

Glencross & Hudson

Structural Engineers and Construction Consultants

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BASEMENT IMPACT ASSESSMENT

95 PEPYS ROAD, LONDON, SW20 8NW

Dated: 19th June 2014

Prepared by:

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CONTENTS

Foreward 2

1.0 Introduction..... 3

 1.1 Purpose of Assessment 3

 1.2 Planning Policy Context..... 3

 1.3 Proposed Development 3

2.0 Site Location and Layout 4

 2.1 Site Location 4

 2.2 Site Layout and History 4

 2.2.1 Previous Planning History 4

 2.2.2 Neighbouring Properties..... 5

3.0 Screening 6

4.0 Scoping 7

 4.1 Subterranean (groundwater) flow 7

 4.2 Slope & Ground Stability 7

 4.3 Surface flow and flooding 8

 4.4 Summary of scoping stage: 9

5.0 Ground Investigation 10

6.0 Basement impact assesement 11

 6.1 Subterranean Ground water flows..... 11

 6.2 Slope & Ground stability 11

 6.2.1 Shrinking /swelling clays..... 11

 6.2.2 Heave of underlying soils..... 11

 6.2.3 Adjacent Pedestrian right of way and utilities..... 11

 6.2.4 Adjacent properties 12

 6.2.5 Damage Category..... 12

 6.3 Surface flow and flooding 13

FOREWARD

This report has been prepared for Mr & Mrs Wallace within the agreed scope and terms of contract.

The advice and opinions in this report should be read and relied on only in to the context of the report as a whole. As with any appraisal or investigation, the conclusions and observations are based on limited data. The recommendations and comments given in this report are based on the information contained from the sources cited and may include information provided by the Client and other parties including anecdotal information. It must be noted that there may be special conditions prevailing at the site which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

This report does not constitute a full environmental audit of either the site or its immediate environs.

The report is for the exclusive of the Client and shall not be relied upon by any third party without explicit written agreement from Glencross and Hudson Ltd.

This assessment has been prepared by Richard Hudson, a Chartered Civil Engineer with an MSc in Geotechnical Engineering with previous experience of basement assessment and basement structural design.

1.0 INTRODUCTION

1.1 PURPOSE OF ASSESSMENT

The purpose of this assessment is to consider the local conditions, existing property in relation to the proposed basement construction 95 Pepys Road, London, SW20 8NW to assess the potential impact on surrounding structures, hydrological and ground features to support the planning application submitted to Merton Borough Council and to be used as a basis for the engineering design proposals.

1.2 PLANNING POLICY CONTEXT

Merton Council's Supplementary Planning Document Residential Extensions Alterations & Conversions November 2001 and the Unitary Development Plan 2003 do not have any specific guidance in relation to basement construction. DCP 5 & 6 and P.E. 5 & 6 require proposed developments to demonstrate they will not cause harm to the to the local water environment. This basement impact assessment will enable the Council to assess whether any predicted damage to neighbouring properties and the water environment is acceptable or can be satisfactorily ameliorated by the developer.

This assessment includes the following stages and addresses issues surrounding, structural stability of the building and neighbouring properties, effects on drainage and run off, harm of the amenities of neighbours and loss of open space or trees. These issues are similar to those raised in other London Boroughs.

1	Screening	To identify any matters of concern and determine if a full BIA is required or not.
2	Scoping	Identify potential impacts
3	Site investigation and study	Develop understanding of the site and immediate surroundings
4	Impact Assessment	Evaluating direct and indirect implications of proposed development

The report will review existing site data and provide preliminary assessment of the issues identified by the Glencross and Hudson Ltd screening process.

1.3 PROPOSED DEVELOPMENT

It is proposed to excavate under the existing building to construct a single storey basement beneath the footprint of the original property with lightwells to the front and rear. The basement is to be founded approximately 3.5m below ground to provide further living accommodation. See *Appendix 1* for Architects Drawings

2.0 SITE LOCATION AND LAYOUT

2.1 SITE LOCATION

The existing property is an end of terrace residential property constructed in 1901 at 95 Pepys Road, London, SW20 8NW. The existing site is located on the south side of Copse Hill, north of the Kingston line rail track, 2km south west of Wimbledon Town Centre and is located in Lambton Road Conservation Area. The general area is under the authority of London Borough of Merton Council in Raynes Park ward. The area is predominately residential and the majority of houses off Pepys Road and Kenwyn Road are terraced. The property's right hand flank wall is adjacent to Kenwyn Road.

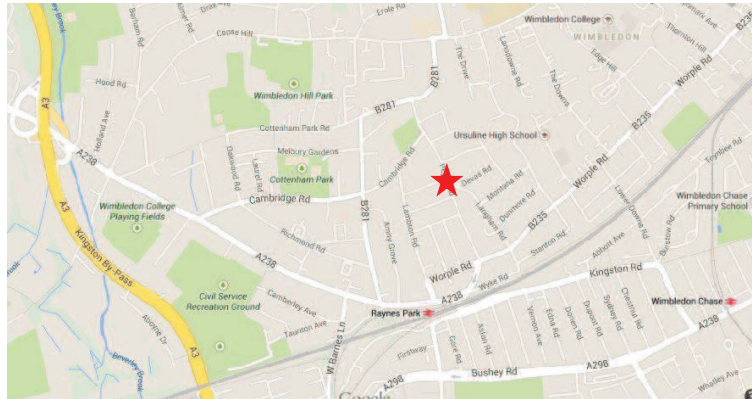


Figure 1 – Site Location Map

2.2 SITE LAYOUT AND HISTORY

The site was attended on 21st May 2014 for the purpose of conducting the site walkover.

The building is a two storey end of terrace house with loft conversion, comprising solid masonry external walls that support a pitched slate covered roof. To the rear there is a single storey rear extension of cavity wall construction. The footprint of the floors to the main house is approximately 6m wide by 13m long to the external faces of the front and rear walls. Internally, the walls a combination of solid 225mm and 100mm thick masonry walls together with 100mm stud partitions. The floors are generally suspended timber. An area of hardstanding fronts onto Pepys Road and there is a garden to the rear. A decked patio is located to the rear of the building, extending across the full width of the property. Two areas of paved patio provide hardstanding within the lawned area of the garden.

The property is not listed as being of special architectural and historic interest either nationally or local.

The London bomb mapping shows no bombs were dropped in the 1940's in the immediate vicinity.

The nearest overground/underground train lines are approximately 400m south of the property.

There are large shrubs in the front garden to the left and right hand side boundaries. However there are no trees within the boundaries of the property and none within the neighbouring garden or street.

See *Appendix 1* for Architects drawings of existing layout.

See *Appendix 2* for site photographs from walk over survey.

2.2.1 PREVIOUS PLANNING HISTORY

There are no details of previous planning history available on the Councils planning portal. It is understood that the property at some point in its history has had a loft conversion and a rear extension at ground floor level.

From a review of historical maps, the earliest being 1870, no other building has occupied this site and no specific use of the land has been identified from old maps. Lambton Road Character Assessment notes that the area was part of “Prospect Place” and later “Cottenham Park” estates.

2.2.2 NEIGHBOURING PROPERTIES

Adjoining property 93 is of a similar age and type of construction with a more recent loft conversion and ground floor extension.

3.0 SCREENING

A screening process has been undertaken for the site – see appendix 3

This screening incorporates the flood risk screening as set out in PE5 Risk from flooding, PE6 water quality, PE7 Capacity of water systems, DCP5 Development and flooding and surface water runoff and DCP 6 Water quality supply as well as incorporating other screening issues that are adopted in other London Boroughs. The screening exercise has identified the following potential issues which will be carried forward to the scoping phase.

Summary of screening conclusions to take forward to scoping stage

Item	Description
1	<p><i>Subterranean Groundwater Flow</i></p> <p>Will the proposed basement extend beneath the water table surface?</p>
2	<p><i>Slope & Ground Stability</i></p> <p>Is the London clay the shallowest strata at the site?</p> <p>Is the site within 5m of a highway or pedestrian right of way?</p> <p>Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?</p>
3	<p><i>Surface Flow and Flooding</i></p> <p>No issues were identified to be carried forward for scoping</p>

4.0 SCOPING

The scoping stage is required to identify the potential impacts from the aspects of the proposed basement which have been shown by the screening process to need further investigation.

4.1 SUBTERRANEAN (GROUNDWATER) FLOW

Will the proposed basement extend beneath the water table surface?

Potential impact: Local restriction of any groundwater flow through permeable silt/sand horizons with in the London Clay.

The site is an area that is predominately of clayed sequence up to 140m thick confining underlying aquifers. These are classified by the Environment Agency as unproductive strata and therefore the basement will not extend beneath a water table in an aquifer.

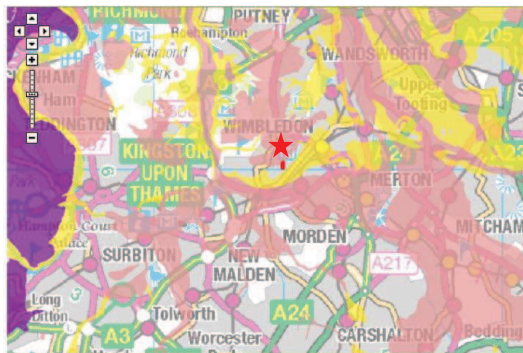


Figure 3 – Aquifer and ground water mapping from Environment Agency

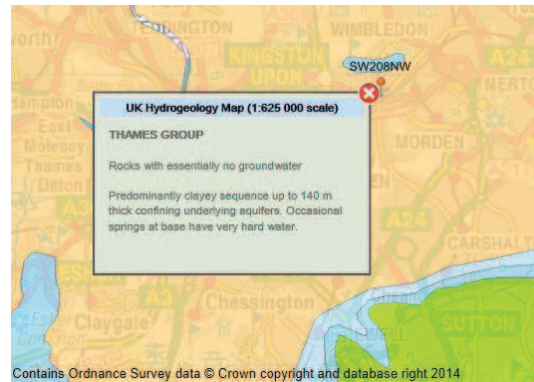


Figure 4 - British Geological Survey Hydrogeology Map 1: 625 000

The Architects drawings show that the top of the basement slab is 3.5m beneath the underside of the ground floor. *See appendix 1 Architects drawings.*

Action: A ground investigation is required to determine if ground water is present at the site. (Subsequently provided by Chelmer Consultancy Services)

4.2 SLOPE & GROUND STABILITY

Is the London Clay the shallowest strata at the site?

Potential impact: Settlement/ heave associated with unloading caused by the basement excavations including short term and long term heave movements, settlement associated with retaining walls and underpinning, and ground movements around the basement perimeter

The BGS 1:50000 Geological Survey of Great Britain indicate the site to be underlain by London clay formation- clay, silt and sand.

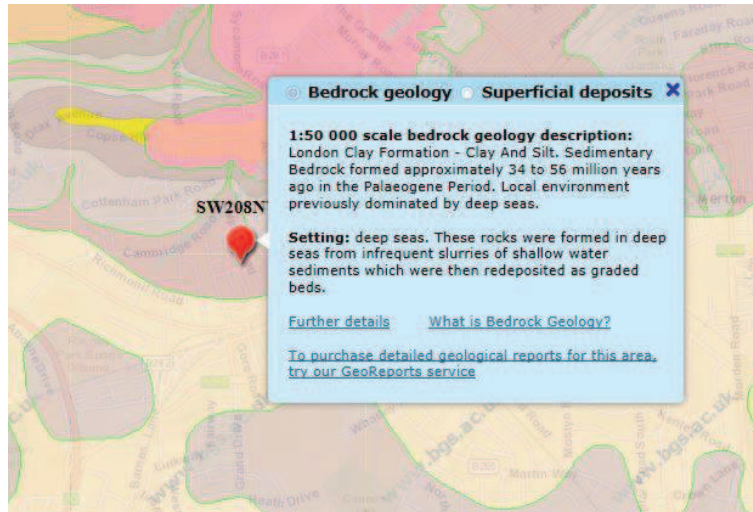


Figure 2 - British Geological Survey - Geology

Action: Ground investigation required to establish whether the BGS information is accurate or of there are any additional features of structural significance. (Subsequently provided by Chelmer Consultancy Services). In conjunction with the ground information the design will need to carefully consider the soil structure interaction and take this into account in the complete state and stability during construction.

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

Potential impact: Loss of support to the ground beneath the pathway if basement excavations are inadequately supported during construction.

Action: Ensure adequate temporary and permanent support is designed by an experienced Engineer and installed in accordance with the drawings by the appointed contractor.

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

Potential impact: Long term differential movement between basement and adjoining structure.

As the party wall with no 93 is to be underpinned this will leave the party wall with a deeper foundation than the other walls at no 93.

Action: Ensure adequate temporary and permanent support is designed by an experienced Engineer and installed in accordance with the drawings by the appointed contractor. The structural design should take into account the soil conditions and associated soil/structure interaction.

4.3 SURFACE FLOW AND FLOODING

No issues were identified at screening stage.

The property is not located in flood risk zone and is therefore not subject to a site specific flood risk assessment as laid out in PPS25 PE5 and DCP5

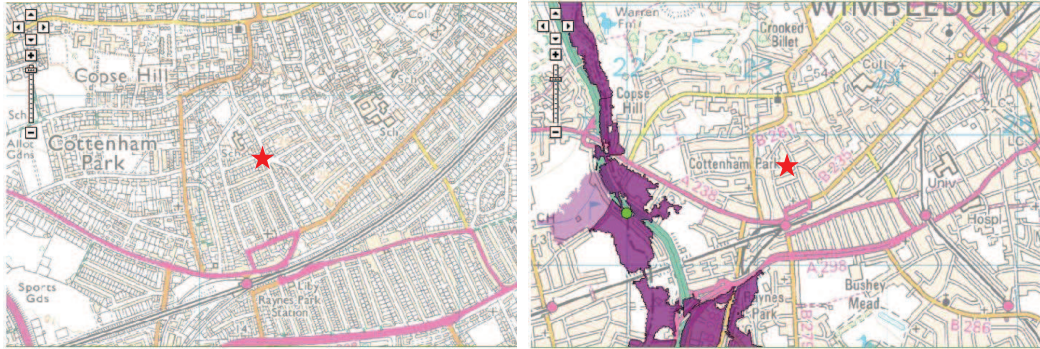


Figure 6 – Environment Agency Flood Risk Map and flood warning areas

4.4 SUMMARY OF SCOPING STAGE:

The scoping exercise has reviewed the potential impacts for each of the items carried forward from screening and has identified the following actions to be undertaken:

- A ground investigation is required. This has already been undertaken by Chelmer Consultancy Services.
- Appropriate geotechnical design will be required for both permanent and temporary works to ensure:
 - Ground beneath /alongside the lightwells and pathways remains stable
 - Possible high horizontal earth pressures are considered
 - Potential differential ground movements caused by the basement excavations are assessed and allowed for or mitigated such that no greater than category 1 movement is anticipated.
- Ensure adequate temporary and permanent support is designed by an experienced Engineer and installed in accordance with the drawings by the appointed contractor.

5.0 GROUND INVESTIGATION

A ground investigation that included one bore hole was undertaken by Chelmer Site Investigations in June 2014. The site plan and borehole log are available in *appendix 4*.

The sites geology as found by the ground investigation may be summarised as:

- Topsoil : to 0.5m
- Made ground: medium compact, brown sandy, very silty clay with brick fragments to 0.5-1.3mbgl
- Clay: stiff brown clay with partings of orange and brown silty and fine sand. The clay became very stiff from 2.0m

No roots were recorded in the borehole.

No groundwater entries were recorded and the boreholes were 'dry' and open on completion.

6.0 BASEMENT IMPACT ASSESSEMENT

6.1 SUBTERRANEAN GROUND WATER FLOWS

The made ground comprises silty clays that have low permeability characteristics and therefore will restrict the build-up or flow of any perched groundwater. It is anticipated that due to low permeability of London Clay there will be no significant seepage/inflows during excavation and dewatering will not be required. The site is a considerable distance from water sources. Ground water was not present in the borehole, though this was taken in summer and it is possible that the groundwater may rise in the coming months and fluctuate throughout the year. Observations on ground water should be recorded during excavation and appropriate mitigation strategies put in place should ground water be encountered.

The proposed basement will need to be fully waterproofed in order to provide adequate long-term control of moisture ingress from groundwater. It would be prudent for the system to be designed in compliance with the requirements of BS 8102.

The basement structure must be designed to resist the buoyant uplift pressures which would be generated by ground water at ground level, and provide lateral resistance to water up to 1m from the top of the wall in accordance with BS 8102.

For this development a full hydrology report is not required due to the dry borehole, clay soils and distance from water sources.

6.2 SLOPE & GROUND STABILITY

Information obtained from the site walkover, site plans and Ordnance survey maps indicate that the site itself is essentially level with only minor undulations present. Although it should be noted that the immediate site area is heavily urbanised and the slopes in the vicinity have been altered as part of historically developments. There is a general slope in the wider hillside setting downwards from north to south from Copse Hill OSD 50m down to 20m OSD on OS maps over a distance of 412m giving a slope ratio of 1:13.23 which raises no concern in relation to slope stability.

6.2.1 SHRINKING /SWELLING CLAYS

No testing on soil samples carried out to date to determine the susceptibility to shrinkage and swelling with changes of moisture although London clay is typically clay with a high shrinkage potential.

There are no trees in the immediate vicinity and therefore no impact or mitigation measures required for the expansion and contraction of the clay soil due to water extraction by vegetation.

6.2.2 HEAVE OF UNDERLYING SOILS

The main phase of uplift or heave from the cohesive soils will come immediately following the excavation of the basement when the greatest elastic rebound of the soil will occur. Heave will be reduced by proceeding with the excavation in stages. As far as the party wall is concerned the soil that is currently below the party wall will be replaced with a reinforced concrete wall which a greater density than the soil. Consequently we would not expect heave below the party wall.

There is a potential for minor heave below the basement slab to the new basement. This should be catered for in the design of the reinforcement to the concrete slab.

6.2.3 ADJACENT PEDESTRIAN RIGHT OF WAY AND UTILITIES

With regard to the impact on the adjacent footpath the proposed basement construction will be within influencing distance of Kenwyn Road but will not undermine it. The construction methodology must be considered to ensure adequate support is maintained at all times.

Car parking is present to the front of the property. It is possible for heavier goods vehicles to reverse on to the property; an allowance for appropriate loadings to be considered in the design.

6.2.4 ADJACENT PROPERTIES

The excavation and construction of the basement has the potential to cause some movement in the surrounding ground. The resultant ground movements depend primarily on the geology and the adequacy of the temporary support to both the underpinning excavations and the partially complete underpins prior to installation of full permanent support. A high quality workmanship and use of best practice methods of temporary support are therefore crucial to the satisfactory control of ground movements alongside basement excavations.

It should be assumed that full support will be required to any made ground exposed in the excavations. However provided that the existing foundation do all bear into natural ground as anticipated, then no made ground should be exposed in the excavations beneath the existing footings, so this requirement will apply only to the lightwells.

In stiff London Clay formation additional intermittent temporary support is only likely to be required where the clays are heavily fissured and at corner excavations where there otherwise would be two un-supported excavation faces.

The work should be carried out in accordance with the Party Wall etc. Act 1996 and condition survey of no.93 will be necessary. However the movement, if any, will be managed through proper design of permanent and temporary works and in conjunction with the requirement of the Party Wall Act (1996).

The construction sequence should be in accordance with the Construction Method Statement.

6.2.5 DAMAGE CATEGORY

In view of the comments above and provided that a suitably experienced contractor is appointed and the temporary support follows Engineer's design, then extensive past experience and data from analysis of similar basements designed has shown that the bulk of ground movements caused by underpinning to this depth in London Clay should not exceed 5mm in either horizontal or vertical directions. When relating this figure of ground movement to possible damage to adjacent buildings it is expected that a damage category of 'very slight' (Burland Category 1) applies.

Category	Description
0 Negligible	Hairline cracks of less than about 0.1mm are classed as negligible. < 0.1 mm
1 Very Slight	Fine cracks that can easily be treated during normal decoration. <1mm
2 Slight	Cracks easily filled, redecoration probably required. Some repointing may be required externally. <5mm
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. 5-15mm or a number of cracks >3mm
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. 15-25mm but also depends on number of cracks
5 Very severe	This requires a major repair involving partial or complete re-building. >25mm but depends on number of cracks

Classification of visible damage to walls CIRIA C580 (table 2.5)

6.3 SURFACE FLOW AND FLOODING

The Environment Agency flood mapping shows the property is within flood risk zone 1 (little or no risk) and is not in a flood warning zone. The nearest water course is more than 1km from the property. The site location is 'inland', approx. 20m above OD and not at risk from tidal flooding. The site is located on low permeability London Clay. The area is not noted in Merton Council's SFRA 2008 as being at risk from surface (pluvial) flooding. There are no reservoirs, canals or other artificial sources in the vicinity that could give rise to a flood risk.

Drainage at or near the site could potentially become blocked or cracked and overflow or leak. Drainage of the basement may rely on pumping should there be an infrastructure failure. An upstand around the front lightwell to form a barrier against excessive flow should be considered.

A pumping mechanism is likely to be installed to remove any groundwater that may have seeped through the basement walls/floor slab. A failure of the pump could lead to an accumulation of water within the basement, however this is considered highly unlikely and could be reduced by including battery backup and warning system.

The risk of flooding from excessive surface water is not considered significant. The location of existing sewers should be identified prior to excavation works to determine whether there are any unusual features to be considered in the design.

APPENDIX 1

ARCHITECTS DRAWINGS

APPENDIX 2

PHOTOGRAPHS FROM SITE VISIT



Front Elevation
Showing front garden hard standing and vegetation



Rear Elevation
Showing rear timber decking and single storey extension and loft conversion



Left hand side elevation
Adjacent Kewyn Road and public footpath



Rear garden
Lawn and patio areas



Kewyn and Pepys Road

APPENDIX 3

SCREENING

Subterranean Development Screening

95 Pepys Road London, SW20 8NW

Item	Response	Comment	Source
Subterranean (Ground Water Flow)	No	Predominantly clayey sequence up to 140m thick confining underlying aquifers. Classified as unproductive strata.	BGS UK Hydrogeology (1:625 000) Maps EA Groundwater maps
	Unknown	Water is not expected to influence the construction Proposed basement will extend to approx. 2.87m	Architects drawings
	No	2. Is the site within 1000m of a watercourse, well (used/disused) or potential spring line	Lost Rivers of London CHHS Fig11 Environment Agency OS maps Merton's Proposal map
	No	3. Will the proposed basement development result in a change in the proportion of hard surface/paved areas	Architect's Drawings
	No	4. As part of 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)	Architects Drawings
	No	5. Is the lowest point of the proposed excavation (allowing for drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond.	OS Maps

Subterranean Development Screening

95 Pepys Road London, SW20 8NW

Item	Description	Response	Comment	Source
Slope & Ground Stability	1. Does the existing site include slopes, natural or manmade greater than 1 in 8	No	The land is essentially level	Walkover survey OS map 1:10 000 contour lines
	2. Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 1 in 8	No		Architects Drawings
	3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 1 in 8	No	Neighbouring land is essentially flat	Walkover survey
	4. Is the site within a wider hillside setting in which the general slope is greater than 1 in 8	No	There is a general slope in the wider hillside setting downwards from north to south from copse hill. 50m down to 20 m over a distance of 412m = 1:13.73	Walkover survey OS Maps
	5. Is the London clay the shallowest strata at the site?	Yes	London Clay Formation- Clay, silt and sand	BGS 1:50 000
	6. Will any trees be felled as part of the development and or any works proposed within any tree protection zones where trees are to be retained.	No	There are no trees with the development or trees in a protection zone	Walk over survey
	7. Is there a history of seasonal shrink-swell subsidence in the local area and or evidence of such effects at the site?	No	The site lies above the London Clay Formation, well known to have a high tendency to shrink and swell although there is no significant evidence of the effects of this at this site. No evidence of cracking or repair to the building	Walkover survey

Subterranean Development Screening

95 Pepys Road London, SW20 8NW

			to suggest this has been an issue	
8. Is the site within 100m of a watercourse or potential spring line?	No		Lost Rivers of London CHHS Fig11 Environment Agency OS maps	
9. Is the site within an area of previously worked ground.	No		No reference is made to old pits, or formerly dug brick yards etc. on old maps	Historic maps, earliest dated 1870
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		No Predominantly clayey sequence up to 140m thick confining underlying aquifers. Classified as unproductive strata.	BGS UK Hydrogeology (1:625 000) Maps EA Groundwater maps
11. Is the site within 5m of a highway or pedestrian right of way?	Yes		The site lies adjacent to the Kenwyn Road.	Walkover survey OS Maps
12. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes		The development will increase the depths of foundation at the site, although the foundation depths of adjacent properties are not known.	
13. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines.	No		Nearest over ground line (Kingston line) is located 430m south of the property.	

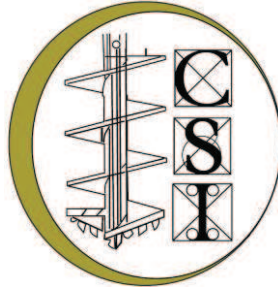
Subterranean Development Screening

95 Pepys Road London, SW20 8NW

Item	Description	Response	Comment	Source
Surface Water and Flooding	1. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak runoff) be materially changed from the existing route?	No	The proposed development will enter the current drainage system. If Thames water requires a reduction in flow the drainage of the new external hard standing may need to be drained with a SUDS system or soakaways.	Architects drawings
	2. Will the proposed basement result in a change to the proportion of hard surfaced/paved external areas?	No	The amount of hard standing on-site is not changing therefore surface water will not be impacted by the development.	Architects drawings
	4. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	No changes to the surface water regime are expected.	Architects drawings
	5. Is the site within a Flood Risk Zone 2 or 3 or on site greater than 1ha?	No		EA Flood Risk Maps Merton's proposal Map

APPENDIX 4

GROUND INVESTIGATION



Chelmer Site Investigations

Unit 15, East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB

Telephone: 01245 400 930 **Fax:** 01245 400 933

Email: info@siteinvestigations.co.uk **Website:** www.siteinvestigations.co.uk

Factual Report

Client:	Mr and Mrs Wallace
Site:	95 Pepys Road London SW20 8NW
CSI Ref:	FACT/4564
Dated:	6 th June 2014

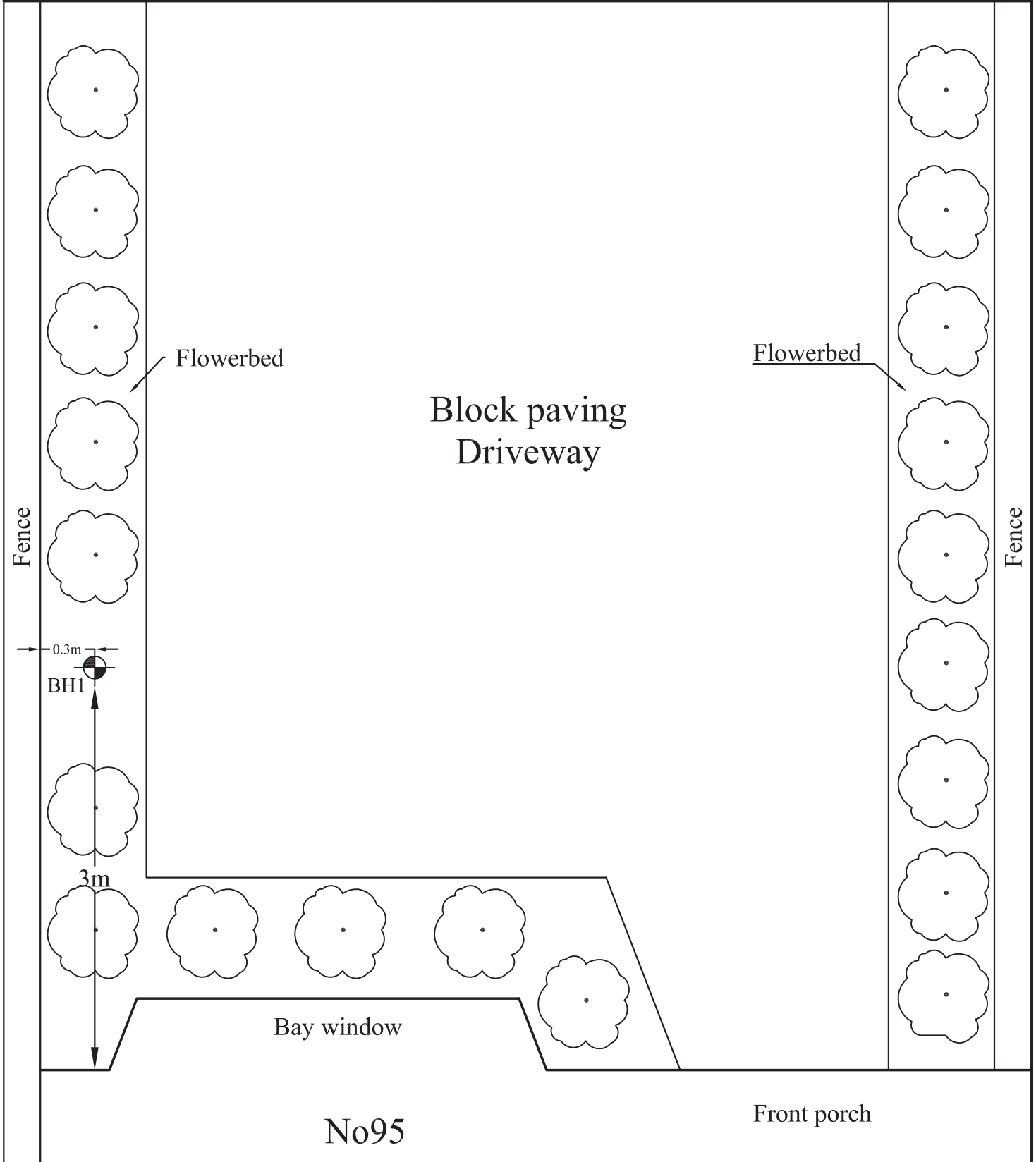
Chelmer Site Investigations

Unit 15 East Hanningfield Industrial Estate
 Old Church Road, East Hanningfield, Essex CM3 8AB
 Telephone: 01245 400930 Fax: 01245 400933

Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk



Client: Mr and Mrs Wallace	Scale: N.T.S.	Sheet: 1 of 1	Date: 06.06.14
Location: 95 Pepys Road, London SW20 8NW	Job No: 4564	Weather: Fine	Drawn by: TP Checked by: JH



Notes: On site tree identification for guidance only. Not authenticated.

Key:

-  Tree/Shrub
-  Borehole
-  Trial Pit
-  Gully
-  Tree Stump
-  Rain Water/
Soil Pipe
-  Manhole

Chelmer Site Investigations

Unit 15 East Hanningfield Industrial Estate
 Old Church Road, East Hanningfield, Essex CM3 8AB
 Telephone: 01245 400930 Fax: 01245 400933



Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

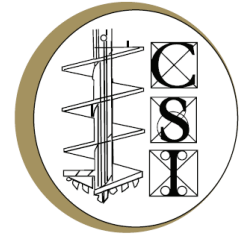
Client: Mr and Mrs Wallace		Scale: N.T.S.		Sheet No: 1 of 1		Weather: Fine		Date: 06.06.14	
Site: 95 Pepys Road, London SW20 8NW		Job No: 4564		Borehole No: 1		Boring method: CFA 100mmØ Secondman			
Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Result	Root Information	Depth to Water	Depth Mtrs
G.L.	TOPSOIL	0.5					No roots observed.		
0.5				D					0.5
	MADE GROUND: medium compact, brown, sandy very silty clay with brick fragments.	0.5		D	M	12 14 16 16			1.0
1.3	Stiff, brown, silty CLAY with partings of orange and brown silty and fine sand. Becoming very stiff from 2.0m.			D					1.5
				D	V	140+ 140+			2.0
				D					2.5
				D	V	140+ 140+			3.0
				D					3.5
		0.5		D	V	140+ 140+			4.0
				D					4.5
				D	V	140+ 140+			5.0
				D					5.5
6.0	Borehole ends at 6.0 m			D	V	140+ 140+			6.0
Drawn by: TP		Approved by: JH		Key: T.D.T.D. Too Dense to Drive D Small Disturbed Sample J Jar Sample B Bulk Disturbed Sample V Pilcon Vane (kPa) U Undisturbed Sample (U100) M Mackintosh Probe W Water Sample N Standard Penetration Test Blow Count					
Remarks: Borehole dry and open on completion.				Page 113					

Chelmer Site Investigations

Unit 15, East Hanningfield Industrial Estate, Old Church Road
East Hanningfield, Essex CM3 8AB

Telephone: 01245 400 930 Fax: 01245 400 933

Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk



REPORT NOTES

Equipment Used

Hand tools, Mechanical Concrete Breaker and Spade, Hand Augers, 100mm/150mm diameter Mechanical Flight Auger Rig, GEO205 Flight Auger Rig, Window Sampling Rig, and Large or Limited Access Shell & Auger Rig upon request and/or access permitting.

On Site Tests

By Pilcon Shear-Vane Tester (Kn/m^2) in clay soils, and/or Mackintosh Probe in granular soils or made ground and/or upon request Continuous Dynamic Probe Testing and Standard Penetration Testing.

Note:

Details reported in trial-pits and boreholes relate to positions investigated only as instructed by the client or engineer on the date shown.

We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.