FLOOD RISK ASSESSMENT

BRITANNIA STREET, LONDON

APRIL 2011

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SIGNATURE SHEET

Report Title	:	Flood Risk Assessment
	:	Britannia Street, London
Client	:	Tier Consult Ltd
Report Status	:	Final
Date of Issue	:	12 April 2011

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1 INTRODUCTION

Weetwood has been instructed by Tier Consult Ltd[1] to undertake a Flood Risk Assessment (FRA) for the proposed redevelopment of a site located on Britannia Street, London, in order to demonstrate that the site complies with Pol 5 (Flood Risk) of the *BRE Environmental and Sustainability Standard: BREEAM 2008 Assessor Manual*. Within the *BREEAM 2008 Assessor Manual* accreditation is awarded as follows:

Two credits

1. Where the assessed development is situated in a flood zone that is defined as having a low annual probability of flooding.
2. A site specific FRA confirms that there is a low risk of flooding from all sources.

One additional credit

3. Where attenuation measures are specified to ensure that the peak runoff rate from the site to the watercourse (natural or municipal) is no greater for the developed site than it is for the pre-development site.
4. The capacity of the attenuation measures include an allowance for climate change.

This report has been prepared in order to demonstrate compliance with the above and in accordance with the requirements of Planning Policy Statement 25: Development and Flood Risk (PPS25).

1.1 SITE LOCATION

The site is located on the corner of Britannia Street and Wicklow Street, London, at Ordnance Survey National Grid Reference TQ 306 829, as shown in **Figure 1**.

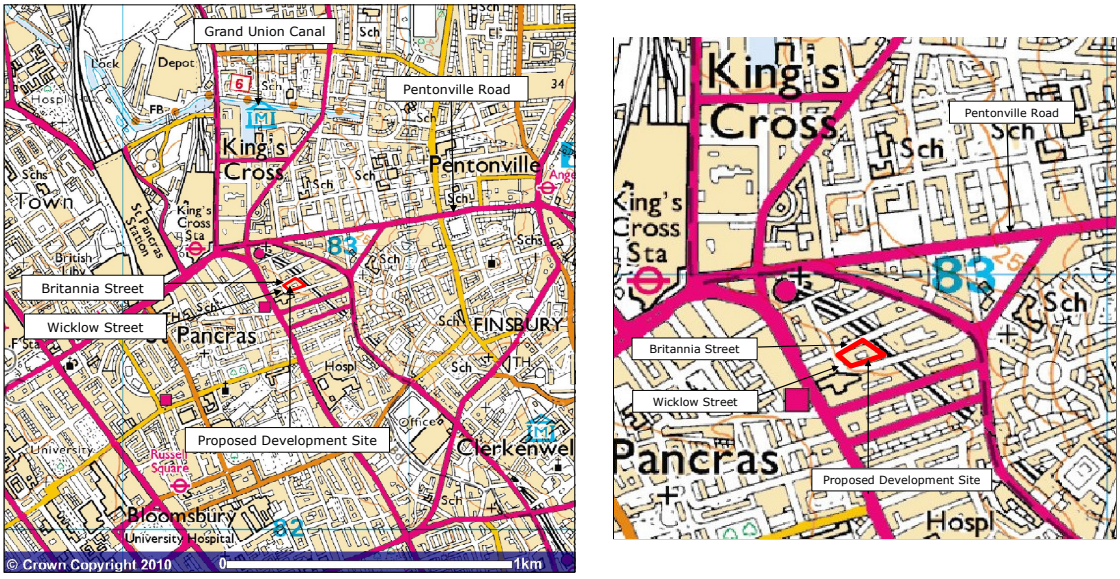


Image reproduced with permission of Ordnance Survey and Ordnance Survey of Northern Ireland

Figure 1: Site Location

[1] Instruction to proceed received 13 May 2010

1.2 EXISTING AND PROPOSED DEVELOPMENT

The site comprises approximately 0.225 ha and is currently occupied by a series of buildings which surround a central triangular courtyard. The buildings are currently used as a University and College Union Conference Centre. The existing site is shown on the topographic survey in **Appendix A**.

The application for planning permission includes the following redevelopment at the site:-

- Partial demolition, rebuilding and extension of 15-27 Britannia Street in connection with the re-use of the site as student accommodation (263 bedrooms) with associated facilities
- Change of use of 15 Britannia Street and properties on Wicklow Street to residential accommodation (4 units)

The development proposals are provided in **Appendix B.**

Proposals are for residential and student accommodation with associated facilities**.** According to Table D.2 of PPS25, student halls of residence and residential development are classified as *'more vulnerable development'*.

1.3 SITE LEVELS

A topographic survey of the site has been undertaken by Sitechnics[2] and is provided in **Appendix A**.

The survey indicates that levels within the central courtyard are within the region of 14.80 to 15.10 metres above Ordnance Datum (m AOD).

1.4 ACCESS AND EGRESS

Access and egress to the site is currently provided via both Britannia Street to the north and Wicklow Street to the south. Levels along these routes are shown to be in the region of 14.82 to 16.13 mAOD and 14.45 to 15.70 mAOD respectively.

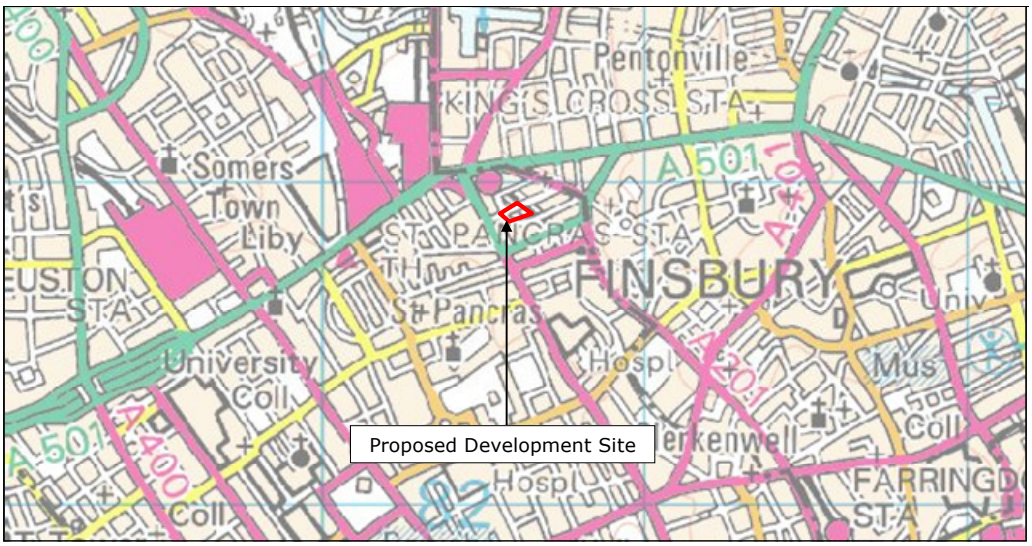
[2] Sitechnics Consultant Surveyors, Topographic Survey, January 2010, ref SP09431

2 PLANNING POLICY STATEMENT 25 (PPS25)

The aim of PPS25 is to ensure that flood risk is taken into account at all stages in the planning process and to direct development away from areas at highest risk.

2.1 ENVIRONMENT AGENCY FLOOD MAP

According to the Environment Agency (EA) flood map (**Figure 2**), the site is located in Flood Zone 1, defined as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding in any year (< 0.1%).



Flooding from rivers/sea without defences (1 in 100 yr / 1 in 200 yr)
Extent of extreme flood (1 in 1000 yr)
Flood defences
Areas benefiting from flood defences

Figure 2: Environment Agency Flood Map

Flood Zone 1 is defined in Table D.1 of PPS25 as having a low annual probability of flooding and as such the redevelopment of the site is shown to satisfy point 1 (as outlined in **Section 1** of this report) of the *BREEAM 2008 Assessor Manual*.

2.2 STRATEGIC FLOOD RISK ASSESSMENT

A Strategic Flood Risk Assessment (SFRA) was undertaken in August 2008[3] for the North London Boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest.

The SFRA has been reviewed and the information therein has been used to inform this FRA.

2.3 SEQUENTIAL TEST

The aim of the Sequential Test (as outlined in Annex D of PPS25 and Chapter 4 of the PPS25 Practice Guide) is to encourage preference to be given to locating new development in areas at the lowest probability of flooding (i.e. Flood Zone 1).

[3] North London Strategic Flood Risk Assessment, Mouchel, August 2008

The proposed development site is in Flood Zone 1 and therefore the requirements of the Sequential Test have been satisfied.

2.4 DEVELOPMENT AND FLOOD RISK

Table D.1 of PPS25 states that for development proposals on sites in Zone 1 comprising one hectare or above, the vulnerability to flooding from other sources and the effect of the new development on surface water run-off should be incorporated in a FRA.

The proposed development site, being located in Flood Zone 1 and 0.225 ha in size would not normally require a FRA under PPS25. However, in order to demonstrate compliance with Pol 5 (Flood Risk) of the *BRE Environmental and Sustainability Standard: BREEAM 2008 Assessor Manual* this FRA has been prepared.

Other potential sources of flooding are discussed in **Section 3** of this report. The effect of the new development on surface water runoff is addressed in **Section 4**.

3 OTHER SOURCES OF FLOODING

3.1 HISTORICAL RECORDS OF FLOODING

The SFRA does not list any historic records of fluvial flooding at or in the vicinity of the site.

The British Hydrological Society (BHS) Chronology[4] does not list any records of flooding at this location.

3.2 FLUVIAL FLOOD RISK

The River Thames is located approximately 2.0km to the south of the site.

The proposed development site is not shown to be at risk of flooding from this source (**Figure 2**).

3.3 CANAL / RESERVOIR

Paragraph C9 of PPS25 states that "*Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure*".

The Regents Canal runs from west to east across London, and bisects the Camden borough. The canal is located approximately 450m to the north of the site.

The canal is operated by British Waterways and as such would be subject to regular maintenance inspections. British Waterways has confirmed that they *"are not aware of any records of overtopping or breaches of this section of the Regents Canal"*[5].

The SFRA and the BHS Chronology[6] do not list any records of flooding from this source at or in the vicinity of the site.

Flood risk to the site from the canal is therefore considered to be low.

3.4 GROUNDWATER FLOODING

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels.

The SFRA states that "*North London is almost entirely underlain by the London Clay formation which overlays a significant chalk aquifer. The London Clay layer varies in thickness from less than 10m near the Lee Valley to over 100m in the areas of higher ground in Camden and Barnet"*[7]*.*

According to the EA groundwater depth contour maps (which are provided within the SFRA[8]), groundwater is shown to be in the region of 60m below existing ground levels in the location of the site.

[4] British Hydrological Society Chronology http://www.dundee.ac.uk/geography/cbhe/
[5] Email from British Waterways to Weetwood, dated 14 May 2010
[6] British Hydrological Society Chronology http://www.dundee.ac.uk/geography/cbhe/
[7] North London Strategic Flood Risk Assessment, pg 68
[8] North London Strategic Flood Risk Assessment, Appendix A, Map 12

The SFRA 'groundwater flooding incidents' map indicates that the site has no history of groundwater flooding[9].

The propensity for groundwater flooding at the site is therefore considered to be low.

3.5 SURFACE WATER FLOODING

Surface water flooding comprises ***pluvial flooding***, ***sewer flooding*** *and flooding from* ***highway drains and gullies.***

3.5.1 Pluvial flooding

Pluvial flooding results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer, or where the sewerage/drainage systems and watercourses are overwhelmed and therefore unable to accept surface water. Pluvial flooding is usually associated with high intensity rainfall events but may also occur with lower intensity rainfall where the ground is saturated, developed or otherwise has low permeability resulting in overland flow and ponding within depressions in the topography.

The SFRA highlights that Camden suffered extensive surface water flooding in August 2002 due to a high intensity rainfall event[10]. The SFRA states *"Thames Water confirmed that the flooding was caused by its sewer system reaching maximum capacity very quickly so that surface water could not be drained at the rate as the rain fell"*[11].

The SFRA provides a map of the roads affected by pluvial flooding during the event in August 2002. This indicates that the site was not affected by pluvial flooding; the nearest street which was affected is located approximately 2.5km[12] to the north west of the site.

The SFRA also provides the location of London Fire Brigade flood calls from 2004 to 2007. There have been no call outs as a result of flooding located at the development site[13].

The Kings Cross area in Camden is not highlighted as a surface water flooding hotspot in the SFRA[14], and therefore the risk of surface water flooding at the development site is considered to be low.

3.5.2 Sewer flooding

Sewer flooding occurs when the capacity of underground sewerage systems is exceeded, resulting in flooding inside and outside of buildings. Normal discharge of sewers and drains through outfalls may be impeded by high water levels in receiving waters.

[9] North London Strategic Flood Risk Assessment, Appendix A, Map 20
[10] North London Strategic Flood Risk Assessment, pg 9
[11] North London Strategic Flood Risk Assessment, pg 76
[12] North London Strategic Flood Risk Assessment, Appendix A, Map 22
[13] North London Strategic Flood Risk Assessment, Appendix A, Map 20
[14] North London Strategic Flood Risk Assessment, Appendix A, Map 23

The sewer systems in London are often very old (particularly within the Boroughs of Camden, Islington and Hackney) and are often combined sewer systems. London's sewer network is generally protected from such large scale flooding by storm overflows which discharge high storm flows from the sewer system into watercourses, thus preventing flooding from the sewer network[15].

As part of the SFRA, Thames Water provided an extract from their flooding register, known as the DG5 register. The data is provided with a reference by truncated post code only so the exact location or source of flooding is not identified. The postcode area, in which the development site is situated, is shown to have 1 incident of sewer flooding[16].

Thames Water has been consulted to ascertain whether they hold any recent records of sewer flooding in the vicinity of the site. They have confirmed that there have been no incidents of flooding as a result of surcharging of public sewers in the vicinity of the site[17].

The risk of sewer flooding at the development site is therefore considered low.

3.5.3 Flooding from Highway Drains and Gullies

Camden Council has confirmed that that they do not hold any records of highway flooding at or in the vicinity of the site[18].

[15] North London Strategic Flood Risk Assessment, pg 72
[16] North London Strategic Flood Risk Assessment, Appendix A, Map 13
[17] Email from Thames Water to Weetwood, dated 18 May 2010
[18] Telephone conversation between Camden Council and Weetwood, 20 May 2010

4 SURFACE WATER RUNOFF

4.1 REQUIREMENTS FOR SURFACE WATER DRAINAGE AT THE SITE

PPS25 recommends that surface water arising from the developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development.

Redevelopment of the site should be such that the volumes and peak flow rates of surface water leaving the developed site are no greater than the rates prior to development. Opportunities to reduce surface water run-off, and the associated flood risk, should also be identified and climate change taken into consideration.

4.2 SURFACE WATER RUNOFF FROM THE SITE

The site occupies a total area of 0.225 ha. The existing site contains entirely impermeable surfaces.

Figure 3 demonstrates clearly that the existing impermeable surfaces at the site are positively drained. The topographic survey (**Appendix A**) identifies several manholes and gullies in the central courtyard area and therefore it is reasonable to assume that surface water runoff from the existing site discharges directly into the public sewer system.

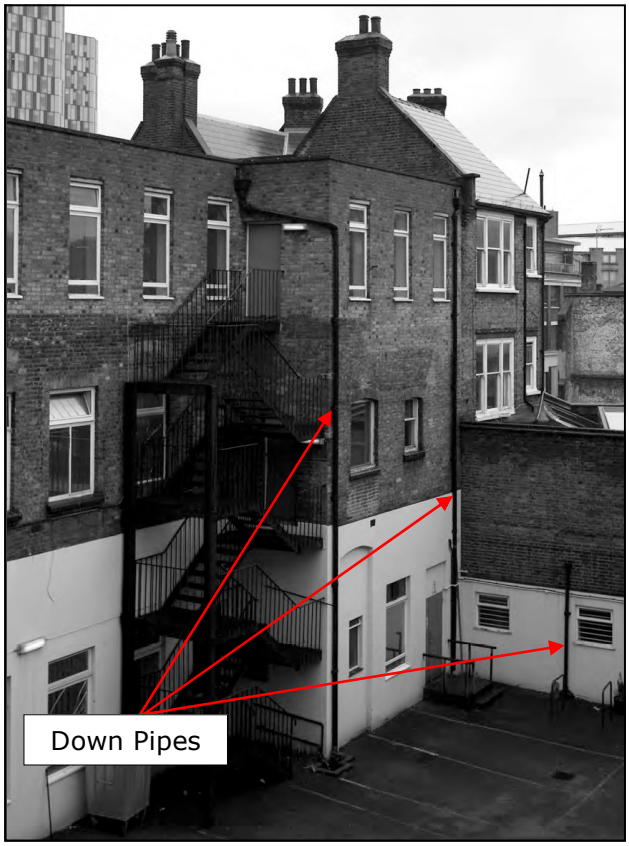


Figure 3: Existing Positively Drained Buildings

Recognising there will be no change in impermeable surfaces at the site following redevelopment, there will be no increase in surface water runoff from the site. Since the existing surface water sewer system at the site appears to be functioning adequately for the existing flows (there are no records of sewer flooding in the vicinity of the site - see **Section 3.5.2**), it is proposed that the redeveloped site should continue to drain as existing.

Given the small size of the site, the very limited land available, the fact that underlying soil conditions are clay precluding infiltration, and that the existing sewer system is remaining, there is considered to be very little potential for reducing runoff rates as part of the proposed development.

4.3 BREEAM ACCREDITATION

The *BREEAM 2008 Assessor Manual* accreditation awards one additional credit for managing surface water runoff from the developed site. The criteria are outlined below:-

- Where attenuation measures are specified to ensure that the peak run-off rate from the site to the watercourse (natural or municipal) is no greater for the developed site than it is for the pre-development site.

- The capacity of the attenuation measures include an allowance for climate change.

However, the BREEAM manual states that for '*refurbishment projects, where no new building or hard landscaping areas are developed, the development is likely to achieve the credit for attenuation of surface water runoff. In such instances, as a minimum, a Flood Risk Assessment must have been carried out and any identified opportunities to reduce surface water runoff as a result of the development must be implemented'*[19].

Following redevelopment there will be no increase in impermeable areas that will be drained to the existing sewer system, and consequently no increase in runoff rates.

Recognising the above, it is therefore considered that the development should comply with this aspect of the BREEAM accreditation.

[19] BREEAM 2008 Assessor Manual, Pol 5 Flood Risk

5 CONCLUSIONS AND RECOMMENDATIONS

There are proposals for the redevelopment of an area of land located off Britannia Street, London. According to the EA's flood map the proposed development site is located outside the 1 in 1,000 year flood outline and is therefore defined as being situated within Flood Zone 1 under PPS25.

Given that the site is located in Flood Zone 1 and comprised 0.225 ha under PPS25 a FRA would not normally be required. However, in order to demonstrate compliance with Pol 5 (Flood Risk) of the *BRE Environmental and Sustainability Standard: BREEAM 2008 Assessor Manual* a FRA has been prepared and the following conclusions reached in relation to the requirements within this:

Two credits

1. The site is defined as having a low probability of flooding under Table D.1 of PPS25.
2. There is a low risk of flooding from all other potential sources.

One additional credit

Whilst the proposed peak runoff rates from the redeveloped site will be no greater than those rates prior to development, it is not possible to provide any betterment given the small size of the site, the very limited land available, the fact that underlying soil conditions are clay precluding infiltration, and that the existing sewer system is remaining. Given that there is no increase in impermeable areas draining to the sewer system, it is considered that the development should comply with this aspect of the BREEAM accreditation.

Recognising the above it is considered that three credits may be awarded to the development.

APPENDICES

APPENDIX A: Topographic Survey

Notes

1. The Survey Grid is Ordnance Survey National Grid, computed using Leica Smartnet RTK Network.
2. Surveyed Boundary features are not necessarily Legal Boundaries.
3. Contours, if applicable, are not shown over hard standing, gravel, banking or flower borders.
4. Dimensions should not be scaled. All dimensions should be checked on site before any fabrication / construction.
5. Copyright of all data produced by Sitechnics shall remain with Sitechnics unless otherwise specifically agreed.
6. Information provided should not be altered or modified in any way. It should not be used for any purpose other than for which it was intended and should not be issued to other parties without prior agreement of Sitechnics.
7. Sitechnics cannot accept responsibility for any damage to computer systems which may result from viruses which may be contained in the data provided.
8. If the AutoCAD drawing is being read by any system other than AutoCAD it should be checked against a hard copy. Sitechnics cannot accept liability for omissions.
9. All drainage connections shown are sounded only. They have not been water tested. Services may be obscured by parked cars, leaf litter or building materials etc.
10. External Eaves levels are Surveyed to lowest tile postiion.

Level Datum

ALL LEVELS ARE ORTHOMETRIC HEIGHTS RELATED TO OSGM02 GPS DATUM, COMPUTED USING LEICA SMARTNET RTK NETWORK

Key

STREET FURNITURE

BB	Belisha Beacon
BL	Basement Light
Bin	Litter Bin
BO	Bollard
BS	Bus Stop
CPO	Concrete Post
EP	Electric Pole
FB	Flower Bed
FHM	Fire Hydrant Marker
FL	Flood Light
FP	Flag Pole
FPO	Fence Post
JB	Junction Box
GB	Grit Box
GMK	Gas Marker Post
GPO	Gate Post
IBO	Illuminated Bollard
LH	Lamp Hole
LP	Lamp Post
LPO	Lockable Post
MK	Marker
MPO	Metal Post
NP	Name Plate
PB	Post Box
PM	Parking Meter
RPO	Reflector Post
RS	Road Sign
SI	Sign
STN	Survey Station
Tap	Attached to Wall/Building etc
TCB	Telephone Call Box
TL	Traffic Light
TLCB	Traffic Light Control Box
TM	Ticket Machine
TP	Telegraph Pole
TPO	Timber Post

PIPES

DP	Down Pipe
GP	Gas Pipe
RWP	Rain Water Pipe
SP	Stand Pipe
SVP	Soil Vent Pipe
VP	Vent Pipe
WP	Waste Pipe

LEVELS & DEPTHS

A	Approximate
CL	Cover Level
DPC	Damp Proof Course
EL	Eaves Level
FFL	Finished Floor Level
FRL	Flat Roof Level
ID	Invert Depth
IL	Invert Level
PWL	Parapet Wall Level
RL	Ridge Level
SFL	Soffit Level
SiltL	Silt Level
SL	Sump Level
SSL	Structural Slab Level
THL	Threshold Level
TBL	Top of Beam Level
TWL	Top of Wall Level
d	Object Depth in Metres
H	Object Height in Metres

FENCES & WALLS

BW	Block Wall
BRP	Brick Pier
BRTW	Brick Retaining Wall
BRW	Brick Wall
BWF	Barbed Wire Fence
CBF	Close Board Fence
CIF	Corrugated Iron Fence
CLF	Chain Link Fence
CPF	Chestnut Paling Fence
CRW	Concrete Retaining Wall
CW	Concrete Wall
CWF	Chicken Wire Fence
DIL	Dilapidated
HR	Hand Rail
IWF	Interwoven Fence
LF	Lattice Fence
MF	Miscellaneous Fence
MRF	Metal Railing Fence
OBF	Open Board Fence
PCF	Post & Chain Fence
PNF	Panel Fence
PRF	Post & Rail Fence
PWF	Post & Wire Fence
RTW	Retaining Wall
STW	Stone Wall
SRTW	Stone Retaining Wall
WMF	Wire Mesh Fence

INSPECTION CHAMBERS

AC	Access Cover
BH	Borehole
CDC	Concrete Drainage Channel
EIC	Electric Inspection Cover
ER	Earth Rod
FWIC	Foul Water Inspection Cover
FH	Fire Hydrant
GIC	Gas Inspection Cover
GM	Gas Meter
GV	Gas Valve
G	Gully
IC	Inspection Cover
KI	Kerb Inlet
MDC	Metal Drainage Channel
MW	Monitoring Well
RE	Rodding Eye
SV	Stop Valve
SWCP	Surface Water Catch Pit
SWIC	Surface Water Inspection Cover
TCIC	Traffic Control Inspection Cover
TIC	Telecom Inspection Cover
UTR	Unable To Raise
WIC	Water Inspection Cover
WM	Water Meter
WWO	Water Wash Out
WSV	Water Stop Valve

SURFACES

BPav	Brick Paving
Conc	Concrete
CPav	Crazy Paving
CPS	Concrete Paving Slabs
FB	Flower / Shrub Border
KFC	Kidney Flint Cobbles
Tmac	Tarmac
TPav	Tactile Paving
TS	Trench Scar

Symbology

- Single Gate
- Double Gate
- Banking
- Step Up
- Ø Diameter shown in mm
- Survey Station

Linetypes

- CHANGE OF SURFACE
- DROP KERB
- FENCE
- WALL
- KERB
- BUILDING FACE
- OVERHEAD STRUCTURE
- TRENCH SCAR
- TREE CANOPY OVERHANG
- BUSHES/OVERGROWTH
- TREE CANOPY EXTENTS
- HEDGE

CLIENT

CAMPUS ESTATES

SITE
27 Brittania Street
London
WC1X 9JP

DRAWING TITLE
Topographical Drawing

PROJECT NUMBER	DRAWING NUMBER	DATE
SP09431	SD09431-01	Jan 2010
SURVEYED BY	DRAWN BY	CHECKED BY
BD/GL	BD/GL	GL
SCALE	SHEET SIZE	SHEET
1:200	A1	1 OF 1

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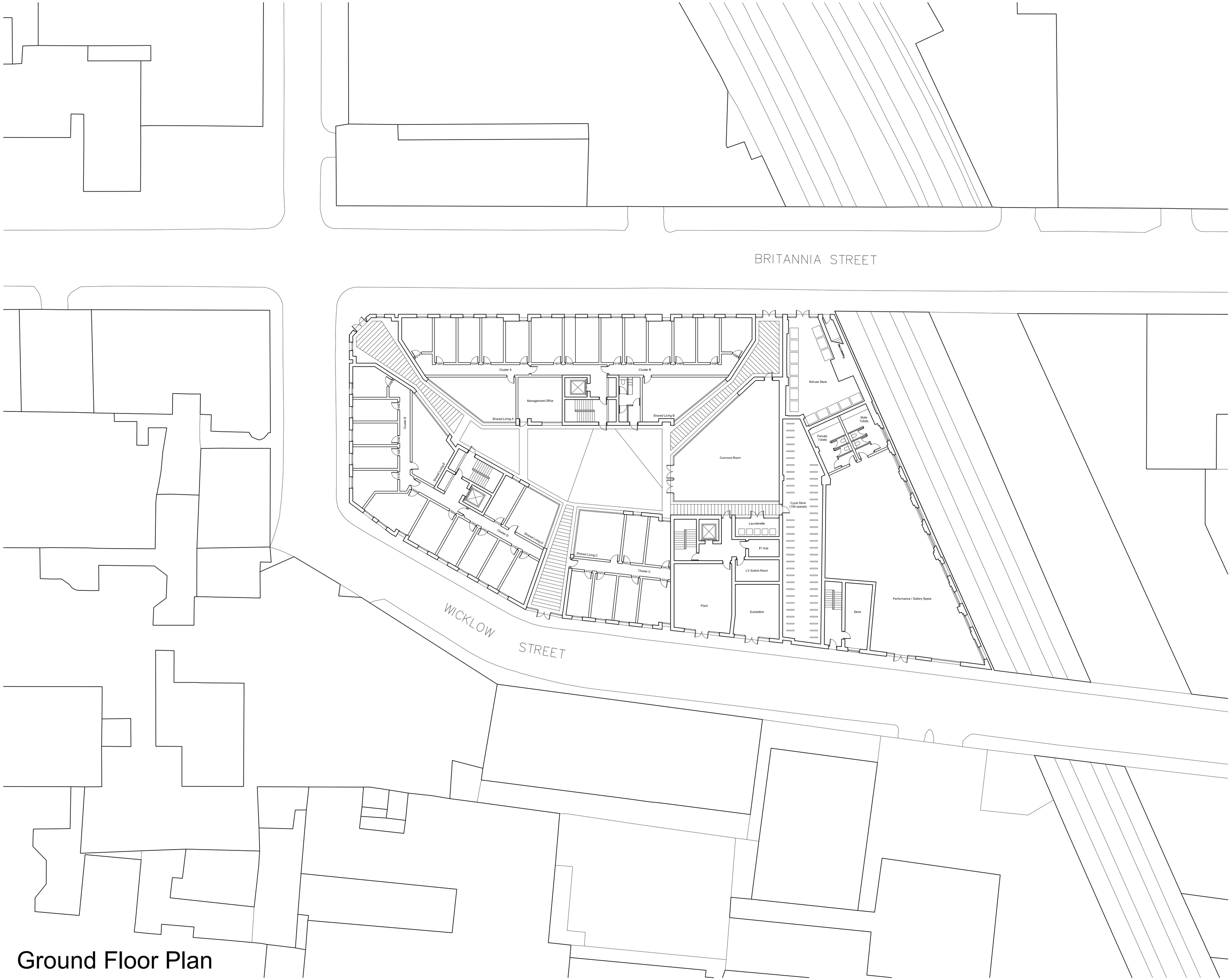
APPENDIX B: Development Proposals



Ground Floor Plan

Notes

Contractor must verify all dimensions on site before commencing any work or shop drawings.

If this drawing exceeds the quantities taken in any way the Architects are to be informed before the work is initiated.

Only figured dimensions to be taken from this drawing.
Do not scale off this drawing.

Drawings based on Ordnance Survey and / or existing record drawings - design and drawing content subject to Site Survey, Structural Survey, Site Investigations, Planning and Statutory Requirements and Approvals.

This drawing originates from the CAD file:

Revisions

Rev	Des	By	Date	Ch
A	DTM comments incorporated	JSW	23.02.10	TNT
B	1825 building incorporated	JSW	29.03.10	TNT
C	careyjones design review	JSW	19.04.10	TNT
D	Revised layout	JSW	16.08.10	TNT
E	Revised layout	JSW	15.10.10	TNT
F	Fenestration revised	JSW	03.11.10	TNT
G	Maisonette included	JSW	05.11.10	TNT
H	Cycle store amended	JSW	10.11.10	TNT
I	Wicklow St windows corrected	JSW	10.11.19	TNT
J	Revised Layout	JSW	23.02.11	TNT
K	Revised Layout	JSW	17.03.11	TNT
L	Scheme Freeze	JSW	24.03.11	TNT

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Project:	Job No:
27 Britannia Street London WC1X 9JP	23083

Title:
Ground Floor Plan

Scale:	Drawn by:
1:200 @ A1 / 1:400 @ A3	JSW
Date:	Checked by:
September 2009	TNT
Drawing No:	Revision No:
SKAP01	L