



**BASEMENT IMPACT ASSESSMENT
FOR DEVELOPMENT AT
HAMPTON BY HILTON
EGERTON WAY
CLIENT: ACRE HOTELS LTD**

Rev	Date	Revision Notes	Author
4	01/11/17	1. Nos of rooms revised from 150 to 128. 2. Drawing revisions updated. 3. Groundwater investigation and mitigation measures added in Sections 5.4.1, 5.6.1. 4. Flood risk from surface water updated in Sections 5.7.2, 9.6 & Appendix 2, item 1.7	J. Pereira
5a	02/08/18	1. Nos of rooms revised from 128 to 157. 2. BIA update to revised drawing Ref. 1.0a, b and c listed in Section 4. 3. BIA key findings added to Section 2 Preamble	J. Pereira

Report Ref: AHL-BIA-0001

JP MANN CONSULTING LTD

Tel: 07877267115

Anglo Dal House
5 Spring Villa Park
Edgware
Middlesex, HA8 7EB

1 Contents

2	PREAMBLE	1
3	INTRODUCTION	4
4	REFERENCE	6
5	SITE CONDITION	9
6	STAGE 1 SCREENING	29
7	STAGE 2 SCOPING	30
8	STAGE 3 SITE INVESTIGATION AND STUDY	32
9	STAGE 4 BASEMENT IMPACT ASSESSMENT	33
10	GROUND MOVEMENT AND DAMAGE ASSESSMENT	38
11	APPENDIX 1 – SITE PHOTOGRAPHS	49
12	APPENDIX 2 – STAGE 2 SCREENING	53
13	APPENDIX 3 – SETTLEMENT CALCULATION	61
14	APPENDIX 4 – HORIZONTAL GROUND MOVEMENT CALCULATION	63
15	APPENDIX 5 – DAMAGE ASSESSMENT CALCULATION	65

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	1
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 01

PREAMBLE

2 PREAMBLE

This report has been prepared by J P Mann Consulting Ltd for Acre Hotels Ltd who are proposing a development that comprises of a 157-bedroom hotel with a single basement carpark. The building is to be constructed on an existing car park area which currently serves the adjacent Axis House residential apartment block.

This revision is updated following the granting of the 128 extant consent and that the changes now proposed do not extend to the basement and therefore the conclusions previously found acceptable by the LPA on the extant consent can be applied to this revision of the report too.

This report presents findings of the impact assessment of the basement excavation to the adjacent Axis House and Strata House. *Key findings of the assessment are summarised below.*

- 1. The site is considered to have a low risk of encountering unexploded ordnance during groundworks phase. However a preliminary UXO risk assessment may be required prior to commencement of groundworks on site.*
- 2. The twin Heathrow Express tunnels is positioned to the west of this site, however the exact position has not been determined. It is recommended for the exact position to be determined prior to carrying out the proposed site investigation scope. . Heathrow Express may request for a tunnel damage assessment to be carried out subject to the distance of the tunnels to the site.*
- 3. The Environmental Agency and groundwater maps has confirmed the site to have the following groundwater features.*

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	2
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 02

PREAMBLE

- a. *The underlying soil strata is classified as an unproductive strata and consists of soil deposits of low permeability that have negligible significance for water supply or river base flow.*
- b. *The site is not situated within a groundwater source protection zone, or groundwater safeguard zone.*
- c. *The proposed site is not influenced by any bedrock aquifer.*
- d. *There are no groundwater abstraction points within the area and there are no businesses within 500m of the site that hold consent to discharge waste waters.*
- e. *The site is defined as flood zone 1 that has a low probability of flooding and the site does not lie within an area of flooding risk from either rivers or sea.*
- f. *The site and its' surrounding areas were never subject to any surface water and sewer flooding incidents.*
- g. *The site is located outside the zone for increased potential for groundwater to rise sufficiently to interact with the ground surface or be within 2m of the ground surface. Hence the site has a low potential for elevated groundwater. The proposed site has been assessed to be SAFE from the following consequences.*
 - i. *The site investigation data for the land to west of the site confirms the underlying stratum to be dry and free of groundwater.*
 - ii. *The proposed basement will not have any impact on the natural groundwater regime in the area and will not increase the flooding risk.*
4. *The site is assessed to be potentially unsuitable to accommodate infiltration SUDS possibly due to the presence of cohesive substrata.*
5. *A detailed site investigation scope is recommended for this site.*
6. *The findings of the building damage assessment is presented in Figure 10-7 and is summarised below.*
 - a. *The damage assessment categorises the damage to both Axis House and Strata House as Category '0' (Negligible) using both upper bound and best*

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	3
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 03

PREAMBLE

estimated ground movement prediction. This confirms the basement excavation of the project has negligible impact on both Axis House & Strata House.

This report comprised of a review of the available documented information from a variety of sources, together with (where appropriate) meetings and discussions with relevant authorities and other interested parties.

The information reviewed should not be considered exhaustive and has been accepted in good faith by JP Mann Consulting Limited as providing a true description of site conditions and the proposed scheme. However, no liability can be accepted for the detailed accuracy or otherwise of any of the reports or documents prepared by others for the client or for third parties, or for any associated errors or omissions.

The liability of JP Mann Consulting Ltd in respect of the information contained in the report will not extend to any third party.

The primary author of this assessment is Jeffery Pereira. He is a Civil Engineer, with a BEng in Civil Engineering and an MSc in Soil Mechanics from Imperial College, London. He has over 20 years of experience in the area of geotechnical engineering, with a particular interest in the design of basements.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	4
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

3 INTRODUCTION

3.1 Introduction

The objective of this study is to produce an impact assessment for the proposed basement construction on this site in accordance with the requirements of the London Borough of Hillingdon.

The purpose of the Basement Impact Assessment is to enable Hillingdon Council to assess whether any predicted damage to neighbouring properties and the water environment is acceptable or can be satisfactorily improved by the developer.

This report covers the initial desk study, screening and scoping processes, referred to as Stage 1 and 2 as well as the site investigation, referred to as Stage 3 and includes ground movement analysis Stage 4. Specific groundwater impact modelling and assessment was not considered necessary for this site.

3.2 Scope of Work

This report presents the desk study findings and interpretation of the data.

The findings in this report are based on information obtained from a variety of sources as detailed within this report which are considered to be reliable. JP Mann Consulting cannot guarantee the reliability of the information it has obtained from others.

This report was prepared for the use of Acre Hotels Ltd and their appointed Engineers.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	5
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

3.3 BIA Stages

The general stages involved in a basement impact assessment are given in Table 3-1. This assessment will address from Stage 1 to Stage 4 to be used in the planning application of the project. It will address surrounding issues, structural stability of the viaduct, effects on drainage and run-off and harm to the amenities of neighbours.

Stage	Name	Description
1	Screening	Identify any matters of concern
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

Table 3-1: Stages of Basement Impact Assessment

The report will review existing site data and provide detailed assessment of the issues identified, by J P Mann Consulting Ltd.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	6
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 06

REFERENCE

4 REFERENCE

4.1 Drawing

Ref.	Drawing No.	Revision / Date	Drawing Title
[1.0a]	1056-PL002	06/18	Bath Road, Heathrow, Proposed basement
[1.0b]	1056-PL103	07/02/18	Bath Road, Heathrow, Proposed and approved south elevation
[1.0c]	1056_PL001_12B	Jun 2018	Hampton By Hilton, Heathrow, Basement Plan
[1.1]	Figure A-1.2	06/04/11	Summary Map of Past Floods – Surface Water Incidents (Source: London Borough of Hillingdon website: surface water management plan)
[1.2]	Figure A-2.2	06/04/11	Summary Map of Past Floods – Main River / Fluvial / Tidal Incidents (Source: London Borough of Hillingdon website: surface water management plan)
[1.3]	Figure A-3.2	06/04/11	Summary Map of Past Floods – Ground Water Incidents (Source: London Borough of Hillingdon website: surface water management plan)
[1.4]	Figure A-4.2	06/04/11	Summary Map of Past Floods – Sewer Incidents (Source: London Borough of Hillingdon website: surface water management plan)
[1.5]	Figure A-5.2	06/04/11	Increased Potential for Elevated Groundwater Map (Source: London Borough of Hillingdon website: surface water management plan)
[1.6]	Figure 11.2	06/04/11	Infiltration SUDS Suitability Map (Source: London Borough of Hillingdon website: surface water management plan)
[1.7]	15L08PL01	24/11/16	Site plan as existing, car park Hampton Hotel Site, Architects Network (Topographical Map)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	7
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 07

REFERENCE

[1.8]	15L08PL3_SK08	A / 21/09/17	Hampton by Hilton, London Bath Road, Section AA and BB as proposed
-------	---------------	--------------	--

4.2 Report

Ref.	Report No.	Revision / Date	Report Title
[2.0]	14151/GIR	Aug 14	Report On A Ground Investigation on Land At 272 – 276, Bath Road, Heathrow, UB3 5JJ For Acre 1153 Limited
[2.1]	16084.D100A	Nov 16	Sustainable Drainage Strategy Statement, Hampton by Hilton, Bath Road, Hillingdon by Shear Design Consulting Civil and Structural Engineers
[2.2]	-	8 Dec 16	Outline Planning Application, Hampton by Hilton, London Heathrow for Acre Hotels Limited
[2.3]		Nov 16	Arboricultural Impact Assessment at Hampton by Hilton, London Heathrow, 242 Bath Road, Harlington, UB3 5AY by Arboricultural Solutions LLP

4.3 Guide

Ref	Report No	Revision/ Date	Guide Title
[3.0]	C580	2003	CIRA Guide, Embedded retaining walls – guidance for economic design

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	8
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 08

REFERENCE

4.4 Abbreviations

	Description
ARP	Air-raid Precautions
bgl	Below ground level
BGS	British Geological Survey
Category U	Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years
OS	Ordnance Survey
SI	Site investigation
SUDS	Sustainable Drainage System
UXO	Unexploded Ordnance
WWII	Second World War (1939 – 1945)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	9
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 09

SITE CONDITION

5 SITE CONDITION

5.1 Site Location

The site is located at the underused car park of Axis House, 242 Bath Road, Harlington, UB3 5AY situated between Bath Road and Egerton Way accessed from the latter.

The site is bounded by Strata House located to the west and Axis House located to the east of the site.

The site is currently a flat tarmac surface formerly used as a car park to an office building Axis House which has been converted to residential use.

The site occupies a plan area of 2,989m² and is centralised on National Grid Reference 507900mE 176980mN.

The OS Map of the site and the site location plan are shown in Figure 5-1 and 5-2 respectively and the site photos are presented in Appendix 1.

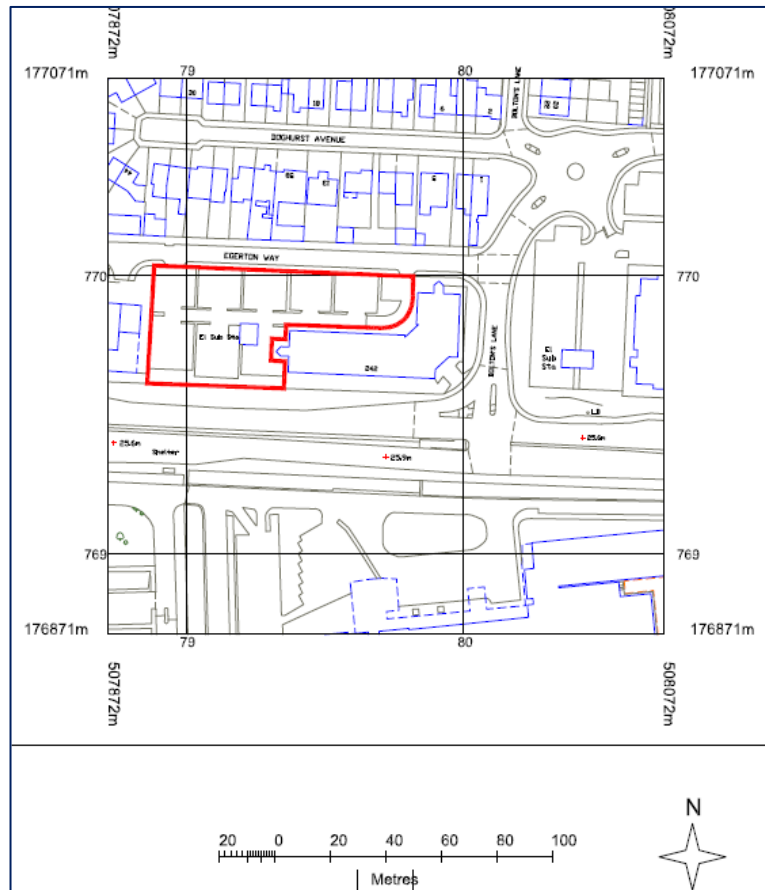


Figure 5-1: OS Map of the Site

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	11
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

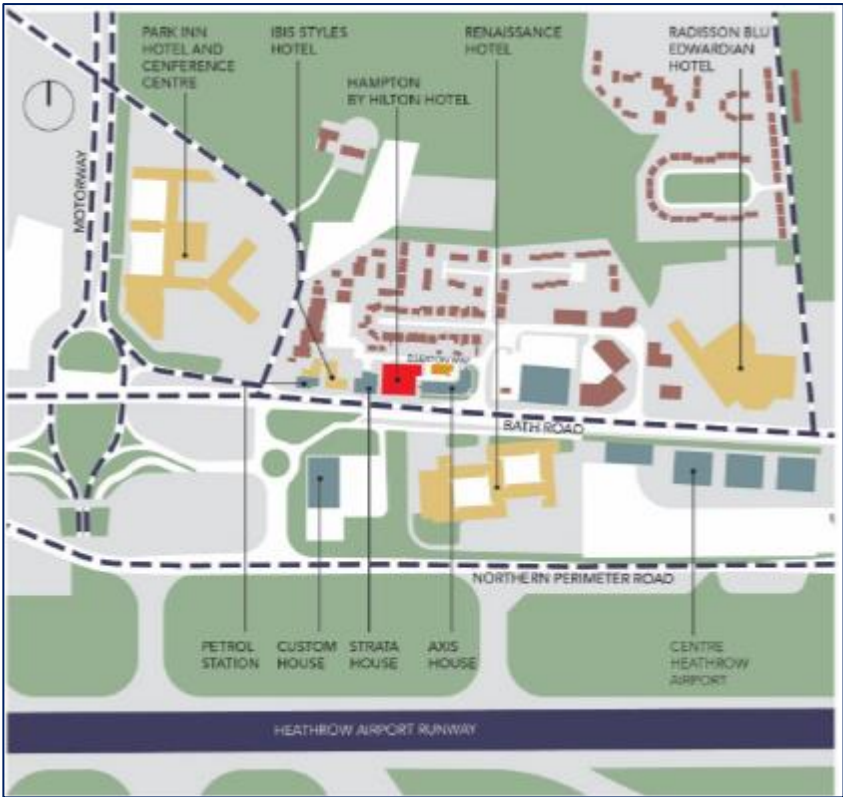


Figure 5-2: Site Location Plan

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	12
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

5.2 Site History

The 1938 historical map presented in Figure 5-3 show the proposed site to be developed with a row of single detached dwellings. The surrounding area were relatively underdeveloped with the majority of the land was used as farm land.

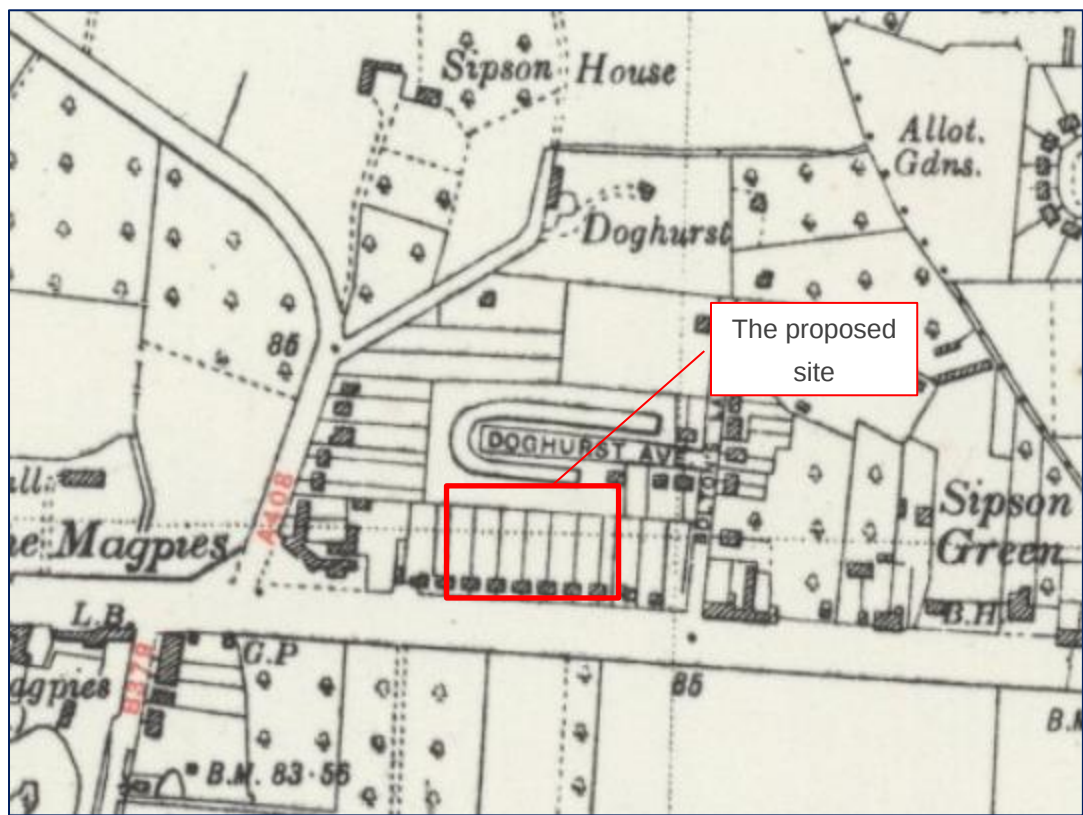


Figure 5-3: Extract from Middlesex XIX.NE OS Map surveyed in 1938
 (<http://maps.nls.uk/view/101454979>)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	13
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

The London bomb map shown in Figure 5-4 (extract from website www.bombsight.org) shows no bombs were dropped directly between 7th October 1940 and 6th June 1941 in the immediate vicinity of the proposed site.

A preliminary UXO risk assessment may be required prior to commencement of construction activities on site.

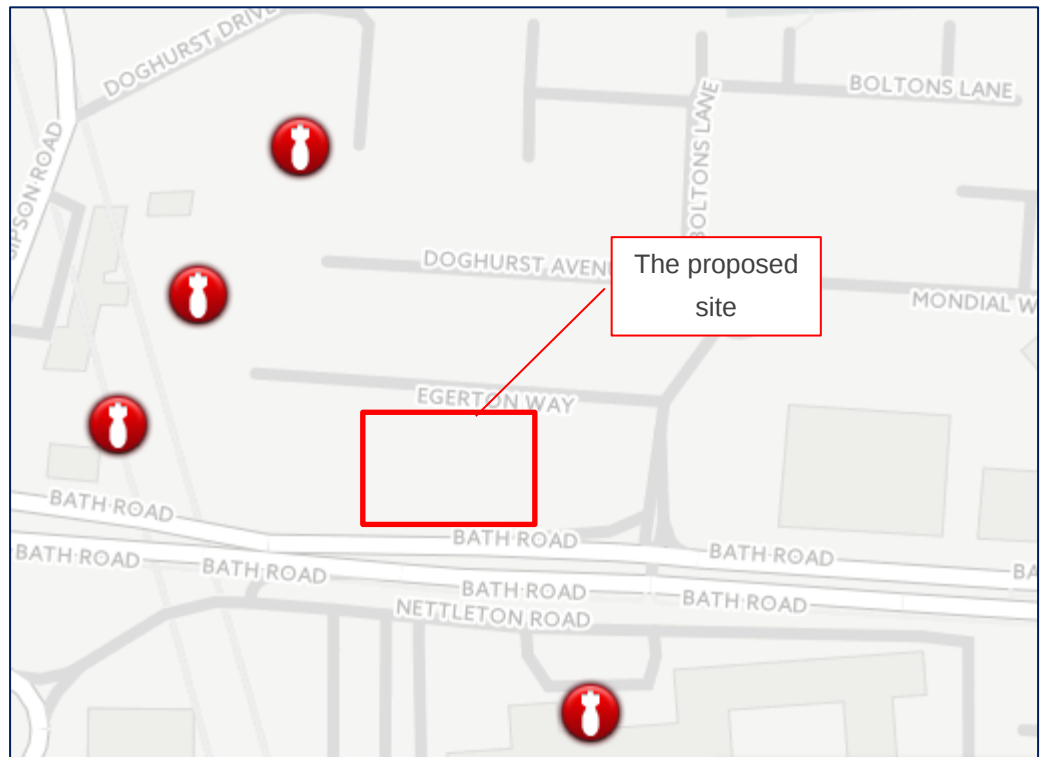


Figure 5-4: Extract from bombsight.org that maps WWII bomb census (<http://bombsight.org/#17/51.48176/-0.44856>)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	14
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

5.3 Proposed Development

The proposed development comprises of a 157-bedroom hotel with a single basement carpark. The building is to be constructed on an existing car park area which currently serves the adjacent Axis House residential apartment block.

The proposed development and basement occupies near the entire footprint of the available site as shown in Figure 5-5. *The proposed and approved elevation from Bath Road (south elevation) is shown in Figure 5-6.*

The existing site is generally flat with falls to gullies. The site is bounded by two public highways, Bath Road to the south and Egerton Way Drive to the north, with two existing buildings encompassing the development to the east (Axis House) and west (Strata House).

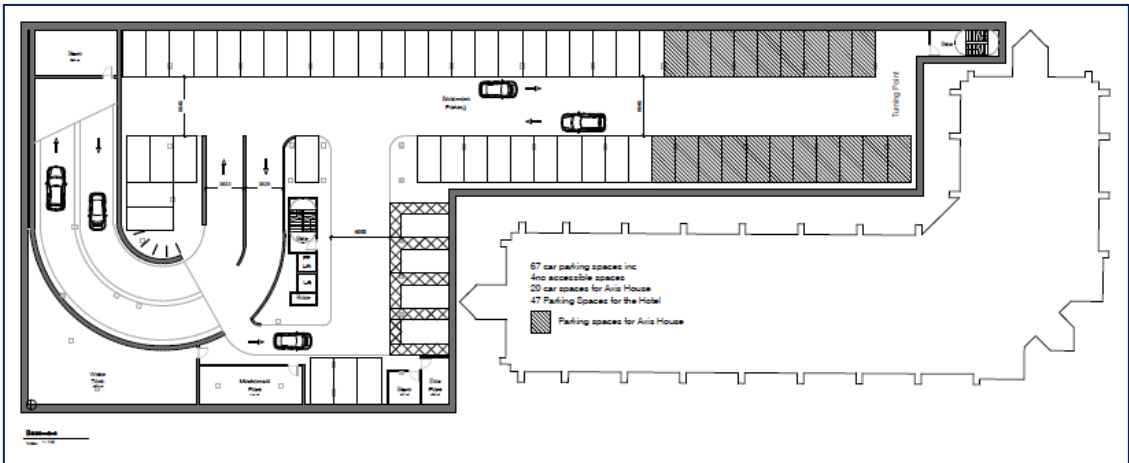


Figure 5-5: Proposed site and basement plan [Ref. 1.0a]

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	15
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

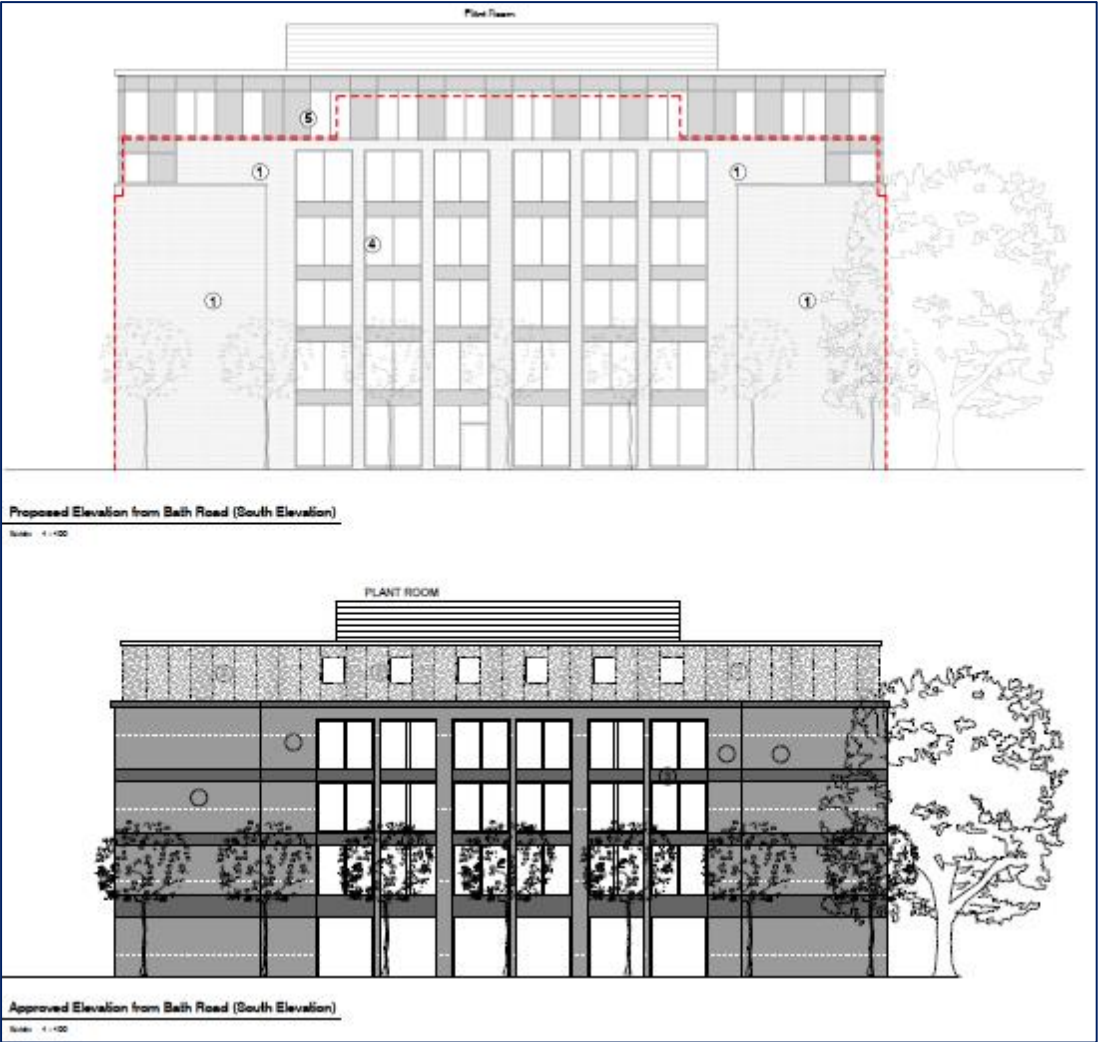


Figure 5-6: Proposed and approved elevation from Bath Road (South Elevation) [Ref. 1.0b]

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	16
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 16

SITE CONDITION

5.4 Geology

The geological map of the area (extract shown in Figure 5-7 below) shows the bedrock geology of the site to be London Clay Formation, which formed in the Palaeogene period and comprises primarily of clays with bands of silt and sand. Superficial Langley Silt member (sandy silty clay) and Lynch Hill Gravel member deposits of sandy gravel overlie the London Clay Formation. These superficial deposits achieve a maximum thickness of 5m.

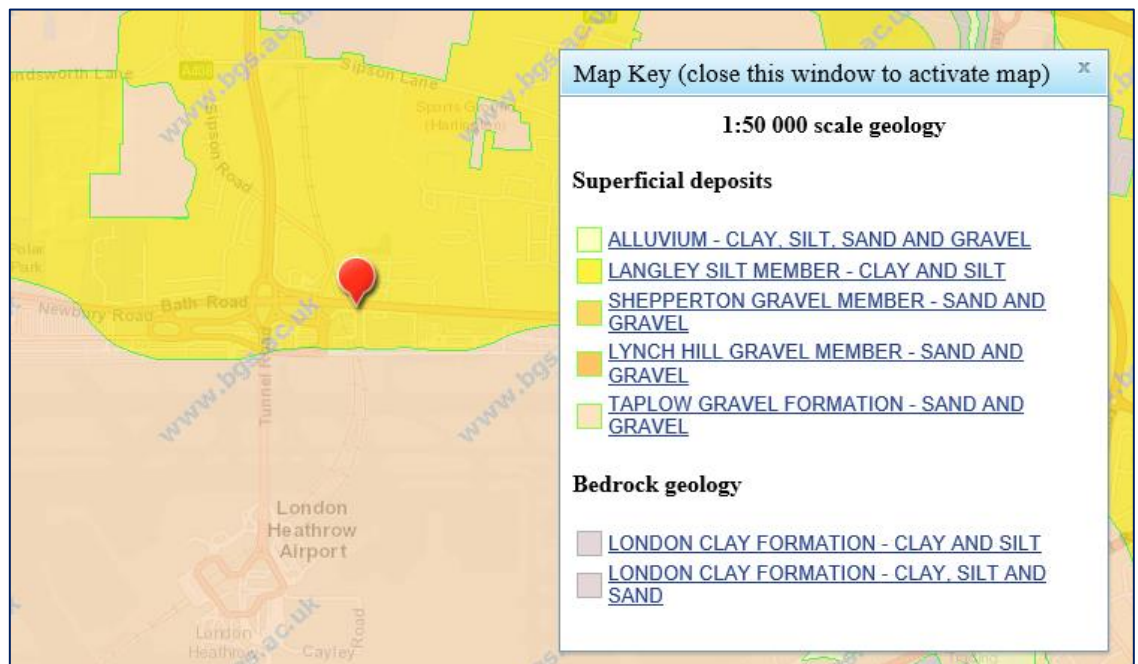


Figure 5-7: British Geological Survey Geology Map 1: 50000

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	17
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

5.4.1 Ground Condition

The site investigation report [Ref. 2.0] that was produced for the land to the west of the proposed site was made available as reference for this project. The borehole layout plan is shown in Figure 5-8.

It is to be noted that the twin Heathrow Express tunnels that passes beneath the land, however its' exact position was not determine. Hence, the drilling depths were restricted to a maximum depth of 5m in order to avoid the risk of penetrating the tunnels. A 5m deep investigation is insufficient for this site considering the foundations for the proposed development will extend beyond this depth. A detailed site investigation including groundwater monitoring is recommended.



Figure 5-8: Borehole Location Plan (Extract from Ref. 2.0)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	18
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Historical boreholes from the British Geological Survey website were used to determine the ground condition beyond 5m deep. The historical borehole location plan is given in Figure 5-9.

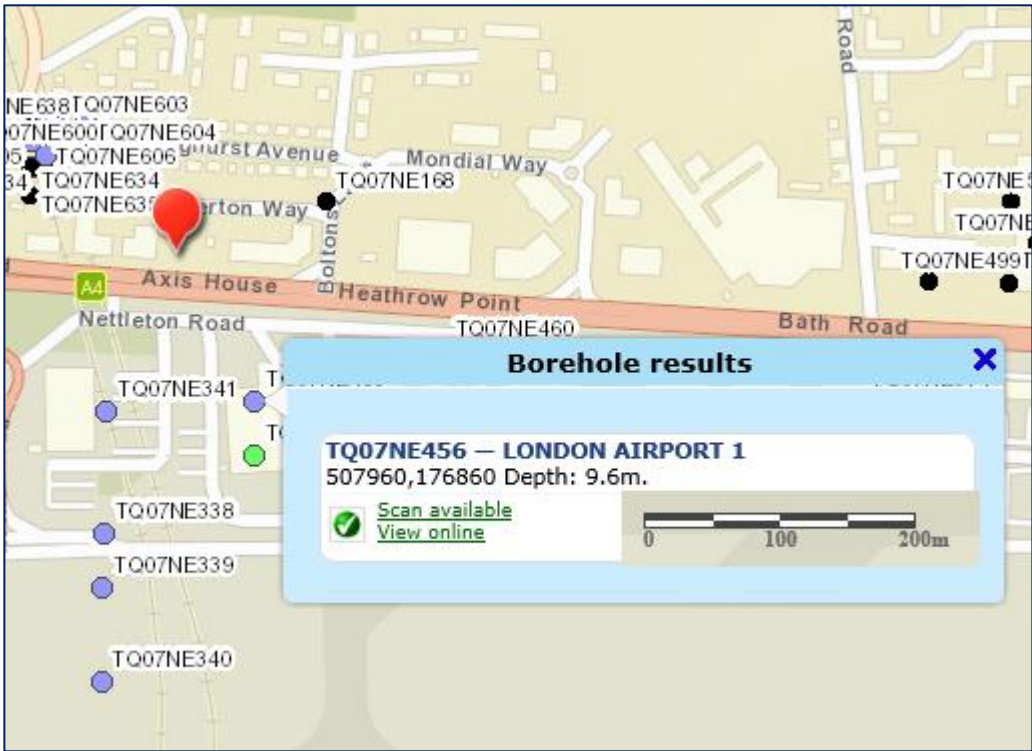


Figure 5-9: Historical Borehole Location Plan (BGS Website)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	19
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 19

SITE CONDITION

The ground condition based on the two sources described above is summarised in Table 5-1.

Strata	Top of Strata (m bgl)	Bottom of Strata (m bgl)	Thickness (m)
Made Ground	0	1.0	1.0
Langley Silt Clay	1.0	2.0	1.0
Lynch Hill Gravel	2.0	5.0	3.0
London Clay Formation	5.0	80.0	75.0

Table 5-1: Summary of Ground Condition

5.5 Hydrogeology

The site is an area that is predominately of clayed sequence of more than 75m thick, confining the underlying aquifers. This stratum is classified by the Environment Agency as unproductive strata and are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

It is also defined as rocks with essentially no groundwater by the BGS Hydrogeology Map (extract shown in Figure 5-10).

The Environment Agency website defines the proposed site as:

- No protection is required on groundwater source.
- The proposed site is not influenced by superficial deposits and bedrock aquifer.

Therefore, the proposed 3.75m deep basement will not impact the natural groundwater regime in the area. Surface water run-off is likely to be collected by the current drainage system.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	20
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 20

SITE CONDITION

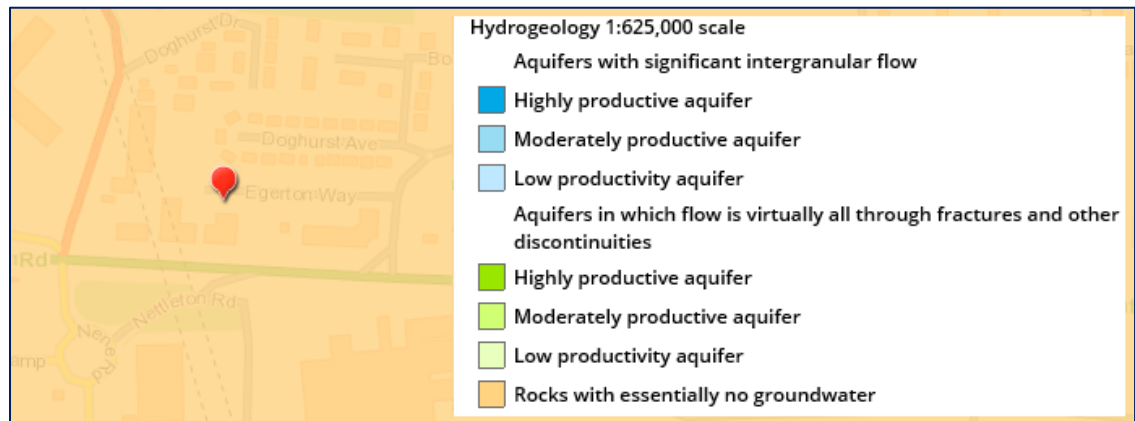


Figure 5-10: British Geological Survey Hydrogeology Map 1: 625 000

5.6 Groundwater

The Environmental Agency confirms that the site is not situated within a groundwater source protection zone, or groundwater safeguard zone. There are no groundwater abstraction points within the area and there are no businesses within 500m of the site that hold consent to discharge waste waters.

5.6.1 In-situ Groundwater Condition

Groundwater equilibrium conditions may only be conclusively established by means of a series of measurements made in a standpipe, or piezometer installed in the ground after completion of site works.

Monitoring wells were installed in the boreholes (WS1-WS3) to their full depth in order to allow long-term soil-gas and groundwater level monitoring on one occasion.

Groundwater was not encountered during the drilling of the boreholes. It is possible that the speed of drilling may have masked any groundwater strikes.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	21
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 21

SITE CONDITION

Groundwater was also not encountered during the monitoring undertaken on one occasion as agreed with the client and presented in Table 5-2.

Groundwater Records (to date)		
Trial Hole	Groundwater Depth (m bgl)	Comment
WS1	No groundwater observed	Reading taken on 30.06.14
	Well noted to be dry	Reading taken from monitoring well on 07.07.14
WS2	No groundwater observed	Reading taken on 30.06.14
	Well noted to be dry	Reading taken from monitoring well on 07.07.14
WS3	No groundwater observed	Reading taken on 30.06.14
	Well noted to be dry	Reading taken from monitoring well on 07.07.14

Table 5-2: Groundwater Monitoring Records (Extract from Report Ref. 2.0)

Changes in groundwater level do occur for a number of reasons including seasonal effects and variations in drainage. The site investigation and the groundwater monitoring (to date) were conducted in June and July 2014 respectively, when groundwater levels should typically be decreasing to their annual minimum elevation (i.e. lowest in September).

It is recommended for a detailed groundwater investigation to be carried out to determine the presence or absence of groundwater. If groundwater is found, mitigation of flooding risk to the basement will be provided. This may include provision for the flow of groundwater around the proposed basement if found necessary.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	22
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

5.7 Flooding

5.7.1 River & Sea Flooding

In accordance to the Environmental Agency website, the proposed site is defined as flood zone 1 that has a low probability of flooding and the site does not lie within an area of flooding risk from rivers or sea as illustrated in Figure 5-11 (Extract from the Environmental Agency website).

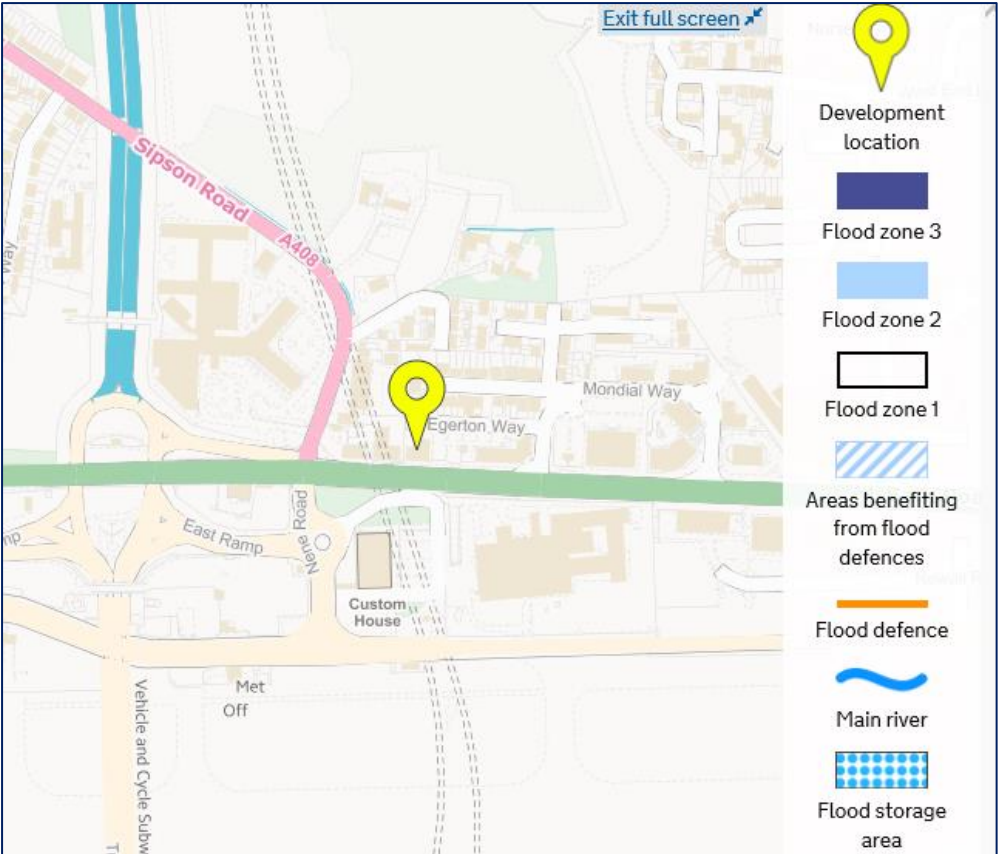


Figure 5-11: Flood Risk from Rivers & Sea (Extract from the Environmental Agency Website)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	23
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

5.7.2 Surface Water and Other Flooding Incidents

In accordance to surface water incident map shown in Figure 5-12, the proposed site and its' surrounding areas were not subject to any surface water flooding incidents.

The closest permanent water body to the proposed site is located approximately 250m away. Which appears to be a long pond.

Based on the information presented, the proposed development will have negligible effect on the already low risk area of surface water flooding.

However, the surface water incident map (Figure 5-12) is in contradiction with the environmental agency's flood risk from surface water map shown in Figure 5-13. This environmental agency defines the site as being at high risk to surface water flooding. In order to confirm this risk, a detailed groundwater investigation is recommended to be carried out to determine the presence or absence of groundwater. If groundwater is found, mitigation of flooding risk to the basement will be provided. This may include provision for the flow of groundwater around the proposed basement if found necessary.

Similarly the maps listed below, show the proposed site and its' surrounding areas were not subject to any flooding caused by such incidents.

- Main river / fluvial / and tidal incidents map (Drawing Ref.1.2 obtained from the London Borough of Hillingdon website).
- Ground water incidents map (Drawing Ref.1.3 obtained from the London Borough of Hillingdon website).
- Sewer incidents map (Drawing Ref.1.4 obtained from the London Borough of Hillingdon website).

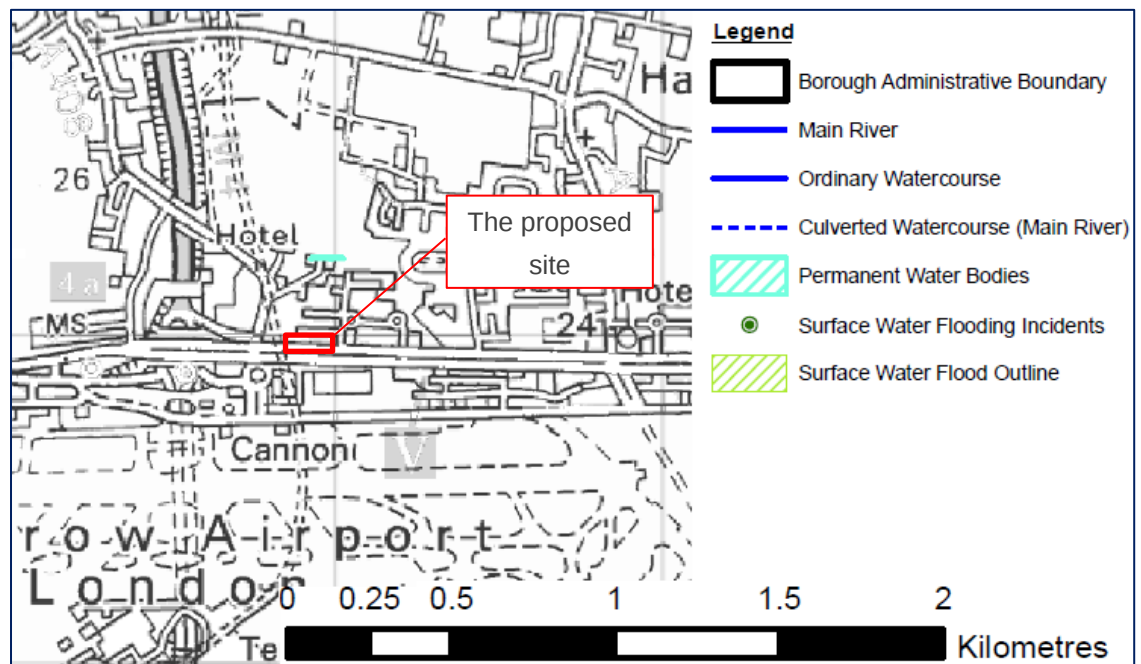


Figure 5-12: Flood Risk from Surface Water (Extract from Figure A-3.2 Summary Map of Past Floods – Ground Water Incidents [Ref. 1.3])

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	25
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

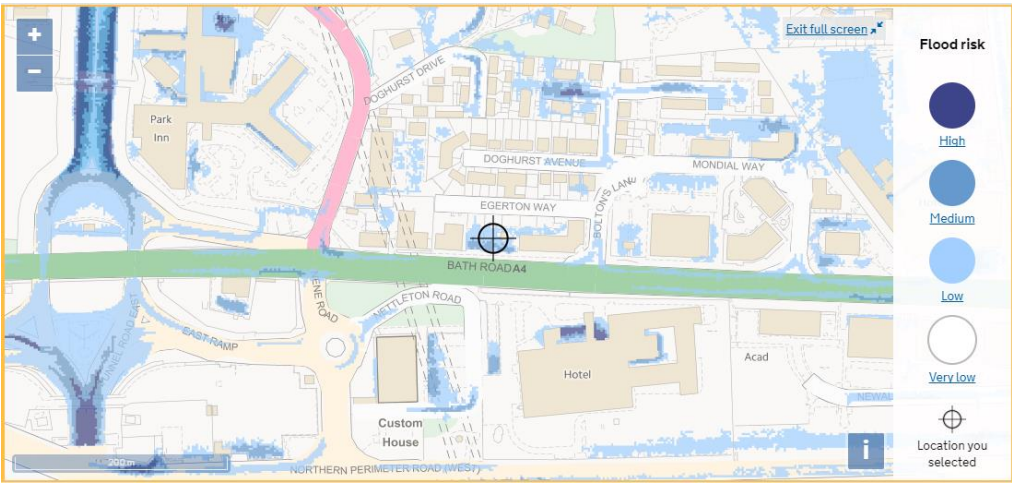


Figure 5-13: Flood Risk from Rivers & Sea (Extract from the Environmental Agency Website)

5.7.3 Potential for Elevated Groundwater

The increased potential for elevated groundwater map presented in Figure 5-13 shows areas within the borough where there is an increased potential for groundwater to rise sufficiently to interact with the ground surface or be within 2m of the ground surface. The map confirms the proposed site to be well outside this zone and therefore has a low potential for elevated groundwater. The proposed site has been assessed to be SAFE from the following consequences.

- Flooding of the proposed basement.
- Flooding of buried services or other assets below ground level.
- Flooding of ground floors of buildings above ground level.
- Overflowing of sewers and drains.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	26
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

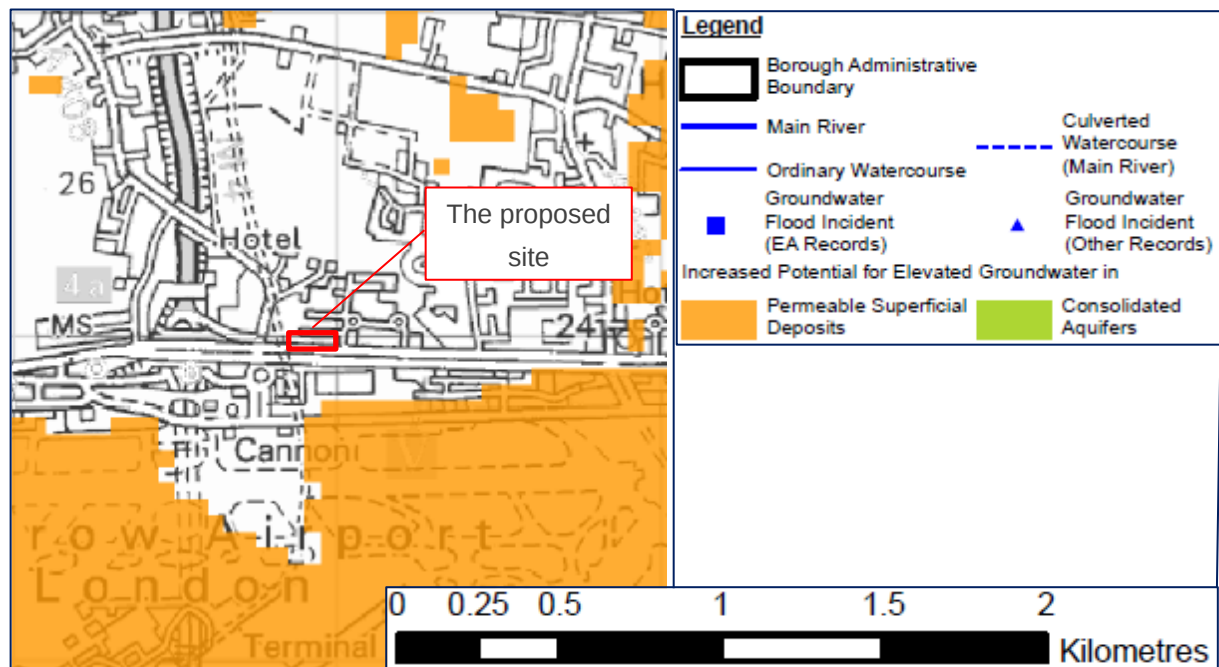


Figure 5-14: Potential for Elevated Groundwater Map (Extract from Drawing Ref. 1.5)

5.7.4 Infiltration SUDS Suitability Map

The infiltration SUDS Suitability Map shown in Figure 5-14 suggest the proposed site to be potentially unsuitable to accommodate infiltration SUDS possibly due to the presence of cohesive substrata.

Further details on SUDS can be found in the SUDS Statement Report [Ref. 2.1].

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	27
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

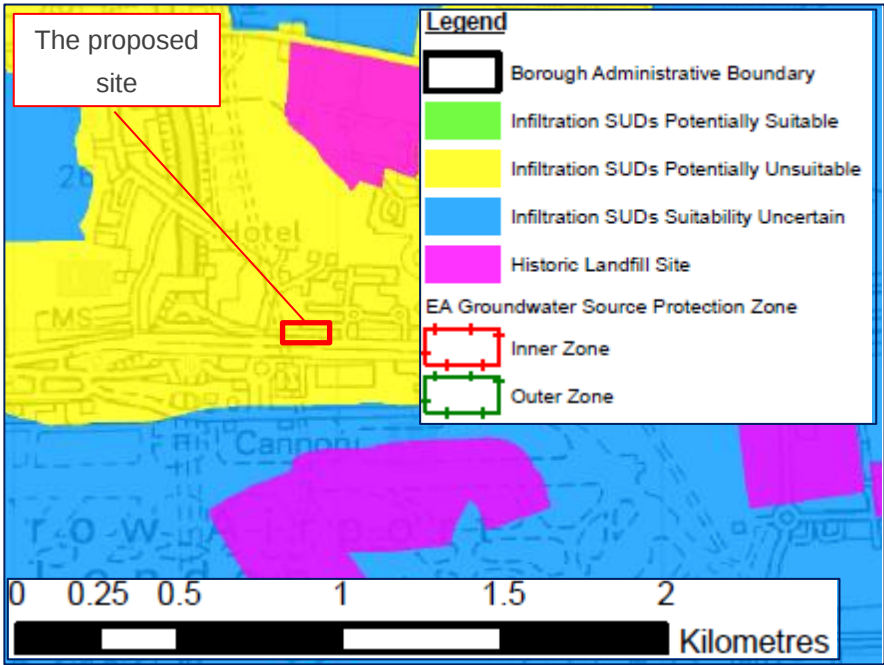


Figure 5-15: Infiltration SUDS Suitability (Extract from Drawing Ref. 1.5)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	28
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

5.7.5 Water Abstraction Licenses

Figure 5-15 presents the location of water abstraction licenses that are in place within the area surrounding the proposed site. A medium sized abstraction point is located 600m away in the north-west direction.

The proposed basement construction has no effect on this abstraction point, since the site predominately consists of more than 75m thick of clayed sequence confining the underlying aquifers.

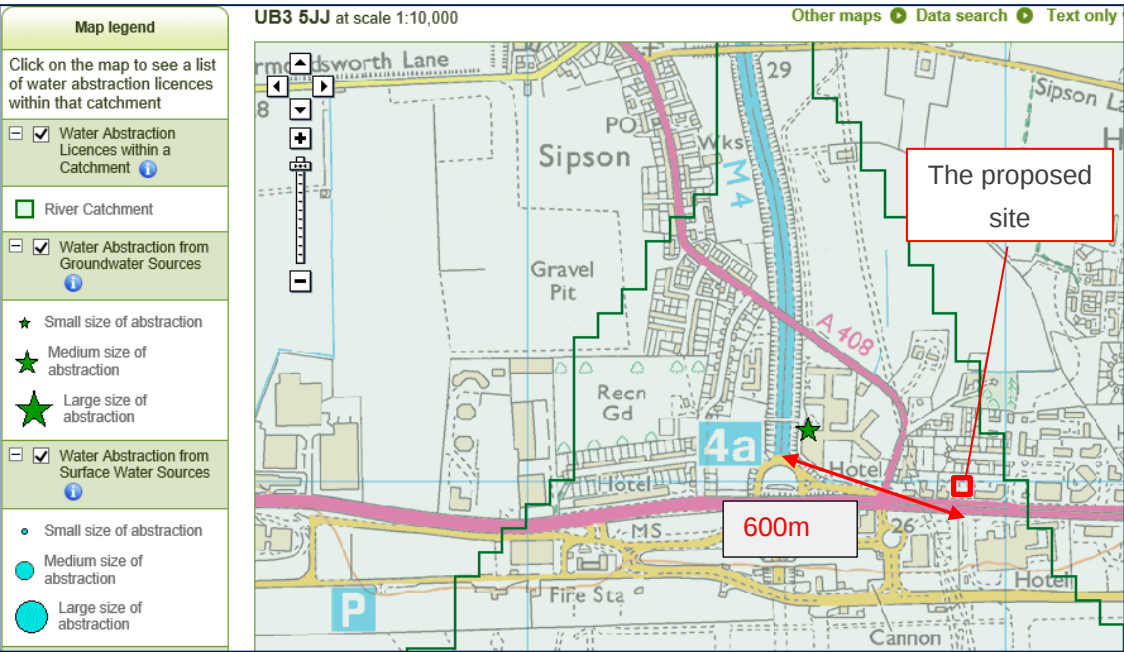


Figure 5-16: Location of water abstraction licenses [Source: Environmental Agency Website: Water abstraction licenses]

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	29
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

6 STAGE 1 SCREENING

Guidance from planning documents require that any development proposal that includes a subterranean basement should be screened in order to determine whether there is a requirement for a full BIA to be carried out.

The screening process has been undertaken for the site proposed with the findings are presented in Appendix 2.

This screening process incorporates the flood risk, water quality, capacity of water systems, development and flooding and surface water runoff as well as incorporating other screening issues that are adopted in other London Boroughs.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	30
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 30

STAGE 2 SCOPING

7 STAGE 2 SCOPING

On the basis of the above screening exercise, it is concluded that there are a number of items that will need to be investigated further to assess their potential impacts.

The items are as follows:

1. A detailed site investigation is required at the proposed site for the following reasons.
 - Deep boreholes and laboratory testing is required to ascertain soil parameters for use in retaining wall and bearing pile design.
 - An assessment of the underlying geology to confirm the geological profile of the proposed site
 - An assessment of the groundwater table on site is required in order to confirm flooding risk from surface water, construction methods, dewatering and waterproofing requirements.
 - An assessment of whether the site is underlain by any areas of 'worked ground' will need to be made in order to confirm ground conditions for proposed foundations/construction activities.
 - Potentially contaminative land uses have not been investigated on this site.
2. A preliminary UXO risk assessment may be required prior to commencement of construction activity.
3. A detailed search on buried services is required prior to commencement of any site investigation and construction works.
4. The proposed site is between 5m and 10m of a highway or pedestrian right of way. An assessment of any ground movements in relation to the proposed basement excavation will need to be made in relation to potential damage to the adjacent highway/footway and any underground services that may be present. Appropriate construction measures

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	31
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

and control measures will need to be assessed. Also, adequate temporary and permanent support is designed by an experienced Engineer and installed in accordance with the drawings by the appointed contractor.

5. An assessment of the nature and depth of party wall foundations for Axis and Strata House will need to be undertaken. This will need to be undertaken to confirm any underpinning and proposed construction methods and controls necessary to minimise any structural effects on the neighbouring structures.
6. The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties. The retaining wall analysis of the proposed basement should consider surcharges from adjacent pad footings and the wall should be constructed in a way that would minimise surrounding ground movement.
7. The twin Heathrow Express Underground Tunnels run below the land to the west of the proposed site. The exact position of the tunnels in relation to the proposed site has to be identified. This can be obtained by contacting Heathrow Express office directly. If the position of the tunnels are relatively close to the proposed site, Heathrow Express may request for a tunnel damage assessment to be carried out.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	32
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 32

STAGE 3 SITE INVESTIGATION AND STUDY

8 STAGE 3 SITE INVESTIGATION AND STUDY

It is recommended that a detailed desk top study and site investigation including groundwater monitoring is carried out at the proposed site for the reasons given in Section 7.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	33
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 33

STAGE 4 BASEMENT IMPACT ASSESSMENT

9 STAGE 4 BASEMENT IMPACT ASSESSMENT

9.1 Subterranean Groundwater Flows

This section to be concluded after the proposed detailed site investigation including groundwater monitoring has been carried out. General principals of basement waterproofing design will be discussed below.

It is anticipated that due to low permeability of London Clay and the dry condition encountered on the adjacent SI, there will be no significant seepage/inflows during excavation, hence dewatering may not be required. This will be confirmed upon completion of the proposed site investigation.

From a groundwater flow perspective, the effects of the construction of this basement on adjacent properties will be negligible. The site is a considerable distance from water sources and groundwater was not present in the boreholes done on the adjacent site, 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 groundwater 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. Usually, in most instance such basements are constructed using a cavity drainage system or/and an external drainage system comprising of granular fill or a geotextile drainage layer. Where a cavity wall system is used, water collected will be recycled within the development, if an external drainage system is used. The water collected in the system will be channeled into an appropriately designed drainage system.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	34
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

The basement structure must be designed to resist the buoyant uplift pressures which would be generated by groundwater 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 adjacent boreholes, clayey soils and the distance from water sources.

9.2 Slope & Ground Stability

The topographical map [Drawing Ref. 1.7] shows the proposed site to be located on a relatively flat area. The slope is considerably less than 1V:8H, hence there is no concern in relation to slope stability.

9.3 Shrinking / Swelling Clays

This section to be concluded after the proposed detailed site investigation and laboratory testing has been carried out.

Testing on soil samples will be carried out to determine the susceptibility to shrinkage and swelling with changes of moisture although London Clay is typically a clay with high shrinkage/swelling potential.

Geotechnical testing will be scheduled on soil samples collected as part of the proposed SI to assess the susceptibility of the clay underlying the site to shrinkage and swelling as a result of changes in moisture content.

There are trees present on the site and therefore necessary measures will be taken during the detailed design to ensure the foundations of the proposed structures are taken to a suitable depth to mitigate the expansion and contraction properties of the clays underlying the site and the presence of the trees.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	35
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

9.4 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.

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.

9.5 Adjacent Pedestrian Right of Way & Utilities

The footpath to the south of the site, running parallel to Bath Road is located between 5m and 10m away from the proposed basement. Hence, the design of the proposed basement retaining wall has to consider the footpath being in service during construction works. The basement excavation should be propped sufficiently in order to minimise ground movement.

Car parking is present to the back of the proposed site. It is possible for heavier goods vehicles to reverse on to the site, however, an allowance for appropriate loading bays to be considered in the design.

9.6 Surface Flow and Flooding

The findings of the impact assessment on the proposed basement suggest the risk of the basement being flooded to be very low.

However, the surface water incident map (Figure 5-12) is in contradiction with the environmental agency's flood risk from surface water map shown in Figure 5-13. This environmental agency defines the site as being at high risk to surface water flooding. In order to confirm this risk, a detailed groundwater investigation is recommended to be carried out to determine the presence or absence of groundwater. If groundwater is found, mitigation of flooding risk to the basement will be provided. This may include provision for the flow of groundwater around the proposed basement if found necessary.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	36
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

The findings also indicate that the impact of the construction of the basement will have negligible effect on the groundwater flow or impact flooding in the area.

It is supported by the following points:

- The Environment Agency flood map (Figure 5-10) shows the site to be within flood risk zone 1 (very low or no risk) and is not in a flood warning zone.
- Section 5.7.2 describes the basement to be not at risk from fluvial flooding.
- The nearest water course is more than 250m away from the site and it's location is 'inland', approximately 25m above OD and not at risk from tidal flooding.
- The site is underlain by low permeability London Clay.
- There are no reservoirs, canals or other artificial sources in the vicinity that could give rise to a flood.

Potential risks of flooding to be considered in design are listed below.

- Drainage at or near the site could potentially become blocked or cracked which could lead to overflow or leakage.
- 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 following mitigation measures should be considered in preliminary and detail design of the basement.

- It is recommended for the drainage of the basement to be equipped with pumps with sufficient capacity in the event of flooding.
- Installation of an upstand around the front light well (if present in the scheme) to form a barrier against excessive flow.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	37
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

- 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.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	38
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 38

GROUND MOVEMENT AND DAMAGE ASSESSMENT

10 GROUND MOVEMENT AND DAMAGE ASSESSMENT

10.1 Ground Movement

The potential ground movement is estimated based on empirical approach recommended in Ciria Guide C580 [Ref. 3.0] which has been calibrated against case history field measurements. Case history based empirical methods of predictions are preferred compared to the use of complex analyses, unless such analyses are first calibrated against reliable measurements of well monitored comparable excavations and wall systems.

The main reason for estimating ground movements is to assess possible settlements close to the proposed retaining wall and for performing damage assessment on Axis House which has pad footing approximately 4634mm [Drawing Ref. 1.8] from the proposed basement wall.

Typical movement profiles associated to excavation of a basement is shown in Figure 10-1 (Extract from Ciria Guide C580 [Ref. 3.0]).

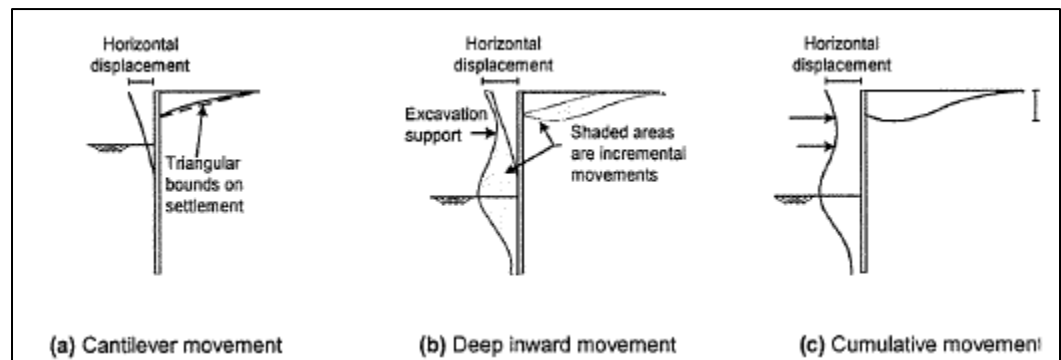


Figure 10-1: Typical Movement Profiles (Extract from Ciria Guide C580 [Ref. 3.0])

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	39
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 39

GROUND MOVEMENT AND DAMAGE ASSESSMENT

10.1.1 Excavation Support Stiffness

Three categories of wall support (temporary props) stiffness were considered in this method as listed in Table 10-1.

Support Stiffness	Description /examples
High	Top-down construction, temporary props installed before permanent props at high level
Moderate	Temporary props of high stiffness installed before permanent props at low level
Low	Cantilever walls, temporary props of low stiffness or temporary props installed at low level

Table 10-1: Prop Support Stiffness Categories

For the basement excavation, it is proposed for the top temporary prop to be preloaded which classifies the support stiffness as high. Preloading of props are done to minimise inward ground movement.

However, in the analyses below, an upper bound condition is also considered using a moderate support stiffness which feeds into the building damage assessment.

10.1.2 Vertical Ground Movement (Settlement) Profile

The settlement profile between the retaining wall and Axis House is estimated using the chart recommended in Figure 2.11(b) of the Ciria Guide C580 [Ref. 3.0]. Extract of the chart is presented in Figure 10-2.

General notes on usage of the chart is presented below:

- Maximum settlement occurs close to the wall and is expressed as a percentage of the maximum excavation depth in front of the wall. The maximum excavation depth here is taken as 3.75m [Drawing Ref. 1.8].

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	40
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 40

GROUND MOVEMENT AND DAMAGE ASSESSMENT

- Extent of settlement is calculated non-dimensionally by dividing by maximum excavation depth.

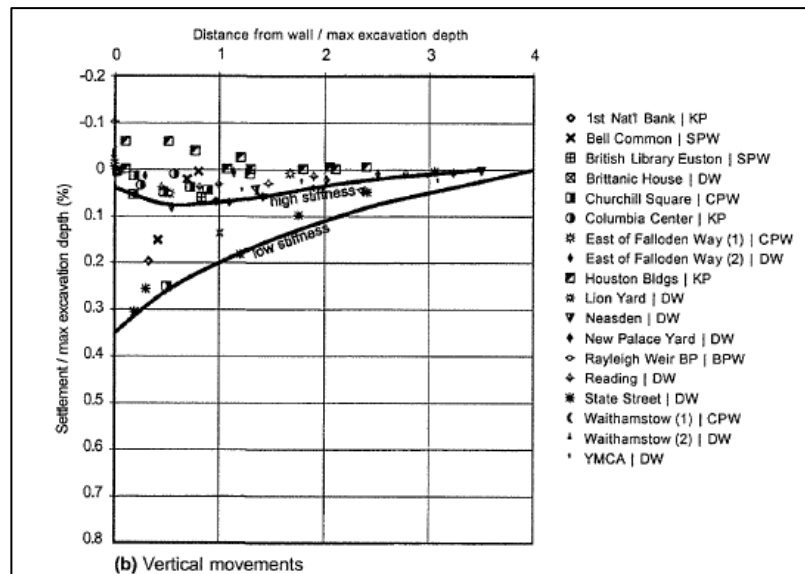


Figure 10-2: Vertical Ground Surface Movement (Settlement) due to excavation in front of wall in stiff clay (Extract from Ciria C580 [Ref. 3.0])

The chart provides estimates for excavation with high and low support stiffness's only. The upper bound estimate provided in this section assumes a moderate support stiffness. The settlement ratios for a moderate support stiffness is obtained by taking an average value between the high and low support stiffness values.

The chart presents settlement estimates for walls embedded in stiff clay only while the wall in this project retains approximately 3.0m of medium dense gravel which is underlain by stiff clay.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	41
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

For this reason, an additional estimate is made using the chart recommended in Figure 2.12 of the Ciria Guide C580 [Ref. 3.0], for walls embedded in sands. Extract of the chart is presented in Figure 10-3.

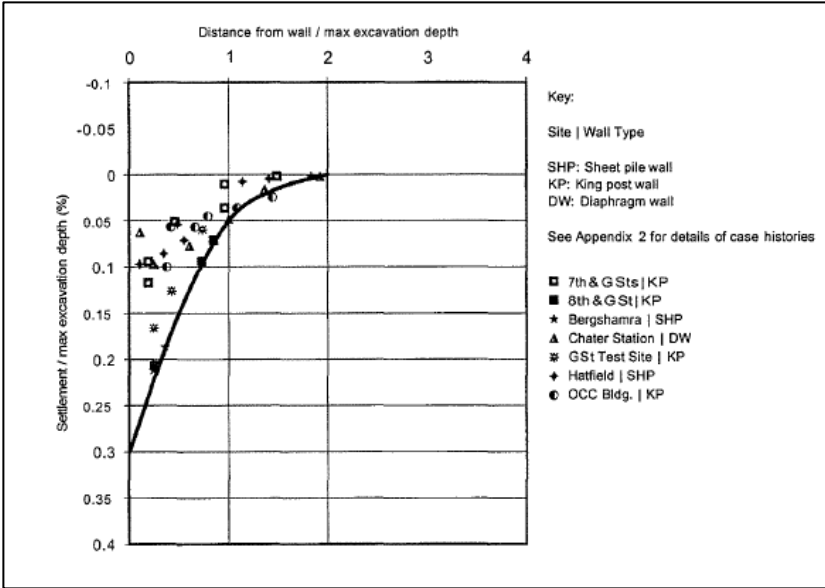


Figure 10-3: Vertical Ground Surface Movement (Settlement) due to excavation in front of wall in sand (Extract from Ciria C580 [Ref. 3.0])

The range of estimated settlement profile behind the wall is presented in Figure 10-4 while the settlement range at Axis House pad footing location is summarised in Table 10-2. The calculations are presented in Appendix 3.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	42
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

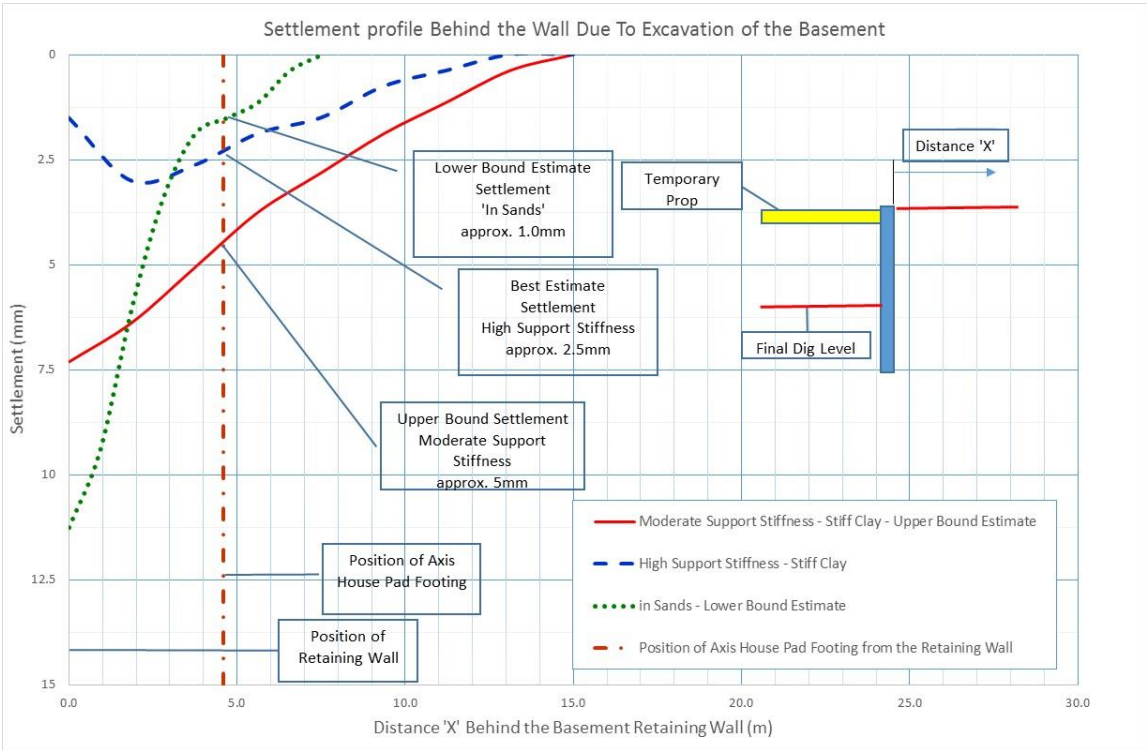


Figure 10-4: Range of settlement estimate behind the wall due to basement excavation

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	43
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Range	Predicted settlement at viaduct location (mm)
Lower Bound	1.0
Best Estimate	2.5
Upper Bound	5.0

Table 10-2: Range of settlement estimates at viaduct location

10.1.3 Horizontal Ground Movement

The horizontal ground movement behind the retaining wall is estimated using the chart recommended in Figure 2.11(a) of the Ciria Guide C580 [Ref. 3.0]. Extract of the chart is presented in Figure 10-5.

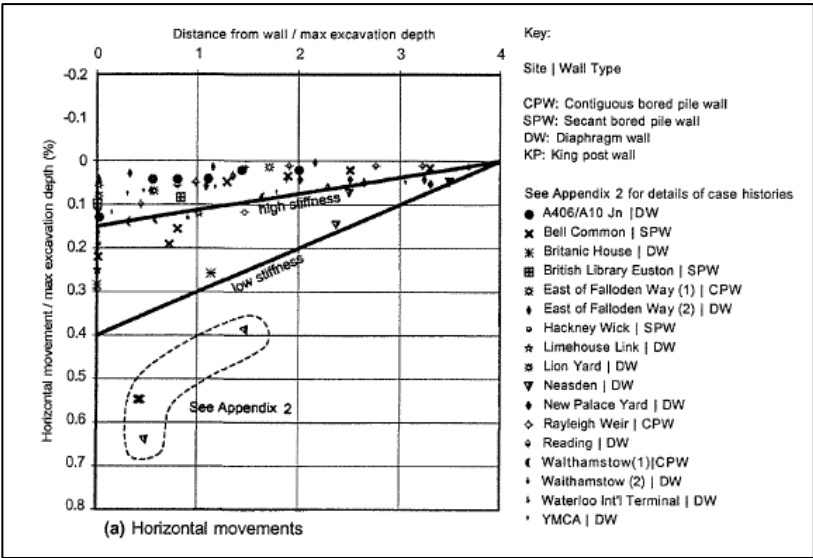


Figure 10-5: Vertical Ground Surface Movement (Settlement) due to excavation in front of wall in stiff clay (Extract from Ciria C580 [Ref. 3.0])

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	44
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

The range of estimated horizontal ground movement is presented in Figure 10-6 while the range of horizontal ground movement at Axis Housed Pad Footing location is summarised in Table 10-3. These calculations are presented in Appendix 4.

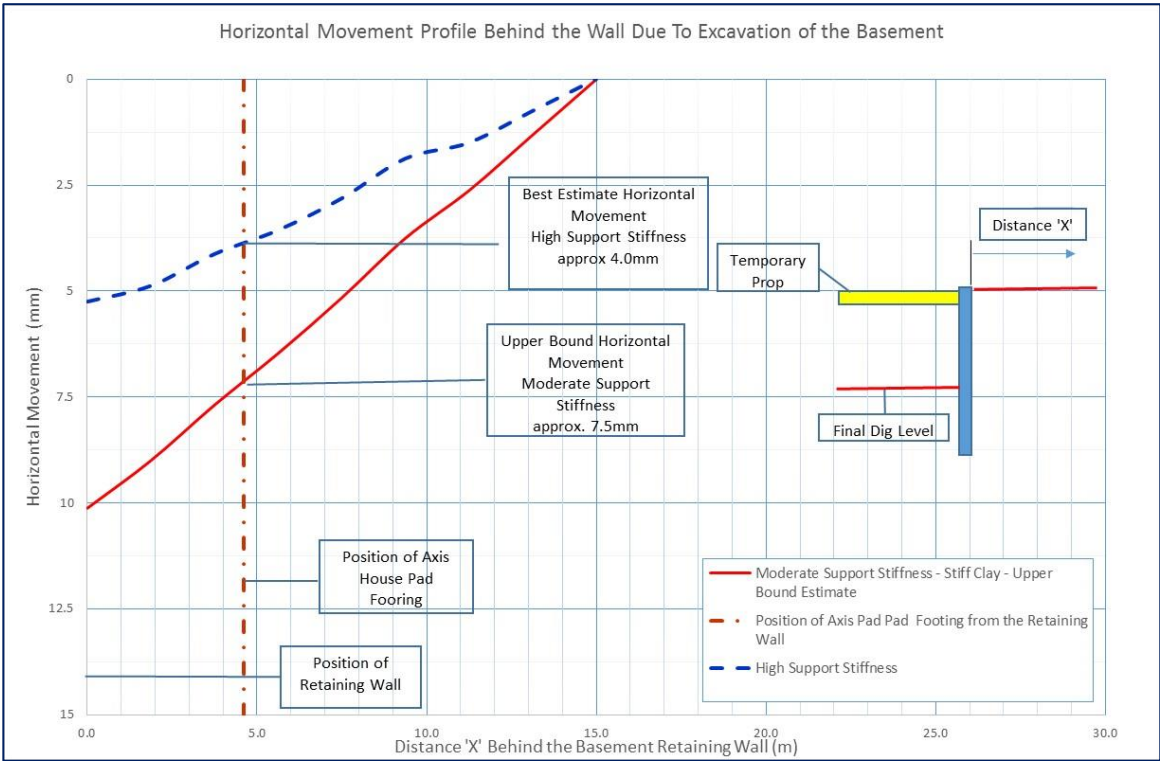


Figure 10-6: Range of horizontal ground movement estimate behind the wall due to excavation

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	45
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 45

GROUND MOVEMENT AND DAMAGE ASSESSMENT

Range	Predicted horizontal ground movement at viaduct location (mm)
Best Estimate	4.0
Upper Bound	7.5

Table 10-3: Range of horizontal ground movement at viaduct pier location

10.2 Viaduct Damage Assessment

As part of the damage assessment requirement, a condition survey is required to be carried out on Axis and Strata House before work commences on-site.

This assessment is performed to determine the category of damage to Axis House (positioned closest to the proposed basement) due to excavation of the basement. The classification of damage is presented in Table 10-4.

The methodology for performing the damage assessment is outlined below.

- 1) Axis House pad footing displacement profile is assumed to follow ground movement profiles estimated in Sections 10.1.2 and 10.1.3. This is a conservative assumption as the pad footings do possess a higher stiffness value that allows it to minimise its' deformations.
- 2) The distortions and the strains induced on Axis is calculated using the methodology described in Figure 2.18 of Ciria Guide C580 [Ref. 3.0] and the calculations are shown in Appendix 5.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	46
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 46

GROUND MOVEMENT AND DAMAGE ASSESSMENT

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain ϵ_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible.	< 0.1	0.0–0.05
1 Very slight	<u>Fine cracks that can easily be treated during normal decoration.</u> Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection.	< 1	0.05–0.075
2 Slight	<u>Cracks easily filled. Redecoration probably required.</u> Several slight fractures showing inside of building. Cracks are visible externally and <u>some repointing may be required externally</u> to ensure weathertightness. Doors and windows may stick slightly.	< 5	0.075–0.15
3 Moderate	<u>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.</u> Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5–15 or a number of cracks > 3	0.15–0.3
4 Severe	<u>Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows.</u> Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 but also depends on number of cracks	> 0.3
5 Very severe	<u>This requires a major repair involving partial or complete rebuilding.</u> Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually > 25 but depends on number of cracks.	

Table 10-4: Classification of damage, Ciria Guide C580 [Ref. 3.0]

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	47
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

The findings of the assessment is presented in Figure 10-7 and is described below.

- Category ‘0’ (Negligible) damage is achieved by using best estimated ground movements prediction which represents the most likely condition on site.
- A check is also performed using upper bound ground movement prediction. The category of damage still maintains ay Category ‘0’ (very slight).
- This assessment confirms the basement excavation of the project has negligible impact on both Axis House & Strata House.

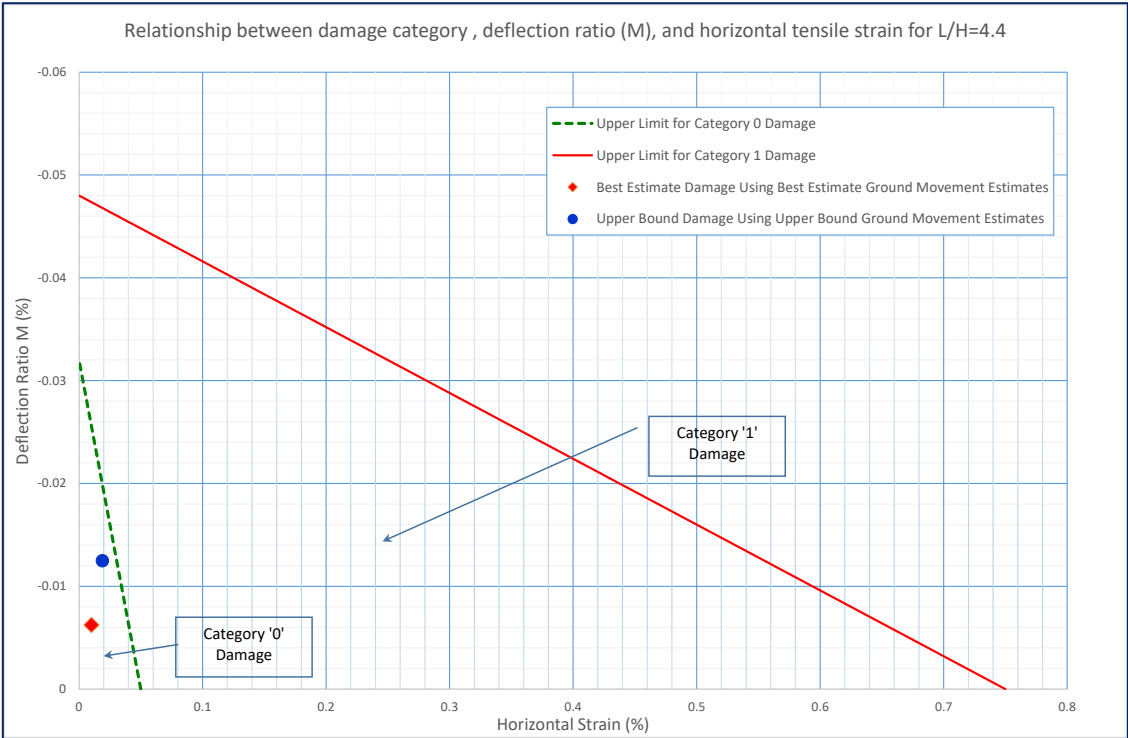


Figure 10-7: Findings of Building (Axis House) Damage Assessment showing Damage Category ‘0’

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	48
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

The above damage categories assume good quality working practice is observed during basement construction and that a 'robust' level of propping is provided.

Finally a formal monitoring system should be employed during construction in order to observe and monitor ground movements especially in critical areas such as Axis House and Strata House. Monitoring data should be checked against predefined trigger limits to give early indications if any deviating ground movements are occurring. In the case of nearby footway/roads, the highways department of Hillingdon's Council should be consulted in relation to the predicted short & long term movements as they may request that allowances be made for remedial works.

10.3 On-Site Ground Movement Control Measures

Measures recommended to be adopted on-site to minimise ground movements around the excavation are described below:

- The wall has been designed to have an adequate embedment in stiff clay for satisfactory vertical and lateral stability.
- A minimum possible first stage excavation sufficient to facilitate installation of the first support as early as possible in the construction sequence.
- The extent of dig is minimised beyond the proposed support levels.
- Delays to the construction of the wall and its support system is minimized.
- Over excavation is avoided by stringent survey control measures.

It is to be noted that the early installation of a preloaded prop with a shallow first stage excavation is the best way of reducing ground movements.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	49
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

11 APPENDIX 1 – SITE PHOTOGRAPHS

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	50
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a



264 Bath Road, STRATA HOUSE (Side view of the building from Bath Road)



264 Bath Road, STRATA HOUSE (View from Egerton Way looking West)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	51
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 51

APPENDIX 1 – SITE PHOTOGRAPHS



242 Bath Road, AXIS HOUSE (Side view of the building from Bath Road)



242 Bath Road, AXIS HOUSE (View from Egerton Way looking East)

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	52
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a



JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	53
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

12 APPENDIX 2 – STAGE 2 SCREENING

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	54
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 54

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
Subterranean Groundwater Flow				
1.0	Is the site located directly above an aquifer?	Possibly	The site is an area that is predominately of clayed sequence of more than 75m thick confining underlying aquifers.	Section 5.4.1 & 5.7.5 / None
1.1	Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	To be confirmed by the SI proposed on this site.	The SI on groundwater monitoring record for the adjacent land is insufficient to determine the true ground water regime due to the depths being limited to 5m bgl. The basement depth is expected to be approx. 3.75m.	Section 5.6.1 / Take to Stage 2 Scoping
1.2	Is the site within 1000m of a watercourse, well (used/disused) or potential spring line?	The closest permanent water body to the proposed site is located approximately 250m away. It appears to be a long pond.	Construction of the basement is expected to have negligible effect on this watercourse.	Section 5.7.2 / None
1.3	Is the site within 100m of a watercourse or potential spring line?	As above.	As above.	As above / None

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	55
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 55

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
1.4	Will the proposed basement development result in a change in the proportion of hard surface/paved areas	No	The amount of hard standing on-site is not expected to increase.	Section 5.3 /None
1.5	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	Soakaways or SUDS are not expected as part of the development due to the presence of cohesive substrata. Also, the Infiltration SUDS suitability Map shows the site to be potential unsuitable for infiltration SUDS.	Section 5.7.4 / None
1.6	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.	Maybe, however the cohesive substrata will not provide a pathway for groundwater flow due to the strata's very low permeability.	Confirmed by the SI on the adjacent land.	Section 5.4.1 / None
1.7	What is the maximum BGS groundwater flooding susceptibility within 50m of the study site?	The surface water incident map (Figure 5-12) suggest the site is not at risk from surface water flooding. However, this map is in contradiction with the environmental agency's flood risk from surface water	N/A	Section 5.7.2 / In order to confirm this risk, a detailed groundwater investigation is recommended to be carried out to determine the presence or absence of groundwater. If groundwater is

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	56
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 56

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
		map (Figure 5-13). This environmental agency defines the site to be at high risk to surface water flooding.		found, mitigation of flooding risk to the basement will be provided. This may include provision for the flow of groundwater around the proposed basement if found necessary.
Surface Water and Flooding				
2.0	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 solution will help to ensure that any surface water run-off from the development is contained on site and discharged at the maximum agreed rate. This will help to prevent surface water flooding for all rainfall events up to and including a 1 in 100-year storm event with an additional 30% climate change allowance. It is unlikely that the existing on site, car park drainage has been designed to such stringent requirements hence the development proposal will offer significant	Report [Ref. 2.1] / None

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	57
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 57

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
			betterment to flood risk within the development and surrounding areas.	
2.1	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.	Section 5.3 / None
2.2	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.	None
2.3	Is the site within a Flood Risk Zone 2 or 3?	No, the site and the surrounding areas are within a Flood Risk Zone 1		Section 5.7.1 / None
2.4	Does the property lie within 25m of the Environment Agency flood plain?	No		Section 5.7.1 / None
Slope & Ground Stability				
3.1	Does the existing site include slopes, natural or manmade greater than 1 in 8?	No	The topographical map shows the site to be relatively on a flat area.	Drawing [Ref. 1.7] and Site Photos in Appendix 1 / None

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	58
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 58

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
3.2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 1 in 8?	No	The site ground level is maintained as per pre-construction site ground levels.	None
3.3	Does the development neighbouring land, including railway cuttings and the like, with a slope greater than 1 in 8?	No	Neighbouring land is relatively on a flat areas.	Drawing [Ref. 1.7] and Site Photos in Appendix 1 / None
3.4	Is the site within a wider hillside setting in which the general slope is greater than 1 in 8?	No	As above.	Drawing [Ref. 1.7] and Site Photos in Appendix 1 / None
3.5	Is the London clay the shallowest strata at the site?	No	The London Clay Formation is overlain by Lynch Hill Gravel and Langley Silt Clay.	Section 5.4.1 / None
3.6	Will any trees be felled as part of the development and any works proposed within any tree protection zones where trees are to be retained.	Seven trees are required to be removed for the development as they fall within or are very close to the proposed building footprint. Of those, one tree has been categorised as U and has been recommended for removal due to its condition.	The rest of the trees will be protected during the course of the development.	Report [Ref. 2.2 & Ref. 2.3]

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	59
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 59

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
3.7	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.	Section 5.4.1 / None
3.8	Is the site within an area of previously worked ground?	Unknown	Proposed SI should confirm if the ground has been previously worked	Take to Stage 2 Scoping
3.9	Is the site within 5m of a highway or pedestrian right of way?	Yes		Take to Stage 2 Scoping
3.10	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, the foundation depths of adjacent properties are considered to be shallow pad foundation.	Drawing [Ref. 1.8] / Take to Stage 2 Scoping
3.11	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines.	Yes	The twin Heathrow Express Underground Tunnels run below the land to the west of the proposed site.	Figure 5-7 / Take to Stage 2 Scoping

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	60
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 60

APPENDIX 2 – STAGE 2 SCREENING

Item No	Risk	Response	Comment	Source / Action Required
Site Investigation				
4.0	There is no site investigation at the proposed site	No	A detailed site investigation is required prior to detail design of the building. 2. Exact position in relation to the proposed site is required prior to site investigation works. This can be obtained by contacting Heathrow Express office directly. Potentially contaminative land uses have not been investigated on this site.	Take to Stage 2 Scoping
4.1	Requirement for preliminary UXO risk assessment	Yes	A preliminary risk assessment may be required prior to commencement of construction activity.	Take to Stage 2 Scoping
Buried & Adjacent Services				
5.0	Search on buried services not been carried out.		A detailed search on buried services is required prior to site investigation works.	Take to Stage 2 Scoping

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	61
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

13 APPENDIX 3 – SETTLEMENT CALCULATION

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	62
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 62

APPENDIX 3 – SETTLEMENT CALCULATION

JP Mann Geotechnical Consultants	Project Name	Hampton By Hilton, 242 Bath Road						Sheet No	1 of 1
	Area of Project	Basement Excavation						Revision	1
	Element Description	Settlement Profile Estimate						Prepared by and date	J Pereira 13/04/17
								Checked by and date	J Pereira 13/04/17
Wall Depth	3750	m							
In Stiff Clay									
Chart Ref:	Figure 10-2 in Section 10 of this report								
Distance from wall / wall depth	0	0.5	1	1.5	2	2.5	3	3.5	4
Distance from wall (m)	0.0	1.9	3.8	5.6	7.5	9.4	11.3	13.1	15.0
(High Stiff) Settlement / wall depth (%)	0.04	0.08	0.07	0.05	0.04	0.02	0.01	0	0
(Low Stiff) Settlement / wall depth (%)	0.35	0.26	0.2	0.15	0.11	0.08	0.05	0.02	0
(High Stiff) Settlement (mm)	1.5	3	2.625	1.875	1.5	0.75	0.375	0	0
(Low Stiff) Settlement (mm)	13.125	9.75	7.5	5.625	4.125	3	1.875	0.75	0
(Medium Stiff) Settlement (mm)	7.3125	6.375	5.0625	3.75	2.8125	1.875	1.125	0.375	0
In Sands									
Chart Ref:	Figure 10-3 in Section 10 of this report								
Distance from wall / wall depth	0	0.25	0.5	0.75	1	1.25	1.5	1.75	2
Distance from wall (m)	0.0	0.9	1.9	2.8	3.8	4.7	5.6	6.6	7.5
Settlement / wall depth (%)	0.3	0.25	0.16	0.09	0.05	0.04	0.03	0.01	0
Settlement (m)	11.25	9.375	6	3.375	1.875	1.5	1.125	0.375	0

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	63
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

14 APPENDIX 4 – HORIZONTAL GROUND MOVEMENT CALCULATION

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	64
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 64

APPENDIX 4 – HORIZONTAL GROUND MOVEMENT CALCULATION

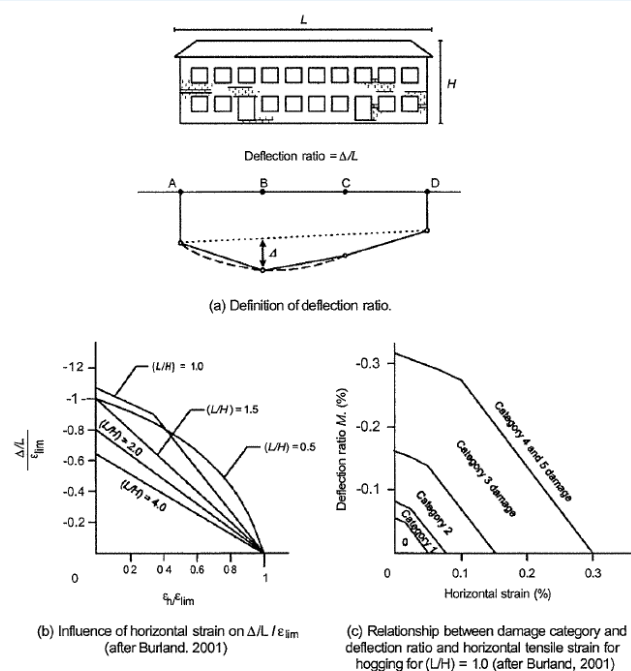
JP Mann Geotechnical Consultants	Project Name		Hampton By Hilton, 242 Bath Road					Sheet No	1 of 1
	Area of Project		Basement Excavation					Revision	1
	Element Description		Horizontal Ground Movement Estimates					Prepared by and date	J Pereira 13/04/17
								Checked by and date	J Pereira 13/04/17
Wall Depth	3750	m							
Chart Ref:	Figure 10-5 in Section 10 of this report								
Distance from wall / wall depth	0	0.5	1	1.5	2	2.5	3	3.5	4
Distance from wall (m)	0.0	1.9	3.8	5.6	7.5	9.4	11.3	13.1	15.0
(High Stiff) Horizontal movement / wall depth (%)	0.14	0.13	0.11	0.095	0.075	0.05	0.04	0.02	0
(Low Stiff) Horizontal movement / wall depth (%)	0.4	0.35	0.3	0.25	0.2	0.15	0.1	0.05	0
(High Stiff) Horizontal movement (mm)	5.25	4.875	4.125	3.5625	2.8125	1.875	1.5	0.75	0
(Low Stiff) Horizontal movement (mm)	15	13.125	11.25	9.375	7.5	5.625	3.75	1.875	0
(Medium Stiff) Horizontal Movement (mm)	10.125	9	7.6875	6.46875	5.15625	3.75	2.625	1.3125	0

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	65
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

15 APPENDIX 5 – DAMAGE ASSESSMENT CALCULATION

JP Mann Geotechnical Consultants	Project Name	Hampton by Hilton, 242 Bath Road	Sheet No	1 of 2
	Area of Project	Basement excavation	Revision	1
	Element Description	Viaduct Damage Assessment	Prepared by and date J Pereira 13/04/17	J Pereira 13/04/17
			Checked by and date	

Extract from Ciria Guide C580 [Ref. 3.0]



By adopting values of ϵ_{lim} associated with the various damage categories given in Table 2.5, Figure (b) can be developed into an interaction diagram showing the relationship between Δ/L and ϵ_h for a particular value of L/H . Figure (c) shows such a diagram for $(L/H) = 1.0$.

Figure 2.18 Relationship between damage category, deflection ratio and horizontal tensile strain (after Burland, 2001)

Reinforced concrete-framed structures are more flexible in shear than are masonry structures and are consequently less susceptible to damage. Nevertheless, for the purposes of a stage 2 assessment of potential damage, all structures should be treated as masonry structures.

Box 2.5 Procedure for stage 2 damage category assessment

The following steps should be undertaken in making a stage 2 assessment of the damage to a structure:

- establish L and H for the structure (see Figure 2.18(a) for definitions of L and H)
- determine (L/H)
- determine relationship between (Δ/L) and ϵ_h for the required (L/H) from Figure 2.18(b) for ϵ_{lim} values from Table 2.5
- estimate vertical and horizontal ground surface movements in the vicinity of the structure from Figure 2.14
- determine (Δ/L) and $\epsilon_h (= \delta_h/L)$ where δ_h is the horizontal movement
- estimate damage category from the relationship between (Δ/L) and ϵ_h established from step (iii) above.

JP Mann Geotechnical Consultants	Job	Calc By	Page
	Hampton By Hilton, 242 Bath Road, Harlington	J. Pereira	67
	Calculations for	Date	Revision
	Basement Impact Assessment	02/08/18	5a

Pg. 67

APPENDIX 5 – DAMAGE ASSESSMENT CALCULATION

JP Mann Geotechnical Consultants	Project Name	Hampton by Hilton, 242 Bath Road	Sheet No	2 of 2
	Area of Project	Basement excavation	Revision	1
	Element Description	Viaduct Dmage Assessment	Prepared by and date	J Pereira 13/04/17
			Checked by and date	J Pereira 13/04/17

Abbreviation	Description	Value	Reference	Unit
L	Length of Axis House influenced by excavation	40		m
H	Height of Axis House	9		m
ϵ_{limit}	Limiting tensile strain for 'negligible (0)' damage category	0.05	Table 10-4	%
ϵ_{limit}	Limiting tensile strain for 'very slight (1)' damage category	0.075	Table 10-4	%
Δ_{LB}	Best estimate settlement at Axis House pad footing location	2.5	Figure 10-4/ Table 10-2	mm
Δ_{UB}	Upper bound settlement at Axis House pad footing location	5.0	Figure 10-4/ Table 10-2	mm
δ_{HLB}	Best estimate horizontal ground surface movement at Axis House pad footing	4.0	Figure 10-6 / Table 10-3	mm
δ_{HUB}	Upper bound horizontal ground surface movement at Axis House pad footing	7.5	Figure 10-6 / Table 10-3	mm
ϵ_h	Horizontal strain	$\delta h/L$		%
M	Deflection ratio	Δ/L	See Sheet 1 of 2	%
BE	Best estimate			
UB	Upper bound estimate			

L/H	4.4
-----	-----

To determine BE and UB Building Damage Categories Points Produced in Figure 10-7

	BE	UB
M	-0.006	-0.013
ϵ_h	0.010	0.019

Figure 2.18 (b) - Influence of horizontal strain on $\Delta/L/\epsilon_{limit}$ [Ref. 3.0]

Linear equation (for L/H = 4.4) needed to derive Figure 2.18 '(c), that determines the damage category

$$\Delta/L/\epsilon_{limit} = 0.64(\epsilon_h/\epsilon_{limit}) - 0.64$$

To determine upper limits of damage category '0' and 1, produced in Figure 10-7

For negligible damage (category 0) with $\epsilon_{limit} = 0.05$			
Δ/L	=	$0.64\epsilon_h$	- 0.032
Δ/L	ϵ_h		
0	0.05		
-0.032	0		

For very slight damage (category 1) with $\epsilon_{limit} = 0.075$			
Δ/L	=	$0.64\epsilon_h$	- 0.048
Δ/L	ϵ_h		
0	0.75		
-0.048	0		