

16 Daleham Gardens Groundwater Impact Assessment	
Contents	
1	Introduction2
1.1	Background..... 2
1.2	Scope and Approach..... 2
2	Proposed Development3
3	Site Setting1
3.1	Topography 1
3.2	Hydrology and Drainage..... 1
3.3	Geology..... 1
3.4	Hydrogeology 2
4	Screening3
4.1	Screening Discussion 3
4.2	Screening Conclusions..... 4
5	Scoping and Site Investigation.....5
5.1	Potential Impacts..... 5
6	Groundwater Impact Assessment.....6
7	Review and Decision Making.....7

16 Daleham Gardens Groundwater Impact Assessment	
1 Introduction	
1.1 Background	
<p>Ms Jamie Cooper is applying for Planning Consent to refurbish the upper floors and lower the existing part basement of 16 Daleham Gardens (the Site).</p> <p>The proposal is to refurbish the upper floors and to lower the existing basement</p> <p>Ground levels in the central part of the garden to the rear of the property will be lowered by approximately 1m. This will involve excavating to a depth of 2m and subsequently backfilling with approximately 1m of topsoil.</p> <p>Site investigation works have been undertaken by Site Analytical Services (SAS) Ltd. The work has included a Phase 1 Preliminary Risk Assessment¹ and a detailed Ground Investigation². This assessment should be read in conjunction with these reports.</p>	
1.2 Scope and Approach	
<p>This report reviews the proposed development at 16 Daleham Gardens within the context of the conceptual understanding of its site setting which has been informed through site investigation findings. The report will identify potential groundwater impacts the development may have. Appropriate mitigating measures can then be developed and adopted to avoid or minimise these affects.</p> <p>This report is limited to the groundwater flow component of the Basement Impact Assessment, as specified by the London Borough of Camden's "Guidance for Subterranean Development"³. The Author of this report is a qualified Hydrogeologist, Chartered Geologist and Fellow of the Geological Society of London, as required by the Guidance.</p>	

¹ "Report on a Phase 1 Preliminary Risk Assessment" Site Analytical Services Ltd. August 2011.

² "Report on a Ground Investigation" Site Analytical Services Ltd. August 2011.

³ "Camden Geological, Hydrogeological and Hydrological study - Guidance for Subterranean Development" Ove Arup & Partners Ltd., November 2010

16 Daleham Gardens Groundwater Impact Assessment

2 Proposed Development

The Site occupied by 16 Daleham Gardens slopes gently downward from the front (West) to the rear (East) of the property. The house, which occupies the Eastern part of the Site, is a large unoccupied four-storey detached property with three-stories evident at the front and a part basement or lower ground floor at the rear.

The proposal is to refurbish the upper floors and to lower the existing basement.

The property's existing lower ground floor will be deepened by approximately 1.6m throughout to accommodate the new lower ground floor level. An additional basement level will be created under a partial footprint of the lower ground floor to accommodate storage and plant rooms. This will occupy approximately 50% of the property footprint. The basement level will be approximately 50% of the property footprint. The basement level will be approximately 5m below the existing lower ground level.

Ground levels in the central part of the garden to the rear of the property will be lowered by approximately 1m. This will involve excavating to a depth of 2m and subsequently backfilling with approximately 1m of topsoil.

16 Daleham Gardens Groundwater Impact Assessment

3 Site Setting

The Site is located on the east side of Daleham Gardens in the Belsize Park area of London, NW3 5DA.

3.1 Topography

The Site lies at an elevation of approximately 67mAOD on ground sloping at around 3 to 4% south and eastwards towards the Adelaide Road which lies 700m to the south at an elevation of approximately 50mAOD.

Within the Site itself the ground slopes gently downward from the front (West) to the rear (East) of the property. The front garden is at an elevation of approximately 1.3m higher than the rear garden.

3.2 Hydrology and Drainage

The Site lies within the surface water catchment of the culverted River Tyburn. The river historically rose from springs on Hampstead Heath. A small tributary is believed to have flowed southwards along the course of Fitzjohn's Avenue³ approximately 150m west of the Site. The tributary is now culverted.

There are no other surface water features marked on Ordnance Survey mapping (1:25,000 scale) within 1km of the Site.

3.3 Geology

According to the British Geological Survey (BGS) 1:50,000 sheet for the area (Sheet 256, North London, 2006) and the associated geological memoir, The Geology of London (BGS 2004), the Site lies on the London Clay Formation. Approximately 100m north of the Site the sheet shows that Quaternary head deposits may be present. This is disturbed material which has moved downslope from higher ground in the area of Hampstead Heath.

The London Clay is underlain by the Cretaceous Chalk at a depth of over 100m beneath the Site.

Site specific geological data from the SAS Ltd. site investigation (July 2011)³, has established the presence of between 0.25m and 1.60m thickness of made ground beneath the Site locally overlying a thin layer of Superficial Head Deposits. Firm silty clay was proved to the investigation depth of 20m below ground. This latter material has been attributed to the London Clay Formation.

16 Daleham Gardens
Groundwater Impact Assessment

3.4 Hydrogeology

The Environment Agency classifies the London Clay as Unproductive Strata (formerly Non Aquifer), i.e. not capable of providing useable quantities of water; however this classification does not take into account local geological variations within the sandier upper London Clay Formation.

The Cretaceous Chalk is classified as a Primary (formerly Major) Aquifer however it is highly confined and not generally used for water supply in the central London area due to its poor water quality.

Groundwater beneath the Site will be dominated by fissure flow through Unit D of the upper London Clay Formation. Due to the nature of the London Clay, any groundwater flow will be at very low rates. Groundwater flow beneath the Site follows general topographic contours toward the south or southeast. This is parallel to the alignment of Daleham Gardens dwellings.

Groundwater was not encountered in any of the exploratory holes during boring and excavation and the material remained essentially dry throughout.

Geological logs show only occasional partings of silty fine sand within the clay. Falling head tests have confirmed the low permeability of the clay at around 3.5×10^{-8} m/s.

Groundwater was subsequently observed within monitoring wells installed at the Site (BH1, BH2, BH3 shown on Figure 1 of the SAS Ltd. report) with a rest water level at approximately 4.9m below ground. This is attributed to minor and delayed seepage to the monitoring wells from the London Clay formation.

16 Daleham Gardens
Groundwater Impact Assessment

4 Screening

The London Borough of Camden's "Guidance for subterranean development" suggests that any development proposal which includes a subterranean basement should be screened in order to determine whether there is a requirement for a BIA to be carried out.

4.1 Screening Discussion

- Appendix E of the guidance document details the following six questions:
- Question 1a: Is the site located directly above an aquifer?**

No. London Clay is at outcrop, and this is not considered to be an aquifer.
 - Question 1b: Will the proposed basement extend beneath the water table surface?**

The basement will extend into saturated London Clay formation. The proposed basement extends to a depth of approximately 6m below existing ground level. Monitoring standpipes installed during the site investigation showed water at 4.96m, 4.92m and 4.95m below ground approximately three weeks after installation (August 2011). Therefore in summer conditions, the basement can be expected to extend 1m into saturated medium. In winter conditions, the groundwater level can be expected to rise. Refer to Section 3.4.
 - Question 2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?**

No. Refer to Section 3.2.
 - Question 3: Is the site within the catchment of the pond chains on Hampstead Heath?**

No. The Site is approximately 1km south and outside the catchment of Hampstead Heath ponds.
 - Question 4: Will the proposed development result in a change in the proportion of hard surfaced / paved area?**

Yes. A roof terrace is proposed with a surface area of 55m². The drainage from the Site will be directed to public sewer via a storm attenuation tank.
 - Question 5: As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to ground (e.g. via soakaways and/or SUDS)?**

No. The nature of the London Clay strata is unsuitable for receiving ground discharge.
 - 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. There are no local ponds or spring lines present.

16 Daleham Gardens
Groundwater Impact Assessment

4.2 Screening Conclusions

The screening exercise has identified two potential issues which should be assessed:

- 1. The basement structure will extend into saturated London Clay formation.
- 2. An additional 55m² of hard surfaced area will be created in the form of a roof terrace which will extend above the basement on the rear ground floor.

16 Daleham Gardens
Groundwater Impact Assessment

5 Scoping and Site Investigation

Scoping is the activity of defining in further detail the matters to be investigated as part of the impact assessment. Potential impacts should be ascertained for each of the matters of concern identified during the screening process.

The investigation of the potential impacts is undertaken through a site investigation. In this instance, a site investigation has been undertaken to establish ground conditions for geotechnical and land contamination assessment purposes. The investigation included the installation of groundwater monitoring points and falling head testing. This groundwater impact assessment relies upon the findings of the site investigation.

5.1 Potential Impacts

The following potential impacts have been identified:

Potential Impact	Relevant Site Investigation conclusions
<p>The basement structure may extend into saturated ground.</p> <p>The groundwater flow regime may be altered by the proposed basement. Changing is flow regime could potentially cause the groundwater level within the zone encompassed by the new flow route to increase or decrease locally. For existing nearby structures the degree of dampness or seepage may potentially increase as a result of changes in groundwater level.</p>	<p>The ground investigation has confirmed the presence of London Clay at outcrop. It has also confirmed saturated water levels within the London Clay formation, and that the basement is likely to extend into this water table.</p> <p>The London Clay is not considered to be an aquifer and will not store or transmit significant quantities of groundwater.</p>
<p>An additional 55m² of hard surfaced area will be created in the form of a roof terrace which will extend above the basement on the rear ground floor.</p> <p>The sealing off of the ground surface by pavements and buildings to rainfall will result in decreased recharge to the underlying ground. In areas underlain by an aquifer, this may impact upon the groundwater flow or levels. In areas of non-aquifer (i.e. the London Clay), this may mean changes in the degree of wetness which in turn may affect stability.</p>	<p>The ground investigation has confirmed the presence of London Clay beneath the Site, a non-aquifer.</p> <p>Falling head tests have demonstrated that soakaway drainage is not appropriate for the Site.</p>

**16 Daleham Gardens
Groundwater Impact Assessment**

6 Groundwater Impact Assessment

The screening process identified two potential impacts. The results of the site investigation have been used below to revisit the original concerns and to assess the likelihood of these impacts occurring. These are:

1. Altering of the groundwater flow regime.

It has been established that the basement will extend into saturated soils. The potential impact of this is that the groundwater regime may be altered. However, it is apparent from the site investigation that the geological formation into which the basement will be installed is not an aquifer as defined by the Guidance. The hydrogeological properties of the London Clay are such that groundwater is not present in significant quantities.

Additionally, the basement will extend only a few meters (possibly 2 or 3 depending on winter water levels) into the saturated clay, which is believed to be in excess of 100m thick at this location. When considering the shape of the basement, and the orientation with respect to groundwater flow, the structure will occupy only a minor fraction of the total width of the Site. Damming of any groundwater is therefore unlikely to occur.

It is therefore highly unlikely that the proposed development will result in significant changes to the groundwater regime beneath the Site.

2. Altering of the recharge rate or changes in the degree of wetness through the installation of additional hard surfaces and/or soakaway

As discussed above, the site investigation has demonstrated that the Site is located on a non-aquifer as defined by the Guidance. Recharge to the London Clay is likely to be negligible. In addition, the properties of the London Clay negate the possibility of discharging drainage to ground.

Due to the nature of the soils beneath the site, groundwater recharge is unlikely to be affected by the proposed development. Drainage from the development will be directed to public sewer via a storm attenuation tank, and therefore the degree of wetness of local soils will be unaffected by the development.

**16 Daleham Gardens
Groundwater Impact Assessment**

7 Review and Decision Making

A groundwater impact assessment of the proposed development has been undertaken. The assessment has been based on information and guidance published by the London Borough of Camden³ and on site investigation information^{1,2}.

Potential impacts have been identified and assessed.

It is concluded that the proposed development is unlikely to result in significant changes to the groundwater regime beneath the Site.

4.0 Land Stability Impact Assessment

31 August 2011

Your ref:
Our ref: J11190/MC

Mr Gary Povey
Elliott Wood
241 The Broadway
London
SW19 1SD

GEA

Geotechnical & Environmental Associates

Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

tel 01727 824666
fax 01727 824777
email mail@gea-ltd.co.uk
web www.gea-ltd.co.uk

Dear Mr Povey

Re 16 DALEHAM GARDENS, LONDON NW3 5AD

A copy of our report for the above site follows. We trust that the report contains sufficient information but will be pleased to discuss any specific points you may wish to raise. In addition our consultancy service is available to review any design matters and to provide further assistance at any stage of the project.

The report will be available for download from our filestore site using your username and password for a period of six months.

In accordance with our normal practice all remaining samples will be disposed of within two weeks unless we are instructed otherwise.

Yours sincerely
GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES

pp


Martin Cooper

Offices in Hertfordshire (tel 01727 824666), Nottinghamshire (tel 01509 674888) and Wiltshire (tel 01985 248570)

Geotechnical and Environmental Associates Limited
Registered office: 3 Brook Business Centre, Uxbridge UB8 2FX
Registered in England No 4585616

Steve Branch BSc MSc CGeol FGS FRGS MEnvSc
Mike Plimmer BSc MSc CGeol FGS MEnvSc
Martin Cooper BEng CEng MICE
Juliet Fuller BSc MSc DIC FGS

Company Secretary
Penny Piddington

Land Stability Impact Assessment Report

16 Daleham Gardens
London NW3

Client

Mr Chris Hohn

Engineer

Elliott Wood

J11190

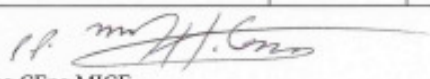

August 2011



16 Daleham Gardens, London NW3 5DA
Mr Chris Hahn

Land Stability Impact
Assessment Report

Document Control

Project title	16 Daleham Gardens, London NW3 5AD	Project ref	J11190
Report prepared by	 Martin Cooper BEng CEng MICE		
Report checked and approved for issue by	 Steve Branch BSc MSc CGeol FGS FRGS MEnvSc		
Issue No	Status	Date	Approved for Issue
1	Final	31 August 2011	
2	Final (revised)	31 August 2011	

This report has been issued by the GEA office indicated below. Any enquiries regarding the report should be directed to the office indicated or to Steve Branch in our Herts office.

<input checked="" type="checkbox"/>	Hertfordshire	tel 01727 824666	mail@gea-ltd.co.uk
<input type="checkbox"/>	Nottinghamshire	tel 01509 674888	midlands@gea-ltd.co.uk

Geotechnical & Environmental Associates Limited (GEA) disclaims any responsibility to the Client and others in respect of any matters outside the scope of this work. This report has been prepared with reasonable skill, care and diligence within the terms of the contract with the Client and taking account of the manpower, resources, investigation and testing devoted to it in agreement with the Client. This report is personal and confidential to the Client, may only be relied upon by the Client to whom it is addressed and the benefit of the report or any part may not be assigned by the Client to any third party without the consent of GEA. GEA accepts no responsibility whatsoever to any third parties to whom this report or any part thereof is made known. Any such parties rely upon the report at their own risk. This report may provide advice based on an interpretation of legislation, guidance notes and codes of practice. GEA does not however provide legal advice and if specific legal advice is required a lawyer should be consulted.

© Geotechnical & Environmental Associates Limited 2011

Ref J11190
Issue No 2
31 August 2011



16 Daleham Gardens, London NW3 5DA
Mr Chris Hahn

Land Stability Impact
Assessment Report

CONTENTS

1.0	INTRODUCTION	1
1.1	Proposed Development	1
1.2	Purpose of Work	1
1.3	Qualifications	1
1.4	Limitations	1
2.0	THE SITE	2
2.1	Site Description	2
2.2	Topography	2
3.0	GROUND CONDITIONS	2
3.1	Soil Conditions	2
3.2	Groundwater Conditions	2
4.0	SCREENING	3
4.1	Screening Assessment	3
5.0	SCOPING AND SITE INVESTIGATION	4
5.1	Potential Impacts	4
6.0	LAND/SLOPE STABILITY IMPACT ASSESSMENT	4
7.0	CONCLUSIONS	5

APPENDIX

Ref J11190
Issue No 2
31 August 2011



16 Daleham Gardens, London NW3 5DA
Mr Chris Hohn

Land Stability Impact
Assessment Report

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) Limited have been commissioned by Elliott Wood, on behalf of Mr Chris Hohn, to carry out a Land Stability Impact Assessment of this site at 16 Daleham Gardens, London NW3 5DA in accordance with guidelines from London Borough of Camden ("the Council") in support of a planning application.

A Phase 1 Preliminary Risk Assessment and a Ground Investigation have been completed by Site Analytical Services Limited (SAS; report refs 1118172-1 and 10/18172, both dated August 2011) and these reports have been referred to as necessary.

1.1 Proposed Development

The proposed scheme is to refurbish the existing house and to deepen the existing basement. The basement will extend to a depth of 2.5 m below external ground level below the periphery of the house, increasing to a depth of 5.5 m in the centre.

This report is specific to the proposed development and the advice herein should be reviewed if the development proposals are amended.

1.2 Scope and Purpose of Work

The work carried out comprises a Land Stability Assessment (also referred to as Slope Stability Assessment) which forms part of the Basement Impact Assessment (BIA) procedure specified in the London Borough of Camden Planning Guidance CPG4¹ and their Guidance for Subterranean Development² prepared by Arup.

The aim of the work is to provide information on land stability and in particular to assess whether the development will affect the stability of neighbouring properties and whether any identified impacts can be appropriately mitigated by the design of the development.

1.3 Qualifications

This assessment has been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng) and member of the Institution of Civil Engineers (MICE), who has over 20 years specialist experience in ground engineering. The assessment has been made in conjunction with Steve Branch, a BSc in Engineering Geology and Geotechnics, MSc in Geotechnical Engineering, a chartered geologist (CGeol) and Fellow of the Geological Society (FGS) with 25 years experience in geotechnical engineering and engineering geology. Both assessors meet the Geotechnical Specialist criteria of the Site Investigation Steering Group and satisfy the qualification requirements of the Council guidance.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated

¹ London Borough of Camden Planning Guidance CPG4 Basements and lightwells
² Ove Arup & Partners (2010) Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development. For London Borough of Camden November 2010

Ref J11190
Issue No 2
31 August 2011

GEA Geotechnical & Environmental Associates

16 Daleham Gardens, London NW3 5DA
Mr Chris Hohn

Land Stability Impact
Assessment Report

scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by GEA.

2.0 THE SITE

2.1 Site Description

No 16 Daleham Gardens is located to the south of Hampstead in North London in the London Borough of Camden. It is occupied by a detached house, located in the western part of the site, which is three storeys at the front, with an additional lower ground floor or garden level at the rear, such that the property currently incorporates a partial basement. Similar houses fronting onto Daleham Gardens are in close proximity to the north and south.

At the time of the SAS investigation the rear garden was overgrown and a number of mature trees are present in the gardens.

2.2 Topography

The site lies at an approximate elevation of 67 m OD, and the general area slopes gently to the south and east at an angle in the order of 3° to 4°. The site level slopes gently downwards from east to west, with the front of the site about 1.3 m higher than the rear.

3.0 GROUND CONDITIONS

3.1 Soil Conditions

The British Geological Survey map of the area (Sheet 256) indicates the site to be underlain by London Clay.

Information from the SAS ground investigation, which comprised three 20 m deep boreholes drilled by cable percussion techniques, and a number of shallow boreholes, confirms the anticipated ground conditions. Below a cover of made ground, of up to 1.6 m in thickness, the London Clay was generally encountered; it comprised an upper weathered zone of firm becoming very stiff brown and grey clay, extending to depths of between 7.70 m and 9.50 m, underlain by typical unweathered very stiff grey fissured clay to the full depth of investigation of 20 m. In the shallow boreholes a thin (about 300 mm) thickness of apparently reworked gravelly clay was noted; this was absent from the deeper boreholes but was possibly overlooked in the sampling.

Classification tests on the clay soils indicated that they are generally of high shrinkage potential, as is typical for the London Clay.

3.2 Groundwater Conditions

Groundwater was not encountered by SAS during drilling of the boreholes, but was subsequently measured in 5 m deep monitoring standpipes at depths of between 4.92 m and 4.96 m, but in the final monitoring carried out four weeks after installation all of the pipes were dry.

Ref J11190
Issue No 2
31 August 2011

GEA Geotechnical & Environmental Associates

4.0 SCREENING

The Council's guidance suggests that any development proposal that includes a subterranean basement should be screened to determine whether or not a full BIA is required.

4.1 Screening Assessment

A number of screening tools are included in the Arup document and for the purposes of this report reference has been made to Appendix E which includes 14 questions within a screening flowchart. Responses to the questions are tabulated below.

Question	Response for 16 Daleham Gardens
1. Does the existing site include slopes, natural or manmade, greater than 7°?	No
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	No
5. Is the London Clay the shallowest strata at the site?	No
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	Yes – some trees are proposed to be felled. No – no works are proposed within the root protection zones of the trees to be retained.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	Yes – the Hampstead area is prone to these effects as a result of the presence of shrinkable London Clay and abundant mature trees
8. Is the site within 100 m of a watercourse or potential spring line?	No
9. Is the site within an area of previously worked ground?	No
10. Is the site within an aquifer?	No
11. Is the site within 50 m of Hampstead Heath ponds?	No
12. Is the site within 5 m of a highway or pedestrian right of way?	Yes – the site fronts onto a public road
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes – the development will increase foundation depths in the centre of the site to in excess of 5.5 m deep and it is understood that adjacent properties have shallow foundations
14. Is the site over (or within the exclusion zone of) any tunnels, eg railway lines?	No

The above assessment has identified the following potential issues that need to be assessed:

- Q6 Some trees will be felled but no works are proposed within tree root protection zones.
- Q7 The site is in an area of seasonal shrink-swell.
- Q12 The site is within 5 m of a public highway.
- Q13 The development will increase the foundation depths relative to the neighbouring properties to a relatively significant extent.

5.0 SCOPING AND SITE INVESTIGATION

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential impacts are assessed for each of the identified potential impact factors.

The investigation of the potential impacts is carried out through a suitable site investigation and this has been carried out by SAS in August 2011. It is considered that the scope of the investigation complies with the guidance issued by the Council and is therefore a suitable basis on which to assess the potential impacts.

5.1 Potential Impacts

The following potential impacts have been identified.

Potential Impact	Site Investigation Conclusions
Felling of trees	None – this is a determination that needs to be made outside of the BIA, subject to relevant Tree Preservation Orders etc
Seasonal shrink-swell	The investigation has indicated that the site has a cover of made ground, but that shrinkable London Clay is present within a depth that can be affected by tree roots
Location of public highway	The investigation has not indicated any specific problems, such as weak or unstable ground, voids, high water table, that would make working within 5 m of public infrastructure particularly problematic at this site
Founding depths relative to neighbours	As above; in addition, the proposed basement is deepest in the centre of the building, whereas closer to neighbours the new foundations will be less deep and outside the zone where excavation may give rise to instability of neighbouring structures

6.0 LAND / SLOPE STABILITY IMPACT ASSESSMENT

The screening identified four potential impacts. Of these, it is considered that the question of tree felling is not a material impact, other than possible effects on the clay, which is dealt with as a consideration of shrink-swell. The results of the site investigation have therefore been used below to review the remaining three potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

Seasonal Shrink-Swell

The proposed development involves deepening the foundations to below what would be expected as a depth of influence of tree roots on the basis of the trees present on the site. Consideration will need to be given to the effects of clay swelling following the removal of some of the trees, but similarly the foundations are to be placed at depths that should not be affected. Subject to inspection of foundation excavations in the normal way to ensure that there is not significant unexpectedly deep root growth, it is not considered that the occurrence of shrink-swell issues in the local area has any bearing on the proposed development.

The subject property is detached and deepening of the foundations will not therefore give rise to any concerns with regard to differential movements.