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Basement Impact Assessment

for
New Subterranean Development
at
27 John's Mews
London
WC1N 2N

Document History and Status

Revision	Date	Purpose/Status	Author	Check
00	June 2018	Comment/discussion/review	mor	
01	August 2018	General revisions	mor	mw
02	September 2108	Updated for Issue to Camden	mor	mw

Document Details

Path	S:\Projects\RP 117 - 2017\JOB 11751 (27 Johns Mews)\BIA
Author	M O'Regan
Project Director	M Wakely
Project Number	11751
Project Name	27 John's Mews WC1
Planning Reference No.	To follow

Additional supporting documents

The following documents are included within the BIA appendices

- Site Investigation Report C14337 dated January 2018 by Ground Engineering Ltd (Appendix 5.0)
- Ground Movement Assessment Report 0624-RPT-001-Rev01 dated August 2018 by Asquared Studio (Appendix 6.0)
- Evidence of consultation with neighbours is presented in Appendix 4

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Appendices

- *Groundwater Source Protection Zone (LB Camden GHHS Figure 11)*
- *Transport for London Map*

Appendix 2: Existing and Proposed Development Drawings

Appendix 3: Structural Engineer's Statement and Calculations

Appendix 4: Consultation with neighbours

Appendix 5: Site Investigation Data

Appendix 6: Ground Movement and Damage Impact Assessment

1.0 Non-Technical Summary

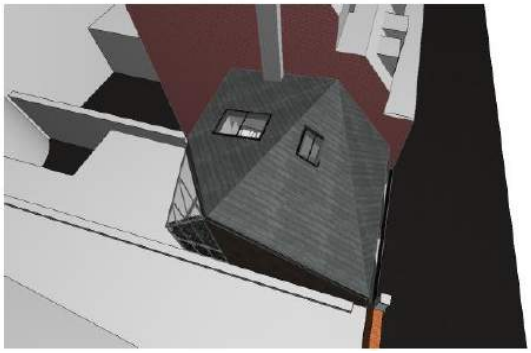
1.1.1. The site location is 27 John's Mews, London WC1N 2NS

1.1.2. The property is located in the Bloomsbury Conservation Area. It is a terraced mews house with accommodation arranged over ground, first and second floors with a pitched roof over. The existing property is shown in the photograph below.

"Street View" of 27 John's Mews

1.1.3. In April 2017, the owner and occupier was granted planning approval for the substantial demolition and reconstruction of the property to provide further and better accommodation.

The approved planning application allows for retention and protection of the existing front brick façade as it contributes to the character of the area and the complete rearrangement and rebuilding of the interior and the rear façade. The roof will be replaced with a new polygonal volume roof to bridge the difference in heights from No 25 to No 29 John's Mews. The property owner is seeking permission to provide additional basement accommodation beneath the property. This will become a single storey basement with the basement structural slab level set at 3m below ground level. There is presently no basement within the existing property. The upper floors shall remain unchanged from the current planning permission. It is intended that the entire redevelopment of the property, both above and below ground, will be carried out under a single construction project.



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Proposed Rear Isometric View (consented)

Proposed Isometric Section

1.1.4. The following assessments are presented:

- Desk Study
- Screening
- Scoping
- Additional evidence/assessments (as required)
    - *Site investigation report by Ground Engineering Report C14337 dated January 2018 is included in Appendix 5*
    - *An Arboricultural study is not required as there are no nearby trees*
    - *Ground movement assessment 0624-RPT-Rev00 by A-squared Studio is included in Appendix 6*
    - *Consultation with adjacent infrastructure/asset owners*
- *Impact Assessment*

1.1.5. The authors of the assessments are

M O'Regan BSc CEng MI Struct E

JEM Davies BSc (Hons) MSc C.GeolFGS

J Wieczorek BSC (Hons) Msc

1.1.6. The ground and groundwater conditions beneath the site are:

Stratum	Depth to top (mbgl)	Thickness (m)	Average thickness (m)	Description
Topsoil	0.00	0.2m	0.20m	Existing concrete ground slab
Made Ground	0.00 to 3.75m	3.55m	3.55m	Loose to very loose brown, slightly clayey, Sand and Gravel with occasional brick cobbles, flint, ash, mortar and slate (refer to SI)
Lynch Hill Gravel	3.75m to 5.2m	1.45m	1.45m	Very dense, light, brown, slightly silty, very sandy Gravel.
Reworked London Clay	5.2m to 5.5m	0.3m	0.3m	Firm, brown and orange-brown mottled, slightly sandy, slightly gravelly clay.
London Clay	5.5m to 19.2m	13.7m	13.7m	Stiff fissured grey brown silty clay
Lambeth Group	19.2m	Depth not proven	Depth not proven	

Groundwater strikes were encountered within the Lynch Hill Gravel. Groundwater monitoring was conducted over a month. The results are summarised below.

Borehole	Unit	Lowest Water Level	Highest Water Level
TP1	Lynch Hill Gravel	4.0m bgl	4m bgl
BH1	Lynch Hill Gravel	5.0m bgl	3.46 bgl

1.1.7. The construction methods proposed are to be traditional reinforced (or special) underpins to the perimeter walls. These will be formed in an hit and miss sequence together with lateral propping to maintain stability of surrounding properties at all times. This is a well proven method of constructing basements beneath small terraced buildings.

1.1.8. A structural monitoring strategy to control the works and impacts to neighbouring structures will comprise of a series of discrete survey targets fixed to the walls of adjoining properties. The three-dimensional co-ordinates of each target are to be established at least one month prior to construction. The co-ordinates are to be recorded at regular intervals during construction to check if adjoining walls have moved vertically and/or horizontally. The amount of movement will be checked against anticipated threshold levels to ensure any such movement remains within expected amounts

1.1.9. The BIA has assessed land stability and the impacts of the proposed development on neighbouring structures will be no greater than *Category 1* according to the *Burland Scale*.

1.1.10. The BIA has identified no potential slope stability impacts as the site and it's immediate and wider surrounds are relatively flat and level.

1.1.11. The BIA has identified there are no potential hydrological impacts.

1.1.12. The BIA has identified the site is above a Secondary A aquifer. The proposed development might just encounter the perched water table at formation level. Some temporary pumping might be required during construction however there are no *potential hydrogeological impacts on the wider hydrogeological environment as there will be little or no displacement of ground water as a result of the development.*

1.1.13. The BIA has identified the site to be *a very low flood risk for the proposed development i.e less than a 1 in 1000 annual probability of river or sea flooding.*

2.0 Introduction

The purpose of this assessment is to consider the effects of a proposed basement development at 27 John's Mews, London WC1N 2NS *on the local hydrology, geology and hydrogeology and potential impacts to neighbours and the wider environment. The site location is presented below and in Appendix 1.0.*

The BIA approach follows current planning procedure for basements and lightwells adopted by LB Camden and comprises the following elements (CPG Basements):

- Desk Study;
- Screening;
- Scoping;
- Site Investigation, monitoring, interpretation and ground movement assessment;
- Impact Assessment

Site Location

2.1. Authors

2.1.1 The BIA has been prepared by Ross and Partners in collaboration with Ground Engineering Ltd and A-Squared Studio.

Ross and Partners is a practice of professional Civil and Structural Engineering consultants that was established in 1954. The company has been involved with the design of a multitude of basement developments. These include single, double and triple storey basements, basements as part of new developments and basements beneath existing buildings.

Author:	M O'Regan	BSc CEng MI Struct E
Reviewer/Approver:	M Wakely	BSc CEng FICE Mistruct E

Ground Engineering Ltd specialises in the provision of geotechnical and geo-environmental ground investigation and associated professional services that is delivered thought their team of engineers, geologists and scientists.

Author:	JEM Davies	BSc (Hons) MSc C.GeolFGS
Reviewer/Approver:	S Fleming	MSc MCSM C.Geol FGS

A-squared Studio provide specialist geotechnical engineering design, soil structure interaction analysis and numerical modelling in support of a wide range of sectors. They carried out the Ground Movement Analysis and damage assessment for the site.

Author:	J Wieczorek	BSC (Hons) Msc
Approver:	A Nikolic	BEng(Hons) MSc DIC MICE CEng Mst(Cantab)

2.2. Sources of Information

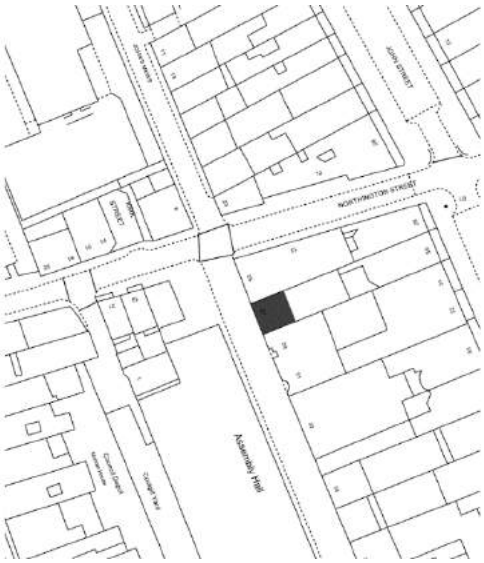
2.2.1 The following baseline data have been referenced to complete the BIA in relation to the proposed development:

- Site walkover and discussion with residents has taken place over a number of months and this is scheduled in Appendix 4;
- Current/historical mapping has been reviewed from 1720 to the present day and is referenced as Figs A to X incl within Ground Engineering's Report in Appendix 5
- Geological mapping presented in the Camden Geological, Hydrogeological and Hydrological Study - Guidance for Subterranean Development (produced by Arup, 2010) Camden has been reviewed;
- Hydrogeological mapping presented in the Camden Geological, Hydrogeological and Hydrological Study - Guidance for Subterranean Development (produced by Arup, 2010) Camden has been reviewed;
- Current/historical hydrological data from Thames Water, Environment Agency;
- Flood risk mapping from the Environment Agency;
- LB Camden, Strategic Flood Risk Assessment (produced by URS, 2014);
- LB Camden, Floods in Camden, Report of the Floods Scrutiny Panel (2013);
- LB Camden, Planning Guidance (CPG) – Basements (March 2018);
- LB Camden, Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development (produced by Arup, 2010);
- LB Camden, Local Plan Policy A5 Basements (2017);
- LB Camden's Audit Process Terms of Reference;

2.3. Existing and Proposed Development

2.3.1. The Application site is located at 27 John's Mews, WC1N 2NS and is within the Bloomsbury Conservations Area. The area is relatively level.

The property is terraced with access available only to the front of the building. The house is immediately flanked by 25 John's Mews to the North, 29/31 John's Mews to the south and 30 John Street to the East (i.e the rear of the site). There is no garden or amenity space.

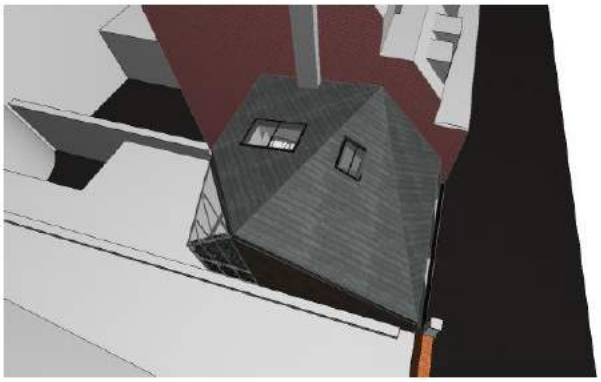


Site Location Plan

The full footprint of the site is occupied by the house. The site stands at an approximate elevation of 22mOD with the surrounding area generally level and without any slopes exceeding 1.0°. the property and its immediate environs is not within a wider hillside setting.

2.3.2. In April 2017, the owner and occupier was granted planning approval for the substantial demolition and reconstruction of the property to provide further and better accommodation.

The approved planning application allows for: retention and protection of the existing front brick façade as it contributes to the character of the area and the complete rearrangement and rebuilding of the interior and the rear façade. The roof will be replaced with a new polygonal volume roof to bridge the difference in heights from No 25 to No 29 allowing also for additional floor-space.



Proposed Isometric View looking South (consented)

Proposed Street View (consented)

Proposed Rear Isometric View (consented)

The property owner is seeking permission to provide additional basement accommodation beneath the property. This will become a single storey basement with the basement structural slab level set at 3m below ground level. There is presently no basement within the existing property. The upper floors shall remain unchanged from the current planning permission

It is intended that the entire redevelopment of the property, both above and below ground, will be carried out under a single construction project.

Proposed Isometric

2.3.3. The house is immediately flanked by 25 John's Mews to the North, 29/31 John's Mews to the south and 30 John Street to the East (i.e the rear of the site).

25 John's Mews is a Grade II listed property with accommodation arranged over ground and first floors.

Nos 29/31 John's Mews is an apartment building with accommodation arranged over basement carparking and residential units from ground to fifth floor inclusive.

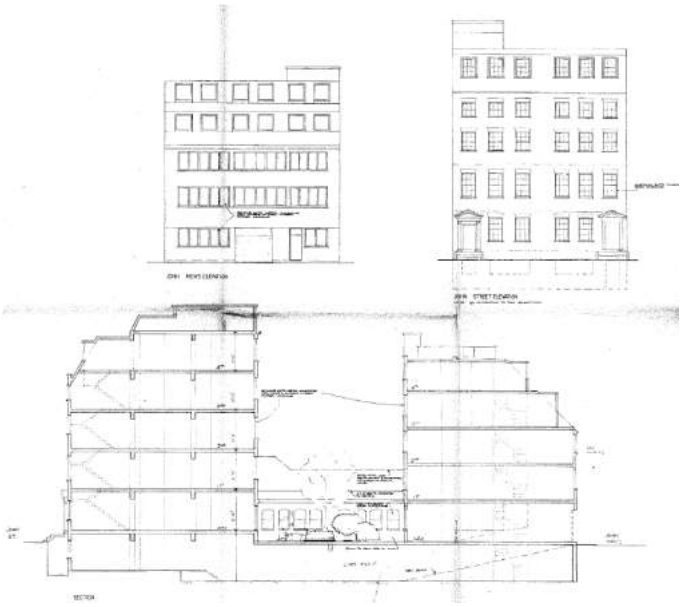
25 John's Mews

25 John's Mews is Grade II listed and dates from the late nineteenth or early twentieth centuries. It is formed of traditional brick masonry with suspended timber floors. Records indicate that no 25 was constructed at some time prior to 1896. It is known the buildings share a common brick party wall.

No 25 John's Mews and 13 Northington Street have the same architectural language and are thought to have been constructed at the same time. Whilst 13 Northington Street was constructed with basement accommodation, 25 John's Mews was not.

29/31 John's Mews

This property is of a more contemporary twentieth century reinforced concrete construction. The property extends from John's Mews to John Street with a central courtyard. The basement carpark is noted to be at 3m below ground level – which equates to the proposed basement level of 27 John's Mews.

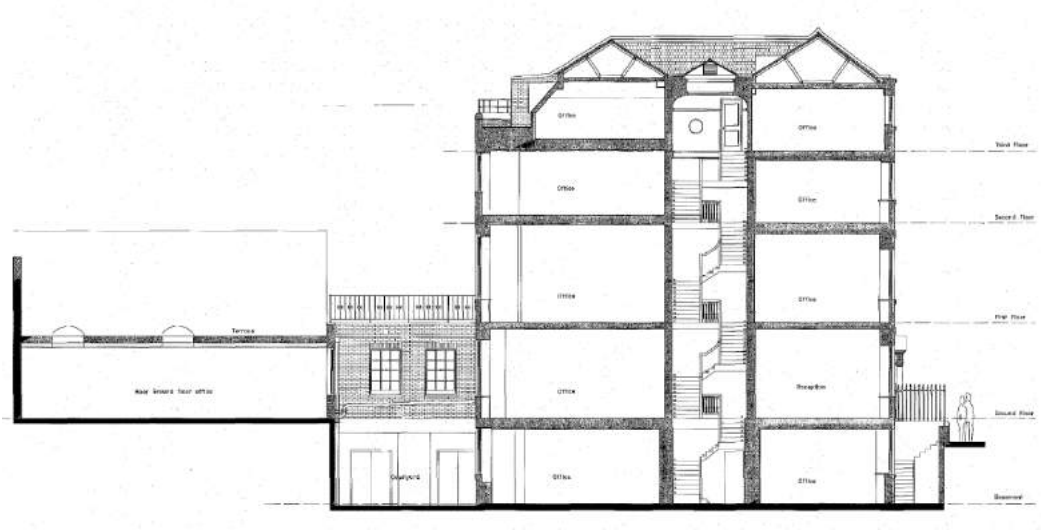


Elevations and Sections through the Existing Building

30 John Street

30 John Street, at the is an existing office building with accommodation arranged over basement, ground and first to third floors inclusive.

The site occupied by 30 John Street is long and narrow. The building is also thought to date from the late nineteenth century. The part of the building that immediately borders 27 John's Mews is single storey, without a basement and with a shared brick party wall.



Section through 30 John Street

Surrounding Basements

The coloured site plan adjacent illustrates the extent of existing basements immediately bordering the property. These are all single storey basements (shaded yellow). During our liaison with neighbours we also discovered a small below ground cellar space within no 25 John's Mews. We believe this dates from when the adjoining building was used as a vehicle repair workshop and constituted the means to access and repair the underside of vehicles.

2.3.4. Neighbouring buildings include the Grade II listed building at 30 John's Mews.

2.3.5. There is no garden at the site. Nor are there neighbouring gardens or any known trees to be protected.

2.3.6. Adjacent infrastructure includes the mews street that is John's Mews.

2.3.7. Underground infrastructure present beneath/close to the site is limited to simple gas, water, electrical and telecom at shallow depth within John's Mews. There are no underground tunnels near the site.

2.3.8. Existing and Proposed development drawings are presented in *Appendix* 2.

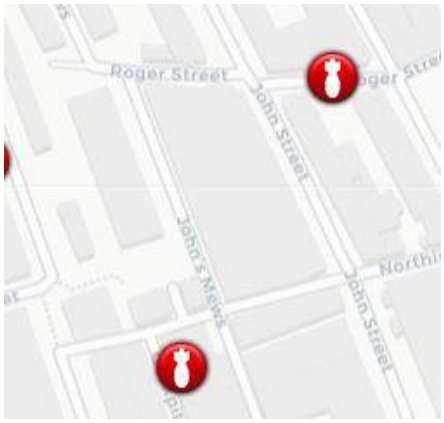
2.3.9. The proposed development will utilise well known construction techniques. These will include traditional hit and miss underpinning of perimeter walls, simple temporary propping and reinforced concrete substructures as shown on the sequence drawings in Appendix 2.

3.0 Desk Study

3.1. Site History

3.1.1. With reference to historic maps the site was an open bowling green from 1720 until some time up to 1792 when the first property was constructed as part of a terrace of buildings. Later records all show the site at a very small scale. It is not until the OS maps of 1874 the site is shown in greater detail. The Goad Insurance Map of 1901 describes the property as a stable.

3.1.2. There are no recorded WW2 bomb strikes at the site. The nearest recorded strike hit Cockpit Yard. It is reasonable to regard the ground beneath the property as free from any WW2 ordinance. The plan on the right shows recorded strikes in the vicinity of John's Mews



3.2. Geology

3.2.1. The British Geology Survey (BGS) map of the area (reference) indicates that the site is underlain by Taplow Gravels over the solid geology of the London Clay.

3.3. Hydrogeology

3.3.1. The site is designated by the EA as being underlain by a Secondary (A) aquifer, the Lynch Hill Gravel which overlies the unproductive strata of the London Clay.

3.3.2. LB Camden data indicates the site is not within a groundwater source protection zone.

3.4. Hydrology, Drainage and Flood Risk

3.4.1. There are no river networks or surface water features within 250m of the site. And the site is not at risk from these features.

3.4.2. The site is located approximately 500m from the River Fleet. There is a culverted tributary running east to west and situated approx. 120m to the north of the site.

3.4.3. The site surface area is currently 100% *impermeable with rainwater collected via roof gutters and rainwater downpipes which discharge via gravity into the public sewer.*

3.4.4. The proposed surface area will remain 100% *impermeable and maintain the same means of discharge into the public sewer.*

3.4.5. The site is classified as Flood Zone 1 with a *very low risk of surface water flooding*

3.4.6. The site *is not within a Critical Drainage Area.*

4.0 Screening

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

Question	Response	Details
1a. Is the site located directly above an aquifer?	**Yes**	Site is underlain by Made Ground over River Terrace Deposits, see Site Investigation Report (Appendix 5; page 3)
1b. Will the proposed basement extend beneath the water table surface?	No	The proposed basement SSL is above the Water table.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	No	There is a culverted tributary of the River Fleet running some 120m to the North of the site.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No	The Hampstead ponds are approx. 5KM to the North
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	The site is presently 100% impermeable and will remain 100% impermeable.
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	The entire site is covered by hardstanding and is only circa 70m². The volume and peak flows will not be increased. There is no space for infiltration drainage.
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	There are no local ponds or spring lines within 100m of the site.

4.2 Slope Stability

Question	Response	Details
1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8)?	No	The site is level. See also Site Investigation (Appendix 5; page 34)
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	No reprofiling of the land is planned
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?	No	Fig 16 of the CGHHS shows the site to be within an area of 0 to 7˚ slope.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately1 in 8)?	No	Fig 16 of the CGHHS shows the site to be within an area of 0 to 7˚ slope.
5. Is the London Clay the shallowest strata at the site?	No	Lambeth Group present at 19.5m BGL. Refer to Site Investigation Report
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	There is no vegetation nearby.
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?`	No	No evidence of cracking damage or building movement was noted at the site.
8. Is the site within 100m of a watercourse or a potential spring line?	No	There is a culverted tributary of the River Fleet running some 120m to the North of the site. (Refer to Site Investigation; Appendix 5.0).
9. Is the site within an area of previously worked ground?	No	The site history shows the land to have historically been used as gardens
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 excavation level is expected to extend some 250mm below the water table. Refer to Site Investigation report; Appendix 5.0.
11. Is the site within 50m of the Hampstead Heath Ponds?	No	The Hampstead ponds are approx. 5KM to the North
12. Is the site within 5m of a highway or pedestrian right of way?	**Yes**	The building faces John's Mews.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	**Yes**	The existing party wall foundations vary from between 1.6m and 4.0m below ground level. The new basement will unify the foundation levels.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No	There are no tunnels under or near the site

4.3 Surface Water and Flooding

Question	Response	Details
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No	The Hampstead ponds are approx. 5KM to the North
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No	The SW discharge will remain as existing.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	The present site is 100% covered by the buildings and the proposed development will also cover 100%.
4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No	Little or no displacement of groundwater will take place as a result of the development. (Ref Ground Eng Report; Appendix 5.0 P35)
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	Little or no displacement of groundwater will take place as a result of the development. (Ref Ground Eng Report; Appendix 5.0 P35)
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.	No	The site is within Flood Risk Zone 1. There is no reported history of flooding.

4.4 Non-Technical Summary of Screening Process

The scoping stage of the BIA requires applicants to identify the potential impacts of the proposed scheme, which are shown by the screening process to require further investigation.

4.4.1 The screening process identifies the following issues to be carried forward to scoping for further assessment:

Hydrogeology

- The site is located directly above an upper secondary aquifer. The proposed development might potentially extend to approximately 250mm beneath the water table such that some local dewatering might be required during construction?

Land Stability

- The site is within 5m of a Highway or pedestrian right of way. Namely the building faces John's Mews.
- the existing party wall foundations vary from 1.6m to 4.0m below ground level. The new proposals will unify foundation depths.

These impacts are investigated further within Stage 3 Site Investigation and assessed within Stage 4 Impact Assessment.

4.4.2 The other potential concerns considered within the screening process have been demonstrated to be not applicable or not significant when applied to the proposed development.

5.0 Scoping

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

5.1. Hydrogeology

5.1.1. *The site is directly above a Secondary (A) aquifer and the proposed development could potentially extend marginally below the water table. It is prudent therefore to consider the potential impacts such as site dewatering to facilitate construction, displacement of ground water and any consequential rise in ground water levels.*

5.1.2. *It is considered that the development proposals can be suitably designed to ensure no adverse impact on ground water. In order to demonstrate this, a site-specific ground investigation is presented in Section 6, with implications discussed and concluded therein and within Section 8.*

5.2. Land Stability (proximity of Highway)

5.2.1. *The site is immediately adjacent to John's Mews, which is a narrow roadway. Stability of the roadway must be maintained during and after construction.*

5.2.2. *The retaining walls will be designed for lateral loads resulting from:*

- *lateral loads arising from the retained earth,*
- *ground water (which will be taken at a conservative level of 1.0m bgl)*
- *a variable surcharge action of 10.0KPa and*
- *At rest earth pressures K_0.*

Temporary lateral props will be deployed to ensure vertical and lateral stability is maintained at all times.

5.2.3. *No further assessment is considered necessary. Stability will be maintained at all times.*

5.3. Land Stability (differential depth of foundation)

5.3.1. *The proposed development will increase differential foundation depth with neighbours. The construction activities will cause ground movements and have the potential to damage existing neighbouring properties.*

5.3.2. *It is considered that the development proposals can be suitably designed to maintain stability. In order to demonstrate this, a site specific ground investigation is presented in Section 6, with structural information and a ground movement assessment presented in Section 7. Conclusions of the impact assessment are provided in Section 8.*

6.0 Site Investigation/Additional Assessments

6.1. Site Investigation

The third stage of the BIA, the Site Investigation, is undertaken to develop an understanding of the site and its immediate environs.

In November 2017, Ground Engineering Ltd carried out intrusive geotechnical investigations works at the site. These consisted of a single borehole within the centre of the building and extending to 20m below ground level. Also, three trial pits were excavated to expose the foundations of the adjoining properties.

The results of their investigations together with an interpretative discussion of the proposed subterranean works are presented within their Report Ref No C14337, which is presented within Appendix 5.0

Site Geology

A single, 20m deep borehole plus three trial pit excavations were taken across the site extending to 20m below ground level. The ground conditions are as expected and summarised below:

Stratum	Depth to top (mbgl)	Thickness (m)	Average thickness (m)	Description
Topsoil	0.00	0.2m	0.20m	Existing concrete ground slab
Made Ground	0.00 to 3.75m	3.55m	3.55m	Loose to very loose brown, slightly clayey, Sand and Gravel with occasional brick cobbles, flint, ash, mortar and slate (refer to SI)
Lynch Hill Gravel	3.75m to 5.2m	1.45m	1.45m	Very dense, light, brown, slightly silty, very sandy Gravel.
Reworked London Clay	5.2m to 5.5m	0.3m	0.3m	Firm, brown and orange-brown mottled, slightly sandy, slightly gravelly clay.
London Clay	5.5m to 19.2m	13.7m	13.7m	Stiff fissured grey brown silty clay
Lambeth Group	19.2m	Depth not proven	Depth not proven	

Groundwater strikes were encountered within the Lynch Hill Gravel. Groundwater monitoring was conducted over a month. The results are summarised below.

Borehole	Unit	Lowest Water Level	Highest Water Level
TP1	Lynch Hill Gravel	4.0m bgl	4m bgl
BH1	Lynch Hill Gravel	5.0m bgl	3.46 bgl

7.0 Construction Methodology/ Engineering Statements

7.1. Outline Geotechnical Design Parameters

7.1.1. Reasonably conservative geotechnical parameters have been determined, based on the site investigation data presented in the site investigation report. (Appendix 5.0; page 33)

Soil Type	Bulk Density (Mg/m^3) Y_B	Effective Shear Strength c' (kPa)	Angle of Shearing Resistance Φ' (Degrees)
Made Ground	1.80	0	28˚
Lynch Hill Gravel	2.10	0	41˚
London Clay	2.00	0-2	22˚

At rest pressure coefficients have been employed, where

$K_0 = 1 - \sin(\Phi'_{r.d}) =$ **0.540**

7.2. Outline Temporary and Permanent Works Proposals

7.2.1. The basement construction sequence is presented within Appendix 2 on drawings 11751/TW/01 to 08 inclusive. The construction sequence employs traditional underpinning of perimeter walls in an hit and miss sequence coupled with temporary horizontal props and waling beams. This method maintains stability during all work stages and will be familiar to contractors specialising in basement construction works.

The basement will be formed of an insitu reinforced concrete "box" with a 350mm thick basement slab, 250mm (min) thick concrete retaining walls and 200mm thick ground floor slab.

The party walls will be underpinned in a traditional hit and miss sequence to ensure they are not undermined by the construction and are founded below the depth of the proposed excavation. The pins will be reinforced and as such are regarded as "special foundations" under the Party Wall Act. Each pin will have cast-in Kwikastrip continuity reinforcement sleeves to ensure full continuity of reinforcement between adjoining bays.

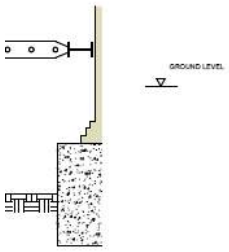
The concrete retaining walls are designed to retain the basement in the temporary and permanent condition. This includes

- lateral loads arising from the retained earth,
- ground water (which will be taken at a conservative level of 1.0m bgl)
- a variable surcharge action of 10.0KPa

The new substructure will comprise of a concrete raft foundation slab, "special" reinforced underpins which are designed to act as retaining walls and temporary propping. The construction work sequence is illustrated on Stage by Stage drawings as follows:

The proposed construction sequence, as illustrated within Appendix 2 on drawings 11751/TW/01 to 08 inclusive, is as follows:

Stage 1

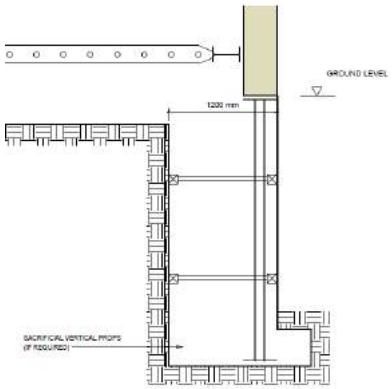


Install temporary lateral propping and shores at low level and break out existing ground bearing slab.

Reduce the ground within the site in horizontal layers by 1250mm.

Stage 2

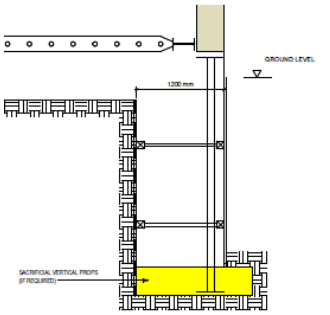
Form individual pins not exceeding 1m in length in the sequence as noted on the General Arrangement drawings.
Shuttering to be installed to all four sides of the pins and cross-braced adequately.
Shuttering facing the next door property to be installed in 1m vertical segments, and any over-excavation behind the shuttering to be carefully filled in with high workability C20 structural concrete and compacted adequately.
The geotechnical study suggests made ground deposits and terrace gravels are likely to be encountered. Some temporary boarding or steel sheeting may be required and adequately propped until the concrete has been placed and cured. All temporary boarding must be adequately braced to prevent collapse. Should it prove impossible to excavate and construct the pins in a single vertical segment, the pins should be excavated in two vertical lifts.



Vertical, sacrificial props should be available and deployed where necessary. If formed in two lifts, the upper half is to be excavated and concreted, and then dry packed. In the second instance, the lower half of the pin is to be excavated and concreted, whilst leaving a 30mm gap between the new and old concrete to be dry packed. Sufficient time (48h) must be allowed for between each operation to allow for the new concrete and cement packing to set. Maintain horizontal props.

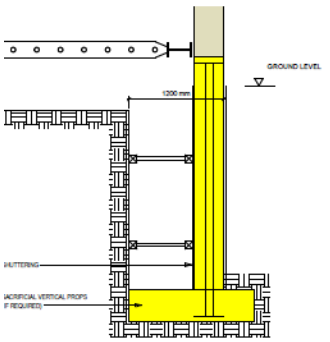
Stage 3

Formation to be inspected and approved by the Building Inspector or engineer. The base is to be blinded, the reinforcement fixed and base cast. Leave starter bars for adjoining bases and the retaining wall stem.



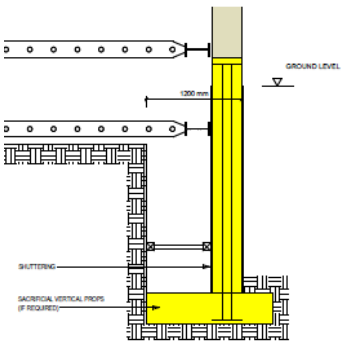
Stage 4

The wall stem reinforcement is to be fixed with projecting bars/Kwikastrip each side for continuity with adjoining underpinning.
Fix concrete spacers to brace cement board against reinforcement.
Fix shuttering to wall and prop. Concrete can be poured through top of wall and compacted.
After 24 hours tightly ram dry pack between concrete and masonry



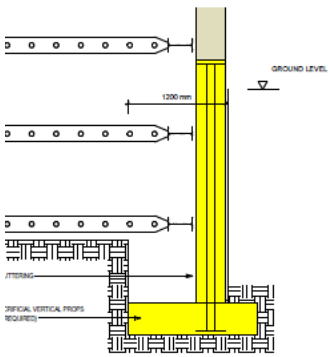
Stage 5

When concrete to wall has cured strike the wall shuttering and back prop across
excavation as shown. The temporary props are to be retained for the duration of the works until all the pins have been constructed and the centre berms removed.



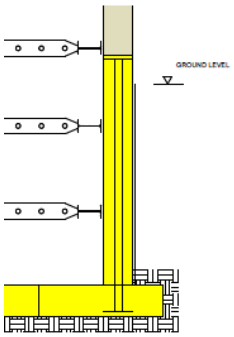
Stage 6

Once all the underpinning is complete, excavate and reduce height of central berm to approximately 1/3 of the total height, install a second layer of lateral props. the props are to remain until after the base slab has been formed and the concrete reached min 20N/mm² compressive strength.



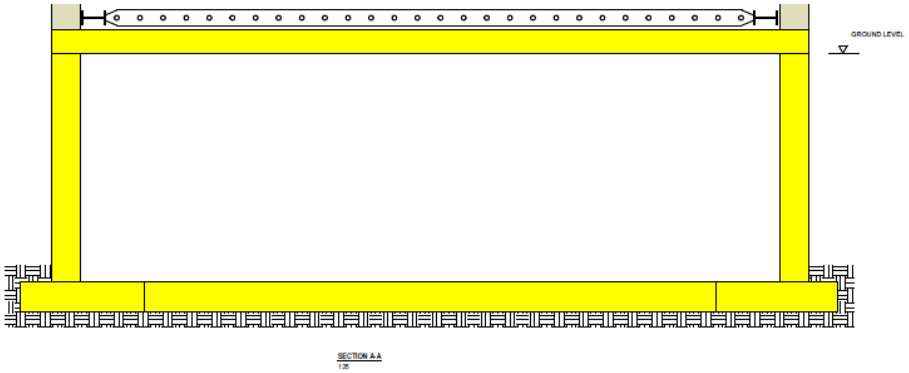
Stage 7

Excavate down to the formation level. Install any new drainage, sumps, pumps etc. The sump should be set away minimum 300mm from the face of any wall. Prepare base blinding, fix reinforcing bars and cast base slab.



Stage 8

On completion of the base slab, shutter, reinforce and cast ground floor slab. Allow to cure until concrete has reached a minimum compressive strength of 20N/mm² before striking shuttering and removing lateral props.



7.3. Ground Movement and Damage Impact Assessment

7.3.1. A Ground Movement Assessment (GMA) has been carried out by A-squared Studio (ref: 0624-RPT-001-Rev01) and is presented in Appendix 6. The assessment has been carried out using Oasys Xdisp and Pdisp software and with reference to CIRIA C760. The analysis allows for the short and long term cumulative vertical and horizontal ground movements induced by the works phases of demolition, underpinning, basement excavation and subsequent permanent works. The assessment takes into account the construction methodology and site specific ground and groundwater conditions.

7.3.2. The assessment encompasses all properties located within the *zone of influence* of the proposed scheme. The GMA assessment is based on *greenfield* movements neglecting the stiffness of any structures. The adopted assessment methodology provides a robust and conservative assessment representative of current industry best practice.

7.3.3. Two different scenarios have been considered in order to bind the potential ground movements arising from the works:

- The effects of unloading and overburden removal using Pdisp, and
- Excavation induced ground movements using empirical CIRIA curves in Xdisp.

Both short-term (undrained) and long-term (drained) conditions have been assessed by adopting relevant soil stiffness parameters for each case.

7.3.4. The ground movements resulting from the works are movements due to unloading from demolition/excavation, underpinning as well as loading from the permanent structure. Contour plots are presented in the body of the report.

7.3.5. The following structures were assessed, having been identified as potentially within that zone of influence:

- *Assembly Hall (2 John's Mews)*
- *25 John's Mews*
- *13 Northington Street*
- *30 John Street (rear)*
- *31-32 John Street*
- *29-31 John's Mews.*

7.3.6. In accordance with the Burland Scale, the damage impacts are assessed as:

Property	*Potential damage Impacts*
Assembly Hall (2 John's Mews)	***Category 0*** *Negligible*
25 John's Mews	***Category 1*** *Very slight*
13 Northington Street	***Category 0*** *Negligible*
30 John Street (rear)	***Category 1*** *Very slight*
31-32 John Street	***Category 0*** *Negligible*
29-31 John's Mews.	***Category 1*** *Very slight*

7.4. Control of Construction Works

7.4.1. The construction works will be closely controlled in accordance with the relevant technical guidelines for underpinning such as the ASUC. It is recognised that basement construction works should be undertaken by suitably qualified and experienced contractors only under the supervision of a chartered engineer.

7.4.2. The temporary support works are crucial for the safety of construction works and to limit potential ground movements. Surplus props will be kept on site during the basement works to cater for any unexpected ground conditions or loose masonry.

Props are to be checked twice daily to ensure they are securely deployed.

Excavation will proceed in horizontal layers

7.4.3. **Movement Monitoring**

A structural monitoring strategy is proposed during the works.

It is known that all buildings experience some degree of movement and that this can vary with the types of foundations, ground conditions and weather conditions throughout the year.

The purpose of movement monitoring is to check adjacent properties to ensure any recorded movements are within the predicted movements determined from the Ground Movement Analyses calculated by Messrs A². The Contractor will appoint an independent surveyor to fix temporary "targets" to the external facades of adjacent buildings and check for any movement at regular intervals throughout the construction phase of the project.

- Scope

  Prior to commencement of any new works, a series of targets will be installed on the facades of adjoining buildings. The

  The three-dimensional co-ordinates of each target are to be established. The co-ordinates will be recorded at regular intervals to check if a wall has moved vertically and/or horizontally.

  The monitoring station (s) will need to be protected throughout the construction period. Ideally two independent stations should be provided for continuity in the event of damage.

  If it becomes necessary for a station to be relocated, the new station should be set up and target co-ordinates established for an agreed period (min two weeks) prior to the decommissioning of the existing station.

- Accuracy

  The survey equipment shall achieve the following tolerances:

  Target co-ordinates +/- 2.0mm

- Frequency of Monitoring and Reports

  Ideally target monitoring should take place two to three months prior to commencement of demolition works. Target monitoring is to take place daily and to include recalibration from back-sights. All data is to be transferred to the engineer, party wall surveyor and contractor.

- Monitoring Reports

  The independent monitoring surveyor will produce a summary report that includes, the following:

  - Executive Summary
  - Target Location diagrams/photos
  - Tables showing base readings and tabulated differences (if any) in mm
  - Deflection Graphs.

  The reports are to be used to monitor actual building movements against those predicted from the ground movement analyses.

- Action levels

  Building façade movements have been calculated as part of the ground movement analyses.

  Green Trigger Value (movement within predicted levels)

  Continue with monitoring and works as planned

  Amber Trigger Value (movement approaching predicted levels)

  All interested parties, including the Adjoining Owner's Surveyor should be informed. The contractor and engineer will consider the cause of the movement and submit proposals to limit movement thereafter.

  Red Trigger Value (movement above predicted levels)

  All interested parties including Adjoining Owner's Surveyor and Engineer will be informed immediately. Works will stop in the affected area immediately, and if required actions will be taken to make the works safe. Actions to limit movement thereafter to be proposed by the contractor for comment.

Noise and Vibration

In general, Best Practicable Means as defined in section 72 of the Control of Pollution Act 1974 will be employed to minimise noise and vibration. Furthermore, the guidance provided within BS 5228-1:2009 – Code of practice for noise and vibration control on construction sites –part 1 will be followed. Such measures control the noise at source by using effective acoustic screens or barriers and ensuring regular maintenance of plant. The following measures will be implemented:

- Restricted working hours to reduce impact.
- The contractor will only use the most environmentally acceptable and quietly operating plant and equipment compatible with the safe and efficient execution of the works.
- Items of plant operating on site will be shut down in intervening periods of use.
- Compressors brought onto site will be sound reduced models.
- All pneumatic tools will be fitted with silencers of mufflers.
- Where the use of impact hammers is necessary for the ground works, their attachment to larger and heavier excavators can often reduce the level of vibration.
- Care to be taken during the erection of scaffolding to avoid impacts from banging steel.
- Deliveries will be programmed to arrive during working hours only. Care will be taken when unloading vehicles and construction vehicles will be routed on major roads where possible.
- In addition, liaison with the Environmental Health Officer at LB Camden will be maintained throughout the construction period if required.

8.0 Basement Impact Assessment

8.10 27 John's Mews is a small terraced house within Bloomsbury's conservation area. Planning permission has already been granted to demolish the existing building superstructure and replace it with a new superstructure. The owner and occupier would like to include a new basement and this is the subject matter of this basement impact assessment. The four outer walls of the property will be retained. Of these the rear and two side walls are Party Walls that are shared with neighbouring buildings.

The proposal is for a single-story basement extending to approximately 3m below existing ground level. The basement will be formed of an insitu reinforced concrete "box" with a 350mm thick basement slab, 250mm thick concrete retaining walls and 200mm thick ground floor slab.

The party walls will be underpinned in a traditional hit and miss sequence to ensure they are not undermined by the construction and are founded below the depth of the proposed excavation.

The concrete retaining walls are designed to retain the basement in the temporary and permanent condition. This includes

- lateral loads arising from the retained earth,
- ground water (which will be taken at a conservative level of 1.0m bgl)
- At rest earth pressure coefficient of $K_0 = 0.54$
- a variable surcharge action of 10.0KPa

The basement structure will comprise of an insitu reinforced concrete "box" having a 350mm raft slab and 200mm thick reinforced concrete walls.

8.1.2 The ground conditions, proven by site investigation, are:

Stratum	Depth to top (mbgl)	Thickness (m)	Average thickness (m)	Description
Topsoil	0.00	0.2m	0.20m	Existing concrete ground slab
Made Ground	0.00 to 3.75m	3.55m	3.55m	Loose to very loose brown, slightly clayey, Sand and Gravel with occasional brick cobbles, flint, ash, mortar and slate (refer to SI)
Lynch Hill Gravel	3.75m to 5.2m	1.45m	1.45m	Very dense, light, brown, slightly silty, very sandy Gravel.
Reworked London Clay	5.2m to 5.5m	0.3m	0.3m	Firm, brown and orange-brown mottled, slightly sandy, slightly gravelly clay.
London Clay	5.5m to 19.2m	13.7m	13.7m	Stiff fissured grey brown silty clay
Lambeth Group	19.2m	Depth not proven	Depth not proven	

8.1.3 The monitored groundwater level is:

Borehole	Unit	Lowest Water Level	Highest Water Level
TP1	Lynch Hill Gravel	4.0m bgl	4m bgl
BH1	Lynch Hill Gravel	5.0m bgl	3.46 bgl

8.1.4 The site is flat. And the existing foundations, which are shared with the neighbours, are founded at 1.6m to 4.0m below ground level. The new foundation raft will be at circa 3.5m below ground level.

8.1.5 The construction methodology employs traditional methods of underpinning and temporary works props that are designed to maintain stability at all times and are familiar to contractors specialising in basement construction.

8.1.6 A ground movement assessment has been undertaken, in accordance with industry best practice, to address potential movements arising from demolition, underpinning, excavation and the permanent new structure. Short-term and long-term movements have been analysed. All surrounding properties within the zone of influence have been assessed and the results indicate Burland Damage limits not exceeding *Category 1, very slight*. This has been reviewed and considered as reasonable, acceptable, and achievable. Contractors suitably experienced with this type of construction will be employed to undertake the works together with appropriate levels of monitoring and control procedures.

8.2 Land Stability/Slope Stability

8.2.1 The site investigation has identified a suitable founding stratum of Lynch Hill Gravels.

8.2.2 The screening stage identified the two issues to be brought to the screening stage. The impact assessments are:

Scoping Issue 1
Is the site within 5m of a Highway or pedestrian right of way?
Impact Assessment
The site immediately faces John's Mews. There are utility services of electricity, water, and gas within the road. Basement construction can result in ground movements and these must not have a detrimental effect on buried utilities. The retaining walls are designed for lateral loads resulting from: • Earth pressures arising from the retained soil, • ground water (which will be taken at a conservative level of 1.0m bgl) • a variable surcharge action of 10.0KPa and • At rest earth pressures K_0. Temporary lateral props will be deployed to ensure vertical and lateral stability is maintained at all times. On such a basis the residual risk is considered to be of minor significance.
Further Information
Ground Engineering Report within Appendix 5.0

Scoping Issue 2
Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?
Impact Assessment
The perimeter walls are supported on traditional strip footings which may have been historically underpinned. They are founded between 1.6m and 4.0m below ground level. It is proposed these are underpinned to circa 3.75m below ground level. The underpinning shall be undertaken in a hit and miss sequence to maintain stability and minimise ground movements. The property at 29-31 John's Mews has an existing basement carpark and will remain largely unaffected by this. The underpinning will locally increase the stiffness of the shared party wall with 25 John's Mews; and it is noteworthy that some of the foundations of no 25 already extend to basement level. The methodology has been modelled and impacts on surrounding properties are all at Burland Category 0 and 1.0.

It is also noted within Ground Engineering's Report that little, if any amount of heave is anticipated to occur at formation level, as a consequence of demolition and bulk excavation (see Ground Engineering Report in Appendix 5.0) as any heave would dissipate between the inter-grain contacts within the Lynch Hill Gravel.

8.2.3 The risk of movement and damage arising from this development due to demolition, underpinning, excavation and the new permanent structure is no greater than Burland exceeding *Category 1, very slight*.

8.2.4 The BIA has concluded that there *will not be risks or stability impacts to adjacent properties.*

8.3 Hydrogeology and Groundwater Flooding

8.3.1 The screening stage identified one issue to be brought to the screening stage. The impact assessment is as follows:

Scoping Issue
The site is within an aquifer. The proposed development is likely to extend beneath the water table such that dewatering might be required during construction?
Impact Assessment
The site investigation identified water strikes at 4m and 5m below ground level. The seepage was noted to be gradual. Localised dewatering of pins **may** be necessary during construction. This would be in the form of localised sump pumps within each small excavation. As this is a localised activity over a short duration, there will not be a large-scale migration of fine particles and lowering of the water table. This is a common underpinning activity and it is reasoned it will not lead to damage of adjoining properties and infrastructure.
Further Information
Ground Engineering Report in Appendix 5.0

8.3.2 The BIA has concluded there is a negligible risk of ground water flooding. The highest recorded groundwater level at the site is below the proposed basement structural floor level. Little or no displacement of groundwater will take place due to this new basement and there will be little or no rise in groundwater level. This includes the cumulative effects of surrounding nearby basements.

8.3.3 The BIA has concluded *there are no impacts* to the wider hydrogeological environment.

8.4 Hydrology, Surface Water Flooding and Sewer Flooding

8.4.1 The BIA has concluded there is negligible risk of *surface water/sewer flooding*.

8.4.2 The BIA has concluded there are *no impacts to the wider hydrological environment*.