Job Number: 170503

CROFT STRUCTURAL ENGINEERS

Croft Structural Engineers
Clock Shop Mews
Rear of 60 Saxon Road
London SE25 5EH

T: 020 8684 4744
E: enquiries@croftse.co.uk
W: www.croftse.co.uk

Flood Risk Assessment

Property:

80 Greencroft Gardens
Camden
NW6 3JQ

Client:

Quorum Project Management

Author	Reviewed by
Geoff Watson MEng	Phil Henry BEng MEng MICE

Revision	Date	Comment
-	26.06.2017	First Issue
1	30.06.2017	Minor alterations
2	31.08.2017	Sections 4 to 6 and Appendix A altered.

LABC Regional winner 2013 awards
constructionline
TRADA
ice Institution of Civil Engineers
The Institution of Structural Engineers

CROFT STRUCTURAL ENGINEERS

Contents

Executive Summary

This flood risk assessment for the basement development at 80 Greencroft Gardens has explored the potential sources of flooding and compared existing and proposed conditions. The assessment has included a detailed study of the site the surrounding area. The assessment concludes that the basement will not give rise to any significant risks of flooding other than to the occupants; these are inherent with all basement structures and can be suitably mitigated.

CROFT STRUCTURAL ENGINEERS

1. Introduction

A new basement is proposed at 80 Greencroft Gardens. During the Screening stage of a Surface Water BIA, historical flooding was identified. Further study in the context of a flood risk assessment (FRA hereafter) is recommended. The objectives of the FRA is to establish:

- Whether the basement is likely to be affected by current or future flooding from any source
- Whether the basement will increase flood risk elsewhere
- Whether mitigation measures to deal with these effects and risks are feasible and appropriate

This FRA is in accordance with guidance and requirements from PPS25 and the National Planning Policy Framework (NPPF). This flood risk assessment includes proposed design measures to reduce any risks associated with flooding and mitigate the impacts for the operation of the building, the users, the surrounding properties and the occupants of nearby properties.

This report is based on information from a desk study, a site visit and also information from a Groundwater BIA (Ref. 30132R3) and a Land Stability BIA (Ref 30207-1). These are separate reports but are referred to within this assessment.

2. Existing Site Conditions

The site comprises a three storey detached residential property in a densely built up urban area. The building is constructed from brickwork walls. Trial pits records from this site show that the foundations of these walls are approximately 600mm deep below ground level.

Figure 1: Front view of property

There is a front and a rear garden. Paving is present to the front and rear of the property. A significant portion of the rear garden is soft-landscaped. The footprint of the building is approximately 220m^2; the area of the whole site is approximately 550m^2.

Figure 2: Birdseye View from south

The land within the site is relatively flat. The area surrounding the site has a gentle slope from north to south. There are no watercourses traversing the site.

There are detached buildings of a similar construction immediately to the left and right of the site. The rear end of the rear garden forms a boundary with properties on Canfield Gardens.

Figure 3: Street plan with approx. site area indicated

Inspection of contours of OS maps confirm a slope from north to south and indicate a fall of approximately 1 in 40.

Figure 4: Extract from OS map, with location of site indicated.

Clay is understood to be the highest natural strata below the site. A ground investigation has been carried out for this site. The report for this is available separately (ref GWPR 1731). An extract from this is shown below

CROFT STRUCTURAL ENGINEERS

Project Name	Project No.	Co-ords: -	Hole Type
80 Greencroft Gardens,	GWPR1731		WLS
Location: South Hampstead, London NW6 3JQ		Level: -	Scale 1:50
Client: Ground and Project Consultants Limited		Dates: 11/07/2016	Logged By RT

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.07			Block Paving
		0.30	D					MADE GROUND: Dark brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare, fine to medium, sub-angular to sub-rounded flint and brick.
		0.50	D		0.65			
		0.80	D					HEAD DEPOSITS: Dark brown/mid brown/orange brown mottled silty gravelly CLAY. Gravel is rare, fine to coarse, rounded to sub-angular flint.
		1.00	SPT	N=6 (1,1/ 2,1,1,2)				
		1.00	D		1.20			
		1.50	D					LONDON CLAY FORMATION: Mottled mid brown/orange brown silty CLAY. Clay becomes denser with depth. Lenses of grey clay noted from 1.90m bgl.

Figure 5: Extract from borehole log.

The ground investigation confirmed the presence of clay and also a thin layer of made ground below the surface (approximately 600-800 deep, refer to ground investigation report appended to the Groundwater BIA for more details)

Inspection of flood risk maps from the Environment Agency show that the site is in Flood Risk Zone 1 (not at any significant risk of flooding from rivers and seas)

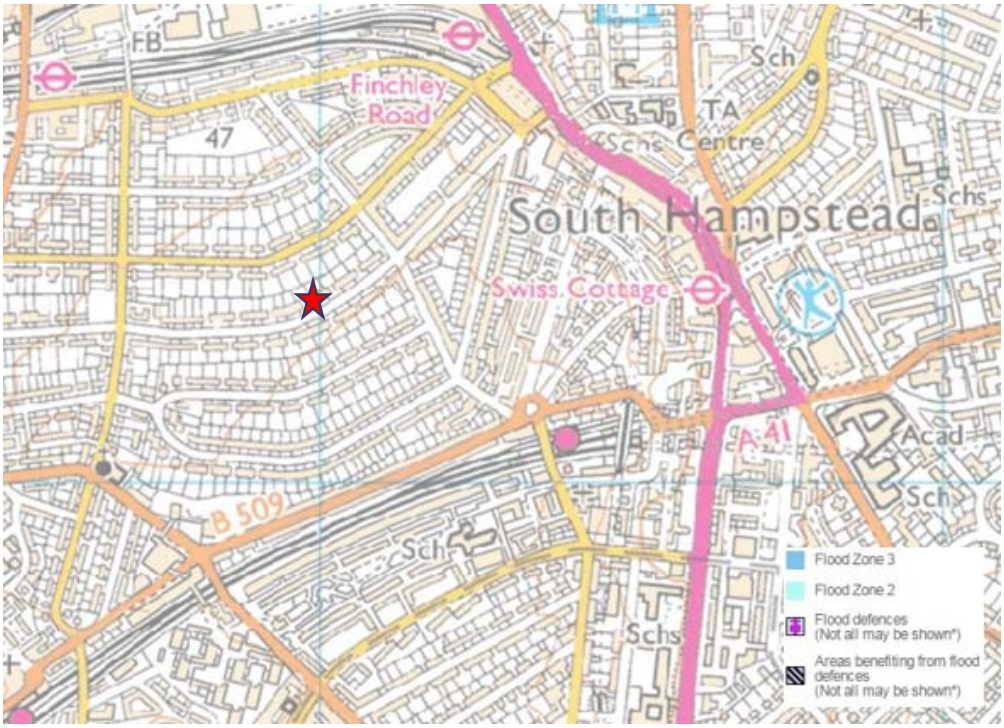


Figure 6: Extract from EA map showing areas at risk of flooding from rivers and seas

3. Proposed Development

The new development will include a basement under the full footprint of the existing building. The basement will partly extend into the rear garden to incorporate a full width light-well. Inspection of existing and proposed plans show that the proportion of hard standing will be approximately the same.

The development is understood to form a self-contained dwelling. The NPPF classifies this type of development as 'Highly Vulnerable'.

The NPPF Sequential Test determines which developments are permitted in the context of flood risk. This is summarised in a table which is reproduced below

Flood risk vulnerability classification see table D2	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	√	√	√	√	√
Zone 2	√	√	Exception test required	√	√
Zone 3a	Exception test required	√	X	Exception test required	√
Zone 3b 'functional flood plain'	Exception test required	√	X	X	X

√ Development is appropriate
X Development should not be permitted

Given that the development is in Zone 1, it is classified as 'appropriate' by the test. An exception test is not required.

4. Identification of Flood Hazards

The potential sources of flooding are summarised below:

Potential Source	Potential Flood Risk at Site?	Justification
Fluvial flooding	No	EA Flood Mapping shows Flood Zone 1. Distance from nearest surface watercourse >1km
Tidal flooding	No	Site location is 'inland' and topography > 40mAOD.
Flooding from rising / high groundwater	No	Site is located on low permeability London Clay. This provides barrier against water from rising from below.
Surface water (pluvial) flooding	Yes	Recorded in unspecified part of Greencroft Gardens in 2002
Flooding from reservoirs, canals and other artificial sources	No	There are no reservoirs, canals or other artificial sources in the vicinity of the site that could give rise to a flood risk.

It is evident from the above that the only significant flood risks are due surface water (pluvial) flooding. This is based on historical flooding records. It is understood that this flooding was due to a Thames Water relief sewer being overloaded. It is also understood that Thames Water subsequently increased the capacity of this relief system: the likelihood of flooding of this nature is now significantly reduced.

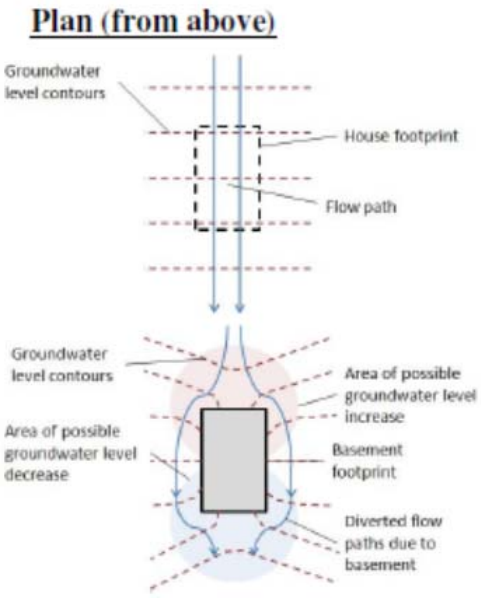
Off-site risks

Flooding has been reported to the rear of properties in Canfield Gardens. This is likely to be due to the presence of clays which have a low level of permeability. As mentioned previously there is a thin band of made ground above the clay which allows a greater rate of seepage. Hydraulic connectivity between this type of soil will be maintained throughout the rear gardens of the property. The basement will not affect this.

Residual risks

The accumulation of surface water is influenced by the permeability of the surfaces within the site and the permeability of the soil. Basements can be an obstruction to ground water conveyance. The relevant features of the ground, the groundwater and the surface water within and around the site are as follows:

- As described previously the proportion of hard surfaces will remain the same. There will be no changes in the amount of surface water discharging to other properties.
- London clay allows for a steady but slow seepage of groundwater. This will be obstructed by the presence of the basement. However, given that the edges of the basement will be at a distance within the site boundary, groundwater conveyance via the clay will be possible around the sides as well as below the structure (illustrated below).



This is discussed in more detail in the Groundwater BIA.

The Groundwater BIA notes that the area of ground in comprising the light well and sunken terrace is small proportion of the overall size of the property and the net effect on the recharge of ground water likely to be small. This is adequately compensated by the increase in permeable areas in the front garden. Drawing SL-20 (appended) illustrates this.

- Made ground contains more permeable soil. Inspection of the trial pit borehole records show that the depth of the made ground is approximately the same as the foundations. The building is already forming a barrier in this layer of soil; the new basement will not change this thus the risk to flooding due to obstructions in made ground will not be increased.

Infrastructure failure

Drainage at or near the site could potentially become blocked or cracked and overflow or leak. This risk is inherent with all subterranean structures.

5. Mitigation Measures

The most significant risks identified are those to the occupants of the basement. To mitigate the risks associated with flooding of the basement, Croft would recommend the following measures:

- A pumping system should be installed for the proposed basement. There is a likelihood that this may fail and allow excess water to accumulate. If this were to occur, the build-up of water would be gradual and noticeable before it becomes a significant life-threatening hazard.
- The pumping system should be a dual mechanism to maintain operation in the event of a failure. This should include a battery backup and a suitable alarm system for warning purposes. The pump will discharge water into the mains sewer. At detailed design stage (after the planning application is concluded), the design team should obtain Thames Water's approval for this connection.
- Install all electrical wiring at high level

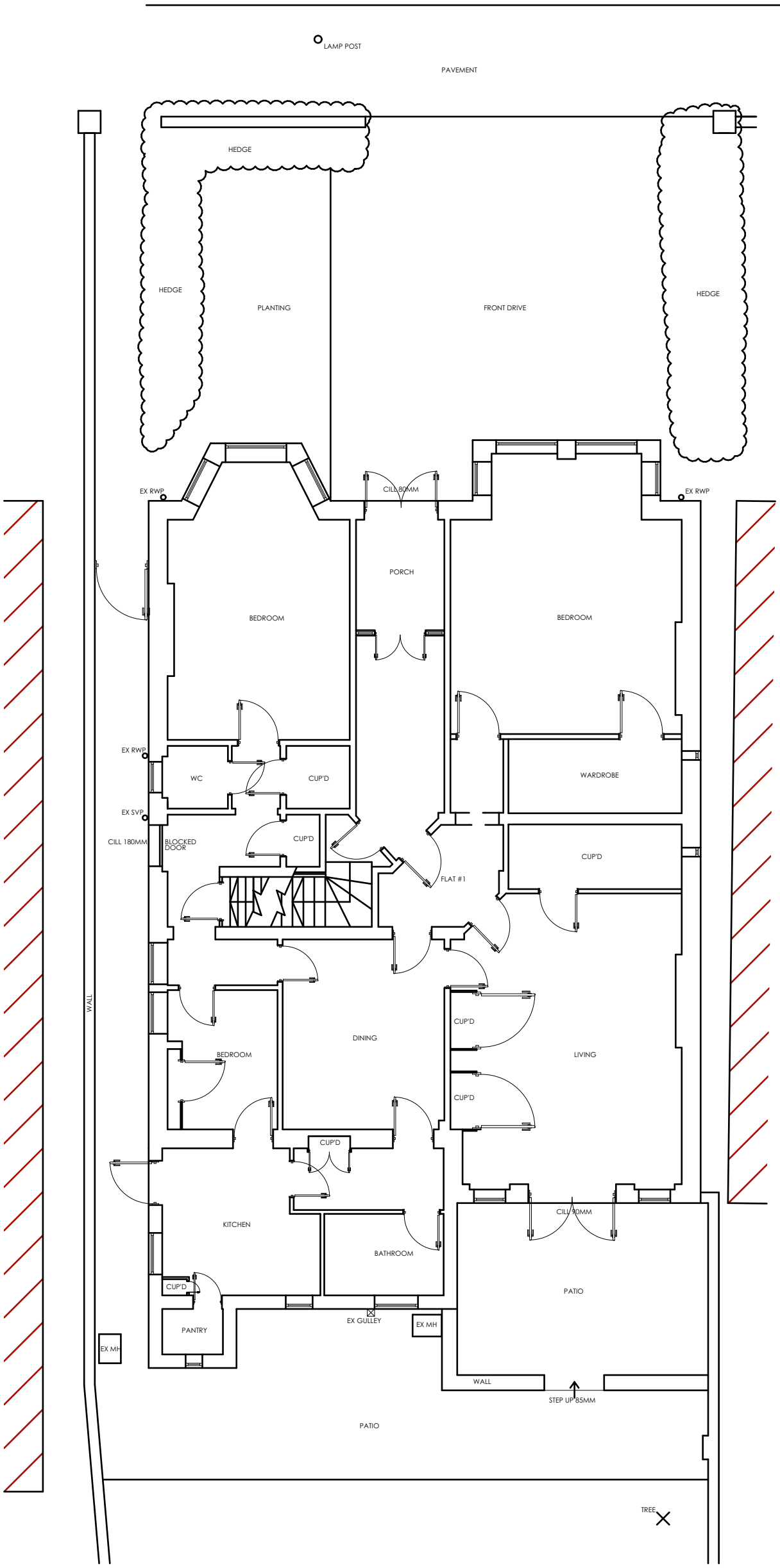
6. SUDS Considerations

As described previously, the basement will not have any noteworthy impacts on surface flow. Section 11 of CPG3 draws attention to the SUDS hierarchy of drainage solutions, which promotes the use of infiltration techniques above others.

There is plentiful soft landscaping in the rear garden which allow and will continue to allow rainwater to discharge into the ground. This mechanism will be maintained: although the rear light-will extend into the rear garden, there are no proposals to change the landscaping in the rear garden beyond this. The use of artificial mechanisms such as attenuation tanks is therefore not considered necessary in this development. SUDS will be achieved by the continued use of soft-landscaped areas for infiltration.

Drawing SL-20 (appended) shows existing and proposed areas relevant to surface permeability. As shown on these, soft landscaping is proposed at the front which is occupied mostly by hardstanding at present. There will be no increase in the area in the overall area of impermeable surfaces; furthermore, the area of permeable ground will be better balanced between the front and rear gardens.

Appendix A: Drawings



Existing Groundfloor Plan

ARCHIAN

Design, Develop, Deliver Intelligent Solutions

All dimensions are in millimeters. if in doubt ask. This drawing is not to be used for setting out. all sizes and dimensions to be checked on site prior to commencement and confirmed by the architect. This drawing is to be read in conjunction with all other relavant drawings and details. Materials and workmanship must be of standard conforming with the appropriate recognised authority. For example "National House Building Council", "British Standards Institution", "Department of the Environment (Building regulations 1991)" etc.

Party Walls: All relevant party wall agreements are to be entered into and agreed between owners prior to commencement of works. All cross over, build over agreements with utility companies to be agreed and approved prior to works on site.

Health and Safety: The contractor must at all times operate safe working practices, maintain the integritty of the existing structures, and conform to all the appropriate requirements Executive including the "Construction (Health, Safety and welfare) Regulations 1996". The working methods of any hazardous operations must first be discussed with the Planning Supervisor and the designer prior ro commencement

Job Title

ARC-532

Address: 80 Greencroft Gardens, London, lww6 3JQ

Drawing Name

A-03 - EXISTING GROUNFLOOR PLAN

Drawing Status

PROPOSAL 1

Drawn by
S. L

Date: 28/06/2016

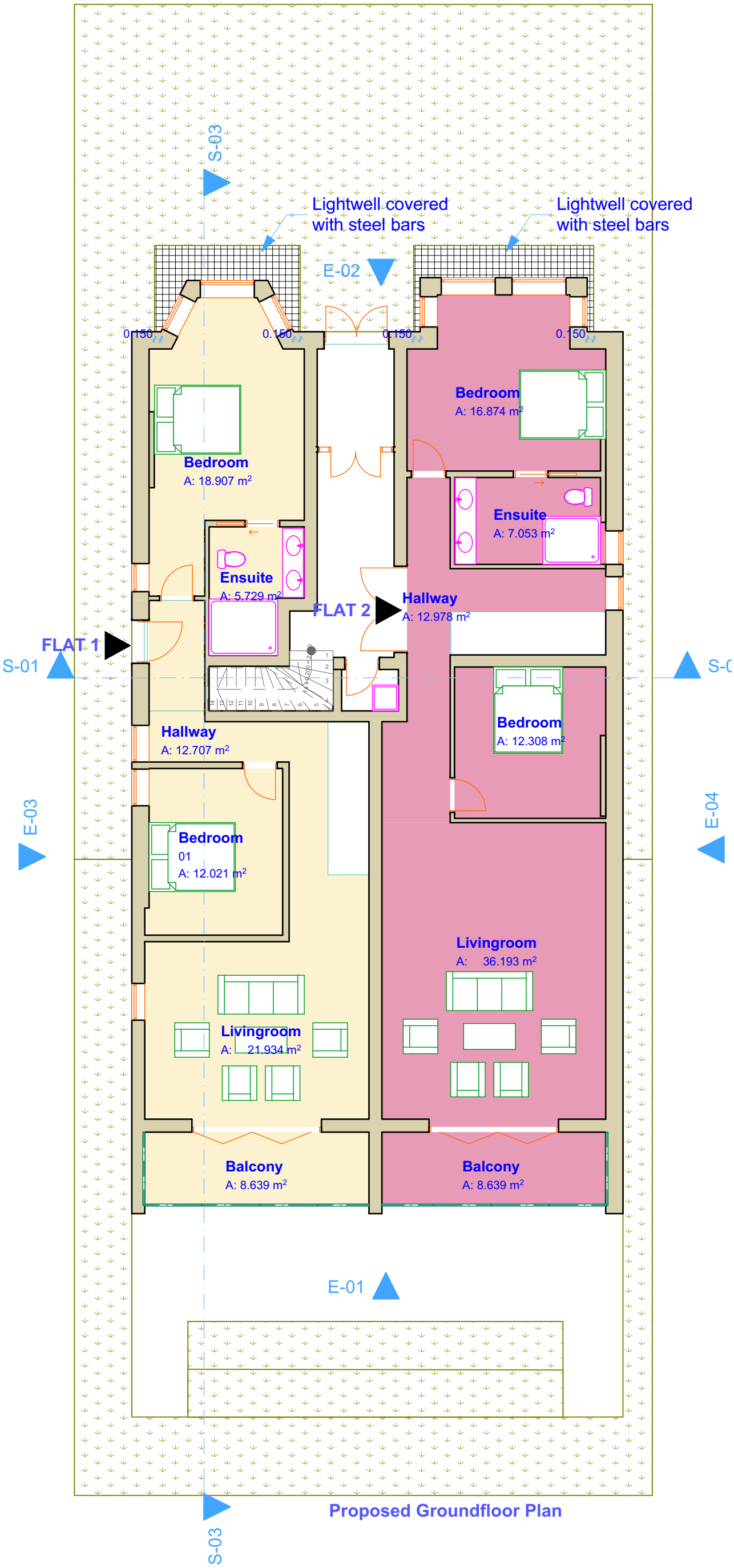
Checked by
T. P

Date: 28/06/2016

Drawing Scale

0 1 2 3 4 5 m

M=1:100 on A3



ARCHIAN

Design, Develop, Deliver Intelligent Solutions

All dimensions are in millimeters. if in doubt ask. This drawing is not to be used for setting out. all sizes and dimensions to be checked on site prior to commencement and confirmed by the architect. This drawing is to be read in conjunction with all other relavant drawings and details. Materials and workmanship must be of standard conforming with the appropriate recognised authority. For example "National House Building Council", "British Standards Institution", "Department of the Environment (Building regulations 1991)" etc.

Party Walls: All relevant party wall agreements are to be entered into and agreed between owners prior to commencement of works. All cross over, build over agreements with utility companies to be agreed and approved prior to works on site.

Health and Safety: The contractor must at all times operate safe working practices, maintain the integrity of the existing structures, and conform to all the appropriate requirements Executive including the "Construction (Health, Safety and welfare) Regulations 1996". The working methods of any hazardous operations must first be discussed with the Planning Supervisor and the designer prior ro commencement

Job Title

ARC-532

Address: 80 Greencroft Gardens, London, NW6 3JQ

Drawing Name

A-02 - PROPOSED GROUNFLOOR PLAN

Drawing Status

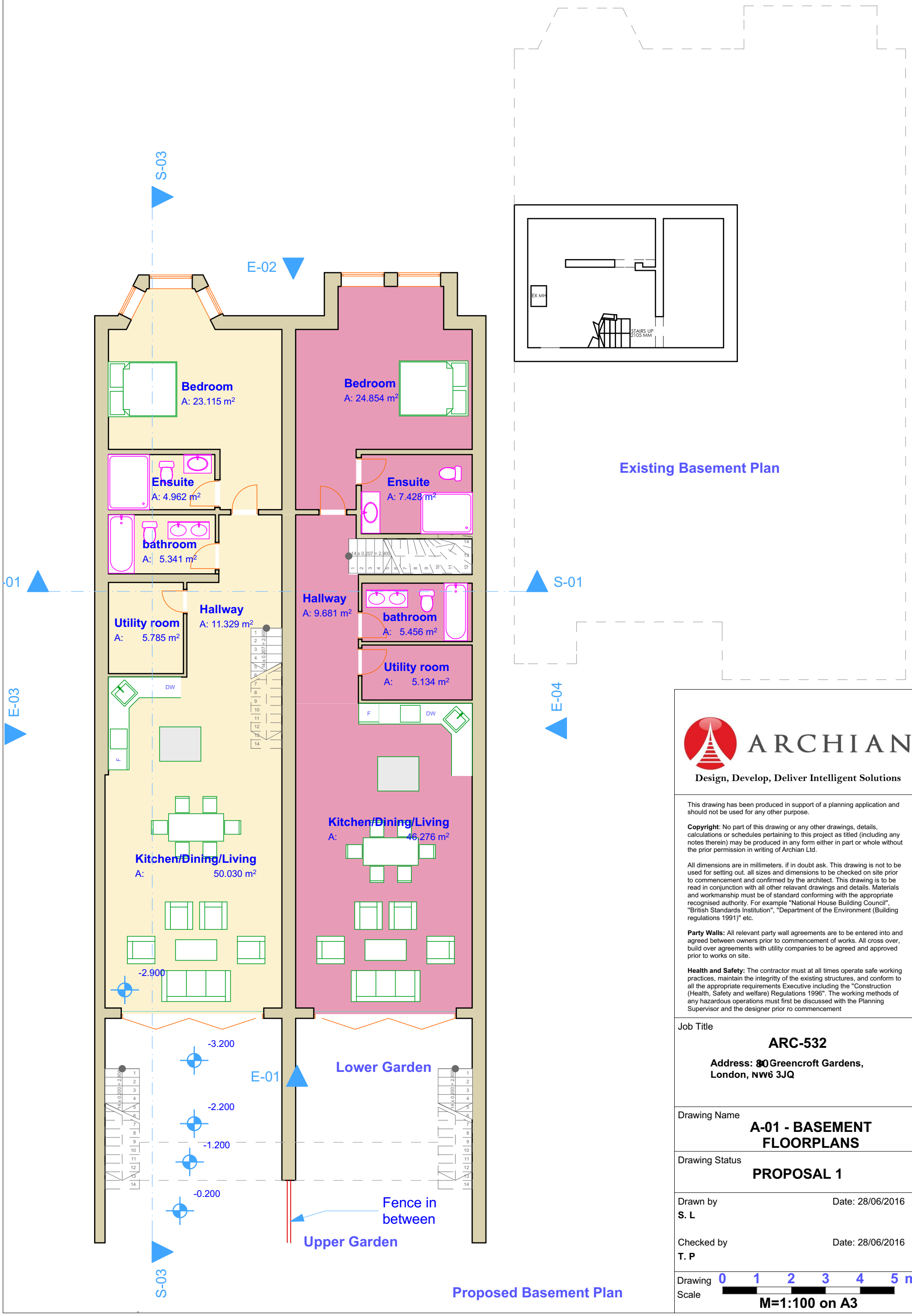
PROPOSAL 1

Drawn by **S. L** Date: 28/06/2016

Checked by **T. P** Date: 28/06/2016

Drawing Scale 0 1 2 3 4 5 m

M=1:100 on A3



ARCHIAN

Design, Develop, Deliver Intelligent Solutions

All dimensions are in millimeters. if in doubt ask. This drawing is not to be used for setting out. all sizes and dimensions to be checked on site prior to commencement and confirmed by the architect. This drawing is to be read in conjunction with all other relavant drawings and details. Materials and workmanship must be of standard conforming with the appropriate recognised authority. For example "National House Building Council", "British Standards Institution", "Department of the Environment (Building regulations 1991)" etc.

Party Walls: All relevant party wall agreements are to be entered into and agreed between owners prior to commencement of works. All cross over, build over agreements with utility companies to be agreed and approved prior to works on site.

Health and Safety: The contractor must at all times operate safe working practices, maintain the integritty of the existing structures, and conform to all the appropriate requirements Executive including the "Construction (Health, Safety and welfare) Regulations 1996". The working methods of any hazardous operations must first be discussed with the Planning Supervisor and the designer prior ro commencement

Job Title

ARC-532

Address: 80 Greencroft Gardens, London, NW6 3JQ

Drawing Name

A-01 - BASEMENT FLOORPLANS

Drawing Status

PROPOSAL 1

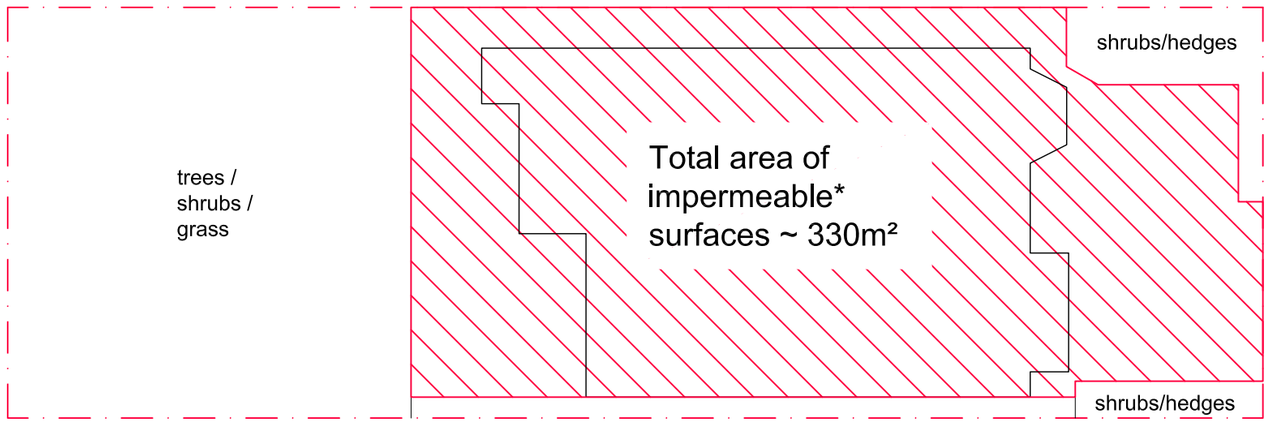
Drawn by **S. L** Date: 28/06/2016

Checked by **T. P** Date: 28/06/2016

Drawing Scale 0 1 2 3 4 5 m

M=1:100 on A3

- PLANNING ISSUE -
NOT FOR CONSTRUCTION



Site Plan - Existing

(Scale 1:200)

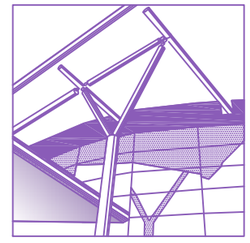
Site Plan - Proposed

(Scale 1:200)

* impermeable areas include patios, conventional driveway paving, and ight-wells, in addition to areas occupied by buildings

Rev	Date	Amendments
-	31.08.2017	First issue

Croft Structural Engineers
Clockshop Mews,
r/o 60 Saxon Rd,
London, SE25 5EH.
020 8684 4744
www.croftse.co.uk



Client: Quorum Project Management

Project: 80 Greencroft Gardens

Title : Site Areas

Job No.	Drawn	Scale
170503	GW	As shown @ A3
	Chk'd -	
Dwg No. SL-20	Rev. -	Date Aug 2017