WEBB YATES ENGINEERS

Basement Impact Assessment

15 Great James Street

Ref: J4001-S-RP-0002

Revision: 00

Status: S9

Webb Yates Engineers Ltd
48-50 Scrutton Street
London. EC2A 4HH
020 3696 1550
london@webbyates.com
www.webbyates.com

Registered in England & Wales No.: 5393930

CONTENTS

DOCUMENT CONTROL

Document number:	J4001-S-RP-0002		
Status:	Information	**Reason for issue:**	To support planning submission
Date:	26/7/'19	**Revision:**	00

Author:	P. Smith	**Signature:**	
Reviewer:	A. Nikolic	**Signature:**	
Approver:	T. Suckling	**Signature**	

REVISION HISTORY

Date	Status	Revision
26th July 2019	Information	00

1. NON-TECHNICAL SUMMARY

1.1.1. The site location is 15 Great James Street, London, WC1N 3DP.

1.1.2. The current development / property comprises a four-storey residential building with an existing lower ground floor / basement level. The rear of the property comprises a single storey brick structure with no lower ground floor level. The property shares party walls with 14 & 16 Great James Street, respectively.

1.1.3. The proposed development works comprise the renovation of the existing building and extension of the lower ground floor / basement level to the rear of the property.

1.1.4. The new basement will be retained by a combination of mass concrete underpins and RC L-sections, cast in sequence in bays.

1.1.5. It is understood that the bulk excavation works and construction of permanent works elements will be facilitated utilising a *bottom-up* methodology.

1.1.6. Temporary propping / shoring measures are likely to be required at ground level, prior to proceeding with bulk excavation works. The props will increase the *system stiffness* of the embedded retaining wall during construction and reduce the risk of adversely affecting neighbouring structures and/or third-party assets, due to excessive ground movement.

1.1.7. The following assessments are presented in the current document:

- Screening.
- Scoping.
- Additional evidence/assessments (as required), including:
    - Architectural and structural drawings.
    - Ground movement assessment.
- Basement Impact Assessment.

1.1.8. The ground conditions beneath the site are predicted to comprise (based on review of BGS data):

- Made Ground: to a depth of 1.0 – 1.5 mbgl.
- Alluvial and River Terrace deposits: to a depth of
- London Clay Formation: The London Clay Formation is expected to be at least 30m thick, the thickness of this stratum is not considered to be of engineering significance to the proposed scheme and will not be proven during the site specific GI works.

1.1.9. The hydrogeological conditions at the site, relevant to the proposed development are predicted to comprise:

- Finite bodies of perched ground water occurring locally within the Made Ground, with the perched water table (Secondary A aquifer) expected to be present atop the London Clay at depths greater than 5mbgl.
- It is expected that the pore water pressure distribution within the London Clay Formation will be approximately hydrostatic from the surface of the formation.

1.1.10. The BIA has assessed land stability and the impacts of the proposed development on neighbouring structures will be limited to *Category 1 – Very Slight,* in accordance with the Burland Scale.

1.1.11. The BIA has not identified any hydrological impacts, as there groundwater table is expected to be present above the basement formation level. In addition, the proposed works do not involve the construction of a new large scale groundwater flow restriction, only the extension of the existing lower ground floor / basement to the rear of the property. Therefore, the proposed works are not expected to significantly alter any local hydrological regime.

2. INTRODUCTION

2.1. Overview

2.1.1. Webb Yates Engineers Ltd (Webb Yates) were engaged by Marrick Consult to prepare a geotechnical desk study on behalf of 15 Great James Street Ltd for the proposed redevelopment of 15 Great James Street, located in central London.

2.1.2. The purpose of this assessment is to consider the effects of the proposed works at 15 Great James Street, London WC1N 3DP, on the local hydrology, geology, hydrogeology and the potential impacts to neighbours and the wider environment.

2.1.3. The location of the proposed development site is presented in Figure 1.

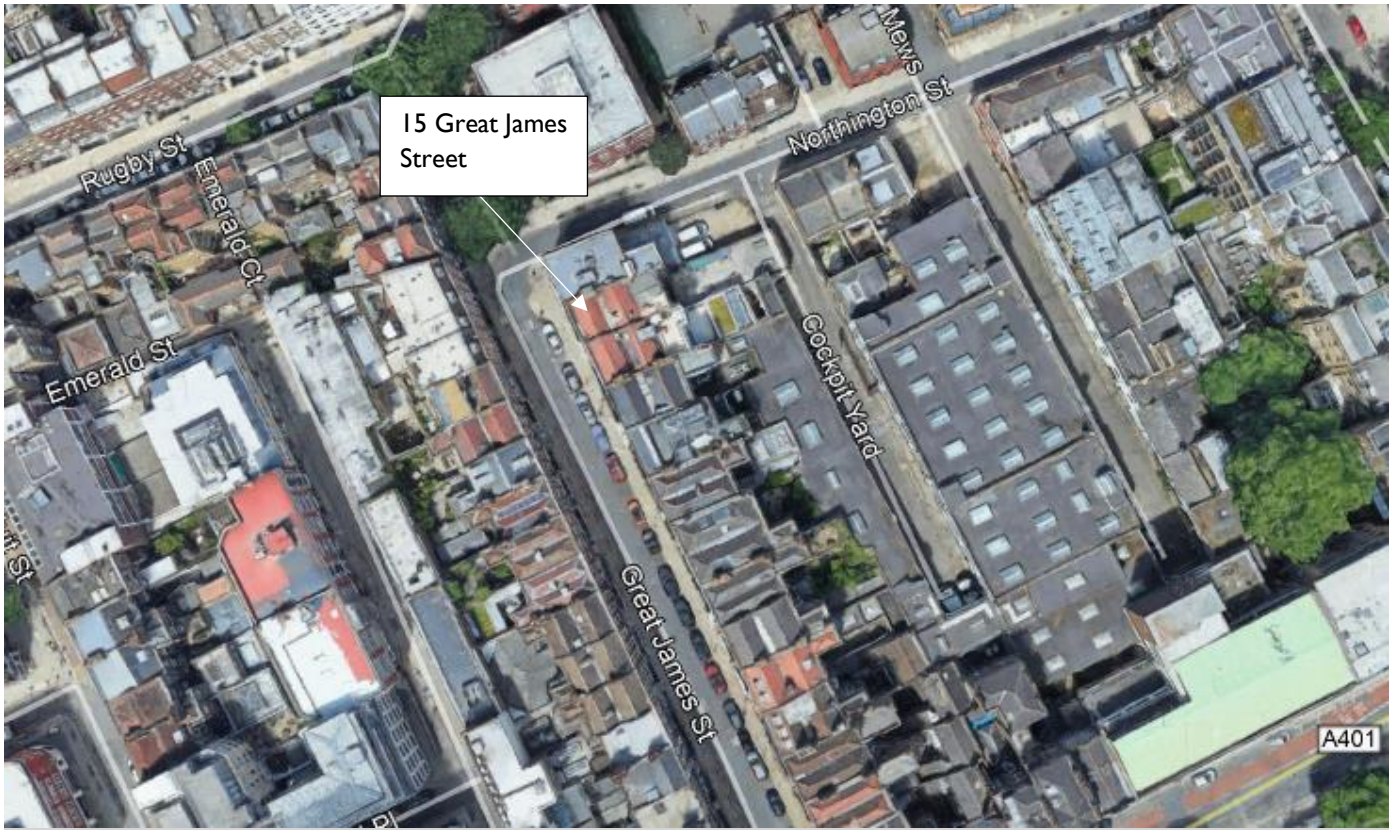


Figure 1: Location of proposed development.

2.1.4. The development site is located within the jurisdiction of the London Borough of Camden.

2.1.5. The Basement Impact Assessment (BIA) has followed the approach developed by the London Borough of Camden, which is considered to represent current industry best practice.

2.1.6. The BIA comprises the following elements:

- Screening.
- Scoping.
- Additional evidence / assessments (as required), including:
    - Architectural and structural drawings.
    - Ground movement assessment.
- Basement Impact Assessment.

2.2. Credentials

2.2.1. The BIA has been reviewed by Alex Nikolic. Alex is a Chartered Member of the Institution of Civil Engineers (MICE) with 20 years of industry experience in geotechnical design and construction of ground engineering works. Alex has attained post-graduate qualifications including a Master of Science in Soil Mechanics (MSc DIC) from the Imperial College London and a Master of Studies (MSt Cantab) in Sustainable Development from the University of Cambridge. Alex was formerly the Director of Ground Engineering at Buro Happold.

2.2.2. The BIA has been approved by Tony Suckling. Tony is a Chartered Fellow of the Institution of Civil Engineers (FICE) and a Fellow of the Geological Society (FGS). Tony has a Master of Science (MSc) in Geotechnical Engineering from City University. Tony is a Registered Ground Engineering Professional (RoGEP) with almost 30 years of industry experience in geotechnical design and construction of ground engineering works. Tony has previously held the position of Technical Director for Balfour Beatty Ground Engineering Ltd. Tony has been a past Chairman of the Federation of Piling Specialists Technical Committee and a Board Member of the Deep Foundation Institute Europe. Tony was part of the steering group for CIRIA C760 *Guidance on Embedded Retaining Wall Design*.

2.3. Sources of information

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

- Desk Study report prepared by Webb Yates Engineers Ltd. Document reference: J4001-S-RP-0001
- Architectural drawings produced by Owen Architects, dated 5th July 2019.
- Structural sketches prepared by Webb Yates Engineers Ltd.
- Public domain geological mapping from British Geological Society Geology of Britain Viewer and Borehole Viewer. (last accessed July 2019).
- Flood map for planning – Environment Agency.
- Hydrogeological data obtained by Envirocheck.

2.4. Existing development

2.4.1. The development site is located at 15 Great James Street, London, WC1N 3DP. The site has approximate dimensions of 28m long by 7m wide.

2.4.2. The existing ground level at the site is approximately +23.0 mOD.

2.4.3. The site is currently occupied by a four-storey residential property (which may at present be unoccupied) with a single storey basement level / lower ground floor.

2.4.4. Figure 2 shows street level imagery of the existing site conditions from Great James Street.

Figure 2: Existing site development at 15 Great James Street. (image courtesy of Google Earth).

2.4.5. The total area of the development site is approximately 196 m^2.

2.4.6. The existing dwelling consists of four brick / masonry storeys.

2.4.7. The existing property has a lower ground floor / single storey basement level, accessible off Great James Street.

2.5. Neighbouring properties and infrastructure

2.5.1. The west site boundary is delineated by Great James Street. Two properties bound the site, and share party walls, to the north and south, respectively. Both properties are of masonry construction and are approximately the same height as the property under investigation. The site is bounded to the east by Cockpit Yard.

2.5.2. The development building, and both neighbouring properties, are assumed to be supported on shallow foundations comprising a combination of either brick / masonry, or concrete, strip and pad footings.

2.6. Proposed development

2.6.1. Proposed development sketches are presented in Appendix A.

2.6.2. The development is planned to be for private commercial use.

2.6.3. The development does not include increasing the number of storeys of the existing structure. Most of the existing building structure will be retained.

2.6.4. A lower ground floor / basement extension is planned to the rear of the property which will connect with the existing. The proposed basement level is approximately 3.5 m below the existing ground surface.

2.6.5. Appendix A presents Webb Yates outline structural arrangements.

2.6.6. The superstructure consists of load bearing masonry construction with timber floor construction.

2.6.7. The proposed basement perimeter will be retained by a combination of mass concrete underpins and RC L-sections.

2.6.8. Temporary props / shoring will be installed at ground level, prior to proceeding with bulk excavation works. Such measures will increase the *system stiffness* of the retaining walls and reduce the risk of adversely affecting neighbouring structures and third-party assets, due to excessive ground movement.

2.6.9. The basement will be reduced to the formation level using standard means and methods of excavation.

3. SCREENING

3.1. Subterranean (groundwater) flow screening flowchart

Question	Response	Details
1a. Is the site located directly above an aquifer?	Yes	The site is underlain by superficial deposits of alluvium and river terrace deposits comprising a secondary A aquifer. The underlying London Clay Formation is considered an aquiclude.
1b. Will the proposed basement extend beneath the water table surface.	No	The basement is considered to be founded within the river terrace deposits. However the water table is not coincident with or above the proposed formation level.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	No	The site is not within 100m of a watercourse.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	The proposed development footprint will not differ significantly from the existing building footprint.
4. As part of site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS).	No	The proposed development will maintain the existing surface water discharge conditions.

3.2. Stability screening flow chart

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 and surrounding areas are flat lying (less than 2 degrees).
2. Will the proposed re-profiling of landscaping at the site change slopes at the property to more than 7 degrees (approximately 1 in 8)?	No	The proposals involve extension of the existing basement level. No landscaping and / or re-profiling is proposed.

3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?	**No**	**Adjacent sites are flat lying.**
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8)?	**No**	**Refer topographic map of region. Site is located in a flat lying area in Central London.**
5. Is the London Clay the shallowest strata at the site?	**No**	**The site is underlain by superficial deposits of alluvium and river terrace gravels.**
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 are no existing trees within the development footprint.**
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 superficial deposits are expected to provide protection of the upper part of the London Clay stratum against saturation and evaporation.**
8. Is the site within 100m of a watercourse or a potential spring line?	**No**	**The site is not within 100m of a watercourse.**
9. Is the site within an area of previously worked ground?	**No**	**There is no recorded hazard associated with the site due to the presence of worked ground.**
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**	**Finite bodies of perched groundwater within the Made Ground may be encountered.** **The main water table is expected to be present at depths greater than the proposed formation level – which is broadly coincident with the existing lower ground / basement level.**
11. Is the site within 5m of a highway or pedestrian right of way?	**Yes**	**The west site boundary is adjacent to Great James Street and the east site boundary is adjacent to Cockpit Yard.**

		However no basement works are proposed to the west, and the east basement works do not extend to within 5m of Cockpit Yard.
12. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	**Yes**	**Underpinning works are proposed at the party wall boundary with 14 & 16 Great James Street.**
13. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	**No**	**There is no recorded tunnel infrastructure at the proposed development site.**

3.3. Surface water and flooding screening flowchart

Question	Response	Details
1. Is the site located within a Critical Drainage Area?	**Yes**	**The site is located within a Camden critical drainage area as defined in the London Borough of Camden – Strategic Flood Risk Assessment.**
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 existing route is expected to be incorporated into the scheme.**
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	**No**	**The proposed development's footprint will not differ significantly from the existing buildings footprint.**
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**	**See above.**

5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	**No**	**See above.**
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 of very low risk of flooding due to surface water according to the Strategic Flood Risk Assessment.**

3.4. Non-technical summary of screening process

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

- The site is located directly above an aquifer.
- The site is within 5m of a highway or pedestrian right of way.
- The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties.
- The site is located within a Camden Critical Drainage Area.

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

4. SCOPING

4.1. Groundwater flow: site located directly above an aquifer.

Hazard:

4.1.1. The basement construction results in damming of the aquifer and groundwater flow regime.

4.1.2. Changes in groundwater head result in stress changes within the ground.

Risk:

4.1.3. Ground movements (settlements and/or heave) associated with the stress changes in the ground cause damage to existing properties.

- Mitigating Factors:

4.1.4. The basement will not extend below the water table or into the secondary A aquifer atop the London Clay, thus basement damming effects are not possible.

4.1.5. Ground investigation works will review in detail the groundwater regime at the site location in order to validate the above.

4.2. Stability: site located within 5m of a highway or pedestrian right of way.

Hazard:

4.2.1. Deep excavation carried out adjacent to public highways and neighbouring structures.

Risk:

4.2.2. Collapse of the excavation.

4.2.3. Excessive ground movement resulting in damage to the road surface or buried services within the public highway easement.

4.2.4. The proposed basement will increase the differential foundation depth with neighbours. Construction and excavation activities will cause ground movements that have the potential to damage existing, neighbouring structures.

- Mitigating Factors:

4.2.5. The basement excavation works are only to the rear of the development. Hence no impact is foreseeable to Great James Street in front of the property. Equally, the excavation works to the rear of the development are not within 5m of Cockpit Yard.

4.2.6. Depth of excavation is limited to a single storey basement. The risk profile is expected to be proportional to the depth of excavation.

4.2.7. Numerous basements of similar depth and scale have been successfully constructed throughout London within similar geological and urban settings.

Further Actions:

4.2.8. Design of the retaining wall and temporary propping shall be carried out by an appropriately experienced and qualified specialist/engineer. Design of the retaining wall and propping shall be carried out in accordance with relevant Eurocodes, Codes of Practice and industry standards. The design should allow for appropriate surcharging behind the embedded retaining wall to reflect the type and intensity of any traffic and building loads.

4.2.9. Prepare a ground movement assessment to assess the impact of the proposed basement excavation on any third party assets. Demonstrate anticipated damage categories of adjacent property in accordance with the Burland Scale, or the performance limits set by third party asset protection teams.

4.2.10. Implement an appropriate monitoring methodology during construction to provide site personnel adequate information to assess the performance of the earth retention system (baseline monitoring pre-commencement of the works should be carried out to determine any potential existing movement trends).

4.3. Flooding: the site is located within a critical drainage area

Hazard:

4.3.1. The proposed works result in a change of existing drainage flow paths.

Risk:

4.3.2. Risk of flooding / restriction of drainage local to the development which affects the development and neighbouring properties.

Mitigating factors:

4.3.3. The proposed works will not alter the area of hard standing and / or current drainage condition.

5. SITE INVESTIGATION

5.1. General

5.1.1. At the time of writing, site specific ground investigation works have not been undertaken.

5.1.2. Ground investigation works are due to be undertaken in the near future – the BIA will then subsequently be updated, and any assumptions made with regard to ground and groundwater conditions validated.

6. CONSTRUCTION METHODOLOGY / ENGINEERING STATEMENTS

6.1. Outline temporary and permanent works proposals

6.1.1. The outline basement construction proposal is to construct the basement using a *bottom up* methodology.

6.1.2. Standard means and methods of excavation are expected to be suitable to excavate the basement, based upon the ground conditions proven through ground investigation works.

6.1.3. The basement excavation will be restrained by underpins and RC L-section retaining walls.

6.1.4. Design of the retaining wall and temporary propping shall be carried out in accordance with the relevant Eurocodes, non-conflicting codes of practice and associated design best practice.

6.1.5. It is anticipated that any ground water inflow during excavation arising from finite bodies of perched ground water can be suitably managed/mitigated with localised pumping where required.

6.2. Ground movement and damage impact assessment

A Ground Movement Assessment (GMA) has been carried out in accordance with CIRIA C760 and takes into account the construction methodology and site-specific ground and groundwater conditions as presented in report J4001-S-RP-0003.

6.2.1. All structures / properties within the zone of influence of the proposed development have been assessed.

6.2.2. The following assumptions have been made within the GMA:

- New underpins and RC walls are assumed to be founded in the River Terrace Deposits.
- The buildings included in the GMA were assumed to be founded on ground surface.
- The walls of the above-mentioned buildings were assumed to behave as equivalent beams.

6.2.3. The ground movements resulting from the works comprise deformations arising from the following mechanisms:

- Installation of the retaining walls / underpins.
- Bulk excavation works.
- Heave and settlements due to the unloading / loading of River Terrace Deposits.

6.2.4. The following structures were assessed, having been identified as falling within that zone of influence of the proposed development:

- 14 Great James Street.
- 16 Great James Street.
- Brick masonry structure to the rear of the property line.

6.2.5. In accordance with the Burland Scale, the damage impacts are assessed not to be greater than ***Category 1 – Very Slight***.

6.2.6. The expected ground movements resulting from the proposed works are proposed to be limited by means of temporary propping, which is planned to be installed during the basement excavation phase.

6.2.7. The following mitigation measures are proposed to reduce ground movements and damage:

- Design of the embedded retaining wall and temporary propping measures shall be carried out in accordance with the relevant Eurocodes, non-conflicting codes of practice and associated design best practice.
- Retaining wall construction to be performed by an experienced ground engineering contractor.
- Frequent monitoring of neighbouring properties to be carried out during excavation, to validate ground movement predictions against reality.
- Development of a monitoring-trigger-action plan that identifies trigger levels, responsible personnel and actions to be followed in the event of a trigger level exceedance.
- Incorporating stiff, high level props into the temporary works design of the basement excavation, so as to provide a *high stiffness wall*. Design details regarding minimum wall flexural stiffness, prop stiffness and arrangement, shall be defined as part of detailed design development.
- Designated areas for stacking and storing materials behind the embedded retaining wall should be identified. These should be located away from sensitive structures. The design of the retaining wall should incorporate an appropriate surcharge load to the rear of the wall, to capture effects of stacking and storing materials, vehicle traffic, etc.
- The Ground Movement Assessment did not consider the impact of the proposed development on existing buried utilities (e.g. Thames Water sewer assets). It is expected that these assets will be assessed (if applicable to the proposed works) following engagement of the asset owner and direction from the asset protection team, with regards to establishing limiting performance criteria.

6.3. Control of construction works

Following selection of a Principal Contractor, a Construction Method Statement should be developed, which covers in detail the following items:

6.3.1. Work method statements developed for main stages of the construction works, outlining the means and methods of safely carrying out the works.

6.3.2. Details of temporary propping and temporary works, required to ensure structural stability is maintained throughout demolition and excavation.

6.3.3. Construction traffic management plans.

6.3.4. Detailed development of structural and environmental monitoring strategy, developed to control construction works and maintain movements/damage impacts within the predicted limits and monitor environmental impacts. It is expected this monitoring strategy would include:

- A structural monitoring layout plan of instrumentation/survey points/critical sections.
- Programme/frequency of monitoring.
- Trigger values derived for each of the structures within the zone of influence.
- Contingency actions.

7. BASEMENT IMPACT ASSESMENT

7.1. General

7.1.1. The Conceptual Site Model (CSM) is described below.

- The assumed ground conditions (prior to undertaking GI works) are a Made Ground layer overlaying Alluvial and River Terrace Deposits and the London Clay formation.
- It is assumed that the main water table is present at depths greater than 5m, sitting atop the London Clay Formation aquiclude.
- The site is considered flat based on available topographic data.
- The existing building comprises a 4-strorey structure.
- The proposed development involves the internal redevelopment of parts of the existing structure and the extension of the lower ground / basement level to the rear of the property.
- Neighbouring buildings are assumed to be founded near surface.
- The distance from the proposed basement excavation works to the nearest highway/footpath is approximately 6 m.
- The proposed development may result in damage to the neighbouring buildings and utilities. Any potential damage will be mitigated by appropriate construction means and methods (such as temporary propping/shoring and controlled excavation operations).

7.2. Land stability / slope stability

7.2.1. It is assumed that the new substructure elements will be founded on the River Terrace Deposits, which are considered to be a suitable founding stratum.

7.2.2. The risk of movement and damage to this development due to volumetric changes of the London Clay Formation is low. The scheme design development will consider heave mitigation measures (if appropriate) and the relevant soil structure interaction mechanisms.

7.2.3. A Ground Movement Assessment has concluded that ground movements caused by excavation and construction of the proposed development will be limited. The upper bound damage category for surrounding structures within the zone of influence of the proposed development has been assessed as **Category 1 – Very Slight** in accordance with the Burland Scale.

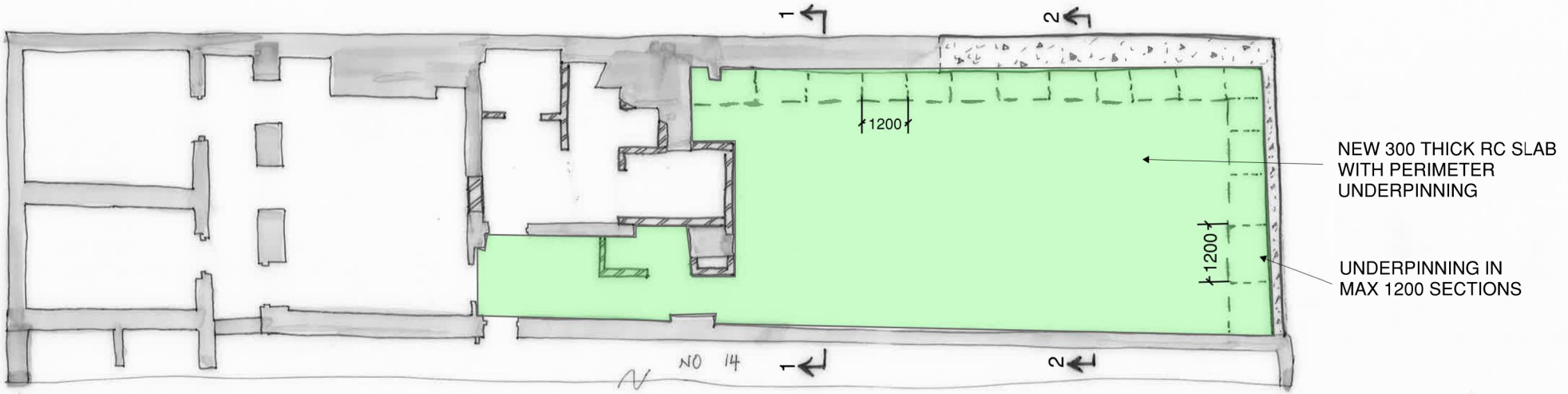
7.2.4. The BIA has concluded that there will not be risks or stability impacts to the adjacent properties due to the adopted / proposed mitigation measures.

7.3. Hydrogeology and groundwater flooding

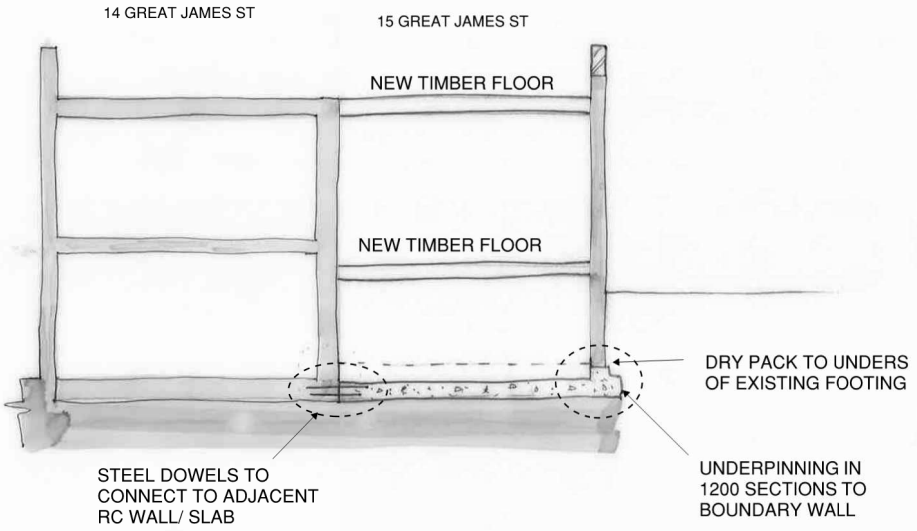
7.3.1. The BIA has concluded that there is very low risk of an increased occurrence or groundwater flooding due to the proposed development.

7.3.2. The BIA has not identified any hydrological impacts as the water table is expected to be below the proposed formation level of the basement. In addition, the new basement extension will simply extend the already existing lower ground floor / basement to the rear of the property. Therefore, the construction of this basement extension is not expected to alter the local hydrological regime.

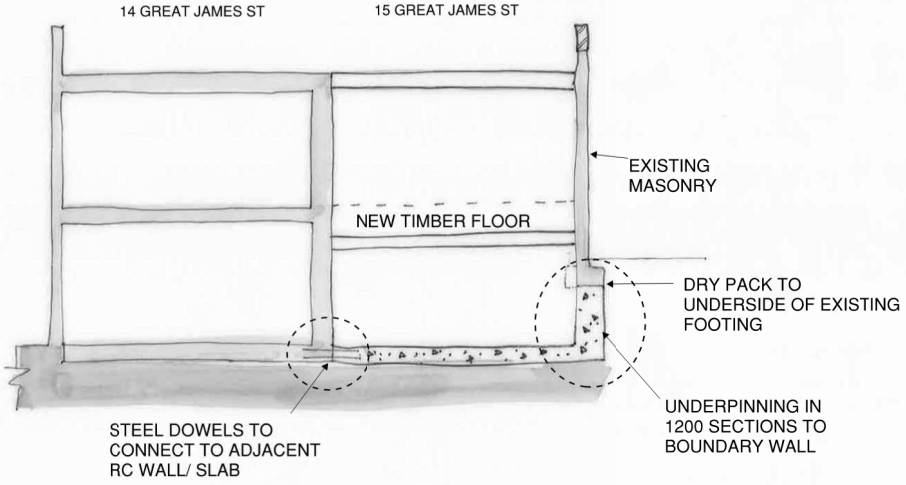
APPENDIX A



BASEMENT PLAN



SECTION 1-1



SECTION 2-2

NOTES:
WATERPROOFING & INSULATION TO ARCHITECTS DETAILS

Drawing No. J4001-S-SK-0001			Status S9
Project 15 GREAT JAMES ST			Job number J4001
Drawing Title BASEMENT GA & SECTIONS			
Date 26/07/19	Drawn by S.R	Scale N/A	Revision 00

WEBB YATES ENGINEERS
020 3696 1550
info@webbyates.com | www.webbyates.com