BASEMENT IMPACT ASSESSMENT

19 PARK SQUARE EAST, LONDON

FOR

19 PARK SQUARE EAST LTD

Giving our all

CONTENTS PAGE No.

FIGURES

TABLES

APPENDICES

APPROVAL & DISTRIBUTION SHEET

PROJECT DETAILS	
CET LEAD NO.	1038915
JOB NAME	The Diorama
CLIENT	19 Park Square East Ltd.
STATUS	Final
VERSION	V2

DISTRIBUTION			
Date:	Issued to:	Name:	No:
January 2020	19 Park Square East Ltd.	Paddy Donaghy	1
January 2020	CET Infrastructure	File	1

PREPARED BY:

James Maness BSc (Hons), FGS
Geotechnical Engineer

APPROVED BY:

Phil West BSc, MSc, CEng, MICE
Consultancy Manager

Construction Testing Solutions Limited trading as CET Infrastructure
Northdown House
Ashford Road
Harrietsham
Kent ME17 1QW

Tel: + 44 (0) 1622 858545
Web: www.cet-testing.com

FOREWORD

This document has been prepared by CET Infrastructure with all reasonable skill, care and diligence within the terms of the contract with the Client and within the limitations of the resources devoted to it by agreement with the Client. Any interpretation included herein is outside the scope of CET Infrastructure's UKAS accreditation.

This document is confidential to the Client and CET Infrastructure accepts no responsibility whatsoever to third parties to whom this document, or any part thereof, is made known. Any such party relies upon the document at their own risk.

This document shall not be used for engineering or contractual purposes unless signed above by the author and the approver for and on behalf of CET Infrastructure and unless the document status is 'Final'.

1. SUMMARY

The site is located at 19 Parks Square East, NW1 4LH within the jurisdiction of the London Borough of Camden.

The site is occupied by a four/five-storey disused office building and associated courtyard areas that occupies the entire footprint of the site.

The proposed development comprises the extension of the existing basement under the site footprint and lowering of the floor levels in the 'vault' section. The proposed scheme will be implemented by a series of "hit and miss" underpinned walls.

The following assessments are presented in this report:

- Desk Study;
- Screening;
- Scoping;
- Site investigation;
- Ground movement/Damage category assessment; and
- Summary and impact assessment.

A conceptual ground model for the site is summarised as follows:

- **Excavation Levels** – Circa 26mAOD for the bulk excavation and 25mAOD for the underpinning of the basement extension. Vault areas to be lowered by 1.2m to circa 24.8mAOD with underpinning blocks founding at circa 23.8mAOD.
- **Site Topography** – Relatively flat at approximately 30mAOD.
- **Surface Water Bodies** – 473m from the site.
- **Flood Risk** – 0.1% annual risk from water courses and High (greater than 3.3%) from surface water.
- **Ground Conditions:**
  - Made Ground penetrated from 30mAOD.
  - Langley Silt Member penetrated from 28.2 to 28.25mAOD.
  - Lynch Hill Gravel Member penetrated from 27 to 25.78mAOD.
  - London Clay Formation proved to 7.65mAOD.
- **Aquifer** – Secondary A Aquifer in the Lynch Hill Gravel Member.
- **Groundwater** – Groundwater level of 23mAOD to 21.65mAOD.

The main conclusions from the screening and scoping assessment are as follows:

- The site is located above a Secondary Aquifer, the Lynch Hill Gravel Member, however a measured groundwater level of between 23 and 21.65mAOD in the installed standpipes indicates the proposed basement will not extend below the groundwater table. Therefore, on the basis of the observed groundwater levels no dewatering is likely to be required. It is also unlikely that the basement would cause any significant adverse impact on groundwater flows as there are already basements surrounding the proposed construction in all four cardinal directions. Groundwater level monitoring readings should be taken during the detailed design period and prior to construction to establish the long-term groundwater regime;
- Flooding from surface water is characterised as high for this site indicating that there is a greater than 3.3% annual risk from flooding at the development site. The development must therefore meet the requirements as set out in LBC Core Strategy Camden Development Policy 27, which state that "the scale of the scheme is such that there is no, or minimal, impact on drainage conditions". As presented in the surface water impact assessments the increase in the impermeable surface area is insignificant when compared with the site and infinitesimally small in comparison to the surrounding area;
- Construction of the basement and lowering of the vault floor level will result in lowering of the foundations compared to adjacent sites by an assumed net value of between 0.5m and 2.1m, and excavation of the basement will result in some ground movements. The effect of this has been reviewed in the ground movement and damage category assessment sections of this report. Contour plots of displacement in response to the changes in vertical pressure caused by the excavation and construction of the proposed basement are included. Based upon the maximum displacements predicted by PDISP analyses, Damage Category Assessments were undertaken for the worst-case scenarios in the adjoining properties and these combined with the ground movements alongside the basement in response to the lateral stress release are as predicted by CIRIA publication C760.
- In the assessed cases, the nearest walls of 20 Park Square East (South Wall) and The Diorama (South West Wall) are classified as Category 0 'negligible', 20 Park Square East (Rear Wall) and 20 & 18 Park Square East Vault (Rear Walls) are classified as Category 1 'very slight' (as given in CIRIA SP200). The damage category results have been plotted graphically in Figure 4. Parameters for founding depths have been assumed where not data was available, and this will require validation prior to construction. No further Damage Category Assessments have been carried out as other structures in the vicinity are further away and therefore considered lower risk. Use of best practice construction methods will be essential to ensure that the ground movements are kept in line with the above predictions. Pre-construction condition surveys of neighbouring properties are also recommended, and a system of monitoring adjoining and adjacent structures should be established before the works start.

2. INTRODUCTION

2.1 GENERAL INTRODUCTION

This report presents a Basement Impact Assessment (BIA), Ground Movement Assessment (GMA) and Damage Category Assessment (DCA) for the proposed basement extension at 19 Park Square East, NW1 4LH, which is within the London Borough of Camden.

This report has been carried out at the request Quartz Project Services Limited acting on behalf of the client 19 Park Square East Limited.

This BIA has been produced specifically to meet the requirements of London Borough of Camden (LBC), including Planning Guidance - Basements (Camden Planning Guidance CPG, March 2018) - and the Local Plan (A5 Basements, July 2017). The report structure follows guidance for BIAs set out in the Camden Borough CPG4 (2015). The CPG4 requires desk study, screening and scoping stages, a site investigation and interpretation and ground movement assessment, and impact assessment.

This BIA evaluates the geological, hydrogeological and hydrological conditions and assess the potential detrimental ground stability, groundwater and surface water impacts the proposed development may have on the surrounding area and neighbouring properties.

Attention is drawn to the fact that whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there is a potential for variations in ground and groundwater conditions between and beyond the specific locations investigated. No liability can be accepted for any such variations. Furthermore, any recommendations are specific to the client's requirements as detailed herein and no liability will be accepted should these be used by third parties without prior consultation with CET Infrastructure.

2.2 SOURCES OF INFORMATION

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

- Site walkover conducted during a ground investigation in August 2019;
- Current/historical mapping contained in an Envirocheck report;

- The site's geological setting based on the British Geological Survey (BGS) Geological Map Sheet 270 (South London 1: 50,000 scale solid and drift, 2006), the BGS digital geology maps that utilises most up to date names of geological units (www.bgs.ac.uk/data) and the Geology of London Memoir (Ellison et al., 2004);
- Online flood risk mapping by the Environment Agency;
- LB Camden, Strategic Flood Risk Assessment (produced by URS, 2014);
- LB Camden, Planning Guidance (CPG) – Basements (March 2018);
- LB Camden, Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development GHHS (produced by Arup, 2010); and
- LB Camden, Local Plan Policy A5 Basements (2017).

2.3 EXSISTING SITE LOCATION AND LAYOUT

The subject site is located at 19 Park Square East, NW1 4LH at approximate Ordnance Survey grid reference TQ 287822 (see Appendix A1).

The property comprises an existing five storey section with an existing basement. The neighbouring properties comprise similarly constructed 4-storey buildings including basements. The footprint of the building is of an irregular polygon shape approximate dimensions of which can be found as Appendix A2.

The property is located roughly within the centre of Park Square East and shares a party wall with No. 20 Park Square East to the south and No. 18 Park Square East to the north.

2.4 TOPOGRAPHY

The topographic map shown on an online topographic map source (http://en-gb.topographic-map.com) shows that the general area of the site is located on at about 30mAOD. The general area of the site is essentially level with no significant slopes noted as shown on Appendix A3. The map indicates a change in slope of approximately 1.5m over Park Square East.

2.5 PROPOSED DEVELOPMENT

Based on the provided drawings (Appendix B), the proposed development at 19 Park Square East includes the excavation and construction a single storey basement extension under the courtyard area with sides up to 10m in length. It has been assumed for purposes of this analysis that the footing width will be 1m. The total basement extension area is estimated to be about 40m^2.

The proposed finished floor level of the basement extensions across the whole site will be circa 26mAOD with a proposed foundation level of 25mAOD, including an allowance for construction of the floor slab. The perimeter walls will comprise reinforced concrete (RC) retaining walls with a reinforced ground bearing concrete floor slab.

The Vault section of the site is to have the floor levels lowered by 1.2m below the existing floor level of circa 26mAOD. Underpinning blocks are assumed to extend at least 1m below the proposed floor level.

2.6 NEIGHBOURING PROPERTIES AND STRUCTURES

The subject site is bordered to the north and south by No. 18 and No.20 Park Square East respectively. The west of the site is bordered by Park Square East, with the east of the site being bordered by the atrium of No. 18 Park Square East.

The neighbouring properties on Park Square East comprise similarly constructed four-storey properties of brick construction. The neighbouring properties were noted as having basements underneath their footprints and do not appear to be additions added after original construction.

Access to the public database (tfl.maps.arcgis.com) provided by TFL asset protection locates the nearest TFL rail asset zone of influence is about 50m to the south of the site.

3. DESK STUDY

Information in this section has been obtained from the sources outlined in Section 1.2. The background information has been used to undertake a screening and assessment of potential basement impacts.

3.1 SITE HISTORY

Historical maps have been obtained for the area and are presented in the Envirocheck Report in Appendix C. Notable developments are detailed below:

- 1869 to 1880: The earliest map available shows the property and those surrounding were already established. The property at this time was described as occupied by a "Baptist Chapel" up to 1940-1951.
- 1953 – 1954: The maps listed the building as "The Arthur Stanley Institute of Middlesex Hospital". There were no significant changes to the surrounding structures worth noting.
- 1966 – 1988: The site was shown as being the "Bedford College Annexe of the University of London". No significant changes to the surrounding structures was noted.
- No specific name for the building is given.

3.2 GEOLOGY

Publications of the British Geological Survey (BGS) indicate that the site is underlain by the London Clay Formation with superficial deposits of Langley Silt Member over Lynch Hill Gravel Member. The online BGS geological map extract displaying the geology is presented in Figure A4.

A BGS borehole located within approximately 70m of the site on St Andrews Place was available for review. The depths of the geology and groundwater levels are summarised in Table 3-1.

Table 3-1: BGS Borehole Data

Borehole Reference	Depth	Geology	Geological Unit	Depth From (m bgl)	Depth To (m bgl)	Groundwater Strike (m)
TQ28SE126	29.81mAOD	Tarmac & Brick	Made Ground	0	0.15	9.1
		Clay & Stones	Made Ground	0.15	0.9	
		Brown Clay	Langley Silt Member	0.9	2.4	
		Gravel and Sand	Lynch Hill Gravel Member	2.4	9.1	
		Firm Brown Clay over Stiff Grey Clay	Weathered and Relatively Unweathered London Clay Formation	9.1	11.2	

The borehole records in Table 3-1 show a typical sequence of London Clay Formation, with superficial deposits of Langley Silt Member overlying Lynch Hill Gravel Member. These deposits will be locally mantled by Made Ground dependant on the current and previous use of the site. Superficial deposits were penetrated to a depth of 9.1m below ground level, with deposits of the London Clay formation being encountered thereafter. This borehole is located about 70m to the north of the site, but the geology at the site is not expected to vary significantly, only the thicknesses. The actual ground conditions have been assessed by a site specific ground investigation and are discussed later in this report.

3.3 HYDROGEOLOGY

A groundwater strike was noted as being encountered at 9.1m below ground level in the BGS borehole in Table 3-1. It is worth noting that while this may represent the groundwater in this geographic location at the time the borehole was drilled the groundwater table is liable to seasonal and long-term changes. Comments on the groundwater for the subject site is addressed in later chapters.

Hydrogeological information provided by the Envirocheck report is summarised below:

- **Aquifer Category (as defined by the Environment Agency) –** The Superficial Deposits (Lynch Hill Gravel Member) are described as Secondary A Aquifer with a medium vulnerability.

  The bedrock aquifer (London Clay Formation) designation is Unproductive (non-aquifer); rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The Superficial and Bedrock have a combined Medium vulnerability.

- **Nearest groundwater abstraction licence -** There have been 18 licensed groundwater abstractions within 1km of the site with the closest being 354m to the west for the purpose of production of energy for electricity: heat pump from a ground water source.
- **Source Protection Zone (SPZ) -** None present at the site.
- **Groundwater vulnerability** - Medium; and,
- **Groundwater flooding susceptibility** - Potential for groundwater flooding to occur.

3.4 HYDROLOGY

Hydrological information provided by the Envirocheck report and the Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development GHHS is summarised below:

- **Surface water features** – Nearest surface water feature 473m from the subject site.
- **Surface water abstraction licences** – The nearest surface water abstractions are within the Regent's Canal. The Regent's Canal is over 1km from the subject site.
- **River and coastal Zone 2 or 3 flooding** – Site is not a Zone 2 or 3 floodplain and none are identified within 500m.
- **Risk of flooding from rivers and seas** – Less than 0.1% yearly risk.
- **Risk of flooding from surface water** – Yearly flood risk for the site identified as greater than 3.3%.
- **Flood defences** – None identified within 500m.
- **Flood storage areas** – None identified within 500m.

The book 'The Lost Rivers of London' (Barton, 1992) has been consulted and does not identify any former tributaries on the site. The nearest such example has been mapped in excess of 500m from the site.

3.5 FLOODING

The flood risk from rivers and seas as identified in the Environment Agency flood map for planning service, Figure A5, indicates a low risk.

The following risk ratings have been collated from the various references referred to in Section 10 of this report:

- High risk for surface water flooding (greater than 3.3%).

- No historical flood incidents recorded near the site.
- Surface water body was recorded 473m from the site, but environment agency has not identified this as a flood risk to the site.
- No sewer flooding events recorded within 250m of the site.

3.6 CONCEPTUAL SITE MODEL

A conceptual site model for the site has been developed using the information obtained from the desk study for use during the Screening stage.

The conceptual site model can be summarised as follows:-

- **Excavation Levels** – Circa 26mAOD for the bulk excavation and 25mAOD for the underpinning of the basement extension. Vault areas to be lowered by 1.2m to circa 24.8mAOD with underpinning blocks founding at circa 23.8mAOD.
- **Site Topography** – Relatively flat at 30mAOD.
- **Surface Water Bodies** – 473m from the site.
- **Flood Risk** – Very low risk (less than 0.1% annual risk) from water courses and high (greater than 3.3%) from surface water.
- **Ground Conditions:**
    - Made Ground to a minimum level of approximately 28.2mAOD.
    - Langley Silt Member to a minimum level of approximately 25.78mAOD.
    - Lynch Hill Gravel Member to a minimum level of approximately 20.6mAOD.
    - Weathered and relatively unweathered London Clay Formation proved to a minimum level of 7.65mAOD.
- **Aquifer** - Superficial Deposits (Lynch Hill Gravel Member) are a Secondary A Aquifer. Bedrock (London Clay Formation) is Unproductive' stratum.
- **Groundwater** – Water strike at approximately 20.7mAOD 70m from the site.

4. SCREENING

Screening has been carried out using the criteria outlined in CPG4 to identify any matters of concern relating to slope stability, groundwater flow and surface water flow/flooding that should be carried forward to the Scoping stage. The screening process uses the background site information provided in Section 2 and Section 3 of this report to complete flow charts provided in CPG4. The flow charts are reproduced in the tables below. Items requiring scoping, investigation and impact assessment are highlighted in yellow and are addressed in subsequent sections of this report.

4.1 SLOPE STABILITY

The slope stability screening flowchart from CPG4 is displayed in Table 4-1.

Table 4-1: Screening – Slope Stability

Slope stability screening chart	
1. Does the existing site include slopes, natural or manmade, greater than 7 degrees? (approx. 1 in 8)	No. The site is relatively flat with no sloping land above 7 degrees to the horizontal.
2. Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7 degrees? (approx. 1 in 8)	No. No re-profiling is planned.
3. Does the development neighbouring land, including railway cuttings and the like, with a slope greater than 7 degrees? (approx. 1 in 8)	No. The surrounding area slopes at less than 7 degrees.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees? (approx. 1 in 8)	No. The surrounding area slopes at less than 7 degrees.
5. Is the London Clay the shallowest strata at the site?	No, the shallowest stratum is Langley Silt Member.
6. Will any trees be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	No, there are no trees on the property.
7. Is there a history of seasonal shrink-swell subsidence in the local area,	None recorded. Suitable heave protection to be implemented where clay soils are deemed to be desiccated. Kempton Park Gravel

Slope stability screening chart	
and/or evidence of such effects at site?	Member to be the founding stratum is not liable to seasonal shrink swell.
8. Is the site within 100m of a watercourse or a potential spring line?	None recorded.
9. Is the site within an area of previously worked ground?	No. There is no evidence of any previously worked ground on the site.
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. The Envirocheck report indicates the Superficial Deposits are a Secondary A Aquifer. Based on the proposed excavation levels for the site dewatering is not likely to be required.
11. Is the site within 50m of the Hampstead Heath Ponds	Not within 50m.
12. Is the site within 5m of a highway or pedestrian right of way?	Yes, the excavation for the lowering of the vault section will be within will be within 5m of Park Square East.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No, the neighbouring properties have been constructed with basements to approximately the same depth as the existing basement on this site.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No. The nearest railway tunnel exclusion zone is about 50m from the site boundary.

4.2 SUBTERRANEAN (GROUNDWATER) FLOW

The subterranean (groundwater) flow screening flowchart from CPG4 is displayed in Table 4-2.

Table 4-2: Screening – Subterranean (Groundwater) Flow

Subterranean (groundwater) flow screening chart	
1. a) Is the site located directly above an aquifer?	Yes. The Envirocheck report indicates the Superficial Deposits are a Secondary A Aquifer.
b) Will the proposed basement extend beneath the water table surface?	Based on BGS borehole records the excavation is unlikely to encounter groundwater. However, a ground investigation will be required to assess the conditions of the groundwater beneath the subject site. Further consideration of this will be given in light of the site specific ground investigation.
2. Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No.

3. Is the site within the catchment of the pond chains on Hampstead Heath?	No.
4. Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	Yes. Part of the existing courtyard areas are soft landscaped, with the proposed material to be removed and basement extended beneath these areas. These areas are of insignificant size in comparison to the site and surrounding area.
5. As part of the site drainage, will more surface water (e.g. rainfall and runoff) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No, there are currently no water discharges to the ground on site or proposed to be constructed. Additionally, the subject site is currently mostly hard landscaped.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring line?	No. There are no ponds or spring lines identified in the vicinity of the site.

4.3 SURFACE FLOW AND FLOODING

The surface flow and flooding screening flowchart from CPG4 is displayed in Table 4-3.

Table 4-3: Screening – Surface Flow and Flooding

Surface flow and flooding screening chart	
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No.
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?	Courtyards to be changed from soft to hard landscaped. This will not likely rise to the level of a 'material change'.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	Yes. Soils in courtyard area to be excavated and basement constructed underneath. In effect this will be changed from soft to hard landscaped.
4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of	No. There are no nearby watercourses.

surface water being received by adjacent properties or downstream watercourses?	
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No. There are no nearby water courses.
6. Is the site in an area identified to have surface water flood risk or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	Yes. The site is a high flood risk from surface water flooding. There are no nearby surface water features.

5. SITE INVESTIGATION

A site investigation stage has been undertaken to develop an understanding of the site and its immediate surroundings and for use in assessing matters of concern identified during the Screening stage. The results have been used to address the matters of concern in the Scoping and Impact Assessment stages.

5.1 INTRUSIVE GROUND INVESTIGATION

A ground investigation (GI) was completed by CET in October 2019 and comprised one 'cut-down' cable percussion borehole (BH01) and two modular windowless sampler boreholes (BH02 & BH03). Details of the GI are outlined in Table 5-1. The boreholes were undertaken within the footprint of the existing and adjacent properties.

Table 5-1: Ground Investigation Details

Type	Reference	Depth mbgl (termination)	Installation Details
'Cut-down' Cable Percussion.	BH01 (Located in rotunda area).	20.45	7m installation with 2m plain pipe and 2m of slotted. Bentonite seal at top and bottom of installation.
Modular Windowless sampler	BH02 (Located in Basement of 17 Park Square East).	18.45	6m installation with 1m plain pipe and 5m of slotted. Bentonite seal at top and bottom of installation.
Modular Windowless sampler	BH03 (Located in Courtyard of 19 Park Square East).	20	10m installation with 2m plain pipe and 5m of slotted. Bentonite seal at top and bottom of installation.

5.2 GROUND AND GROUNDWATER CONDITIONS

A summary of the ground and groundwater conditions encountered in the GI is presented in the table below. The borehole logs are presented in Appendix D.

Table 5-2.1: Summary of Ground Conditions

Strata name	Approximate level to top of strata (mAOD)	Thickness (m)	Description
Made Ground	30	0.25 to 1.9	Very clayey, slightly sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick.
Langley Silt Member	28.2 to 28.25	1.2 to 1.75m	Firm and firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. Or Soft, brown, slightly fine sandy, silty CLAY.
Lynch Hill Gravel Member	27 to 25.78	5.18 to 5.9m	Loose to very dense, brown, very fine to coarse sandy, locally sandy and slightly sandy GRAVEL of sub-angular to rounded, fine to coarse flint.
Weathered and Relatively Unweathered London Clay Formation.	21.3 to 20.6	Not proved.	Stiff, brown mottled grey, becoming brown and grey mottled CLAY with occasional sand size selenite and silt partings. Or Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite.

A groundwater seepage was recorded in BH01 at 9.5m below ground level rising to 8m below ground level after 20 minutes of monitoring. Groundwater was likely masked in BH02 and BH03 by the continuous casing of the borehole during the drilling process. Groundwater monitoring standpipes were installed within each of the boreholes to the various depths as described in Table 5-1. Subsequent readings of the standpipes were undertaken and are presented in Table 5-2.2.

Table 5-2.2: Summary of Groundwater Monitoring

Standpipe ID	BH01		BH02		BH03	
Date of Monitoring Visit.	05/12/2019	12/12/2019	05/12/2019	12/12/2019	05/12/2019	12/12/2019
Level (mAOD)	Dry	21.65	21.72	21.74	22.42	23.0

5.3 SITE MODEL

An updated site model has been developed using the information obtained from the site investigation for use during the Scoping and Impact Assessment stages.

The updated site model can be summarised as follows:

- **Excavation Levels** – Circa 26mAOD for the bulk excavation and 25mAOD for the underpinning of the basement extension. Vault areas to be lowered by 1.2m to circa 24.8mAOD with underpinning blocks founding at circa 23.8mAOD.
- **Existing Foundation Level for Neighbouring Properties** – Would be anticipated to be at least 25.4mAOD due to the similarly constructed basements.
- **Site Topography** – Relatively flat at 30mAOD
- **Surface Water Bodies** - 473m from the site.
- **Flood Risk** – Less than 0.1% annual risk from water courses and high (greater than 3.3%) from surface water.
- **Ground Conditions**:
    - Made Ground to a minimum level of approximately 28.2mAOD.
    - Langley Silt Member to a minimum level of approximately 25.78mAOD.
    - Lynch Hill Gravel Member to a minimum level of approximately 20.6mAOD.
    - Weathered and relatively unweathered London Clay Formation proved to a minimum level of 7.65mAOD.
- **Aquifer** – Lynch Hill Gravel Member Secondary A Aquifer.
- **Groundwater** – Groundwater level of 23mAOD to 21.65mAOD

6. SCOPING AND IMPACT ASSESSMENT

The Scoping stage identifies the potential impacts of the proposed scheme that were identified by the Screening stage. Items that have been identified as having a potential impact have been taken forward into the Impact Assessment stage.

The following impact assessments are based on concerns identified previously and the CPG4 screening assessments in Section 4.

6.1 SLOPE STABILITY

The potential impacts identified in the slope stability CPG4 Stage 1 Screening Assessment, Table 4-1, have been addressed in Table 6-1.

Table 6-1: Scoping- Slope Stability Impact Assessment

Slope stability scoping chart		
Screening Question	**Scoping**	**Impact Assessment**
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. The Envirocheck report indicates the Superficial Deposits are a Secondary A Aquifer." Groundwater for the site was measured to a level of between 23mAOD and 21.65mAOD. Minimum excavation level is to be higher than the highest groundwater measured. Excavation is not likely to encounter groundwater.	No impact assessment required. Further consideration given below.

12. Is the site within 5m of a highway or pedestrian right of way?	"Yes, the excavation for the rear basement and lowering of the vault section will be within 5m of the Albany Terrace and Park Square East respectively." Excavation and formation of the basement could cause ground movement affecting the carriageway.	The vault design and construction will need to consider the carriageway in a similar manor to how it addresses the neighbouring properties. The impacts and potential mitigation are discussed in more detail below.

Groundwater has been monitored over a short term period. Taking in to account the water strikes during the investigation and subsequent monitoring readings groundwater has always been encountered at levels below 25mAOD. However this represents the groundwater level over the period of October to December, and further groundwater monitoring may be required to assess the seasonal variations and long term groundwater conditions.

Ground movement associated with forming the basement excavation is a potential hazard. A Damage Category Assessment (DCA) (Sections 7 and 8) has been completed to assess the effects of the excavation and construction of the proposed basement on neighbouring properties.

The excavation and construction of the proposed basement and ground floor lowering will inevitably cause some ground movement. The magnitude of movements when using underpinning techniques will primarily depend on the geology, the adequacy of temporary support to both the underpinning excavations and the partially complete underpinning prior to installation of full permanent support as well as the quality of workmanship when constructing the permanent structure.

It is crucial therefore that the use of best practice methods of temporary support and high-quality workmanship are used to control ground movements alongside the basement excavations. Prior to excavation of the underpinning works all cracks in load-bearing walls that have weakened structural integrity should be fully repaired in accordance with recommendations from the appointed structural engineer.

Under UK standard practice, the design and implementation of temporary works is the contractor's responsibility, so it is considered essential that the contractor employed for these works has successfully completed similar schemes. Therefore, it is recommended that only carefully pre-selected contractors are invited to tender for the works. The contractor's temporary works should be fully detailed in their works method statements.

6.2 SUBTERRANEAN GROUNDWATER FLOW

The potential impacts identified in the subterranean flow CPG4 Stage 1 Screening Assessment, Table 4-2, have been addressed in Table 6-2.

Table 6-2: Scoping and Impact Assessment- Subterranean (Groundwater) Flow Impact Assessment

Subterranean (groundwater) flow scoping chart		
Screening Question	**Scoping**	**Impact Assessment**
1. a) Is the site located directly above an aquifer?	"Yes. The Envirocheck report indicates the Superficial Deposits are a Secondary A Aquifer." The groundwater table has been recorded to a level of lower than the lowest proposed excavation level, i.e below a level of 24.3mAOD.	There are currently similarly constructed basements to that proposed on this site existing on adjacent sites. These surround the site in all four cardinal directions. Although, based on measured groundwater levels, groundwater is not likely to rise to the level of the proposed basement these existing basements will be forming obstructions to groundwater flow as it stands. The proposed construction will not increase the surface area in any of the four directions and will not extended to depths greater than exist on site and likely surrounding the site. Therefore should groundwater level rise groundwater flow is not likely to be significantly impacted by the basement extension in any direction. This hydrogeological regime (i.e. groundwater levels and pressures) will be affected by long-term climatic variations as well as seasonal fluctuations and other man-induced influences, all of which must be considered by the designers when selecting a design water level for the permanent works. No long term, multi-seasonal groundwater monitoring data is available, so a conservative approach will be needed, as required by current geotechnical design standards.
b) Will the proposed basement extend beneath the water table surface?	The ground investigation and subsequent monitoring visits encountered groundwater at its shallowest to be 23mAOD. Which is 1.4m below the minimum proposed excavation level. Based on the above measurement the basement construction is not expected	No impact assessment required.

	to encounter groundwater. However, this is not considering the longer term groundwater regime. Longer term monitoring should be undertaken prior to construction to confirm that this is the case.	
4. Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	"Yes. Part of the existing courtyard areas are soft landscaped, with the proposed material to be removed and basement extended beneath these areas."	The proposed increase in proportion of hard surfaced/paved external areas is only to be circa 40m^2. This is an insignificant change to the total hard surfaced area of the total site and the surrounding area. The area of the total site is circa 790m^2. This represents a total change of approximately 5% to the site and an insignificant change to the surrounding hard surfaced area. As a result there is likely to be little effect on the sub-terranean groundwater flow.

6.3 SURFACE WATER

The potential impacts identified in the subterranean flow CPG4 Stage 1 Screening Assessment, Table 4-3, have been addressed in Table 6-3.

Table 6-3: Scoping and Impact Assessment- Surface Water Flow Impact Assessment

Surface water scoping chart		
Screening Question	**Scoping**	**Impact Assessment**
3. Will the proposed basement development result in a change in the proportion of hard surfaced/ paved external areas?	"Yes. Courtyards to be changed from soft to hard landscaped."	The proposed increase in proportion of hard surfaced/paved external areas is only to be circa 40m2. This is an insignificant change to the total hard surfaced area of the total site and infinitesimally small in comparison to the surrounding area. As a result of the above there is likely to be little increase to the total surface water flow and runoff produced on site. Additionally any rainwater discharged to this area is already heavily restricted by the retaining walls around the courtyards.
6. Is the site in an area identified to have surface	"Yes. The site is a high flood risk from surface water flooding. There are no nearby surface water features."	The site is currently situated in an area identified as a high surface water flood risk (greater than 3.3% annually) by the Environment Agency and Camden Borough Council. The development must therefore

water flood risk or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?		meet the requirements as set out in LBC Core Strategy Camden Development Policy 27, which state that "the scale of the scheme is such that there is no, or minimal, impact on drainage conditions". As presented in the above surface water impact assessments the increase in surface area of hard surfaced area will be insignificant when compared with the site and infinitesimally small in comparison to the surrounding area. As such there is likely to be minimal impact on drainage conditions.

7. GROUND MOVEMENT ASSESSMENT

7.1 INTRODUCTION

Oasys PDISP software has been used to undertake the analyses of heave and settlement ground movements arising from changes in vertical stresses caused by excavation of the basement. The analysis is based on Boussinesq's theory of analysis for calculating stresses and strains in soils due to vertically applied loads with the predicted ground movements being derived by integration of vertical strains derived from Boussinesq's equations. These preliminary analyses have not modelled the horizontal forces on the retaining walls and so have simplified the stress regime significantly. In addition, consistent with Boussinesq theory, the soils are assumed to comprise a semi-infinite isotropically homogeneous elastic medium.

7.2 PROPOSED BASEMENT LAYOUT

The basement layout has been based on drawings provided by Form Structural Design (Figure 1). The layout of the extension is to be approximately 5m by 8m and to a level of circa 26mOAD. Line loadings on the underpinned walls have been advised as being between 276kN/m run and 19.8kN/m run.

The vault area is to have the floor level lowered by 1.2m from a current level of approximately 26mAOD. Underpinning blocks will be used to form the retaining structure and has been assumed to be founding at least 1m below the proposed final floor level and be cast in 1m wide bays.

Gross pressure changes across the development have been estimated based on information provided by the structural engineer. The load zones, positive and negative, used to model the proposed basement in PDISP are displayed in Figure 1. These include the excavation and loads on the retaining walls, excavation of central area from existing ground level and construction of the basement ground bearing floor slab.

It is assumed the retaining walls will be cast in 1m wide bays with a base width of about 1m. There will be no internal columns or pads and the basement will be a reinforced concrete box.

Table 7-2 presents the net changes in vertical pressure for each load zone for the four major stages in the sequence of stress changes which will result from excavation and construction of the basement as outlined below:

- Stage 1: Construction of retaining walls – Short-term (undrained) condition;

- Stage 2: Bulk excavation to basement formation level – Short-term (undrained) conditions;
- Stage 3: Construction of the basement – Short-term (undrained) conditions; and
- Stage 4: Construction of the basement – Long-term (drained) conditions.

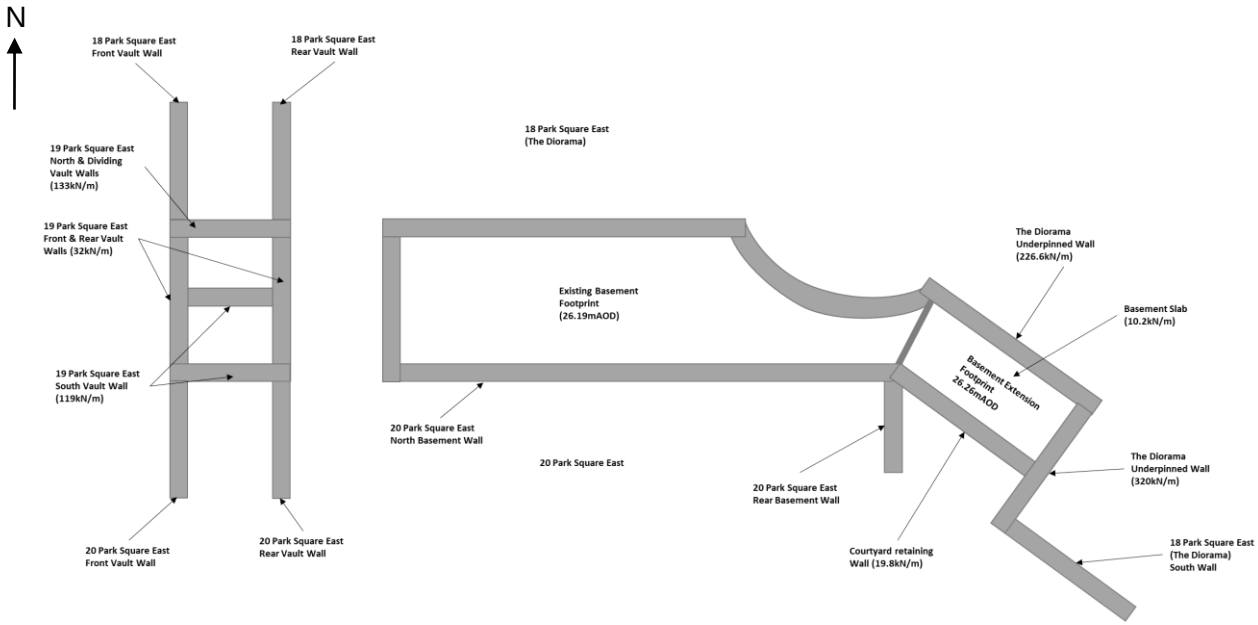


Figure 1: Loaded Zones Introduced to PDISP

Table 7-2: Maximum Net Bearing Pressures for PDISP

Zone	Maximum Net change in vertical pressure (kN/m^2)		
	Stage 1 **Retaining wall**	**Stage 2** **Bulk Excavation**	**Stages 3 & 4** **Basement construction short and long term**
Underpinned basement walls	320	320	320
Basement slab	0	-82	-71.8

7.3 GROUND CONDITIONS

The ground conditions used in the analysis are based on the ground conditions encountered in CET's ground investigation as shown in Table 7-2 and the logs are contained in Appendix D. In light of the ground

investigation the proposed basement will be constructed within the Lynch Hill Gravel Member with underpinning blocks founded at 25mAOD.

The short-term and long-term geotechnical properties used in the analysis are summarised in Table 7-3. These were based on the results of the ground investigation. The Young's modulus properties for the Lynch Hill Gravel Member and London Clay Formation have been selected based on average SPT 'N' values at the foundation depth. The derivation of parameters has been made using CIRIA Special Publication 27 and CIRIA Special Publication 200.

All Made Ground and Langley Silt Member will be excavated and therefore only the change in vertical pressure, due to its excavation, is required for the PDISP analyses. Geotechnical parameters for the Made Ground are not used in the analysis.

A global Poisson's ratio of 0.3 has been adopted for the Lynch Hill Gravel Member and 0.5 for the London Clay Formation over their respective modelled thickness. This has been based on guidance provided in Thomlinson's *Foundation Design and Construction* and Simons and Menzies' *A Short Course In Foundation Engineering*.

Table 7-3: Soil Parameters for PDISP

Strata	Level to Top of Strata (mAOD)	Bulk Density (kN/m^3)	Undrained Young's Modulus, Eu (MPa)	Drained Young's Modulus, E' (MPa)
Made Ground	30	19	Not used	Not used
Langley Silt Member	28.2 to 28.25	18	Not used	Not used
Lynch Hill Gravel Member	27 to 25.78	20	60	60
London Clay Formation	21.3 to 20.6	19	59	35

7.4 PDISP ANALYSIS

Three dimensional analyses of vertical displacements have been undertaken using PDISP software and the basement geometry, loads/stresses and ground conditions outlined above to assess the potential magnitudes

of ground movements (heave or settlement) which may result from the vertical stress changes caused by excavation of the basement. PDISP analyses have been carried out as follows:

- Stage 1: Construction of the retaining walls – Short-term (undrained) condition;
- Stage 2: Bulk excavation of central area to basement formation level – Short-term (undrained) conditions;
- Stage 3: Construction of the basement floor slab – Short-term (undrained) conditions; and
- Stage 4: Construction of the basement floor slab – Long-term (drained) conditions.

The results of the analyses for Stages 1, 2, 3 and 4 are presented as contour plots in Appendix E.

7.5 HEAVE SETTLEMENT ANALYSIS

Excavation of the basement and construction of the underpins will cause immediate elastic heave/settlements in response to the stress changes. The basement will be founded on granular soils that will likely have relatively small immediate effects.

The ranges of predicted short-term and long-term movements for each of the main sections of the proposed basement are presented in Table 7-5. Positive values in Table 7-5 represent settlement and negative values represent heave. All values are approximate owing to the simplification of the stress regime and include only displacements caused by stress changes in the ground beneath the basement.

All the short-term elastic displacements would have occurred before the basement slab is cast, so only the post-construction incremental heave/settlements, the difference from Stages 3, short-term, to 4, long-term, are relevant to the slab design.

Table 7-5: Summary of Predicted Ground Movements form PDISP

Location / Building Element	Stage 1 (short term) Retaining walls	Stage 2 (short term) Bulk Excavation	Stage 3 (short term) Basement slab construction	Stage 4 (long term) Basement slab construction
The Diorama South West Wall	3.9mm to 0mm	3.6mm to 0mm	3.6mm to 0mm	4.7mm to 0mm
20 Park Square East Rear Basement Wall	1.5mm to 0.7mm	0.6mm to 0.0mm	0.6mm to 0.2mm	1.1mm to 0.5mm
20 Park Square East North Basement Wall	1.5mm to Negligible Heave	0.4mm to Negligible Heave	0.4mm to Negligible Heave	0.7mm to -0.1mm
Basement Floor Slab Area	6.5 to 1.7mm	3.9mm to -1mm	4.2mm to -0.6mm	6mm to -0.1mm
20 Park Square East Rear Vault Wall	1.8mm to 0.1mm	1.6mm to 0.1mm	1.7mm to 0.1mm	2.3mm to 0.2mm
18 Park Square East Rear Vault Wall	1.9mm to 0.1mm	1.8mm to 0.1mm	1.9mm to 0.1mm	2.5mm to 0.2mm

8. DAMAGE CATEGORY ASSESSMENT

8.1 INTRODUCTION

Behaviour of the ground will depend on the quality and methods of construction, so rigorous calculations of predicted ground movements are not practical. However, provided that the temporary support follows best practice, then industry experience has shown that the bulk movements of the ground alongside retaining walls for a single storey basement at a nominal depth 3.5m below ground level should not exceed 5mm horizontally, and effected soil is up to 4 times the depth of excavation. This figure should be adjusted pro-rata for shallower or deeper basements.

To relate these predicted ground movements to possible damage to adjacent properties, it is necessary to consider the strains and the angular distortion (as a deflection ratio) that may be generated using the method proposed by Burland (2001, in CIRIA Special Publication 200, which developed earlier work by Burland and others).

8.2 CRITICAL DAMAGE CATEGORY LOCATIONS

Evidence from site visits suggest that the neighbouring properties on Park Square East have similarly constructed basements to that which currently exist on site. There are no proposals for additional basements on the adjoining sites currently being considered by the London Borough of Camden, as confirmed by a search of their planning application portal.

As ground movements reduce with distance away from the proposed basement and the relative founding depths, the worst-case scenarios will be the rear and north walls of No. 20 Park Square East, the South West Wall of No. 18 Park Square East and the rear vault walls of number 18 and 20 Park Square East. The locations of the assessed walls are displayed in Figure 2. There will be no lateral pressure release to the south west of the basement and therefore these walls are considered to undergo inconsequential movement and have therefore not been considered.

Where current foundation details of neighbouring properties have not been available assumed parameters have been used. These values will require validation prior to construction. As a reduction in the values assumed herein will likely result in higher damage category outcomes.

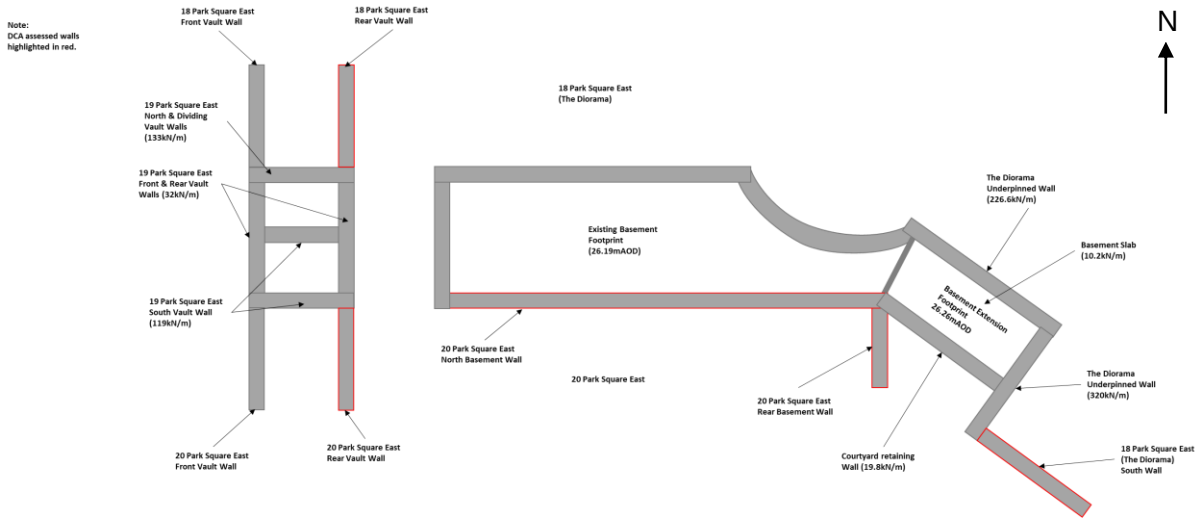


Figure 2: Critical Damage Category Assessment (DCA) Locations

8.3 AFFECTED WIDTHS OF CRITICAL LOCATIONS

The damage category assessments will consider the PDISP analyses of ground movements from vertical stress changes and ground movements alongside the proposed underpinning retaining walls caused by relaxation of the ground in response to the excavations.

CIRIA C760 (Gaba et al., 2017) details that ground movements related to the construction of retaining walls in coarse-grained soil extends up to two times the depth of excavation which at this site will be up to 4.2m laterally. A settlement of up to 0.3% of the excavation depth is predicted by CIRIA C760 which is considered appropriate for the development. The relevant geometries of the assessed locations have been obtained from the available drawings or approximated using maps and aerial images. The relevant geometries and affected widths and predicted settlements of the critical locations are detailed in Table 8-3.

Table 8-3: Geometries, Affected Widths and Predicted Settlements of Critical Locations

	No. 20 (Rear Basement Wall)	No. 20 (North Basement Wall)	The Diorama (South Wall)	20 Park Square East Rear Vault Wall	18 Park Square East Rear Vault Wall
Relative depth of foundations beneath ground floor	0.3m (assumed)	0.3m (assumed)	0.4m (assumed)	0.7m (assumed)	0.7m (assumed)
Depth of excavation (below foundation level)	25.8mAOD - 25mAOD = 0.8m	25.8mAOD - 25mAOD = 0.8m	28.1mAOD - 26mAOD= 2.1m	25.3mAOD – 24.8mAOD = 0.5m	25.3mAOD – 24.8mAOD = 0.5m
Zone of influence behind basement wall (Settlement)	2 x 0.8 = 1.6m	2 x 0.6 = 1.6m	2.1 x 2= 4.2m	0.5 x 2 = 1m	0.5 x 2 = 1m
Zone of influence behind basement wall (Horizontal)	4 x 0.8 = 3.2m	4 x 0.6 = 3.2m	2.1 x 4= 8.4m	0.5 x 4 = 2m	0.5 x 4 = 2m
Ground surface movement due to excavation in front of basement wall (CIRIA 760 Figure 6.16)	0.3% of max excavation depth	0.3% of max excavation depth	0.04% of max excavation depth	0.3% of max excavation depth	0.3% of max excavation depth
Distance from proposed basement	0m	0m	2.5m	0m	0m
Approximate width of assessed wall	8m	16m	11m	6m	6m
Affected width, L	1.6m	1.6m	4.2m	1m	1m
Height of affected building, H	12m (approximate average height)	12m (approximate average height)	9m (approximate average height)	3m (approximate average height)	3m (approximate average height)
L / H	c. 0.5	c. 0.5	c. 0.5	c. 0.5	c. 0.5
CIRIA predicted settlement	2.4mm	2.4mm	0.84mm	1.5mm	1.5mm

8.4 DISPLACEMENTS ALONG ASSESSED WALLS

The predicted horizontal displacements and the relative theoretical horizontal strains beneath each wall as well as the maximum settlements produced by PDISP beneath the location of the assessed walls are displayed in Table 8-4.1.

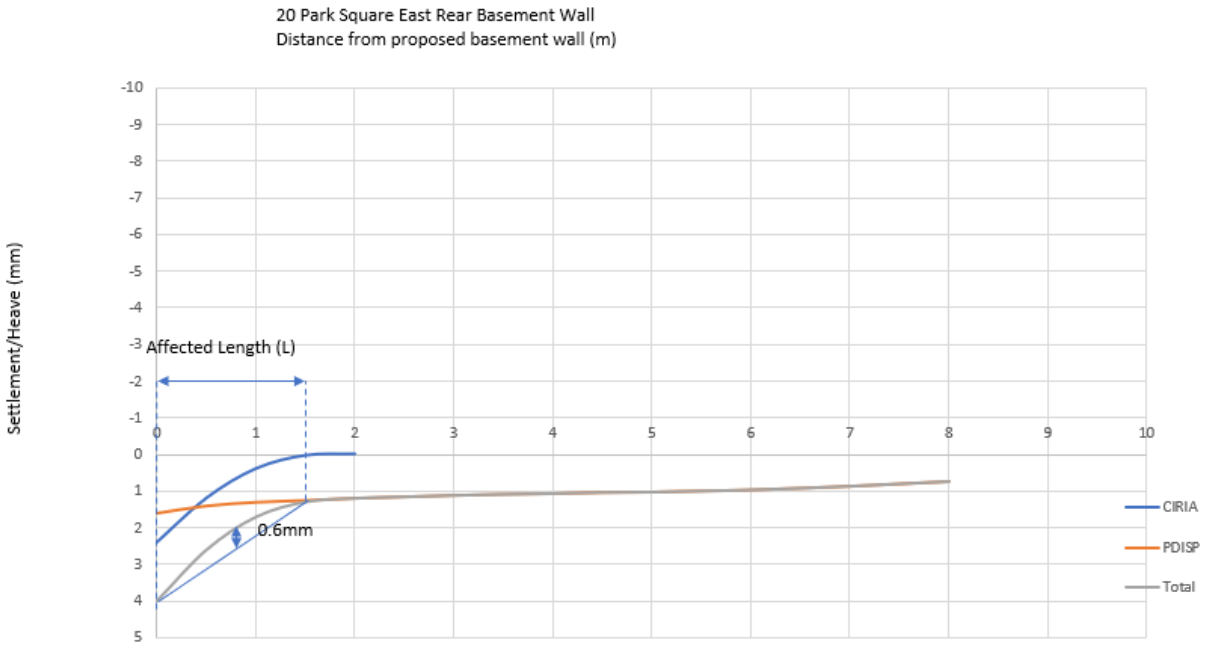
Table 8-4.1: Displacements of Assessed Walls at Closest Point

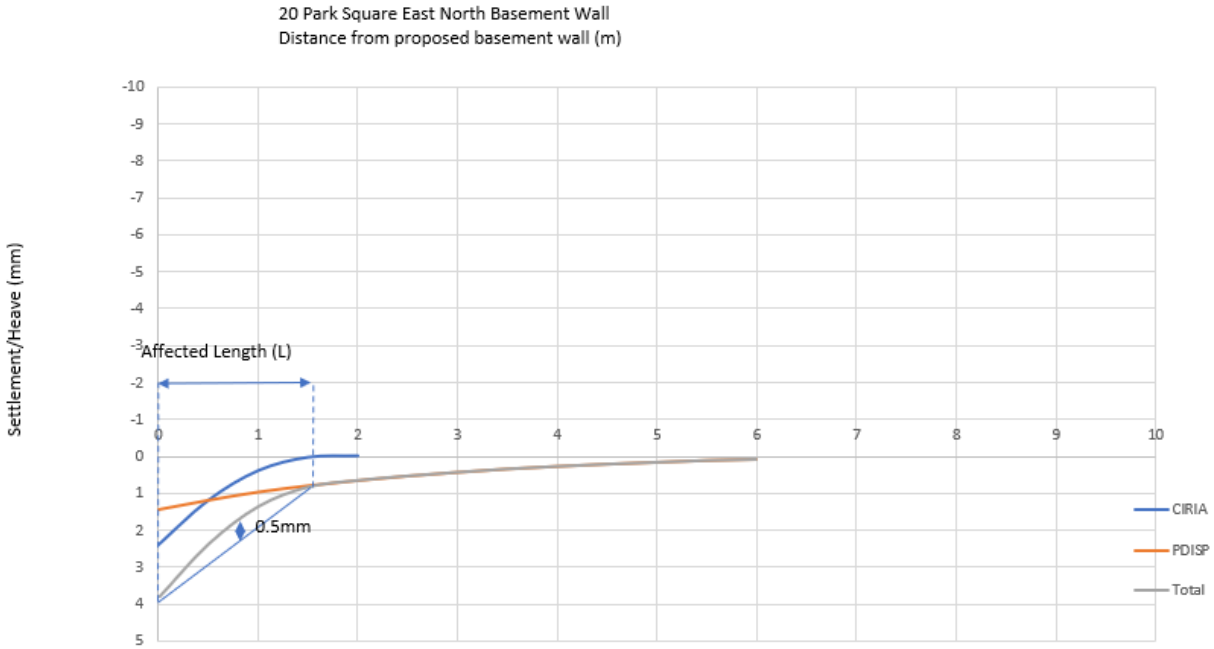
	No. 20 (Rear Basement Wall)	No. 20 (North Basement Wall)	The Diorama (South West Wall)	20 Park Square East Rear Vault Wall	18 Park Square East Rear Vault Wall
Horizontal displacement	1.1mm	1.1mm	3mm	0.7mm	0.7mm
Horizontal strain, ε_h	0.034%	0.034%	0.036%	0.036%	0.036%
Maximum PDISP settlement	1.5mm	1.5mm	3.9mm	1.8mm	1.9mm
CIRIA settlement	2.4mm	2.4mm	0.84mm	1.5mm	1.5mm
Combined CIRIA and PDISP settlement	3.9mm	3.9mm	4.74mm	3.3mm	3.3mm

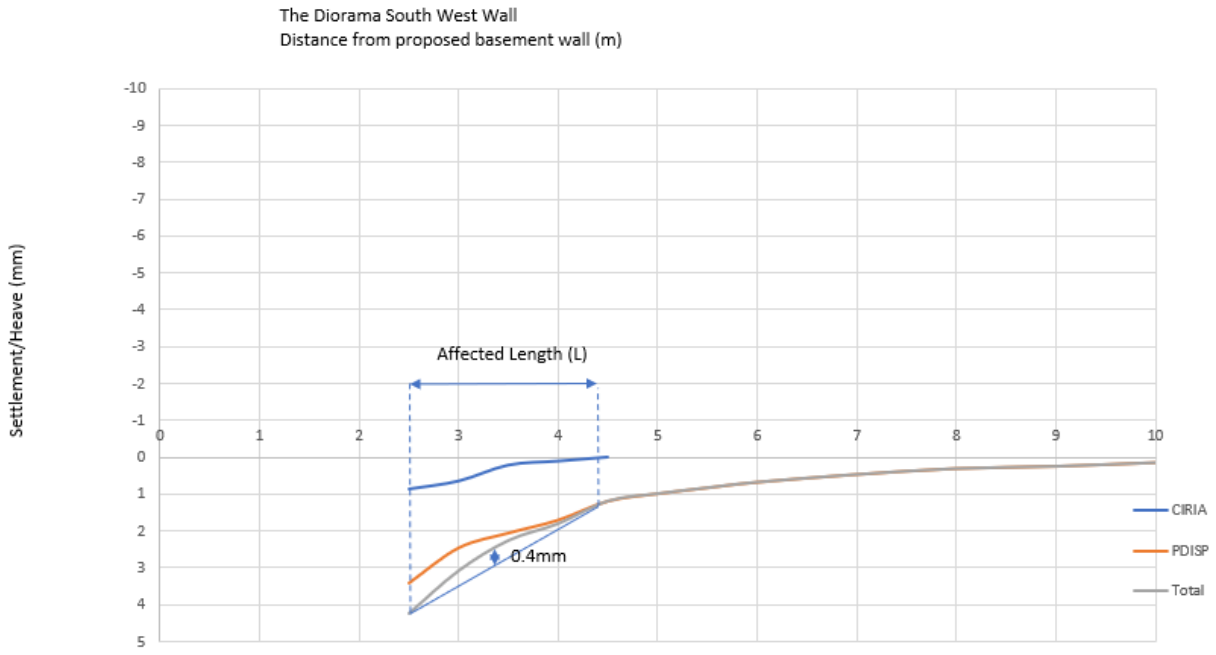
The horizontal strain is the horizontal displacement divided by the affected wall width.

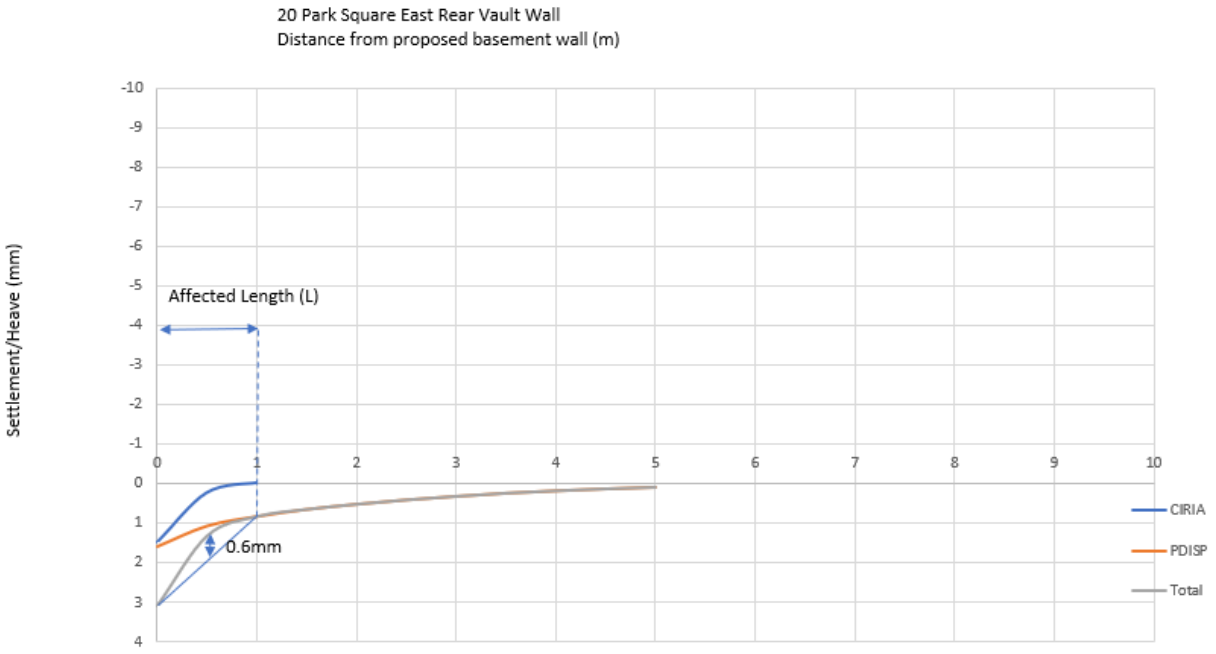
The settlement profile produced by PDISP along the assessed wall locations must be added to the settlement profile presented in Figure 6.16 of CIRIA Report C760, which is appropriate for the proposed construction method. The combined maximum settlements, at the closest point of the assessed walls are displayed in Table 8-2. The CIRIA settlement profiles from the basement wall to the maximum distance of affected ground are predicted to be the same for both walls and this is displayed in Figure 3.

The deflection along the walls is calculated as the difference between the tangent of the relevant width of the affected walls and the total combined predicted ground surface movements curves from the CIRIA C760 and the PDISP analyses.


20 Park Square East Rear Basement Wall
Distance from proposed basement wall (m)
Settlement/Heave (mm)
Affected Length (L)
0.6mm
CIRIA
PDISP
Total


20 Park Square East North Basement Wall
Distance from proposed basement wall (m)
Settlement/Heave (mm)
Affected Length (L)
0.5mm
CIRIA
PDISP
Total


The Diorama South West Wall
Distance from proposed basement wall (m)
Settlement/Heave (mm)
Affected Length (L)
0.4mm
CIRIA
PDISP
Total


20 Park Square East Rear Vault Wall
Distance from proposed basement wall (m)
Settlement/Heave (mm)
Affected Length (L)
0.6mm
CIRIA
PDISP
Total

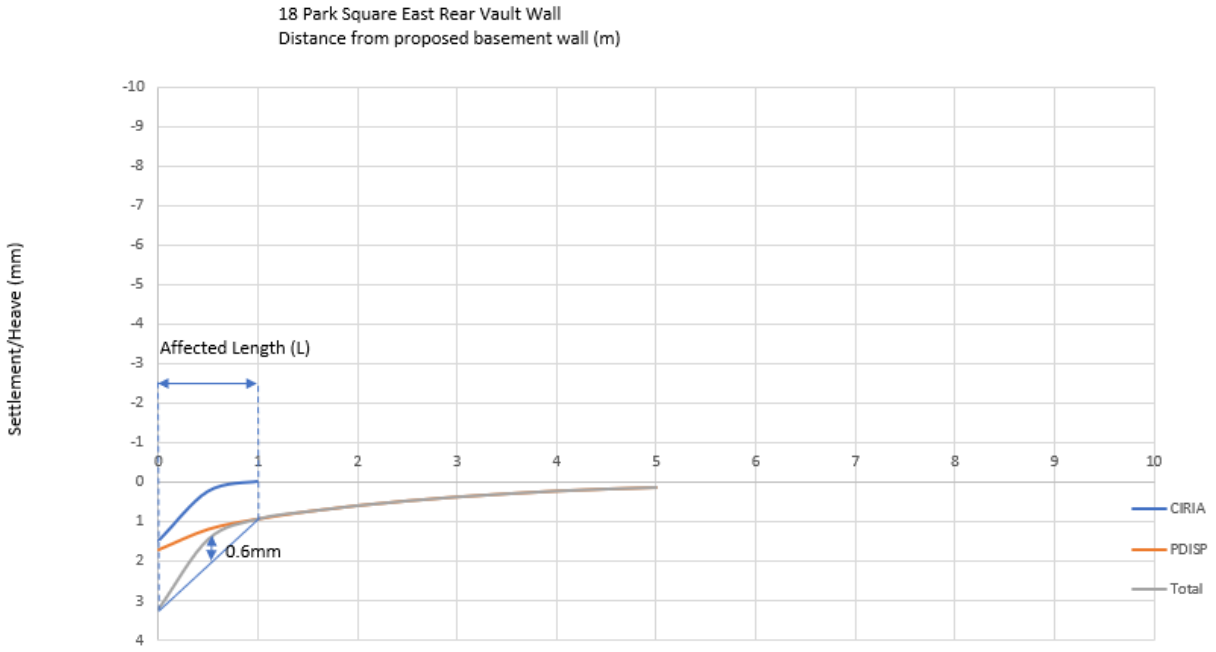


Figure 3: Predicted Displacements for Assessed Walls

The maximum vertical deflections, from the convex settlement curves for the coarse-grained soils support case and the relevant deflection ratios are displayed in Table 8-4.2.

The deflection along the wall is calculated as the difference between the tangent of the relevant width of the affected wall and the total combined predicted ground surface movements curves (from Figure 6.16 of CIRIA C760 and the PDISP analyses). Deflection ratios are measured as the above value divided by the affected width due to settlement.

Table 8-4.2: Vertical Deflections of Assessed Walls

	No. 20 (Rear Basement Wall)	**No. 20 (North Basement Wall)**	**The Diorama (South West Wall)**	**20 Park Square East Rear Vault Wall**	**18 Park Square East Rear Vault Wall**
Vertical deflection, Δ	0.6mm	0.5mm	0.4mm	0.6mm	0.6mm
Deflection ratio, Δ/L	0.038%	0.031%	0.019%	0.060%	0.060%

8.5 DAMAGE CATEGOREY RATING

The damage category for both assessed walls are identical and are illustrated in Figure 4, using the damage category ratings and graphs given in CIRIA SP200. Figure 5 explains the damage categories.

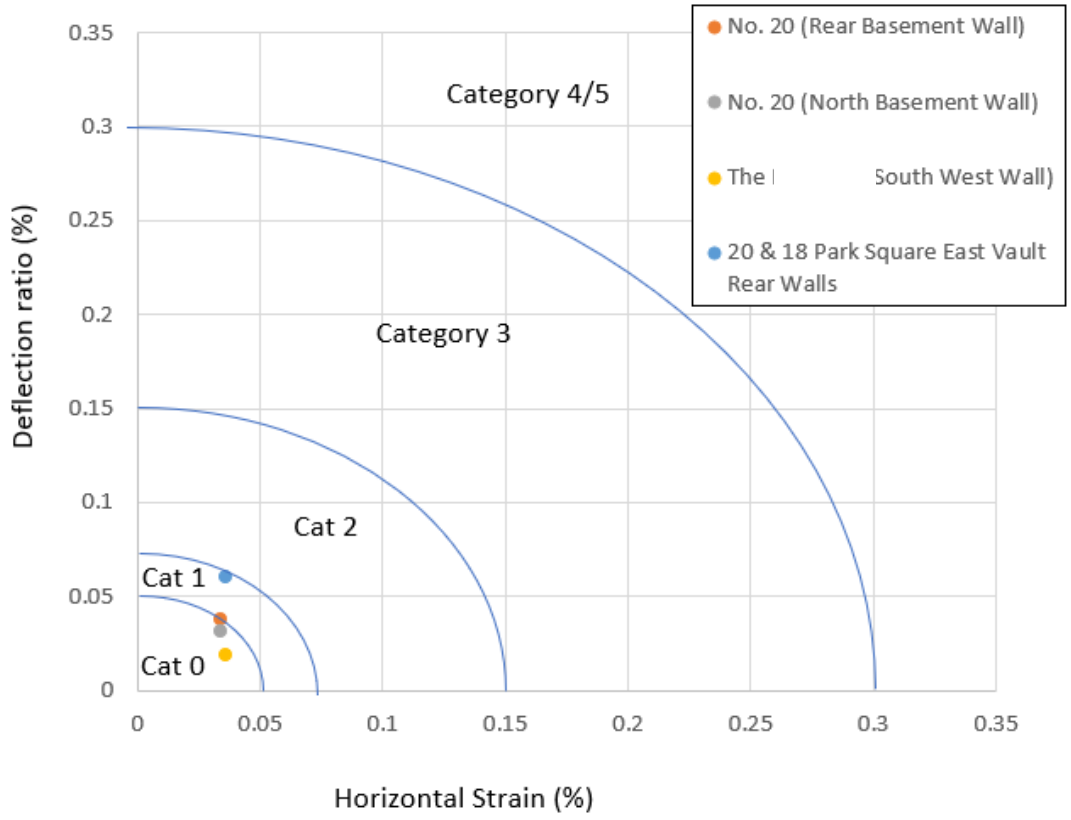


Figure 4: Damage Category Ratings

The results show the affected walls are:

- 20 Park Square East Rear Basement Wall
- 20 Park Square East North Basement Wall
- The Diorama South West Wall
- 20 & 18 Park Square East Vault Rear Walls

Any walls outside of the ones considered above are further away from proposed excavations and as such will have damage categories lower than those presented in figure 4. As such these would be expected to have damage categories of below 2 which is allowable under Camden guidance.

Use of best practice construction methods will be essential to ensure that the ground movements are kept in line with the above predictions. Pre-construction condition surveys of neighbouring properties are also recommended and a system of monitoring adjoining/adjacent structures should be established before the works start.

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain, ε_{lim} (%)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	<0.1	0.0 to 0.05
1 Very slight	**Fine cracks that can easily be treated during normal decoration.** Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	<1	0.05 to 0.075
2 Slight	**Cracks easily filled. Redecoration probably required.** Several slight fractures showing inside of building. Cracks are visible externally and **some repointing may be required externally** to ensure weathertightness. Doors and windows may stick slightly.	<5	0.075 to 0.15
3 Moderate	**The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced.** Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5 to 15 or a number of cracks >3	0.15 to 0.3
4 Severe	**Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows.** Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Services pipes disrupted.	15 to 25, but also depends on number of cracks	>0.3
5 Very severe	**This requires a major repair, involving partial or complete rebuilding.** Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	Usually >25, but depends on numbers of cracks	

Notes

1 In assessing the degree of damage, account must be taken of its location in the building or structure.

2 Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

Figure 5: Classification of Visual Damage to Wall

(after Burland et al, 1977; and Boscardin and Cording, 1989; and Burland, 2001).

9. BASEMENT IMPACT ASSESSMENT AND SUMMARY

This Summary includes the principal aspects and primary findings of this assessment. The whole report should be read to obtain a full understanding of the matters considered.

Location: 19 Park Square East, W8 6JW in the London Borough of Camden.

9.1 STAGE 1: SCREENING

Items identified during a Screening stage as requiring further assessment are outlined below.

Slope Stability:

Slope stability screening chart	
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. The Envirocheck report indicates the Superficial Deposits are a Secondary A Aquifer.
12. Is the site within 5m of a highway or pedestrian right of way?	Yes, the excavation for the lowering of the vault section will be within will be within 5m of Park Square East.

Subterranean Groundwater Flow:

Subterranean (groundwater) flow screening chart	
1. a) Is the site located directly above an aquifer?	Yes. The Envirocheck report indicates the Superficial Deposits are a Secondary A Aquifer.
b) Will the proposed basement extend beneath the water table surface?	Based on BGS borehole records the excavation is unlikely to encounter groundwater. However, a ground investigation will be required to assess the conditions of the groundwater beneath the subject site. Further consideration of this will be given in light of the site specific ground investigation.
4. Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	Yes. Part of the existing courtyard areas are soft landscaped, with the proposed material to be removed and basement extended beneath these areas. These areas are of insignificant size in comparison to the site and surrounding area.

Surface Flow and Flooding:

Surface flow and flooding screening chart	
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	Yes. Courtyards to be changed from soft to hard landscaped.
6. Is the site in an area identified to have surface water flood risk or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	Yes. The site is a high flood risk from surface water flooding. There are no nearby surface water features.

9.2 GROUND INVESTIGATION

A ground investigation (GI) was completed by CET in October 2019 and comprised one 'cut-down' cable percussion borehole (BH01) and two modular windowless sampler boreholes (BH01 & BH02).

Strata name	Approximate level to top of strata (mAOD)	Thickness (m)	Description
Made Ground	30	0.25 to 1.9	Very clayey, slightly sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick.
Langley Silt Member	28.2 to 28.25	1.2 to 1.75m	Firm and firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. Or Soft, brown, slightly fine sandy, silty CLAY.

Lynch Hill Gravel Member	27 to 25.78	5.18 to 5.9m	Loose to very dense, brown, very fine to coarse sandy, locally sandy and slightly sandy GRAVEL of sub-angular to rounded, fine to coarse flint.
Weathered and Relatively Unweathered London Clay Formation.	21.3 to 20.6	Not proved.	Stiff, brown mottled grey, becoming brown and grey mottled CLAY with occasional sand size selenite and silt partings. Or Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite.

A groundwater seepage was recorded in BH01 at 9.5m below ground level rising to 8m below ground level after 20 minutes of monitoring. Groundwater was likely masked in BH02 and BH03 by the continuous casing of the borehole during the drilling process. Groundwater monitoring standpipes were installed within each of the boreholes to the various depths as described in Table 5-1 of this report. Subsequent readings of the standpipes were undertaken with groundwater level varying between 23mAOD to 21.65mAOD.

9.3 SITE MODEL

A ground model for the site is summarised as follows:

- **Excavation Level** – Circa 26mAOD for the bulk excavation and 25mAOD for the underpinning of the basement extension. Vault areas to be lowered by 1.2m to circa 24.8mAOD with underpinning blocks founding at circa 23.8mAOD.
- **Site Topography** – Relatively flat at approximately 30mAOD.
- **Surface Water Bodies** – 473m from the site.
- **Flood Risk** – 0.1% annual risk from water courses and High (greater than 3.3%) from surface water.
- **Ground Conditions:**
    - Made Ground to a minimum level of approximately 28.2mAOD.
    - Langley Silt Member to a minimum level of approximately 25.78mAOD.
    - Lynch Hill Gravel Member to a minimum level of approximately 20.6mAOD.
    - Weathered and relatively unweathered London Clay Formation proved to a minimum level of 7.65mAOD.

- **Aquifer** – Secondary A Aquifer in the Lynch Hill Gravel Member.
- **Groundwater** – Groundwater level of 23mAOD to 21.65mAOD.

9.4 SCOPING AND IMPACT ASSESSMENT

- The site is located above a Secondary Aquifer, the Lynch Hill Gravel Member, however a measured groundwater level of between 23 and 21.65mAOD in the installed standpipes indicates the proposed basement will not extend below the groundwater table. Therefore, on the basis of the observed groundwater levels no dewatering is likely to be required. It is also unlikely that the basement would cause any significant adverse impact on groundwater flows as there are already basements surrounding the proposed construction in all four cardinal directions. Groundwater level monitoring readings should be taken during the detailed design period and prior to construction to establish the long-term groundwater regime;
- Flooding from surface water is characterised as high for this site indicating that there is a greater than 3.3% annual risk from flooding at the development site. The development must therefore meet the requirements as set out in LBC Core Strategy Camden Development Policy 27, which state that "the scale of the scheme is such that there is no, or minimal, impact on drainage conditions". As presented in the surface water impact assessments the increase in the impermeable surface area is insignificant when compared with the site and infinitesimally small in comparison to the surrounding area;
- Construction of the basement and lowering of the vault floor level will result in lowering of the foundations compared to adjacent sites by an assumed net value of between 0.5m and 2.1m, and excavation of the basement will result in some ground movements. The effect of this has been reviewed in the ground movement and damage category assessment sections of this report. Contour plots of displacement in response to the changes in vertical pressure caused by the excavation and construction of the proposed basement are included. Based upon the maximum displacements predicted by PDISP analyses, Damage Category Assessments were undertaken for the worst-case scenarios in the adjoining properties and these combined with the ground movements alongside the basement in response to the lateral stress release are as predicted by CIRIA publication C760.
- In the assessed cases, the nearest walls of 20 Park Square East (South Wall) and The Diorama (South West Wall) are classified as Category 0 'negligible', 20 Park Square East (Rear Wall) and 20 & 18 Park Square East Vault (Rear Walls) are classified as Category 1 'very slight' (as given in CIRIA SP200). The damage category results have been plotted graphically in Figure 4. Parameters for founding depths have been assumed where not data was available, and this will require validation prior to construction. No further Damage Category Assessments have been carried out as other structures in the vicinity are further away and therefore considered lower risk. Use of best practice construction methods will be essential to ensure that the ground movements are kept in line with the above

predictions. Pre-construction condition surveys of neighbouring properties are also recommended, and a system of monitoring adjoining and adjacent structures should be established before the works start.

10. REFFERENCES

Barton, N. 1992. The Lost Rivers of London. Historical Publications, London.

British Geological Survey (BGS) Geological Map Sheet 270 (South London 1: 50,000 scale solid and drift, 2006), the BGS digital geology maps that utilises the most up to date names of geological units (www.bgs.ac.uk/data), and the Geology of London Memoir (Ellison et al., 2004).

Burland, J.B., et al. 2001. Building response to tunnelling. Case studies from the Jubilee Line Extension, London. CIRIA Special Publication 200.

Gaba A.R., et al. 2017. Guidance on Embedded Retaining Wall Design. CIRIA Report C760.

London Borough of Camden, Local Plan Policy A5 Basements (2017).

Padfield, C.J. and Sharrock, M.J. 1983. Settlement of structures on clayey soils. CIRIA Special Publication 27.F

Tomlinson , M.J. 1986. Foundation Design and Construction.

Simons, N. and Menzies B., 1977. A Short Course in Foundation Engineering.

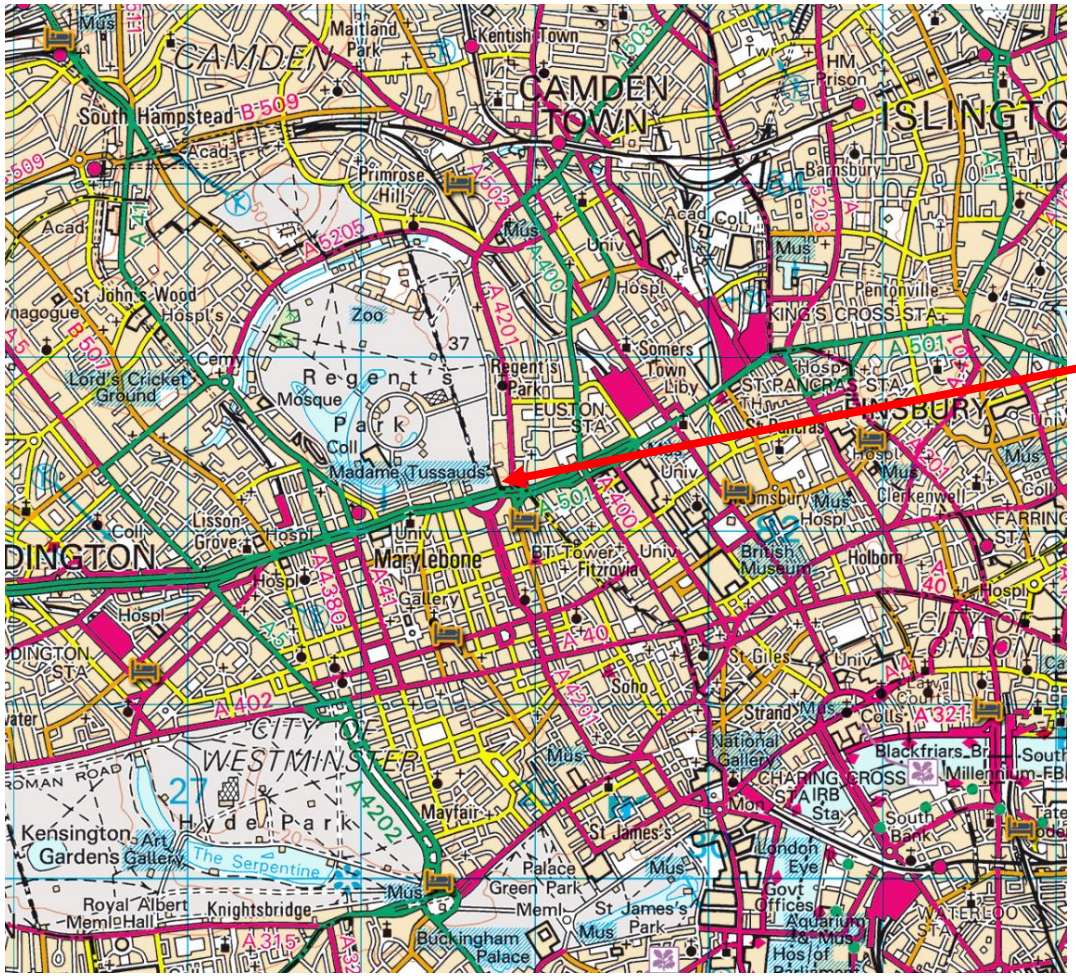
APPENDIX A
CET REPORT FIGURES

CET INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East

Lead No.			
1038915			
Created By:	Checked:	Approved:	Date:
JM	**PJW**	**PJW**	**November 2019**



Site Location Plan

Scale: 1 square = 1km

FIGURE A1

INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East

Lead No.
1038915

Created By:	Checked:	Approved:	Date:
JM	**PJW**	**PJW**	**November 2019**

Transport for London Property Asset Manager

Tunnel Asset Locations

Scale: As shown

FIGURE A2

CET INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East

Lead No.
1038915

Created By:	Checked:	Approved:	Date:
JM	**PJW**	**PJW**	**November 2019**

Topographic Map

Scale: NTS

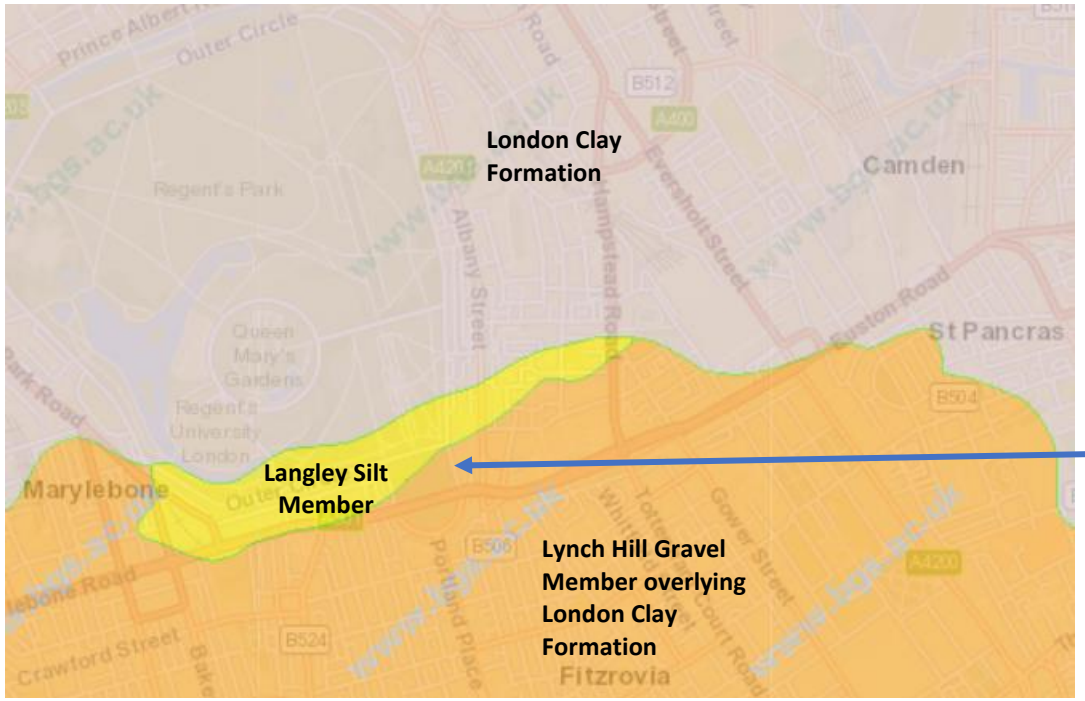
FIGURE A3

CET INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East

Lead No.			
1038915			
Created By:	Checked:	Approved:	Date:
JM	**PJW**	**PJW**	**November 2019**



Geological Map

Scale: As shown

FIGURE A4

CET INFRASTRUCTURE
Giving our all

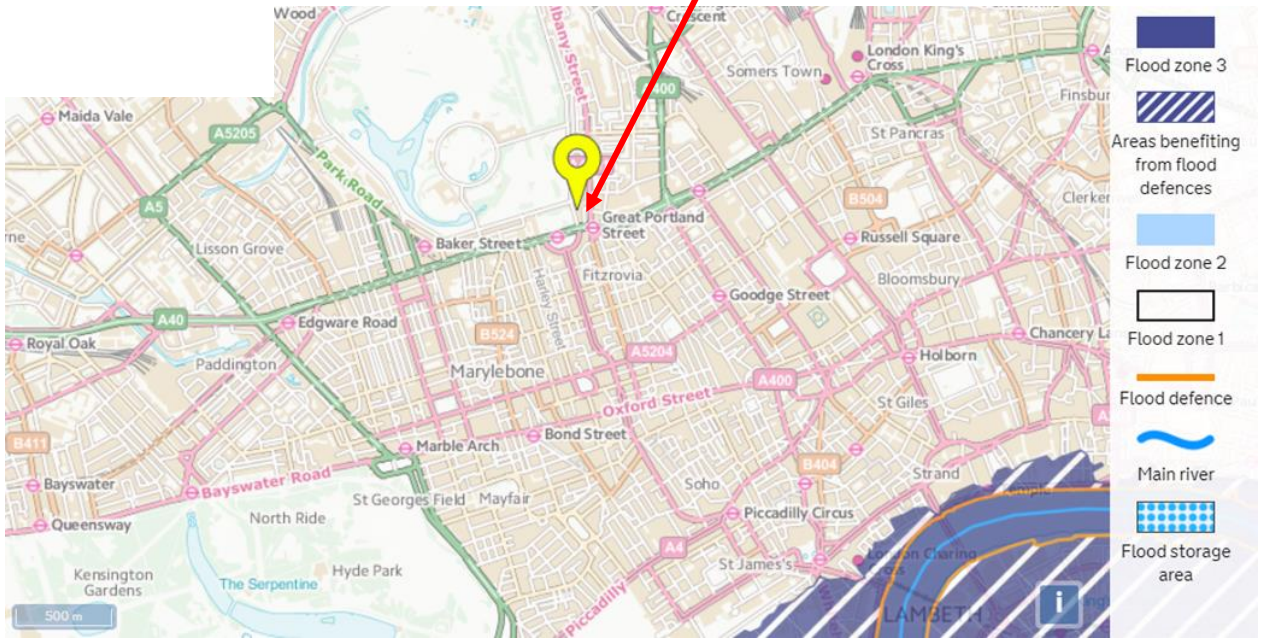
Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East			Lead No. 1038915
Created By: JM	Checked: PJW	Approved: PJW	Date: November 2019

FLOOD ZONE 1

Land and property in flood zone 1 have a low probability of flooding

More information about flood zones



Flood Zone Map

Scale: As shown

FIGURE A5

INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East

Lead No.			
1038915			
Created By: **JM**	Checked: **PJW**	Approved: **PJW**	Date: **November 2019**

Flood Risk (Rivers & Seas)

Scale: NTS

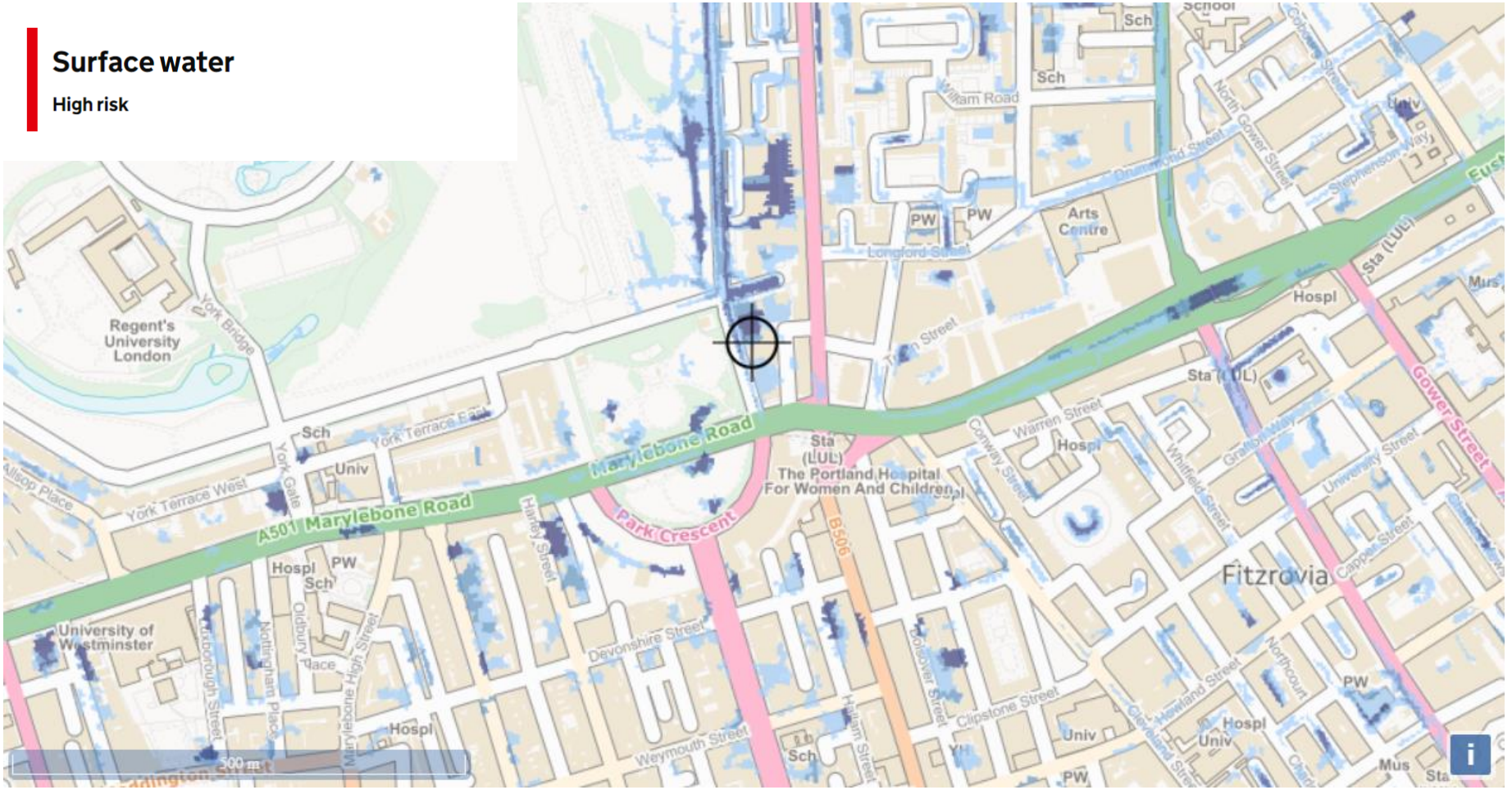
FIGURE A6

CET INFRASTRUCTURE
Giving our all

Northdown House, Ashford Road, Harrietsham, Maidstone
Kent, ME17 1QW
Telephone: 01622 858545 Facsimile: 01622 858544

The Diorama- 17-19 Park Square East

Lead No.	Created By:	Checked:	Approved:	Date:
1038915	JM	PJW	PJW	November 2019



Flood Risk (Surface Water)

Scale: As shown

FIGURE A7

APPENDIX B
PROPOSED DEVELOPMENT PLANS

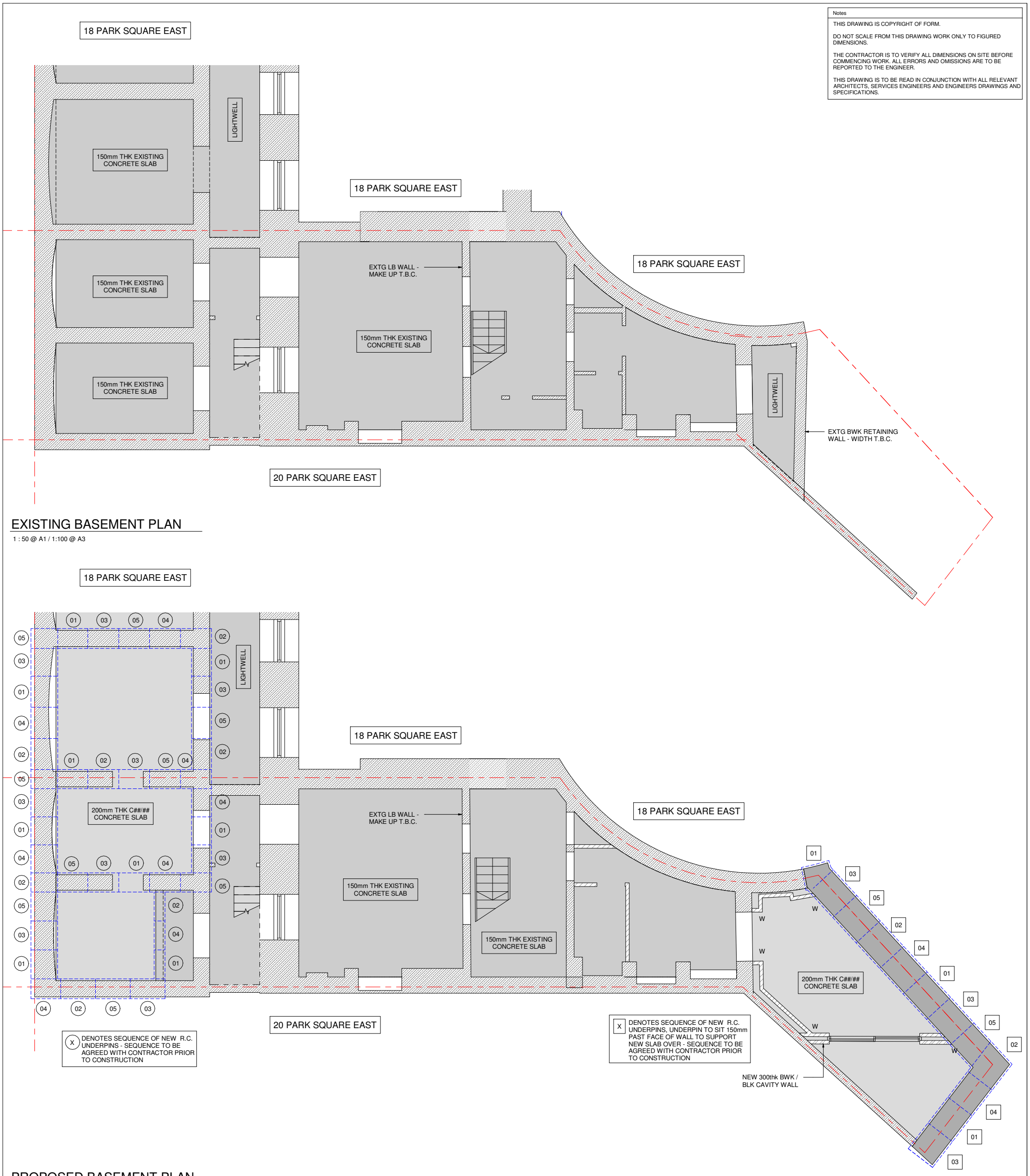
Notes

THIS DRAWING IS COPYRIGHT OF FORM.

DO NOT SCALE FROM THIS DRAWING WORK ONLY TO FIGURED DIMENSIONS.

THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. ALL ERRORS AND OMISSIONS ARE TO BE REPORTED TO THE ENGINEER.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES ENGINEERS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



EXISTING BASEMENT PLAN

1 : 50 @ A1 / 1:100 @ A3

(X) DENOTES SEQUENCE OF NEW R.C. UNDERPINS - SEQUENCE TO BE AGREED WITH CONTRACTOR PRIOR TO CONSTRUCTION

X DENOTES SEQUENCE OF NEW R.C. UNDERPINS, UNDERPIN TO SIT 150mm PAST FACE OF WALL TO SUPPORT NEW SLAB OVER - SEQUENCE TO BE AGREED WITH CONTRACTOR PRIOR TO CONSTRUCTION

PROPOSED BASEMENT PLAN

1 : 50 @ A1 / 1:100 @ A3

LINTEL SCHEDULE	
MARK	DESCRIPTION
L1	150dp PRE-STRESSED P.C LINTEL/S TO SUIT WIDTH OF WALL
L2	CG90/100 CATNIC CAVITY WALL LINTEL

PADSTONE SCHEDULE	
MARK	DESCRIPTION
P1	450x100x225dp MASS CONCRETE

Rev.	Date	Amendment	Drawn / Chkd
P1	06.11.19	ISSUED FOR PLANNING	PE / SD

Drawing Status: PRELIMINARY

Form

Job Title
19 PARK SQUARE EAST
LONDON,
NW1 4LH

Drawing Title
EXISTING & PROPOSED BASEMENT PLANS

Form Structural Design Ltd 77 St John Street London EC1M 4NN
T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

Date	Scale	Drawn	Checked
NOV 19	As indicated		

Job No.	Drawing No.	Revision
193206-FSD-	L(23)200	P1

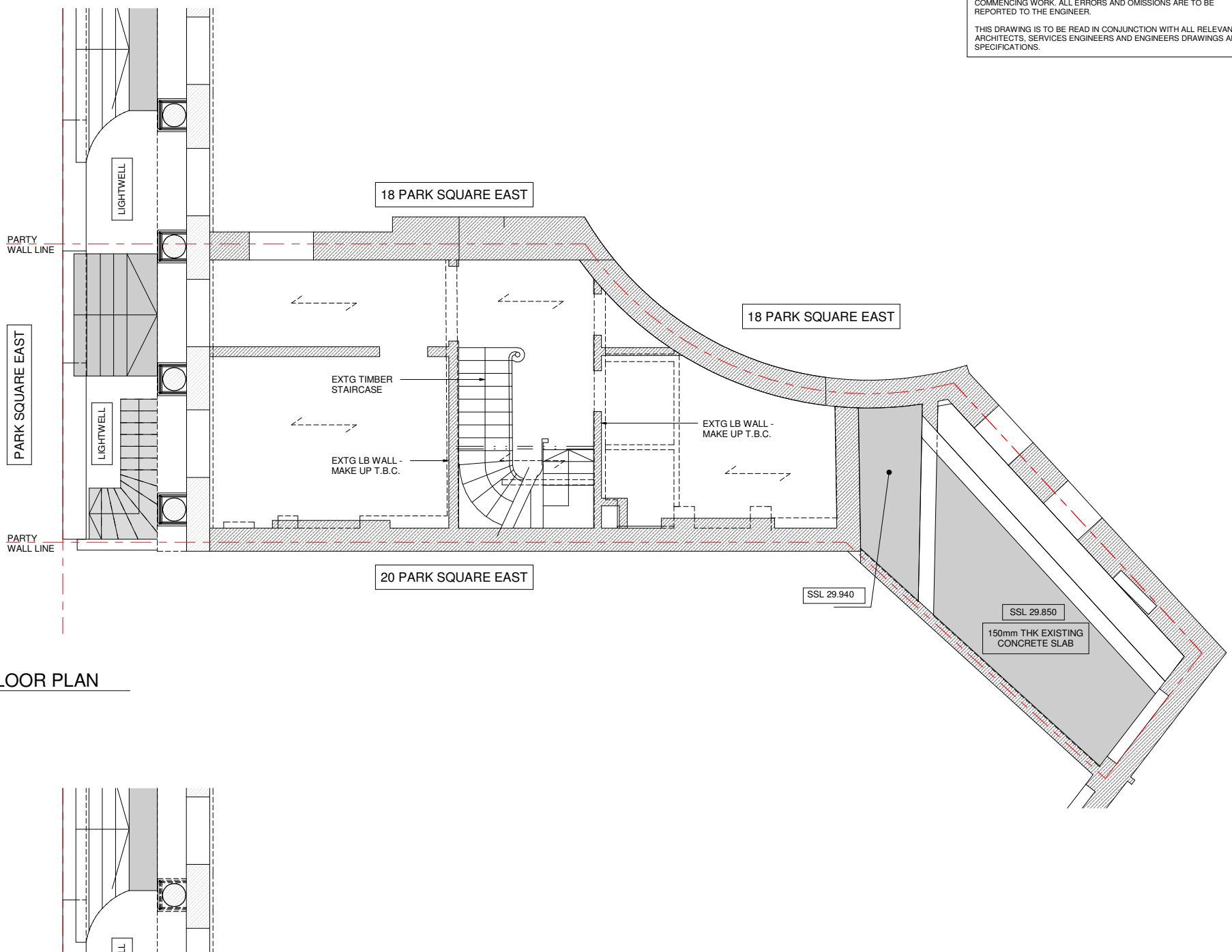
Notes

THIS DRAWING IS COPYRIGHT OF FORM.

DO NOT SCALE FROM THIS DRAWING WORK ONLY TO FIGURED DIMENSIONS.

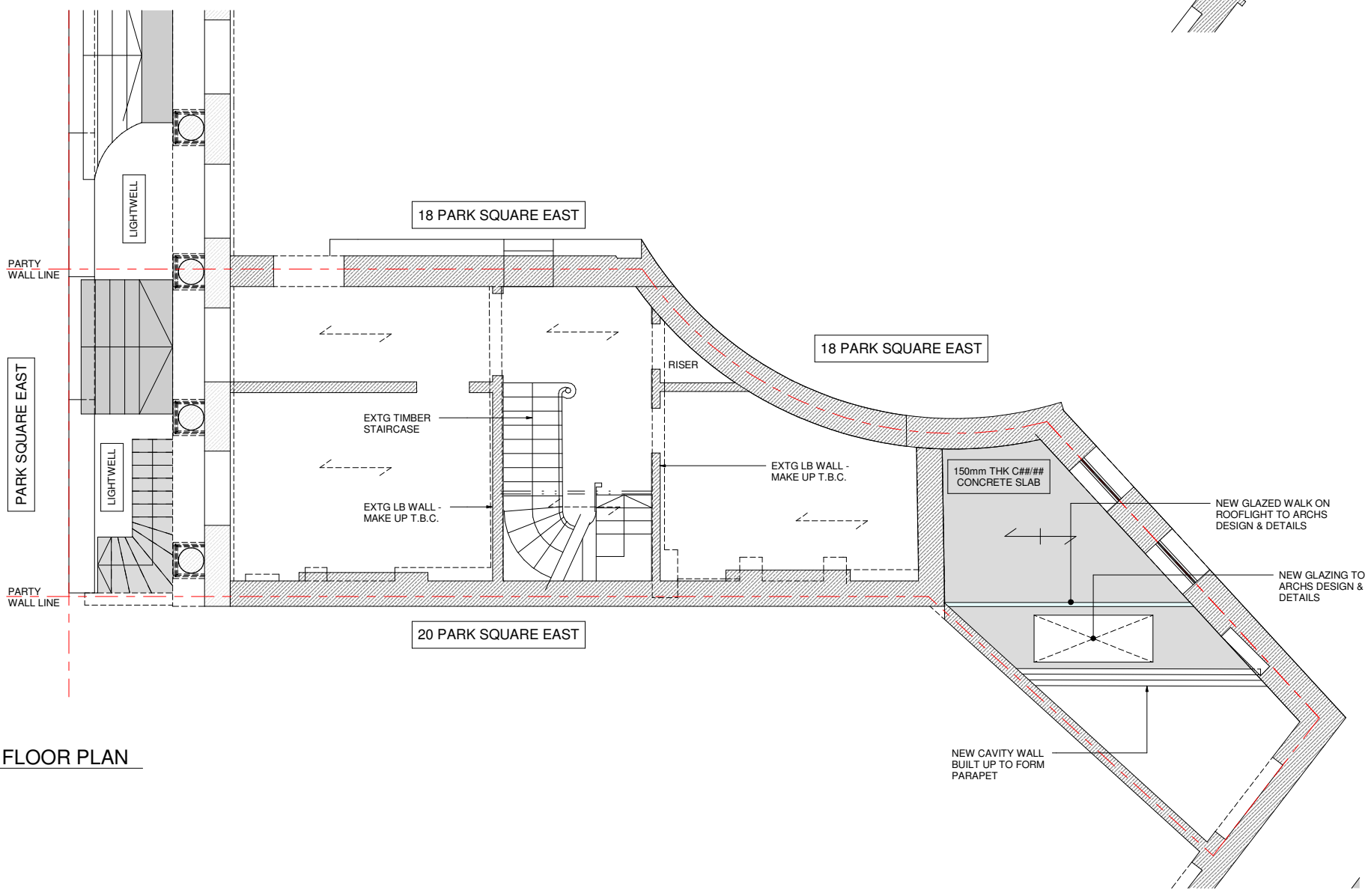
THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. ALL ERRORS AND OMISSIONS ARE TO BE REPORTED TO THE ENGINEER.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES ENGINEERS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



EXISTING GROUND FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3



PROPOSED GROUND FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3

KEY	
WALL TYPES	
	EXISTING WALL
	EXISTING WALL TO BE REMOVED.
	NEW 20N/mm² BRICKWORK IN DESIGNATION (iii) MORTAR.
	NEW 7N/mm² MEDIUM DENSE BLOCKWORK IN DESIGNATION (iii) MORTAR.
	NEW NON LOAD BEARING PARTITION.
	LOAD BEARING WALL UNDER.
	NEW BRICKWORK TO BE FULLY TOOTHED IN AND PACKED UP TO EXTG BRICKWORK
W	STAINLESS STEEL WALL EXTENSION PROFILES.
ALL MASONRY BELOW DPC LEVEL TO BE FROST RESISTANT AND IN DESIGNATION (i) MORTAR.	

LEGEND	
	NEW BEAM UNDER.
	DOUBLED TIMBERS TRIMMING OPENINGS/ UNDER PARTITIONS.
	DENOTES SPAN OF NEW 50x200 C24 TIMBER JOISTS AT 400c/c U.N.O.
	DENOTES SPAN OF NEW CONCRETE SLAB

LINTEL SCHEDULE	
MARK	DESCRIPTION
L1	150dp PRE-STRESSED P.C LINTEL/S TO SUIT WIDTH OF WALL
L2	CG90/100 CATNIC CAVITY WALL LINTEL

PADSTONE SCHEDULE	
MARK	DESCRIPTION
P1	450x100x225dp MASS CONCRETE

Rev.	Date	Amendment	Drawn / Chkd
P1	06.11.19	ISSUED FOR PLANNING	PE / SD

Drawing Status: PRELIMINARY

Form

Job Title
19 PARK SQUARE EAST
LONDON,
NW1 4LH

Drawing Title
EXISTING & PROPOSED GROUND FLOOR PLANS

Form Structural Design Ltd 77 St John Street London EC1M 4NN
T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

Date	Scale	Drawn	Checked
NOV 19	As indicated		

Job No.	Drawing No.	Revision
193206-FSD-	L(23)201	P1

Notes

THIS DRAWING IS COPYRIGHT OF FORM.

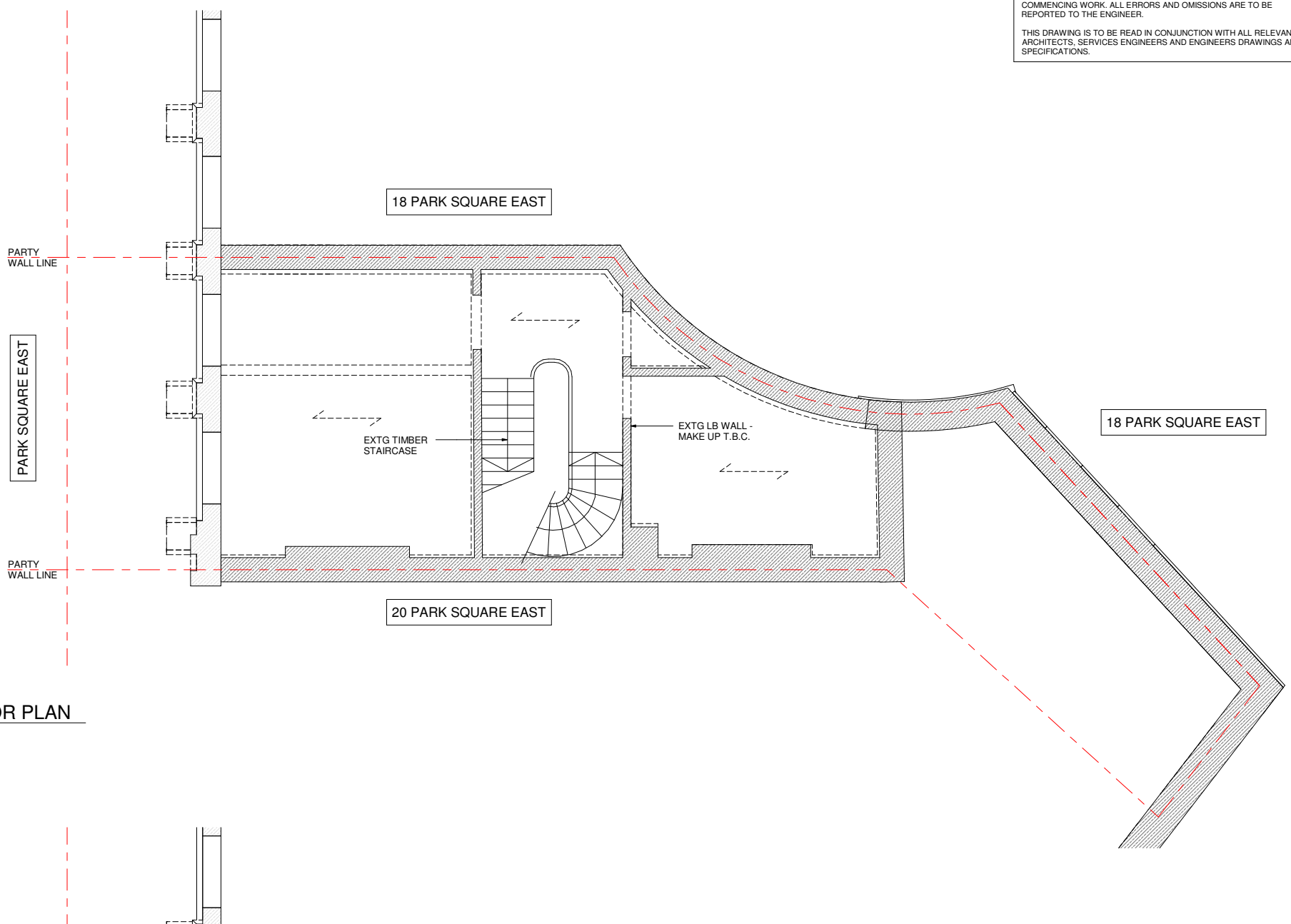
DO NOT SCALE FROM THIS DRAWING WORK ONLY TO FIGURED DIMENSIONS.

THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. ALL ERRORS AND OMISSIONS ARE TO BE REPORTED TO THE ENGINEER.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES ENGINEERS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

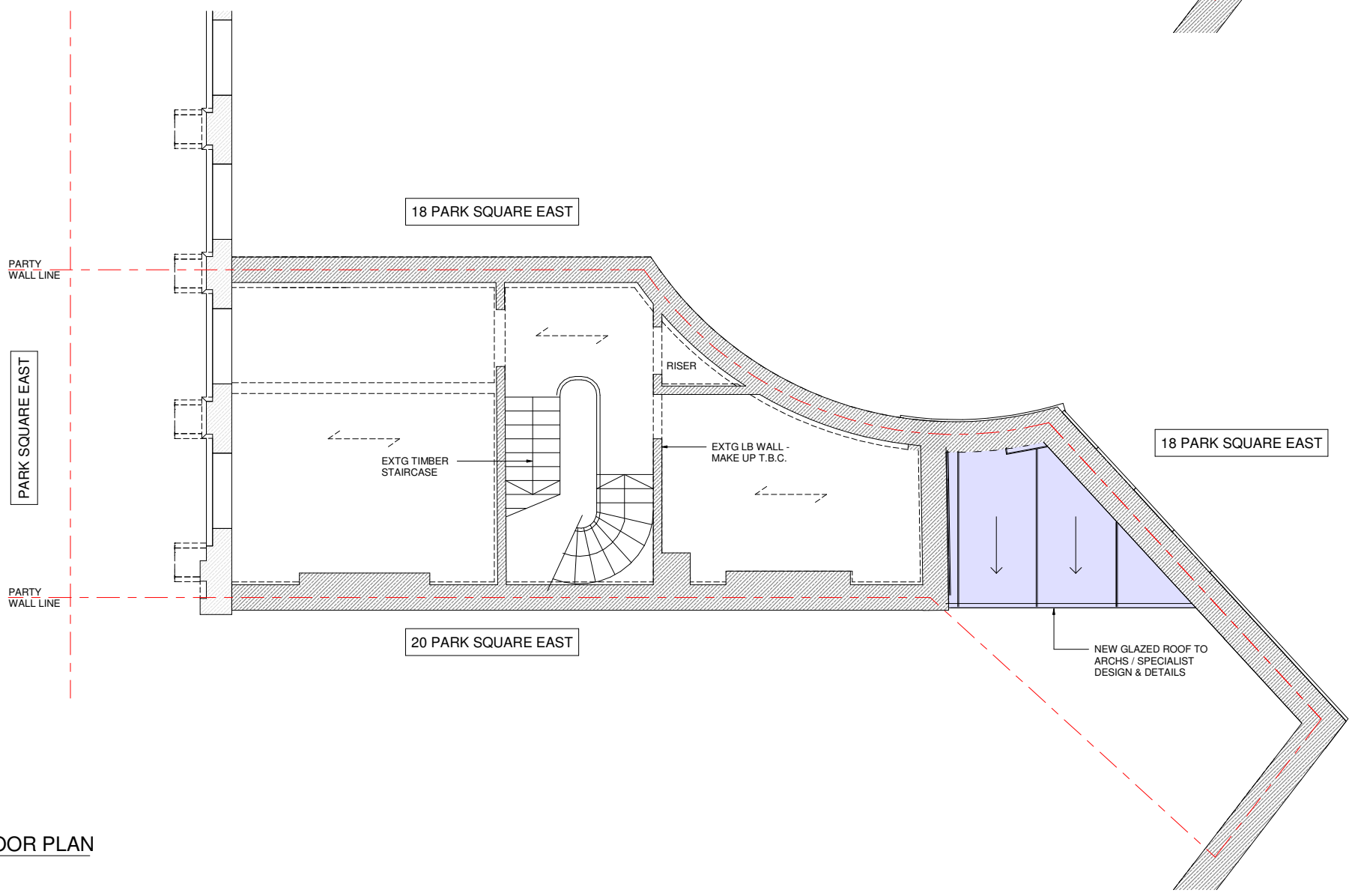
EXISTING FIRST FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3



PROPOSED FIRST FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3



KEY	
WALL TYPES	
	EXISTING WALL
	EXISTING WALL TO BE REMOVED.
	NEW 20N/mm² BRICKWORK IN DESIGNATION (iii) MORTAR.
	NEW 7N/mm² MEDIUM DENSE BLOCKWORK IN DESIGNATION (iii) MORTAR.
	NEW NON LOAD BEARING PARTITION.
	LOAD BEARING WALL UNDER.
	NEW BRICKWORK TO BE FULLY TOOTHED IN AND PACKED UP TO EXTG BRICKWORK
W	STAINLESS STEEL WALL EXTENSION PROFILES.
ALL MASONRY BELOW DPC LEVEL TO BE FROST RESISTANT AND IN DESIGNATION (i) MORTAR.	

LEGEND	
	NEW BEAM UNDER.
	DOUBLED TIMBERS TRIMMING OPENINGS/ UNDER PARTITIONS.
	DENOTES SPAN OF NEW 50x200 C24 TIMBER JOISTS AT 400c/c U.N.O.
	DENOTES SPAN OF NEW CONCRETE SLAB

LINTEL SCHEDULE	
MARK	DESCRIPTION
L1	150dp PRE-STRESSED P.C LINTEL/S TO SUIT WIDTH OF WALL
L2	CG90/100 CATNIC CAVITY WALL LINTEL

PADSTONE SCHEDULE	
MARK	DESCRIPTION
P1	450x100x225dp MASS CONCRETE

Rev.	Date	Amendment	Drawn / Chkd
P1	06.11.19	ISSUED FOR PLANNING	PE / SD

Drawing Status: PRELIMINARY

Form

Job Title
19 PARK SQUARE EAST
LONDON,
NW1 4LH

Drawing Title
EXISTING & PROPSOED FIRST FLOOR PLANS

Form Structural Design Ltd 77 St John Street London EC1M 4NN
T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

Date	Scale	Drawn	Checked
NOV 19	As indicated		

Job No.	Drawing No.	Revision
193206-FSD-	L(23)202	P1

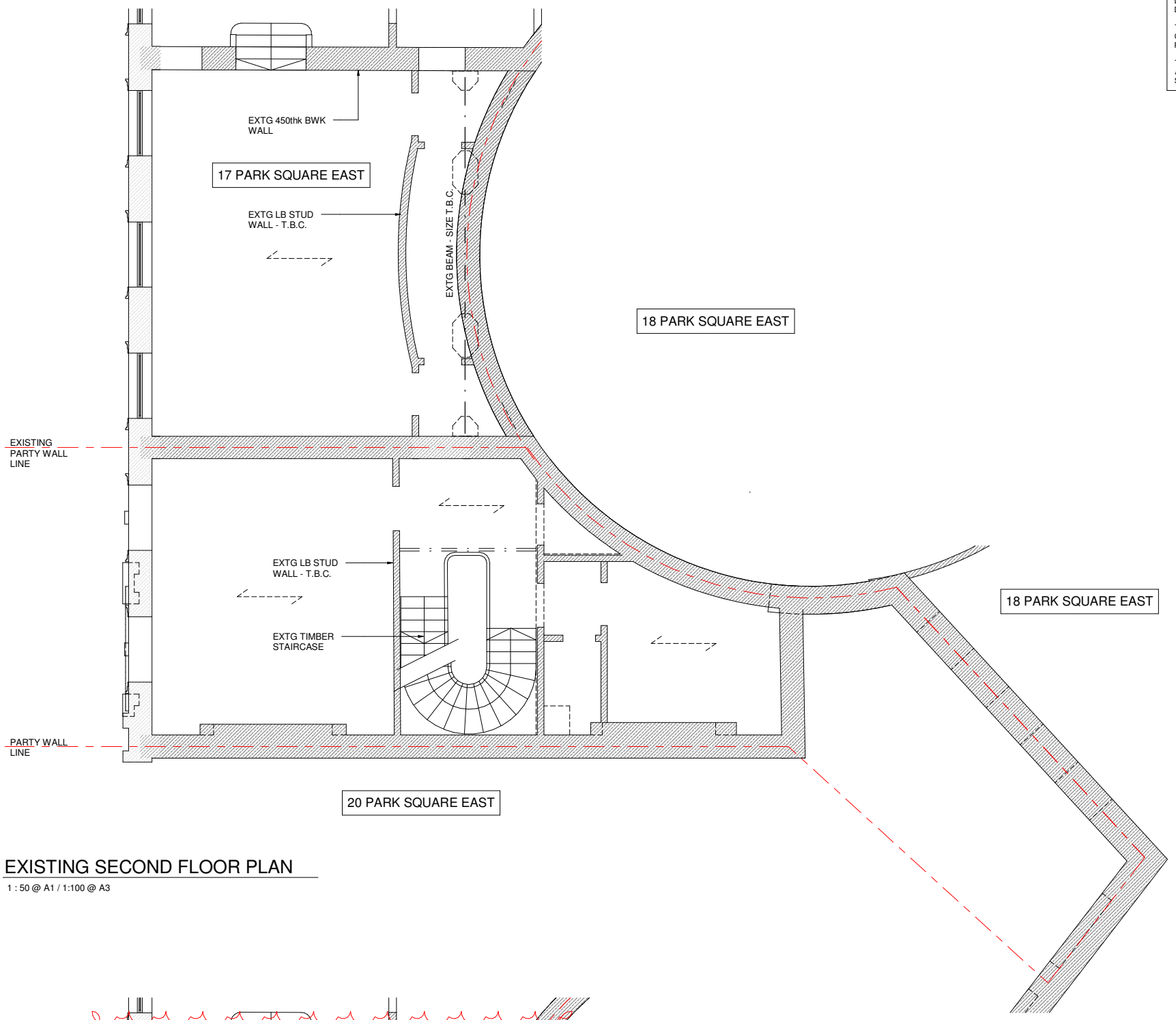
Notes

THIS DRAWING IS COPYRIGHT OF FORM.

DO NOT SCALE FROM THIS DRAWING WORK ONLY TO FIGURED DIMENSIONS.

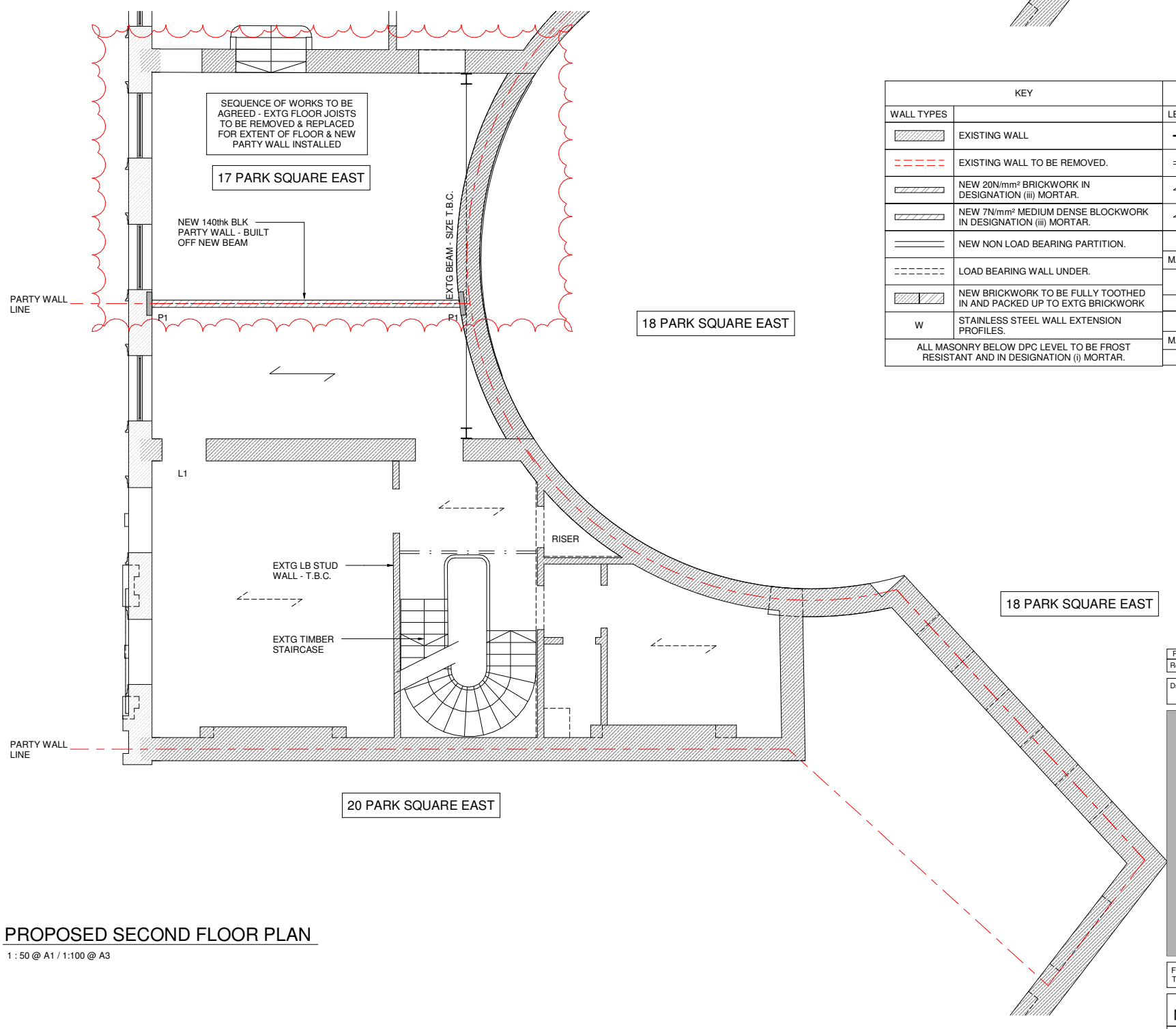
THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. ALL ERRORS AND OMISSIONS ARE TO BE REPORTED TO THE ENGINEER.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES ENGINEERS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



EXISTING SECOND FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3



PROPOSED SECOND FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3

KEY			
WALL TYPES		LEGEND	
	EXISTING WALL		NEW BEAM UNDER.
	EXISTING WALL TO BE REMOVED.		DOUBLED TIMBERS TRIMMING OPENINGS/ UNDER PARTITIONS.
	NEW 20N/mm² BRICKWORK IN DESIGNATION (iii) MORTAR.		DENOTES SPAN OF NEW 50x200 C24 TIMBER JOISTS AT 400c/c U.N.O.
	NEW 7N/mm² MEDIUM DENSE BLOCKWORK IN DESIGNATION (iii) MORTAR.		DENOTES SPAN OF NEW CONCRETE SLAB
	NEW NON LOAD BEARING PARTITION.	LINTEL SCHEDULE	
	LOAD BEARING WALL UNDER.	MARK	DESCRIPTION
	NEW BRICKWORK TO BE FULLY TOOTHED IN AND PACKED UP TO EXTG BRICKWORK	L1	150dp PRE-STRESSED P.C LINTEL/S TO SUIT WIDTH OF WALL
W	STAINLESS STEEL WALL EXTENSION PROFILES.	L2	CG90/100 CATNIC CAVITY WALL LINTEL
ALL MASONRY BELOW DPC LEVEL TO BE FROST RESISTANT AND IN DESIGNATION (i) MORTAR.		PADSTONE SCHEDULE	
		MARK	DESCRIPTION
		P1	450x100x225dp MASS CONCRETE

Rev.	Date	Amendment	Drawn / Chkd
P1	06.11.19	ISSUED FOR PLANNING	PE / SD

Drawing Status: PRELIMINARY

Form

Job Title
19 PARK SQUARE EAST
LONDON,
NW1 4LH

Drawing Title
EXISTING & PROPOSED SECOND FLOOR PLANS

Form Structural Design Ltd 77 St John Street London EC1M 4NN
T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

Date	Scale	Drawn	Checked
NOV 19	As indicated		

Job No.	Drawing No.	Revision
193206-FSD-	L(23)203	P1

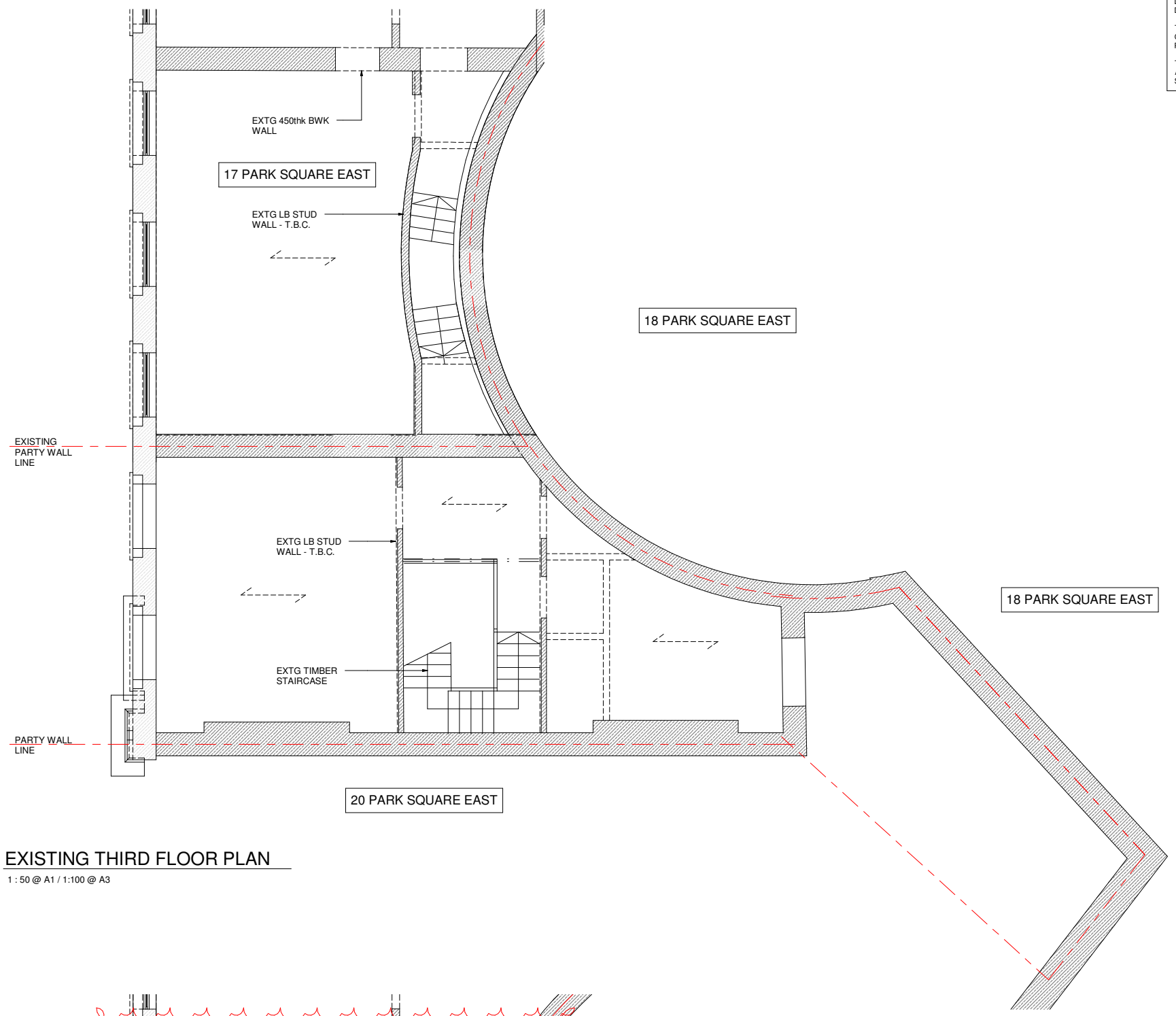
Notes

THIS DRAWING IS COPYRIGHT OF FORM.

DO NOT SCALE FROM THIS DRAWING WORK ONLY TO FIGURED DIMENSIONS.

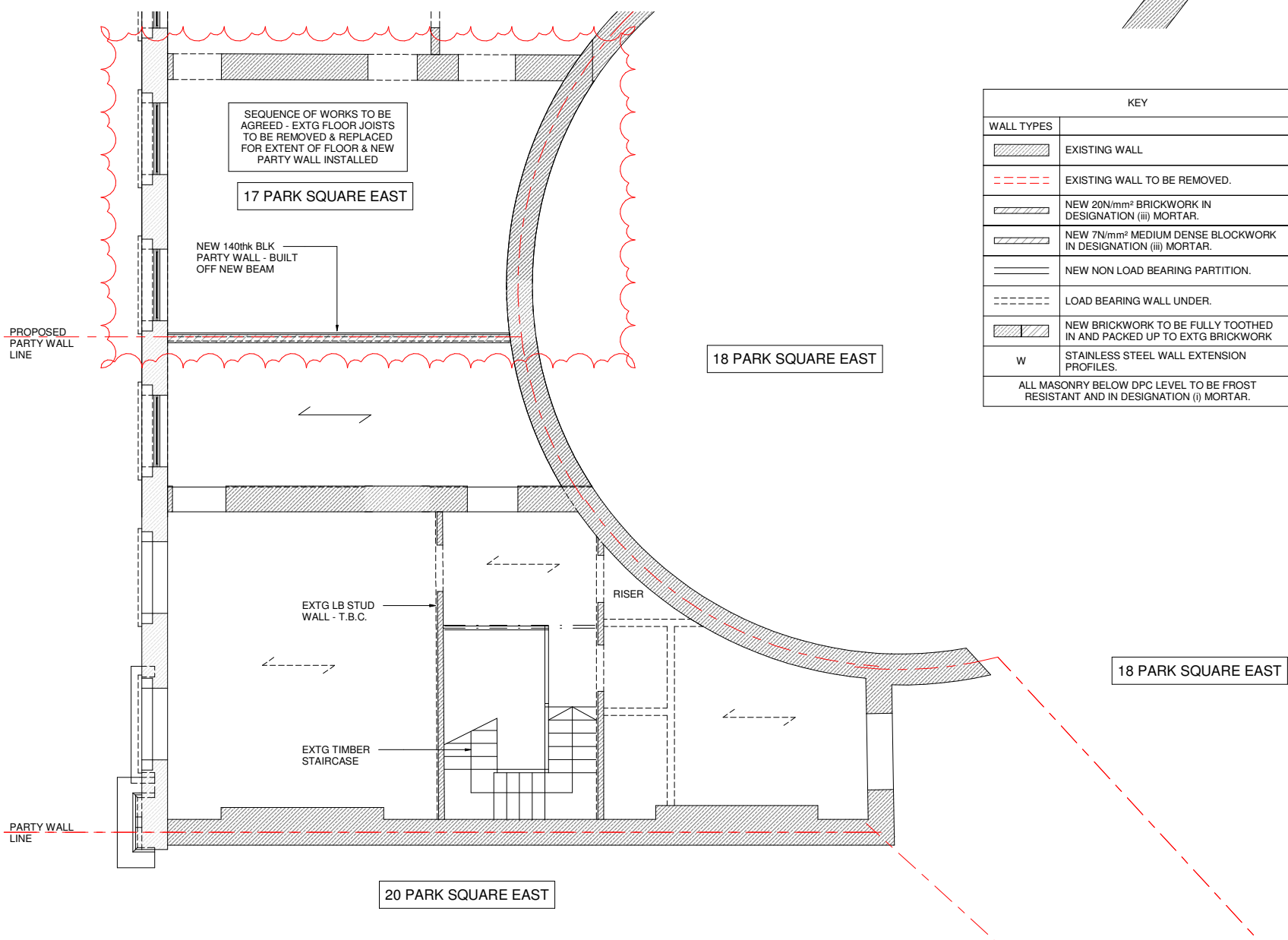
THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. ALL ERRORS AND OMISSIONS ARE TO BE REPORTED TO THE ENGINEER.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES ENGINEERS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



EXISTING THIRD FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3



PROPOSED THIRD FLOOR PLAN

1 : 50 @ A1 / 1:100 @ A3

KEY		LEGEND	
WALL TYPES			
	EXISTING WALL	— · —	NEW BEAM UNDER.
	EXISTING WALL TO BE REMOVED.	= : = : = : =	DOUBLED TIMBERS TRIMMING OPENINGS/ UNDER PARTITIONS.
	NEW 20N/mm² BRICKWORK IN DESIGNATION (iii) MORTAR.		DENOTES SPAN OF NEW 50x200 C24 TIMBER JOISTS AT 400c/c U.N.O.
	NEW 7N/mm² MEDIUM DENSE BLOCKWORK IN DESIGNATION (iii) MORTAR.		DENOTES SPAN OF NEW CONCRETE SLAB
	NEW NON LOAD BEARING PARTITION.	LINTEL SCHEDULE	
	LOAD BEARING WALL UNDER.	MARK	DESCRIPTION
	NEW BRICKWORK TO BE FULLY TOOTHED IN AND PACKED UP TO EXTG BRICKWORK	L1	150dp PRE-STRESSED P.C LINTEL/S TO SUIT WIDTH OF WALL
W	STAINLESS STEEL WALL EXTENSION PROFILES.	L2	CG90/100 CATNIC CAVITY WALL LINTEL
ALL MASONRY BELOW DPC LEVEL TO BE FROST RESISTANT AND IN DESIGNATION (i) MORTAR.		PADSTONE SCHEDULE	
		MARK	DESCRIPTION
		P1	450x100x225dp MASS CONCRETE

Rev.	Date	Amendment	Drawn / Chkd
P1	06.11.19	ISSUED FOR PLANNING	PE / SD

Drawing Status: PRELIMINARY

Form

Job Title
19 PARK SQUARE EAST
LONDON,
NW1 4LH

Drawing Title
EXISTING & PROPOSED THIRD FLOOR PLANS

Form Structural Design Ltd 77 St John Street London EC1M 4NN
T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

Date	Scale	Drawn	Checked
NOV 19	As indicated		

Job No.	Drawing No.	Revision
193206-FSD-	L(23)204	P1

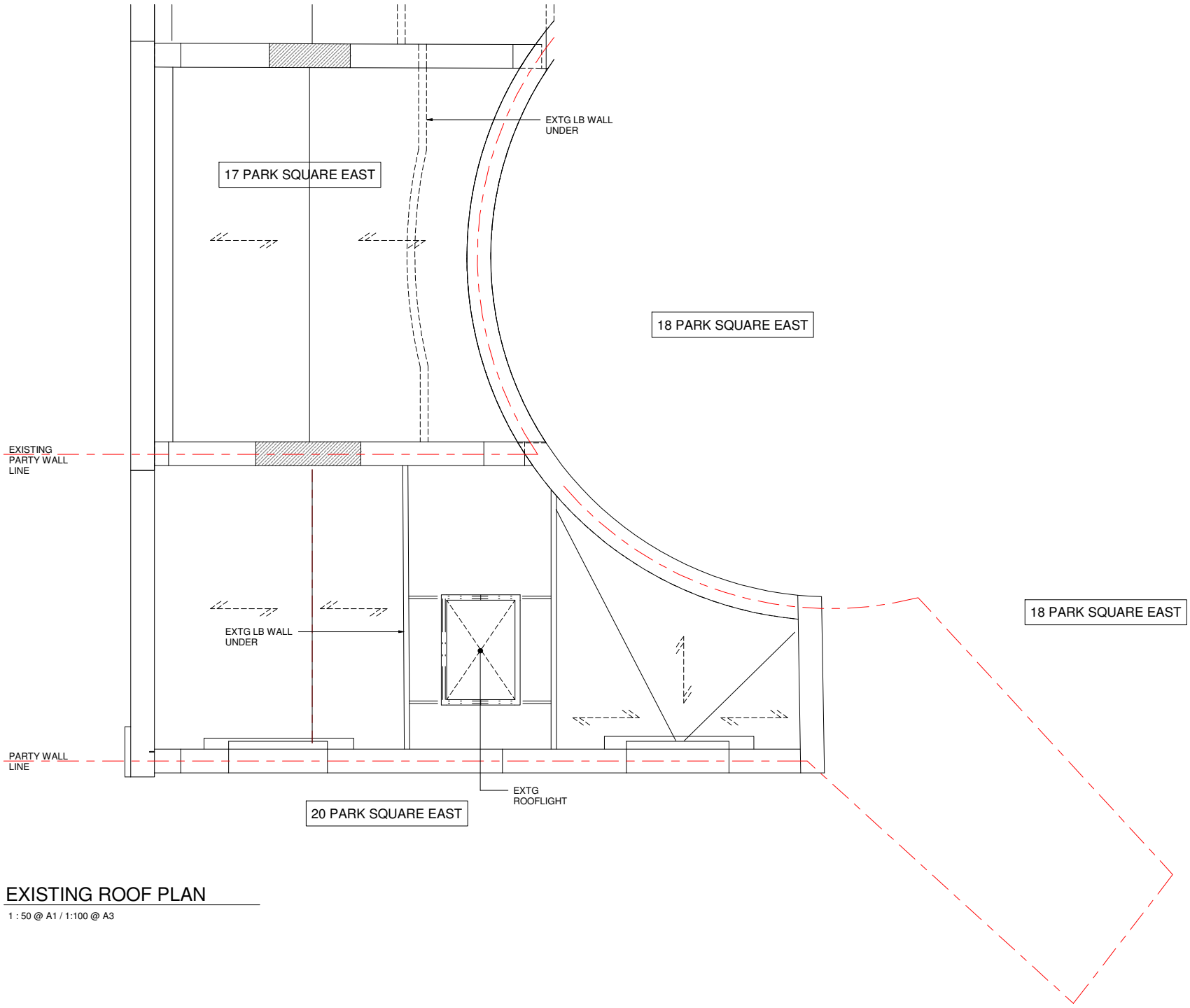
Notes

THIS DRAWING IS COPYRIGHT OF FORM.

DO NOT SCALE FROM THIS DRAWING WORK ONLY TO FIGURED DIMENSIONS.

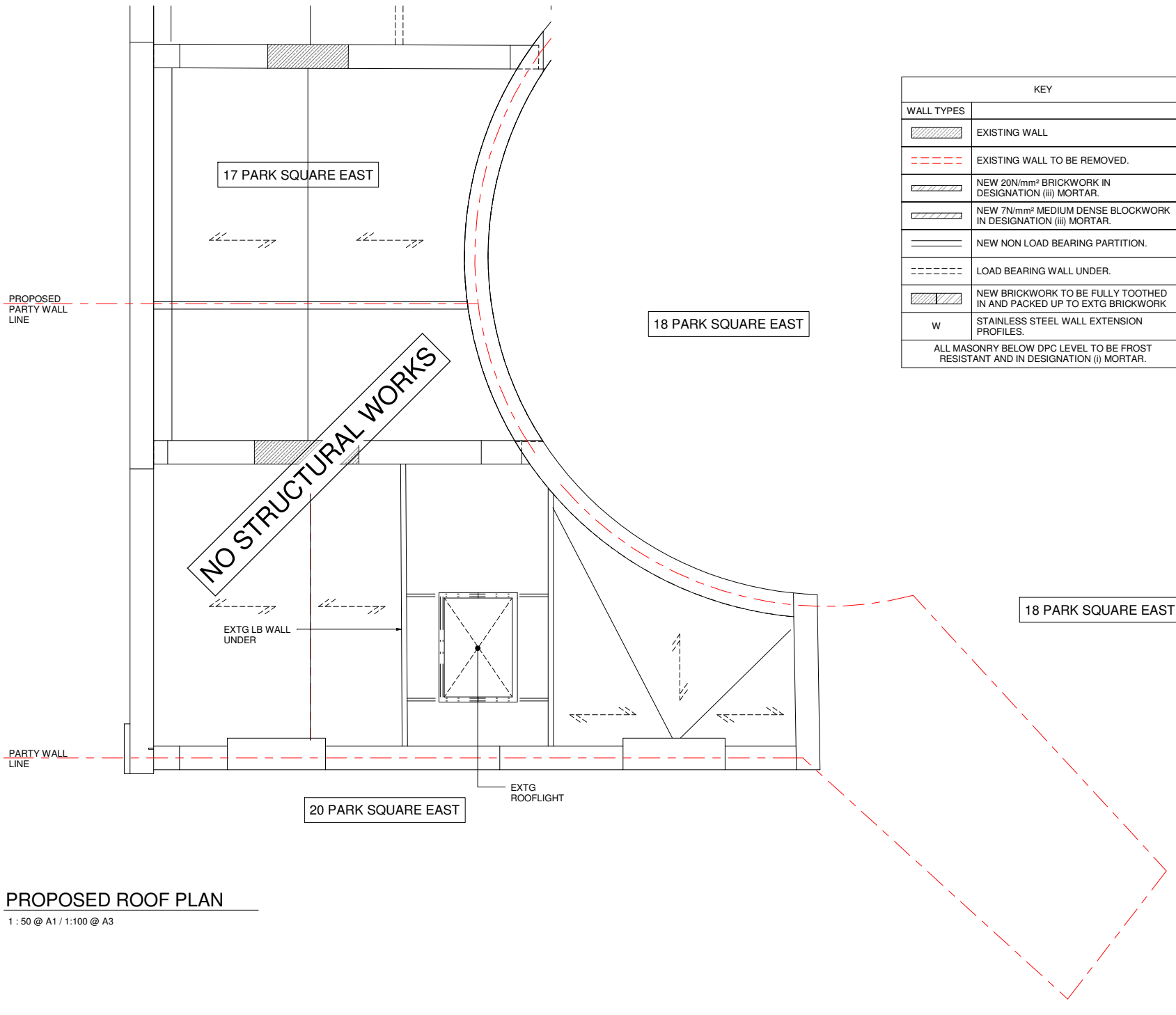
THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK. ALL ERRORS AND OMISSIONS ARE TO BE REPORTED TO THE ENGINEER.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICES ENGINEERS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



EXISTING ROOF PLAN

1 : 50 @ A1 / 1:100 @ A3



PROPOSED ROOF PLAN

1 : 50 @ A1 / 1:100 @ A3

KEY		LEGEND	
WALL TYPES			
	EXISTING WALL	— · —	NEW BEAM UNDER.
	EXISTING WALL TO BE REMOVED.	= : = : = : =	DOUBLED TIMBERS TRIMMING OPENINGS/ UNDER PARTITIONS.
	NEW 20N/mm² BRICKWORK IN DESIGNATION (iii) MORTAR.		DENOTES SPAN OF NEW 50x200 C24 TIMBER JOISTS AT 400c/c U.N.O.
	NEW 7N/mm² MEDIUM DENSE BLOCKWORK IN DESIGNATION (iii) MORTAR.		DENOTES SPAN OF NEW CONCRETE SLAB
	NEW NON LOAD BEARING PARTITION.	LINTEL SCHEDULE	
	LOAD BEARING WALL UNDER.	MARK	DESCRIPTION
	NEW BRICKWORK TO BE FULLY TOOTHED IN AND PACKED UP TO EXTG BRICKWORK	L1	150dp PRE-STRESSED P.C LINTEL/S TO SUIT WIDTH OF WALL
W	STAINLESS STEEL WALL EXTENSION PROFILES.	L2	CG90/100 CATNIC CAVITY WALL LINTEL
ALL MASONRY BELOW DPC LEVEL TO BE FROST RESISTANT AND IN DESIGNATION (i) MORTAR.		PADSTONE SCHEDULE	
		MARK	DESCRIPTION
		P1	450x100x225dp MASS CONCRETE

Rev.	Date	Amendment	Drawn / Chkd
P1	06.11.19	ISSUED FOR PLANNING	PE / SD

Drawing Status: PRELIMINARY

Form

Job Title
19 PARK SQUARE EAST
LONDON,
NW1 4LH

Drawing Title
EXISTING & ROOF PLANS

Form Structural Design Ltd 77 St John Street London EC1M 4NN
T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

Date	Scale	Drawn	Checked
NOV 19	As indicated		

Job No.	Drawing No.	Revision
193206-FSD-	L(23)205	P1

APPENDIX C
ENVIROCHECK REPORT

APPENDIX D
SITE INVESTIGATION LOGS

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 100 to 20.45m	BOREHOLE NUMBER **BH01**
Method: Cable Percussion	Casing Dia. (mm): 150 to 7.50m	
Date Started: 14/10/2019 Co-ordinates	Ground Level (m AOD) 28.50 Ref. No: **1038915**	Sheet 1 of 3

Backfill/Well Depth (m)	Backfill/Well Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Type	In Situ Tests Results	Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
			0.00 - 1.00	B			28.50	(0.25)	Concrete.	
0.50			0.50	D			28.25	0.25	Firm, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. (Langley Silt Member)	
			1.20	D	C	N = 4		(1.45)		
			1.70	D			26.80	1.70		
2.00			2.00	D	C	N = 8		(0.30)	Soft, brown slightly fine sandy, silty CLAY. (Langley Silt Member)	
			2.50	D			26.50	2.00	Loose to medium dense, brown, slightly fine sandy, becoming very sandy at 4m below ground level GRAVEL of sub-angular to rounded, fine to course flint. Low cobble content of rounded flint. (Lynch Hill Gravel Member)	
			3.00	D	C	N = 8				
			3.00 - 4.00	B						
			3.50	D						
			4.00	D	C	N = 18				
			4.50	D				(5.20)		
			5.00	D	C	N = 23				
			6.00	D						
			6.00 - 7.00	B						
			6.50	D	C	N = 24				
7.00	W						21.30	7.20	Stiff brown mottled grey, becoming brown and grey mottled at 9m below ground level, CLAY with occasional sand size selenite and silt partings. (Weathered London Clay Formation)	
7.50			7.50	D						
		8.00	8.00	D	C	N = 12		(2.80)		
			9.00	D						
		9.50	9.50	D	C	N = 13				

General Remarks:

1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.

Driller:	LH	**BOREHOLE RECORD** Scale 1:50 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A1**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 100 to 20.45m	BOREHOLE NUMBER **BH01**
Method: Cable Percussion	Casing Dia. (mm): 150 to 7.50m	
Date Started: 14/10/2019 Co-ordinates	Ground Level (m AOD) 28.50 Ref. No: **1038915**	Sheet 2 of 3

Backfill/Well Depth (m)	Backfill/Well Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Type	In Situ Tests Results	Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
			10.50	D			18.50	10.00	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
			11.00	D	C	N = 18				
			11.00 - 12.00	B						
			12.50	D	C	N = 19				
			13.50	D						
					C	N = 19				
								(10.45)		
					C	N = 24				
			16.00 - 17.00	B						
					C	N = 27				
					C	N = 25				

General Remarks:

1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.

Driller:	LH	**BOREHOLE RECORD** Scale 1:50 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A1**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 100 to 20.45m	BOREHOLE NUMBER **BH01**
Method: Cable Percussion	Casing Dia. (mm): 150 to 7.50m	
Date Started: 14/10/2019 Co-ordinates	Ground Level (m AOD) 28.50 Ref. No: **1038915**	Sheet 3 of 3

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
20.00					C	N = 28	8.05	20.45	End of Borehole at 20.45m	

General Remarks:

1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.

Driller:	LH	**BOREHOLE RECORD** Scale 1:50 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A1**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 18.45m		BOREHOLE NUMBER **BH02**
Method: Windowless Sampler			
Date Started: 21/10/2019 Co-ordinates	Ground Level (m AOD) 26.10	Ref. No: **1038915**	Sheet 1 of 3

Backfill/Well Depth (m)	Backfill/Well Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Type	In Situ Tests Results	Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
							26.10	(0.32)	Concrete.	
0.50							25.78	0.32	Dense to very dense, brown, very fine to coarse sandy, locally sandy GRAVEL of sub-rounded to rounded, fine to coarse flint. (Lynch Hill Gravel Member)	
1.00			1.00 - 2.00	B	S	N = 58				
			2.00 - 3.00	B	S	N = 42				
			3.00 - 4.00	B	S	N = 47		(5.18)		
			4.00 - 5.00	B	S	N = 43				
			5.00 - 6.00	B	S	N = 14				
							20.60	5.50	Stiff, brown mottled grey CLAY with rare silty fine sand partings. (Weathered London Clay Formation)	
								(0.40)		
6.00	W		6.00 - 7.00	B	S	N = 25	20.20	5.90	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
6.50										

General Remarks:
1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.

Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A2**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 18.45m	BOREHOLE NUMBER **BH02**
Method: Windowless Sampler		
Date Started: 21/10/2019 Co-ordinates	Ground Level (m AOD) 26.10 Ref. No: **1038915**	Sheet 2 of 3

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			7.00 - 8.00	B	S	N = 24				
			8.00 - 9.00	B	S	N = 26				
			9.00 - 10.00	B	S	N = 24				
			10.00 - 11.00	B	S	N = 29				
			11.00 - 12.00	B	S	N = 33				
			12.00 - 13.00	B	C	N = 38		(12.55)		
			13.00 - 14.00	B	S	N = 38				

General Remarks:
1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.

Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A2**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 18.45m	BOREHOLE NUMBER **BH02**
Method: Windowless Sampler		
Date Started: 21/10/2019 Co-ordinates	Ground Level (m AOD) 26.10 Ref. No: **1038915**	Sheet 3 of 3

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			14.00 - 15.00	B	S	N = 44				
			15.00 - 16.00	B						
			16.00 - 17.00	B	S	N = 44				
			17.00 - 18.00	B						
					S	N = 52				
							7.65	18.45	End of Borehole at 18.45m	

General Remarks:
1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.

Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A2**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10 Ref. No: **1038915**	Sheet 1 of 4

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			0.00 - 1.00	B			30.10	(0.10)	Decorative gravel.	
							30.00	0.10	Loose, dark brown mottled red, very clayey, slightly fine to coarse sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick. (Made Ground)	
0.50										
			1.00 - 2.00	B	S	N = 4		(1.80)		
							28.20	1.90	Firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. (Langley Silt Member)	
2.00			2.00 - 3.00	B	S	N = 14				
								(1.20)		
			3.00 - 4.00	B	S	N = 51	27.00	3.10	Very dense, brown, very fine to coarse sandy, locally sandy GRAVEL of sub-rounded to rounded, fine to coarse flint. (Lynch Hill Gravel Member)	
			4.00 - 5.00	B	S	N =50/160mm				
			5.00 - 6.00	B	S	N =50/275mm				
			6.00 - 7.00	B	S	N = 50		(5.90)		

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10 Ref. No: **1038915**	Sheet 2 of 4

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			7.00 - 8.00	B	S	N = 62				
			8.00 - 9.00	B	S	N = 50				
			9.00 - 10.00	B	S	N = 22	21.10	9.00	Stiff, brown mottled grey CLAY with rare silty fine sand partings. (Weathered London Clay Formation)	
								(0.80)		
10.00	W		10.00 - 11.00	B	S	N = 33	20.30	9.80	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
10.50										
			11.00 - 12.00	B	S	N = 25				
			12.00 - 13.00	B	S	N = 28				
			13.00 - 14.00	B	S	N = 35				

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10 Ref. No: **1038915**	Sheet 3 of 4

Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			14.00 - 15.00	B	S	N = 42				
			15.00 - 16.00	B	S	N =50/95mm		(10.20)		
			16.00 - 17.00	B						
			17.00 - 18.00	B	S	N = 21				
			18.00 - 19.00	B						
			19.00 - 20.00	B	S	N = 33				

General Remarks:

Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

Client: **17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd**	Hole Diameter (mm): 75mm tapering with depth to 20m	BOREHOLE NUMBER **BH03**
Method: Windowless Sampler		Sheet 4 of 4
Date Started: 25/10/2019 Co-ordinates	Ground Level (m AOD) 30.10 Ref. No: **1038915**	

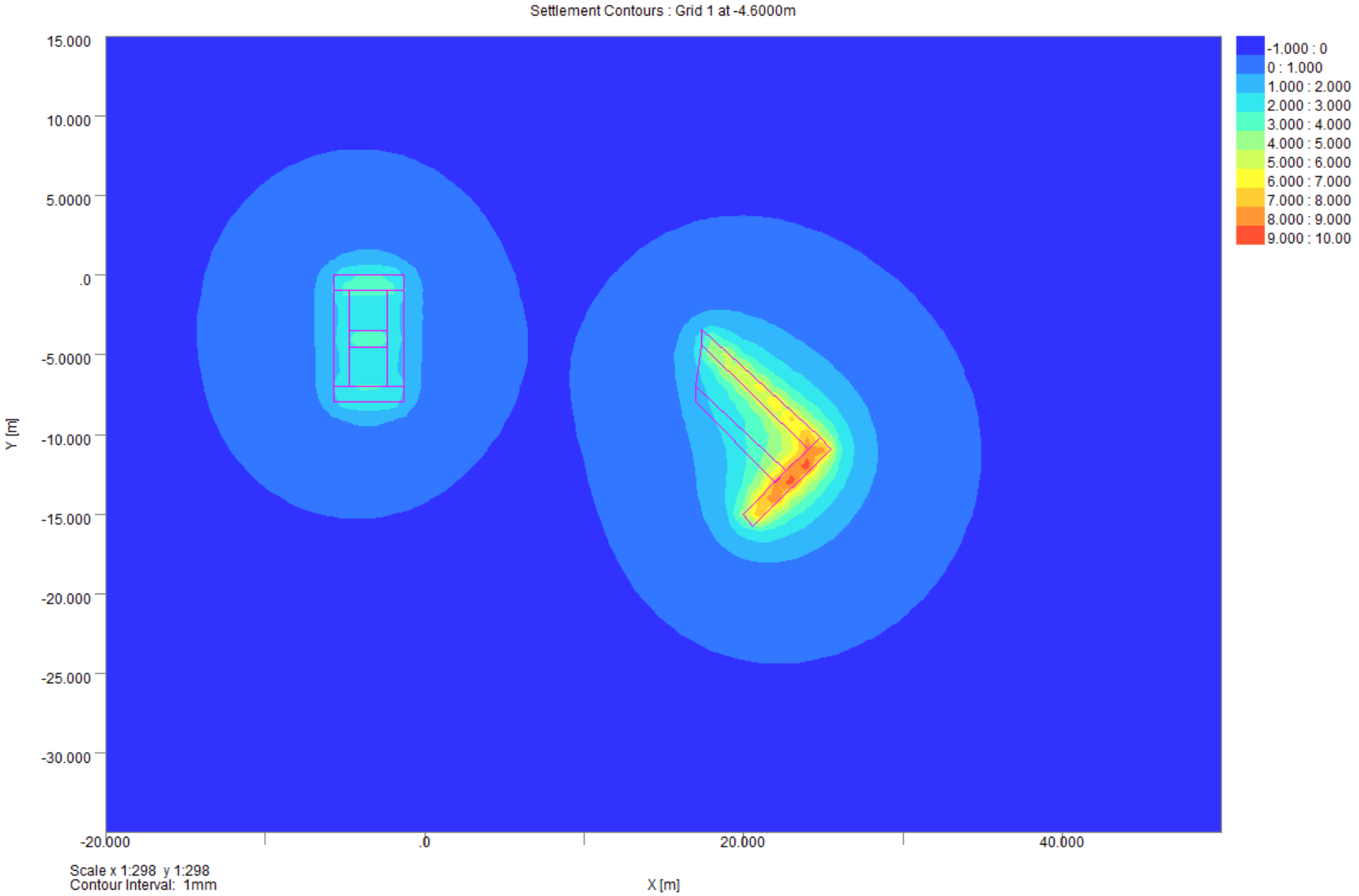
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
							10.10	20.00	End of Borehole at 20.00m	

General Remarks:

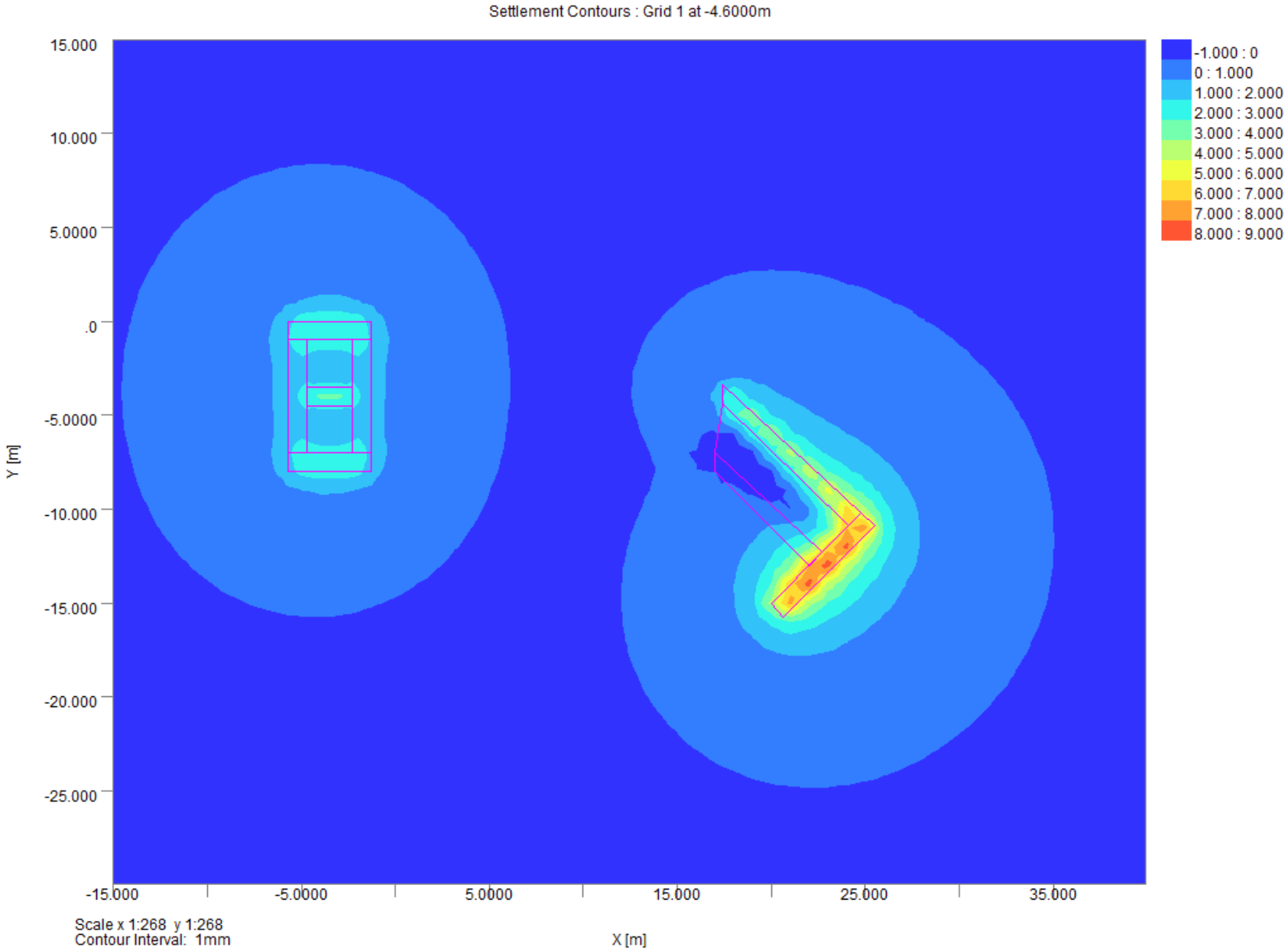
Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JM		
Checked:		**The Diorama**	**FIG A3**
Appr'd:			

APPENDIX E
PDISP EXPORTS

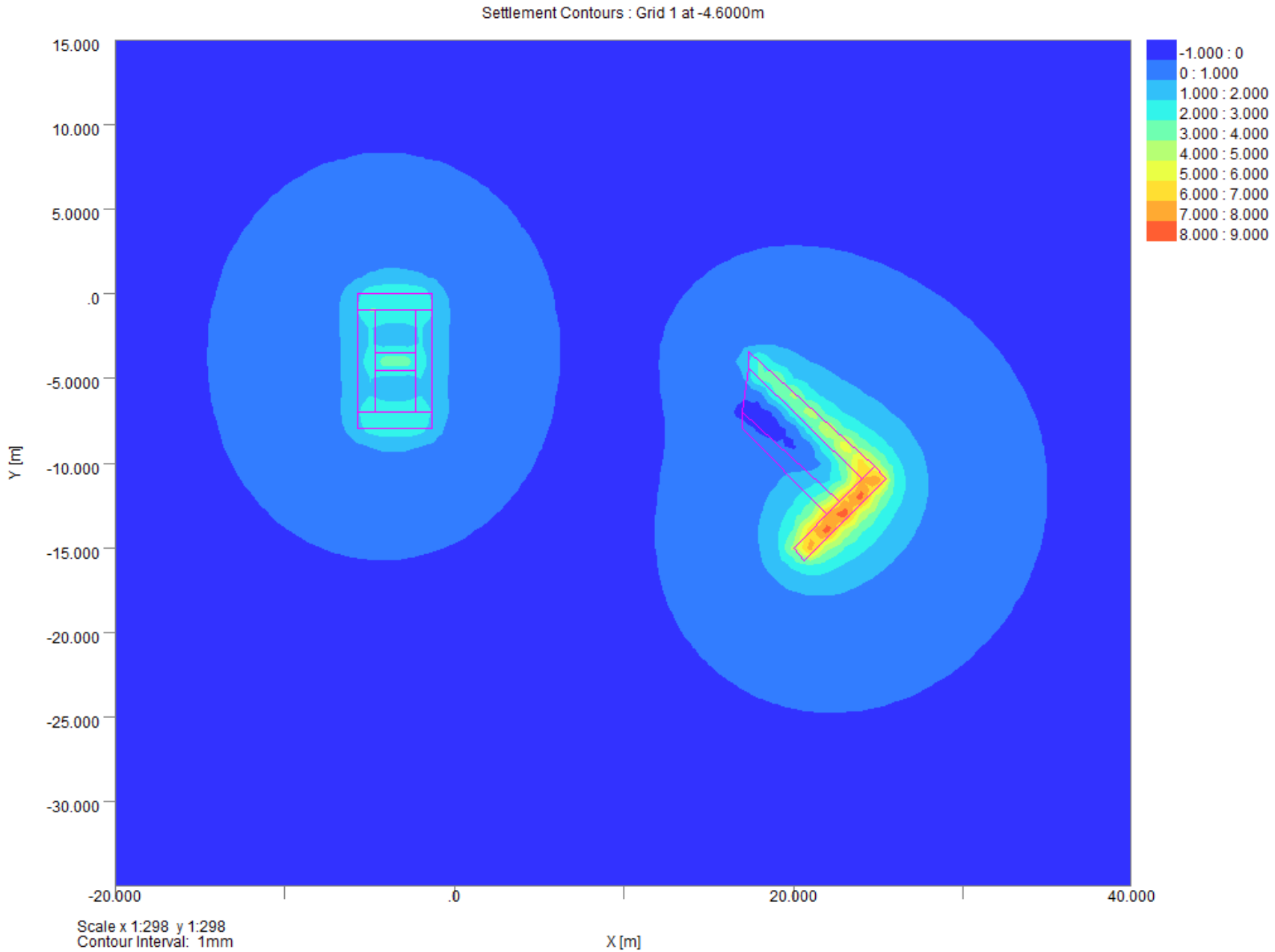
19 Park Square
Underpinning



19 Park Square
Excavation



19 Park Square
Basement Slab



19 Park Square
Total Settlement
(inc. Long Term)