



SYMMETRYS
STRUCTURAL / CIVIL ENGINEERS

BASEMENT IMPACT ASSESSMENT

139 CRANLEY GARDENS
N10 3AH
LONDON

21066-SYM-XX-XX-RP-S-0001-Rev E

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REVISION HISTORY

Revision	Description	Date	By	Checked
A	First issue	21/02/2022	SB	DS/CA
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1.0 Introduction

- 1.1 Symmetrys Limited have been engaged by Crawford Partnership Architecture to produce a Basement Impact Assessment for the proposed single storey basement at 139 Cranley Gardens, London. The overall project consists of basement extension, relocating the existing outbuilding structure above the proposed basement footprint towards the rear (Figure 1 and Figure 2).

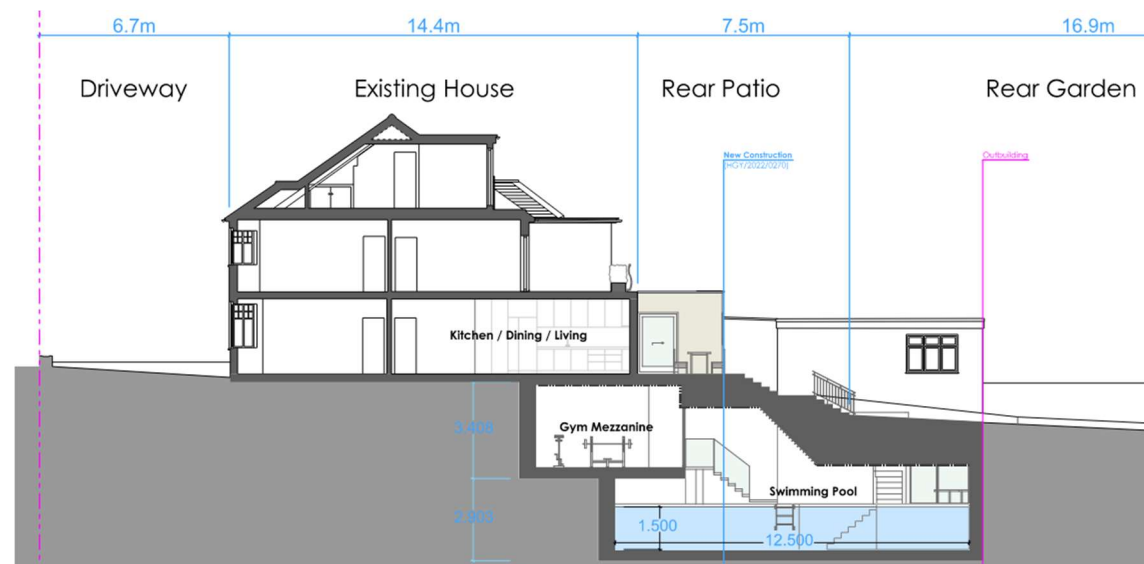


Figure 1. Proposed Section A-A.

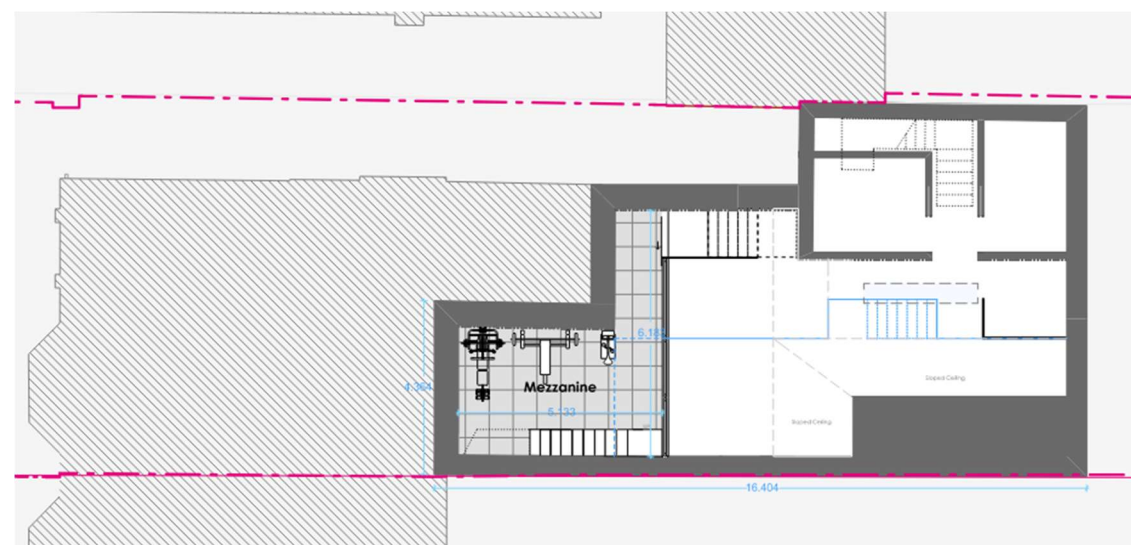


Figure 2. Proposed basement plan

- 1.2 Symmetrys drawings and this report form part of the architect's planning application. These documents are not intended for, and should not be relied upon, by any third party for any other purpose. Symmetrys drawings are based on the existing and proposed drawings provided by Crawford Partnership Architecture.
- 1.3 The client has appointed the specialist geotechnical engineers Site Analytical Services Ltd to drill one continuous flight auger borehole to a depth of 12.0m below ground level to accurately assess the site-specific soil conditions. This can be found in Appendix C. Site Analytical Services Ltd were also appointed to carry out a desk top study and specialist assessment of the ground conditions which is included within their report.

- 1.4 Symmetrys Limited have carried out a preliminary design of the proposed basement. The resulting structural drawings can be found in Appendix A.

- 1.5 The following reference documents have been used as guidance in compiling this report;

- Local requirements for information to be submitted with planning applications, Haringey, adopted July 2021.
- Development management DPD, including Policy DM18, Haringey, adopted July 2017.
- Haringey Council Strategic Floor Risk Assessment, issued on February 2015.
- Draft Basement Development Guidance Note (June 2012)
- Guidelines on safe and efficient basement construction below or near to existing structures (ASUC).

2.0 Existing site

- 2.1 The site is a residential property consisting of a 3-storey semi-detached house and a single-storey outbuilding located at the rear.
- 2.2 The semi-detached house was built at the beginning of 20th century, in a period between WW1 and WW2. The outbuilding was built over a period within the last decade.
- 2.3 The site is located on the south-eastern side of Cranley Gardens, in the London Borough of Haringey.
- 2.4 The site is surrounded by residential properties to the east and west, and a sport ground to the south (Figure 3).

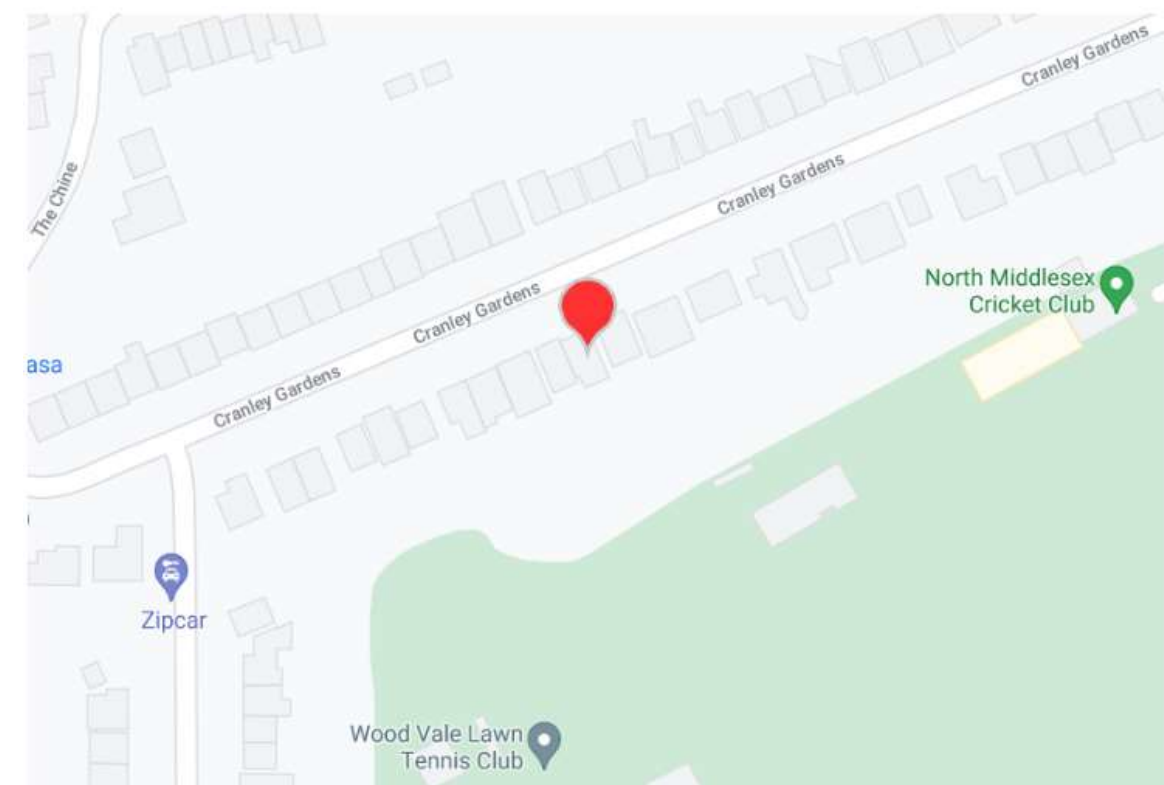


Figure 3. Location plan.

3.0 Desk Study

3.1 Ground Condition

- 3.1.1 The local geographical survey maps, accessible via the British Geological Society website, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>, indicates London Clay Formation for bedrock geology.



Figure 4. British Geological Survey plan showing the bedrock geology data on the site.

- 3.1.2 Within the BGS archive, a historical exploratory borehole, located 345m to the north-east of the site, reference number TQ28NE260, shows made ground over firm brown and orange brown thinly laminated fissured silty clay becoming stiff with depth (London Clay).

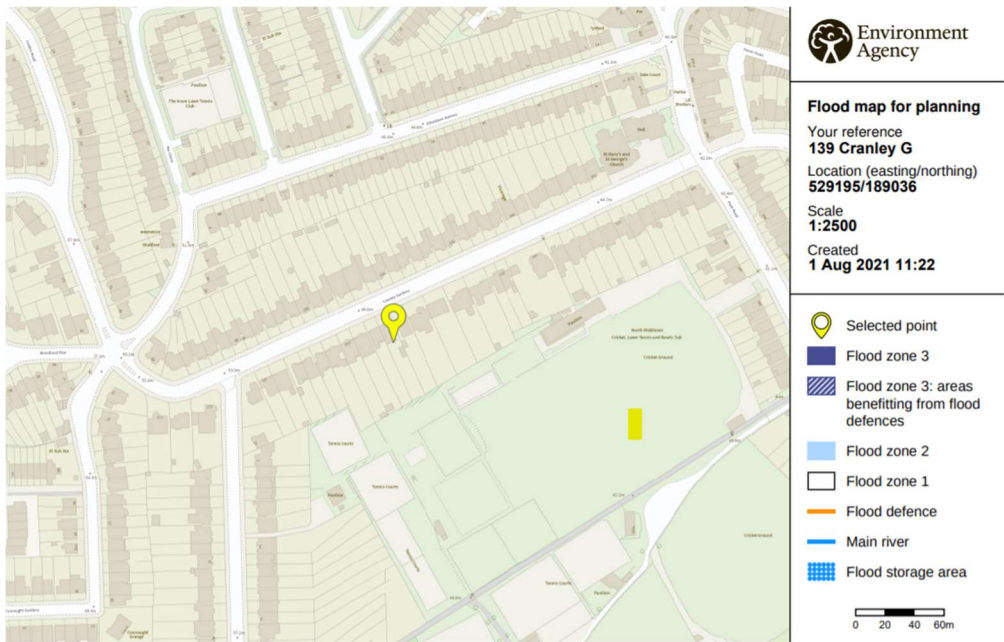


Figure 5. Environment Agency Flood Map for Planning

3.2 Hydrology

- 3.2.1 Figure 5 shows the indicative flood risk map taken from Environment Agency. It can be seen that the site falls within Flood zone 1, an area with a low probability of flooding. However, the risk of surface water flooding appears to be medium (Environment Agency), and the site falls within a Critical Drainage Area. As a result, a site specific flood risk assessment has been carried out by Symmetrys to address the impact of the development on the hydrology and hydrogeology of the site.
- 3.2.2 Haringey Council Strategic Flood Risk Assessment (Figure 6) shows that the site is in the vicinity of a watercourse, the Moselle Brook now culverted. However, it is unlikely that the proposed development will have a detrimental impact on this asset.
- 3.2.3 Site Analytical Services Phase 1 report refers to streams located from 70m to the north and 192m to the south of the site, which have been infilled between the end of 19th century and beginning of 20th century.
- 3.2.4 Potential Made Ground/Ground gas from the infilled pond and the infilled streams are highlighted in the Geotechnical Phase 1 report having a potential impact on the site. A detailed Risk Assessment is included within the aforementioned report.

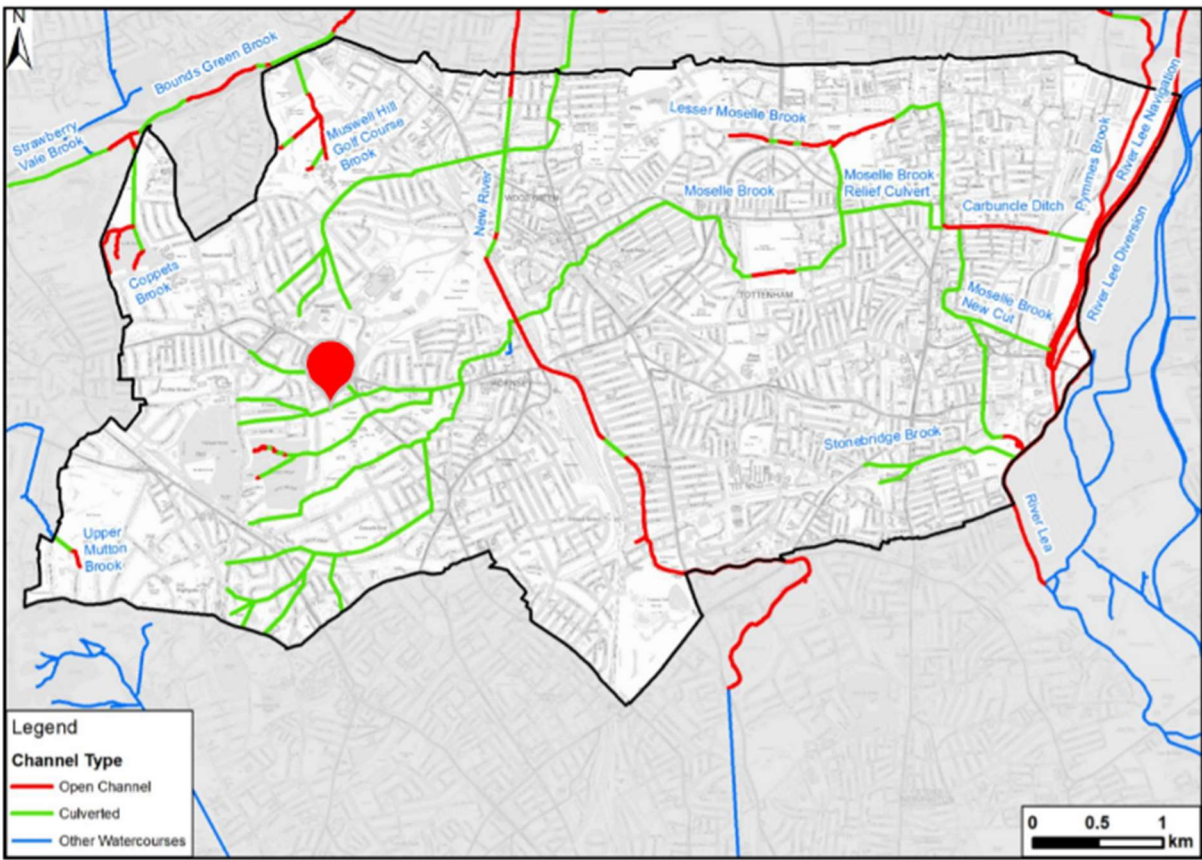


Figure 6. London Borough of Haringey- Channel Type

3.3 Overground and Underground Railway Infrastructure

- 3.3.1 Figure 7 shows the position of proposed basement in relation to the existing and historic railway routes (web site <http://www.railmaponline.com/UKIEMap.php>). The now abandoned Highgate to Alexandra Park railway line is located approximately 200m at north-west of the site.
- 3.3.2 The proposed development is unlikely to have any impact to the existing over ground or underground network rail system.
- 3.3.3 CAT scan, safe digging practices (as contained in HSE publications) and other appropriate investigative techniques should always adopted.

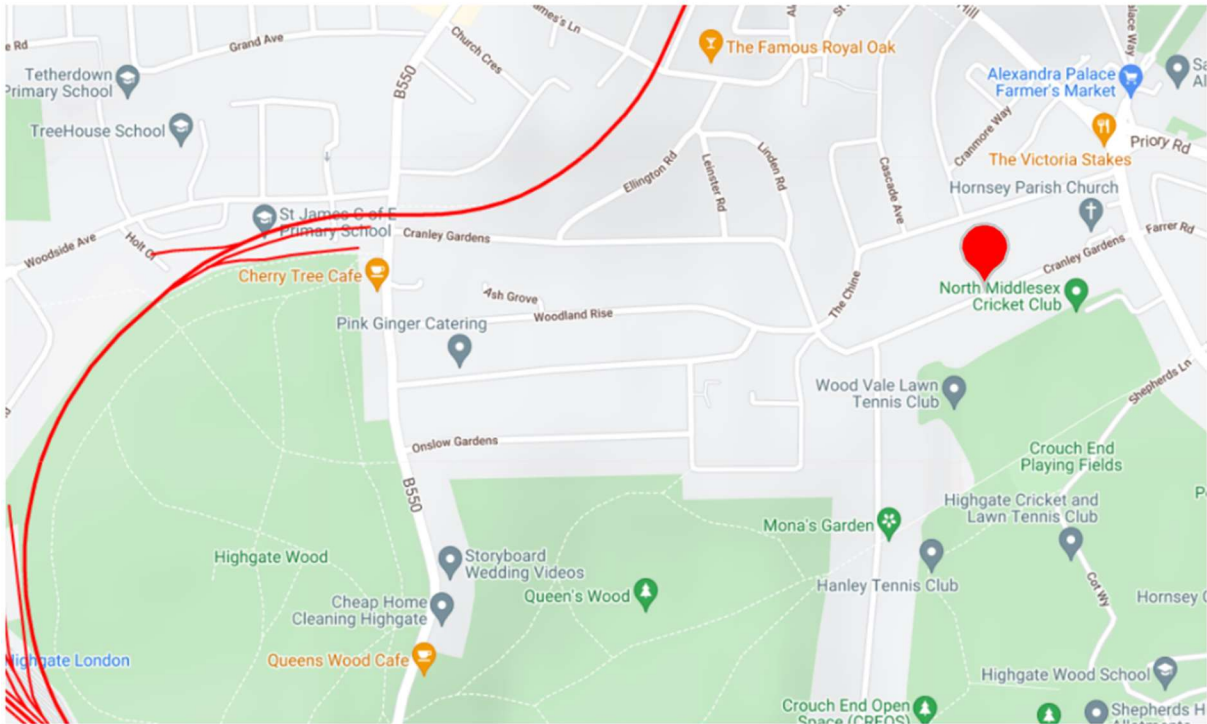


Figure 7. London Transport historic map. The red line is the now abandoned Highgate to Alexandra Park GNR's branch.

- 3.4 Bomb Damage
- 3.4.1 The ‘Bomb Sight’ archive has identified multiple areas within 250m from the site targeted by WW2 bombing.
- 3.4.2 The closest high explosive bomb is located 160m from the site. Therefore, caution must be exercised during the ground works.

4.0 Screening

The Draft Basement Development Guidance Note outlines the following issues should be considered in the Basement Impact Assessment:

- Groundwater flow;
- Surface flow and flooding;
- Land stability;
- Cumulative development;
- Construction management.

The screening tools outlined in the London Borough of Camden have been used in absence of detailed guidance in the Haringey Guidance Note.

4.1 Subterranean ground water flow

4.1.1 A screening process has been undertaken and the findings are described below.

Question	Response	Details
1a. Is the site located directly above an aquifer?	No	
1b. Will the proposed basement extend beneath the water table surface?	No	Groundwater was encountered at a depth of 0.85m below ground level. However, as the London Clay Formation is a non-aquifer, the water encountered is not believed to be groundwater but water trapped within the monitoring pipe. It is recommended that the water levels in the monitoring borehole be periodically measured immediately prior to and during the development.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	Yes	Historically, streams were located in the vicinity to the site. The Moselle Brooke lies close to the property and it is now culverted.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	Refer to Flood Risk Assessment and SuDS strategy report for run-off calculation details
5. 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)?	No	Refer to Flood Risk Assessment and SuDS strategy report for run-off calculation details
6. 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	

4.2 Land Stability

Question	Response	Details
1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8)?	No	
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?	No	
3. Does the development neighbour land, including railway cuttings and the like, have a slope greater than 7 degrees (approximately 1 in 8)?	No	

4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8)?	No	
5. Is the London Clay the shallowest strata at the site?	Yes	
6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?	No	
8. Is the site within 100m of a watercourse or a potential spring line?	Yes	Historically, stream located 70m at the north of the site was recorded in maps dated 1864, and it is believed infilled. The Moselle Brooke is believed to be in the vicinity of the site, although this is now culverted.
9. Is the site within an area of previously worked ground?	No	
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 appointed contractor should allow for dewatering measures should perched water be encountered during excavation and construction works
11. Is the site within 50m of the Hampstead Heath Ponds?	No	
12. Is the site within 5m of a highway or pedestrian right of way?	No	
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	The maximum dig will be 3.7m, starting at the south west corner of 137 Cranley Gardens and extend towards the rear garden. The maximum dig will become approximately 6.2m, at 3m distance from above mentioned reference point
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No	

4.3 Surface Water and Flooding

Question	Response	Details
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No	
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?	Yes	Refer to Flood Risk Assessment and SuDS strategy report for run-off calculation details. Surface water peak flow will be reduce by minimum 50% in order to mitigate the risk of surface water flooding.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	Refer to Flood Risk Assessment and SuDS strategy report for run-off calculation details. Permeable paving is proposed to provided flow attenuation, however this will be lined and will not allow infiltration.
4. Will the proposed basement result in changes to the profile of the inflows	No	The site's geology is London Clay, classified as non-aquifer and therefore interation with surface water is not

(instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?		significant. Moreover, the proposed development will not increase the total impermeable areas. Permeable paving is proposed but it will be line and will not allow infiltration. This will contribute to limit the risk of surface water fooding on site and downstream.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	No, the proposed works do not include a change of use that might have impact on water quality downstream.
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?	Yes	The site is within a Critical Drainage Area, at risk of surface water flooding. Sustainable drainage measures, including flow attenuation, and flood resistance measures are proposed as described in the to Flood Risk Assessment and SuDS strategy report.

4.4 Cumulative development

4.4.1 The proposed basement will not be part of a cumulative development.

4.5 Construction management

4.5.1 The proposed basement will include retaining walls cast in multi-stage hit/miss sequence to maintain the stability of the surrounding ground and neighbouring properties. The temporary works will address and maintain stability to the neighbouring properties during the construction works, which will be caried out by carefully selected contractors.

5.0 Scoping

The following issues have been brought forward from the Screening process for further assessment:

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

5.1.1 Historically, stream located 70m at the north of the site was recorded in maps dated 1864, and it is believed infilled. The Moselle Brooke is believed to be in the vicinity of the site, although this is now culverted. Therefore, the proposed development is not believed to be have detrimental effects on the above mentioned asset.

5.2 Is the London Clay the shallowest strata at the site?

5.2.1 The London Clay is prone to season shrink/swell, hence subsidence/heave might occur. The presence of clay has been accounted for on the basement design and the site specific ground movement assessment.

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

5.3.1 The maximum dig will be 3.7m, starting at the south west corner of 137 Cranley Gardens and extend towards the rear garden. The maximum dig will become approximately 6.2m, at 3m distance from above mentioned reference point. The temporary works sequence and the construction methodology have been conceived to ensure the works will be completed without any adverse impact on the structural stability of the neighbouring properties. A ground movement assessment has been carried out to estimate the category of damage resulting from the construction works.

5.4 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?

5.4.1 The surface water peak flow will be reduce by minimum 50% in order to mitigate the risk of surface water flooding.

5.5 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.

5.5.1 The site is within a Critical Drainage Area, at risk of surface water flooding. Sustainable drainage measures, including flow attenuation, and flood resistance measures are proposed as described in the to Flood Risk Assessment and SuDS strategy report. These will contribute to reduce the existing risk from medium to low.

6.0 Ground Investigation

6.1 A ground investigation was carried out by specialist geotechnical engineers Site Analytical Services Ltd. Their geotechnical report is provided in Appendix C.

6.2 One borehole was excavated at the rear of the site to a maximum depth of 12m where stiff clay was encountered. See Appendix C for details.

6.3 The allowable bearing pressure was found to be 165 kN/m² at 1m depth, increasing to 250 kN/m² at 3m depth.

6.4 Groundwater was encountered at 0.85m depth in Borehole 1 after a period of two weeks. As the London Clay is a non-aquifer, the water is not believed to be groundwater, instead surface water trapped in the monitoring pipe. The appointed contractor should allow for dewatering measures should perched water be encountered during excavation and construction works.

6.5 A Waste Acceptance Criteria analysis (WAC) was carried out. The results confirmed the sample being non-hazardous in nature, and the same has been classified as Inert Waste.

6.6 The result obtained from tests for buried concrete (Appendix C), indicates that Design Sulphate Class DS-3 should be applied, hence according to BS 8500-1:2006, designated concrete to be DC-1 (min RC25/30)

7.0 Design Proposal

7.1 The design proposal is to construct a single storey basement. The proposed methodology consists of multi-stage underpinning.

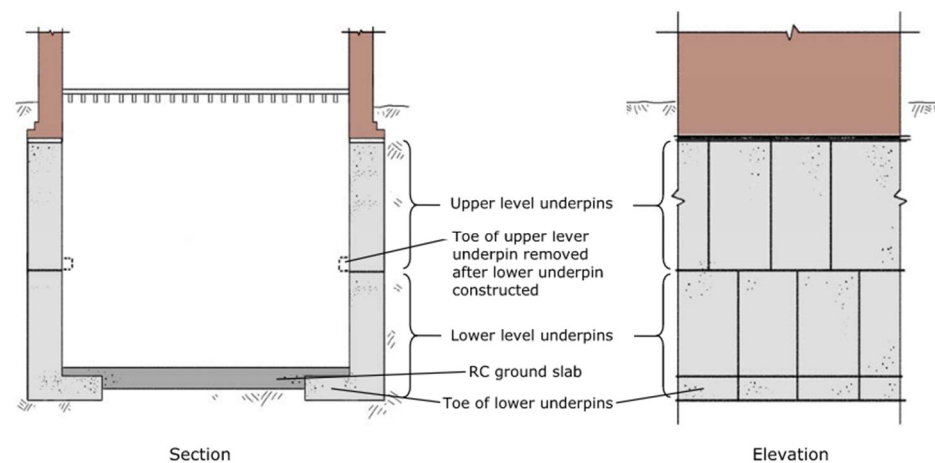


Figure 8. Typical underpinning multi-stage underpinning sequence (source: Guidelines on safe and efficient basement construction below or near to existign structures (ASUC).

7.2 Horizontal and vertical propping shall be provided at all stages of the basement construction up to completion. Continuity reinforcement shall be allowed between the different stages of underpinning. Temporary bases shall be allowed at intermediate stages of underpinning, trimmed off at a later stage to leave a flat vertical wall. A new suspended basement slab with suitable compressive void formers has been considered to accommodate the expected ground heave. Tensions piles have also been considered to provide additional resistance to uplift. See Structural drawings in Appendix A. A ground floor slab is envisaged providing permanent propping to the retaining walls at top level.

7.3 The retaining walls shall have adequate strength to resist anticipated lateral soil forces, water pressure and surcharge loading. At-rest pressures have been considered for design purposes. The surcharge from 137 Cranley Garden walls has been accounted for in the design. Despite ground water been identified as perched water, hydrostatic pressure has been accounted for in the design of the retaining walls, located at 1m below ground floor level.

7.4 The retaining walls and the basement slab are proposed to be constructed in a sequential manner in lengths of maximum 1.2m, to be cast in sequence as specified in the temporary works method statement.

7.5 Connections from the neighbouring properties (lateral drains) and share pipes (public sewer) have been identified on site. The basement construction will be carried out in a manner that the works will not have an impact on the integrity of the pipes and access for maintenance is provided. Works are subject to a Buildover Agreement application to Thames Water.

7.6 Existing trees located on site are to be retained and protected with appropriate protective measures during the course of the construction. Further investigation works must be carried out prior to any construction works to confirm that the proposed foundations meet the requirement indicated in the NHBC Standards, Chapter 4.2 "Building near trees".

8.0 Temporary Works and construction method statement

8.1 The proposed temporary works sequence for the basement is provided in Appendix A. This is for design development purposes only and for the purposes of this planning application. A detailed construction method statement and temporary works design must be provided by contractor and temporary works designer post planning and prior to any construction works. The appointed contractor will be responsible for all temporary supports and for the stability of the structure during the works. The method of construction adopted for the basement construction minimises the quantity of temporary works required.

8.2 Along with a sequence of works for the basement construction at Cranley Gardens, a typical multi-stage underpinning sequence of works has been included in Appendix A, focusing exclusively in a typical sequence for the underpinning works.

8.3 To ensure that the retained engineer's intent is correctly interpreted by the contactor, they will be required to submit all temporary works proposals for review a minimum of 7 working days prior to commencing works. The contractor should also submit a dewatering strategy to ensure a strategy is agreed should water be encountered.

9.0 Ground Stability and Stability of Neighbouring Structures

9.1.1 A Ground Movement Assessment (GMA) has been carried out by GEA in accordance with CIRIA publication C760 'Guidance on embedded retaining wall design' and takes into account the construction methodology and site-specific ground and groundwater conditions presented in this report. This assessment is attached to this report in Appendix D.

9.1.2 The report has concluded that the predicted damage to the neighbouring properties from the construction of the proposed basement would be "Negligible" (maximum damage category "0") to "Very Slight" (maximum damage category "1") for the majority of neighbouring building elevations, except elevation 6 at 137 Cranley Gardens where the maximum damage category has been identified as Slightly (2) (Figure 9 and 10).

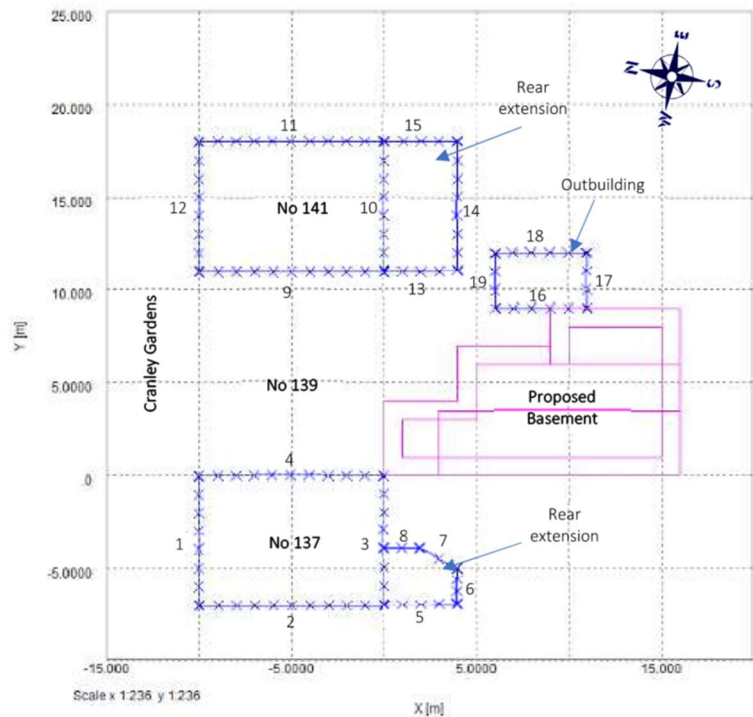


Figure 9. Scheme showing the elevation key plan for the neighbouring properties with the purposes of identifying the maximum damage category of each elevation.

Structure	Elevation Ref	Critical Stage(s)	Max Tensile Strain (%)	Maximum Damage Category*
No 137 Cranley Gardens	1	4	<0.01	Negligible (0)
	2	2	<0.01	Negligible (0)
	3	3	0.04	Negligible (0)
	4	4	0.04	Negligible (0)
	5	4	<0.01	Negligible (0)
	6	3 & 4	0.08	Slight (2)
	7	4	0.01	Negligible (0)
	8	3	<0.01	Negligible (0)
No 141 Cranley Gardens	9	2	0.01	Negligible (0)
	10	2	0.02	Negligible (0)
	11	4	<0.01	Negligible (0)
	12	2	<0.01	Negligible (0)
	13	2	<0.01	Negligible (0)
	14	2, 3 & 4	0.06	Very Slight (1)
	15	2	<0.01	Negligible (0)
	16	2	0.06	Very Slight (1)
	17	4	0.06	Very Slight (1)
	18	1	0.03	Negligible (0)
	19	2 & 3	0.06	Very Slight (1)

*From Table 6.4 of C760: Classification of visible damage to walls.

Figure 10. Maximum Damage Category for each elevation of the beighbouring properties.

10.0 Drainage and SuDS

10.1 Refer to Symmetrys document number “21066-SYM-XX-XX-RP-C-0001 Flood Risk Assessment and SuDS Report” for details on Drainage and SuDS.

11.0 Party Wall Matters

11.1 The proposed works will fall within the Party Wall Act 1996. Procedures under the Act will be dealt with by the client’s Party Wall Surveyor. The Party Wall Surveyor will prepare and serve necessary Notices under the provision of the Acts and agree Party Wall Awards in event of disputes. The Contractor will be required to provide the Party Wall Surveyor with the appropriate drawings, method statements and all other relevant information covering the works notifiable under the Act. The resolution of the matters under the Act and provision of Party Wall Awards will protect the interests of all owners.

11.2 Monitoring

It is proposed that the structural stability of the adjacent properties is safeguarded by a system of movement monitoring. The Contractor shall monitor the position and movements of the elevations of the retained façade and adjacent properties around the perimeter of the proposed excavation. The monitoring shall be undertaken by a specialist survey company. The monitoring system will have at least the following characteristics:

- (1)

The retained façade and existing façades of the neighbouring properties as well as the flank wall of the neighbouring building will be monitored near ground level and at roof level, at intervals not exceeding 3m centres.
- (2)

Monitoring points (targets) shall be firmly attached, to allow 3D position measurement, for the duration of the work, to a continuous and uninterrupted accuracy of +/- 1mm. A suitable remote reference base/datum unaffected by the works will be adopted, one located at least 50m from the site.
- (3)

Points/targets shall be measured for 3D positioning on, at not less than the following intervals:

(a)

Before any works commence (base reading).

(b)

Weekly during the period of basement excavation/construction.

(c)

Fortnightly until permanent structure is in place

(d)

Monthly during the course of the remainder of the works.

(e)

Six months after the completion of all construction works.
- (4)

All measurements shall be plotted graphically, to clearly indicate the fluctuation of movement with time. The survey company shall submit the monitoring results to the Engineer (Symmetrys Ltd) and to the Adjoining Owners Party Wall Surveyors/Engineer within 24 hour of measurement, graphically and numerically.
- (5)

The following trigger levels for movement are proposed for agreement. In the event of a trigger value being reached the Contractor will immediately stop any work that might cause further movement, assess the situation and propose alternative methods for proceeding, with definitive further movement limits for those later steps.

(6) Trigger movement limits are proposed as follows:

Existing Buildings: Horizontal/Vertical Movement	
Amber +/-5mm	All parties notified
Red +/-10mm	Works Reviewed

12.0 Sustainability

12.1 As the basement construction will involve significant amounts of concrete, cement replacement alternatives should be considered. Cement replacements can used to replace up to 40% of the cement in concrete mix. These replacements are typically waste products from the energy production industry such as PFA (pulverised fuel ash) and GBFS (granulated blast furnace slag). By adopting them waste products from the energy production industry are recycled and not sent to landfill sites. Furthermore this also reduces the amount of cement that needs to be mined. Concrete should be bought from a local supplier to further reduce the carbon footprint of transport.

12.2

There is a significant amount of reinforced concrete on the project for which steel reinforcement bars will be required. By specifying reinforcement from a UK supplier it ensures that the rebar is made from 100% recycled steel. Any structural steelwork should be sourced from a British manufacturer to ensure that rolled sections are made from at least 60% recycled steel. Sourcing the steel from a local supplier will further reduce the transport carbon footprint.

13.0

Summary

13.1

The proposed basement at 139 Cranley Gardens has been designed with robust structural principals and methods of construction that are widely used and known. This will ensure the integrity of neighbouring structures and roadways are not compromised during its construction.

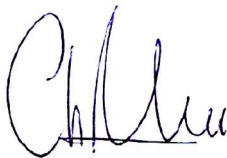
13.2

This assumed Method Statement and Structural report has been completed by Simone Boncio, Senior Structural Engineer at Symmetrys Limited, reviewd by David Snaith BEng (Hons) PG Cert Structs, Associate at Symmetrys Limited, and checked by Christopher Atkins CEng MStructE who is the Managing Director of Symmetrys Limited.



Simone Boncio MSc

Senior Structural Engineer



Chris Atkins CEng MStructE

Managing Director

APPENDIX A

STAGE 2 DRAWINGS

APPENDIX B

STRUCTURAL CALCULATIONS

APPENDIX C

GEOTECHNICAL REPORT

(PHASE 1 AND 2)

APPENDIX D

GROUND MOVEMENT

ASSESSMENT