engenuiti

IMAGINE + CREATE + ENGINEER

St Giles Circus
North of Denmark Street

BASEMENT IMPACT ASSESSMENT

Prepared by

Clive Fussell *MEng MSt CEng MIStructE*
Structural Engineer

Paul Grimes *BEng MSt CEng MICE*
Civil Engineer
For Engenuiti

Hilary Skinner, *MA, FICE CEng*
Geotechnical Engineer
For Donaldson Associates

30th November 2015

Engenuiti Limited
2 Maltings Place
169 Tower Bridge Road
London SE1 3JB
www.engenuiti.com

CONTENTS

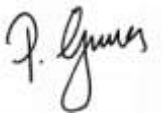
Revision History

Rev	Date	Purpose/Status	Document Ref.	Comments
00	14/05/2012	Draft	029-S-REP-006	For Information & Comment
01	04/12/2012	Information	029-S-REP-006	Planning
02	19/06/2015	Information	029-S-REP-006	Planning MMA
03	30/11/2015	Information	029-S-REP-006	Planning MMA 02 (Smithy basement)

Prepared by:

Clive Fussell
MEng MSt CEng MIStructE
Director Engenuiti

Reviewed by:



Paul Grimes
BEng MSt CEng MICE
Director Engenuiti

Hilary Skinner
MA, FICE CEng
Associate, Donaldson Associates

1 INTRODUCTION

1.1 Objective

This Basement Impact Assessment (BIA) has been produced in response to the guidance for basement construction adopted by the London Borough of Camden (LBC) to support the Planning submission for St Giles Circus and deals with the proposed basement North of Denmark Street that is bounded by Charing Cross Road, Andrew Borde Street, St Giles High Street and Denmark Street. These parts of the project are referred to as 'Zone 1 and Zone 2' as defined in figure 1.1 below. A separate BIA (report number 029-S-REP-007) has been prepared for the proposed basement between 4 Flitcroft Street and 1 Book Mews on the site South of Denmark Street, which is referred to as 'Zone 3' in figure 1.1.

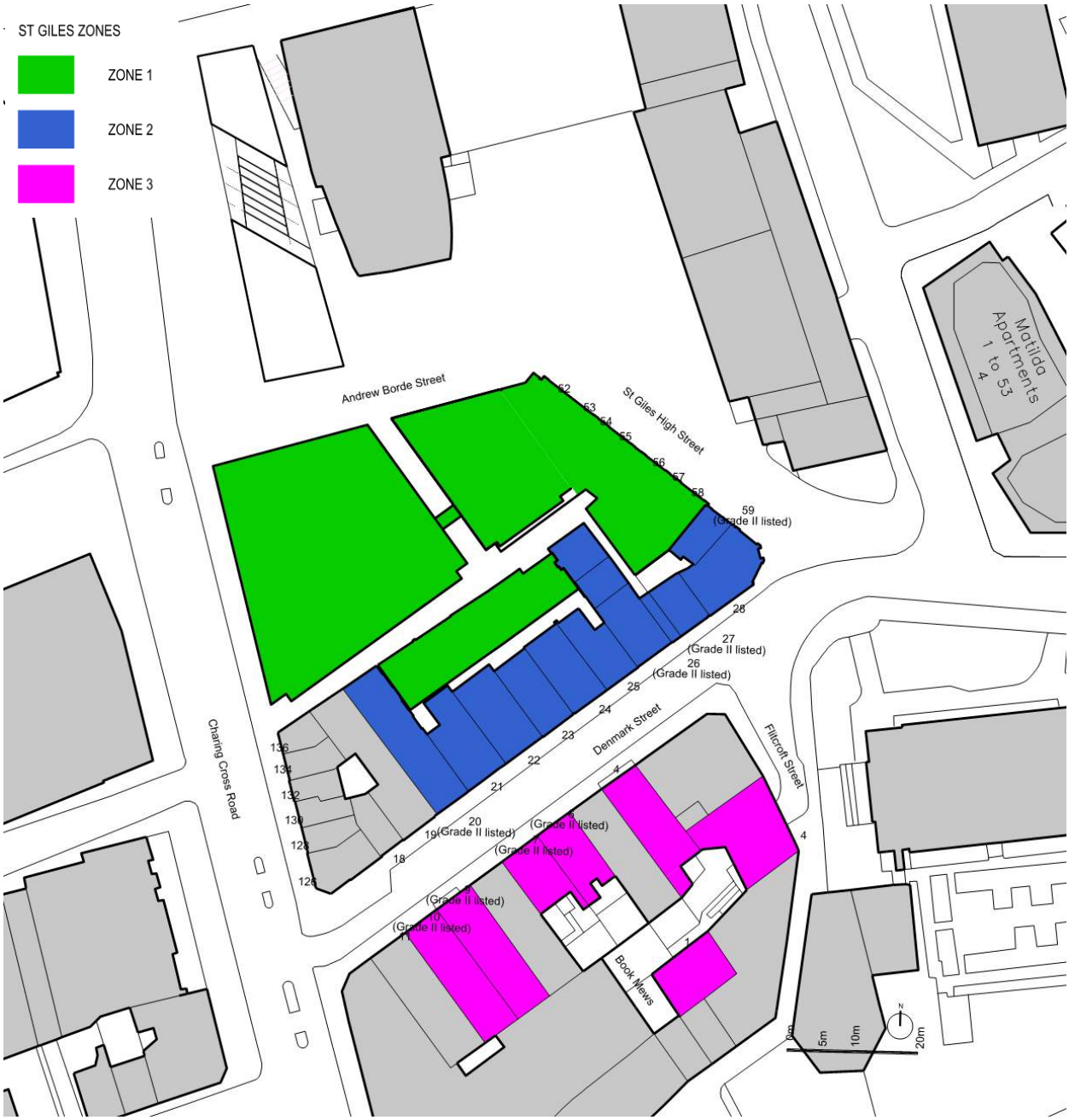


Figure 1.1 Site plan showing Zones 1 and 2 (North of Denmark Street) and Zone 3 (South of Denmark Street).

The information contained within this BIA has been produced to cover the information required within a BIA as set out by Camden Planning Guidance - Basements and Lightwells (CPG4, July 2015) including Camden Development Policies DP27 – Basements and Lightwells, in respect of the subterranean development proposal.

This BIA was previously submitted to support the December 2012 planning application for the project and has been updated to incorporate the results of the intrusive Site Investigation undertaken on the site by Concept Consulting between October 2014 and March 2015. The BIA has also been updated to align with the extent of the proposed basement in the Minor Materials Amendment (MMA) submission to Camden in June 2015 and the further Minor Materials Amendment (MMA 02) relating to the 'Smithy' (22 Denmark Place) due to be submitted to Camden in November 2015.

The purpose of this Basement Impact Assessment document is to outline the key points for the method of safe excavation and construction of the basement. It also sets out how the neighbouring buildings will be protected as well as local environment and amenity.

The topics covered within the appendices are extracts from relevant maps, Camden CPG4 Appendix with notes and relevant drawings for the scheme. The main contractor will liaise with London Borough of Camden and the local residents to ensure that the principles outlined are established in detail prior to the commencement of construction.

For further information on the civil and structural design of the basement and how it fits into the whole development please refer to the Zone 1 Civil and Structural Engineering Stage 3 Report (report number 029-S-Z1-REP-002 Rev 02) and the Flood Risk Assessment.

1.2 Proposed Works – St Giles Circus Site North of Denmark Street

The client is proposing to construct a new deep basement beneath the Northern part of the site. The approximate extent of the basement is shown in figure 1.2 below.

c

Figure 1.2 Approximate extent of new basements overlaid on ground floor plan.

The site is above the eastbound Crossrail running tunnel and above the new Northern Line escalator box that serves Tottenham Court Road station. As a result separate Conceptual Design Statement (report number 029-S-REP-001) and Ground Movement Impact Assessment (report number 029-Z1-REP-001), reports have been prepared for and reviewed by Crossrail in respect of the eastbound running tunnel. London Underground's infrastructure protection team have also been contacted and provided with details of the construction interface and movements associated with the basement construction around the Northern Line escalator box (see report number 029-S-REP-005) and Conceptual Design Statement (report number 029-Z1-REP-002). These documents assess the impact of the proposed scheme on the existing Crossrail and London Underground structures, therefore this BIA does not repeat the detail on the interaction between the proposed scheme and these structures. The above reports have been submitted to Crossrail and London Underground. Figure 1.3 shows the relationship between the basement's piled foundations and the Crossrail and London Underground infrastructure.

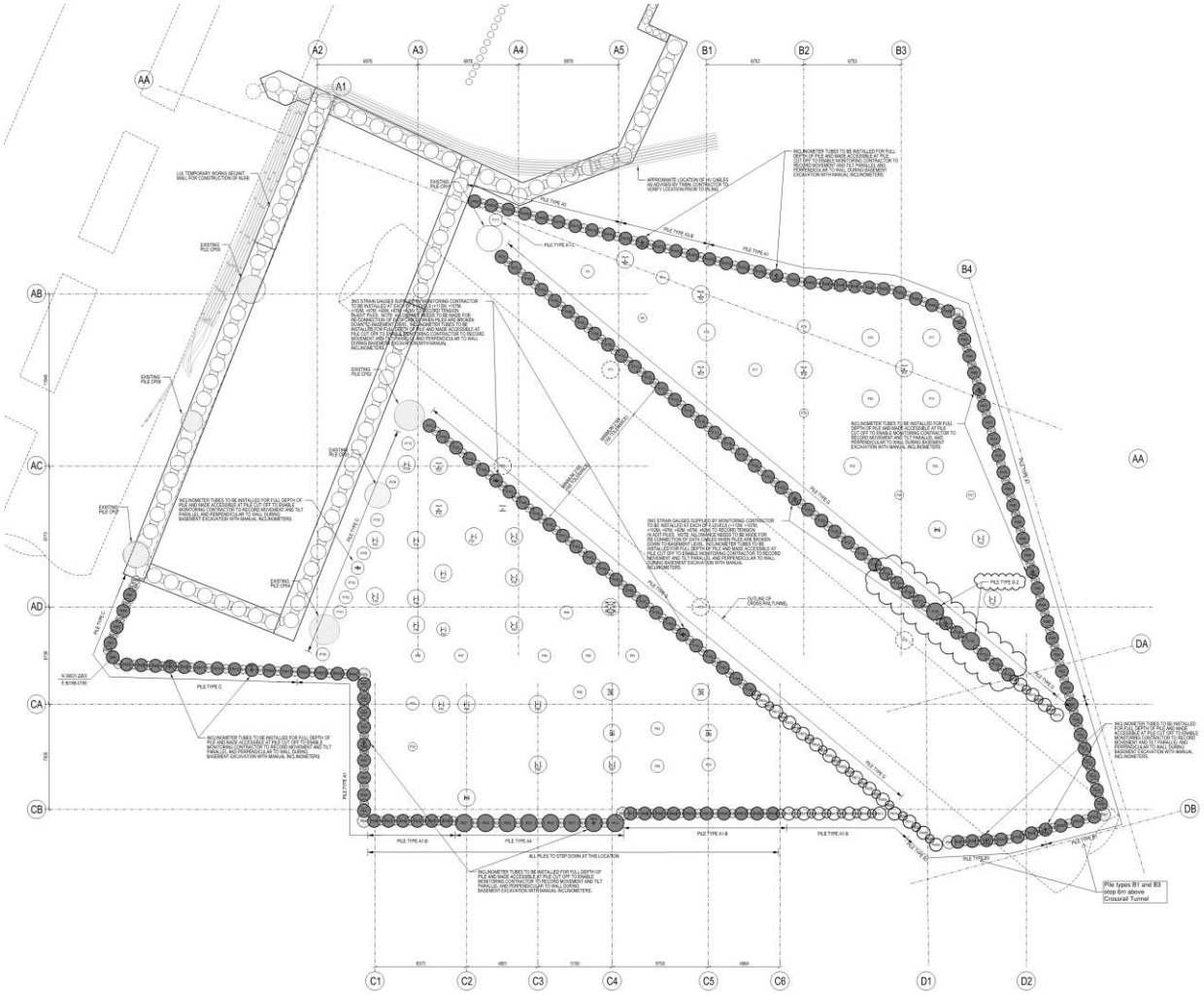


Figure 1.3 Piled foundations for new basement co-ordinated with London Underground and Crosrail infrastructure.

The new basement is proposed beneath the new buildings on the St Giles Circus project and will form an Event's Gallery for up to 800 people. The central part of the Event's Gallery is a column free space of approximately 18m x32m with the maximum clear height possible. A mezzanine is provided around the Event's Gallery to accommodate bars and ancillary activities. On the south side of the site, adjacent to Denmark Place, the depth of the basement is increased to accommodate the foul drainage sump and pump, lift pits and sprinkler tanks. A similar area of deeper basement is located on the north side of the site to accommodate air handing plant associated with the Event's Gallery. These areas of deeper basement are clear of both Crossrail and the Escalator Box. The footprint of the basement is constrained by the Escalator Box and Charing Cross Road to the west, Andrew Borde Street to the north, the retained facade on St Giles High Street to the east and the retained (some listed) buildings to the south on Denmark Place. Figure 1.4 shows an isometric of the basement and its relationship to the Crossrail and London Underground infrastructure.

The basement typically consists of an 11m deep excavation within embedded retaining walls, with areas of 15m deep basement to accommodate the foul drainage sump and pump, air handling plant and sprinkler tanks. The embedded retaining walls will be propped by the ground floor slab (top down construction); temporarily propped with steel shoring during excavation, and permanently propped by the basement slab, mezzanine slab and lower ground floor slab.

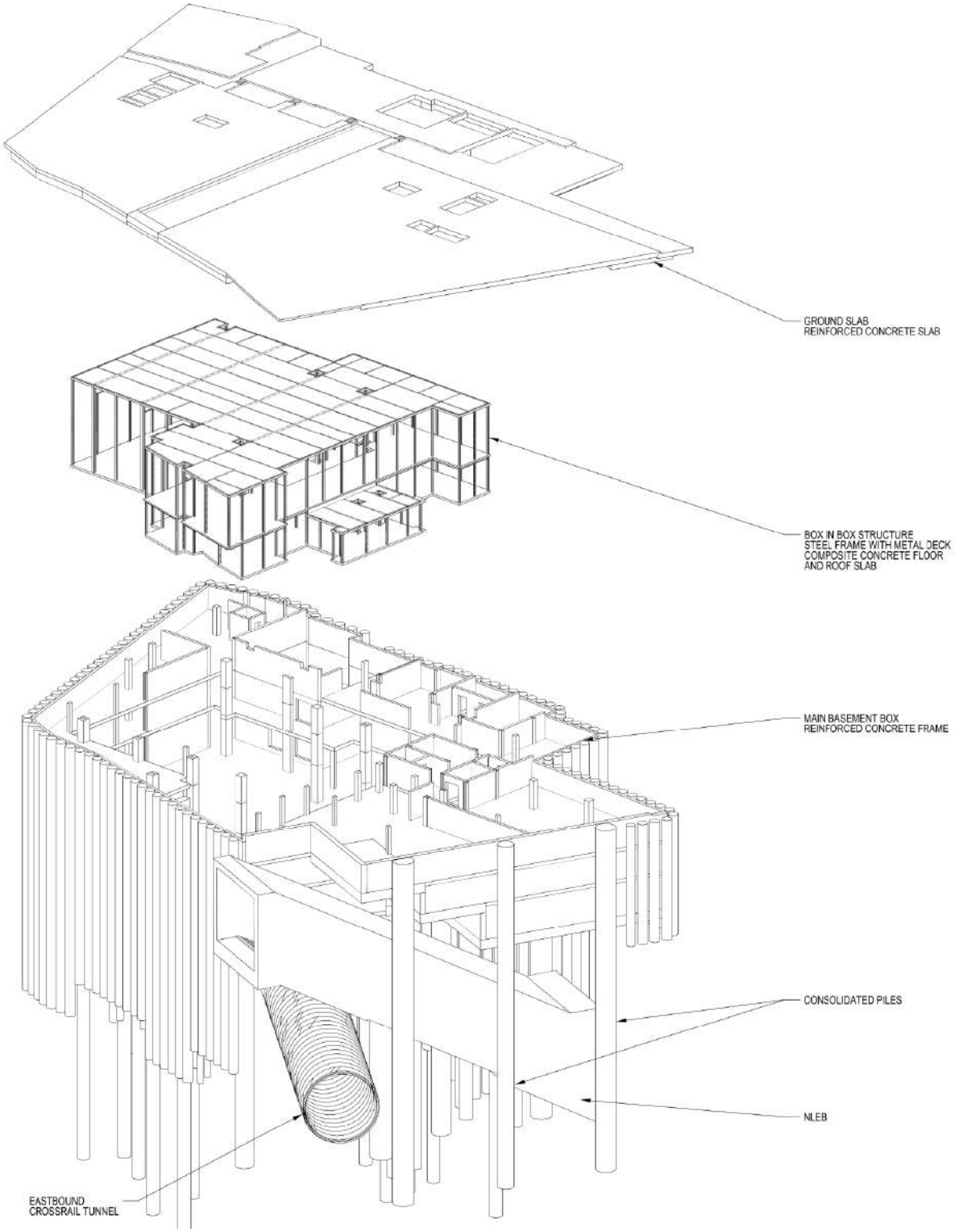


Figure 1.4 Exploded isometric of basement

On the South East corner of the site the existing basement slab at 28 Denmark Street will be replaced with a new basement raft slab to accommodate the increased load from the 4 hour fire rated box required for the new UKPN power supply for the St Giles Circus development. Existing masonry walls around the perimeter of 28 Denmark Street will be underpinned in order to achieve the headroom required in the UKPN room. The ground floor slab at 28 Denmark Street will also be reconstructed to achieve the 4 hour fire rating whilst maintaining the required headroom in the UKPN room. Temporary propping to the existing basement walls will be provided during the basement slab reconstruction and again during the subsequent ground floor slab reconstruction. The arrangement of the basement at 28 Denmark Street is shown in figure 1.5 below.

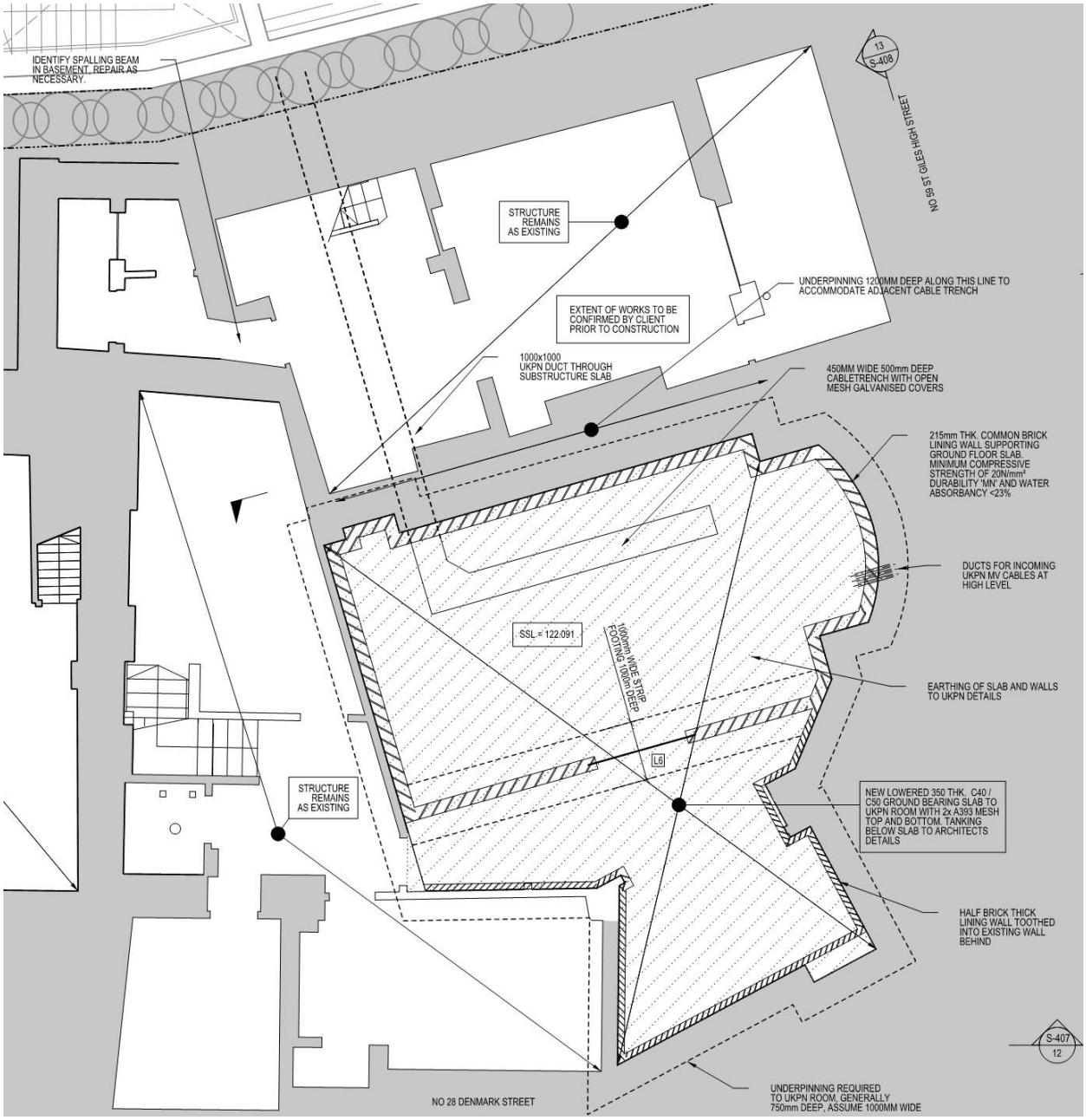


Figure 1.5: Rebuilt basement slab at 28 Denmark Street for incoming UKPN switch room.

The existing buildings on Denmark Street are provided with a lower ground floor approximately 3.0m below street level. These lower ground floors will abut the new basement below the new buildings at St Giles Circus. To the rear of 26 Denmark Street there is an existing building (23 Denmark Place) that does not currently have a lower ground floor. The MMA 02 proposes to dismantle 23 Denmark Place to facilitate the temporary relocation of 22 Denmark Place (the Smithy) during the main basement piling works. By temporarily relocating 22 Denmark Place the impact of the piling works on 22 Denmark Place is reduced. The interface of the basement construction with the Eastbound Crossrail tunnel beneath the site is also standardized, mitigating the risk of differential movements on both the Crossrail Tunnel and 22 Denmark Place. The revised construction sequence also enables a safer construction methodology and reduces the period required for construction of the basement, thereby reducing the risk that basement construction continues in parallel with operation of Crossrail.

After the piling operations, 22 Denmark Place will be repositioned in its original location and will be supported by piled foundations over the new basement construction, protecting this historic building from future ground movements. Please refer to the separate study prepared by Abbey Pynford for details of the proposed methodology for relocating 22 Denmark Place. Figure 1.6 schematically shows the sequence of works for temporarily relocating the Smithy and constructing the basement below.

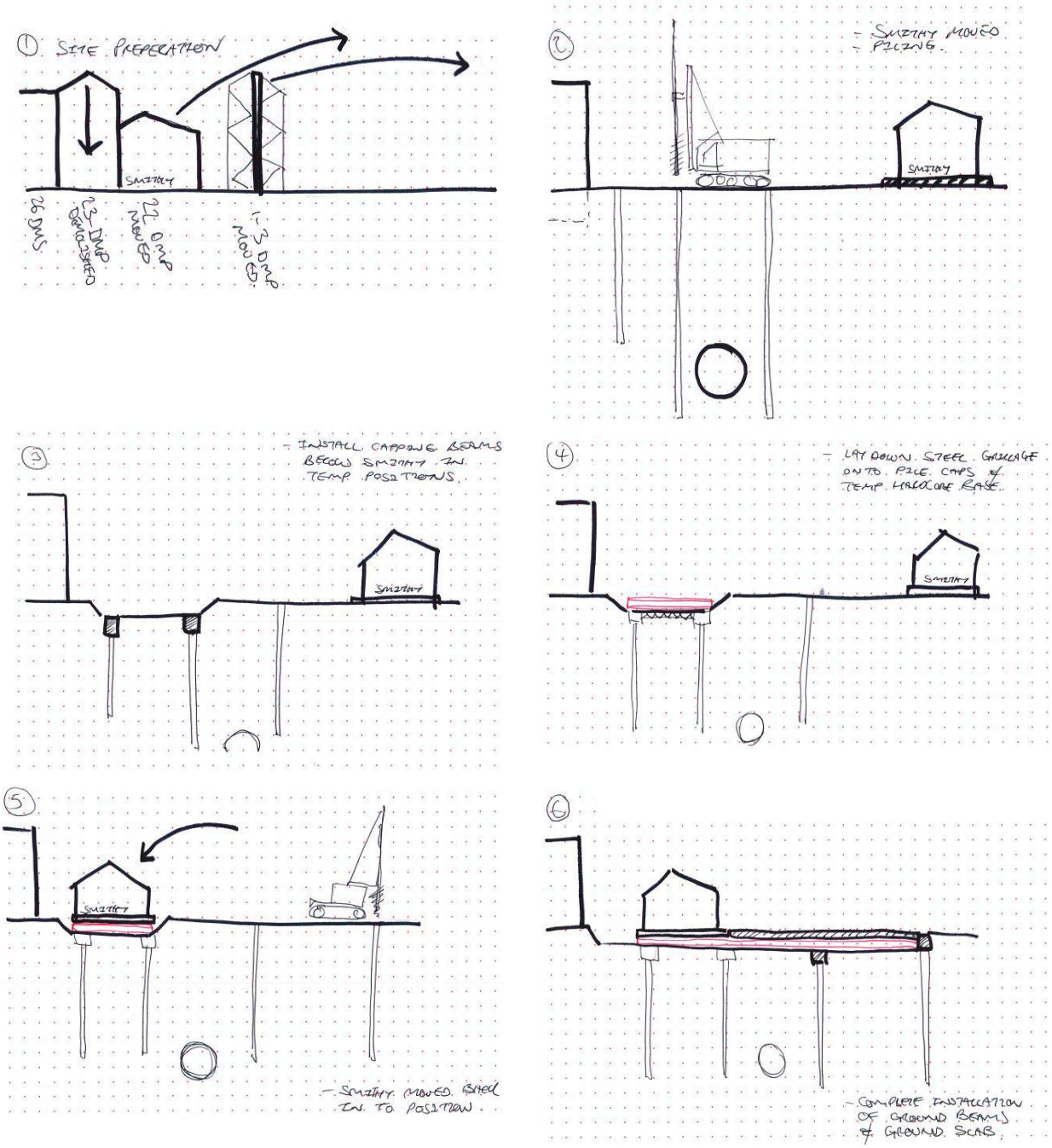


Figure 1.6: Temporary relocation of 22 Denmark Place (Smithy), during pilnig operations.

Following the removal of 23 Denmark Place it is proposed to extend the lower ground floor so that the existing lower ground floors of 26 Denmark Street and 25 Denmark Street are linked to the new basement below 23 Denmark Place (the Smithy). As the footprint of this extended lower ground floor is surrounded by existing lower ground floors and the new St Giles Circus basement, this extension will reduce the earth pressure on the existing retaining walls around 23 Denmark Place. Figure 1.7 shows the extent of the extended lower ground floor below 23 Denmark Place.

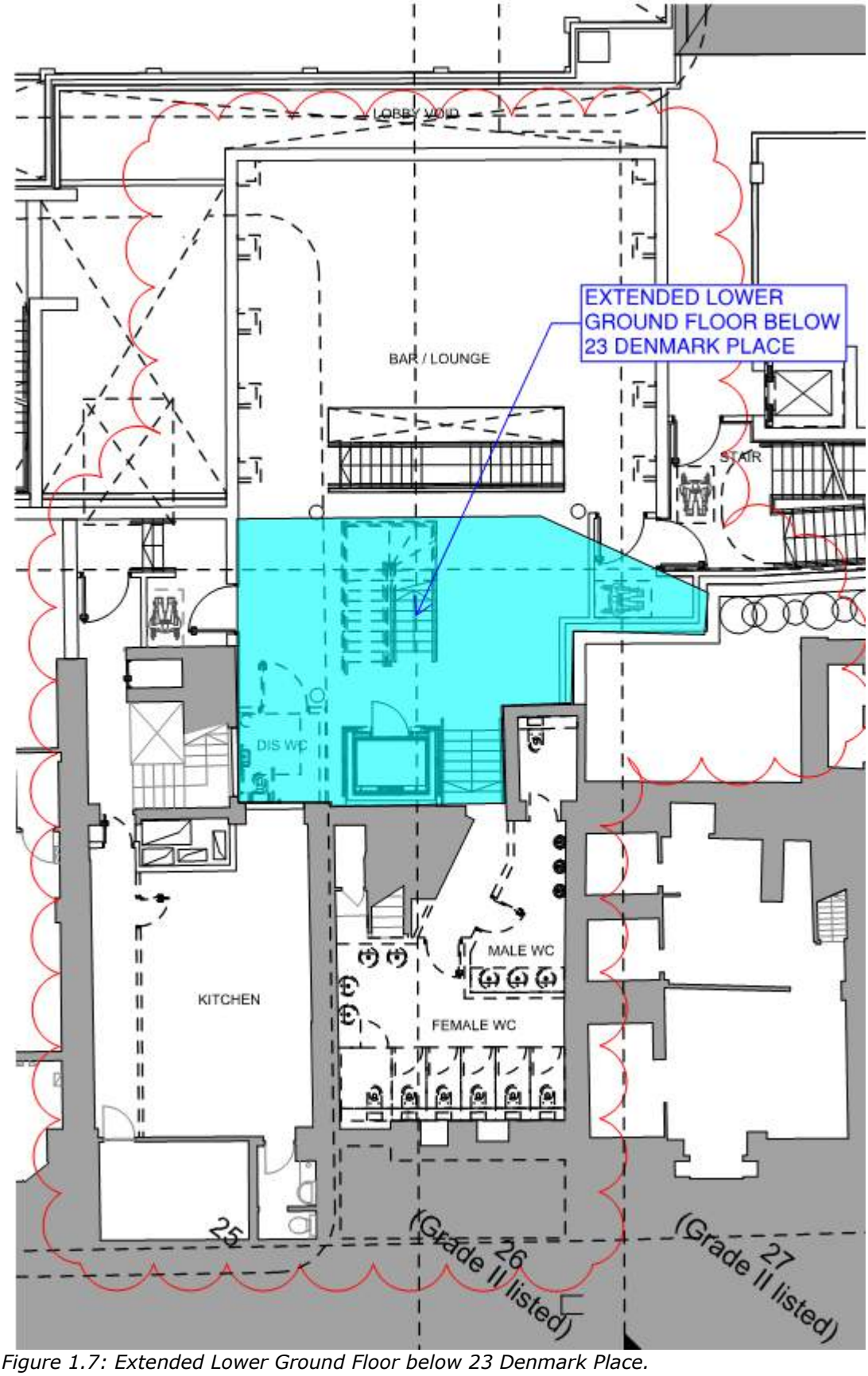


Figure 1.7: Extended Lower Ground Floor below 23 Denmark Place.

2 SCREENING

The following screening stage was reviewed to see the effect of the basement on the surrounding area. The following Figures 2.1, 2.2 and 2.3 outline the results of the screening stage within this BIA report and reference them to supporting information in the Appendices.

Figure 2.1-Subterranean (ground water) screening chart

Q 1a: Is the site located directly above an aquifer?	Yes	The site sits on the Lynch Hill Gravel Member, classified as Secondary A Aquifer, see Appendix A
Q 1b: Will the proposed basement extend beneath the water table surface?	Yes	Water table 21.0mAOD, see Appendix D
Q 2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No	See Appendix A
Q 3: Is the site within the catchment of the pond Chains on Hampstead Heath?	No	See Appendix B
Q 4: Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	No	Refer to Flood Risk Assessment
Q 5: As part of the 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	Refer to Flood Risk Assessment
Q6: 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 ponds chains on Hampstead Heath) or spring line.	No	See Appendix B

Figure 2.2 - Slope stability screening chart

Q 1: Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)	No	See Appendix A
Q 2: Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°? (approximately 1 in 8)	No	See Appendix A and C
Q 3: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°? (approximately 1 in 8)	No	See Appendix A
Q 4: Is the site within a wider hillside setting in which the general slope is greater than 7°? (approximately 1 in 8)	No	See Appendix A
Q 5: Is the London Clay the shallowest strata at the site?	No	The Lynch Hill Gravel is the shallowest strata at the site. See Appendix A
Q 6: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree zones where trees are to be retained?	No	See Appendix C

Q 7: Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	There is no evidence of heave related movement in the existing buildings See Appendix D
Q 8: Is the site within 100m of a watercourse or a potential spring line?	No	See Appendix A
Q 9: Is the site within an area of previously worked ground?	Yes	See Appendix A
Q 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?	Yes	See Appendix A, C, cut off wall provided into London Clay
Q 11: Is the site within 50m of the Hampstead Heath ponds?	No	See Appendix B
Q 12: Is the site within 5m of a highway or pedestrian right of way?	Yes	See Appendix A, C
Q 13: Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	See Appendix C, F
Q 14: Is the site over (or within the exclusion zone of) any tunnels e.g. railway lines?	Yes	Refer to CDS prepared for both Crossrail and LUL..

Figure 2.3 - Surface flow and flooding screening chart

Q 1: Is the site within the catchment of the ponds on Hampstead Heath?	No	See Appendix B
Q 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	See Appendix A and C
Q 3: Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	Refer to Flood Risk Assessment
Q 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	Refer to Flood Risk Assessment
Q 5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	Refer to Flood Risk Assessment
Q 6: Is the site in an area known to be at risk from Surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?	No	See Appendix B

3 INTERPRETATIVE REPORT

3.1 Site Investigation

An initial site investigation has been carried out at the site by STATS Ltd on behalf of Consolidated Developments Ltd (see figure 3.1). The works were carried out during the period between 8th April and 16th May 2008. A further site investigation has been carried out at the site by CONCEPT Ltd on behalf of Consolidated Developments Ltd (see figure 3.2). The works were carried out during the period between 28th October 2014 and 20th March 2015.

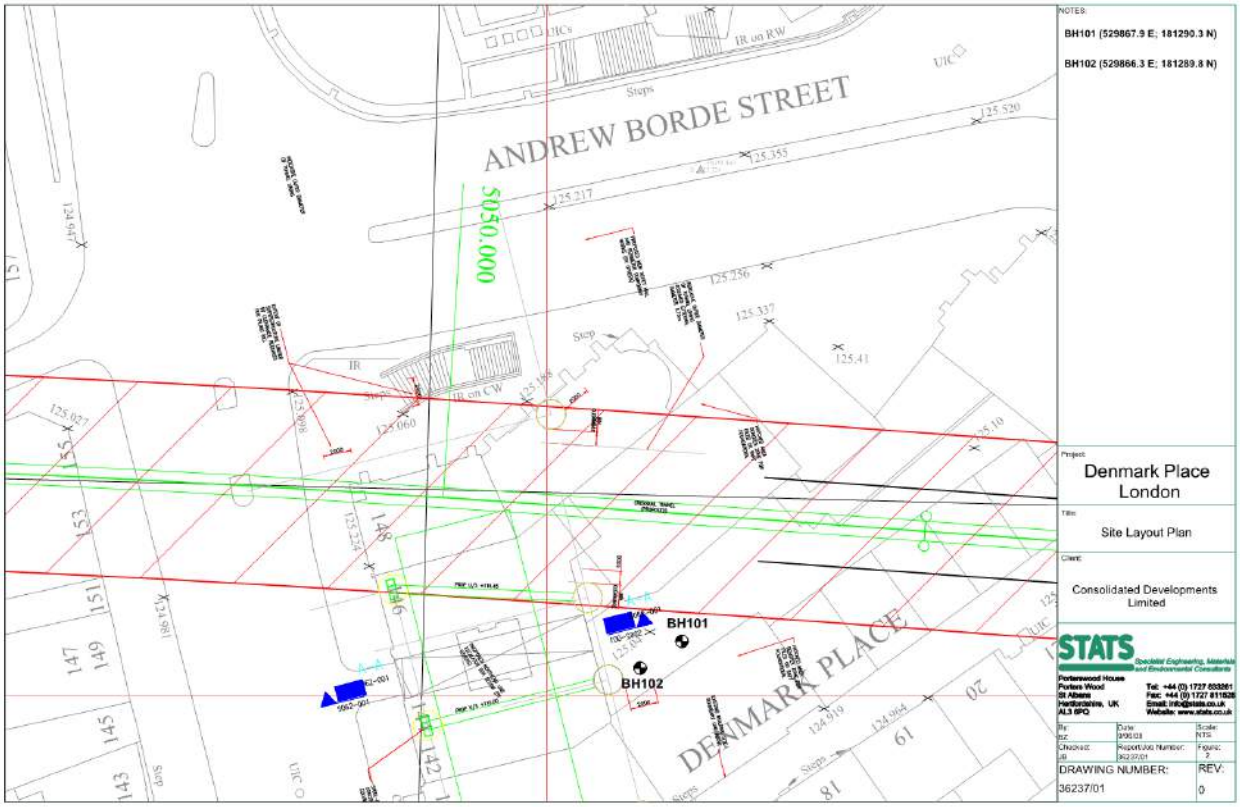


Fig 3.1 STATS Site Investigation Scope

The STATS investigation included the sinking of two cable percussive boreholes (BH) to a depth of 7.6mbgl. BH101 was extended to 63.5mbgl by rotary coring and BH102 was extended to 54.0mbgl using open hole rotary drilling. Nine self-boring pressuremeter tests were carried out within BH102 and further in-situ and laboratory testing was conducted. Four piezometers were installed to depths of 15.0, 24.1, 35.05 and 55.0mbgl.

Full details of the Ground Investigation are presented within the STATS Factual Report on Ground Investigation (STATS, 2008), included in Appendix D.

The site was returned to the client by London Underground following completion of the initial phase of the Tottenham Court Road station upgrade works and further intrusive site investigation was undertaken by CONCEPT to confirm the ground conditions over the remainder of the site and enable detailed design to commence (Figure 3.2). Two rotary boreholes (PB01 and PB02) were drilled to 55.3mbgl. Four piezometers were installed in PB01 from 9-30mbgl and one standpipe to 8mbgl was installed in PB02. Laboratory tests on core samples were conducted.

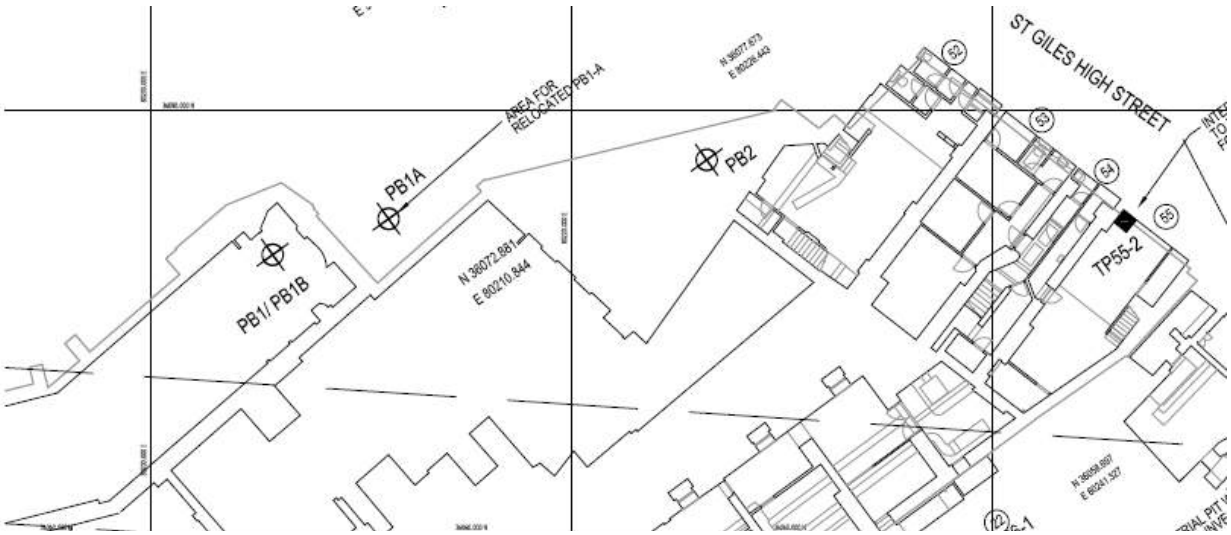


Fig 3.2 CONCEPT Site Investigation Scope

3.2 Stratigraphy

The investigations revealed the following strata:

Table 3.1 Design Stratum Levels

Stratum	Top Of Stratum Level		Thickness (m)	Description
	mAOD	mATD +100		
Made Ground	+25.10	125.10	3.90	Brick rubble and ceramic fragments changing with depth to slightly sandy gravely Clay.
Lynch Hill Gravel Member	+21.20	121.20	2.10	Dense to very dense, slightly silty sandy fine to coarse angular to subrounded Gravel.
London Clay	+19.10	119.10	24.50	Firm, becoming stiff and very stiff with depth, fissured locally thinly laminated Clay. Weak mudstone bands present between +12.70 and +3.55mOD.
Cohesive Lambeth Group	-5.40	94.60	13.60	Very stiff and hard, locally laminated, Clay becoming very dense laminated, locally silty, fine Sand with depth.
Cohesionless Lambeth Group	-19.00	81.00	1.80	
Thanet Sand	-20.80	76.30	4.60	Very dense silty fine Sand. A 0.7m thick layer of flint cobbles present at the base interface.
Chalk	-25.40	71.70	Proven to 10.7	Weak to moderately weak, medium density structured Chalk.

3.3 Groundwater

Groundwater was encountered in boreholes BH101 and BH102 with an initial strike 5.6m below ground in the Lynch Hill Gravel member. Groundwater monitoring took place between May and June 2008 and in PB01 and PB02 between November 2014 and March 2015, with a maximum recorded level of 21.0mAOD. The groundwater is perched above the London Clay which was shown to be under drained by piezometric monitoring.

A subsequent site investigation at 4 Flitcroft Street (see report number 029-S-REP-007) on the south side of Denmark Street in October 2012 confirmed the groundwater level 50m south of the proposed basement to be at between 20.1mAOD and 20.2mAOD in the Lynch Hill Gravels. The groundwater level was found to be similar in the most recent investigations also undertaken by CONCEPT on the south side of Denmark Street. This is consistent with a groundwater flow from north to south.

3.4 Geotechnical parameters

The recommended soil parameters used in the design are as follows:

Soil Parameter	Made Ground	Lynch Hill Gravel Member	London Clay	Upper Lambeth Group (cohesive)	Lower Lambeth Group (cohesionless)
Undrained strength	NA	NA	Above +7.6mAOD s_u=100kPa Below +7.6mAOD s_u=150+7.7z kPa where z is depth below +7.6mAOD	s_u=250+13.6z kPa where z is depth below -5.0mAOD	NA
Drained strength	Φ'=28° c'=0	Φ'=36° c'=0	Φ'=24° c'=0	Φ'=24° c'=0	Φ'=33° c'=0
Stiffness (MPa)	E=10 Mpa	E=60 MPa	Above +7.6mAOD E_u=80MPa (total stress) E'=0.8*E_u (effective stress) Below +7.6mAOD E_u=120+6.35zMPa (total stress) E'=0.8*E_u (effective stress) where z is depth below +7.6mAOD	E_u=250+13.6zMPa (total stress) E'=0.8*E_u (effective stress) where z is depth below -5.0mAOD	E= 320 MPa
At rest earth pressure	k_o=0.53	k_o=0.41	k_o=1.5	k_o=1.5	k_o=1.25
Unit weight (kN/m^3)	γ=18.0	γ=20.0	γ=20.0	γ=20.0	γ=20.0
Poisson's Ratio	0.2	0.2	0.5 undrained 0.2 drained	0.5 undrained 0.2 drained	0.2

These values are interpreted from the STATS geotechnical investigation and were agreed with London Underground for the design of the Consolidated Piles on the site that were designed by Buro Happold. The Consolidated Piles were installed as part of the Tottenham Court Road station upgrade works. Additional model specific parameters have been derived from the most recent site investigation for the finite element modelling required for assessment of the LUL and Crossrail assets.

3.5 Earthworks and drainage

The proposed basement involves significant excavation to a depth of 11m over the majority of the footprint and 15m for the foul water pumping station, air-handling plant rooms and sprinkler tanks. In these cases the underside of the basement slab will be in the London Clay. The removal of this amount of overburden following demolition would normally result in a significant heave as the London Clay and Lambeth Groups swell over a period of time. Such movements are conventionally dealt with by providing a compressible void former below the basement slab and suspending the basement slab on piled foundations. In the case of the St Giles Circus basement such a system could locally have a negative impact on the eastbound Crossrail tunnel that runs under the site. Therefore a system of heave restraint using tension piles and adit beams constructed above the Crossrail tunnel prior to bulk excavation above the tunnel is proposed. Details of this heave restraint system and supporting calculations are provided in the CDS and GMIA (see reports 029-S-REP-001 and 029-S-Z1-REP-001) and are therefore not repeated here. Outside the zone of the eastbound Crossrail tunnel a conventional void former is proposed below the basement slab.

The demolition of some of the existing buildings on the site and the excavation will generate a large volume of material to be removed from the site. In order to avoid the busy Charing Cross Road and Denmark Street it is proposed to remove material from the site from the north side and then via St

Giles High Street. A more detailed assessment of the construction traffic generated and routes to and from the site is being prepared by Skanska, the Principal Contractor.

In order to maintain slope stability during the excavation a system of embedded secant piled retaining walls with capping beams is proposed around the perimeter of the basement. These walls will be constructed from a piling mat at existing ground level and will form a cut off wall into the London Clay. The overlap between the hard-firm secant piles is sized to allow for construction tolerances on both position and verticality and will ensure that the perched ground water as well as the fines in the made ground and Lynch Hill Gravels are retained. Bored piles with temporary steel casings or CFA piles will be used to control ground loss during the piling operation.

Prior to excavation the ground floor slab will be cast to provide a permanent prop to the basement retaining walls thus reducing the horizontal movement of the retaining walls compared to a conventional open excavation. The early construction of the ground floor slab will also provide a working platform across the footprint of this tight site. Within the secant piled retaining walls excavation will proceed to the basements North and South of the Crossrail tunnel whilst leaving the overburden in place directly above the Crossrail tunnel. In line with the construction sequence identified in the CDS, the heave restraint system will be constructed before the overburden above the Crossrail tunnel is removed.

Bulk excavations within the retaining walls will use 'mole holes' in the ground floor slab to remove the excavated material. A system of temporary props to the excavation will be installed once the excavation proceeds to a level of approximately +20mAOD. The excavation will then proceed to the formation level of the B1 basement (approx. +14mAOD). The B1 basement slab will then be cast to prop the perimeter retaining walls. Mole holes will also be formed in the B1 basement slabs to enable excavation of the B2 basement whilst lining walls and internal structures are constructed above the B1 basement slab. The slabs at Basement Mezzanine and Lower Ground Floor levels will form the permanent props to the perimeter retaining wall allowing the removal of the temporary props..

Upon completion of the B2 basement slabs adit beams will be constructed from timber headings between the B2 basements to form part of the heave retention system. Once the heave retention system is completed the basement excavation above the Crossrail tunnel can be completed from mole holes in the ground floor slab. Where the toe depth of the retaining wall is limited by the Crossrail or London Underground infrastructure a third level of props will be installed just above proposed basement slab level. Upon completion of the basement excavation the adit piles between the B1 slab and the ground floor slab can be broken down.

An assessment of the predicted ground movements as a result of the basement excavation and earlier Crossrail tunnel construction is presented in Appendix F.

As the perched groundwater on the site will be cut off from the surrounding aquifer by the secant piled wall there is no need for long term drainage of groundwater from the site. It is envisaged that the groundwater trapped within the excavation will be dewatered by local sump and pump just ahead of the excavation and removed via tanker to a controlled waste facility. In the permanent condition the secant piled wall will be lined with an in situ reinforced concrete wall that is designed to resist the water pressure and will either be designed as a water resisting concrete structure with sufficient reinforcement to limit crack widths to less than 0.2mm, or will be provided with an additive to make the concrete water resisting. A drained and ventilated cavity will be provided inside this liner wall to deal with water vapour.

The existing sewer on Denmark Place will be stopped up at the boundary of Charing Cross Road to enable construction of the proposed basement. As this sewer serves the buildings on Denmark Place that will be demolished it is not envisaged that existing connections will need to be reconnected beyond any connections from Sheldon Mansions and Nos 15 and 16 Denmark Place. A divestment of the sewer has been agreed with Thames Water. The demolition and enabling works will divert existing drainage from the client's property at 21 Denmark Street to the existing drainage network on Denmark Street.

The surface water connections for the existing buildings that are retained on the site will be maintained wherever possible with all connections on Denmark Street and the connection for 59 St Giles High Street continuing in use. Where new buildings are constructed the drainage will pass through an attenuation system prior to discharge. The proposed attenuation systems are identified in the Flood Risk Assessment.

The total run off from the North of Denmark Street site (including retained buildings) in response to a rainfall event with an annual probability of 1% will be 16.2 litres per second. This compares with 51.5 litres per second pre-development.

Two attenuation tanks will be located in the new basement at lower ground floor level: in the North East corner of the site adjacent to St Giles High Street; and in the South West corner of the basement where Denmark Place meets Charing Cross Road. Given the invert levels of the existing sewers it is proposed to gravity drain from the attenuation tanks to the combined sewers on Charing Cross Road and St Giles High Street.

The foul water connections for the existing buildings that are retained on the site will be maintained wherever possible with all connections on Denmark Street and the connection for 59 St Giles High Street continuing in use. The foul water from the new buildings at and above existing ground level will be collected at high level in the basement and discharged into the existing combined sewers on Charing Cross Road and St Giles High Street. Where possible existing final connections from the site to these sewers will be used.

The Event's Gallery in the basement generates a significant foul water flow at low level. As this is below the invert level of the existing combined sewer a foul water sump and pumping chamber is provided at basement level 2. The sump is sized to provide in excess of 24 hours storage capacity. A rising main is provided from the foul water pumping chamber to a connection to the existing combined sewer on Charing Cross Road. The use of a foul water sump and pumping chamber also enables the attenuation of peak foul water flows generated by usage of the Event's Gallery.

3.6 Retaining Wall Design

The embedded secant piled retaining wall is required to resist surcharge loads and earth pressures generated by the basement excavation in both the temporary and permanent conditions and water pressures in the temporary case. As noted above a system of temporary props is envisaged during the construction phase to reduce the vertical span of the retaining wall and therefore reduce the deflection of the retaining wall and associated horizontal and vertical movements of the surrounding ground.

In the permanent condition the retaining wall will be propped by the basement slab, the ground floor slab and usually (but not in all cases) the basement mezzanine and lower ground floor slabs which will transfer the horizontal pressures across the basement footprint to the balancing horizontal pressures opposite. As there is negligible fall across the site there will be no significant out of balance forces on the basement.

In order to accommodate a rise in groundwater level or the accidental discharge of a large water main the retaining liner wall is designed to resist a water pressure 1.0m below existing ground level. The provision of the drained cavity inside the retaining wall will enable the basement to achieve grade 3 in accordance with BS8102:2009.

The laboratory testing from the site investigations indicate that some soil samples have a sulfate level requiring a design sulfate class of DS-2 in accordance with BS8500 Part 1.

4 ISSUES BROUGHT FORWARD FOR SCREENING AND FURTHER STUDY

Subterranean (ground water) screening chart

Q1

The site is located on the Lynch Hill Gravel Member (Appendix A Fig.1) which is designated by the Environment Agency (EA) as a "secondary A" aquifer (Appendix B Fig.1). The topography of the site is such that the land falls very slightly from North to South. The fall on the base of the aquifer is not mapped in great detail, but results from the site investigations on this site and at 4 Flitcroft Street show that the top surface of the London Clay generally falls southwards towards the River Thames.

Q1a
Possible Impact: The construction of a basement across the flow of ground water will direct the ground water flow around the basement and could lead to increased water levels immediately upstream of the development and reduced ground water levels immediately downstream of the development.

Site Conditions: Ground water monitoring undertaken as part of the site investigation indicates a perched water table at 21.0mAOD, this is consistent with the invert level of the brick sewers in the proximity of the site. The proposed development uses embedded retaining walls into the London Clay. Immediately to the north of the development are Centre Point and Tottenham Court Road tube station, which are assumed to be upstream of the ground water flow in the Lynch Hill gravels. Both of these existing developments have subground structures which extend below the Lynch Hill gravels (which are 3.5m to 6m below ground level). These structures will have affected the ground water flow within the Lynch Hill gravel. South of the proposed basement are the masonry buildings on the north side of Denmark Street, which are founded on the Lynch Hill Gravel Member and generally have basements at a level of +21.5m AOD. These buildings are owned by the client.

Impact Assessment: The Tottenham Court tube station and Centre Point, upstream of the proposed development, are unlikely to be affected by any rise in water level in the gravels caused by the proposed development. If, as is assumed, these structures penetrate the ground water they will have tanked basements/subground structures. The masonry buildings to the south of the proposed basement may experience some reduction in ground water levels as a result of the basement construction which would increase the bearing capacity of the existing footings and reduce the risk of ground water flooding, however this is unlikely to be significant as the Tottenham Court Road and Centre Point developments will already have impeded ground water flow from the north.

Q1b

Possible Impact: As the new basement will extend below the water table surface, water seepage into the basement could cause flooding.

Site Investigation: The CONCEPT site investigation (Appendix D) proved the perched water table to be at 21.0mAOD, demonstrating that the Lynch Hill Gravel Member contains a perched water table above the London Clay.

Impact Assessment: The embedded secant piled retaining walls around the proposed development will form a cut off wall into the London Clay around the footprint of the development, that will reduce ground water inflow from the perched water table sufficiently to enable excavation of the basement. The design of the embedded retaining wall ensures that sufficient overlap/interlock is provided between adjacent piles to allow for both vertical and positional tolerance for the full depth of the Lynch Hill gravel formation. A water-resisting reinforced concrete basement slab and liner wall will then be cast inside the embedded wall to prevent any significant water ingress into the basement. This basement structure is designed to resist the water pressures and uplift resulting from a water table at the top of the Lynch Hill gravel formation. Finally a drained cavity system inside this concrete liner will drain to a sump to collect any residual ground water seepage. The sump will be provided with duty and standby pumps.

The proposed method of basement construction with embedded retaining walls is common in London, and has indeed already been used on the site for the construction of the Northern Line Escalator box. London Underground recorded minimal water ingress during basement construction. The provision of a drained cavity inside the basement box provides a second line of defense and allows the inspection, identification and repair of any defects during construction. Finally the basement is to be used as an entertainment venue, therefore there will be no inhabited rooms in the basement.

Slope stability screening chart

Q9: The site is in a Central London location which has been developed for hundreds of years. The most recent buildings to be demolished on the site were demolished in 2009 to enable construction access for the upgrade of Tottenham Court Road station. Historical maps dating back to 1875 show that the site was previously in the grounds of St Giles Hospital, but was already fully developed by that time.

Possible Impact: The presence of previous developments on the site increases the risk of slope instability during excavation due to variable ground conditions, particularly with made ground. Previous uses also increase the risk of contamination being present on the site and being disturbed by the excavation. The risk of potential contamination was considered separately in the EIA and has been further addressed by a programme of site investigation and testing undertaken by CONCEPT. For full details of the results of this testing and recommendations refer to the 'Land Contamination Assessment of St Giles Circus (Initial Phase – Northern side of Denmark Street)' prepared by LBH Wembley and submitted to Camden in May 2015.

Site Investigation: The site investigations (Appendix D) identified a variable depth of made ground across the site. The lowest pocket of identified made ground was at +20.7mAOD, which is consistent with the construction and reconstruction of basements on the site.

Impact Assessment: Potential slope instability that could be triggered by basement excavation is controlled by the construction of an embedded retaining wall around the perimeter of the basement excavation. The retaining wall is designed to resist the worst combination of earth and water pressures that result from variable depths of made ground, and has been shown to extend well below the maximum depth of made ground, such that the made ground will not adversely affect the stability of the embedded part of the wall. There are no existing slopes with a significant gradient (eg greater than 1 in 20) within the vicinity of the development.

Review: The embedded retaining wall around the basement prevents any previously worked ground from causing a potential slope instability in or adjacent to the proposed basement footprint.

Q10: The site lies on the Lynch Hill Gravels which is designated as a secondary aquifer by the Environment Agency.

Possible Impact: The presence of ground water within the strata on the site, and any changes in ground water level could reduce the stability of slopes on or around the site. Similarly any increases in ground water level could adversely affect the bearing capacity of strata around the site. Finally any de-watering of the surrounding area could result in shrinkage affecting the adjacent properties.

Site Investigation: The CONCEPT site investigation proved the perched water table to be at 21.0mAOD, demonstrating that the Lynch Hill Gravel contains a perched water table above the London Clay. The existing buildings on the site were shown to be founded on the Lynch Hill Gravel.

Impact Assessment: There are no existing slopes with a significant gradient (eg greater than 1 in 20) within the vicinity of the development, therefore existing slopes will not be adversely affected by groundwater. Upstream of the development all buildings within 50m of the new basement (Centre Point, Tottenham Court Road Station, Goslet Yard) are of post-war construction and have deep piled foundations or deep basements that will not be affected by any increase in ground water level as a result of the basement. Immediately downstream of the proposed basement the existing buildings are owned by the client and are founded on the Lynch Hill Gravels. As ground water flows are limited around the basement and the basement is constructed with embedded retaining walls that cut off into the London Clay, it is unlikely that the ground water level will change materially, however any change in ground water level south of the site would be a reduction that would benefit the bearing capacity of the existing buildings. During construction the embedded retaining walls will form a cut-off wall into the London Clay that will prevent ground water flowing into the excavation. The only de-watering will be within the excavation footprint to remove the water initially trapped by the piled walls.

Review: The proposed basement construction will not adversely affect the ground water levels in adjacent properties with spread footings.

Q12: The proposed basement is within 5m of the pedestrian right of way along Charing Cross Road, Andrew Borde Street and St Giles High Street.

Possible Impact: Excavation close to existing highways or pedestrian rights of way could adversely affect the stability of the infrastructure and cause damaging settlement to both the street and any associated utilities.

Site Conditions: The existing buildings on St Giles High Street and the recently demolished (2009) buildings on Charing Cross Road have vaulted basements that extend under the street, with conventional masonry walled basements on the site. Similar basements existed on the site of Andrew Borde Street before the demolition of the buildings to create the street.

Impact Assessment: On the Charing Cross Road frontage a temporary secant piled wall has already been constructed for most of the proposed basement's length to enable the construction of the new escalator box to the Northern Line. A new permanent basement wall will be constructed within this temporary wall to restrain the Charing Cross Road frontage. The same principle was used for the construction of the escalator box within the temporary secant piled wall. Any existing vaults on Charing Cross Road that have not already been filled will be back filled with foamed concrete. On the remainder of the Charing Cross Road basement frontage, and on the Andrew Borde Street frontage a new embedded pile retaining wall will be constructed that will retain the existing Street and associated services. On the St Giles High Street frontage the existing façade is to be retained (see report number 029-S-REP-004) and a new embedded pile retaining wall is to be constructed immediately inside the line of the existing façade. The existing vaults on St Giles High Street will be back filled with foamed concrete.

The design of the embedded secant pile retaining wall ensures that sufficient overlap/interlock is provided between adjacent piles to allow for both vertical and positional tolerance for the full depth of the made ground and Lynch Hill Gravels to prevent loss of groundwater or fines into the excavation.

During excavation the retaining wall will be propped by the ground floor slab (top down construction) and at +20mAOD to control deflections and resultant ground movements. In the final condition the retaining wall will be propped by the basement slab, the mezzanine slab and the lower ground floor slab as well as the ground floor slab. The temporary and permanent propping systems are designed to resist earth pressures, water pressures and a surcharge load of 20kN/m2 from the street. An assessment of the predicted movements resulting from retaining wall construction and basement excavation has been prepared and is presented in Appendix F. Horizontal deflections on the retaining wall system will be limited to a maximum of 15-20mm.

Review: The proposed embedded basement retaining wall will prevent excessive movement of the surrounding streets and utilities. The infilling of the existing vaults under the streets immediately adjacent to the basement development prior to excavation will reduce the risk of over-loading the vaults either during construction or in the future.

Q13: Yes, the proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties.

Possible Impact: Excavation below the founding level of existing buildings will inevitably cause some movement or settlement of the existing building. In addition, a number of utilities are located in proximity of the site perimeter and may be affected by the ground movements induced by the excavation and basement construction.

Site Conditions: The existing buildings to the south of the proposed basement are owned by the client and will be refurbished as part of the development. Generally they are of masonry construction with basements founded at a depth of approximately 3.0m in the Lynch Hill Gravels. Behind the listed building at 26 Denmark Street are two properties (22 and 23 Denmark Place) which do not have a basement and are therefore likely to be founded at less than 1.0m.

Impact Assessment: A study has been carried out to assess the likely impact of the proposed basement construction on the neighbouring existing buildings/structures and services, including:

i) the existing buildings along the southern side of the proposed basement (north of Denmark Street)
ii) the Northern Line escalator box
iii) the brick sewers (section height exceeding 1.2m) located along Denmark Street, St Giles High Street and Charing Cross Road.

It is worth noting that the assessment considers ground movements induced by the Crossrail eastbound tunnel construction, in addition to the movements induced by the proposed basement. Details of the assessment undertaken are presented in Appendix F. In summary:
- the buildings along the southern site boundary would be subject to varying degrees of damage (according to the Burland 1995 damage classification). The vast majority of them would experience Negligible to Very Slight damage, five walls would have Slight damage, four walls Moderate damage and one Severe (23 Denmark Place)
,- observations following the construction of the Crossrail tunnel have shown that both 22 and 23 Denmark Place have experienced movement and damage, particularly at the joint between the two buildings.
- the escalator box would be subject to maximum horizontal movement in the order of 17mm (Slight damage). This figure is considered to represent a conservative upper bound, in view of the relatively simplistic 2D assumptions made in the assessment. Further assessment prepared for the LUL CDS has shown that the long term movement of the escalator box is likely to be in the order of 5 to 7mm.
- the substantial brick sewers along Denmark Street, St Giles High Street and Charing Cross Road would be subject to Negligible to Very Slight damage.

In view of the Severe and Moderate damage identified in the study to 22 Denmark Place (the 'Smithy') and 23 Denmark Place at the rear of 26 Denmark Street, an alternative basement construction method has been developed that will protect the existing single storey structure at 22 Denmark Place during the piling and basement construction and maintain a consistent interface between the new basement and the Crossrail tunnel.

The proposed basement construction method separates 22 Denmark Place from 26 Denmark Street by dismantling 23 Denmark Place. This enables a new concrete raft slab to be constructed under 22 Denmark Place and the building to be temporarily relocated during the piling operation under the footprint of the building. Please refer to the separate report prepared by Abbey Pynford for details of the methodology for protecting and relocating 22 Denmark Place. Once the piling operation is complete 22 Denmark Place will be returned to its original location and supported off piled foundations. MMA 02 assess the planning implications of dismantling 23 Denmark Place.

The existing rear wall of 26 Denmark Street has experienced previous movement and has been shown to have existing footings of variable depth, it was therefore previously proposed to underpin this wall to maintain a consistent depth of footing and also maintain the footings at the same depth as the party wall between 25 and 26 Denmark Street. On the footprint of 23 Denmark Place a new Lower Ground Floor slab is constructed between the existing retaining walls that form the boundaries to 25 and 26 Denmark Street, this Lower Ground Floor slab will not extend below the depth of the adjacent underpinned walls. It is important that the underpinning works to 26 Denmark Street are completed before extending the Lower Ground Floor. The new Lower Ground Floor has been kept away from the listed building at 27 Denmark Street so that the excavation of the Lower Ground Floor is clear of the zone of influence of the retaining wall and footings.

This alternative basement construction will reduce the damage to the buildings on the southern side so that only four walls would have Slight damage (136 Charing Cross Road, front and rear, and 59 St Giles High Street, front and side adjacent to new basement) and three walls Moderate damage (around 16 Denmark Place). The buildings from 20 to 28 Denmark Street, 16 Denmark Place and 59 St Giles High Street are included within the development and will be refurbished as part of the development, ensuring that any necessary repairs as a result of the basement construction will be undertaken as part of the works. The remaining buildings identified in the study (18 to 19 Denmark Street, 15 Denmark Place and Sheldon Mansions) are owned by the client.

Review: The impact assessment undertaken indicates relatively limited impact of the proposed basement construction on adjacent structures, infrastructure and services. In order to further reduce the impact of the basement construction a monitoring system has been installed on the existing buildings to identify movements resulting from the works and ensure that the movements are in line with those predicted. In the event that the measured movements exceed those predicted the workmanship of the basement construction will be reviewed to ensure that correct procedures are being followed and mitigation measures such as compensation grouting, increased propping or underpinning will be undertaken.

5 SURVEYS

This report is based on site survey, search of current and historic ordnance survey maps and geological maps of the area, as presented in the Appendices.

6 SITE HOARDINGS AND SECURITY

It is intended that the perimeter of the site will be protected by hoardings with a vehicular and pedestrian gate which will be secured at night. All necessary permits will be obtained by the main contractor prior to start of relevant works.

With the exception of the temporary facade retention structures on St Giles High Street, the hoarding will be positioned wholly within the site boundary and will not adversely affect the highway, associated pavements or boundary walls and will act to reduce noise emanating from the site during the works.

Safety signage will be installed on the hoarding as necessary at points of access to the site and around the boundary. In additional the hoarding will also have Considerate Constructors Scheme Signs (which the contractor will be required to register with), details of the developer and consultants and contact numbers the site manager.

7 HEALTH, SAFETY AND ENVIRONMENT

Health, Safety and Environment is an integral part of the planning process for each project. Implementation of a comprehensive Health, Safety and Environmental System and Procedures ensures every facet of the construction process is planned, managed and monitored. This also ensures compliance with statutory obligations.

Noisy working hours will be in accordance with the Planning Consent.

8 CONSTRUCTION METHODOLOGY

8.1 Pre-Construction

During the preconstruction phase of the project the contractor will undertake a full review of the scheme and all background information.

The contractor will follow Camden's Considerate Contractors Manual this will involve incorporating the Guide for Contractors Works in Camden within the Construction Management Plan.

8.2 Logistics

As with all construction projects, the efficient and effective management of the site logistics is paramount to the success of the project. The logistical challenges posed by the construction of the structure call for a robust and carefully considered management plan to ensure the programme is met and that disruption to the neighbours and transport routes are kept to a minimum. For further information on the proposed logistics and traffic management associated with the basement construction refer to the Construction Management Plan that is being prepared by Skanska, the Principal Contractor.

8.3 Neighbourhood Liaison

During the project the contractor will ensure that all works are carried out safely and in such a manner that it will not inconvenience pedestrians or other road users and with a positive consideration

of the needs of the local residents, site personnel and visitors as well as the general public. If necessary, airborne dust will be dealt with by dampening down areas with water prior to the works being undertaken.

Public footways and carriageways will be kept tidy, in safe condition and regularly inspected and washed down. Hoardings, safety barriers, lights and other features will be maintained in a safe and tidy condition. The site is to be kept clean and in good order at all times with surplus materials and rubbish controlled within the site and not allowed to spill over into the surroundings.

In addition to this, working times as stipulated within the contract particulars will be complied with and the contractor would look to discuss with London Borough of Camden these times as a proactive approach to control of noise emissions from the site.

9 BASEMENT WORKS

An important consideration for any basement construction is the control of ground movement and ground water during excavation to ensure that any effect on adjacent buildings and infrastructure is minimal and within acceptable limits.

Relevant geological and hydrological maps and data have been reviewed with respect to the site at St Giles Circus (see appendices).
No trees are to be removed as part of the development.

Prior to commencement a full schedule of condition will be carried out to all relevant buildings as defined within The Party Wall etc Act 1996.

10 CONCLUSIONS

The site is above the eastbound Crossrail running tunnel and above the new Northern Line escalator box that serves Tottenham Court Road station. Separate documents dealing with the impact of the proposed basement on these structures have been submitted to and commented on by Crossrail and London Underground respectively.

A design analysis has been undertaken of the various aspects of construction and how these may affect the local amenity and neighbouring properties with regard temporary and permanent stability and the ground and surface water regime.

A review of maps, historic information and associated studies coupled with site inspections and a site investigation have demonstrated that the development will not have an adverse effect on the local ground and surface water regime.

An assessment of movements caused by the basement excavation has been undertaken and shown that four walls will experience slight damage and three walls moderate damage in the adjacent buildings to the south of the basement. These buildings are owned by the client and the effects on them will be mitigated as part of the works.

APPENDIX A – Geological Map and Ordnance Survey Maps

Extract from British Geological Survey 1:50,000 Online Map

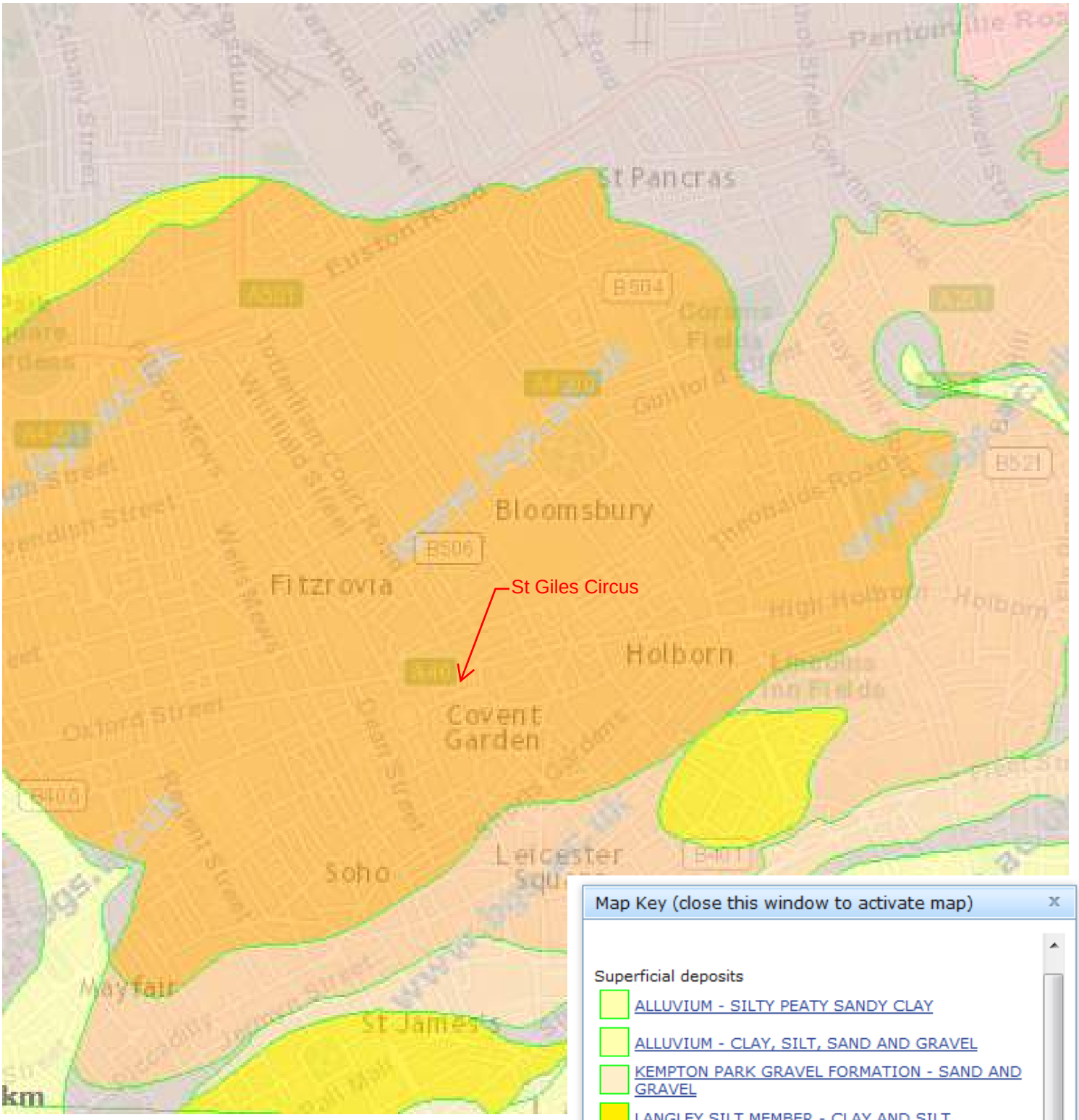


Fig 1 Q1a & Fig 2 Q5 & Fig 2 Q10: As can be seen from the above extract the site is located on the Lynch Hill Gravel Member which is classified as an aquifer in Figure 1 of CPG4. London Clay underlies the Lynch Hill Gravel member and the basement slab sits on London Clay.

Extract from Ordnance Survey 1:25,000 Sheet No 173 - London North

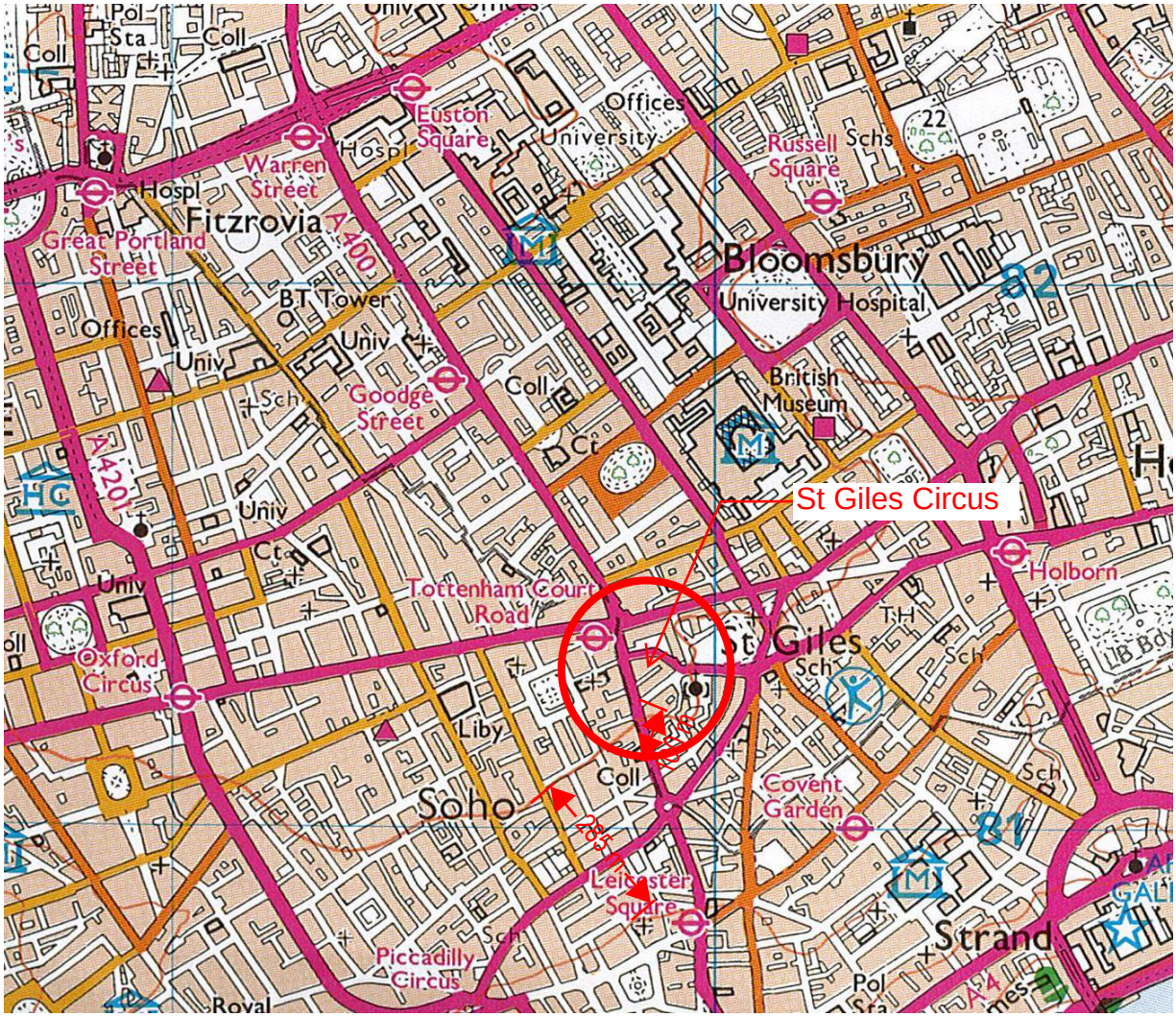


Fig 1 Q2 and Fig 2 Q8: No watercourses, wells or springs are identified near the site.

Fig 2 Q3 and Fig 2 Q4: No neighboring land has a slope greater than 7 degrees. Steepest gradient between contours on the map in the vicinity of the site (south towards Leicester Square) is 1.0 degrees.

Fig 2 Q11: The site is over 50m from Hampstead Heath ponds.

Extract from Ordnance Survey
1:1250 map

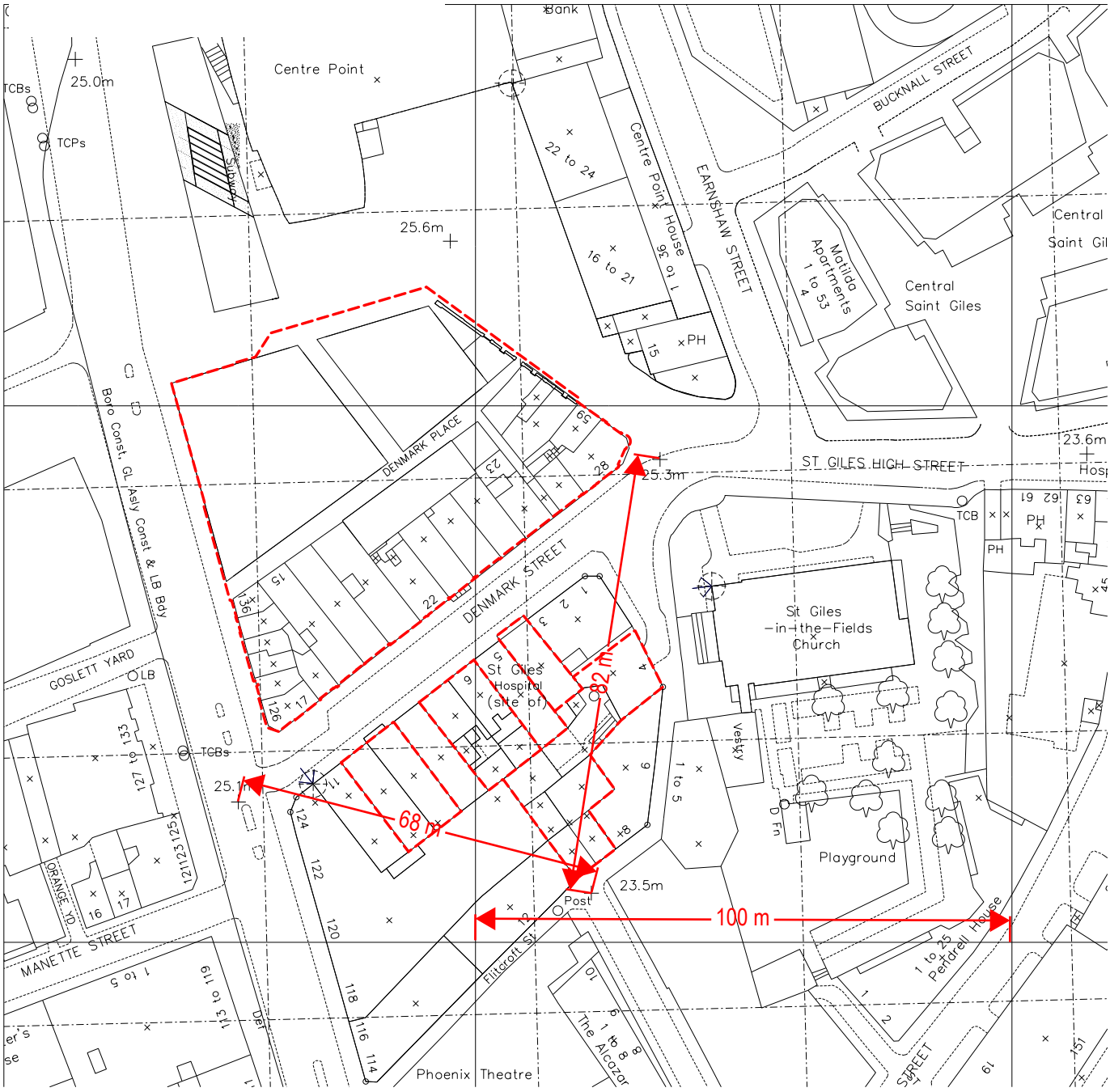


Fig 2 Q1 and Q4: Existing site has negligible slopes. Gradient on Charing Cross Road, Denmark Street and Site Giles High Street adjacent to site is negligible. Flitcroft Street is approx 1.3 degrees.

Fig 2 Q12: The basement site is within 5m of a highway or pedestrian right of way on St Giles High Street, Charing Cross Road and the Plaza around Centre Point.

INDICATIVE NORTH

SURVEY CONTROL STATION SCHEDULE			
STN	EASTING	NORTHING	LEVEL
201	540.676	500.151	25.192
202	490.447	500.122	24.912
203	467.508	502.550	25.054
204	561.557	501.552	25.519
206	555.684	528.836	25.472
207	548.065	552.379	25.454
208	481.202	528.367	25.118

Fig 2 Q1 and Q4: Existing site has negligible slopes. Gradient on Charing Cross Road, Denmark Street and Site Giles High Street adjacent to site is negligible. Flitcroft Street is approx 1.3 degrees.

480.000 E
500.000 E
520.000 N
540.000 N
CHARING CROSS ROAD
DENMARK STREET
DENMARK PLACE
No. 132 CHARING CROSS ROAD APRIKOT CAFE
No. 134 CHARING CROSS ROAD HUMU CAFE
No. 130 CHARING CROSS ROAD HUMU FOODS
No. 128 CHARING CROSS ROAD ROCK SHOP
No. 126 CHARING CROSS ROAD CHRIS BRYANTS MUSICAL INSTRUMENTS
No. 18 DENMARK STREET CONSTANTINOU BROTHERS
No. 19 DENMARK STREET MUSIC ROOM
No. 20 DENMARK STREET WUHLO GUITARS
No. 21 DENMARK STREET SAX.CO.UK
No. 22 DENMARK STREET WUHLO GUITARS
No. 23 DENMARK STREET LONDON PRO AUDIO CENTRE
No. 24 DENMARK STREET WESTSIDE
No. 25 DENMARK MUSICARE
ELEVATION A
ELEVATION B
ELEVATION C
ELEVATION D
ELEVATION 7
SURVEY STATION 24
SURVEY STATION 208
SURVEY STATION 203
SURVEY STATION 202
SURVEY STATION 1

Rev	Date	By	Amendment
A	FEB 08	RJT	No 4 FLITCROFT STREET ADDED
B	MAR 08	MWP	No 7 DENMARK STREET ADDED
C	APR 08	GFT	STEEL FRAMEWORK ADDED
D	JAN 09	SAB	UNDERSIDE OF COURTYARD ENTRANCE LEVELS ADDED
E	MAR 09	SAB	No's 9 AND 10 DENMARK STREET ADDED
F	MAR 09	SAB	No 9 DENMARK STREET FLOOR LEVELS ADDED
G	JAN 12	JAR	TOPOGRAPHIC SURVEY AREA EXTENDED TO NEW COMMISSION
H	MAR 12	GFT	GROUND FLOOR PLANS ADDED
I	APR 12	JAR	ST GILES IN THE FIELD CHURCH FOOTPRINT ADDED CENTERPOINT BUILDING CORNER ADDED
J	JUNE 12	GFT	SHALDON MANSIONS BREAKLINE MOVED

LEGEND

ABBREVIATIONS

B	BOLLARD	MH	MANHOLE
BOE	BRICK ON EDGE	O/H	OVER HEAD
BOX.	BOXING	P	POST
BT	BRITISH TELECOM	P/L	PAVEMENT LIGHT
B/W	BRICK WALL	RAD	RADIATOR
CATV	CABLE TELEVISION	RE	RODDING EYE
CF	CEILING FALL	RS	ROAD SIGN
CL	COVER LEVEL	RSJ	ROLLED STEEL JOIST
CONC	CONCRETE FINISH	RSS	ROLLED STEEL STANCHION
COU	COVER ORIGIN UNKNOWN	RWP	RAIN WATER PIPE
CPD	CUPBOARD	SC	STOP COCK
DK	DROP KERB	SP	SIGN POST
DL	DERIVED LEVEL	SV	STOP VALVE
ELEC.	ELECTRICAL	SVP	SOIL VENT PIPE
ER	EARTHING ROD	TN	TREE NUMBER
F/B	FLOWER BED	TP	TELEPHONE POLE
FAR	FLAT ASPHALT ROOF	UTL	UNABLE TO LIFT
G	GULLY	VP	VENT PIPE
GV	GAS VALVE	VTF	VINYL TILED FLOOR
HLW	HIGH LEVEL WINDOW	WC	WATER CLOSET
IC	INSPECTION COVER	WHB	WASH HAND BASIN
L/L	LOW LEVEL	WV	WATER VALVE
LP	LAMP POST	Ø	DIAMETER

OVERHEAD DETAIL
BARRIER OR FENCE
CHANGE IN SURFACE
GATE
SURVEY STATION

HEIGHTS

C	HEIGHT FROM FLOOR TO CILL
H	HEIGHT FROM CILL TO HEAD
SP	HEIGHT FROM FLOOR TO SPRING OF ARCH
AH	HEIGHT FROM FLOOR TO HEAD OF ARCH
2890	HEIGHT TO CEILING, BEAM OR DOOR
S/C	STRUCTURAL CEILING HEIGHT
F/C	FALSE CEILING HEIGHT
DL	DEDUCED LEVEL DERIVED FROM PLUS MEASUREMENTS

TREES

Ø DIAMETER(mm)
S SPREAD(mm) diameter
H HEIGHT(mm)
ALL TREE HEIGHTS SHOWN IN (mm)

SHEET LAYOUT

SHEET 1
SHEET 2
SHEET 3

LEVELS ARE RELATED TO ORDNANCE SURVEY BENCH MARK ON THE NORTH WEST CORNER OF ST GILES IN THE FIELD CHURCH ST GILES HIGH STREET

VALUE : 26.37m

3sixty measurement
LONDON
SOUTH BANK HOUSE, BLACK PRINCE ROAD
LONDON SE1 7SJ
Tel: 020 7637 2930
Fax: 020 7637 2931
E-mail: info@3sixtymeasurement.co.uk
Website:www.3sixtymeasurement.co.uk

Client	CONSOLIDATED DEVELOPMENTS LTD
Project	DENMARK STREET
Drawing	SITE PLAN - SHEET 1
Date	JAN 2012
Scale	A1@1:100
Drawn by	MRZ
Checked by	JAR
Project No	07397
Drawing No	-02
Revision	J

Fig 2 Q1 and Q4: Existing site has negligible slopes. Gradient on Charing Cross Road, Denmark Street and Site Giles High Street adjacent to site is negligible. Flitcroft Street is approx 1.3 degrees.

Rev	Date	By	Amendment
A	FEB 08	RJT	No 4 FLITCROFT STREET ADDED
B	MAR 08	MWP	No 7 DENMARK STREET ADDED
C	APR 08	GFT	STEEL FRAMEWORK ADDED
D	JAN 09	SAB	UNDERSIDE OF COURTYARD ENTRANCE LEVELS ADDED
E	MAR 09	SAB	No's 9 AND 10 DENMARK STREET ADDED
F	MAR 09	SAB	No 9 DENMARK STREET FLOOR LEVELS ADDED
G	JAN 12	JAR	TOPOGRAPHIC SURVEY AREA EXTENDED TO NEW COMMISSION
H	MAR 12	GFT	GROUND FLOOR PLANS ADDED
I	APR 12	JAR	ST GILES IN THE FIELD CHURCH FOOTPRINT ADDED CENTERPOINT BUILDING CORNER ADDED
J	JUNE 12	GFT	SHALDON MANSIONS BREAKLINE MOVED

SURVEY CONTROL STATION SCHEDULE

STN	EASTING	NORTHING	LEVEL
201	540.676	500.151	25.192
202	490.447	500.122	24.912
203	467.508	502.550	25.054
204	561.557	501.552	25.519
206	555.684	528.836	25.472
207	548.065	552.379	25.454
208	481.202	528.367	25.118

LEGEND

ABBREVIATIONS

B	BOLLARD	MH	MANHOLE
BDE	BRICK ON EDGE	O/H	OVER HEAD
BOX.	BOXING	P	POST
BT	BRITISH TELECOM	P/L	PAVEMENT LIGHT
B/W	BRICK WALL	RAD	RADIATOR
CATV	CABLE TELEVISION	RE	RODDING EYE
CF	CEILING FALL	RS	ROAD SIGN
CL	COVER LEVEL	RSJ	ROLLED STEEL JOIST
CONC	CONCRETE FINISH	RSS	ROLLED STEEL STANCHION
COU	COVER ORIGIN UNKNOWN	RWP	RAIN WATER PIPE
CPD	CUPBOARD	SC	STOP COCK
DK	DROP KERB	SP	SIGN POST
DL	DERIVED LEVEL	SV	STOP VALVE
ELEC.	ELECTRICAL	SVP	SOIL VENT PIPE
ER	EARTHING ROD	TN	TREE NUMBER
F/B	FLOWER BED	TP	TELEPHONE POLE
FAR	FLAT ASPHALT ROOF	UTL	UNABLE TO LIFT
G	GULLY	VP	VENT PIPE
GV	GAS VALVE	VTF	VINYL TILED FLOOR
HLW	HIGH LEVEL WINDOW	WC	WATER CLOSET
IC	INSPECTION COVER	WHB	WASH HAND BASIN
L/L	LOW LEVEL	WV	WATER VALVE
LP	LAMP POST	Ø	DIAMETER

OVERHEAD DETAIL

BARRIER OR FENCE

CHANGE IN SURFACE

GATE

SURVEY STATION

HEIGHTS

C	HEIGHT FROM FLOOR TO CILL
H	HEIGHT FROM CILL TO HEAD
SP	HEIGHT FROM FLOOR TO SPRING OF ARCH
AH	HEIGHT FROM FLOOR TO HEAD OF ARCH
2890	HEIGHT TO CEILING, BEAM OR DOOR
S/C	STRUCTURAL CEILING HEIGHT
F/C	FALSE CEILING HEIGHT
DL	DEDUCED LEVEL DERIVED FROM PLUS MEASUREMENTS

TREES

Ø DIAMETER(mm)
S SPREAD(mm) diameter
H HEIGHT(mm)
ALL TREE HEIGHTS SHOWN IN (mm)

SHEET 1 | SHEET 2 | SHEET 3

LEVELS ARE RELATED TO ORDNANCE SURVEY BENCH MARK ON THE NORTH WEST CORNER OF ST GILES IN THE FIELD CHURCH ST GILES HIGH STREET

VALUE : 26.37m

3sixty measurement

LONDON
SOUTH BANK HOUSE, BLACK PRINCE ROAD
LONDON SE1 7SJ
Tel: 020 7637 2930
Fax: 020 7637 2931
E-mail: info@3sixtymeasurement.co.uk
Website:www.3sixtymeasurement.co.uk

Client	CONSOLIDATED DEVELOPMENTS LTD
Project	DENMARK STREET
Drawing	SITE PLAN - SHEET 2
Date	JAN 2012
Scale	A1@1:100
Drawn by	MRZ
Checked by	JAR

Project No	Drawing No	Revision
07397	-02	J