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60 – 70 SHORTS GARDENS, LONDON

PRELIMINARY BASEMENT IMPACT ASSESSMENT

Ref No: 24509

Date MAR ‘17



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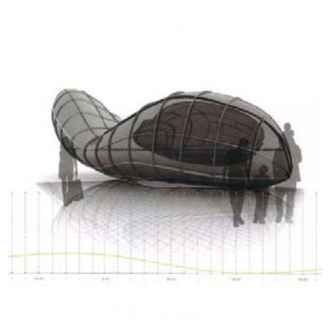






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Quality management

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Date	March 2017
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P1	31/03/17	Preliminary	PRH	MZ	PRH

CONTENTS

1.0 EXECUTIVE SUMMARY

This report discusses the structural implications of the proposals to slightly extend the existing basement of 60-70 Shorts Gardens, London.

It seeks to give indications of the likely construction sequence, and to highlight any key issues. This report will likely require updating following completion of the full site investigation (geotechnical, hydrogeological, etc).

2.0 INTRODUCTION

This report relates to the proposed alterations to 60-70 Shorts Gardens, London.

The proposals encompass refurbishing and extending the large basement space in the Shorts Gardens building and bringing it back in to public or private use. Along with refurbishing the upper floors, it is also proposed to incorporate a two-storey extension to the roof to generate a greater provision of office space.

Fluid Structures have been appointed by Span Group, working with Stanton Williams Architects, to provide structural advice and guidance on the proposals put forward by the design teams.

The information and opinions provided within this report are based on two non-intrusive visual walkarounds undertaken in January 2016 of the basement and partial ground floor, along with survey drawings identifying the general arrangement spatially, and a report completed by Carter Clack Consulting Engineers dated December 2014, ref: 14:4483. It has not been possible to obtain any archive information.

All opinions expressed are subject to further design checks and geotechnical investigations.

3.0 ABOUT FLUID STRUCTURES

Fluid Structures is one of the UK's leading design orientated structural engineering practices. The firm was established in 1999 and gained an exemplary reputation for the quality of its engineering design. The sectors in which the company works regularly include residential, commercial, education and retail. Projects to date have ranged in value from £500,000 to in excess of £100 million. In 2004, Fluid Structures won the Institute of Structures prize for Exceptional Engineering.

Fluid's approach is characterised by a desire to develop engineering solutions that complement the architectural aspiration whilst also responding to the Client's core requirements and maintaining sensitivity to the original building, heritage and Planning Authorities.

The practice considers itself to be a technical design house and offers a number of areas of expertise that include:

- The appraisal and refurbishment of existing buildings and structures, including buildings of historic significance
- The design of complex basements and sub-structures
- Design of façade engineering including double façades and solar shading
- Value engineering reports on potential developments
- An in depth knowledge of construction materials including steel, concrete, timber, masonry, glass, aluminium and fabric
- Sustainable design solutions: working within the constraints of individual projects to minimise the carbon footprint of buildings and maximise their positive impact in relation to the environment, the economy and society at large.

4.0 THE SITE

60-70 Shorts Gardens &14-16 Betterton Street are located approximately 300m north of Covent Garden tube station, in the WC2H post code of London. Grid reference: TQ302812; Lat:51.515432, Long:-0.12385160. See Appendix A for a location map and aerial photo.

Shorts Gardens is in a well-developed, built up part of London. The area is largely flat and around 35m above sea level.

Birds eye views highlighting the property are shown in Appendix B.

The Crossrail tunnel is known to be routed directly below the building footprint, with a depth of circa 14m from ground level to the crown of the tunnel structure. Plan views indicating the tunnel position in relation to the building footprint can be found in the Appendices.

5.0 DESCRIPTION OF EXISTING STRUCTURE

Constructed in the late 1800s/early 1900s, the existing building of 60-70 Shorts Gardens is approximately 44m x 10.5m on plan and consists of three storeys plus basement level, with the top storey having a mansard construction to the rear. The ground floor is a double storey height and incorporates a mezzanine for about 30% of the footprint. The basement has, in the main body, a clear storey height of around 7.3m and is relatively unobstructed save for a row of steel columns running centrally down the length, spaced at circa 4.25m centres. Shallower basements of circa 3.5m deep are located at either end of the deeper basement (one each end). Photos taken from within the basement can be seen in the Appendices.

It is believed the ground floor and basement originally served the London Electricity Board (LEB) substation facilities and its associated transformers, along with car parking and working space. The upper floors were, and still are, used for office space.

The above information is aided by the historic maps, included as Appendix C (Section 15.0).

From a limited visual inspection the building and a review of the Carter Clack report, the structure appears to be a combination of a load bearing masonry construction and steel framing. It is understood that steel columns are encased within the brickwork of the front façade, and that grillages of steel beams form the floor plan. It is assumed the floor spans are of a filler-joist floor construction.

The existing stability system has not been established. It is possible that owing to the absence of any shear walls or cross-bracing along the main body of building that the steel framing has been designed as a sway frame. It is also possible that the stability (in the north-south direction) is provided by the "book end" buildings found at either end of the floorplate, with the concrete floor acting as a rigid diaphragm spanning between them. The existing front and rear walls will inevitably provide a degree of contribution to the lateral stability in the east-west direction.

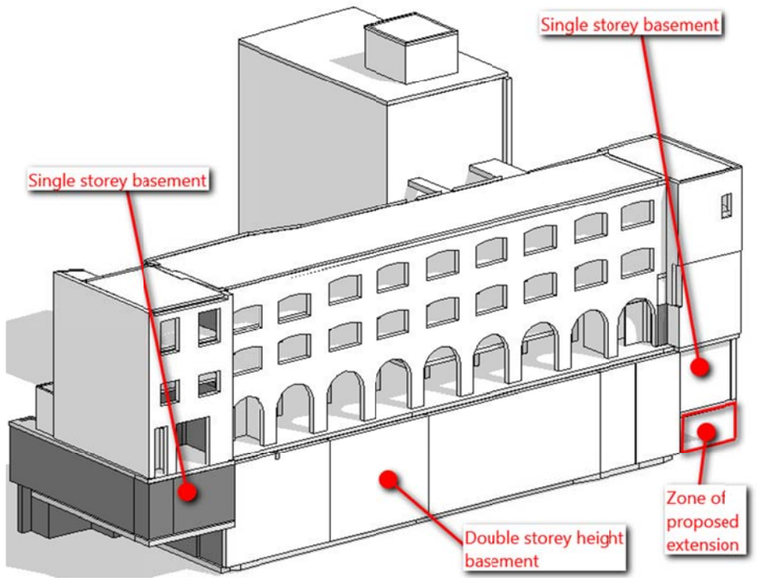
6.0 PROPOSED BASEMENT EXTENSION

A complete refurbishment is proposed to 60-70 Shorts Gardens. Along with a general refurbishment throughout, this includes bringing the expansive existing basement back in to use and also incorporating a two-storey extension to the roof.

The existing basement is present under the whole building footprint. Typically it is circa 7.5m-8m deep, however at either end there is a shallower, circa 4m deep area. This is indicated in Figure 1 below.

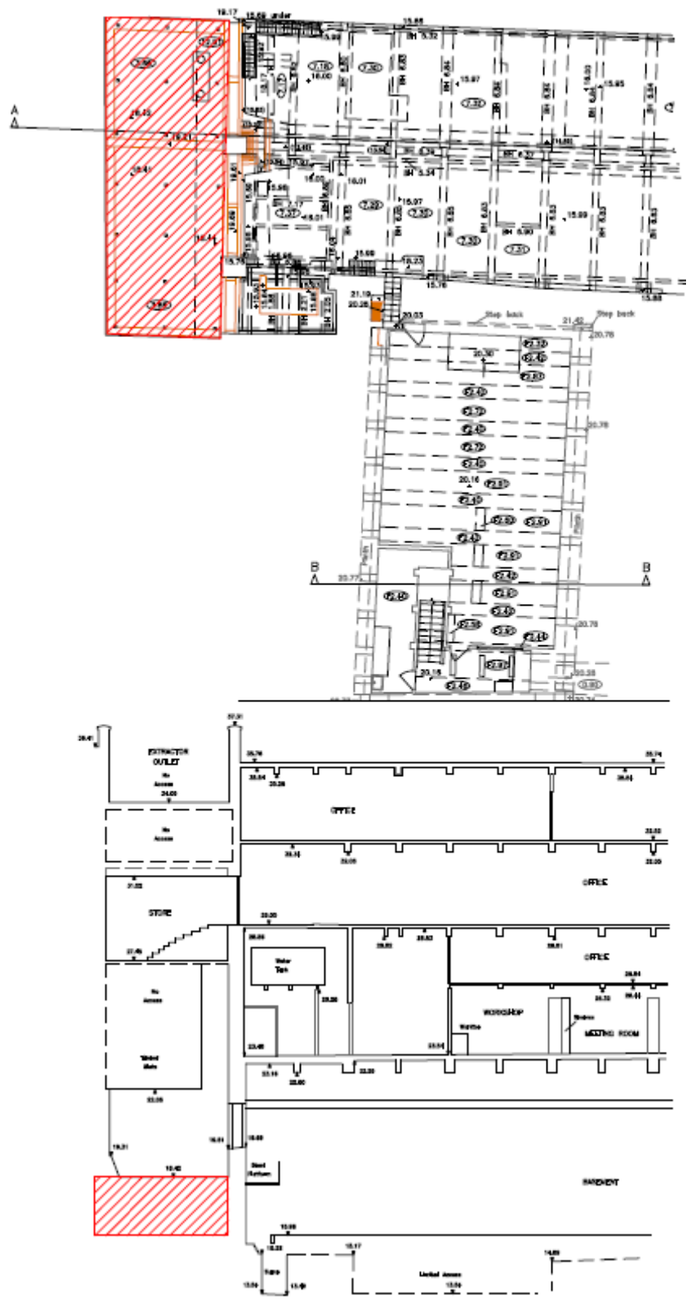
To allow access into the main body of the basement, it is proposed to lower the single storey basement area to the west (under the old vent shaft) down to match the depth of the main area.

Figure 1 - View Showing Existing Structure



A plan and section showing the area of the proposed extension is provided in the Appendices, and an extract is given below in Figure 2.

Figure 2 - Plan & Section Showing Proposed Basement Extension



7.0 PARTY WALL AND SURROUNDING STRUCTURES

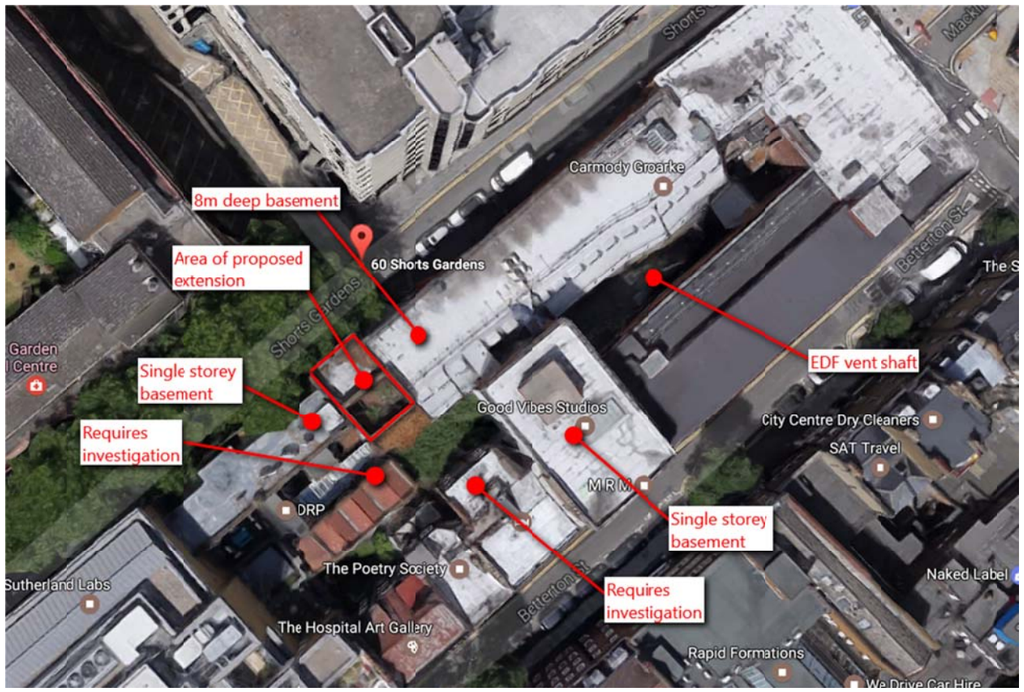
The records of Camden Borough Council were investigated to provide preliminary information on the surrounding buildings and party wall, however none such records were available.

The adjoining property was inspected in person and found to have a single storey basement, with a floor-to-ceiling height of circa 2.5m, taking in to account a shallow suspended ceiling. This information has been incorporated into our construction sequence drawings, included in the appendices.

From an initial review of other buildings in the area it is understood that single storey basements are common, however further investigation is required. A summary of the current understanding of the neighbouring properties is shown below in Figure 3.

It is also understood that the Crossrail tunnel passes directly under our site, and as such will be taken into consideration when proposing the basement scheme.

Figure 3 - Information on Surrounding Properties



8.0 GEOTECHNICAL SITE INVESTIGATION

A preliminary site investigation has been completed by Soil Technics in March 2017.

The full site investigation, with specific regard to a full basement impact assessment, will be completed once safe access is afforded to the basement area in question.

Within the report it is stated that the soil make up is likely to be as shown in Figure 4 below.

Figure 4 - Extract from Site Investigation showing Likely Ground Make Up

Ground conditions	**Soils (geological sequence)**	**Strata.**	**Typical Soil type**	**Approximate depth to base**	
		Made Ground	Unknown	Unknown	
		Lynch Hill Gravel Member	Sand and Gravel	4m to 6m	
		London Clay Formation	Clay	40m	
		Lambeth Group	Sandy clay	60m	
		Thanet Sands	Fine sands	60-90m	
		Chalk	Chalk	200m+	
	Groundwater and Geohydrology	**Strata.**	**Aquifer designation**	**Likely permeability**	**Groundwater**
		Lynch Hill Gravel Member	Secondary A	low	Likely
		London Clay Formation	Unproductive	High	Unlikely
		Lambeth Group	Secondary A	Low to moderate	Unlikely
		Thanet Sands	Secondary A	Moderate	Likely
		Chalk	Principle	High	Likely
		Site not located in a source protection zone.			
Land stability		Site levels uniform and thus not considered to be at risk of instability. Site not affected by opencast workings or past mine workings			
Soil classification		Lynch Hill Gravels likely to be granular (non-shrinkable) London Clay Formation likely to be cohesive (shrinkable)			
Possible foundation solution		Raft or piled, potential requirement for fully tanked basement, Lynch Hill Gravels likely to contain groundwater, which will affect construction of the proposed basement.			

Based on this information it seems likely that the existing shallower basement (and Party Wall) will be founded in the sand and gravel layer, but the lowered basement would bear on to clay.

8.1 WATER TABLE

During a visual inspection of the property in January '16 water was found to be entering the deeper section of basement, indicated by the drainage channels that run at the edge of the basement slab having running water within them. It is also understood that the basement has flooded to a depth of around 2 metres in the past.

The source of the water is currently unknown but Fluid have been informed that a chlorination test has been undertaken and the results came back as inconclusive. This means that we cannot rule out the water being

naturally occurring or from a manmade issue such as a burst/leaking water main. If naturally occurring it could be due to a high water table or there is a small chance it could perhaps be a tributary to either the River Fleet or Tyburn. According to the "Lost Rivers of London" book these "lost rivers" are a reasonable distance away from the site so the likelihood of this being the source of ingress may be low (see Figure 5 below).

Figure 5 - Lost Rivers Map Extract

The preliminary site investigation suggests that the water table is likely to be encountered in the gravel layer (up to 4-6m below ground level), so encountering water in the new basement extension cannot be ruled out.

9.0 STRUCTURAL IMPLICATIONS

Based on the understanding of the current structural arrangement it is considered likely that the basement will be lowered using an underpinning technique. It is expected that this will only be required on the north, west and southern walls, as the eastern is assumed to be at the deeper level already owing to it adjoining the deeper basement.

As we are likely to be excavating below the water table and in gravels, it is expected that permeation grouting will be required to assist with limiting water inflow and therefore assist with the construction.

Within the boundary of the underpinning, a new concrete lining wall will installed to laterally resist the horizontal pressures, and pick up the new concrete slabs. It may be preferable to incorporate a waterproofing additive into this lining wall to form part of the waterproofing strategy, however this will likely be dependent on the general arrangement found after access is provided.

Buoyancy will have to be checked for this area, and in the same way as for the main Shorts Gardens building, the waterproofing strategy may have to allow the water in to avoid the issues with possible floatation, which would also help to keep the required basement slab thickness to a manageable minimum.

Whilst a piled perimeter solution has been considered, owing to the arrangement currently present it is not considered viable to install a secant piled wall internally, with sufficient capacity to resist the horizontal surcharge created by the (assumed) traditional spread foundations of the existing structure, including party wall.

A suggested construction sequence for the basement formation is included in the appendices.

10.0 RISK ITEMS

The following is a list of risk items that came to light during the writing of this report. It should not be considered exhaustive in nature, and does not claim to have captured all the risk items within the project.

- Lack of completed site investigation
  - To date it has not been possible to complete a full site investigation owing to lack of safe access to undertake trial pits and boreholes. The content of this report will have a direct impact on the construction methodology, however what is proposed in this report is believed to be the most likely outcome.
- Party Wall
  - As with many basement projects in built up areas, there is a risk with the proposed construction methodology that it will not be accepted by the Party Wall surveyor(s) as it involves reinforced underpins (“special foundations”) and permeation grouting.
- Water
  - It is considered likely that we will be excavating within the water table. Whilst permeation grouting to help with this, there is always a risk that it will still be a relevant factor in the construction.
- Cross Rail
  - The presence of the Cross Rail tunnel and exclusion zone running below the site may dictate that any use of piling comes with a significant degree of process to complete before an agreement may be reached. Changing the basement volume may also pose a risk in general in terms of what may be required in order to satisfy their requirements. It may well be that a full geotechnical assessment is required of the “before, during and after” loads on the tunnel, involving costs and additional time.

11.0 SUGGESTED FURTHER INVESTIGATIONS

The following is a list of recommended further investigations that came to light during the writing of this report. It should not be considered exhaustive in nature, but should greatly assist in firming up the structural requirements involved to extend the basement.

- Complete the full site investigation, including all the requirements set out in the National Planning Policy Framework (NPPF)
    - Undertake adequate borehole investigations to confirm the geotechnical information and hydrological assessment
    - Complete trial pitting such that the existing foundation arrangement can be confirmed and designed around
    - During trial pitting, if ground water is encountered, complete an infiltration test to see how quickly the water returns once pumped out

12.0 FINAL CONCLUSIONS

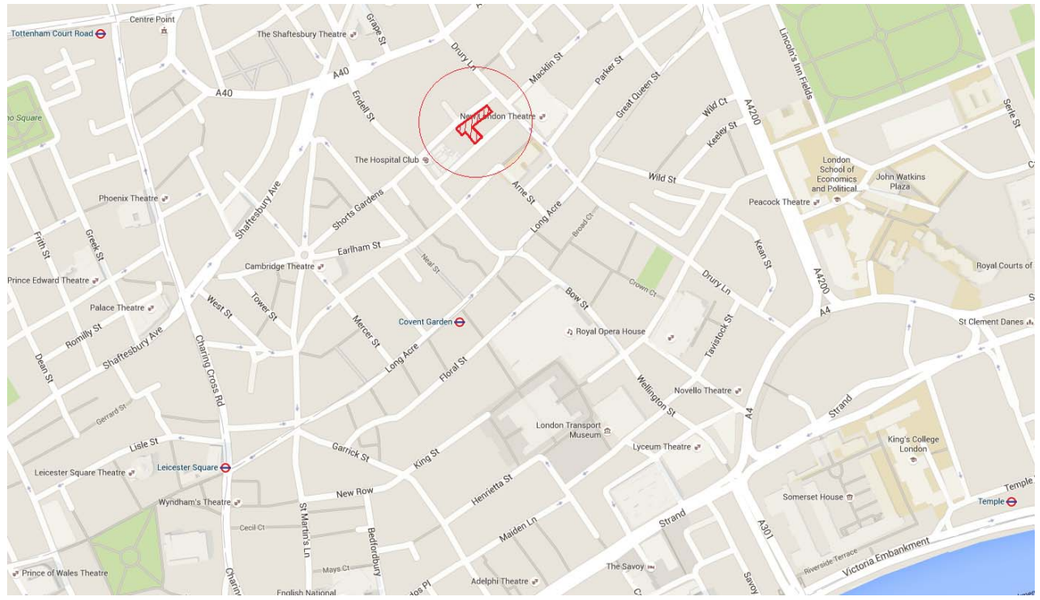
The initial site investigation summarises that the site is “not considered to present unacceptable risks from pollution and land instability. Site not considered to [be] at risk of any manmade or natural hazards. Remediation to render the site fit for purpose with respect to chemical contamination considered unlikely.”

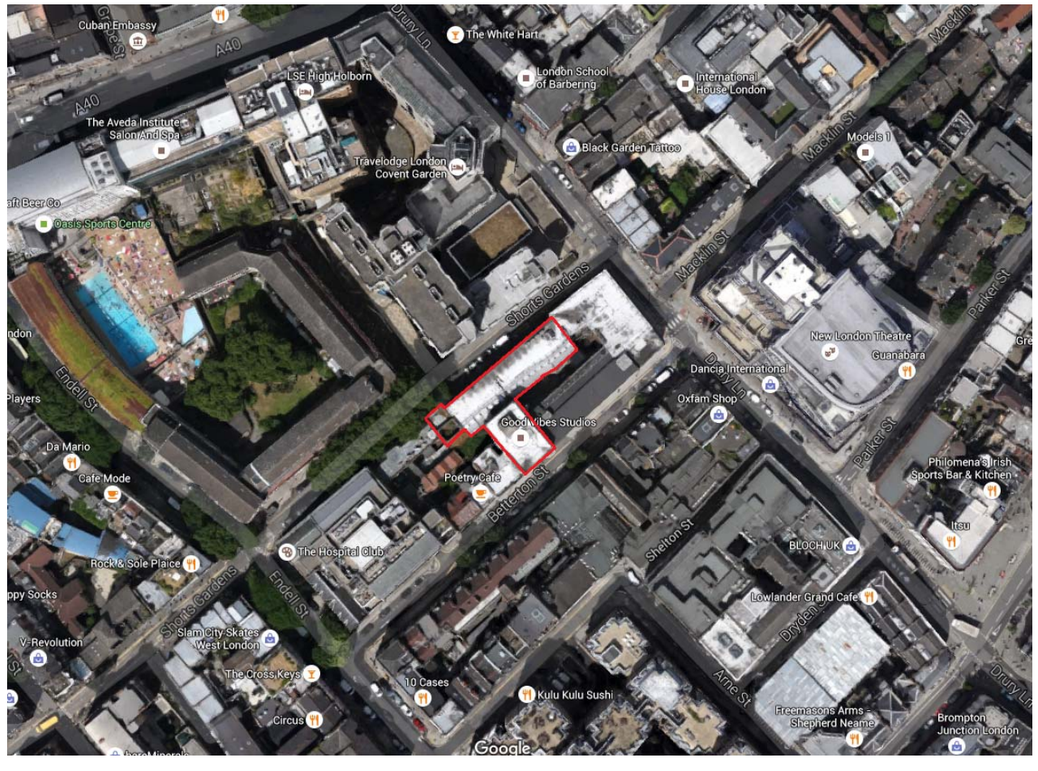
Whilst there are a number of items to be considered, the proposals for the basement extension are considered structurally feasible, with varying levels of structural intervention dependent on the outcome of the full site investigation.

In relation to below ground waterproofing the presence of the Crossrail tunnel below the building footprint removes the more typical solution of tension piles to resist against buoyancy. The waterproofing of the basement presents an unusual scenario, however one of the proposal put forward in this report has been agreed in principal by a waterproofing specialist and an Approved Inspector. The preferred option and associated details are, however yet to be agreed.

With the exception of the above, the Crossrail tunnel is not considered to dictate a significantly different structural solution as would be proposed without it. It will likely have cost and programme implications, however, as there will likely be a process of justification required, which could also involve a geotechnical specialist. The outcome of this justification is not considered to present a significant risk to the project.

13.0 APPENDIX A – LOCATION PLAN & AERIAL VIEW

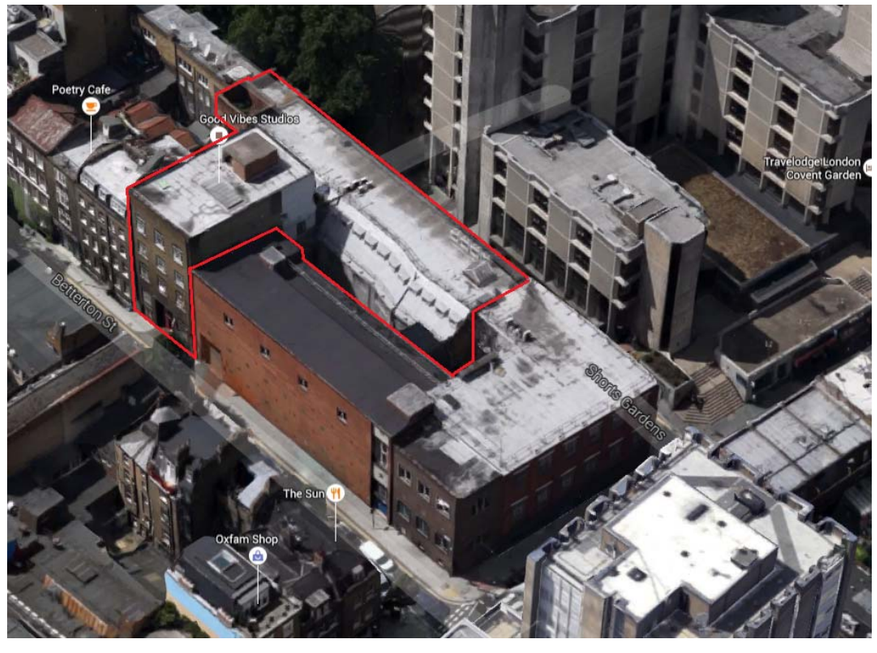




14.0 APPENDIX B – BIRDS EYE PHOTOS

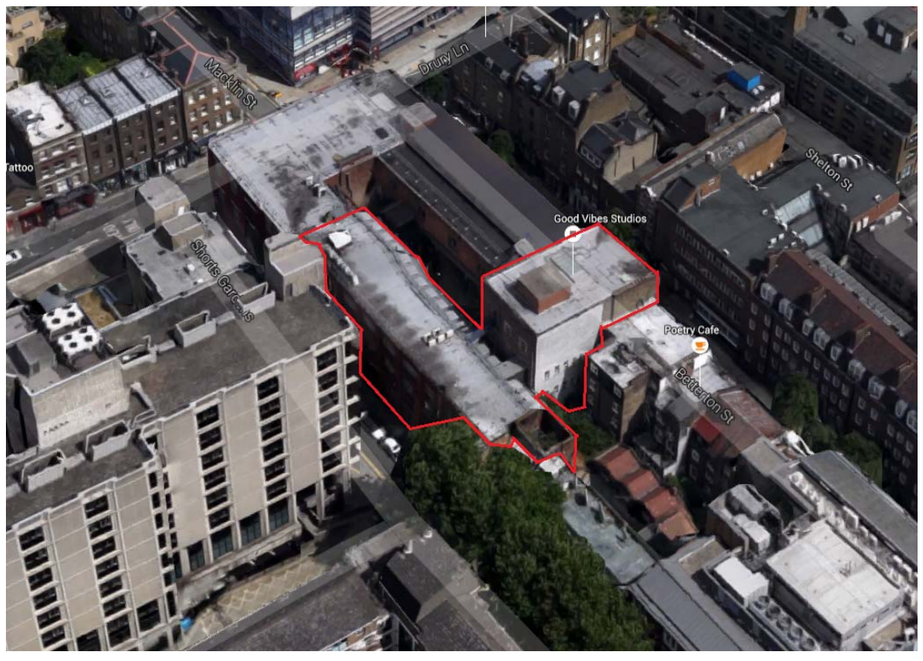
14.1 AERIAL VIEW LOOKING NORTH

14.2 AERIAL VIEW LOOKING WEST



14.3 AERIAL VIEW LOOKING SOUTH

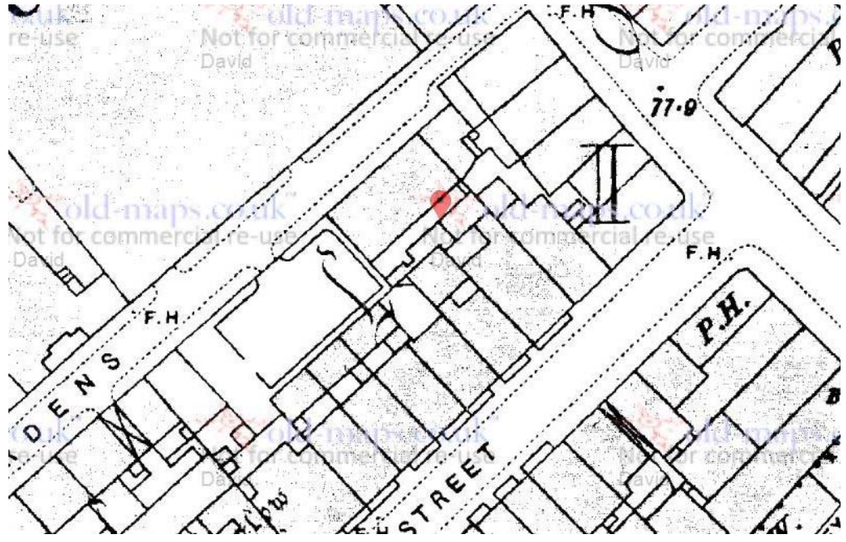
14.4 AERIAL VIEW LOOKING EAST



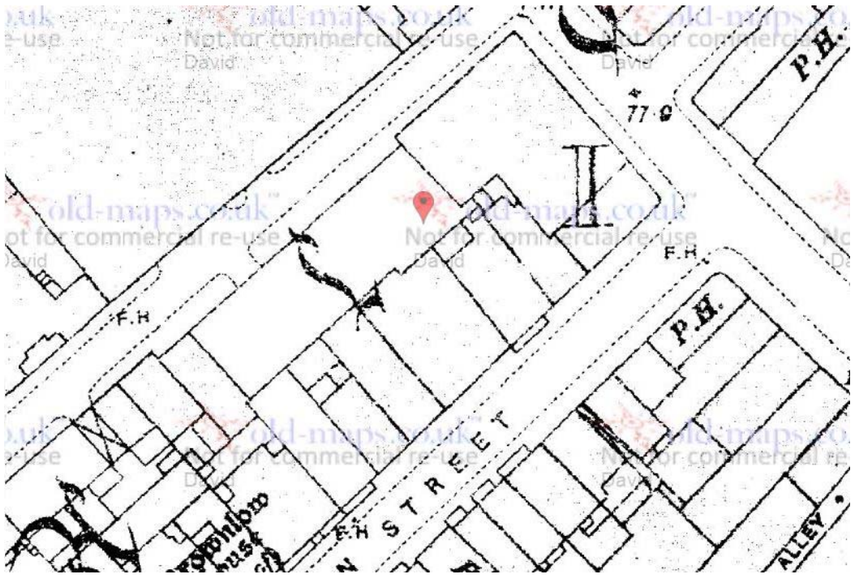
15.0 APPENDIX C – HISTORIC MAPS

15.1 MAP FROM 1874

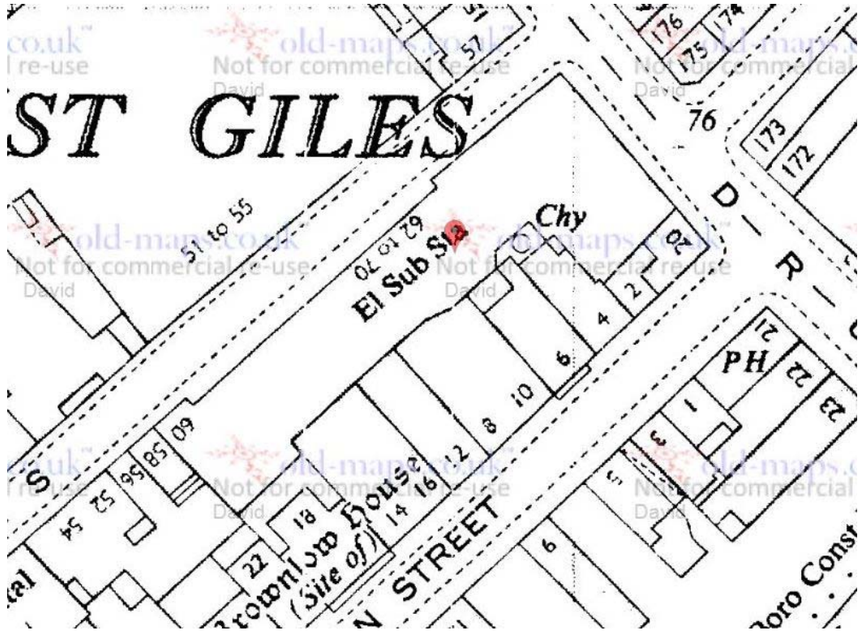
15.2 MAP FROM 1895



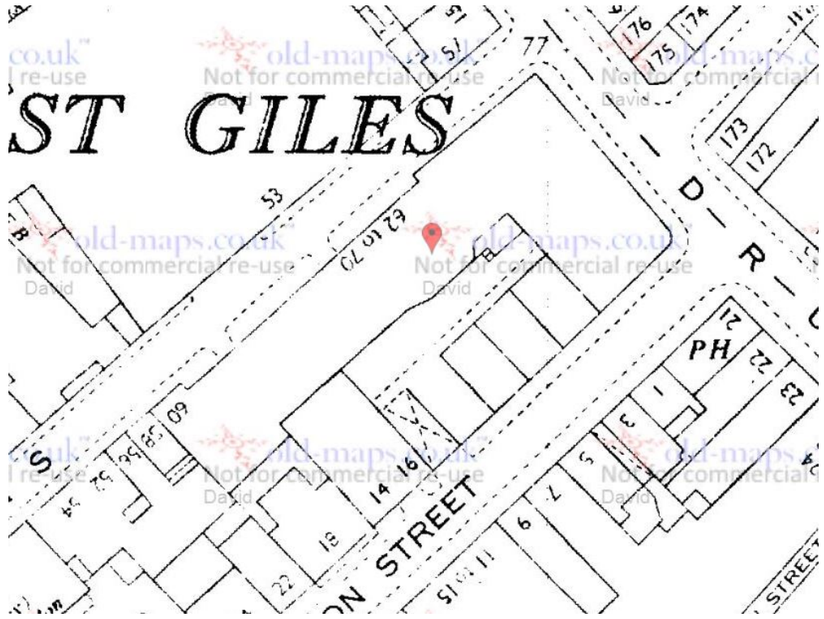
15.3 MAP FROM 1910



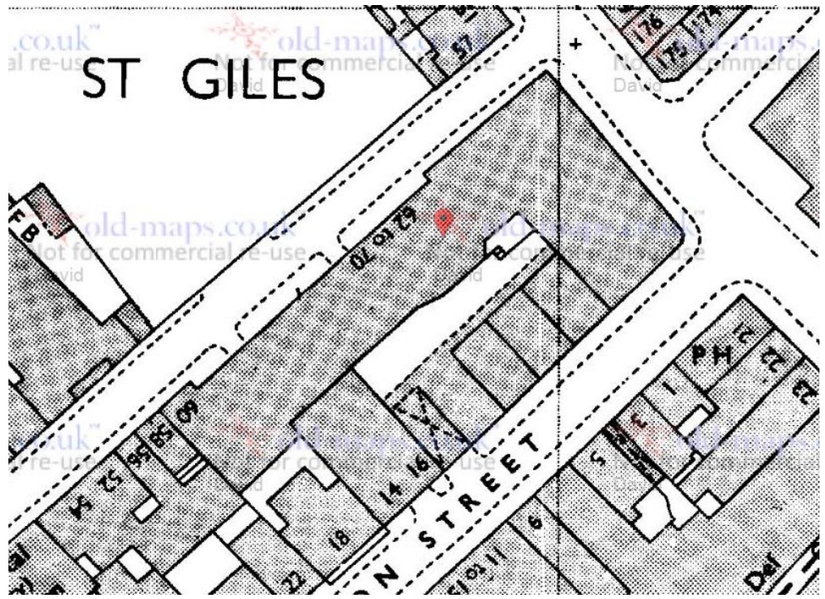
15.4 MAP FROM 1952



15.5 MAP FROM 1963



15.6 MAP FROM 1973



15.7 MAP FROM 1983

16.0 APPENDIX E – SITE PHOTOS

16.1 VIEW INSIDE EXISTING BASEMENT TAKEN FROM STAIRS