

Job Number: 180618  
July 2018



**CROFT  
STRUCTURAL  
ENGINEERS**

Croft Structural Engineers  
Clock Shop Mews  
Rear of 60 Saxon Road  
London SE25 5EH

T: 020 8684 4744  
E: [enquiries@croftse.co.uk](mailto:enquiries@croftse.co.uk)  
W: [www.croftse.co.uk](http://www.croftse.co.uk)

# Structural Appraisal

Holly Walk  
London NW3

Mr. Alan Harari  
Holly Walk Developments  
20 Holly Walk  
London  
NW3 6RA

Revision	Date	Comment
-	18/07/18	First Issue
1	08/08/18	Alterations to screening stage answers, scoping stage added





Contents

1. Executive Summary .....2

2. Introduction.....4

3. Stage 1 - Screening.....6

4. Stage 2 – Scoping .....11

5. Trial Pit results and Structural Section .....12

6. Documentation Provided .....17

## 1. Executive Summary

The site is located at Holly Walk and accommodates three garages at present. These are founded on concrete footings founded approximately 1 meter below the ground level. The overall depth of the footing is based on a single trial pit, but one would think that structurally it would be expected to have the footing casted at the same level throughout.

Based on the discovered made ground within the trial pits and bore holes, as well as the visual inspection of the surrounding area, we are of the opinion site was artificially levelled and ground raised in the past to allow for the construction of the garages. While the natural slope to Holly Walk street is of a gentle 5.5 degree, the slop gradually gets steeper to the west, with the level difference reaching up to 4.5m between the site and adjacent 16 Frognal Gardens.

The proposed development is a single occupancy dwelling extending from the Holly Walk road to approximately 1meter past the existing garages. The design of the new dwelling aims not only to fit visually into the surroundings but also to fit into the topography as it follows the natural slope of the site. In fact, the ground floor to the front of the proposed property is only approximately 250mm lower than the current ground level of the garages in this area. The ground level of the property follows the slope and steps down at the rear part reaching approximately 1.4m in the deepest area.

In our opinion, this project should not be considered as a basement development but rather as the new development with lowered ground floor than the original structure.

### Slope Stability

The slope stability will remain unchanged. The proposed development does not change the slope, it slightly cuts into the existing one at the back of the site.

Desk study of the adjacent properties revealed, that new development will not have an impact on their existing footings. The provided drawings SD-15 and SD-16 show the existing and proposed sections through the site and the adjacent properties illustrate this.

The 18 Holly Walk is more than 3.5 meters away from the site, even if assumed the existing footing to be 600mm deep, which is a conservative value for the property built in 60-70ties, the proposed footing is outside the zone of influence.

While the existing on the boundary line between the site and 18 Holly Walk garden wall has footings above the proposed foundation, it would be protected from any potential damage by building new adjacent wall in segments not exceeding 1m length. In this case this wall would not need underpinning.

The foundations of the 16 Frognal Gardens are more than 3.5meters below the proposed footings, therefore by default would not be affected.

The proposed development has no adverse effect on the slope stability. Foundations are to be designed by qualified engineer in design stage.

### Surface Flow and Flooding

The desk study of surface flow and flooding showed that the site is not within the catchment of the pond chains on Hamstead Heath and accordingly to the Environmental Agency data, the site is at very low risk of flooding. The proposed development has no adverse effect on the surface floor and flooding. The is to be designed by qualified civil engineer in design stage.

### Groundwater flow

The proposed development will not affect the hard surface as the site is currently fully paved. The answers to the surface floor and flooding indicate, that the issues related to surface water floor and flooding are not significant.

The proposed development has no adverse effect on the groundwater flow and is to be designed by qualified civil engineer in design stage.

## 2. Introduction

We have been requested by Mr. Harari, to provide a Structural and geotechnical appraisal on the proposed development at Holly Walk. It is proposed to build a new property on the land currently occupied by garages.



*Figure 1: The existing garages at Holly Walk*

The site is located on Holly Walk, which has a gentle slope from south to north. The overall of the land that each property is on does not match the slope of the street. The site and adjacent 20 Holly Walk is approximately flat, while the land to the left has a steep slope onto the property at opposite Frognaal Gardens. The land of 18 Holly walk is approximately 1m higher than the site in question, but flat throughout.

At the boundary with 16 Frognaal Gardens, there is a significant level change. The difference in the levels is approximately 4.5 meters with area developed with planters stepping onto the lower ground floor of the property.

Our client, Mr. Harari is of the opinion, that the flat area of the site was artificially created during the works on the 20 Holly Walk. This would mean that the original profile of the land would have been consistent with the overall slope.





*Figure 2: Steep slope to the left hand side of the site onto the back of Frognal Gardens*



*Figure 3: 4.5m drop to 16 Frognal Gardens at the back of the site*

It is planned to dig trial pits and bore holes to confirm the type of substrate present.

Croft Structural Engineers is of the opinion, that this development should not be classified as a basement development, but rather as the lowering of the ground floor but the appraisal will go over the Stage 1 – screening required by Camden Council for planned basements.

The desk study will be prepared and checked by Chartered Structural Engineer, no Geotechnical Engineer will be involved in this assessment.

### 3. Stage 1 - Screening

#### Surface Flow and Flooding

The questions below are taken from the Camden CPG 4 – Basements and Lightwells

**Question 1: Is the site within the catchment of the pond chains on Hampstead Heath?**

**No.** The site lies outside the areas denoted by Figure 4 of the GSD (extract shown below)

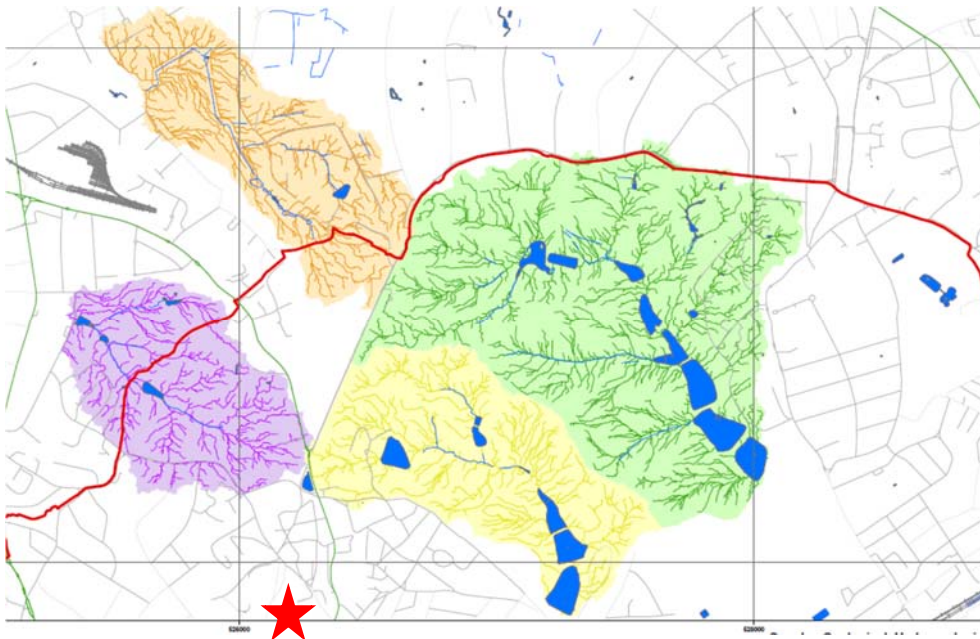


Figure 4: Extract from Figure 14 of the GSD (site lies to the south of the shaded areas)

**Question 2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?**

**No** – The surface water that flows from the proposed development will be routed the same way as before: water is and will be collected from hard surfaced areas and enter the existing drainage system.

**Question 3. Will the proposed development result in a change to the hard surfaced /paved external areas?**

**No** – Currently the site is fully occupied by garages and hard-surfaced areas. This will remain the case with the proposed development.

**Question 4. Will the proposed development result in changes to the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?**

**No** – Currently the site is fully occupied by garages and hard-surfaced areas. This will remain the case with the proposed development.

**Question 5. Will the proposed development result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?**

**No.** Collected surface water will be from building roofs and paving, as b. The quality of the water received downstream will therefore not change.

**Question 6: Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?**

The potential sources of flooding are summarised below:

Potential Source	Potential Flood Risk at site?	Justification
Fluvial flooding	No	Please see research results from Environment Agency flood risk information below this table
Tidal flooding	No	Site location is 'inland'
Flooding from rising / high groundwater	No	The site is located on low permeability London Clay.
Surface water (pluvial) flooding	No	Holly Walk is not noted on the flood street list and maps from 1975 or 2002
Flooding from infrastructure failure	Yes	Drainage at or near the site could potentially become blocked or cracked and overflow or leak. Drainage of the basement terrace areas may rely on pumping.
Flooding from reservoirs, canals and other artificial sources	No	There are no reservoirs, canals or other artificial sources in the vicinity of the site that could give rise to a flood risk.

The answers to Questions 1-5 above indicate that the issues related to surface water flow and flooding are not significant. These questions therefore do not have to be carried forward to Scoping Stage.



18  
HOLLY WALK  
LONDON  
NW3 6RA

## This location is in an area at very low risk of flooding

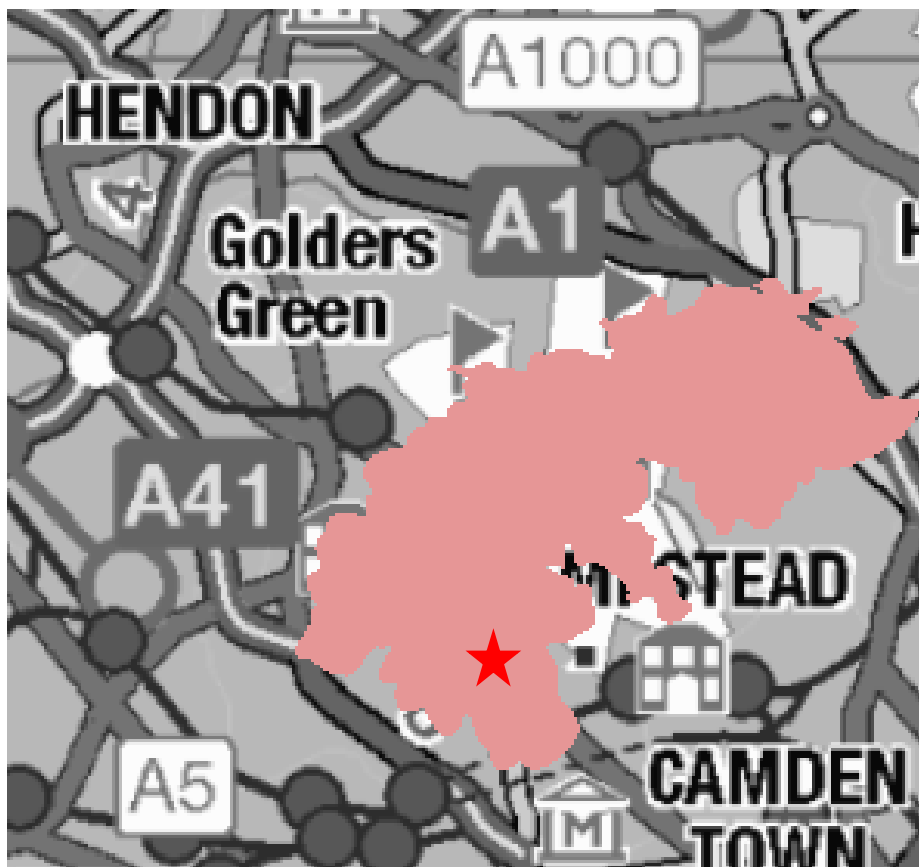
*Figure 5: Risk of Flooding Search results*

In answering Question 6, a flood risk assessment is not considered necessary: the property is not on a street that has flooded in 1975 or 2002 and there are no risks to flooding that are greater than those inherent with all subterranean structures.

### Ground water flow

#### Question 1a: Is the site located directly above an aquifer?

**Yes**, however the Environmental Agency Map, classifies it as a secondary A, formerly classified as minor aquifer. **Forward to scoping.**



#### Question 1b: Will the proposed development extend beneath the water table surface?

**No.** Boreholes completed during soil investigation were dry on completion. The lower ground floor of the adjacent 16 Frognal Gardens is approximately 4.5m lower than the site.

**Question 2: Is the site within 100m of a watercourse, well used/disused or potential spring line?**

**No.** OS maps and local walkover survey show no wells or watercourses.

**Question 3: Is the site within the catchment of the pond chains on Hampstead Heath?**

**No.** The site lies outside the areas denoted by figure 14 of the Arup report.

**Question 4: Will the proposals basement development result in a change in the proportion of hard surfaced/ paved areas?**

**No.** The surfaces to the front & rear are to remain unchanged.

**Question 5: As part of the site drainage will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via. Soakaways and or SUDS)?**

**No.** Existing roof Drainage will run into the existing drainage system. Surface water will still discharge to ground.

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

**No.** From walkover and OS maps, there are no local ponds or springs of significance.

#### Slope Stability

**Question 1. Does the existing site include slopes, natural or man made greater than 7° (approximately 1 in 8)?**

**No.** The Holly walk street is on a gentle slope of approximately 5.5°, and the site itself was flattened in the past. While the ground floor of the adjoining 16 Frognal Gardens is approximately 4.5m lower, this is achieved with retaining walls gradually stepping down. The proposed development will not be altering these conditions.

**2. Will the proposed re profiling of landscaping at site change slopes at the property boundary to more than 7° (approximately 1 in 8)?**

**No.** Proposed landscaping does cut slightly onto the soil but does not affect the slope.

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

**No.** The neighbouring land to the back is already with a slope greater than 7° Proposed landscaping does not affect the slope.

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

**No.** The Holly walk street is on a gentle slope of approximately 5.5°, and the site itself was flattened in the past. While the ground floor of the adjoining 16 Frognal Gardens is approximately 4.5m lower, this is achieved with retaining walls gradually stepping down. The proposed development will not be altering these conditions.

**5. Is the London Clay the shallowest strata on site?**

**No.** As per Soil investigation, the shallowest strata is Bagshot formation generally comprised a dark brown sandy, gravelly clay.

**6. Will any tree/s be felled as part of the proposed development and/or are any of the works proposed within any tree protection zones where trees are to be retained?**

**No.** No local trees are to be felled. The impact of the basement on these trees should be considered

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

**No.** From the walk over survey Subsidence was not considered as an issue on this site.

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

**No.** OS maps and local walkover survey show no wells, watercourses.

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

**No.** Accordingly to historical maps, the site is within residential area for over 100 years.

**10. 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 as per Environmental Agency Map is not located above the primary aquifer.

**11. Is the site within 50m of the Hampstead Heath ponds?**

**No.**

**12. Is the site within 5m of a highway or pedestrian footway?**

**No.** It can be seen on drawing SD-16, that the desired ground floor level against the pedestrian footway is above the existing ground level, and in no way could be classified as a basement development. The query does not apply in this case.

**13. Will the proposed development significantly increase the differential depth of foundations relative to the neighbouring properties?**

**No.** The 18 Holly walk property is approximately 3.5meters away from the proposed development and the boundary, garden wall will be secured by building the adjacent wall in short segments. The property to the back, 16 Frognal Gardens has its lower ground floor approximately 3.5m lower than then ground floor of the proposed development.

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

**No.** Nearest is the LUL Line, is more than 50m away from site.

## 4. Stage 2 – Scoping

Question 1a of Ground water flow in screening stage identified that the site is located above the aquifer;

**Yes**, however the Environmental Agency Map, classifies it as a secondary A, formerly classified as minor aquifer.

We note that the site is located above the aquifer at The Environmental Agency map, however it is classified as a secondary aquifer, formerly known as minor aquifer. Based on the results of soil investigation and topography of the area, we are of the opinion, that development will not extend below the water table. The boreholes were dry on completion, also the Holy Walk is not noted on the flood street list and maps from 1975 and 2002 and does not require flood risk assessment. If there was an issue with high water table, adjacent 16 Frognal Gardens, which lowest floor is significantly lower than the site would be constantly flooded.

## 5. Trial Pit results and Structural Section

The two boreholes and two trial pits has been dug on site on 5<sup>th</sup> of July 2018 by ground and Water Ltd to confirm the soil strata present on site. The results below courtesy of Ground and Water Ltd.

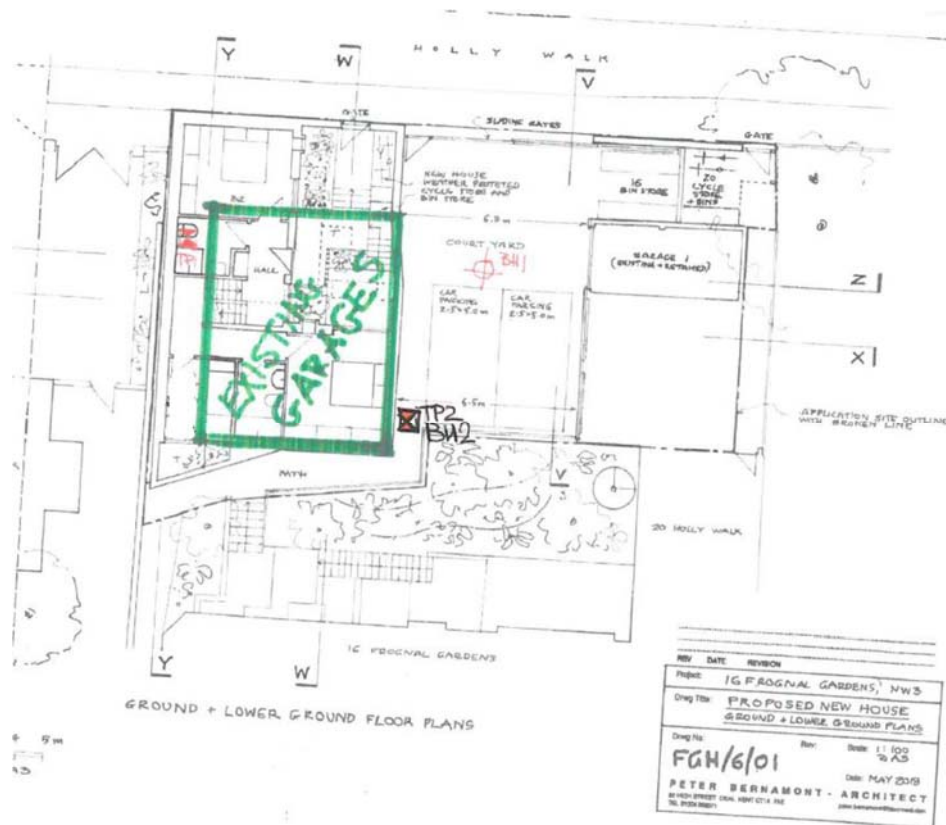


Figure 6: Position of Existing Garages with trial pits and bore holes marked up



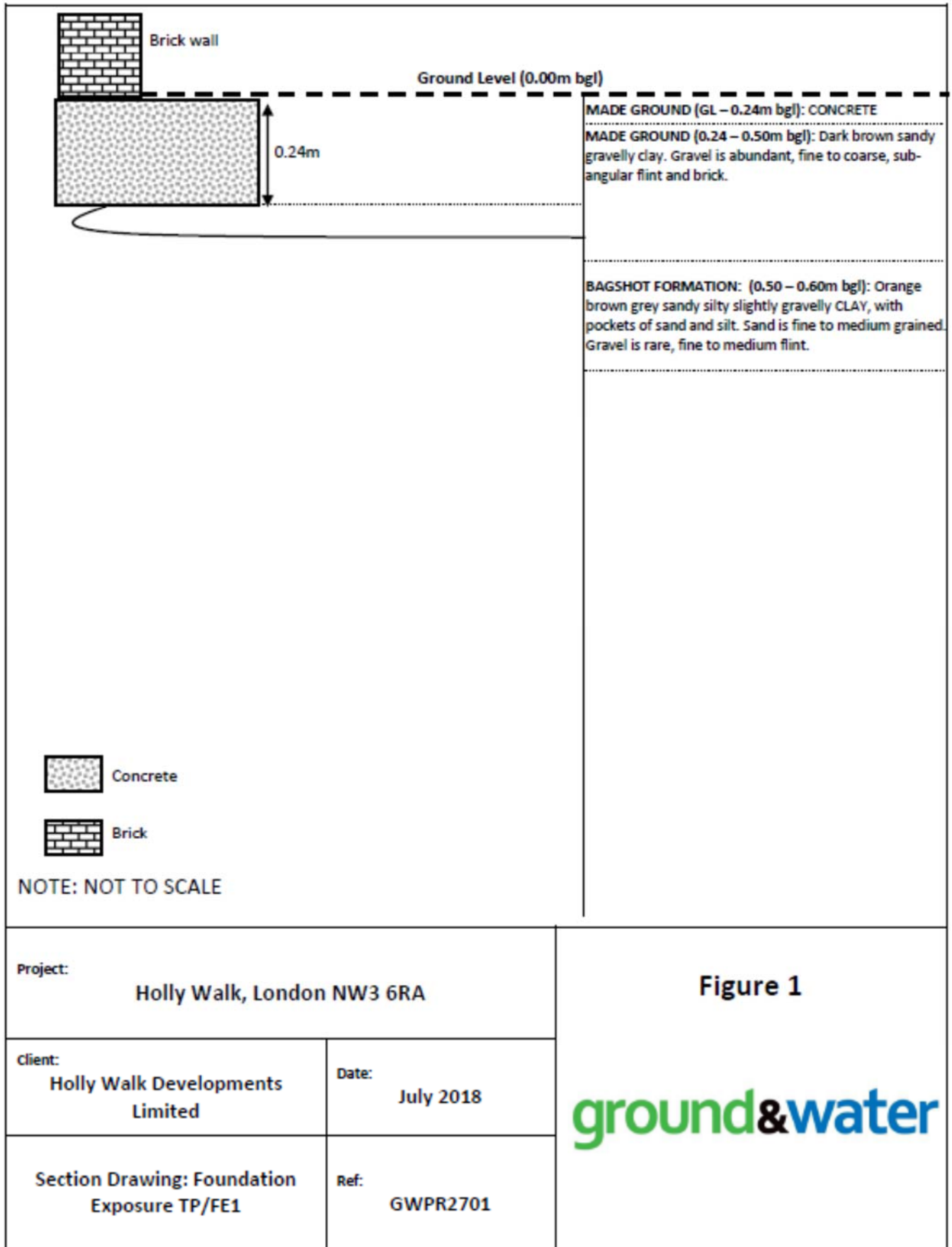


Figure 7: Trial Pit 1 results

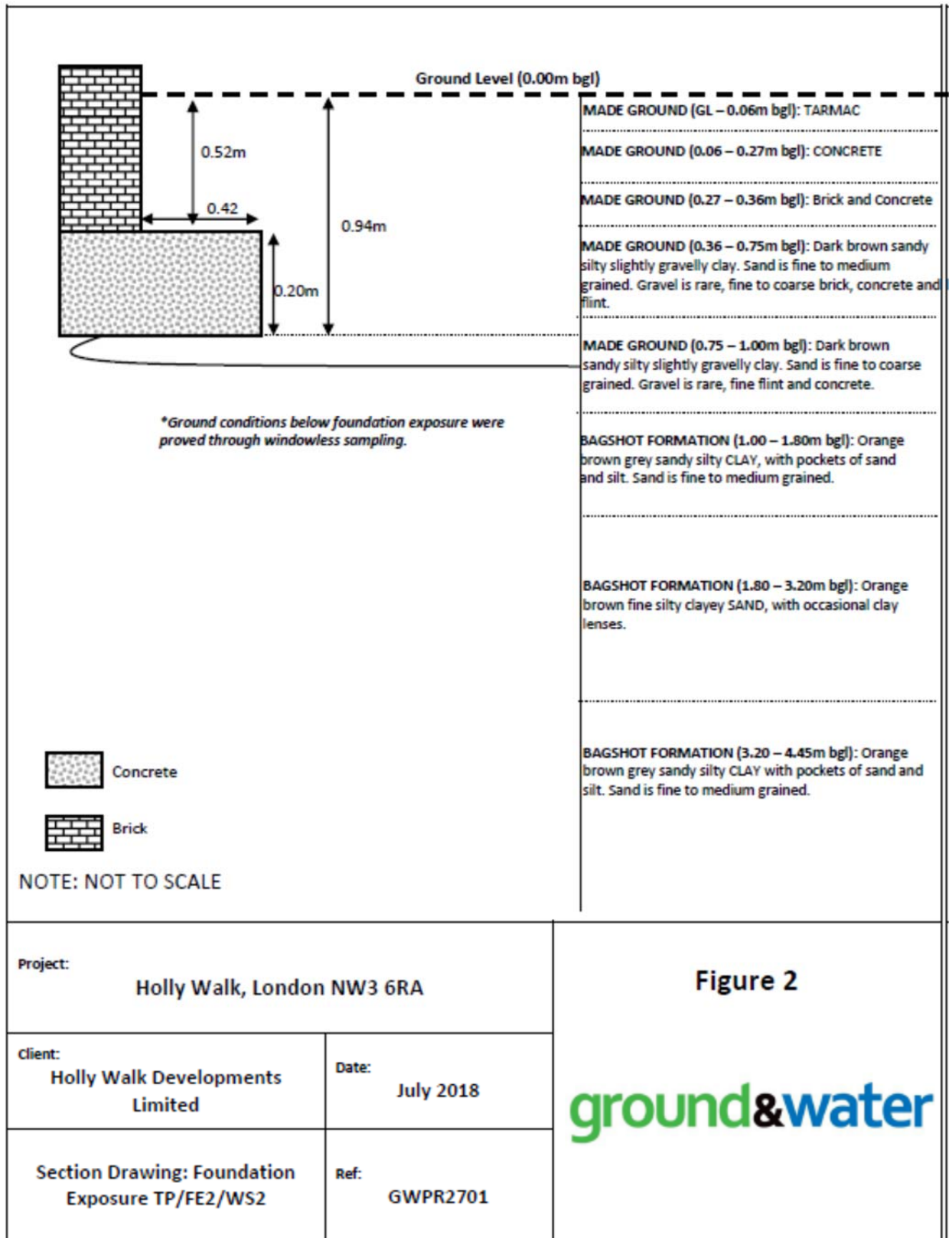


Figure 8: Trial Pit 2 results



ground & water		Percussion Drilling Log									
Project Name: Rear of 16 Frognal Gardens					Client: Holly Walk Developments Ltd					Date: 05/07/2018	
Location: London NW3 8UX					Contractor:						
Project No. : GWPR2701					Crew Name:					Drilling Equipment:	
Borehole Number BH1		Hole Type WLS		Level		Logged By MM		Scale 1:50		Page Number Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.05			0.05			MADE GROUND: Tarmac			
		0.20			0.20			CONCRETE			
		0.30			0.30			MADE GROUND: Brick / concrete.			
		0.70			0.70			MADE GROUND: Dark brown to brown very sandy gravelly clay. Sand is fine to coarse grained. Gravel is rare, fine to coarse, sub-angular brick and flint.			
		1.00	D					BAGSHOT FORMATION: Orange/brown/grey sandy slightly gravelly CLAY with pockets of sand and silt. Sand is fine to coarse grained. Gravel is rare, fine to medium, sub-angular flint.	1		
		1.00	SPT	N=16 (2,3/3,4,5,4)							
		1.50	D								
		1.70			1.70			BAGSHOT FORMATION: Orange/brown fine to medium silty clayey SAND.	2		
		2.00	D								
		2.00	SPT	N=27 (4,6/6,6,6,9)							
		2.50	D								
		3.10			3.10			BAGSHOT FORMATION: Orange/brown/grey sandy silty CLAY. Sand is fine to medium grained.	3		
		3.00	D								
		3.00	SPT	N=10 (2,2/2,2,3,3)							
		3.50	D								
		4.00	D								
		4.00	SPT	N=12 (2,2/3,3,3,3)							
		4.50	D								
	5.00	D									
	5.00	SPT	N=13 (2,3/3,3,3,4)								
	5.40	D			5.40		BAGSHOT FORMATION: Orange/brown/grey very clayey sandy SILT, with pockets of grey clay. Sand is fine to medium grained.	5			
	6.00	D									
	6.00	SPT	N=12 (2,2/3,3,3,3)								
	6.30	D			6.30		BAGSHOT FORMATION: Orange/brown/grey sandy CLAY with pockets of silty sand. Sand is fine to medium grained.	6			
	6.50	D									
	7.00	D									
	7.00	SPT	N=11 (2,2/2,3,3,3)								
	7.50	D									
	8.00	D									
	8.00	SPT	N=14 (2,3/3,3,4,4)								
	8.45				8.45		End of Borehole at 8.450m	8			
								9			
								10			
Hole Diameter		Casing Diameter		Chiselling		Inclination and Orientation					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
Remarks											
Groundwater strike at 6.00m bgl. Roots noted to 1.70m bgl.											

Figure 9: Bore Hole 1 Log

ground & water		Percussion Drilling Log									
Project Name: Rear of 16 Frogna Gardens				Client: Holly Walk Developments Ltd				Date: 05/07/2018			
Location: London NW3 6UX				Contractor:							
Project No. : GWPR2701				Crew Name:				Drilling Equipment:			
Borehole Number BH2		Hole Type WLS		Level		Logged By MM		Scale 1:50		Page Number Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.06			0.06			MADE GROUND: Tarmac			
		0.27			0.27			CONCRETE			
		0.36			0.36			MADE GROUND: Coarse gravel of brick and concrete.			
		0.75			0.75			MADE GROUND: Dark brown sandy gravelly clay. Sand is fine to medium grained. Gravel is rare, fine to coarse, brick, concrete and flint.			
		1.00	D	N=11 (1,2/2,3,3,3)	1.00			MADE GROUND: Dark brown sandy silty slightly gravelly clay. Sand is fine to coarse grained. Gravel is rare, fine, flint and concrete.	1		
		1.80			1.80			BAGSHOT FORMATION: Orange/brown/grey sandy silty CLAY, with pockets of sand and silt. Sand is fine to medium grained.			
		2.00	D	N=12 (2,2/3,2,3,4)	2.00			BAGSHOT FORMATION: Orange brown fine silty clayey SAND, with occasional clay lenses.	2		
		3.20			3.20			BAGSHOT FORMATION: Orange/brown/grey sandy silty CLAY with pockets of sand and silt. Sand is fine to medium grained.	3		
		4.45			4.45			End of Borehole at 4.450m	4		
									5		
								6			
								7			
								8			
								9			
								10			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks  
No groundwater encountered. No roots noted.




Figure 10: Bore Hole 2 Log

Based on provided Existing and Proposed drawings, the results of soil investigation and level survey, Croft Structural Engineers prepared section through the site.

## 6. Documentation Provided

1. Level survey and existing drawings prepared by Mictec Measured Building Surveys
2. Proposed drawings prepared by Peter Bernamont – Architect
3. Trial pit and bore hole readings by Ground and Water Ltd