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BASEMENT IMPACT STUDY FOR 160 IVERSON ROAD LONDON NW6

13098/bis

OCTOBER 2013

REVISION 1

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160 IVERSON ROAD LONDON NW6

BASEMENT IMPACT ASSESSMENT

INTRODUCTION

It is proposed to redevelop 160 Iverson Road into 3 separate units.

The existing and proposed drawings of the property are included separately, but a brief description of the changes is given below.

As part of the proposals the existing low basement that occurs under the main body of the building will be deepened by approximately 1m to provide adequate headroom for a new bedroom and bathroom.

A lightwell will also be added to the front of the building to bring light and air into the bedroom.

To the rear, the current two storey addition will also be widened at ground floor level, to the full width of the site.

This document contains the Basement Impact Assessment of the proposals in line with Camden Planning Guidance CPG4 and concludes that the proposals are acceptable.

It follows the "question and answer" approach suggested by CPG4

STAGE 1 SCREENING PROCESS

SUBTERRANEAN FLOW SCREENING

With reference to Figure 1 of CPG4

Q1a. Is the site located directly above an aquifer?

No, by reference to Figure 8 from the Camden Geological, Hydrogeological and Hydrological Study (CGHHS)

Q1b. Will the proposed basement extend beneath the water table surface?

No, 5m deep boreholes have been sunk to the front and rear of the property and no water was encountered in either hole.

Q2. Is the site within 100m of a watercourse, well (used/disused) or potential spring line?

No. Nothing was noted on a walk around and nothing is shown on Figure 12 (Camden Surface Water Features) from CGHHS, the maps or geological maps consulted or the available satellite images of the area. Figure 11 from CGHHS, Barton's Lost Rivers of London Map, shows a former tributary of the Westbourne crossing Iverson Road approximately 150m to the west and then roughly following the course of Iverson Road eastwards some 110m or thereabouts to the north of No 160 Iverson Road.

Q3. Is the site within the catchment of the pond chains on Hampstead Heath?

No, by reference to Figure 14 from CGHHS.

Q4. Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?

Not a significant change.

The front garden is at presently a mix of concrete with a central soft planting area.
Under the proposals, the lightwell itself will be hard paved and drained into the sewers, whilst the remaining area at existing ground level will have a porous surface.

The external area alongside the rear addition (that becomes part of the building) is currently hard paved as is an area immediately behind the building. This area is currently sunken below the general garden area and drains into a gulley and then the sewers.

Q5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g via soakaways and/or SUDS)?

No, the amount will remain the same (refer to the answer above).

Q6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?

No. Nothing was noted on the walkaround, the maps consulted or Figure 12 from CGHHS.

SLOPE STABILITY SCREENING

With reference to Figure 2 from CPG4

Q1. Does the site include slopes, natural or manmade, greater than 7 degrees (approximately 1 in 8)?

No, the site itself pretty flat and level with No 162. The general slope of the road to the front is approximately 1 in 30 and this is taken up with a change in level each side of the boundary wall with No 158 of some 300mm.

Q2. Will the proposed reprofiling of landscaping at site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?

No, proposed levels are generally to be as existing.

Q3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?

No, see above, and although well served by rail, the nearest track is some 40 or 50m to the south of the building.

Q4. Is the site within a wider setting hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8)?

No. Although Iverson Road slopes, the maximum slope higher up the hill seems to be of the order of 1 in 15 to 1 in 20.

Q5. Is London Clay the shallowest strata at the site?

Yes, according to both the geological maps and the site investigation.

Q6. Will any trees be felled as part of the proposed development and/or are there any works proposed within any tree protection zones where trees are being retained?

No. There are only shrubs in the garden of No 160. There are a couple of small trees in the rear garden of No 162 but outside the zone of influence of the proposed works.

Q7. Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?

Not to our knowledge. There were no obvious signs of seasonal movement noted when we walked around the house, though the foundations are on London Clay, which can be prone to seasonal movement. The house and its neighbour are slightly warped, when viewed from the street, which is common with all pairs of houses in the terrace. I take this to be because every second party wall has deeper foundations than the one in-between, because of the basement arrangement. This has resulted in historic differential settlements. Nor can it have helped that the front basement of No 160 was excavated at some point in the past below the level of the party wall foundations, leaving just a bank of earth up against them.

Q8. Is the site within 100m of a watercourse or a potential spring line?

No, refer earlier answers (Subterranean Flow Screening).

Q9. Is the site within an area of previously worked ground?

No. Nothing is shown on the historical or geological maps and the London Clay was found within 600mm of the surface in the boreholes front and back of the property.

Q10. Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?

No, the site is not within an aquifer, by reference to Figure 8 from the Camden Geological, Hydrogeological and Hydrological Study (CGHHS).

Q11. Is the site within 50m of the Hampstead Ponds?

No, the site is not within 50m of the Hampstead Ponds.

Q12. Is the site within 5m of a highway or pedestrian right of way?

The front lightwell is within 5m of the pavement, the building itself is further away.

Q13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

Existing foundation depths, where measured on site, currently vary between 1.8m and 2.2m below the level of the existing front ground floor. These will be deepened by approximately 1.3m in the new proposals. They will, however, remain in the London Clay.

Q14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?

No it is not.

SURFACE FLOW AND FLOODING SCREENING

With reference to Figure 3 of CPG4

Q1. Is the site within the catchment of the pond chains on Hampstead Heath?

No, it is not (refer earlier answers)

Q2. As part of the proposed site drainage, will surface water flows (eg. volume of rainfall and peak run-off) be materially changed from the existing route?

No, it will not (refer earlier answers).

Q3. Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?

Not a significant change (refer earlier answers)

Q4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses.

It will not. The London Clay on site is relatively impermeable and any water would have to run above it or below it.

The existing building and garden wall foundations sit on the clay and provide a barrier to flow above the London Clay and the proposed foundations, though deeper than existing, do not go below the clay.

Q5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses.

It will not. The proposed basement has no effect, refer earlier answers.

Q6. Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?

The site is in West Hampstead but is not in an area known to be at risk from flooding. Nearby Maygrove road is identified as having flooded in 1975 on Figure 15 from CGHHS, but Iverson Road is not identified as being in a risk area.

The basement is not below the static water level of a nearby surface water feature (refer earlier answers).

STAGE 2 SCOPING PROCESS

SUBTERRANEAN FLOW SCOPING

During the screening process no items were identified that required taking to the scoping process.

SLOPE STABILITY SCOPING

In this section only the points that arose from the screening process will be considered.

Q5. Is London Clay the shallowest strata at the site?

Yes it is, but basements can be satisfactorily built in London Clay and are throughout London.

Q12. Is the site within 5m of a highway or pedestrian right of way?

It is proposed to construct a front lightwell approximately 1.5m from the pavement and 4.0m from the road itself. There is plenty of room within the 1.5m to install temporary works to maintain the stability of the road and the pavement whilst the excavation and construction works take place.
There are trees in the pavement in front of both neighbouring properties, with a 6m tall Lime tree with trunk diameter of 200 and a 5m tall Hawthorn with a trunk diameter of 250mm. The temporary works required during construction of the lightwell are sufficiently far away from the trees such their Root Protection Areas are maintained as per the requirements of BS5837.

Q13. Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?

Under the main house, where there is already a basement throughout No 160, existing foundation depths vary from 1.8m below (front) ground level at the front to 2.2m below (front) ground level at the rear. Deepening these footings by a further 1.3m is not expected to lead to any significant differential settlements causing problems in the neighbouring properties. The foundations are already fairly deep in the London Clay and they just become deeper, but still in the London Clay.

SURFACE WATER FLOW AND FLOODING SCOPING

During the screening process no items were identified that required taking to the scoping process.

STAGE 3 SITE INVESTIGATION

DESK STUDY

The proposals are to redevelop and refurbish No 160 Iverson Road, changing it from a single, three storey house, with an additional low headroom basement under the main body of the house, to a four storey, three unit property, by deepening slightly the basement and by extending the house slightly at ground floor level.

The existing plot of land is approximately 31m long by 5.5m wide with the terraced house, some 15m long, 4.5m from the front of the plot.

An examination of the historical record ('Hampstead, Kilburn, Edgeware Road and Cricklewood' A History of the County of Middlesex: Vol 9: Hampstead, Paddington (1989)) suggests Iverson Road was developed for housing between 1869 and 1882.

The Ordnance Survey Map 0f 1805-1822 shows the area as undeveloped, presumably farmland, whereas that of 1897-1898 shows it as housing.

The British Geological Map shows London Clay to be the shallowest strata on site.

SITE WALK AROUND

I walked around the area to look for any features that may impact upon the proposals, but found none.

Iverson Road slopes down from West End Lane. Up the slope, on the same side of Iverson Road, basements similar to the one proposed at No 160, appear to have been constructed at Nos 172 and 176. Down the slope nothing is obvious. No 156 has a window under the front bay, but I suspect it is just signifies a reduced headroom basement, in common with all properties on the terrace.

At No 138 the housing stock changes.

SITE INVESTIGATION

FIELD WORK

Two boreholes were drilled on site, one to the front of the property and one to the rear, to establish the soil strata in which the proposed basement would be constructed.

In addition four trial pits were excavated to determine the width and depth of the existing foundations to the property and the soil strata on which they were founded.

The logs for these are included overleaf.

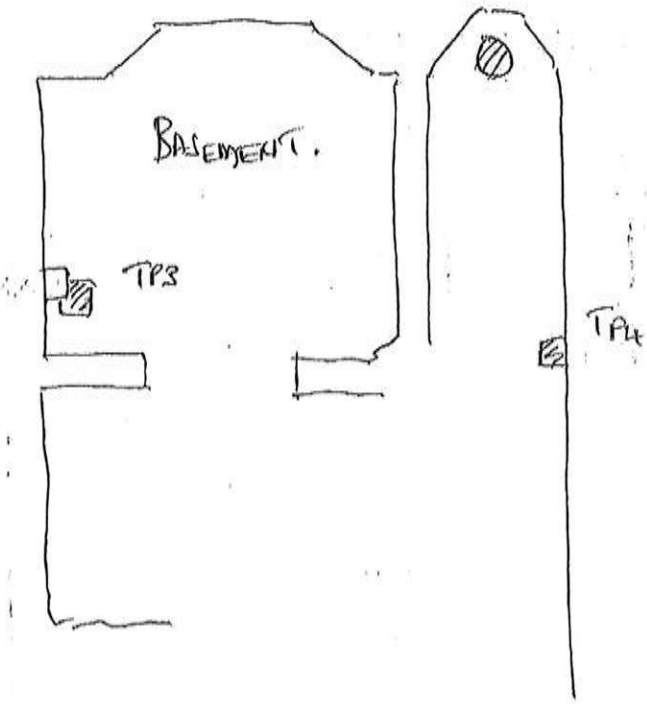
160 Iverson Rd

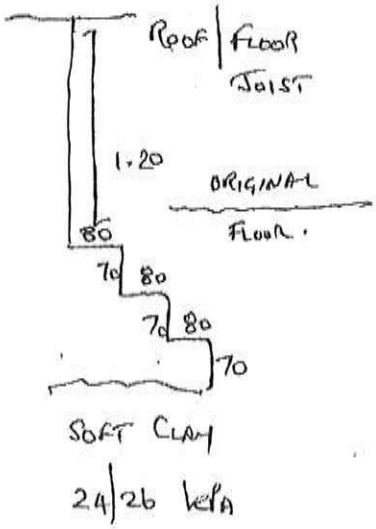
W/V2

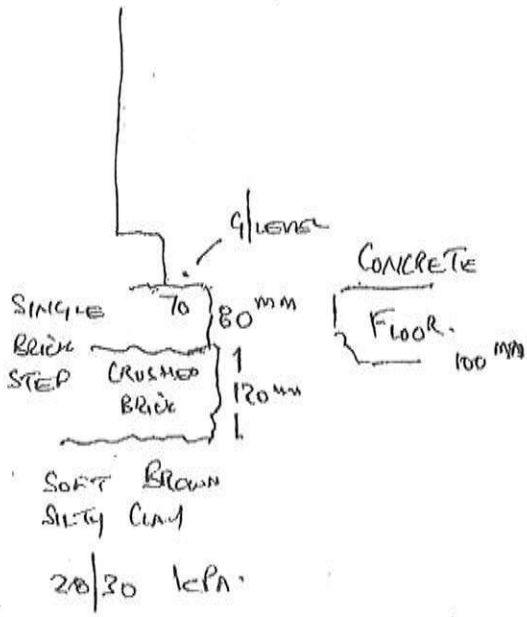
M/cover 2.30m To Invert.

Front

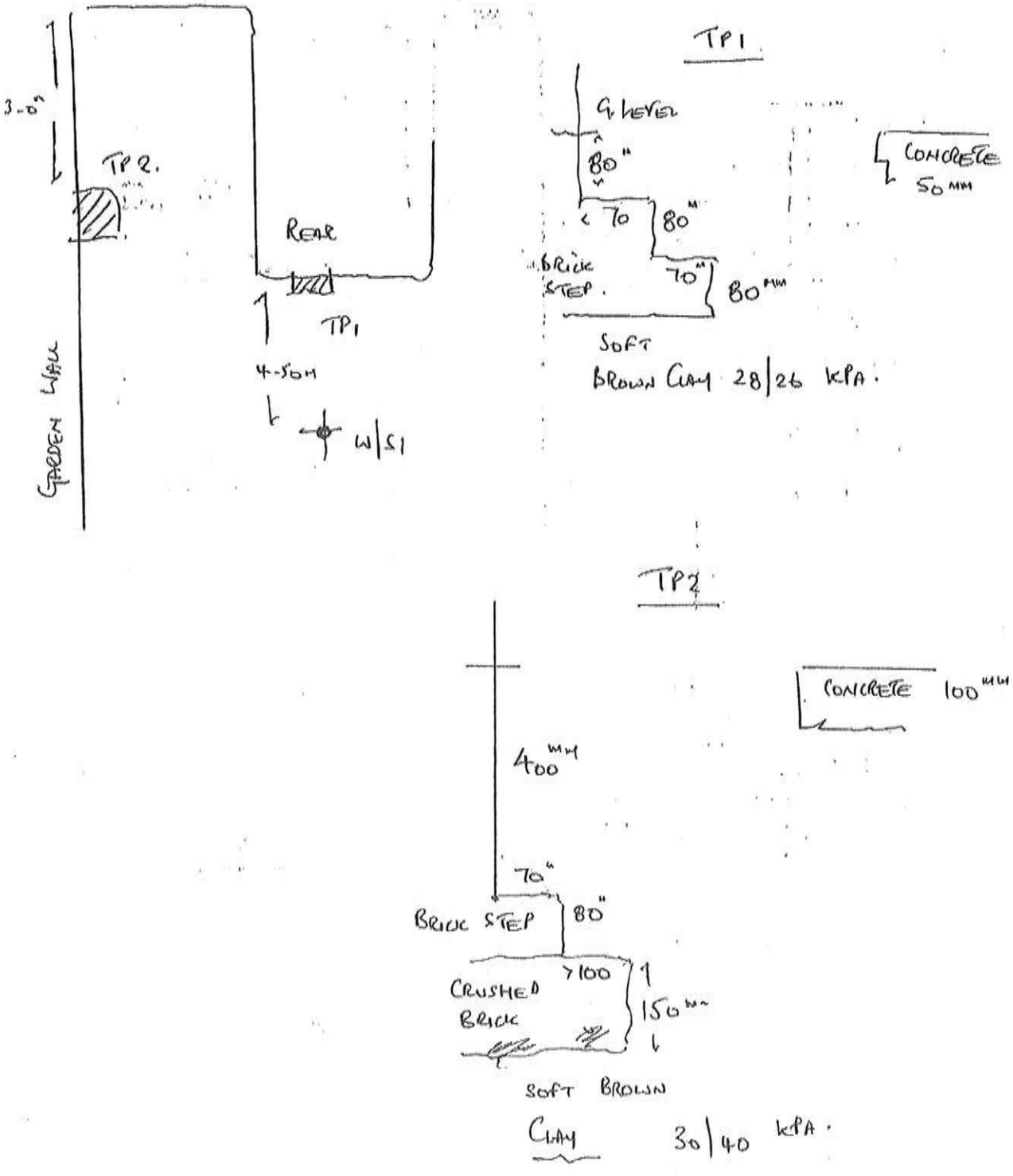
Coal Shute







160 IVERSON RD



S. J. Martindale Site Investigation Services.

PROBE BOREHOLE No. WS2

FRONT

Site: 160 IVERSON RD	**Date:** 11/7/2013
LONDON NW6.	**Ground Level:**
Client: M.B.O.K.	**Job No.**

	Strikes	Inflow	Sealed at	
Ground Water Record	NIL		m m m	DISTURBED SAMPLES @ 0.50 M MANHOLE CONSTRUCTION = CLAY

Description	Strata Depth m	Length	m	Sample Depth	Sample Type	Pocket Penetrometer	SPT	Root Identificati
DARK TOPSOIL / MADE GROUND GRAVELS	0.60 M		1			1.0 M 60/62 KPA		
FIRM BROWN CLAY FILL, OCC BRICK FRAGMENTS AND ROOTS	2.30		2			2.0 M		1.30'
SOFT ORANGE/BROWN SILTY CLAY	4.20		3			36/40 KPA 3.0 M		
FIRM BROWN SILTY CLAY	5.0 M		4			40/40 KPA 4.0 M		
			5			48/50 KPA 5.0 M		
			6			46/46 KPA		

S. J. Martindale Site Investigation Services.

PROBE BOREHOLE No.

Site: 160 IVERSON RD	Date: 11/7/2013
LONDON N.W.6.	Ground Level:
Client: M.B.O.K.	Job No.

	Strikes	Inflow	Sealed at	
Ground Water Record	NIL		m m m	REAR GARDEN DISTURBED SAMPLES (a) 0.50 CLR FINE CRYSTALS = 2.10 - 2.30 M

Description	Strata Depth m	Length	m	Sample Depth	Sample Type	Pocket Penetrometer	SPT	Root Identification
GRASS/TOP	400 M		1			HAND VANE 1.0 M 25 KPA		
SOFT BROWN SILTY CLAY.	1.80 M		2			2.0 M 45 KPA		
FIRM BROWN SILTY CLAY, OCC CLAYSTONE FRAGMENTS	5.0 M		3			3.0 M 55/57 KPA		
			4			4.0 M 66/62		
			5			5.0 M 66/58 KPA		
			6					

INTERPRETATION

The logs show that the underlying strata is London Clay and that the basement will be constructed within it.

The boreholes at the front and back cannot be directly compared, as the ground level is some 1m lower at the rear of the property than at the front. Even taking this into account, the levels of equivalent strata are still 1m or so higher at the rear than the front… Not surprisingly then, there is clay fill under the front garden, presumably from when the area was regraded during construction of the houses and the roads.

The existing foundations are found to be simple spread footings sitting on the London Clay. In the main house they sit just below the existing basement floor level and for the rear addition 240mm below external ground level.

No water was encountered in the boreholes, which were taken up to 3m below the expected formation level of the basement.

The strength of the clay was as expected, with safe bearing pressures around 100kN/m2. Strength parameters will be considered further in the Basement Impact Assessment when the design of the underpinning/retaining walls is considered and predictions of ground movements made.

MONITORING

Water level flow and level monitoring would have been carried out if water had been found in the boreholes.

It was not and the area is outside that considered an aquifer, so no monitoring was required.

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STAGE 4 IMPACT ASSESSMENT

The screening stage has identified that the proposed basement will no effect on subterranean (ground water) flow or surface water flow and flooding risks.

Calculations are attached to show that the proposed underpinning works will not cause undue settlement of the neighbouring structures and that the proposed underpinning can safely resist the lateral loads of the soil to which they are subjected.

Deflections are notoriously difficult to predict for underpinning and retaining work, particularly where the reduction in ground level is relatively small (here we are talking about about a reduction in level of only approximately 1m over the building), as they mainly to do with preparation of the ground beneath the underpinning and the quality of the drypacking.

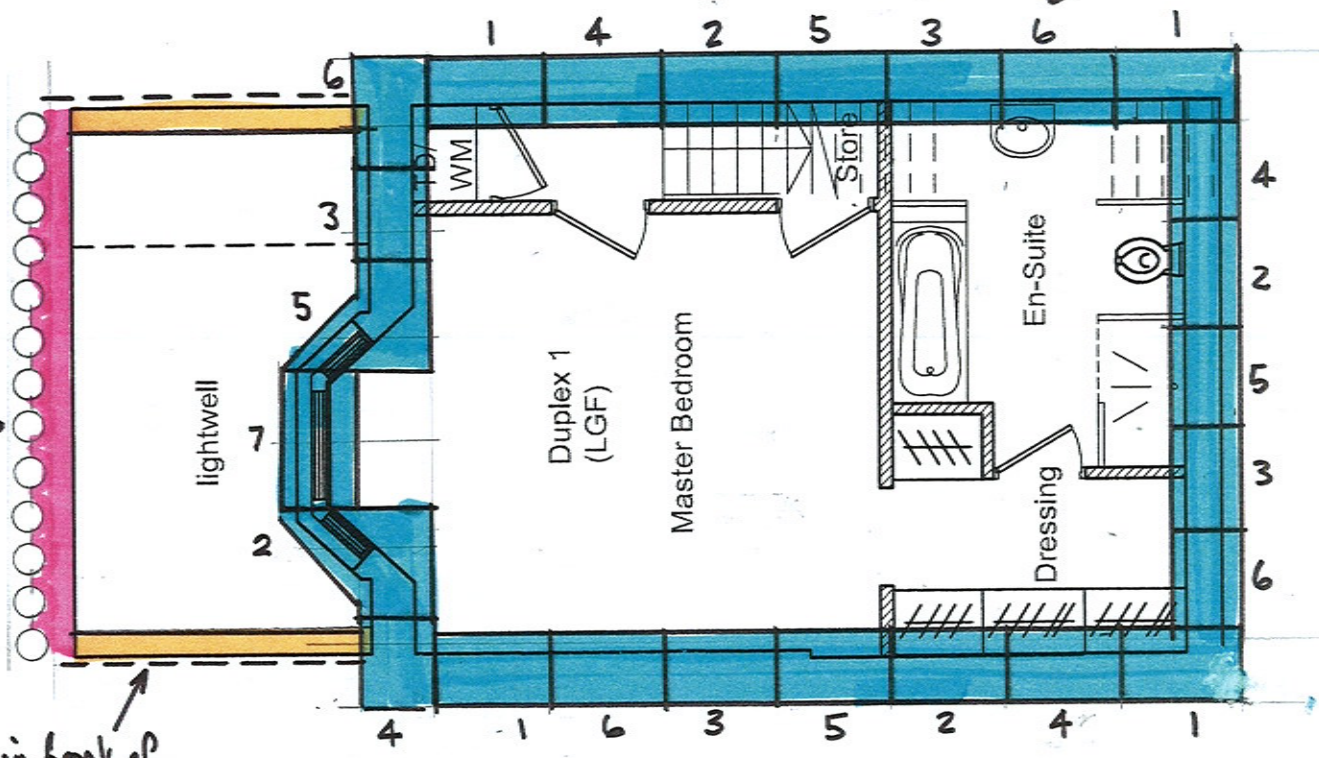
We have found deflections of approximately 2mm tend to be associated with such an operation, which leads to strains of approximately 0.04 in neighbouring properties. Looking at the table in CPG4 (Burland et al) this would suggest damage to neighbouring buildings in the categories 0 (negligible) possibly leading to 1 (very slight).

REPORT PREPARED BY

MICHAEL BAIGENT

MA CEng MICE MIStructE

approx 800mm deep underpins carried out in sequence



Concrete retaining wall in front of temp earth support (e.g. contiguous piles)

Concrete wall in front of earth support

Rev	Date	By	Amendments

General Notes:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS & SPECIFICATIONS.
2. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL DIMENSIONS & FOR THE CORRECT SETTING OUT OF THE WORK ON SITE.
3. DO NOT SCALE THIS DRAWING. ALL DRAWING IN MILLIMETRES.

Drawing Status:

Project Title: 160 IVERSON ROAD

Drawing Title: BASEMENT FOUNDATION PLAN.

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Scale @ A3:	Drawn By:	Project No: 1309B	Drawing No:
Date:	Checked By:		Revision:

Project Title:
160 IVERSON ROAD

Calculation Title:
TYPICAL PARTY WALL U/Pin.

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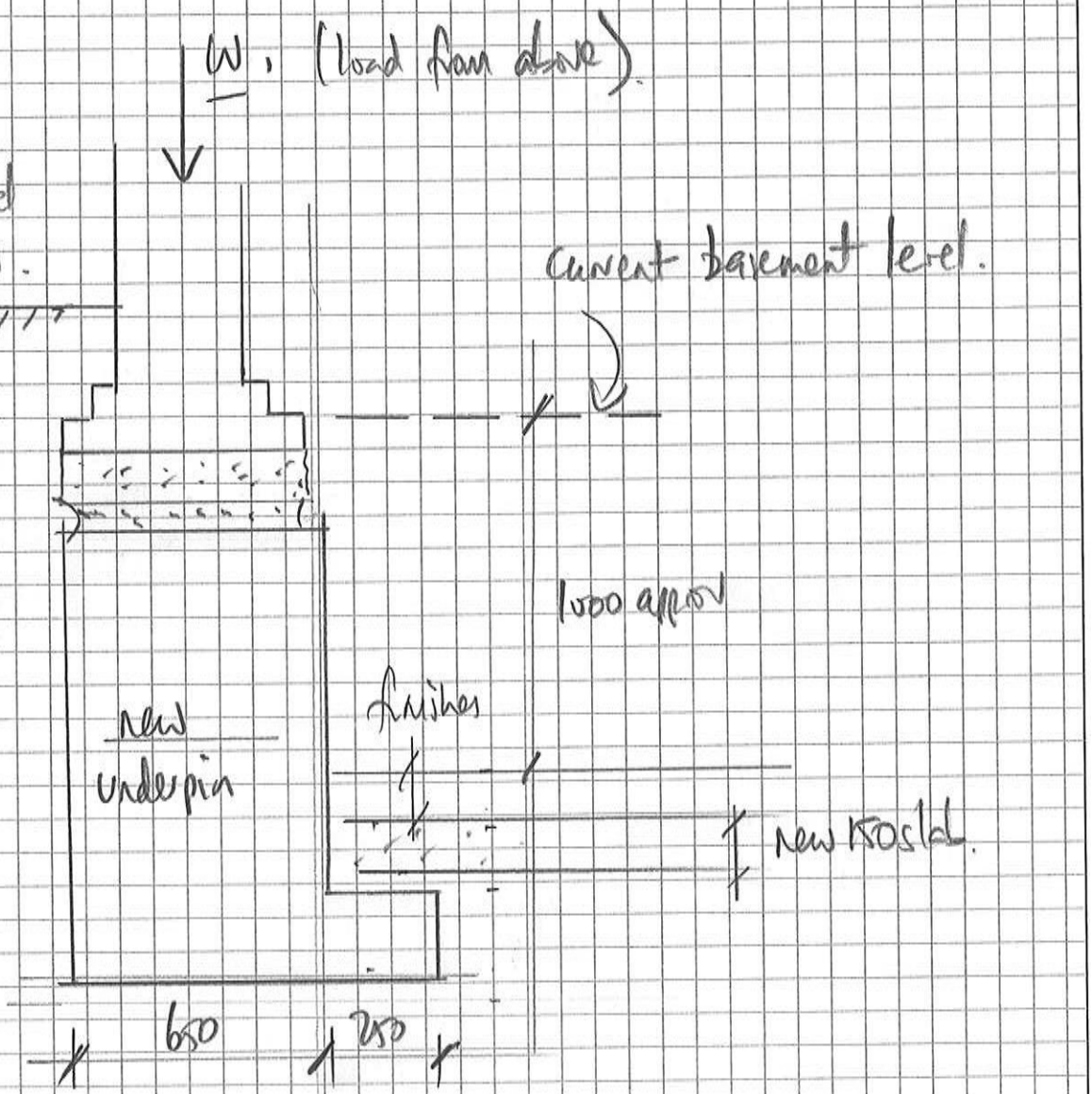
Scale @ A4:	Drawn By:	Project No: 13098.	Sheet No: Cal 01.
Date:	Checked By:		Revision:



TYPICAL UNDERPIN SECTION.

Project Title: 160 Iverson Road.
Calculation Title:
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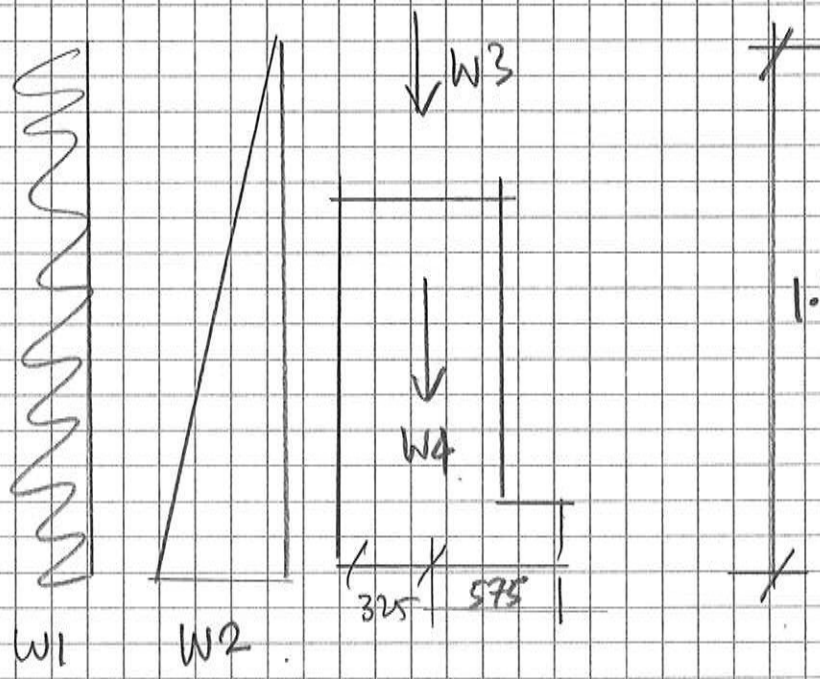
Scale @ A4:	Drawn By:	Project No: 13098.	Sheet No: Cal 02
Date:	Checked By:		Revision:

Forces on Underpin (Temp Case)



assuming $K_p = 0.4$ & Surcharge from neighbour $= 10\ kN/m^2$.

$W1 = 10 \times 0.4 = 4\ kN/m^2$

$W2 = 19 \times 0.4 \times 1.9 = 14.4\ kN/m^2$

$W3$ = wt of wall $\simeq 3 \times 6.5 + 11 \times 4.5 = 69\ kN/m$.
(ignore any floor supported)

$W4$ = wt of underpin $= 0.65 \times 1.3 \times 24 = 20\ kN/m$.

Check shear at base of underpin

destabilising force $= 4 \times 1.9 + 14.4 \times 1.9/2 = 21.3\ kN$.

friction at base $= (69 + 20) \times 0.6 = 53.4\ kN$.

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$\therefore$ FoS = 53.4/21.2 > 2 $\therefore$ OK.

Check overturning

$M = 4 \times 1.9 \times 1.9/2 + 14.4 \times 1.9/2 \times 1.9/3 = 15.9$ kNm.

check about centroid of 900 wide base.

restoring moment due to wt = $89 \times 0.125 = 11.1$ kNm

$\therefore$ net OTM = 15.9 − 11.1 = 4.8 kNm.

stress due to vertical load = $89/.90 = 99$ kN/m^2

due to BM = $\pm 4.8 \times 6/0.9^2 = 36$ kN/m^2.

allows 100 kN/m^2 long term
150 kN/m^2 short term

$\therefore$ stress OK.