16 Daleham Gardens
London NW3 5DA

Basement Impact Assessment

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Document Control

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revision:	P2	prepared by:	Stephanie Bouhala (MEng) Sophie Treillard (MEng CEng MICE)	checked by:	Gary Povey (BSc CEng MIStructE)
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Contents

Appendices (included as a separate Appendices Report)

Introduction

Elliott Wood Partnership have been appointed to provide structural and civil engineering services for the extensive refurbishment of the existing house.

The works are to include the installation of a basement under the existing building and remodelling the existing structure.

This document has been prepared by Stephanie Bouhala and Sophie Treillard of Elliott Wood Partnership LLP, Consulting Structural and Civil Engineers, to accompany the planning application submitted by Milk Studios. This report follows the guidance given in the Camden Planning Guidance on Basements and lightwells CPG4.

Stage 1_Screening and Stage 2_Scoping

These stages have been carried out at the start of the project.

A desk study can be found on page 4.

A ground water flow screening chart can be found in the Groundwater Impact Assessment report by Paulex and attached in the appendices.

Stage 3_Site Investigation and study

The field investigation, the monitoring, reporting and Interpretation of the ground have been done by the company Site Analytical Services Limited and is attached in the appendices.

Stage 4_Impact assessment

For stage 4, it is required to evaluate the implications of the proposed project.

The detailed site geology has been done by Site Analytical Services Limited, in the “Phase 1 risk assessment report” which can be found in the appendices.

The geotechnical properties of the ground have been done by Site Analytical Services Limited, in the “Report on ground investigation” which also can be found in the appendices.

The impact assessment of the basement onto the waterground has been done by the company “Paulex” and can be found also in the appendices.

The impact assessment of the excavation on the neighbouring properties has been done in the current report and can be found on page 16.

Stage 5_Review and decision making

A stage 5, revision and decision making on the groundwater flow has been incorporated in the Groundwater Impact Assessment report by Paulex and attached in the appendices. The document has been signed and approved by Hydrologists with the “CGeol” qualification.

The land stability, stage 5, revision and decision making has been done by Site Analytical Services Limited, in the “Phase 1 risk assessment report” which can be found in the appendices.

The surface flow and flooding screening has been carried out in this report on page 19 by a MICE engineer and a revision and making decision on this subject has been done.

An Impact to neighbours from demolition and construction has been conducted in this report and is on page …

Desk Study Report

1.0 Introduction

The following section is a summary of Elliott Wood Partnership's site desk study and 'Phase 1 Preliminary Risk Assessment' carried out by Site Analytical Services, full details of which are included in the Appendix.

Recognition is made of the screening, scoping etc. requirements of London Borough of Camden Planning Guidance Basements and Lightwells CPG4.

2.0 Site History

The historical maps show that the site was agricultural land until about 1896. From that date, a residential property appears and does not change in size or shape to present day.

3.0 Geology

Ground conditions

London belongs to the Thames Basin which is a broad syncline of chalk occupied in its centre by sands and clays. Fluvial deposits associated with the former deposits of the River Thames lie on top of the bedrock. These different terraces are the remains of the river's floodplains.

The site is likely to be underlain by a certain quantity of Made Ground due to its long history.

According to the British Geological map for North London (sheet 256), the site is underlain by Superficial Head deposits overlying the London Clay.

The deep geology is likely to comprise the Lambeth Ground, Thanet Sands and finally the Upper Chalk at depths.

Hydrology and Hydrogeology

London Clay effectively divides London hydrology into two units: upper aquifer, primarily formed by Pleistocene terrace deposits; and lower aquifer, primarily formed by Upper Chalk often in combination with the overlying Thanet Sands.

A perched water table may be present at the base of the Made Ground resting on top of the relatively impermeable London Clay.
Groundwater levels are subject to variations caused by changes in the local drainage conditions and also by seasonal effects (i.e. Summer/Winter conditions).

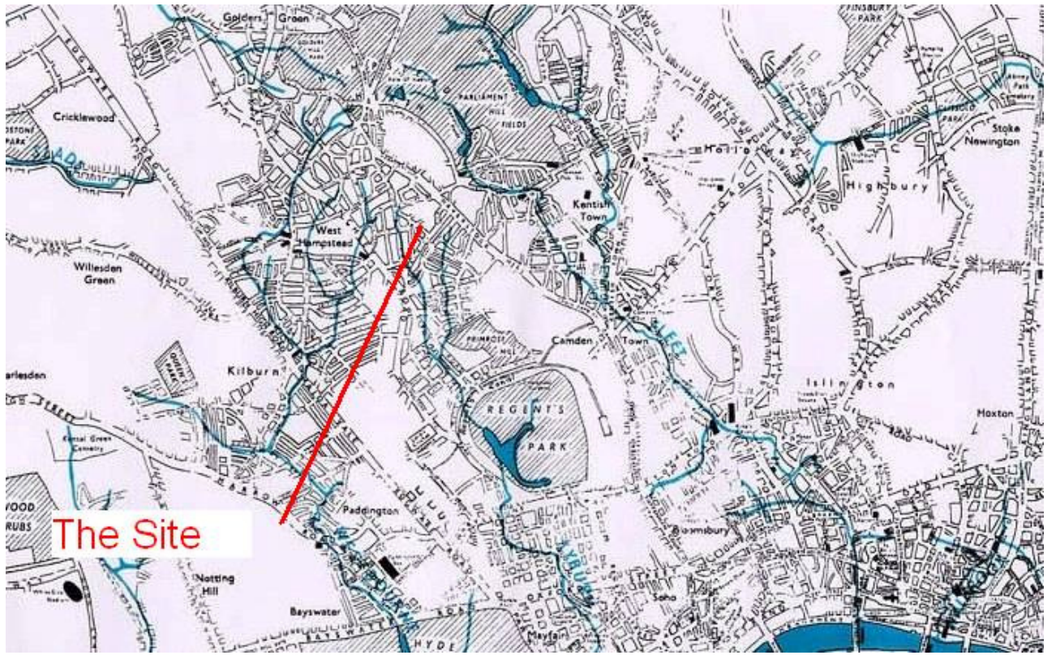
The site is located 279m north west of a Zone II (Outer Protection) Groundwater Source Protection Zone. The Environment Agency has defined Groundwater Source Protection Zones (SPZs) for sources used in the supply of public drinking water. The London Clay below should provide a natural barrier to prevent contaminants migrating to the deep Chalk Aquifer.

The underlying geology (Superficial and Bedrock) is classified as Unproductive Strata according to the Environment Agency maps and to the Envirocheck Report. They are of a low permeability that has negligible significance for water supply or river base flow.

Lost Rivers of London

An extract from the map (see below) showing the 'lost rivers' of London (Barton, 1992) shows that the site is located close to two tributaries of the lost river Tyburn that runs through Regents Park, although these are believed to be too far to affect the site.

The majority of the natural tributary rivers of the River Thames have been culverted or infilled as development of the city has progressed.



A portion of the map showing the course of the River Tyburn taken from Lost Rivers of London ©1962 and 1992 by Nicholas Barton, used by kind permission of Historical Publications Ltd

4.0 Potential Environmental Issues

The site and the surrounding land appear to have been occupied by mainly residential houses.

There appear to have been no industries or potentially contaminative uses located in the area. No major on-site or off-site contamination issues have been identified from the study of the available historical maps.

The only potential contaminative uses are limited. They are identified as dry cleaners, depots or garages and are listed in the Envirocheck environmental report available in the SAS desk study report.
There are also some sub-stations located in the general areas that could be an off-site potential source of contamination.

Contamination associated with the UXO and bomb damage should be limited as the site and the area were lightly affected by the bombing of the city during the Second World War.

Ground Gas

The site investigation has identified a low to intermediate gas regime which requires low level gas protection measures.

5.0 General site constraints

Underground structures

It is understood that the site was agricultural land before being developed with the construction of the present house. Unknown buried foundations or structures should consequently be limited.

Unexploded Ordnance Survey (UXO) and Bomb damage

The site was not severely affected during World War II bombing. The London bomb damage map shows that the site and its surroundings were also unaffected.

Tunnels

From EWP searches, there are no known tunnels in the vicinity of the site.

Two railway tunnels are located to the north under Nutley Terrace but are considered too far to affect the site. They are visible on some of the historical maps.

Archaeology

It is unknown at present if the site could be of any archaeological interest. This will need to be confirmed with further searches.

If archaeological remains were to be found, the presence of the existing building(s) on the site means that they may have been partially truncated by foundation and/or service trench excavations.

If any excavation works are to be undertaken, archaeology may be a potential risk and an archaeological specialist should be appointed to advise on the specific risk. If any archaeological remains are found, it might impact on the program and also have an impact on the structural design.

Structural Engineering Notes

1.0 Introduction

The purpose of the statement is to demonstrate a suggested method, form and sequence of construction for the design of the new basement and the refurbishment of the existing house that will not adversely affect any structures.

The Contractor will, however, have to provide a detailed method statement including all temporary works taking in to account the permanent works design before the works can commence on site.

The Contractor is to accept full responsibility for the stability and structural integrity of the works during the Contract and provide temporary support as necessary. He shall also prevent overloading of any completed or partially completed elements.

The undertaking of such projects is specialist work and Elliott Wood Partnership will be involved in the selection of a competent Contractor who will need the relevant expertise and experience for this type of project. The Contractor will have to demonstrate his experience and competency to undertake the construction of this building.

This statement should be read in conjunction with Elliott Wood Partnership drawings 211338/S.01-S.03, S.21, Milk Studio Architects drawings, Site Analytical Services site investigation report dated from August 2011 and Paulex Environmental Consulting hydrogeological report dated from August 2011.

2.0 Description of Existing Building and Site Conditions

The existing building at 16 Daleham Gardens is situated on the east side of Daleham Gardens. It is a detached four storey house including a lower ground floor level and a single storey side garage at ground floor. The building is currently unoccupied.

The existing building is constructed as a load bearing masonry structure supporting timber joist floors and beams at each level. The foundations of the loadbearing walls, including the party walls, are brick corbels of varying depths and widths.

A site investigation has been carried out which indicates that the underlying ground appears to be a silty clay overlaid by a thin layer of made ground. Groundwater appears to be present approximately 5m below the existing garden level.

There are a number of mature trees both in the garden of number 16 and in adjacent gardens. The proximity of the existing trees will need to be considered in the final design of the basement and its foundations.

3.0 The proposals

The proposal includes refurbishment of the upper floors and creation of a new basement level below lower ground floor. The basement will include a pool and some plant rooms and will be founded approximately 4 metres below the existing lower ground floor level of the house.

It is assumed that the existing roof will be removed as well as the rear façade. Temporary support will be installed to support the relevant internal floors before removing the façade.

The new basement will be constructed by installing reinforced concrete underpins under the existing perimeter walls to transfer the vertical loads to a lower level. The lightwells' retaining walls will be built in an underpinning sequence.

The underpins will be designed to safely support all the earth and surcharge loads applied to it in the temporary condition.

The underpinning may need to be propped at various levels. This will allow the basement to be constructed within the underpins without undermining the existing footings either during excavation or during construction of the permanent works. The propping will provide lateral restraint to the underpins during excavation and therefore limit any potential movement of surrounding walls and floors to an acceptable amount.

Suitable monitoring arrangements should be agreed with the adjoining owners and specified to ensure that movements are maintained within acceptable limits and that early and immediate action can be taken to prevent any unexpected deflections or settlement.

Assumed Sequence of Construction

1.0 Sequence of works enabling excavation of the new basements

Below is an assumed sequence of works, this needs to be clarified by the contractor prior to commencement of works:

- Breakout floor locally and install underpins to all the necessary walls including the front wall and side boundary walls in a sequence to be agreed. The deeper underpins may have to be done in two sections. Allowance for the permanent loads should be made in the design of the width of the toe of the new concrete underpins. Install upper level propping to the underpins as appropriate.
- Install temporary beams under the front bays to the house, supported off the RC underpins.
- Install temporary concrete bases for the existing structure that remains as necessary.
- Install the temporary needles and props such that they will be supported by the temporary concrete bases.
- Removed the existing roof and rear façade.
- Break off the existing toe of the brick corbel footings to the surrounding walls once the underpinning is complete and props are in place.
- Excavate to the new lower ground floor.
- Cast the internal RC retaining walls as well as the new rear extension foundation in an underpinning sequence to be agreed. The deeper underpins may have to be done in two sections.
- Cast the pad foundations
- Excavate to the lowest level ensuring continued back propping of the underpins the ground is reduced.
- Cast the new reinforced concrete basement slabs and allow them to gain sufficient strength before removing lowest level props.
- Cast the reinforced concrete walls and allow in the design for them to act as vertical cantilevers in the temporary and permanent case so that props can be removed above the cast sections.
- Cast the next level of floor slabs and allow them to gain strength before removing the next level of propping.
- Complete the superstructure works once the basement is complete.

2.0 Construction of superstructure

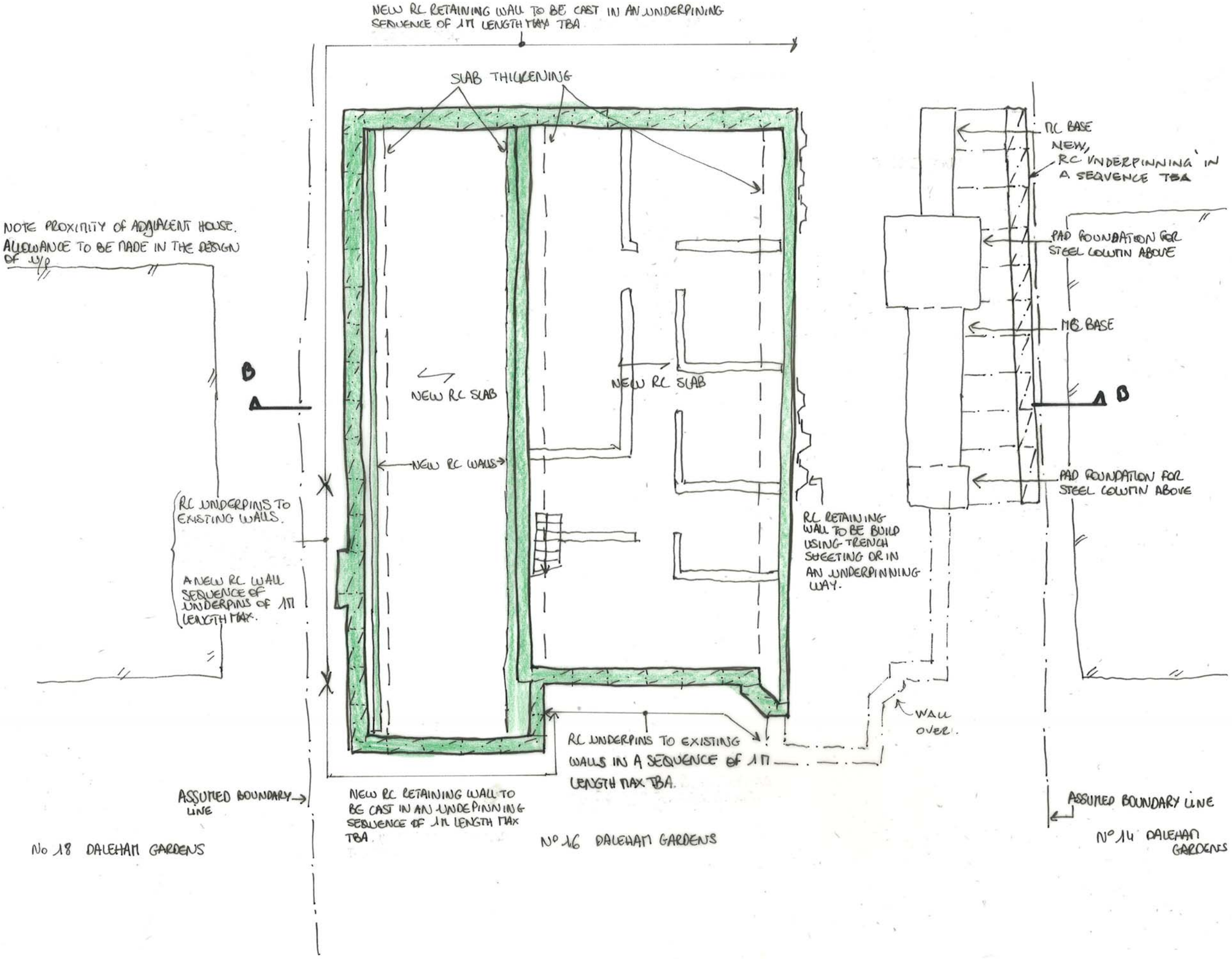
The new superstructure of the main house will be a combination of the existing upper level floors remaining, which will continue to be supported by the existing walls. The existing structure will, in turn, be supported by the new structure at lower levels which will largely be made up of reinforced concrete slabs on concrete walls or underpins.

3.0 Summary and Conclusions

It is assumed that the above measures and sequence of works demonstrate the design and construction of the proposed works can be realised without significant affect on neighbouring properties.

Detailed method statements and calculations for the enabling and temporary works will need to be prepared by the Contractor for both approval and comment by all relevant parties including party wall surveyors and their engineers.

Structural Drawings



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P2	12.8.11	SBO		
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job title

16 DALEHAM GARDENS

drawing title

BASEMENT

scale(s)	date	drawn
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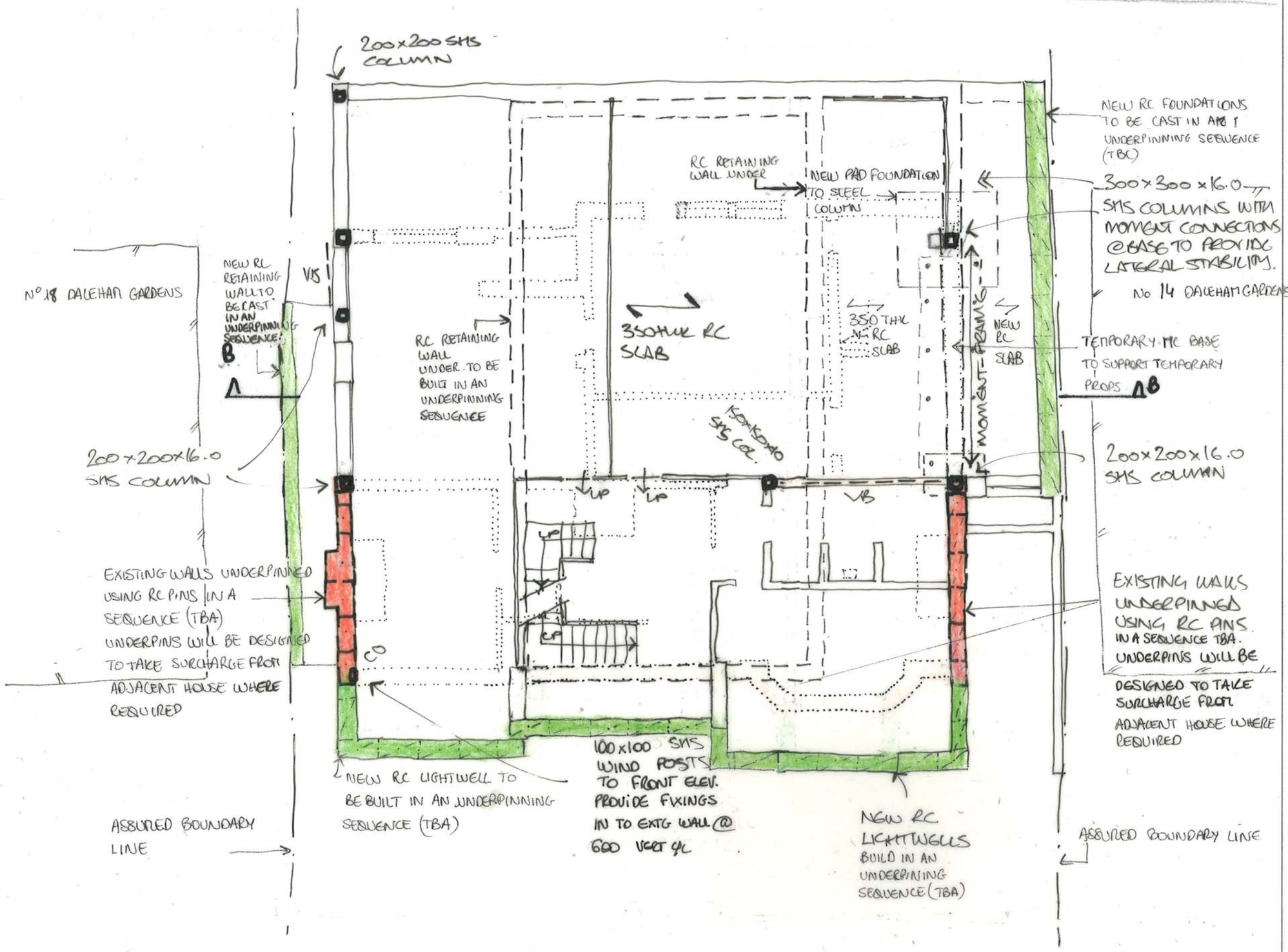
drawing status

PRELIMINARY

job no	drawing no	revision
211338	S/01	P2

N.B.: - PROPOSED AND TEMPORARY WORKS ASSUMED IN DESIGN

ALL DESIGNS ASSUME LIGHTWEIGHT TIMBER FLOORS, TIMBER FRAME WALLS WITH LIGHTWEIGHT CLADDING, ALL TBC BY ARCHITECT



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ALL STEELWORK TO BE GRADE S355.

- - - ; STRUCTURE BELOW

::::: ; STRUCTURE TO BE REMOVED

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16 DALEHAM GDN's

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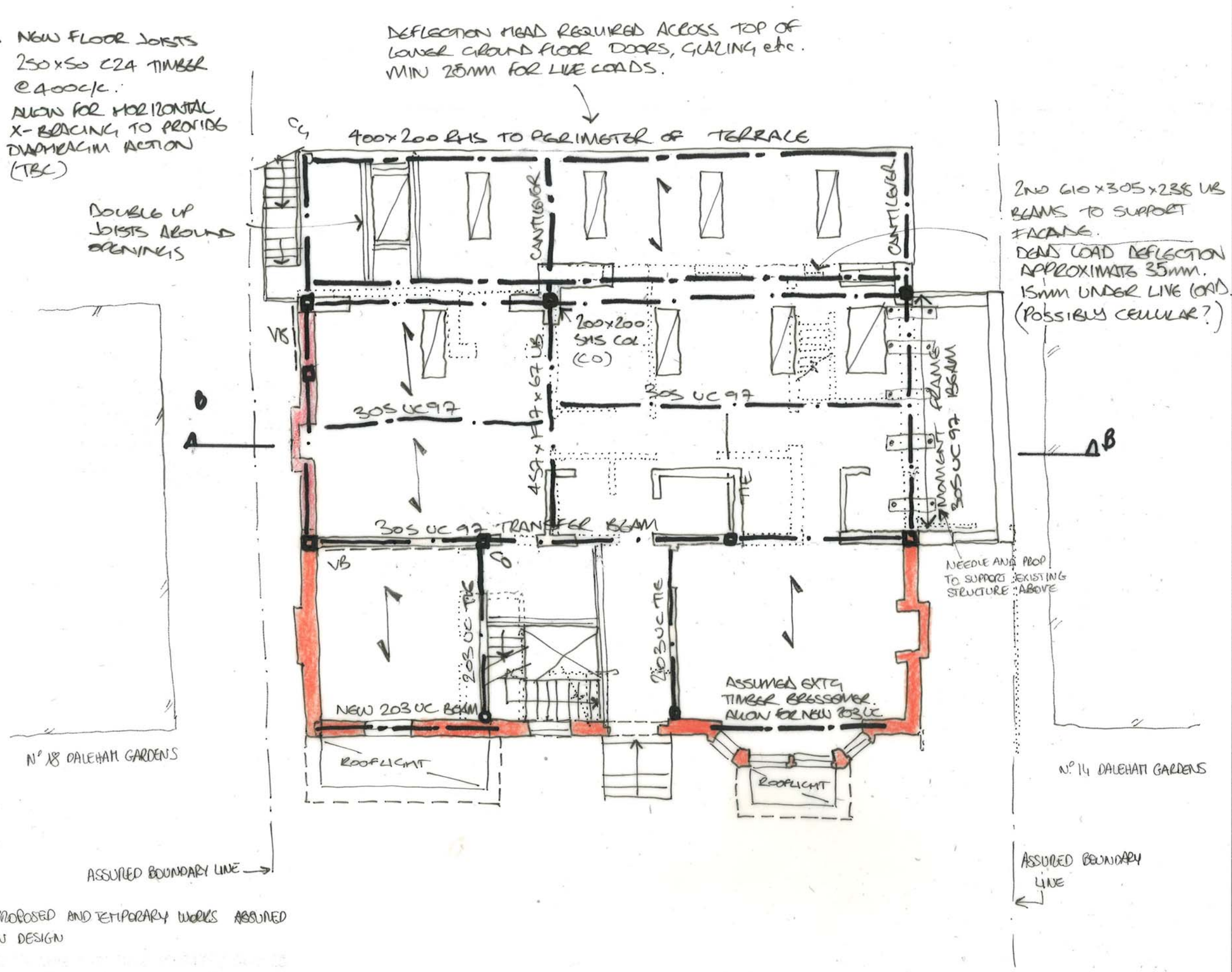
LOWER GROUND FLOOR

scale(s)	date	drawn
N/1:100@A3	5/8/11	CG

drawing status

PRELIMINARY

job no	drawing no	revision
211388	S/02	P2



N.B. :- PROPOSED AND TEMPORARY WORKS ASSUMED IN DESIGN

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BEAMS TO BE PRE-CAMBERED TO TAKE OUT PROPOSED DEAD LOAD DEFLECTIONS.

VB - DENOTES VERTICAL X-BRACING. ALLOW FOR 100x15 MS PLATES.

CO - DENOTES COLUMN OVER. TYP 100x100 x10 SHS UNO.

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job title
16 DALEHAM GDNS

drawing title
GROUND FLOOR

scale(s)	date	drawn
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drawing status
PRELIMINARY

job no	drawing no	revision
211338	S/03	P1

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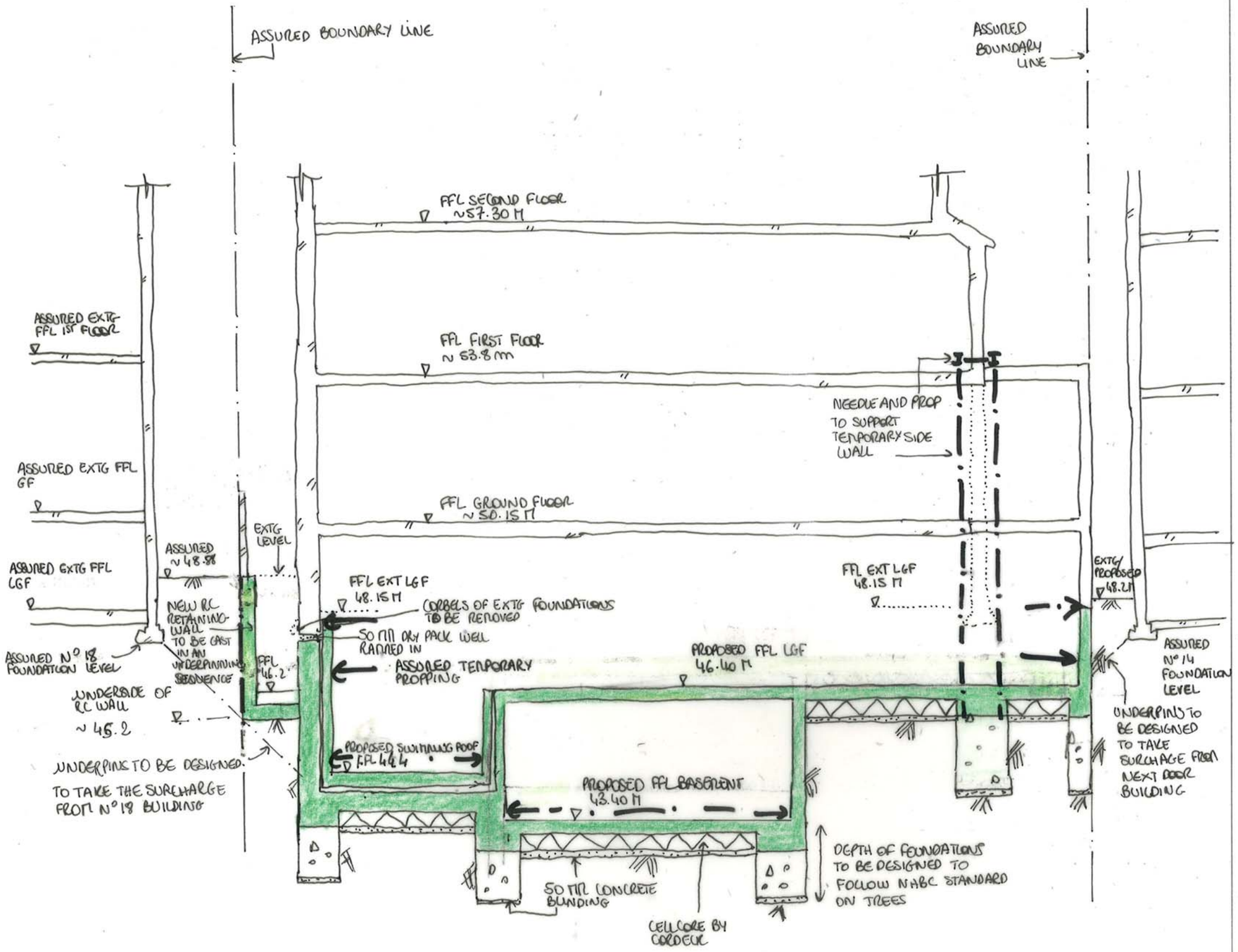

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——— : EXTG STRUCTURE TO BE REMAINED

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P3	11.8.11	SBO	GG	
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job title
16 DALEHAM GARDENS

drawing title
PROPOSED SECTION B-B

scale(s)	date	drawn
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drawing status
PRELIMINARY

job no	drawing no	revision
21338	S -21	P3

Impact assessment on Construction of the Basement

Stage 4_The impact assessment of the excavation on the neighbouring properties:

Some calculations have been done to understand the structural impact of the construction process.
Please refer to calculations attached (which follows the guidance of the Appendix D on the Effects of excavation on foundation strength) to find out that the underpinning of the current foundations won't change the load bearing capacity of the soil by more than 10% which means that is unlikely to have any adverse effect on the structure being supported.

Stage 5_Decision making

From the previous calculations and the ground properties (clay), the effect of the excavation will not affect the neighbour's properties beyond the Burland category as "slight" as developed in the Camden Planning guidance. Some suitable monitoring arrangements will be agreed with the adjoining owners and specified to ensure that movements are maintained within acceptable limits and that early and immediate action can be taken to prevent any unexpected deflections or settlement

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Date: 19/8/11 Engineer: SBO Checked:

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POTENTIAL EFFECTS OF LOSS OF OVERBURDEN DUE TO EXCAVATION

When excavating some foundations, the soil bearing capacity around the excavation might be affected due to overburden.

The present calculation is going to prove that in the case of the above project, the excavations carry out will not affect the foundations of the neighbouring's house, as per "appendix D of Camden geological, hydrogeological and hydrological study."

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From our structural scheme, we are going to use strip foundations, so the load capacity formula given by Brinch Hansen is

$$q_{ult} = [0.5 \times \gamma \times B \times N_\gamma] + [cN_c] + [\gamma D N_q]$$

γ: self-weight of soil $= 1.9\ t^3kg/m^3 = 1900\ kg/m^3$
$= 1.9\ T/m = 19kN/m^3$

B = width of foundation = 650 mm (existing) $\rightarrow$ 0.65 m | new 1.5m
590 mm $\rightarrow$ 0.59 m

D = depth of foundation below ground level = 210 mm = 0.21 m
140 mm = 0.14 mm

c = soil cohesion = 100 kN/m^2

$N_\gamma = 4$ from figure 2.8 of foundation design and construct
$N_c = 16$
$N_q = 7$

$\therefore q_{ult} = 0.5 \times 19 \times 1 \times 4 + 100 \times 16 + 19 \times 1.45 \times 6.5$
$= 38 + 1600 + 182$
$= 1820\ kN/m^2$

before digging

After digging, $q_{ult} = 1638\ kN/m^2$

=> there is only 10% post-dig reduction in the ultimate bearing capacity $\Rightarrow$ little adverse effect

Civil Engineering Notes

1.0 Below ground drainage

Existing condition

Thames Water sewer records indicate that a 965 x 610mm combined public sewer runs in Daleham Gardens.

A CCTV drainage survey of the existing below ground drainage network has been carried out. It showed that the existing private system is combined and discharges into the combined public sewer in Daleham Gardens.

The existing amount of hardstanding area (roof plus external paved areas) represents approximately 233m^2.

Proposed development

A new private and separate below ground drainage network will be installed. Only the existing combined drain connecting the public sewer will be retained. A demarcation chamber will be installed just before the site boundary to allow for inspection of the public owned drain.

The addition of a terrace at ground floor at the rear of the house will increase the amount of hardstanding area to 287m^2. This represents an increase of approximately 54m^2 of hardstanding area.
As the site is not suitable for infiltration techniques (permeable pavement, soakaway), attenuation is provided within the new surface water system by an oversized pipe to restrict the new surface water discharge rates to the existing ones.

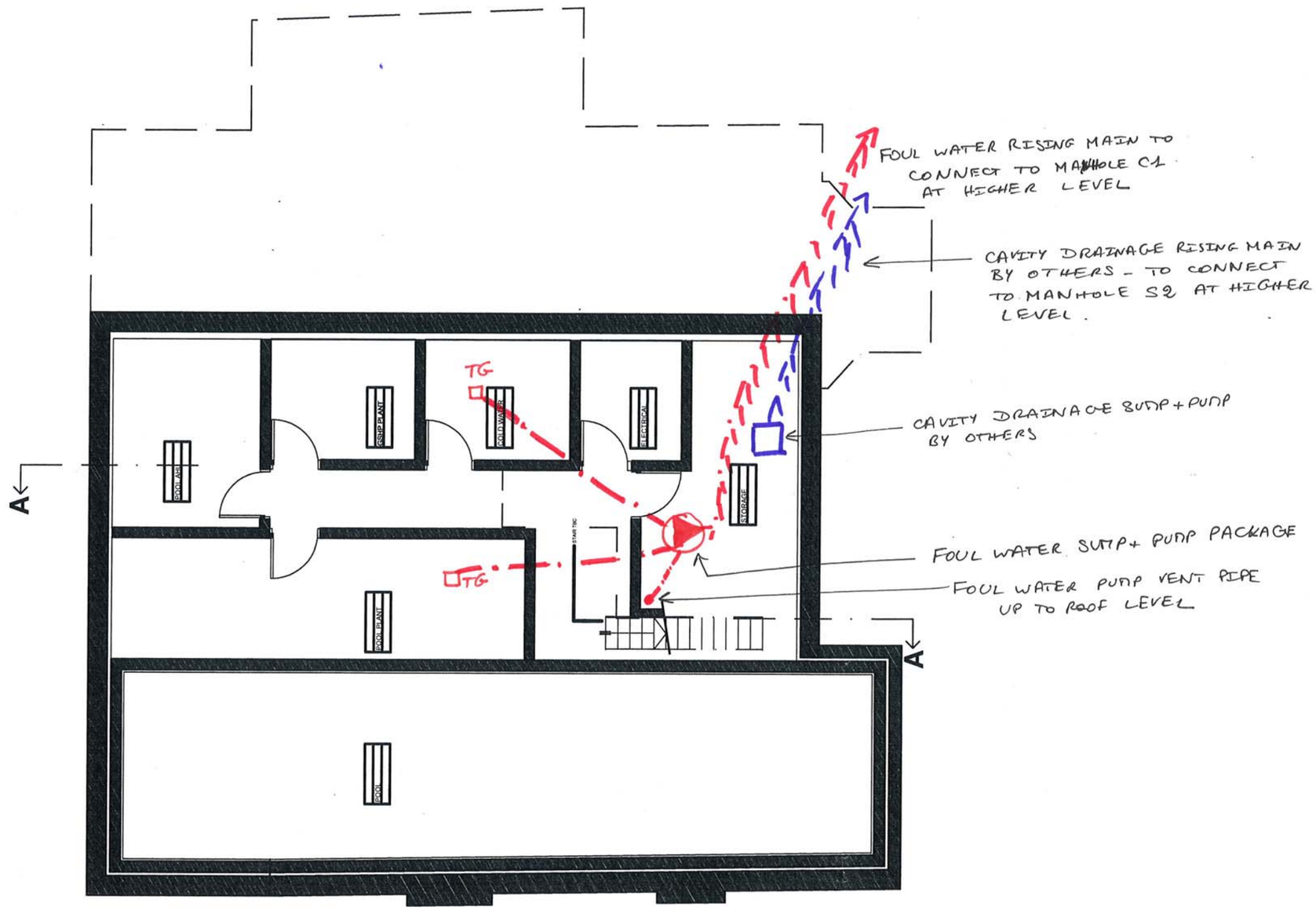
2.0 Flood Risk

The site is located within Flood Zone 1 (low risk of flooding from sea and rivers) according to the Environment Agency map.

The site is not part of the locations identified as a “primary” or “secondary” area of surface water flood risk according to London Borough of Camden report “New Basement Development and Extensions to Existing Basement Accommodation - G u i d a n c e N o t e” dated February 2009.

Thames Water has been consulted and confirmed that no flooding incident was reported for in the vicinity of the site.

Proposed Below Ground Drainage Strategy Drawings



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drawing title
PROPOSED BELOW GROUND DRAINAGE STRATEGY BASEMENT

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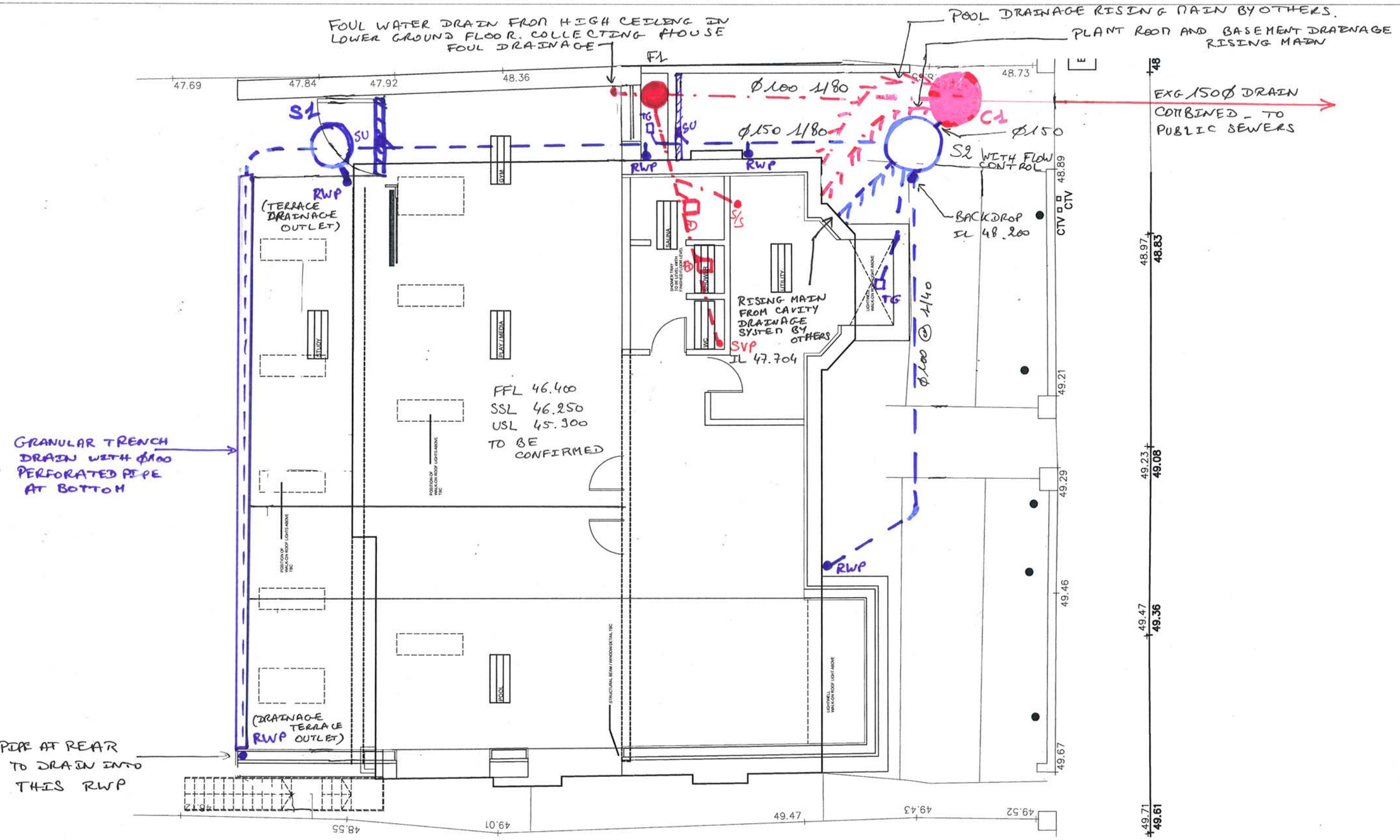
16 DALEHAM GARDENS
LONDON NW3

job no	drawing no	revision
211338	D001	P1



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P1	11.08.11	ST	PRS	Issued for Planning

drawing title
PROPOSED BELOW GROUND DRAINAGE STRATEGY LOWER GROUND FLOOR

scale(s) 1:100 @A3 | date Aug '11 | drawn ST

drawing status
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