ADDENDUM TO
BASEMENT IMPACT ASSESSMENT

AT

62 MANSFIELD ROAD
LONDON, NW3 2HU

FOR

ALLAN PROPERTIES LTD

REPORT REF: AP 3135A

Engineering Geologists and Environmental Scientists

Ashton Bennett

North: Bridge Mills, Huddersfield Road,
West Yorkshire, Holmfirth HD9 3TW

South: 22c Lambourn Road,
Clapham, London SW4 0LY

Tel: 0845 8687488

email: geoenviro@ashton-bennett.co.uk
www.ashton-bennett.com

ADDENDUM TO

BASEMENT IMPACT ASSESSMENT

AT

62 MANSFIELD ROAD
LONDON, NW3 2HU

FOR

ALLAN PROPERTIES LTD

REPORT REF: AP 3135A

ASHTON BENNETT CONSULTANCY

Engineering Geologists & Environmental Scientists

MARCH 2015

Ashton Bennett Limited Co Reg No: 3318828 is a member of the Ashton Bennett Consultancy group of companies

CONTENTS

1 INTRODUCTION

2 THE SITE
- 2.1 Site Description
- 2.2 Proposed Basement

3 SITE GEOLOGY
- 3.1 Geology

4 FOUNDATION INVESTIGATION
- 4.1 Electricity Substation
- 4.2 No 62 Mansfield Road

5 GROUND MOVEMENTS
- 5.1 General
- 5.2 Ground and Groundwater Conditions
- 5.3 Construction

6 PROXIMITY OF UNDERGROUND TUNNELS AND SERVICES

7 RECOMMENDATIONS

8 GENERAL REMARKS

FIGURES

Figure 1	Site Location Plan
Figure 2	Site Plan
Figure 3	Site Façade
Figure 4	Trial Pit Location Plan
Figure 5	Trial Pit Details
Figure 6	Photographs of the Trial Pit
Figure 7	River Westbourne

1. INTRODUCTION

This report is an Addendum to Report No AP 3135 which described the results of a Basement Impact Assessment undertaken for the development of the rear garden of 62 Mansfield Road, London NW3 2HU with a two storey house with basement. The work was undertaken on behalf of Allan Properties Ltd and was carried out by the Ashton Bennett Consultancy. Plans of the proposed development including the basement were provided in Appendix A of Report AP 3135.

The purpose of this Report is to add information regarding the foundations of adjacent properties, to assess services adjacent to the site and to assess likely ground movements from the construction of the new property and its effects on neighbouring properties according to the Damage Category work by Burland.

The site lies within the Administrative Boundary of Gospel Oak within the London Borough of Camden. The assessments were carried out in general accordance with the London Borough of Camden Development Policy 27 “Basements and Lightwells” and Camden Planning Guidance 1 “Design Note prepared by London Borough of Camden for New Basement Development and Extensions to Existing Basement Accommodation” (LBC, 2010).

As stated in Camden Development Policy DP27 paragraph 27.1, LB Camden "will only permit (basement and other underground development that) does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability".

2. THE SITE
2.1 Site Description

The site is located at number 62 Mansfield Road, London NW3 2HU, which is located to the north west of London City Centre in the London Borough of Camden.

The site is the rear garden of No 62 Mansfield Road, London NW3 2HU which comprises a retail premises with overlying accommodation and a rear garden of hard covered car parking area with double door gates leading onto Courthope Road. It is proposed to construct a two storey house comprising a basement and ground floor in the garden.

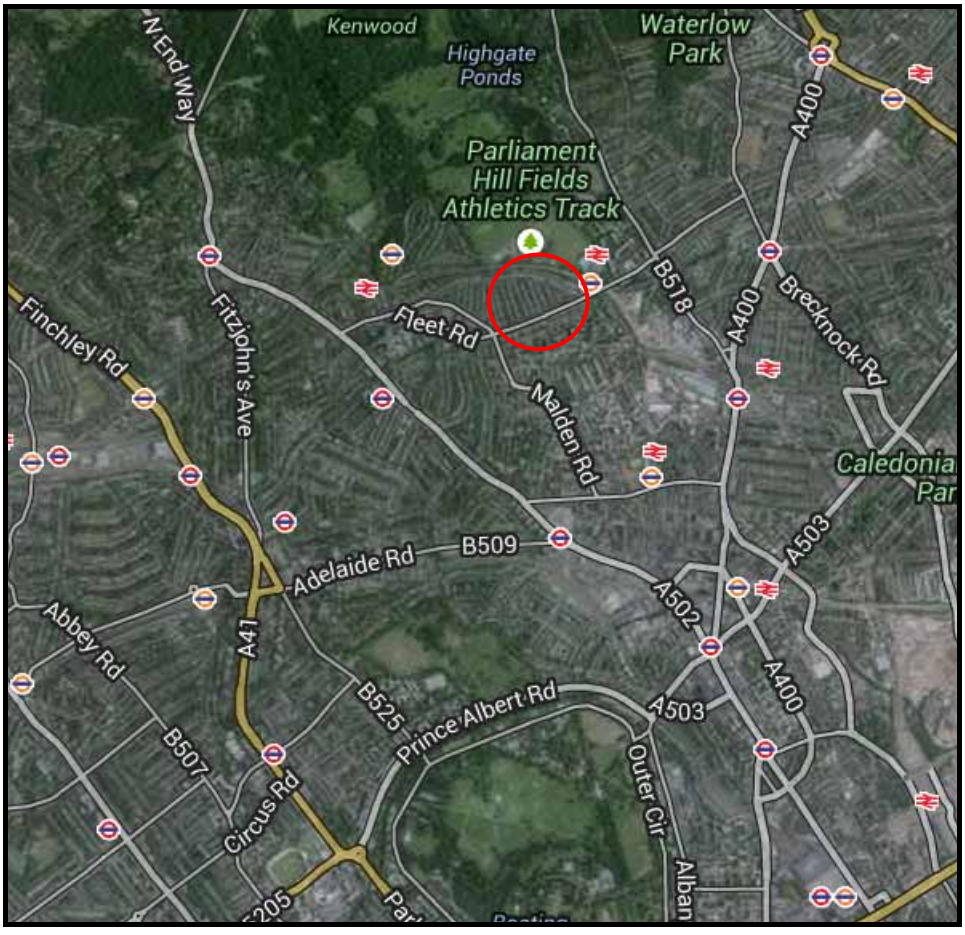

Figure 1 Site Location Plan

The site is bounded to the north by a 2metre high brick wall with an electricity sub-staion immediately beyond and residential properties beyond that. The site is bounded to the west by Courthorpe Road with residential properties beyond. The site is bounded to the south by 62 Mansfield Road property with Mansfield Road beyond and residential flats looking onto Mansfield Road beyond that. The site is bounded to the east by a 2metre high brick wall with residential garden and patio areas beyond.

All land on the site was relatively flat. The ground level in the rear garden was generally level with the pavement, and level with the side access and rear garden. The adjacent road has a slope of <1%.

Roof drainage from the existing property is taken via down pipes into a drainage system in the front of the property which is understood to run northwards collecting drainage from the adjoining properties.

There are no existing lawn areas which would allow infiltration of rainwater into the ground.

Figure 2 Site Plan

The site lies around National Grid Reference 5257984^{E}, 185513^{N} at a height of around 45m above Ordnance Datum. A Site Location Plan is presented as Figure 1 and a Site Plan is presented as Figure 2. A Site Façade is presented as Figure 3. A Trial Pit Location Plan is presented as Figure 4, Trial Pit Details as Figure 5 and Photographs of the Trial Pit as Figure 6. The location of the former River Westbourne is indicated in Figure 7.

2.2 Proposed Basement

It is proposed to construct a two storey building on the site with a basement and ground floor.

Figure 3 Site Facade

3. SITE GEOLOGY

3.1 Geology

The published 1:50,000 scale British Geological Survey (BGS) geological map of the area (Sheet 256 “North London”) shows the site to be underlain by the London Clay Formation of the Eocene geological epoch. The London Clay is shown not to be overlain by any superficial deposits. Given the historical development of the site and surrounding areas, there may be made ground present on the site.

4. FOUNDATION INVESTIGATION

4.1 Electricity Substation

An electricity substation lies immediately to the west of the site and information from UK Power Networks who own the sub station state that they have no plans of the foundations. However they expect the substation to be founded on a raft foundation at or close to ground level.

A Trial Pit was not excavated to assess foundations due to the high incident of electric cables determined by radar beneath the site.

4.2 No 62 Mansfield Road

The rear building of No 62 Mansfield Road extends to within 1.20m of the site and comprises two eras of construction. The older building extending from the original house/shop front on Mansfield Road along the frontage with Courthope Road and the newer building infilling between this building and No 64 Mansfield Road.

Figure 4 Trial Pit Location Plan

In order to determine the nature of the foundations of the rear of No 62 Mansfield Road, a trial pit was excavated in the narrow alley way between the rear of No 62 and the southern wall of the site at a point where the two buildings are joined.

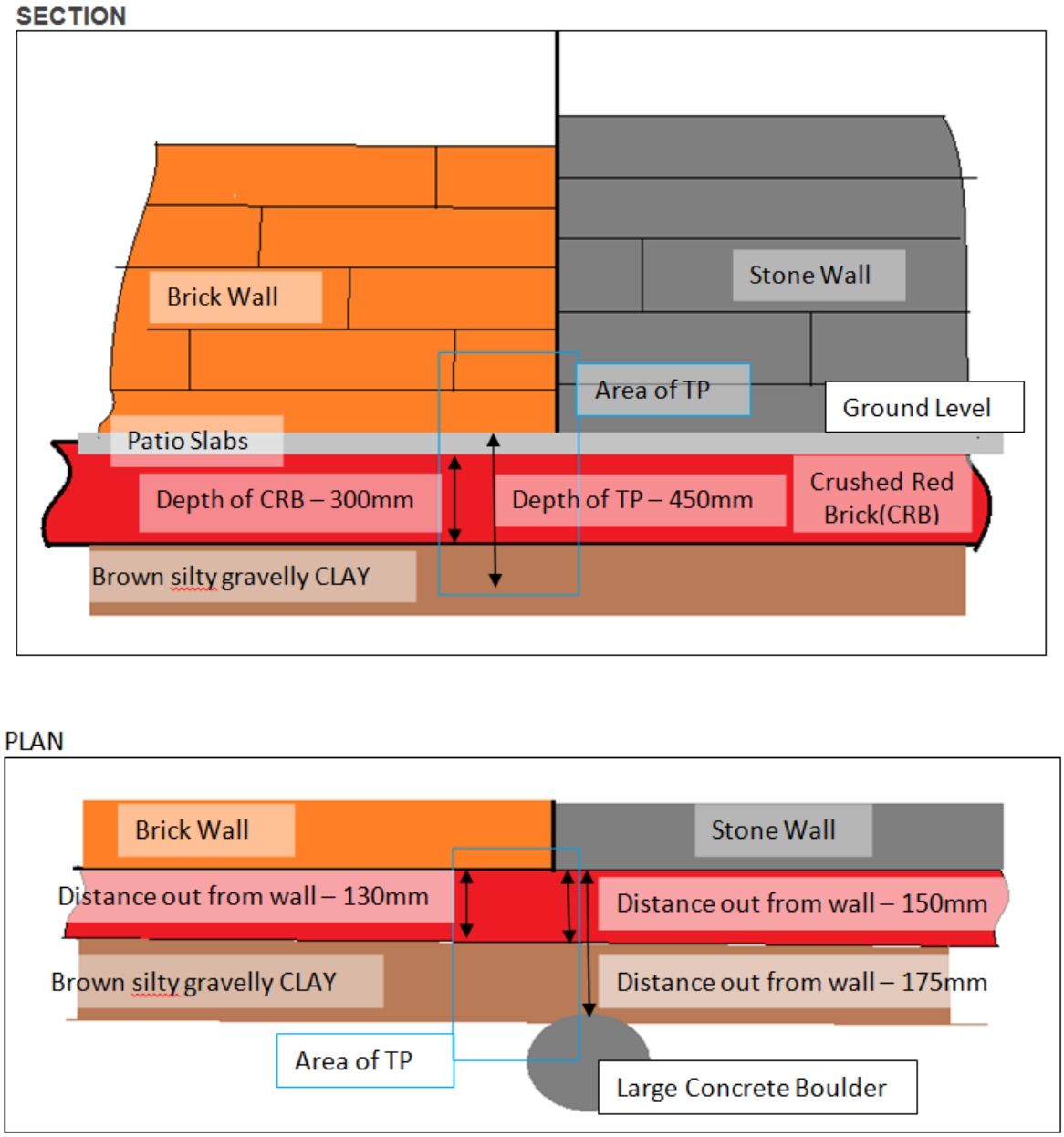

Figure 5 Trial Pit Details

The Trial Pit encountered patio slabs underlain by 0.30m of crushed brick underlain by brown silty gravelly clay, encountered to a depth of 0.45m bgl. The crushed brick extended 150mm out from the rear wall of No 62. An area of concrete was located in the front right corner of the trial pit. The trial pit was dry.

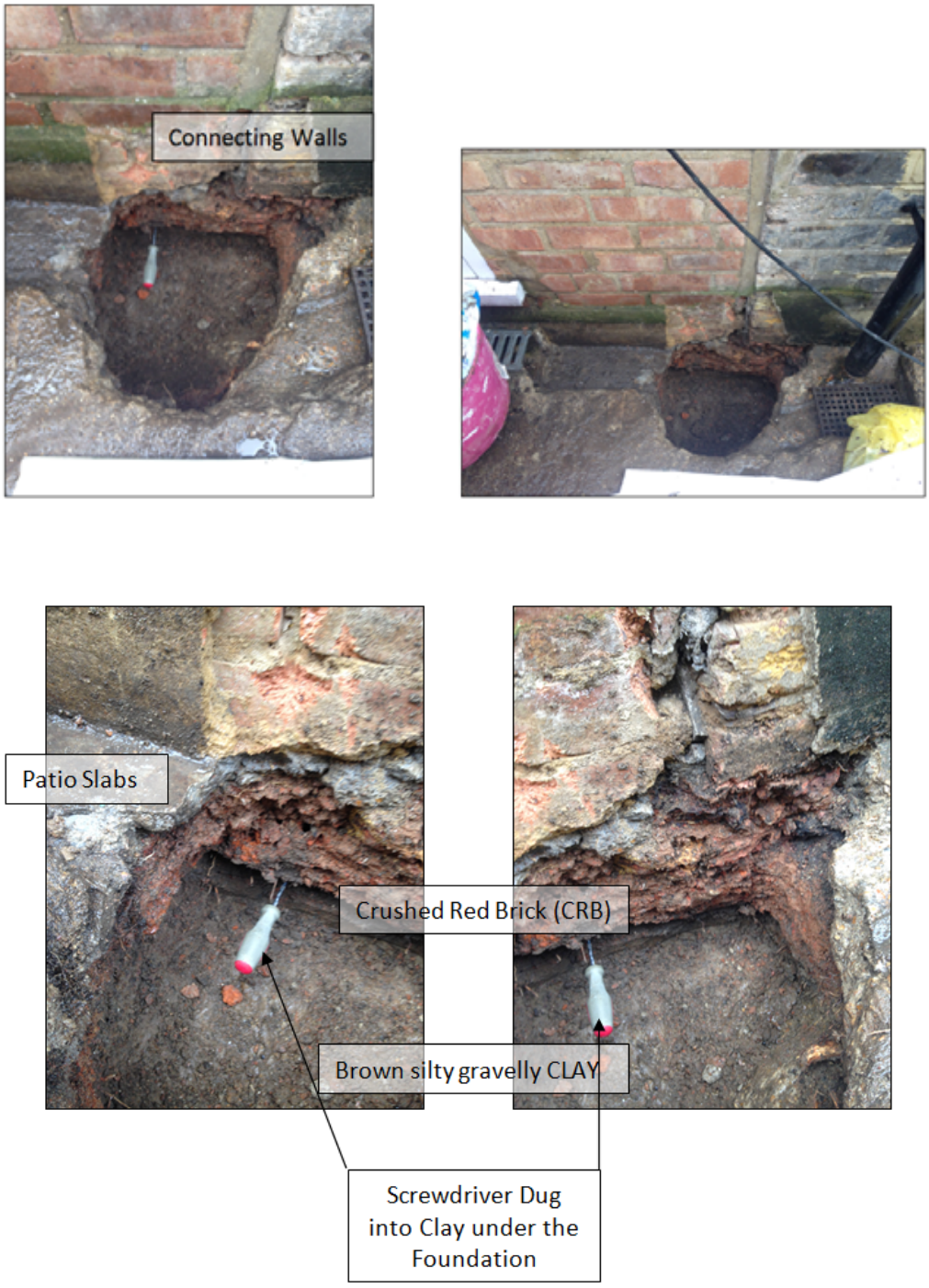

Figure 6 Trial Pit Photographs

As the foundations of adjacent buildings lie close to ground level, the foundation loads of the new development at 3.30m bgl will not add bearing weight to the foundations of adjacent buildings.

5. GROUND MOVEMENTS

5.1 General

Basement construction may cause some ground movements to the surrounding ground and structural damage to overlying properties. It is proposed to redevelop the site using underpinned foundations. Consideration therefore has to be given to the extent of potential damage to adjacent properties.

Likely ground movements and building strains can be estimated by empirical methods based on previous case studies of similar developments or by computer analysis. Empirical methods are used initially to establish the category of likely damage according to Burland et al (1977 and 2001) and Boscardin and Cording (1989) in line with CIRIA C580.

The Party Wall Act (1996) will apply to the construction of the basement because the basement lies within 3m of the adjacent structures, the foundations will extend deeper than adjacent structures and also lies within a zone defined by a 45degree line from an adjacent structure.

5.2 Ground and Groundwater Conditions

The ground conditions encountered in the window sampler boreholes comprised of a concrete top between 0.05m and 0.14m in thickness, overlying made ground down to a maximum of 0.45m. The made ground was everywhere underlain by medium strength clays of the London Clay Formation. At a depth of 1.25m to 1.45 bgl rounded and fractured flint was encountered within the clay. This was underlain by brown, blue veined silty London clay at depths of between 1.95m bgl and 2.20m bgl. The depth of the London Clay was not proven past 4.45m bgl.

The basement floor level will be 3.3m below ground level within the London Clay. Based on insitu soil testing the allowable bearing capacity was calculated as 120kN/m^2.

Groundwater was not encountered during drilling and monitoring of a standpipe on three occasions in February and March 2014. Monitoring of the borehole on March 26th 2015 gave a water level of 0.70m below ground level. It is considered that the water may be entering the site via the backfill of the numerous underground electric cables emerging from the electricity sub station. It is unlikely that there will be any necessity to dewater the site for basement excavation and any perched water is expected to be dealt with by sump pumping.

5.3 Construction

The depth of the basement below lower ground level will be 3.0m, plus a 300mm ground slab making 3.30m. Adjacent properties have foundations of 300mm bgl in the case of the rear of No 62 and possibly the same for the Electricity substation (ESS) which has a concrete slab formed close to ground level.(information from UK Power Networks).

The method of construction will be by underpinning and this construction method has been used in calculation of the possible ground movements due to construction and excavation.

Calculations have been undertaken for ground movements to the rear building of No 62 and the electricity substation. The rear wall of 62 has been taken as 1.20m distance from the proposed building and the wall of the substation as 0.0m distant from the proposed building. The rear building of No 62 has been taken as 18.50m in length and 8.00m in height and the substation 2.00m in length and 4.00m in height.

The empirical method described in CIRIA C580 has been used to calculate the horizontal and vertical strains and resulting ground movements resulting from construction of the underpins and excavation of ground between the walls. These results can be used to assess the strain across adjacent buildings, the deflection ratio and determine the potential Damage Category based on work by Burland (2001) and Boscardin and Cording (1989).

TABLE 1
Figures used in Calculations

Figures used in Calculations							
Site	Wall Depth Wd	Excavation Depth D	Distance To Face of Adj Houses	Length of Adjacent Houses	Distance Far side of Adj houses	Height Houses H	L/H
	mm	mm	mm	m	m	m	
62	3300	3000	1200	18.50	19.70	8.00	2.4
ESS	3300	3000	0	2.00	2.00	4.00	0.5

TABLE 2
Calculations for Underpinning

Empirically Estimated Movement for Underpin Walls Installation to 3.30m bgl										
Site	Horizon wall depth	Horizon	Vertical Wall depth	Vertical	Horizontal Movement	Vertical Movement	Distance Wall to	Distance Face of house	Horizontal Movement	Vertical Movement
	%	mm	%	mm	mm	mm	zero	to zero		
	Surface movement at wall/distance to negligible movement (CIRIA C580 Table 2.2)						Horizontal Displacement in mm		mm	mm
					1.20 m distance					
62	0.05	1.65	0.05	1.65	1.30	0.90	4950	3750	0.26mm/m	0.90
	1.5		1.5		0.00m distance					
ESS	0.05	1.65	0.05	1.65	1.65	1.65	4950	4950	0.33mm/m	1.65
	1.5		1.5							

TABLE 3
Calculations for 3.00m excavation

Site	Horizon excavate depth %	Horizon mm	Vertical excavate depth %	Vertical mm	Horizon Movement mm	Vertical Movement mm	Distance Wall to zero	Distance Face of house to zero	Horizontal Movement mm	Vertical Movement mm
	Empirically Estimated Movement for Excavation of Basement to 3.00m bgl									
	Surface movement at wall/distance to negligible movement (CIRIA C580 Table 2.4) High Stiffness						Distance in m			
					I.20 m distance					
62	0.15	4.50	0.1	3.00	4.05	2.37	12.0H 10.50V	10.8H 9.30V	0.34mm/m	2.37
	4		3.5		0.00m distance					
ESS	0.15	4.50	0.1	3.00	4.50	1.50	12.0H 10.5V	12.0H 10.50V	0.38mm/m	1.50
	4		3.5							

TABLE 4
Calculations for Damage Category

Site	Horizon Movement Con+Exc	Horizon strain	Vertical Movement Con+Exc	Δ	Δ/L	Δ/L /Elim	Eh	L/H	Category Negligible limit for L/H	Category
	Empirically Estimated Calculations for Damage Category									
	mm	%	mm		%	%	%		%	
62	5.35	0.045	3.27	0.02	0.00016	0.0033	0.044	2.2	Δ/L 0.04 Eh 0.05	Negligible
ESS	6.15	0.051	3.15	0.20	0.0016	0.033	0.051	0.50	Δ/L 0.06 Eh 0.05	Negligible

The difference in vertical settlement across the house No 62 will be 3.27mm (3.27mm at 1.20m minus 0mm at 10.50m) with a deflection ratio of 0.00016%. The horizontal movement from underpinning and excavation at 1.20m distance is 5.35mm and at 12.00m is 0mm making 5.35mm over 12m or a horizontal strain of 0.044%.

The difference in vertical settlement across the ESS will be 3.15mm at 0m minus 2.35mm at 2.00m with a deflection ratio of 0.0016%. The horizontal movement from underpinning and excavation at 0m distant is 6.15mm and at 2.00m is 2.35mm and is 0mm at 12.00m making 6.15mm over 12.00m or a horizontal strain of 0.051%.

The calculations are based on Figures 2.8 and 2.9, Tables 2.3, 2.4 and 2.5, Figure 2.18 and Box 2.5 in CIRIA C580. The relationship between deflection ratio and horizontal strain

giving damage category are based on Figures 2.18 b and c, with c amended for L/H of 2 and 0.5 as required for the calculations.

With reference to Table 2.5 in CIRIA C580, after Burland et al (1977 and 2001) and Boscardin and Cordng (1989), the results for both No 62 and the ESS indicate by reference to deflection/limiting strain versus horizontal strain /limiting strain, that the movements fall within Category 0 or negligible damage to the adjacent properties. This implies that hairline cracks of less than 0.1mm may occur.

6. PROXIMITY OF UNDERGROUND TUNNELS AND SERVICES

The proposed basement excavation will not be within the zone of influence of any of the London Underground (rail) tunnels shown on Figure 18 of Arup Report for London Borough of Camden "Guidance for Subterranean Development", 2010).

It is possible that other tunnels owned and maintained by other service providers may exist beneath the site that could be affected by the proposed excavation and construction works.

A full search of potential tunnels that may underlie the site has been commissioned and will be presented in a separate report. On the assumption that it is confirmed that the site is not within the "zone of influence" of any underlying tunnels then no further activities in this regard will be required (the zone of influence is normally defined as the strip of land present above a tunnel with boundaries defined from a line drawn at 45° from the invert level of the tunnel to the ground surface). Alternatively, it will be necessary to liaise with the tunnel owner and undertake further engineering analysis to determine the potential impacts that the proposed basements could have on the tunnel.

As the site lies adjacent to an electricity substation, services may lie beneath the site and require redirecting.

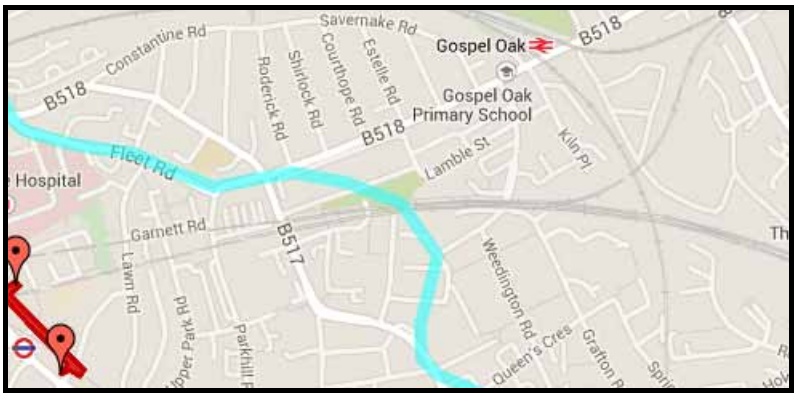

Figure 7 River Westbourne

Further investigation undertaken as to the original route of the River Westbourne confirms that it lies at a distance from the site where it is unlikely to detrimentally affect the site. This

evidence is from 'Lost Rivers of London' by Nicholas Barton. The river is now culverted as the NW Relief Sewer.

7. RECOMMENDATIONS

These recommendations only refer to the Addendum and the full Report AP 3135 should be read in full in conjunction with this Addendum.

Excavations for the proposed basement structure will require high stiffness temporary support to maintain stability of the surrounding structures and to prevent any excessive horizontal ground movements. Perched groundwater may be encountered and rainwater may fall into the excavation, it is considered that both could be dealt with by sump pumping. If this occurs the softened surface of the clay should be removed prior to any pouring of concrete for the basement floor. Consideration should be given to the use of sheet piles for temporary support to aid basement construction below the perched water.

The basement should be suitably tanked to prevent water ingress and must be designed to take account of any hydrostatic pressures exerted by groundwater.

Construction of the proposed basement will need to be supported by new retaining walls. Formation level for the proposed development will be the London Clay beneath any topsoil and made ground, which are unsuitable bearing strata. The London Clay should provide a suitable bearing stratum for underpin foundations based on the bearing pressure and ground loading of the structure.

The basement support for the temporary and permanent conditions must take account of maintaining the stability of the excavation and the stability of the attached structures. The retaining solution should ensure maintenance of a high stiffness lateral support during construction.

The potential for ground movement during the excavation and construction of the basement has been considered as outlined in Appendix D1 of the Camden Geological, Hydrogeological and Hydrological Study. Results indicate the movements predicted to adjacent properties fall within the negligible category of Burlands Category of Damage (1977). Monitoring of ground settlements should be undertaken during construction with a contingency plan in case of movement between 2mm to 5mm and in case of movement in excess of 5mm. This is described further in the structural engineers report by Constant Structural Design Report No SEN-638.

Ground movement could occur from heave of the ground following removal of overburden. Following the excavation of the basement, it is likely that the floor slab for the proposed basement will need to be suspended over a void to accommodate the anticipated heave, unless the slab can be suitably reinforced to cope with these movements. This should be reviewed once the levels and loads are known.

It would be prudent to undertake a structural condition survey of adjacent properties before work commences.

8. GENERAL REMARKS

This report truly reflects the conditions found during the desk study and ground investigation. Whilst the desk study and ground investigation were undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research, the results portrayed only pertain to the information attained, and it is possible that other undetected information and undetected ground and gas conditions, undetected mining conditions and undetected contamination may exist. The investigation was only undertaken within the site boundaries and should not be used for interpretation purposes elsewhere. These conclusions are only a brief summary of the report, and it is recommended that the report is read in full to ensure that all recommendations have been understood.

Frances A Bennett
BSc, CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, AIEMA, MIEnvSci.