE DRIVE NORTHWOOD	ERECTION OF 2, TWO STOREY SIDE EXTENSIONS AND A PART TWO STOREY, PART SINGLE STOREY REAR EXTENSION TOGETHER WITH ADDITION OF A PITCHED CANOPY OVER EXISTING PORCH (INVOLVING DEMOLITION OF EXISTING SINGLE STOREY SIDE EXTENSION).	26-11-07	Refusal
29969/A/81/1416	42 THE DRIVE NORTHWOOD	Householder development - residential extension(P)	26-08-81	Approval
29969/81/0257	42 THE DRIVE NORTHWOOD	Householder development - residential extension(P)	16-02-81	Approval

3.1 GEOLOGY

The British Geological Survey (BGS) map database was reviewed as part of the desk top study. This indicates that the geology local to the site consists of London Clay Formation, London Clay Formation - Clay, silt and sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.

A review of existing borehole data in the vicinity, shows the presence of sandy gravel down to 2.0m BGL and then firm to stiff light brown mottled grey and orange slightly sandy slightly gravelly clay.

A site investigation and trial pits will be undertaken on site to confirm both the ground conditions and existing foundation depths.

For the initial design Clay Strata is assumed at basement/ LGF formation level. For the ground works and foundations, a safe bearing pressure of 150 kN/m^2 at basement level will be set for all design works.

This value will have to be confirmed by the geotechnical engineer in the interpretation of the factual site investigation report.

3.2 HYDROGEOLOGY

No groundwater has been encountered in any of the boreholes around the area.

London clay is virtually impermeable so no significant ground water is to be expected.

Review of the Environmental Agency (EA) maps confirm that the property is located within Flood Zone 1, low probability of flooding – Land having a less than 1 in 1,000 annual probability of river or sea flooding. Refer to *figure 12* in the appendices 9 for the EA's flood risk map.

3.3 EXISTING DRAINAGE

The existing drainage on the site is yet to be surveyed.

A CCTV survey of the below ground drainage assets will be undertaken by a specialist third party to inform the technical design phase. It is assumed that the drainage on site is via a combined sewage system connecting into the presumed main Thames Water Asset running below St Peter's st at the front of the site.

4 THE PROPOSED DEVELOPMENT

It is proposed to undertake remodelling works of the property and the creation of a new basement floor.

The proposal is for the basement floor to extend under the main body and the back extension but not under the side extensions.

The basement will remain accessible via an internal staircase inside the property and also externally by the back garden.

4.1 THE PROPOSED SUBSTRUCTURE

The existing perimeter walls will be underpinned so that the fourmation level can be reduced by approximately 3.5m

It is proposed to construct the new basement level by removing the existing ground floor plate (exploratory works will be undertaken to ascertain the type of structure).

The ground floor plate removal will allow access to the area and will be followed by the underpinning of the existing perimeter walls to the proposed formation level.

The basement will be complete with the construction of a new reinforced concrete slab that will create a concrete box.

In order to safely excavate to the proposed formation level and construct the new slab at lower level, RC, retaining walls are to be constructed below the building perimeter walls.

The underpinning will involve the temporary propping of the party walls at various levels starting from the ground floor in order to allow the removal of the existing ground bearing slab and the creation of the L shaped pins.

The underpinning sequence will be carried out in one stage in order to reduce the maximum excavation depth. Such stage will see the introduction of L-shaped RC pins that will complete the retaining walls to the basement structure and form the base foundation. Retaining walls will be designed to resist lateral earth and hydrostatic pressures assuming ground water is at ground level to allow for rising water levels, in accordance with the latest design standards (Eurocodes)[1]. Due to the lack of working space and to reduce the

[1] Please note that no groundwater is expected. The measure is in favour of safety

extent of temporary works required the RC retaining walls are to be formed in an underpinning style and sequence of construction around the full building perimeter.

The new basement slab will be constructed in an RC slab which will be tied to the toe of the perimeter retaining walls which will prop the bottom of the structure.

This structural arrangement will form a stiff propped cantilever structure which will transfer lateral pressures across the building and resist global instabilities such as overturning and sliding. All retaining elements will be designed for worst case pressures including hydrology and vehicle surcharging.

4.2 THE PROPOSED DRAINAGE

Waterproofing is to be designed by a specialist subcontractor.

Typically 2 no forms of waterproofing are required; it is likely that one form of waterproofing defence for the basement structure will be via membrane cavity system which will discharge water into the existing network.

It is anticipated that the water will run via new drainage runs where required into the existing network before discharging into the main sewer assumed to be below St Peter's Street. Sumps and pumps may be required to connect back to the existing drainage network at street level. Drainage details will be confirmed at technical design stage following confirmation of the existing network and condition via a detailed below ground drainage CCTV survey.

5 SEQUENCE OF WORKS

The first phase of works after site set-up would be to create an access to the basement for the excavators and the machines necessary to demolish the existing ground concretre slab.

Access may occur both from the front and the back gardens.

Adequate temporary works will be installed in phases to keep the building and the adjacent extensions stable during the basement excavation.

The basement slab will be demolished in phases in order to minimise the amount of temporary works present and therefore allowing maneuvering space for the excavator.

Each phase can be considered complete once the L shaped pins are installed in staggered sequence and the new slab is cast in between.

Key pins will be installed to resupport the existing spine walls to be maintained in the proposed scheme (see drawings in appendix)

In order to mitigate any possible damage to the side extensions due to differential settlement caused by the difference in vertical stiffness in presence of an RC box, the underpinning will extend with progressively shorter pins under the extension walls.

The possibility of accessing from the outside will negate the necessity of disrupting the ground floor plate of the side areas.

The section of the underpins will be formed in an L-shaped RC pin. A steel bar should be used to ram the concrete mix into the gap to ensure no voids are present and load transfer between the existing and new elements can occur.

Excavations for adjacent pins are not to be carried out for a minimum 72 hours after completion of the previous pin. To ensure the safety of the operatives carrying out the works and maintain ground stability proprietary side shutters are to be used.

The toe of the underpin and a kicker will be poured first, the stem of the wall poured after. To ensure sufficient lapping of the bars the contractor will need to ram the bars into the ground during the stem pours. When excavating down these will become exposed and enable the elements to be tied together. Along all joint lines the contractor is to introduce Hydrophilic strips which will seek to mitigate any possible water penetration of the structure.

Connection of the underpin to the existing basement walls will occur via the use of resin embedded rebar to the bottom of the existing wall.

After the underpin has been completed the contractor is to backfill and compact the ground removed. In the temporary case this will prevent global instabilities of the pin. This process is to be repeated until all existing perimeter walls are underpinned. The pins will then be all dowelled to the already poured basement slab that will work as a horizontal prop which will prevent the sliding from the horizontal earth pressure.

Once all concrete has cured, temporary works can be removed and the waterproofing installed with the space fitted out to the Architect's details and specifications.

For basement construction sequencing refer to drawings attached

6 IMPACT ON SURROUNDING STRUCTURES

As part of the tender process due diligences will be carried out to ensure that the Contractor is reputable and has experience of working on projects of a similar nature. The method of construction adopted for the works are well tested and the design of the retaining elements will consider the worst-case possible loadings applied onto it during construction and once completed.

Providing the works are carried out in accordance with engineering specifications and to current standards and good building practices it is anticipated that the damage to the surrounding structures will be within Category 0 (ineligible) or Category 1 (very slight) on the basis of the classifications outlined in table 2.5 of CIRIA C580 report.

No visible change to the pavement or road is expected and no long-term movement is expected

7 UNDERPINNING SPECIFICATION

- Before starting the work the Contractor is to check for any services that could be damaged by the underpinning/ retaining wall formation work.
- The Contractor shall be responsible for ensuring that their operations do not in any way impair the safety or condition of the building both before and during the execution of the work. They shall immediately inform the Engineer if they consider that more stringent procedures than those specified are necessary.
- Underpinning is to be carried out in short sections not exceeding 1 metre in length. The bottoms of the foundation shall be inspected and approved by the Engineer and the Building Inspector before concrete is poured. The underpinning is to be carried out to the satisfaction of the Engineer and the Building Inspector.
- Projecting portions of the existing footings are to be carefully cut off where directed and the underside of the footings are to be cleaned and hacked free of dirt, soil or loose materials before underpinning.
- The body of the underpinning concrete is to be constructed in RC35 concrete and is to be cast to the widths shown unless otherwise directed by the Engineer. Excavation and concreting of any section of underpinning shall be carried out on the same day.
- The concrete is to be stopped off 75mm below the underside of the existing footing and the final pinning up over the whole of the footing is to be carried out with 1:3 mix cement to sharp sand dry pack mortar, well rammed in 24 hours after the concrete has been poured.
- Excavation to any section of underpinning shall not be started until at least 48 hours after completion of any adjacent sections of the work.
- The sides of the previous underpinning bays are to be roughened or keyed to the satisfaction of the Engineer and Building Inspector.
- Sequence of underpinning to be as shown. All sections marked 1 to be excavated, cast and dry packed before starting excavation of section marked 2 and all sections marked 2 to be complete before excavation for sections marked 3 etc.
- The Contractor is to keep a record of the sequence and dimensions of the underpinning actually carried out, including details of excavation, casting concrete and pinning up for each section.
- Excavated material intended for backfilling is to be kept protected from drying out or wetting and is to be placed in maximum 150mm layers, carefully compacted with a pneumatic or electric percussion tool with compacting plate.

8 CONCLUSIONS

- Desk top study indicates that the ground conditions are suitable for the proposed construction of the single storey basement below the existing building.
- The original building walls will be lowered using reinforced concrete (RC) underpins constructed in a traditional underpinning style and sequence as shown on Structural drawings.
- The new basement slab will be an RC ground bearing slab.
- A proposed sequence and method of construction is shown on drawings 0500, 0610, 0620, 0630
- Structural integrity of and stability of neighbouring buildings and assets will be maintained throughout the construction phase, providing an appropriate temporary works strategy is employed. Details of which will be confirmed between the appointed Contractor and Temporary Works Engineer.
- All works are to be undertaken in accordance with any Party Wall Awards and CDM regulations.

ENRICO TOMASI

DIRECTOR

MEng CEng MICE

9 APPENDIX A

Figure 1 - Google Earth View of the property

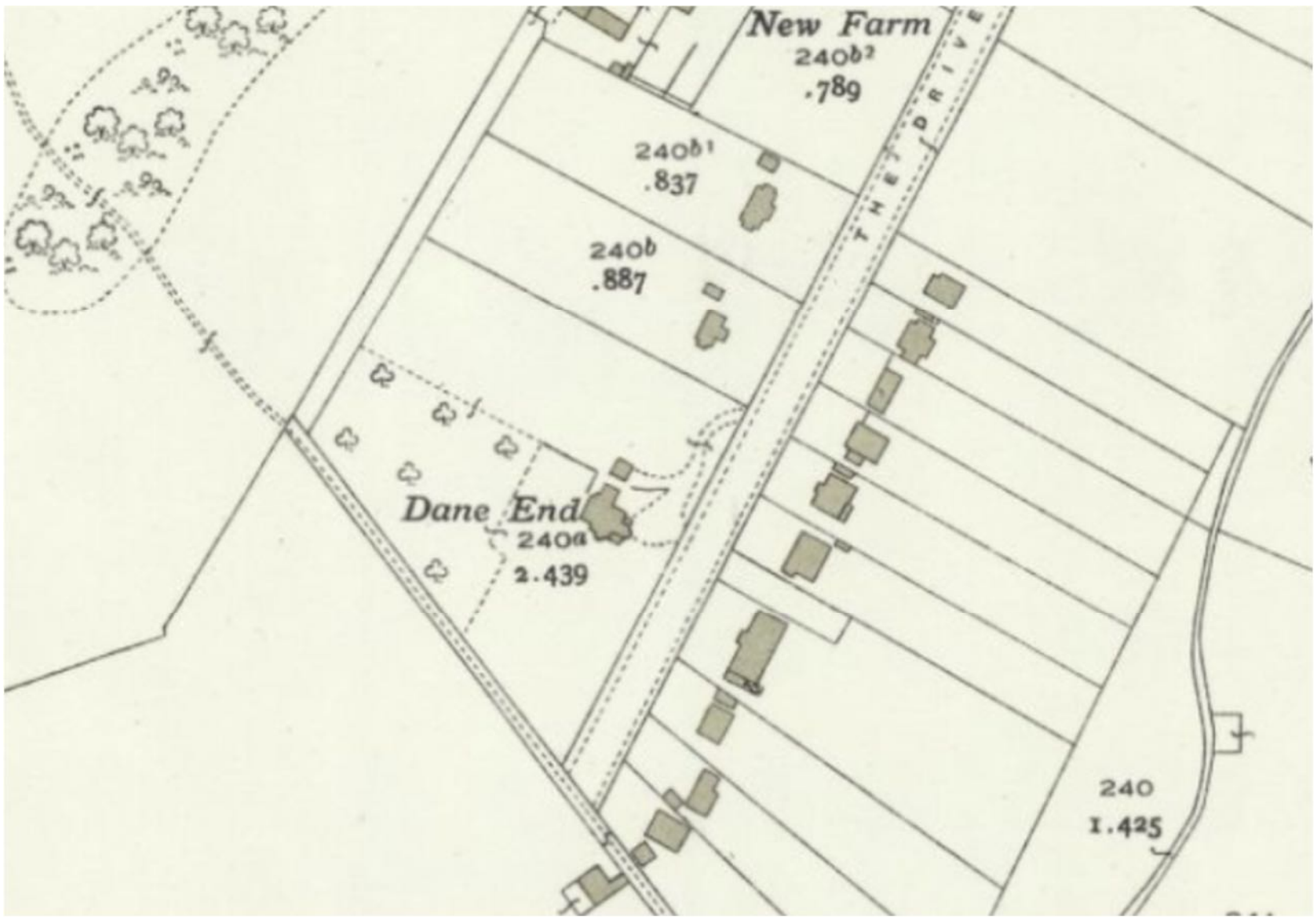


Figure 2 - 1932 25 inch ordnance survey map

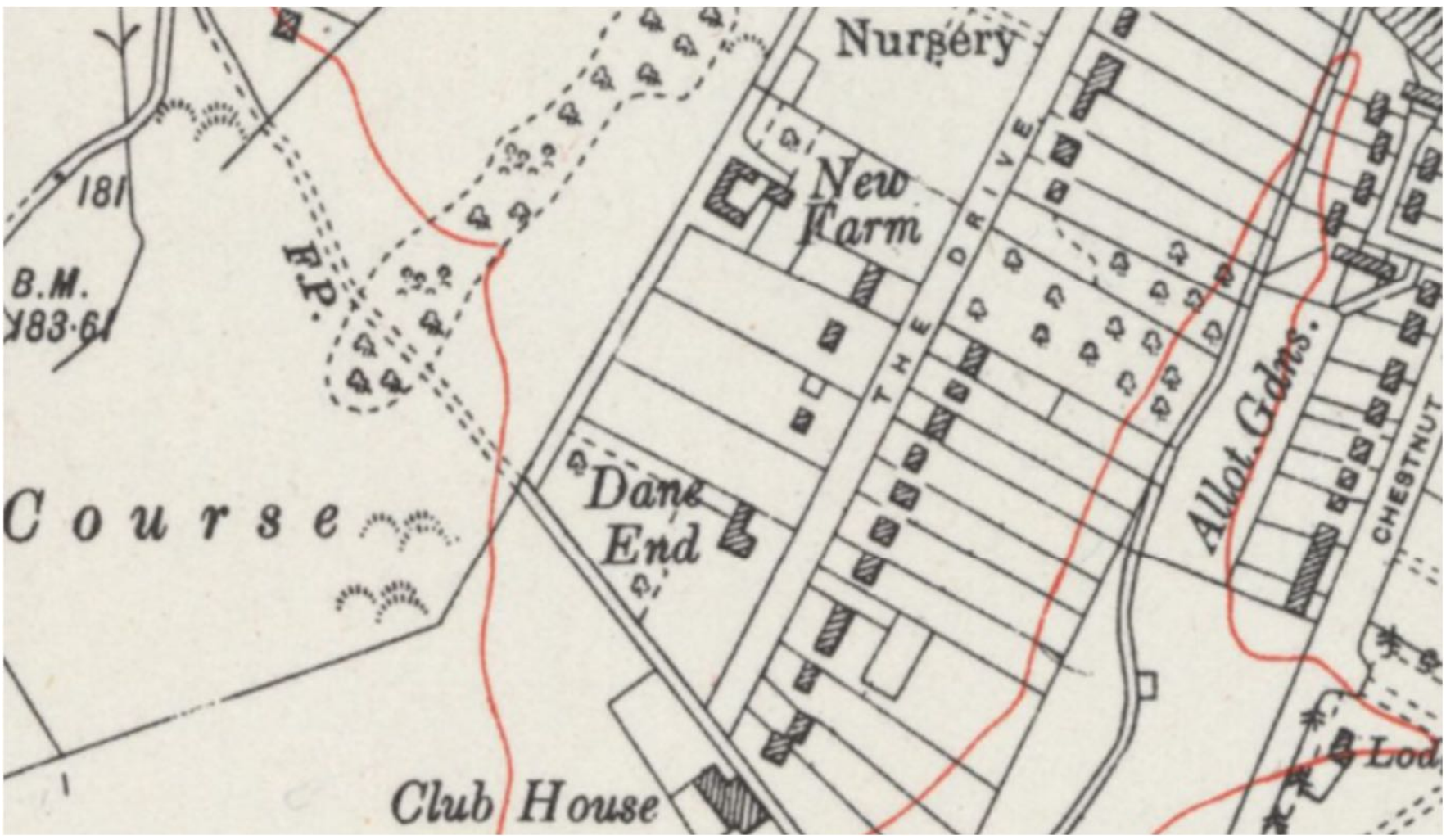


Figure 3 - 1946 6 inch ordnance survey map

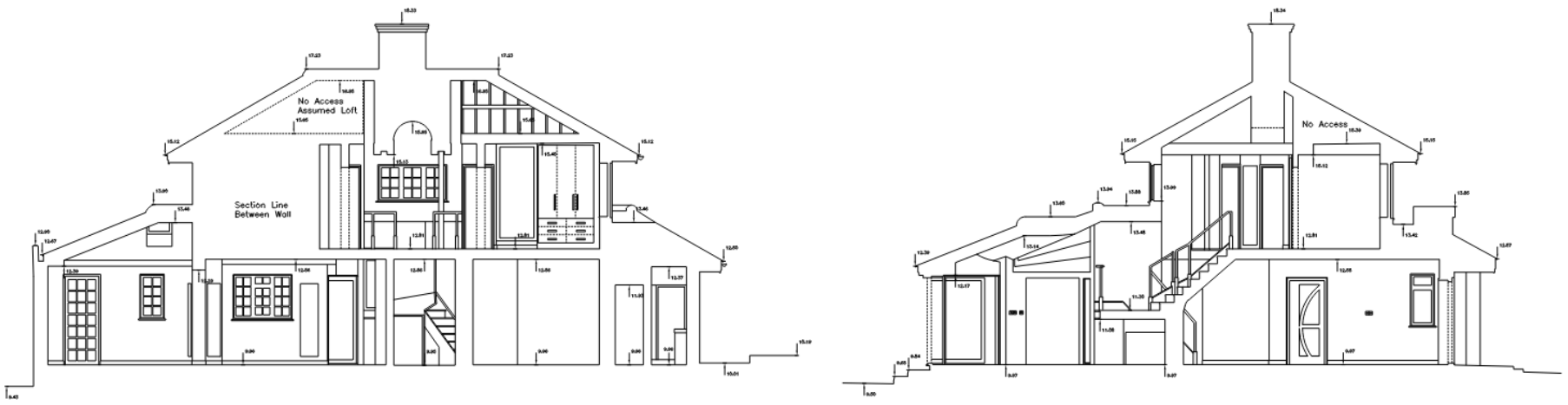


Figure 4 - Existing sections

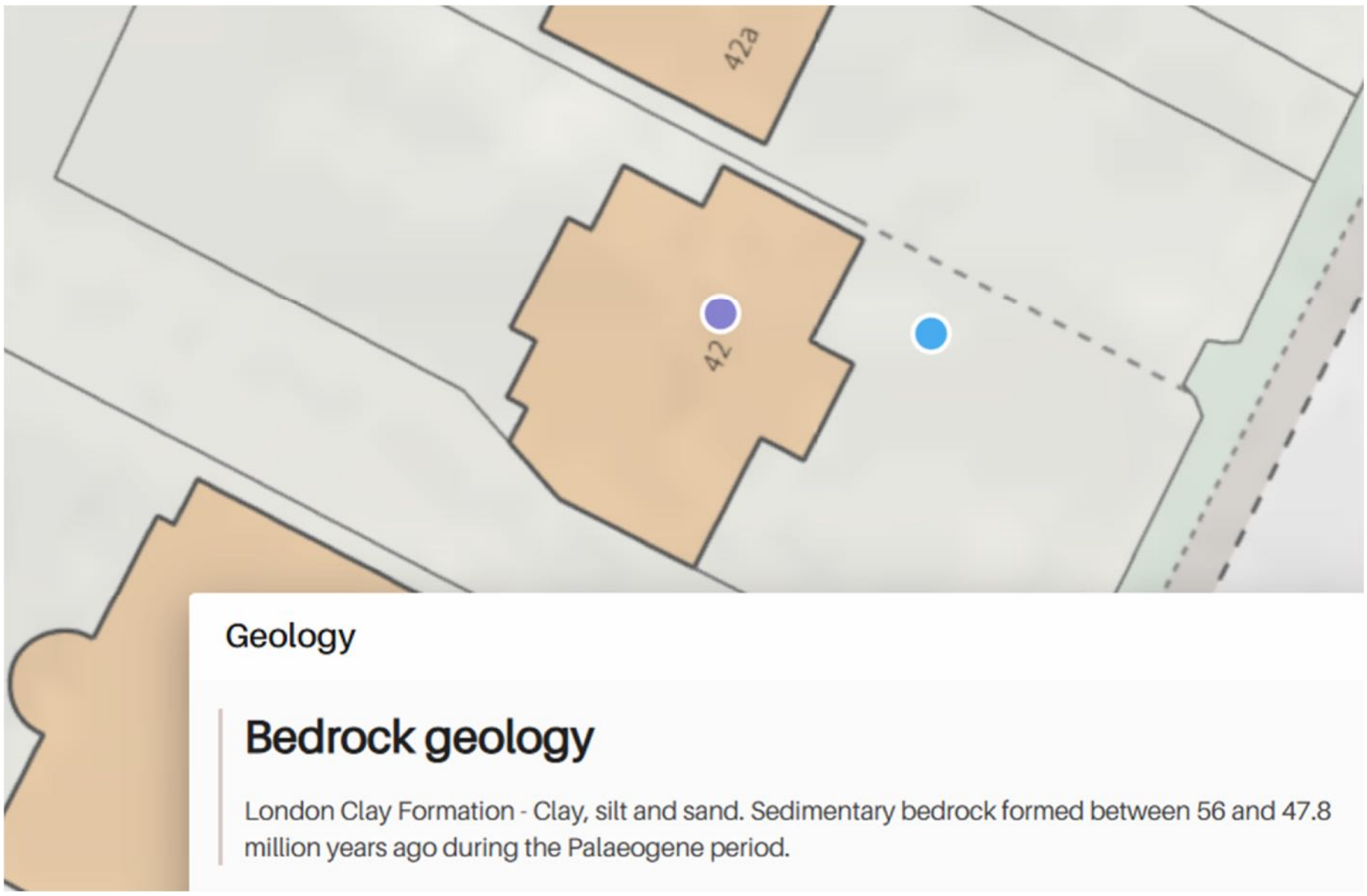


Figure 5 – BGS Geology

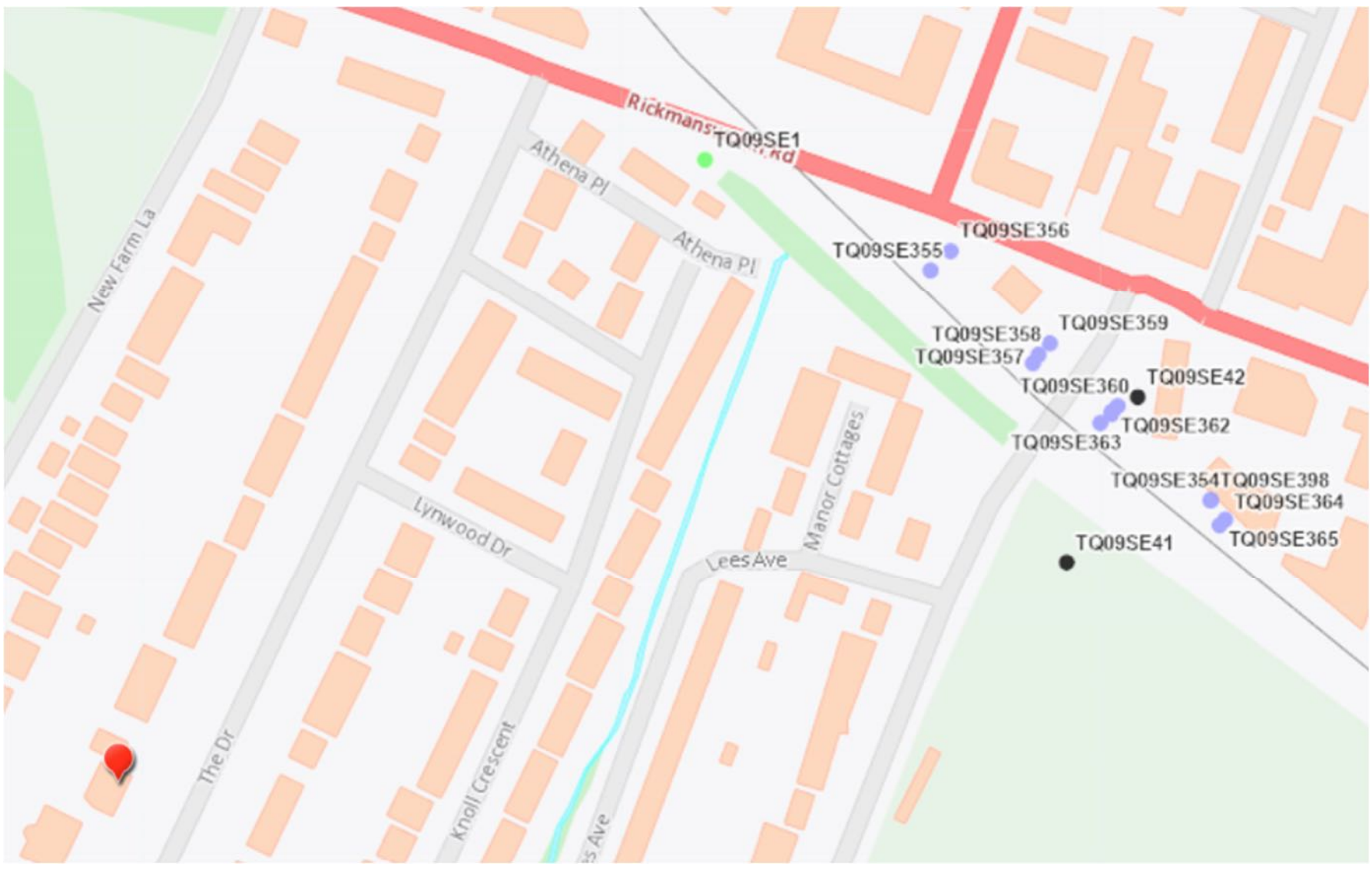


Figure 6 - Borehole Locations

Borehole Log **M066A01W** Page 1 of 1

Project Name: M066 EM4 and EM5 Project No: A059992

Borehole ID: M066A01W

Location: Northwood to Northwood Hills Co-ords (British National Grid): 509670.223 - 190720.376 Level: 70.29

Hole Type: WS Logged By: Dates: 2009-10-15 - 2009-10-15

Client: London Underground Contractor: Project Engineer: WYG

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
		0.0 - 0.2	B					Dark brown silty sandy GRAVEL with occasional roots and rootlets Sand is fine to coarse Gravel is angular to well rounded flint glass red brick fragments pottery and clinker slag undifferentiated EMBANKMENT FILL GRANULAR	
		0.5 - 0.7	B						0.5
		1.0 - 1.2	B						1.0
		1.2 - 1.4	D						
		1.4 - 1.7	D						1.5
		1.7 - 2.0	D						
		2.0 - 2.2	D						2.0
		2.2 - 2.4	D		2.20	68.09			
		2.6 - 2.7	D					Stiff to very stiff light brown mottled grey and orange slightly sandy CLAY with occasional fine pockets of yellow silt and some rootlets Sand is fine LAMBETH GROUP	2.5
		2.7 - 2.8	D						
		2.8 - 4.0	D						3.0
									3.5
					4.00	66.29			4.0
									4.5

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 28-02-2025 at 19:57. BGS Reference 20200206114432614026

Figure 7 – M066A01W Borehole log

Borehole Log **M066A03W** Page 1 of 1

Project Name: M066 EM4 and EM5 Project No: A059992

Borehole ID: M066A03W

Location: Northwood to Northwood Hills Co-ords (British National Grid): 509706.155 - 190687.43 Level: 70.56

Hole Type: WS Logged By: Dates: 2009-10-14 - 2009-10-14

Client: London Underground Contractor: Project Engineer: WYG

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
		0.0 - 0.2	B					Dark brown black slightly silty very sandy GRAVEL with occasional roots and rootlets Sand is fine to coarse with abundant ash Gravel is angular to well rounded fine to coarse ash flint red brick fragments concrete and glass Rare cobble of glass approximately 100mm EMBANKMENT FILL GRANULAR	0.5
		0.5 - 0.7	B						
		1.0 - 1.2	B						1.0
		1.4 - 1.6	D						1.5
		2.0 - 2.1	D		2.00	68.56			2.0
		2.1 - 2.2	D						
		2.5 - 2.6	D						2.5
		2.9 - 3.0	D					Firm to stiff light brown mottled grey and orange slightly sandy slightly gravelly CLAY with occasional roots and rootlets Sand is fine to coarse Gravel is subrounded to angular fine chalk red brick fragments flint and black organic material EMBANKMENT FILL COHESIVE	
		3.0 - 3.5	D						3.0
		3.5 - 4.0	D						3.5
					4.10	66.46			4.0
									4.5

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 28-02-2025 at 19:58. BGS Reference 20200206114432624040

Figure 8 – M066A03W Borehole log

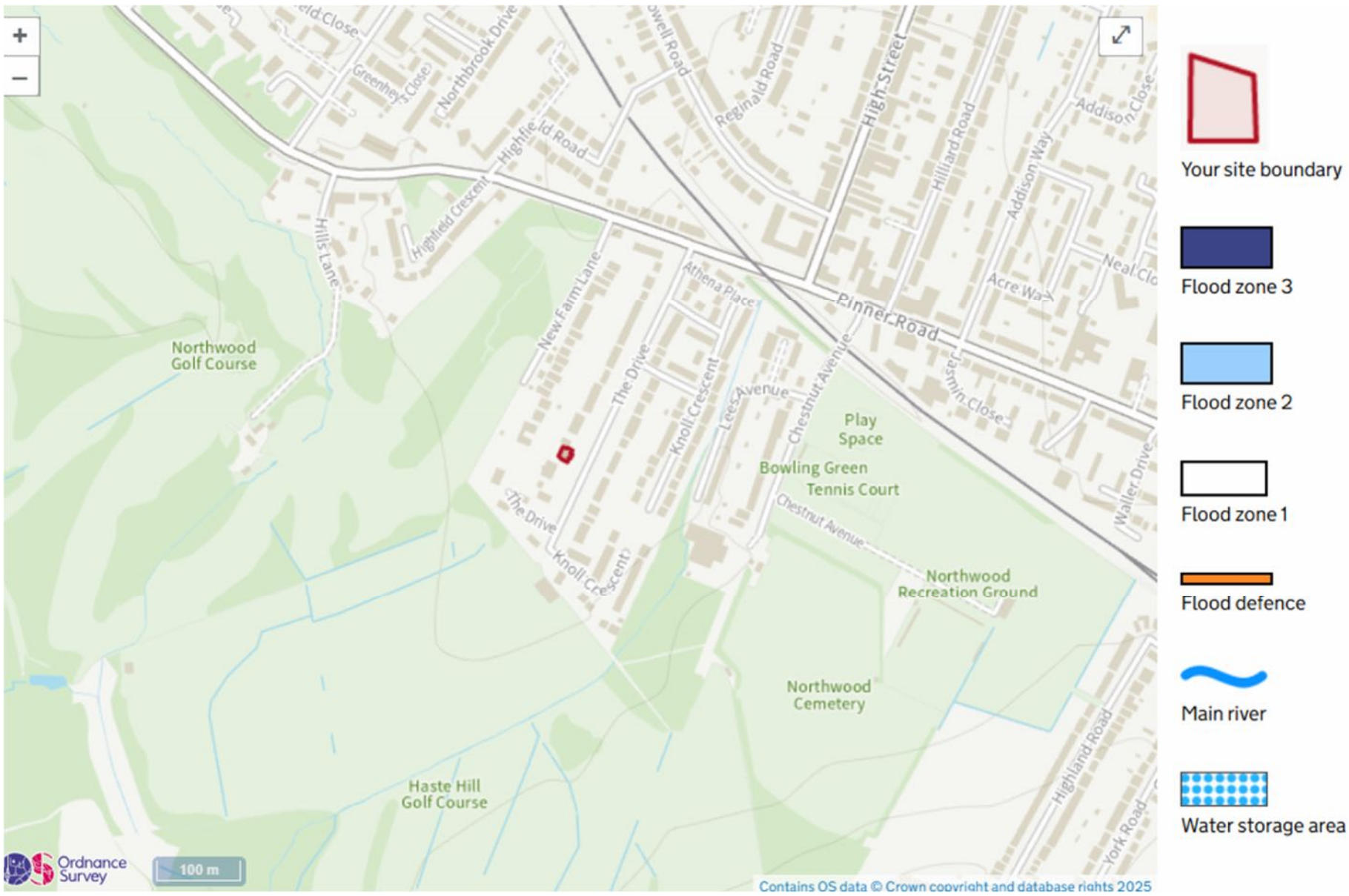
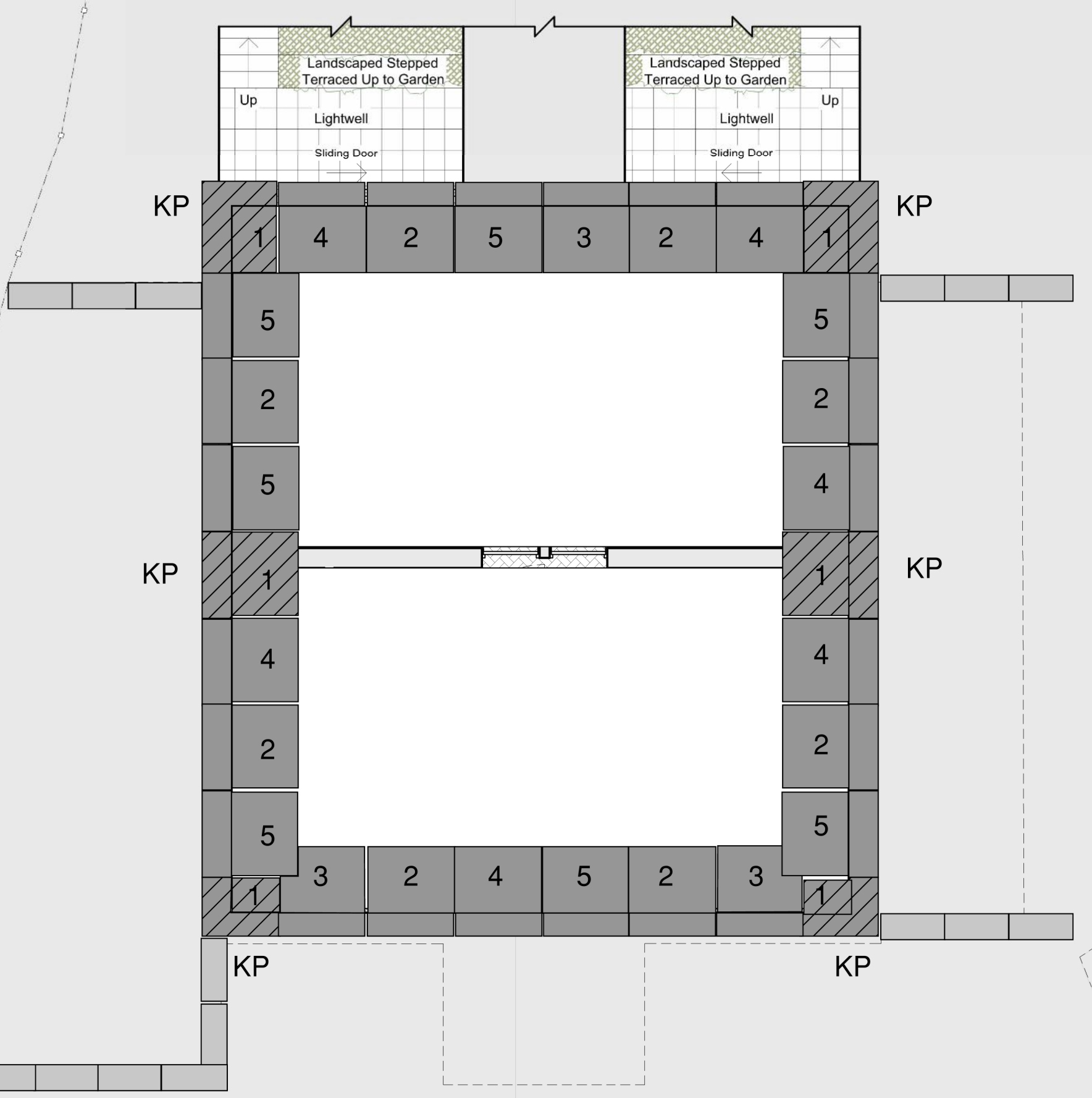


Figure 9 - Environmental Agency - Flood map for planning

10 APPENDIX B

See attached drawings

0 1 2 3 4 5m



ALL DIMENSIONS / LEVELS TO BE CHECKED AND VERIFIED ON SITE BEFORE COMMENCING ANY WORK AND ANY DISCREPANCIES TO BE REPORTED TO THE OFFICE IMMEDIATELY. DO NOT SCALE FROM THE DRAWINGS

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH CONTRACT DOCUMENTS, PROJECT WORKING DRAWINGS, SPECIFICATION, ALL CONSULTANTS / SPECIALIST DRAWINGS, DETAILS AND SPECIFICATION.

REVISION	DATE	NOTE
P01	28.02.2025	PRELIMINARY

WALDER/SHARP
CONSULTING STRUCTURAL ENGINEERS

ADDRESS:
42 THE DRIVE - NORTHWOOD

JOB TITLE:
HOUSE RENOVATION - NEW BASEMENT

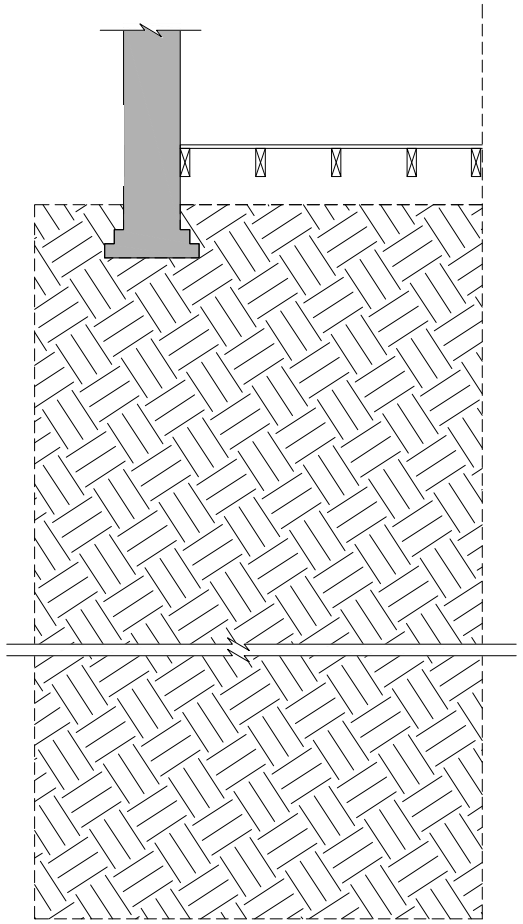
DRAWING TITLE:
BASEMENT IMPACT ASSESSMENT

CLIENT:
DSP ARCHITECTURE

SCALE:	DATE:	
---	FEBRUARY 25	
JOB REFERENCE:	DRAWING REFERENCE:	REV:
1235	0500	P01

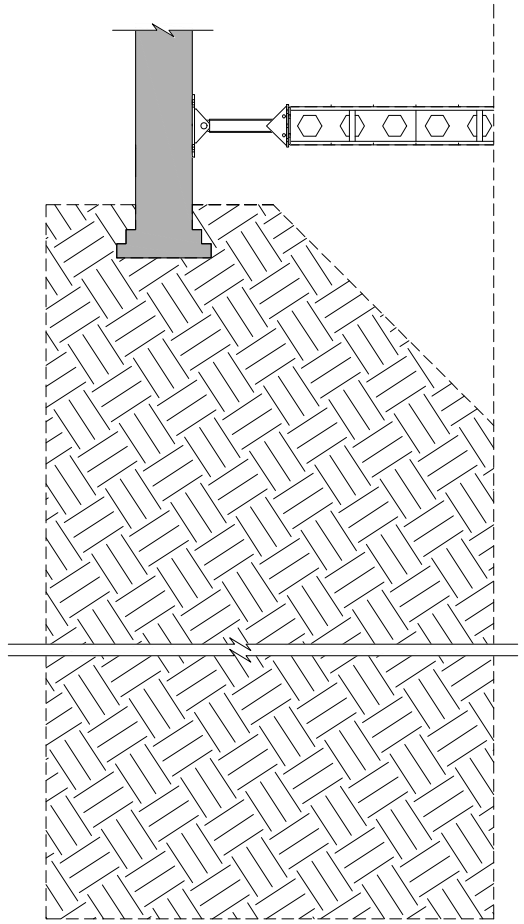
NOT FOR CONSTRUCTION

REVISION	DATE	NOTE
P01	28.02.2025	PRELIMINARY



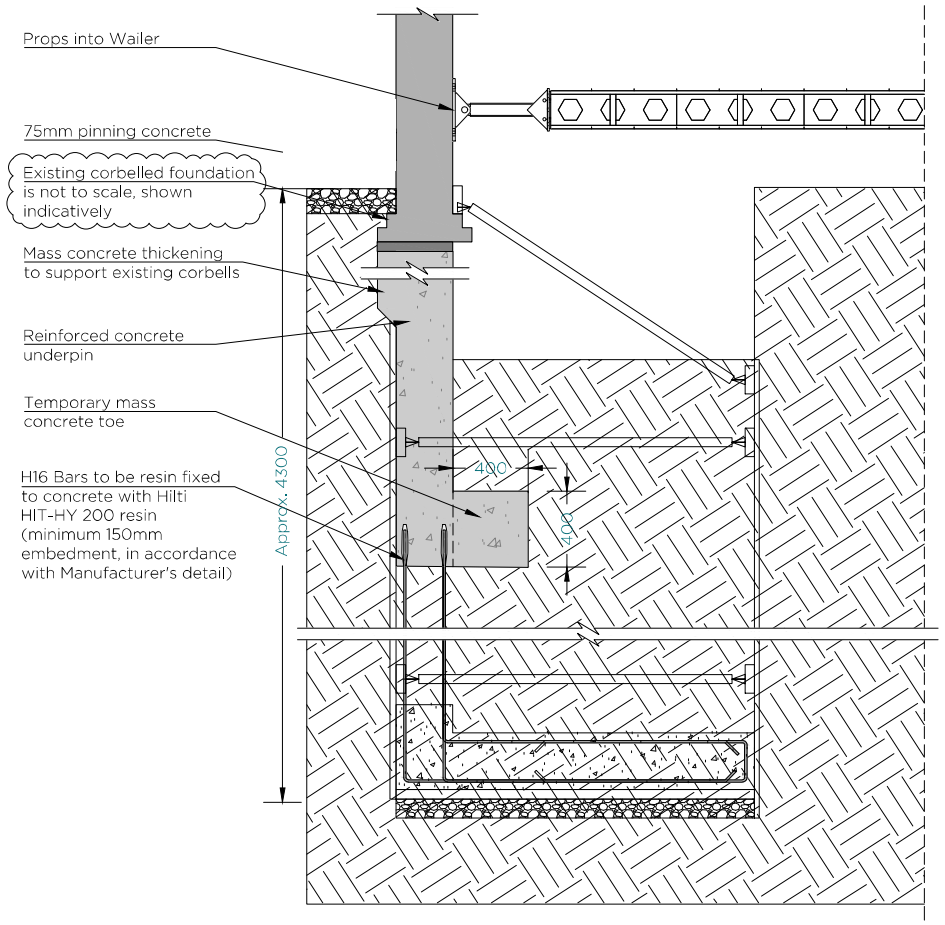
Existing Condition:

Before works commence
Technical design for permanent works to be completed
Temporary works and sequencing to have been designed by Contractor's Temporary works Engineer.
Site specific exploratory works to have been carried out to confirm Geotechnical and Hydrological conditions



Phase 1:

Remove ground floor construction to enable work access
Install props at ground floor level spanning between party walls
Reduce ground levels across site battering back up to walls so that excavations does not exceed 45° line from foundations



Phase 2 (KP):

Locally excavate for underpin down to formation level.
Install temporary props, strutting and blocking to retain loose ground.
Pour Blinding, install reinforcement and then pour toe and kicker of retaining wall.
Subject to party wall award, install cement board against excavated face to form clean finish to concrete. Central Bern to be left high to enable localised propping for underpinning excavations

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42 THE DRIVE - NORTHWOOD

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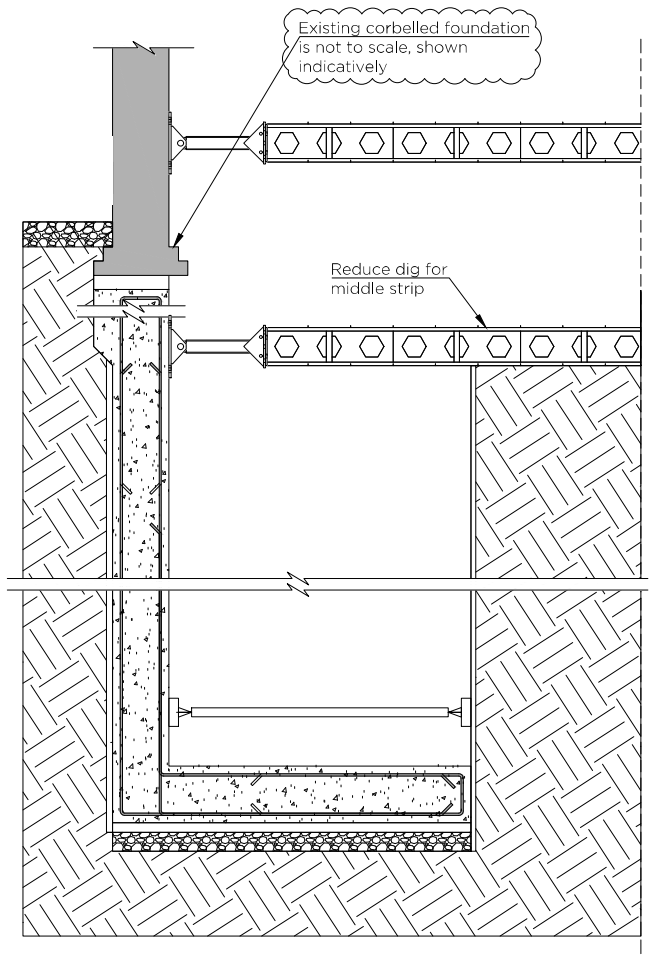
BASEMENT IMPACT ASSESSMENT

CLIENT:
DSP ARCHITECTURE

SCALE:	DATE:	
NTS	FEBRUARY 25	
JOB REFERENCE:	DRAWING REFERENCE:	REV:
1235	0610	P01

NOT FOR CONSTRUCTION

REVISION	DATE	NOTE
P01	28.02.2025	PRELIMINARY

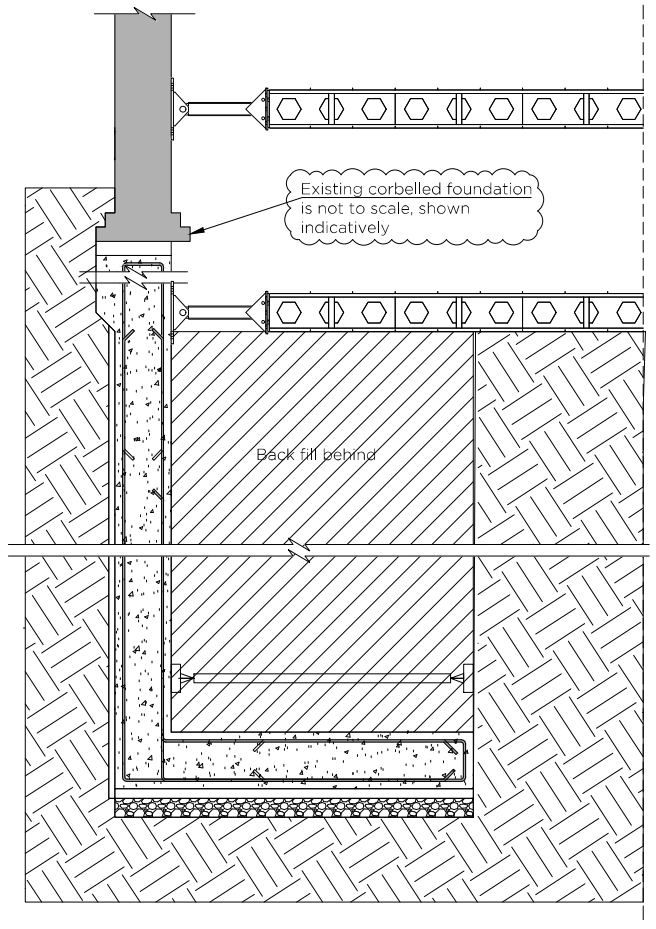


Phase 3:

Install reinforcement for stem
Utilise concrete spacers to brace cement board against reinforcement
Shuttering to be fixed to wall and underpinning section to be cast
Concrete to be poured in Letter box style and vibrated to enable packing

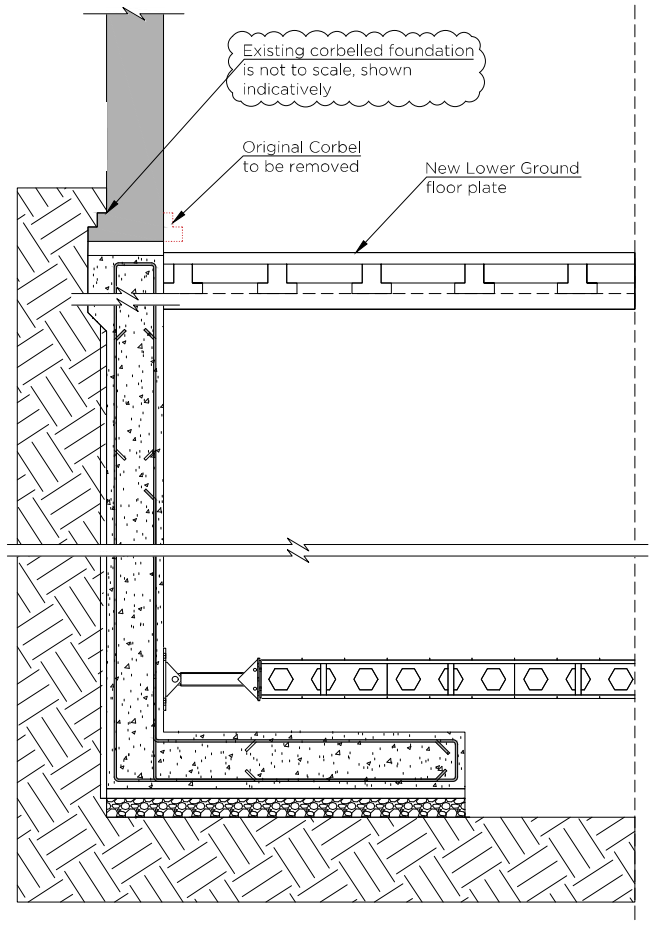
Install temporary horizontal prop below new Lower Ground floor plate level

Reduce dig in the middle strip to formation below Lower Ground floor plate level



Phase 4:

Once concrete has reached required strength, strike shuttering.
Tightly dry pack between head of retaining wall and underside of masonry corbel
Back fill to ensure stability in the temporary case
Repeat through stages until underpinning has been completed



Phase 5:

Install new Ground floor construction
If required wait for concrete to cure prior to removing high level props
Ground level across the site can be reduced in preparation of forming the basement slab.
Ensure stability throughout phase via the installation of low level props

WALDER SHARP
CONSULTING STRUCTURAL ENGINEERS

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42 THE DRIVE - NORTHWOOD

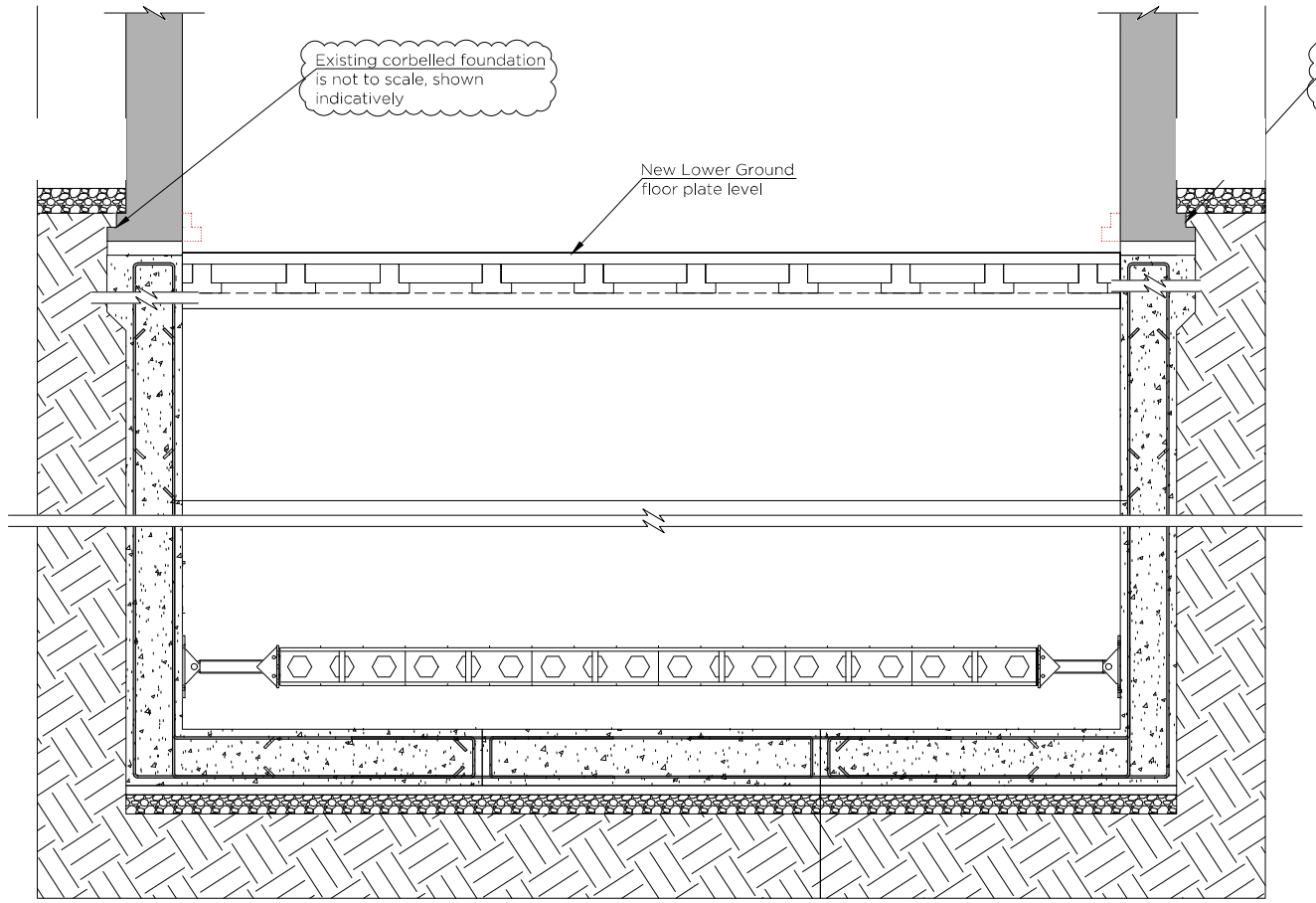
JOB TITLE:
HOUSE RENOVATION - NEW BASEMENT

DRAWING TITLE:
BASEMENT IMPACT ASSESSMENT

CLIENT:
DSP ARCHITECTURE

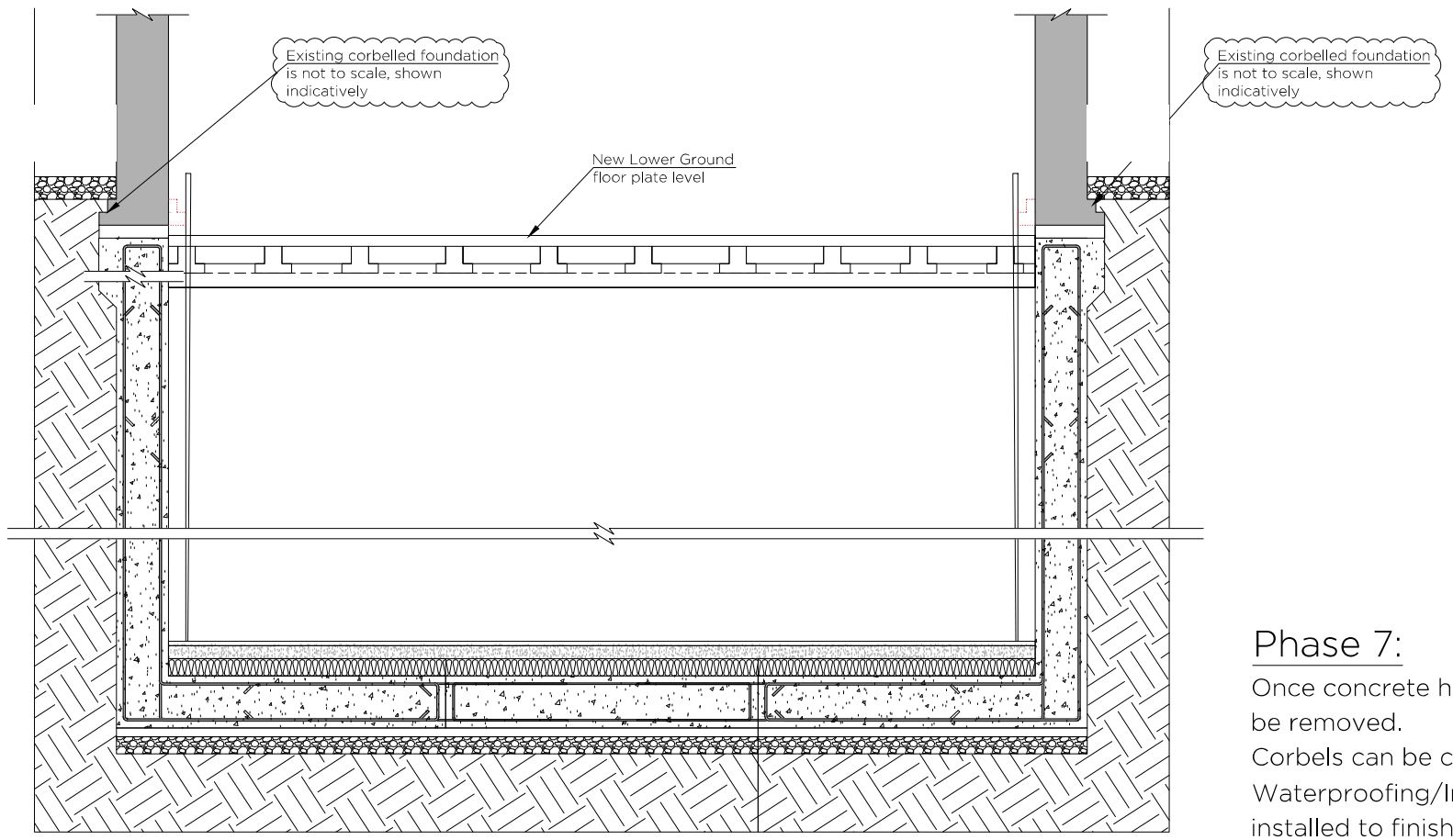
SCALE:	DATE:	
NTS	FEBRUARY 25	
JOB REFERENCE:	DRAWING REFERENCE:	REV:
1235	0620	P01

NOT FOR CONSTRUCTION



Phase 6:

Below ground drainage to be installed/finalised.
Cast blinding layer, reinforcement including tying bars (un-bend) between toe and slab and cast basement slab



Phase 7:

Once concrete has reached the required strength props can be removed.
Corbels can be cleanly disk cut back flush to wall above.
Waterproofing/Insulation to Architect's specification to be installed to finish basement box

REVISION	DATE	NOTE
P01	28.02.2025	PRELIMINARY

WALDER/SHARP
CONSULTING STRUCTURAL ENGINEERS

ADDRESS:
42 THE DRIVE - NORTHWOOD

JOB TITLE:
HOUSE RENOVATION - NEW BASEMENT

DRAWING TITLE:
BASEMENT IMPACT ASSESSMENT

CLIENT:
DSP ARCHITECTURE

SCALE: NTS
DATE: FEBRUARY 25

JOB REFERENCE: 1235
DRAWING REFERENCE: 0630
REV: P01