elliottwood

14-19 Tottenham Mews, Fitzrovia, London, W1T 4AQ

Surface Water Drainage Statement

engineering a better **society**

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		Remarks :	**Issued for Planning**				
Revision	P1	Prepared by:	Will Hudson MEng (Hons)	Checked by:	Paul Davis BEng (Hons) MSc CEng MICE	Approved by:	Paul Davis BEng (Hons) MSc CEng MICE
Date:	13/11/2020	Signature :		Signature :		Signature :	

Contents

Appendices

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One

Introduction

1.1

Elliott Wood Partnership Ltd have been appointed to provide a Surface Water Drainage Statement to support a detailed planning application for the proposed development at 14-19 Tottenham Mews, Fitzrovia, London, W1T 4AQ.

1.2

The purpose of this report is to explain the approach taken with regards to the below ground drainage strategy. It evaluates the selection of SuDS devices and highlights how the drainage disposal hierarchy has been followed.

1.3

This report has been prepared in accordance with the GOV.UK *Sustainable Drainage Systems: Non-statutory Technical Standards, The New London Plan* and the *London Borough of Camden Advice Note on contents of a Surface Water Drainage Statement* and Camden's *Strategic Flood Risk Assessment (SFRA) 2014.*

Two

Existing Site

2.1

The development site is located within the London Borough of Camden (LBC). The site occupies the west side of Tottenham Mews and can be accessed via Tottenham Street. The site is bound to the west by Middlesex House, to the north by Bedford Passage, and to the south by Arthur Stanley House approximately 180m west of Goodge Street London Underground Station. The total site area is approximately 540m2 (0.054ha) and is considered to be 100% hardstanding drained area.

2.2

The existing building located on the site two storey prefabricated timber structure on concrete foundations. The building was formally used as an NHS facility.

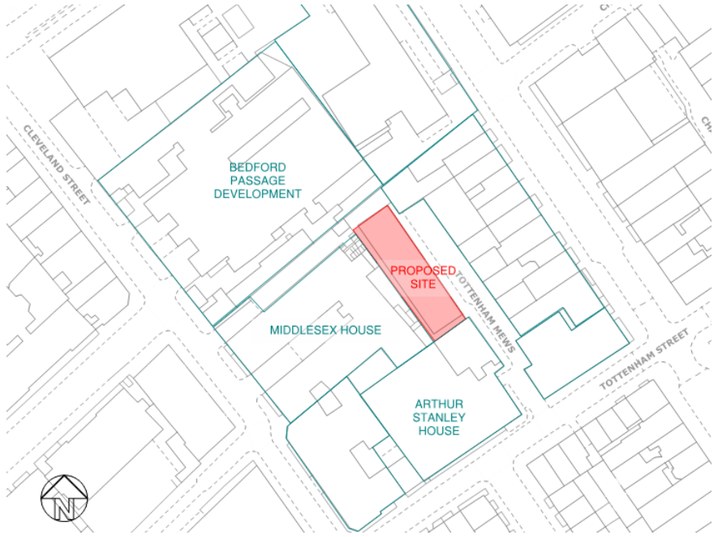

Figure 1: Site Location

2.3

A topographic survey of the site was completed by Greenhatch Group in August 2018. The topographic survey shows that the levels across the site are fairly consistent at around 26.40m AOD, with very little fall along the length of the building. The topographic survey has been included in **Appendix A.**

Three

Underlying Geology

3.1

Site specific investigations have not yet been carried out, however a desk study carried out by Card Geotechincal Ltd has used information from surveys of surrounding sites to confirm the existing ground conditions beneath the site.

The geotechnical information indicate that the soil conditions comprise of 4.3m of Made Ground underlain by 4.4m of Gravel (encountered at 22.54mOD) that is underlain by London Clay (encountered at 18.14mOD).

Groundwater was encountered at 21.34mOD, which is approximately 5m below ground level of the site.

Four

Existing Drainage

4.1

Public sewer records have been obtained from Thames Water. An extract of the asset plan is shown in Figure 2 below. Refer to **Appendix B** for the full records.

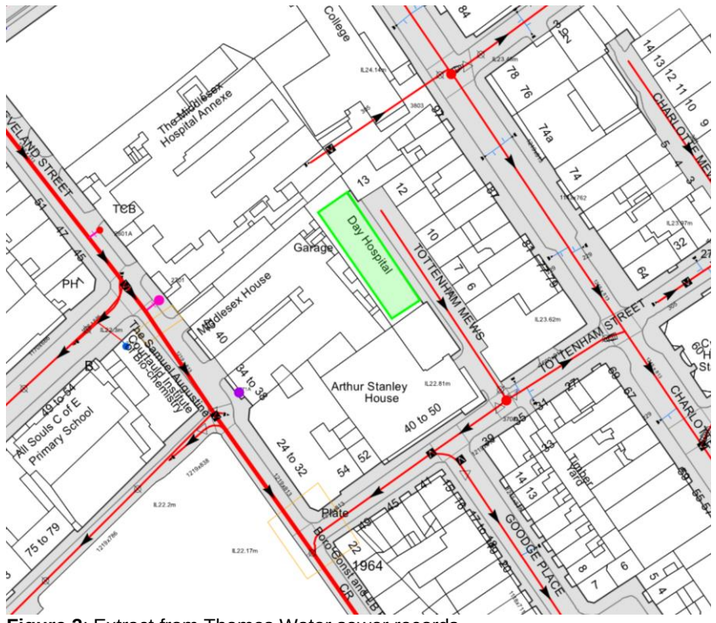

Figure 2: Extract from Thames Water sewer records

4.2

The records show a 381mm diameter combined water sewer is located within Tottenham Mews. This sewer heads south and connects to the high point of the sewer in Tottenham Street, with a 1600x914mm diameter combined sewer heading east, and a 1219x813mm diameter combined water sewer heading west.

4.3

A CCTV Drainage Survey has been undertaken by GO Drainage Ltd to confirm the location, size, depth and condition of the existing network on site, and principally to the located the existing outfall positions to review the possibility for reuse.

The survey indicates that an existing combined water network runs around the exterior of the building to a 100mm diameter outfall on the southern corner of the site. A copy of the CCTV drainage survey has been included within **Appendix C**.

4.4

The surface water runoff rates for the existing site have been calculated using the Modified Rational Method equation below (based on CIRIA C697) and are shown in table 1:

Q = 2.78C.i.A

Where Q = Existing peak runoff (l/s), C = non-dimensional runoff coefficient=1.0, i = Rainfall intensity (see table 1) and A = total catchment area being drained=0.054ha

Table 1 Existing Surface Water Run-off rates

Return Period	Rainfall Intensity (mm/hr)	Existing run-off (l/s)
1yr	33.6	5.00
30yr	82.6	12.4
100yr	107.5	16.1

Note that the rainfall intensities used in the above calculations have been based on average rainfall intensities for a 15-minute storm using Micro Drainage software.

Five

Proposed Development

5.1

The proposed works involve demolition of the existing structure to allow redevelopment of the site over its full footprint. The proposed structure is to comprise a single storey RC basement box with a 5 storey RC framed building with flat slabs above ground and a setback top storey formed with a lightweight steel frame and timber roof. The proposed structure will be 7 storeys in total. The site will provide residential units at ground and upper floors, with affordable workspace being provided at basement at ground floor.

It should be noted that permission has already been granted to demolish the existing building in order to clear the site for this development and the planning reference for this is 2020/3289/P.

Six

Proposed Drainage

6.1

The surface water drainage system has been designed in accordance with the requirements of Planning Practice Guidance (PPG) and the Camden Advice Note on contents of a Surface Water Drainage Statement. The following drainage hierarchy has therefore been considered:

1) Store rainwater for later use
2) Use infiltration techniques, such as porous surfaces in non-clay areas
3) Attenuate rainwater in ponds or open water features for gradual release
4) attenuate rainwater by storing in tanks or sealed water features for gradual release
5) Discharge rainwater direct to a watercourse
6) Discharge rainwater to a surface water sewer/drain
7) Discharge rainwater to the combined sewer.

6.2 Appraising the use of Rainwater Harvesting

A rainwater harvesting system (RWH) sits as a standalone system from the main surface water drainage scheme. When considering rainwater re-use from a sustainability perspective (NPPF principles: environmental, social and economic) this basically translates as an order of priorities; reduce, reuse, recycle.

Therefore, it makes more sense to use less water (by using water efficient appliances) than it does to install an RWH system. Whilst the principles of RWH are endorsed, for this development it is not considered to be the most environmentally friendly solution, and due to the additional complex drainage installation requirements, it is considered that this does not offset the limited quantity of water it removes from the surface water drainage system. Consequently, it would fail to meet the social, environmental and economic tests of the NPPF.

6.3 Appraising the use of Infiltration Techniques

In order to comply with building regulations, infiltration techniques such as soakaways must not be installed within 5m of a building or highway. As the building occupies the majority of the site, it is not possible to comply with this requirement from building regulations.

Due to the limited external areas, which are located above the basement slab, it will not be feasible to make use of permeable paving for the development.

6.4 Appraising the use of Open Water Features

As the site has no considerable associated external area at ground floor proposed as part of the development, it will not be possible to use open water features to provide attenuation.

6.5 Appraising the use of above and below ground attenuation

The current proposals include a combination of green/blue roofs as indicated on the architect's drawings. This will help to improve the thermal performance of the building, reduce the urban heat island effect, reduce both the total and peak surface water discharge and enhance biodiversity in the surrounding area.

6.6

The development proposes to achieve attenuation of surface water through above ground blue roof systems only in order to avoid the need for below ground attenuation or attenuation in the basement. The existing outfall from the site is approximately 1.2m deep. Therefore, any attenuation within the basement (above or below slab) would require pumping. It is not good practice to pump surface water due to the increase risk of flooding.

6.7

The evaluation of SuDS is demonstrated in Table 2 below.

Table 2 Evaluation of SuDS techniques

SuDS Technique	Y/N	Comment
Green/Blue Roofs	**Y**	**Green/Blue roofs will be incorporated within the scheme. Refer to the architects drawings for location and details.**
Rainwater reuse	N	Rainwater reuse is not proposed for the scheme as it is proposed to reduce water usage rather than recycle rainwater.
Open Water features	N	There is limited external space for open water features and the nature of the development makes open water features unfeasible.
Infiltration devices (i.e. Soakaways)	N	Soakaways are not deemed feasible for this site due to restricted space on site not allowing a minimum of 5m from buildings or roads, as well as the underlying clay layers.
Permeable surfaces	N	Due to the basement extending beneath the external areas, permeable surfaces are not considered to be feasible.
Tanked systems	N	In order to avoid the need for surface water pumping, tanked systems are not proposed for the development.

6.8

The Camden Advice Note on contents of a Surface Water Drainage Statement states that developments should aim to achieve greenfield runoff rates. The greenfield runoff for the site has been calculated using Micro Drainage and are shown in Table 3.

Table 3 Greenfield Runoff Rates (from Micro Drainage)

Return Period	Greenfield Runoff Rate (l/s)
1 in 1 year	0.1
1 in 30 years	0.2
1 in 100 years	0.3

As can be seen, the greenfield run-off rates for the site are very low, and it is not considered feasible to restrict a site of this size to 0.3l/s due to the increased risk of blockages associated with the low flows and small orifice size required.

6.9

The Camden advice states that for sites where it is not feasible to achieve Greenfield Runoff rates, “a minimum 50% reduction in run off rate across the development is required”.

It is therefore proposed to utilise a blue roof system to reduce the runoff from the proposed building. ABG Ltd have been contacted and provided calculations for the proposed blue roof systems to be located at the upper roof level and the level 5 terrace area. The ABG Ltd Calculations have been included within **Appendix D.**

A total of 364m^2 will be routed to the blue roof systems. The total runoff achieve from the blue roof has been calculated to be a peak discharge of **0.8l/s** for the 1 in 100-year return + 40% climate change. The peak run-off for the 1 in 1-year, and 1 in 30-year return have been shown in the table below.

Table 4 Blue Roof Runoff Rates (from ABG Ltd)

Return Period	Blue Roof Runoff Rate (l/s)
1 in 1 year	0.3
1 in 30 years	0.6
1 in 100 years	0.6
1 in 100 years + 40% Climate Change	0.8

6.10

As can be seen on the architects plans, there is a small area at the front of the site at ground floor that is within the red line boundary but cannot be routed to an attenuation device. This area totals approximately 176m2. Based on the rainfall profiles detailed earlier in this report, the runoff from this area has been calculated as shown in Table 5.

Table 5 Unrestricted Area Runoff Rates

Return Period	Unrestricted area Runoff Rate (l/s)
1 in 1 year	1.6
1 in 30 years	4.0
1 in 100 years	5.3
1 in 100 years + 40%	6.8

6.11

The total runoff from the post-development site, and the percentage improvement over the existing runoff can be seen in Table 6.

Return Period	Existing Runoff Rate (l/s)	Proposed Runoff Rate (l/s)	Percentage betterment (%)
1 in 1 year	5.00	1.9	62%
1 in 30 years	12.4	4.6	63%
1 in 100 years	16.1	5.9	63%
1 in 100 years + 40% Climate Change	N/A	7.6	>63%

6.12

The London Borough of Camden Surface Water Drainage Pro-forma for new developments has been completed and included within **Appendix E**.

6.13

There are no nearby accessible water courses, therefore surface water generated from site areas of the development will be attenuated before discharging at a restricted rate to the Thames Water combined water sewer in Tottenham Mews.

Seven

Maintenance Requirements

7.1

All SuDS will be maintained by the building management company for the lifetime of the development in accordance with the SuDS Manual as summarised below. Maintenance requirements for the blue/green roof will be supplied by the specialist designer.

Green/Blue Roofs:

Maintenance Schedule	Required Action	Recommended Frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required

	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Eight

Flood Risk

8.1

The existing site is located within Flood Zone 1 and is considered to be at low risk of flooding from fluvial and tidal sources. The development site area is less than 1 hectare in plan area, and not located in an area identified by the Lead Local Flood Authority as having critical drainage issues. As a result, in accordance with Paragraph 103 footnote 20 of the NPPF, a site-specific flood risk assessment is not required for planning.

Nine

Foul Water Drainage Strategy

9.1

Foul water appliances within the new basement level will be pumped via a private packaged pumping station to a suspended above ground network (detailed by the M&E engineer). The pumping station will be specified with a dual pump arrangement (duty and standby) and installed with non-return valve, alarms and telemetry. All foul drainage from ground floor and above will be drained to the below ground drainage network by gravity

Ten

Conclusion

10.1

In summary, following the advice and guidance provided by the London Borough of Camden, a SuDS strategy has been produced for the planning application associated with Tottenham Mews.

10.2

The SuDS Hierarchy has been followed in order to employ the most suitable and practicable SuDS techniques to improve surface water run off rates from the site. The proposed development will restrict surface water run off to the public sewer to a peak discharge of 7.6l/s for the site. This provides a betterment on existing of over 63% for the 1 in 100-year event + 40% climate change event.

10.3

A blue roof system over the main roof area and terraces at Level 05 will provide surface water attenuation above ground level and help restrict these areas of the site to a peak discharge rate of 1.0l/s for the 100 year + 40% climate change return period.

There is a small area of the site at ground floor which cannot be attenuated above ground and it is therefore proposed to allow this are to drain freely the to sewer. Even with this free draining area, it is still possible to achieve the 50% runoff reduction requested by Camden.

10.4

Through the use of SuDS techniques, the surface water management of the proposed site will see a significant betterment from the existing case.

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Appendices

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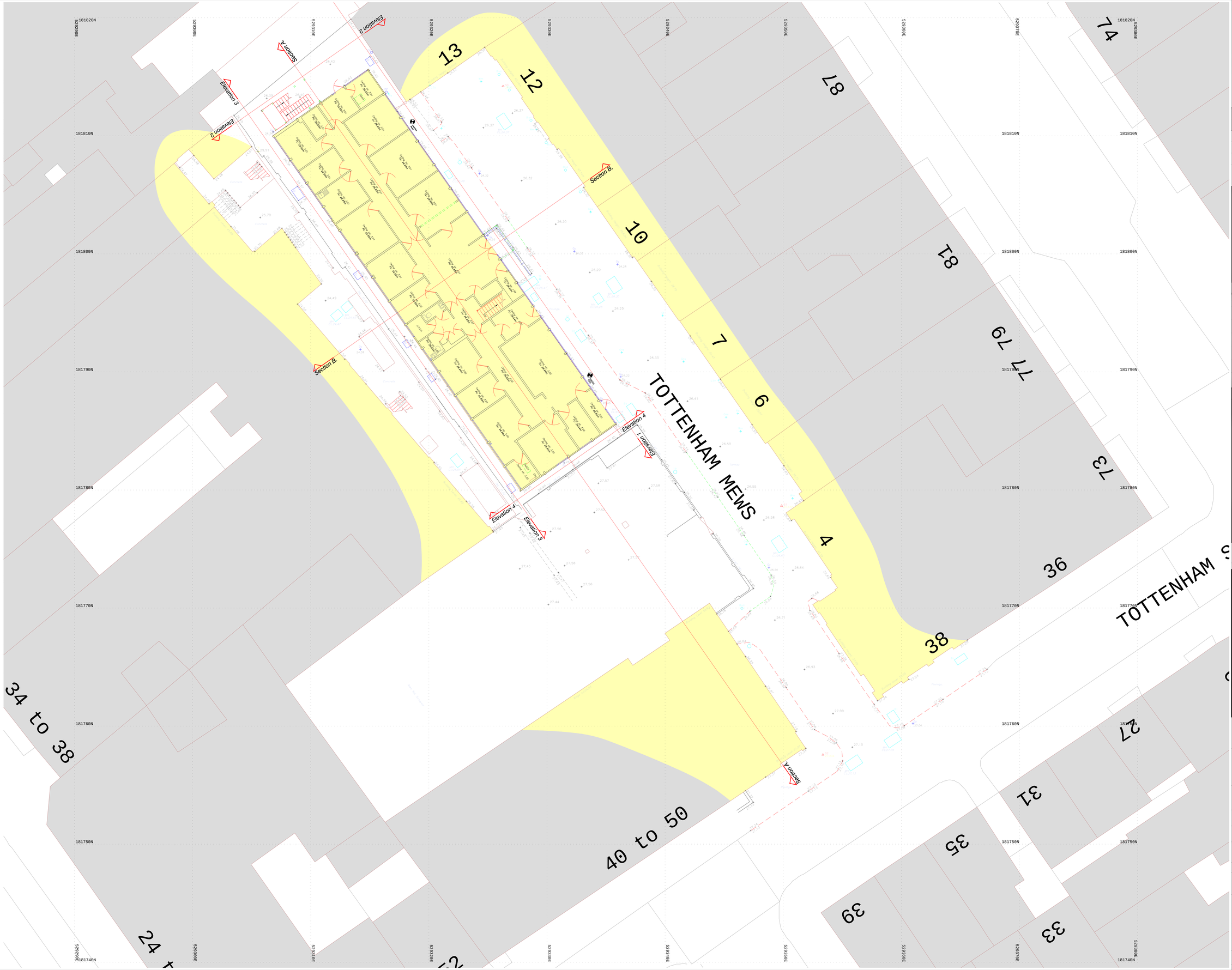
A Topographic Survey



N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
S1	529349.861	181778.665	50.000
S2	529353.361	181757.586	50.596
S3	529326.283	181814.204	49.799

OS Note:
The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net)

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36(15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Incoming Services

Elec. Gas Water

Topographical Survey Legend:

Buildings; Wall; Kerb line; Line marking; Step; Drop kerb; Centre line; Station and Name; Station Level; Tree / Bush / Sapling; Area of Undergrowth; Woodland; R Ridge Level; E Eaves Level; F Flat Roof Level; Gate

Fence types: SW Impressvein; IR Iron Railings; WM Wire Mesh; PR Post & Rail; PW Post & Wire; CL Chain Link; WP Wooden Panels; CP Concrete Panels; SP Steel Palisade

Overhead Cable; Concrete edge; Tarmac edge; Grass verge; Canopy/Overhang; Verge

IC Inspection chamber; Pi/Inv Pipe invert; Gy Gully; Bg Back gully; Dp Down pipe; Pi/ab Pipe above ground; MH Manhole; WL Water level; FI Flood light; Lp Lamp post; Tp Telegraph post; Ep Electricity post; TI Traffic light; Bus Bus stop; Sv Stop valve; St Stop tap; Er Earth rod; Wm Water meter; Gas Gas valve; Air Air valve; ICU Unidentified inspection; Ws Wash out; Re Rodding eye; BB Belisha beacon; CTV Cable tv; Mkr Marker post; Gmkr Gas marker post; Sn Soffit

Bollard; Illuminated bollard; Rubbish bin; Vent pipe; Ground light; Letter box; Ladder; Stile; Internal floor level; Threshold level; Sign post; Trailhole; Boxhole; Electric; British Telecom; Control box; Tactile; Brick paved; Concrete paving slabs; Cover; Inspection chamber; Retaining wall; Unable to lift; Tree canopy level; Girth; Multi girth; Tree Stump; Cover level; Invert level

Rev	Date	Description	Drawn	Q. Ref.
A	09.10.18	Level updated to OS	JJ / SC	

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Bathymetric Surveys
- Measured Building Surveys
- 3D Laser Scanning
- 3D Revit & BIM Models
- Area, Lease & Fire Plans

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CLIENT
Blackburn & Co Ltd.

PROJECT
14-19 Tottenham Mews London, W1T 4AQ

TITLE
Topographical Survey

SCALE	DATE
A0@ 1: 100	23.08.18
DRAWN	QUALITY REF
KD	BS3800

Level datum	OS GPS
Grid orientation	OS Graphical Fit
Job number	31273

Drawing No. 31273_01_P Rev. A

Comments

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Some services may have been omitted due to parked vehicles.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Copyright Greenhatch Group. 08/03/18

B Thames Water Asset Records

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3878101

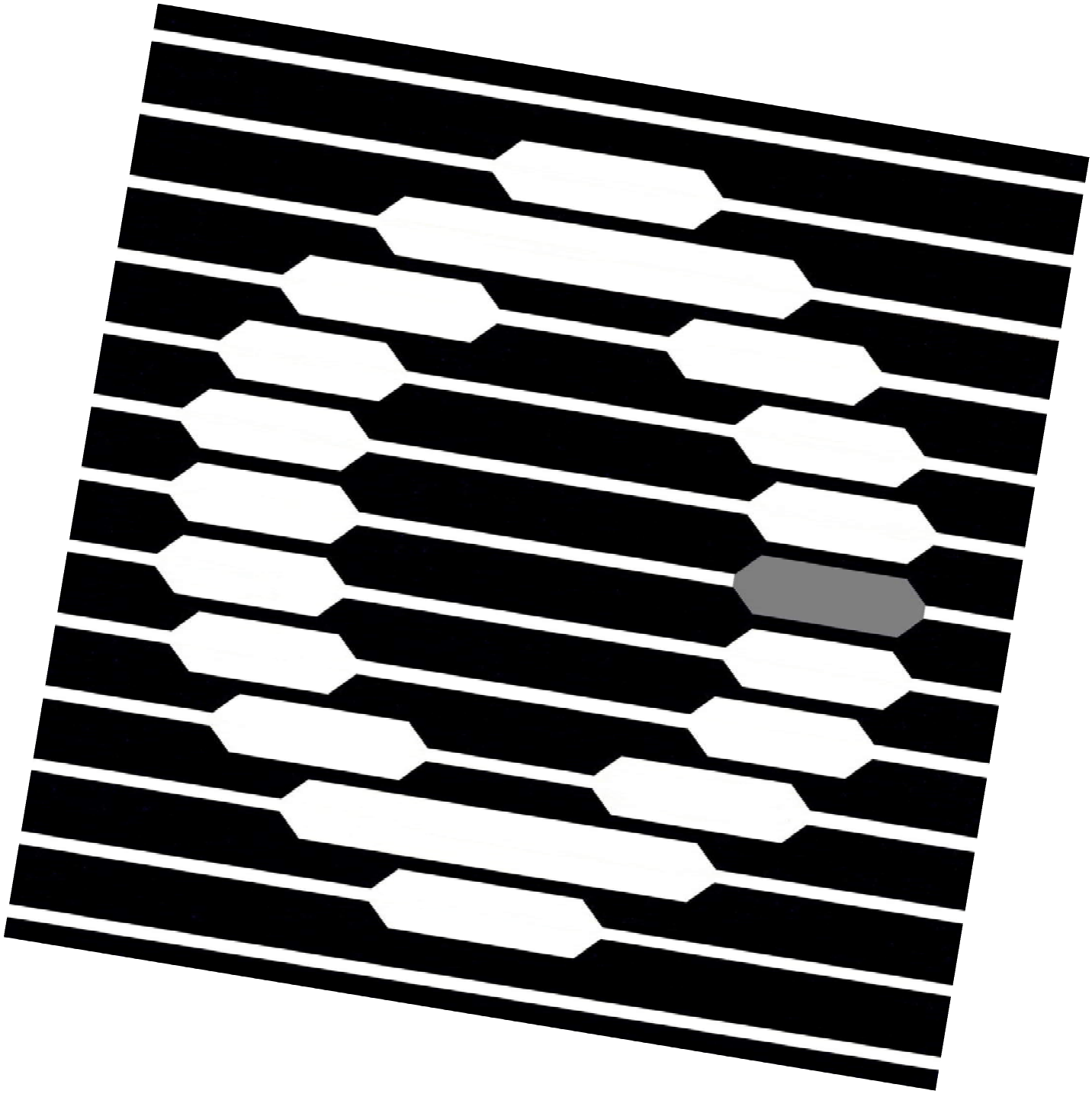
The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 529281,181789

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

C CCTV Drainage Survey

G.O. DRAINAGE SERVICES LTD



CV.1947 14-19 TOTTENHAM MEWS W1T 4AA

G.O. DRAINAGE SERVICES LTD

53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

CCTV SURVEY HEADER SHEET

CLIENT.

ELLIOTTWOOD PARTNERSHIP LLP
CONSULTING STRUCTURAL AND CIVIL ENGINEERS
241 THE BROADWAY
LONDON
SW19 1SD

LOCATION.

14-19 TOTTENHAM MEWS
LONDON
W1T 4AA

JOB NO. CV.1947

SEWER USE. COMBINED DRAINAGE

WEATHER. DRY

DATE. 29/07/20

OPERATOR. GO

CLEANED. YES

ORDER NO. E-MAIL WILL

TOTAL LENGTH SURVEYED. 151.5 metres


R6
MH-3
R4
MH-2
R3
R8
R7
MH-4
R5
R2
MH-1
R1
R12
R15
R11
R16
MH-5
R13
MH-6
R20
MH-9
R26
R25
MH-7
R24
R23
R22
R21
MH-8

G.O. DRAINAGE SERVICES LTD

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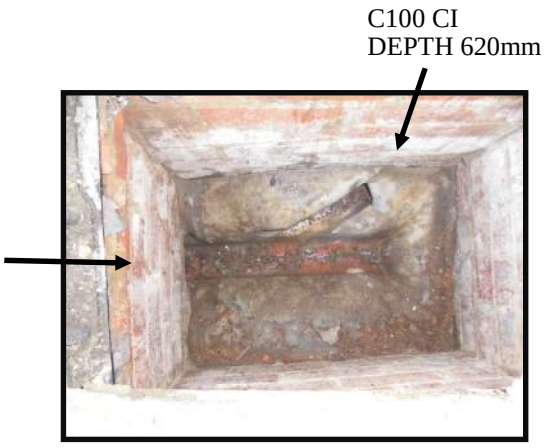
MANHOLE SURVEY

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA
DATE 29/07/20	JOB. **CV.1947**

MANHOLE NO.01

COVER 680X530mm

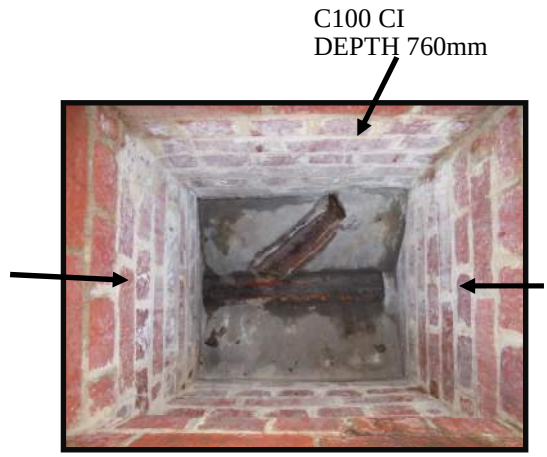
CHAMBER 600X500mm



MANHOLE NO.02

COVER 660X510mm

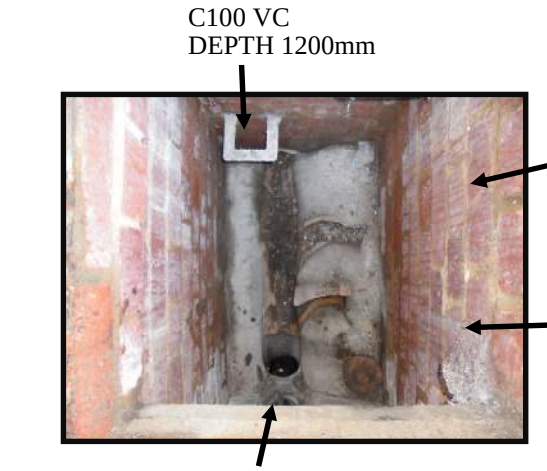
CHAMBER 600X480mm



MANHOLE NO.03

NO COVER

CHAMBER 1000X600mm



G.O. DRAINAGE SERVICES LTD

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MANHOLE SURVEY

CLIENT.	ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	LOCATION.	14-19 TOTTENHAM MEWS LONDON W1T 4AA
DATE	29/07/20	JOB.	**CV.1947**

MANHOLE NO.04

COVER 650X500mm

CHAMBER800X480 mm

MANHOLE NO.05

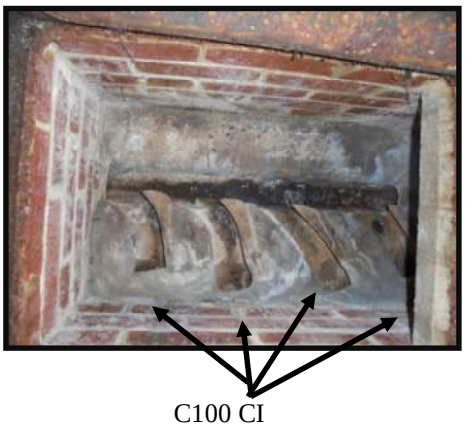
COVER 660X510mm

CHAMBER 800X480mm

MANHOLE NO.06

COVER 660X510mm

CHAMBER 1000X600mm



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MANHOLE SURVEY

CLIENT.	ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	LOCATION.	14-19 TOTTENHAM MEWS LONDON W1T 4AA
DATE	29/07/20	JOB.	CV.1947

MANHOLE NO.07

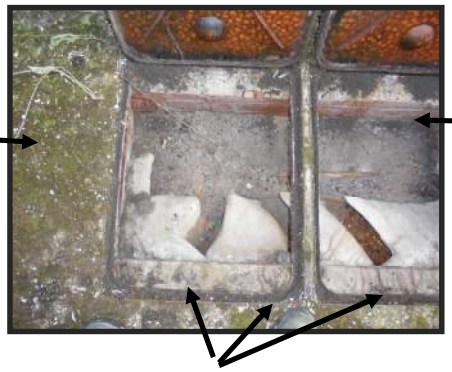
COVER 660X510mm

CHAMBER 800X480mm

MANHOLE NO.08

COVER 660X510mm X2

CHAMBER 1100X450mm



MANHOLE NO.09

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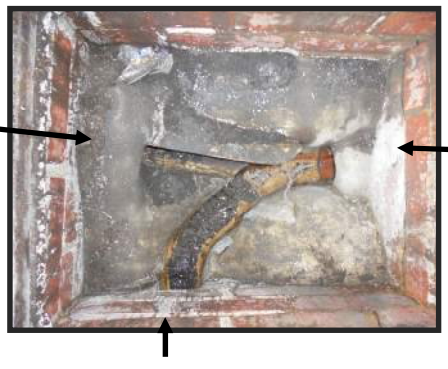
CHAMBER 600X500mm



G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

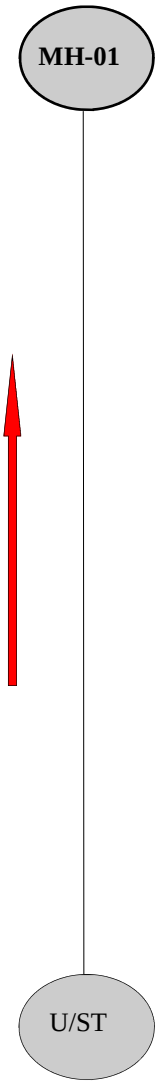
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	01	29/07/20	COMBINED	620mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 01 CONNECTION- 1

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.6	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.6	FH	FINISH OF SURVEY

END OF RUN NO.01

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53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	02	29/07/20	COMBINED	710mm	DOWNSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No. 01 CONNECTION- X

FINISH

FH. MANHOLE NO.03

CHAINAGE	CODE	OBSERVATION
		MH-01
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
012.3	MH	MANHOLE NO.02
012.8	REM	GENERAL REMARK (END OF CHAMBER)
025.1	MH	MANHOLE NO.03
025.1	FH	FINISH OF SURVEY

END OF RUN NO.02

MH-03

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

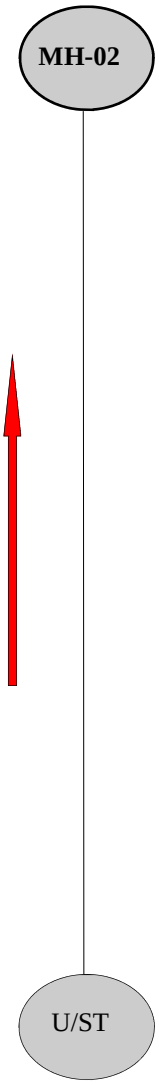
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	03	29/07/20	COMBINED	760mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 02 CONNECTION- 2

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.0	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.0	FH	FINISH OF SURVEY

END OF RUN NO.03

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INSPECTION REPORT

CLIENT.	LOCATION.
ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	14-19 TOTTENHAM MEWS LONDON W1T 4AA

JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	04	29/07/20	COMBINED	760mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 03 CONNECTION– 1

FINISH

FH. MANHOLE NO.04

CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.6	CC	CRACK,CIRCUMFERENTIAL FROM 12 TO 05 O'CLOCK
000.6	CL	CRACK, LONGITUDINAL AT 03 O'CLOCK
004.2	DES	SETTLED DEPOSITS COARSE 20%
004.2	JN	JUNCTION AT 12 O'CLOCK,DIAMETER 100mm
010.4	LR	LINE OF DRAIN DEVIATES RIGHT (SLIGHT)
011.2	FL	FRACTURE, LONGITUDINAL AT 09 O'CLOCK
011.2	FL	FRACTURE, LONGITUDINAL AT 03 O'CLOCK
011.3	MH	MANHOLE NO.04
011.3	FH	FINISH OF SURVEY

MH-03

MH-04

END OF RUN NO.04

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INSPECTION REPORT

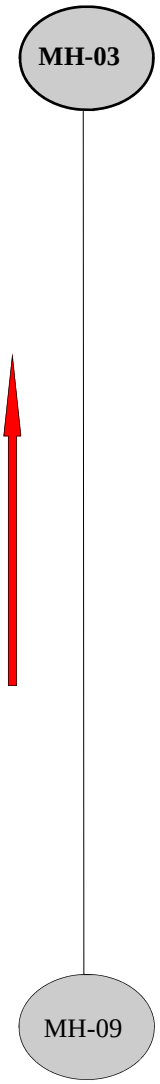
CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	05	29/07/20	COMBINED	1100mm	UPSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START FINISH

ST. MANHOLE No. 03 CONNECTION- 3 FH. MANHOLE NO.09



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.3	JN	JUNCTION AT 09 O'CLOCK,DIAMETER 100mm RWP
000.4	CC	CRACK,CIRCUMFERENTIAL FROM 12 TO 12 O'CLOCK
007.3	JN	JUNCTION AT 09 O'CLOCK,DIAMETER 100mm RWP
011.0 S1	DES	SETTLED DEPOSITS FINE 05% START OF RESIN LINER
014.0 F1	DES	SETTLED DEPOSITS FINE 05% END OF RESIN LINER
017.3	JN	JUNCTION AT 09 O'CLOCK,DIAMETER 100mm RWP
022.8	JN	JUNCTION AT 09 O'CLOCK,DIAMETER 100mm RWP
032.7	JN	JUNCTION AT 09 O'CLOCK,DIAMETER 100mm RWP
036.2	MH	MANHOLE NO.09
036.2	FH	FINISH OF SURVEY

END OF RUN NO.05

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INSPECTION REPORT

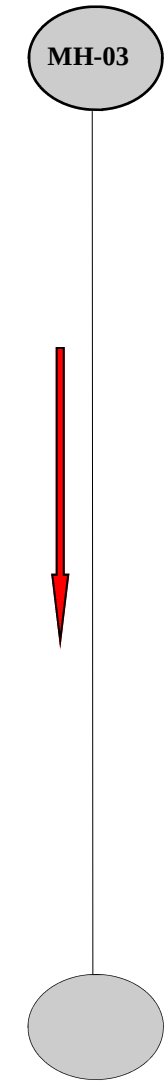
CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	06	29/07/20	COMBINED	1210mm	DOWNSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START ST. MANHOLE No. 03 CONNECTION– X

FINISH FH. MAIN SEWER



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.3	JN	JUNCTION AT 06 O'CLOCK,DIAMETER 100mm
003.3	LD	LINE OF DRAIN DEVIATES DOWN (SHARP)
004.3	FH	FINISH OF SURVEY (MAIN SEWER)

END OF RUN NO.06

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INSPECTION REPORT

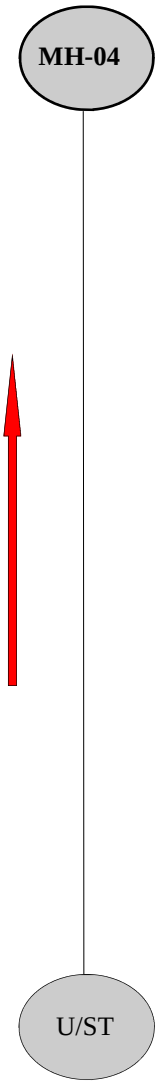
CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	07	29/07/20	COMBINED	740mm	UPSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START FINISH

ST. MANHOLE No. 04 CONNECTION- 1 FH. GULLY



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.4	LU	LINE OF DRAIN DEVIATES UP (SHARP)
000.4	FH	FINISH OF SURVEY (SOIL VENT PIPE)

END OF RUN NO.07

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

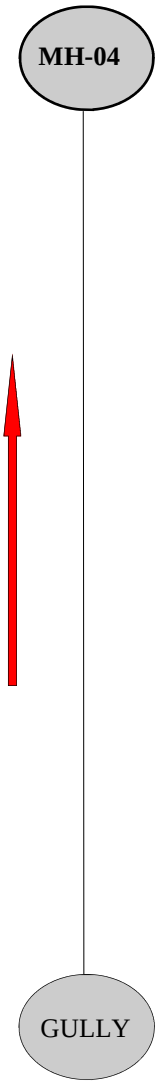
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	08	29/07/20	COMBINED	740mm	UPSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No.04 CONNECTION– 3

FINISH

FH. GULLY



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
002.6	LU	LINE OF DRAIN DEVIATES UP (SHARP)
002.6	FH	FINISH OF SURVEY (GULLY)

END OF RUN NO.08

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

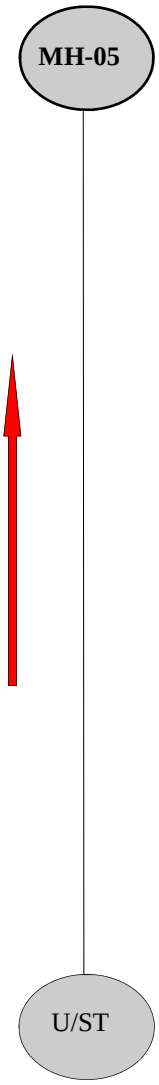
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	09	29/07/20	COMBINED	560mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 05 CONNECTION- 2

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.3	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.3	FH	FINISH OF SURVEY

END OF RUN NO.09

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

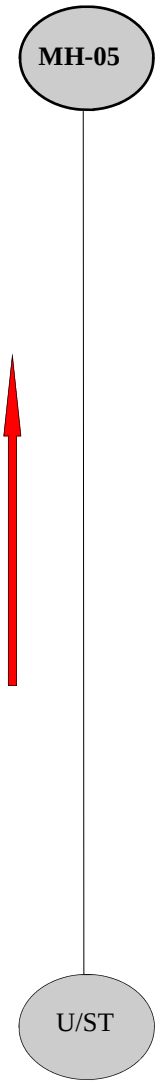
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	10	29/07/20	COMBINED	560mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 05 CONNECTION- 3

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.3	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.3	FH	FINISH OF SURVEY

END OF RUN NO.10

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

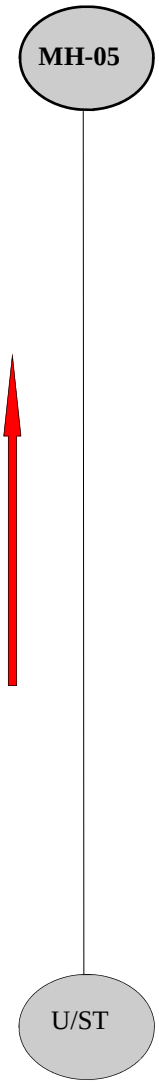
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	11	29/07/20	COMBINED	560mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 05 CONNECTION- 4

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
002.2	LU	LINE OF DRAIN DEVIATES UP (SHARP)
002.2	FH	FINISH OF SURVEY

END OF RUN NO.11

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53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

INSPECTION REPORT

CLIENT.	LOCATION.
ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	14-19 TOTTENHAM MEWS LONDON W1T 4AA

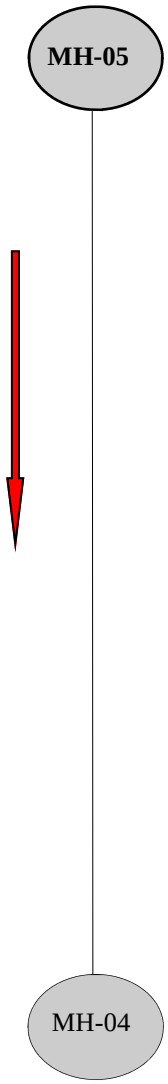
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	12	29/07/20	COMBINED	670mm	DOWNSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No. 05 CONNECTION- X

FINISH

FH. MANHOLE NO.04



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
010.2	FL	FRACTURE, LONGITUDINAL AT 09 O'CLOCK
010.6	MH	MANHOLE NO.04
010.6	FH	FINISH OF SURVEY

END OF RUN NO.12

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

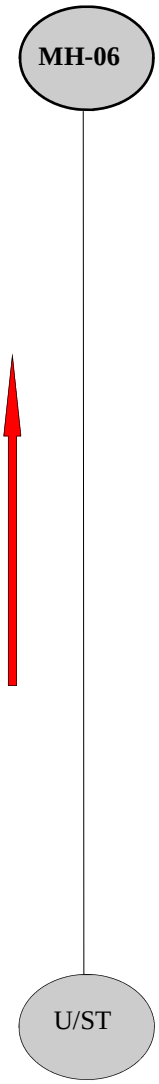
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	13	29/07/20	COMBINED	550mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 06 CONNECTION- 2

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
01.2	LU	LINE OF DRAIN DEVIATES UP (SHARP)
01.2	FH	FINISH OF SURVEY

END OF RUN NO.13

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

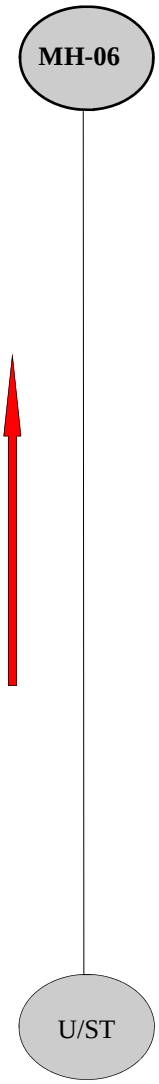
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	14	29/07/20	COMBINED	550mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 06 CONNECTION- 3

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.6	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.6	FH	FINISH OF SURVEY

END OF RUN NO.14

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

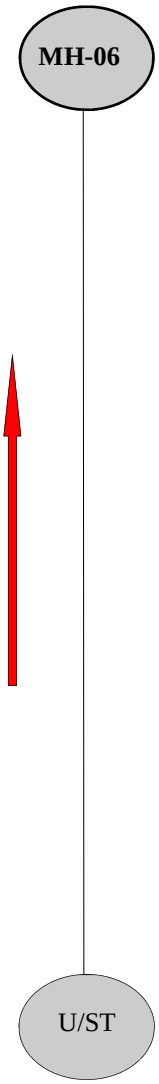
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	14A	29/07/20	COMBINED	550mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 06 CONNECTION- 4

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
002.2	LU	LINE OF DRAIN DEVIATES UP (SHARP)
002.2	FH	FINISH OF SURVEY

END OF RUN NO.14A

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

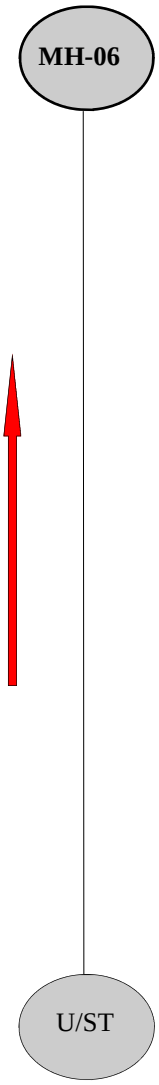
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	15	29/07/20	COMBINED	550mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 06 CONNECTION- 5

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
002.4	DES	SETTLED DEPOSITS COARSE 60%
002.4	SA	SURVEY ABANDONED DUE TO ABOVE

END OF RUN NO.15

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

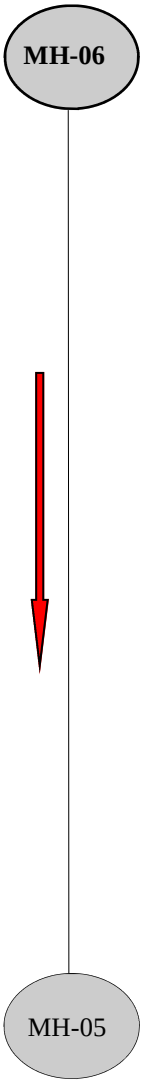
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	16	29/07/20	COMBINED	640mm	DOWNSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No. 06 CONNECTION- X

FINISH

FH. MANHOLE NO.05



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
002.7	MH	MANHOLE NO.05
002.7	FH	FINISH OF SURVEY

END OF RUN NO.16

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

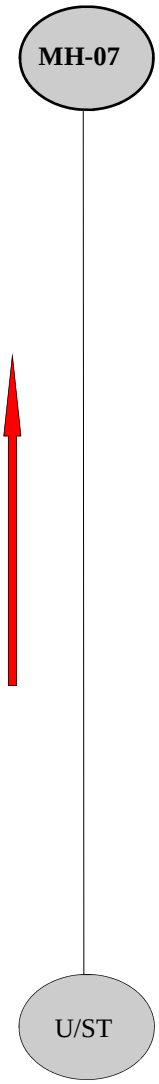
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	17	29/07/20	COMBINED	420mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 07 CONNECTION- 2

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.8	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.8	FH	FINISH OF SURVEY

END OF RUN NO.17

G.O. DRAINAGE SERVICES LTD

53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

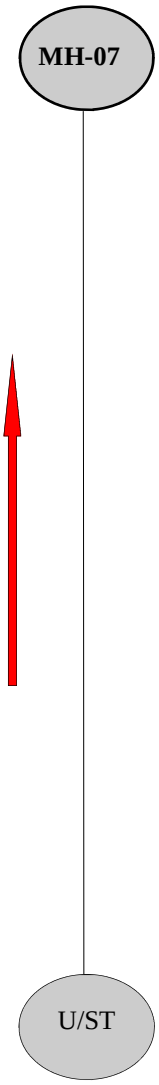
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	18	29/07/20	COMBINED	420mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 07 CONNECTION- 3

FINISH

FH.UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
003.6	DES	SETTLED DEPOSITS COARSE 50%
003.6	LU	LINE OF DRAIN DEVIATES UP (SHARP)
003.6	FH	FINISH OF SURVEY

END OF RUN NO.18

G.O. DRAINAGE SERVICES LTD

53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

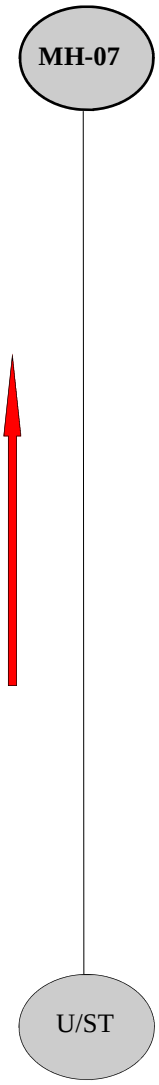
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	19	29/07/20	COMBINED	420mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No.07 CONNECTION– 4

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.7	LU	LINE OF DRAIN DEVIATES UP (SHARP)
000.7	FH	FINISH OF SURVEY

END OF RUN NO.19

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

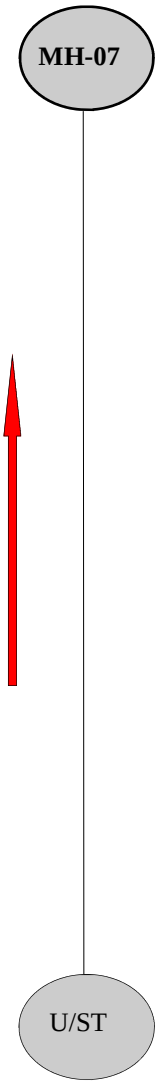
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	19A	29/07/20	COMBINED	420mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 07 CONNECTION- 5

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.6	LU	LINE OF DRAIN DEVIATES UP (SHARP)
000.6	FH	FINISH OF SURVEY

END OF RUN NO.19A

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INSPECTION REPORT

CLIENT.	LOCATION.
ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	14-19 TOTTENHAM MEWS LONDON W1T 4AA

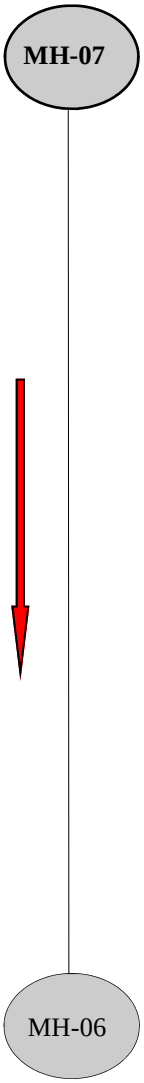
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	20	29/07/20	COMBINED	490mm	DOWNSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 07 CONNECTION- X

FINISH

FH. MANHOLE NO.06



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
006.1	MH	MANHOLE NO.06
006.1	FH	FINISH OF SURVEY

END OF RUN NO.20

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

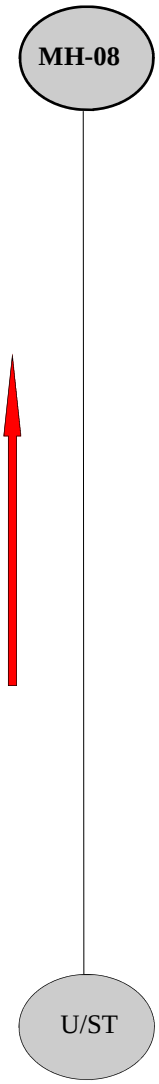
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	21	29/07/20	COMBINED	320mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 08 CONNECTION- 1

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
005.9	LU	LINE OF DRAIN DEVIATES UP (SHARP)
005.9	FH	FINISH OF SURVEY

END OF RUN NO.21

G.O. DRAINAGE SERVICES LTD

53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

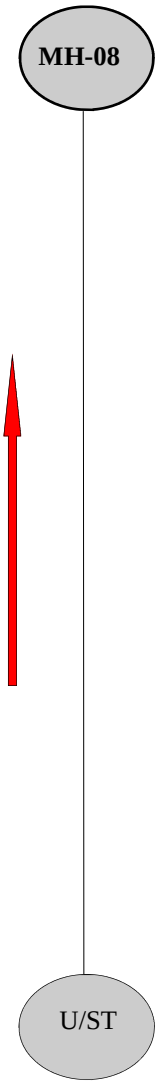
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	22	29/07/20	COMBINED	240mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No.08 CONNECTION- 2

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.7	LU	LINE OF DRAIN DEVIATES UP (SHARP)
000.7	FH	FINISH OF SURVEY

END OF RUN NO.22

G.O. DRAINAGE SERVICES LTD

53 PREMIER AVENUE GRAYS RM16 2SJ TEL:01375 373302 MOB:07792 815977 E-MAIL: godrainage@aol.com

INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

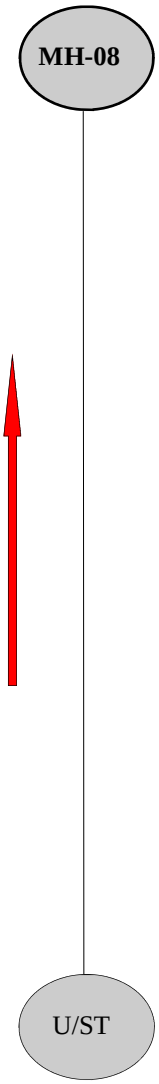
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	22A	29/07/20	COMBINED	240mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No.08 CONNECTION- 3

FINISH

FH.UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
002.1	DES	SETTLED DEPOSITS COARSE 30%
002.1	LU	LINE OF DRAIN DEVIATES UP (SHARP)
002.1	FH	FINISH OF SURVEY

END OF RUN NO.22A

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

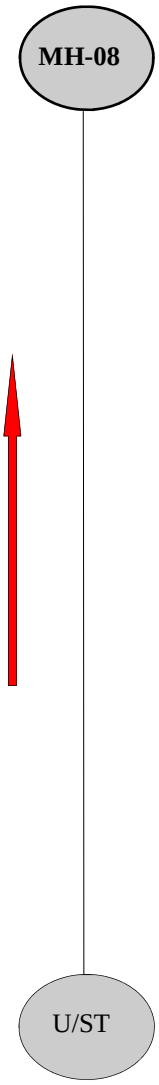
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	23	29/07/20	COMBINED	240mm	UPSTREAM	100mm	CAST IRON	DRY	NO	GO	1

START

ST. MANHOLE No. 08 CONNECTION- 4

FINISH

FH. UPSTREAM



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
001.1	LU	LINE OF DRAIN DEVIATES UP (SHARP)
001.1	FH	FINISH OF SURVEY

END OF RUN NO.23

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

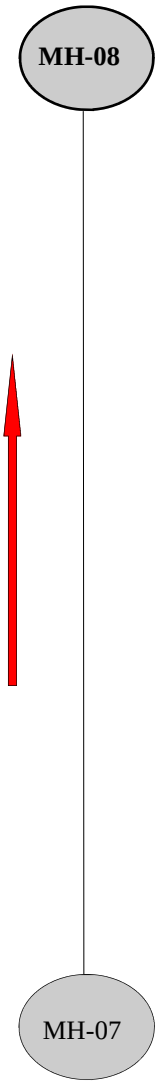
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	24	29/07/20	COMBINED	330mm	DOWNSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No.08 CONNECTION- X

FINISH

FH. MANHOLE NO.07



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
007.7	MH	MANHOLE NO.07
007.7	FH	FINISH OF SURVEY

END OF RUN NO.24

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

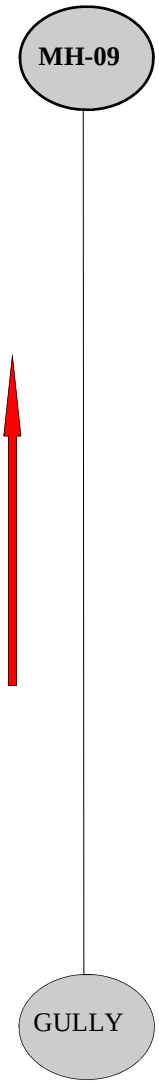
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	25	29/07/20	COMBINED	480mm	UPSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No.09 CONNECTION- 1

FINISH

FH. GULLY



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.4	DES	SETTLED DEPOSITS FINE 05%
009.2	LD	LINE OF DRAIN DEVIATES DOWN (SHARP)
009.2	FH	FINISH OF SURVEY (GULLY)

END OF RUN NO.25

G.O. DRAINAGE SERVICES LTD

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INSPECTION REPORT

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD

LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA

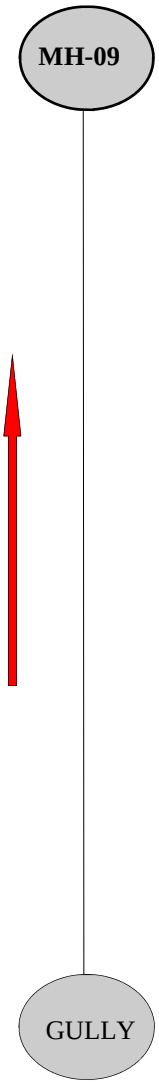
JOB NO.	RUN NUMBER	DATE	SEWER USE	DEPTH	DIRECTION	PIPE SIZE	MATERIAL	WEATHER	CLEANED	OPERATOR	PAGE
CV.1947	26	29/07/20	COMBINED	380mm	UPSTREAM	100mm	V/CLAY	DRY	NO	GO	1

START

ST. MANHOLE No. 09 CONNECTION- 2

FINISH

FH. GULLY



CHAINAGE	CODE	OBSERVATION
000.0	ST	START OF SURVEY
000.0	WL	WATER LEVEL 05%
000.5	LD	LINE OF DRAIN DEVIATES DOWN (SHARP)
000.5	FH	FINISH OF SURVEY (GULLY)

END OF RUN NO.26

G.O. DRAINAGE SERVICES LTD

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SUMMARY AND RECOMMENDATIONS

CLIENT. ELLIOTTWOOD 241 THE BROADWAY LONDON SW19 1SD	LOCATION. 14-19 TOTTENHAM MEWS LONDON W1T 4AA
DATE 29/07/20	JOB. CV.1947

RUN NO.01 NO WORK NEEDED

RUN NO.02 NO WORK NEEDED

RUN NO.03 NO WORK NEEDED

RUN NO.04 CRACKS AND FRACTURES

RUN NO.05 NO WORK NEEDED

RUN NO.06 NO WORK NEEDED

RUN NO.07 NO WORK NEEDED

RUN NO.08 NO WORK NEEDED

RUN NO.09 NO WORK NEEDED

RUN NO.10 NO WORK NEEDED

RUN NO.11 NO WORK NEEDED

RUN NO.12 FRACTURE

RUN NO.13 NO WORK NEEDED

RUN NO.14 NO WORK NEEDED

RUN NO.14 A NO WORK NEEDED

RUN NO.15 NO WORK NEEDED

RUN NO.16 NO WORK NEEDED

RUN NO.17 NO WORK NEEDED

RUN NO.18 NO WORK NEEDED

RUN NO.19 NO WORK NEEDED

RUN NO.19A NO WORK NEEDED

RUN NO.20 NO WORK NEEDED

RUN NO.21 NO WORK NEEDED

RUN NO.22 NO WORK NEEDED

RUN NO.22A NO WORK NEEDED

RUN NO.23 NO WORK NEEDED

RUN NO.24 NO WORK NEEDED

RUN NO.25 NO WORK NEEDED

RUN NO.26 NO WORK NEEDED

DRAIN & PIPEWORK CCTV SURVEYS

-

DRAINS

PIPEWORK

CULVERTS

DUCTS

CHUTES

CHIMNEY FLUES

TANKS

HIGH PRESSURE WATER JETTING

-

SEWER & DRAIN BLOCKAGES

DESCALING

SILT REMOVAL

ROOT CUTTING

GREASE REMOVAL

REMEDIAL WORKS

-

POLYESTER RESIN LINING

DRAINAGE EXCAVATIONS & REPAIRS

G.O. DRAINAGE SERVICES LTD

D ABG Ltd Blue Roof Calculations

BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	14-19 Tottenham Mews, W1T 4AA - Level 5 - 1-in-1yr. +0% CC
Prepared for:	Elliott Wood, London
Date:	23/10/2020
ABG Project ID:	21447 Calculator version: 1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com.
Notes/description:	Assumed paver-on-pedestals or hard landscaped finish - TBC. Potential for freestanding planters to be supported on top of the 'blue roof' system. Pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	1	year	*As supplied by Client*
Allowance for Climate Change:	0	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	104	m^2	*As supplied by Client*
Attenuation area:	81	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	0 hours and 40 minutes	0.1
30 mins	1 hour and 20 minutes	0.1
1 hour	1 hour and 50 minutes	0.1
2 hours	1 hour and 40 minutes	0.1
4 hours	1 hour and 20 minutes	0.1
6 hours	0 hours and 50 minutes	0.1
10 hours	0 hours and 0 minutes	0.0
24 hours	0 hours and 0 minutes	0.0
48 hours	0 hours and 0 minutes	0.0

Total attenuation required: 1.3 m^3

Half empty time: The critical storm does not result in the storage reaching half full

Output - Recommended Blue Roof System	
System Name:	ABG blueroof VF HD 108mm
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.
Total attenuation capacity:	7.8 m^3
Number of Blue Roof outlets:	2

Notes:

1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
2. Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
3. The estimate given in this report is based on the stated parameters as per the brief. If these parameters are not correct or have changed, ABG should be contacted to provide a revised estimate.
4. This estimate is specific to the characteristics of ABG products/systems and is not applicable to other competitor products. The substitution of the whole or any component of this design for a material supplied from another source renders this estimate invalid.
5. Final determination of the suitability of any information is the sole responsibility of the user. ABG will be pleased to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.

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BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

abg creative geosynthetic engineering

Project Name:	14-19 Tottenham Mews, W1T 4AA - Level 5 - 1-in-30yr. +0% CC		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com.		
Notes/description:	Assumed paver-on-pedestals or hard landscaped finish - TBC. Potential for freestanding planters to be supported on top of the 'blue roof' system. Pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	30	years	*As supplied by Client*
Allowance for Climate Change:	0	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	104	m^2	*As supplied by Client*
Attenuation area:	81	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	3 hours and 20 minutes	0.2
30 mins	4 hours and 0 minutes	0.2
1 hour	4 hours and 20 minutes	0.3
2 hours	4 hours and 10 minutes	0.3
4 hours	3 hours and 40 minutes	0.2
6 hours	3 hours and 0 minutes	0.2
10 hours	1 hour and 40 minutes	0.1
24 hours	0 hours and 0 minutes	0.0
48 hours	0 hours and 0 minutes	0.0

Total attenuation required: 3.2 m^3

Half empty time: The critical storm does not result in the storage reaching half full

Output - Recommended Blue Roof System	
System Name:	ABG blueroof VF HD 108mm
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.
Total attenuation capacity:	7.8 m^3
Number of Blue Roof outlets:	2

Notes:

1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
2. Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
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www.abgltd.com

BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

abg creative geosynthetic engineering

Project Name:	14-19 Tottenham Mews, W1T 4AA - Level 5 - 1-in-100yr. +0% CC		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com.		
Notes/description:	Assumed paver-on-pedestals or hard landscaped finish - TBC. Potential for freestanding planters to be supported on top of the 'blue roof' system. Pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	100	years	*As supplied by Client*
Allowance for Climate Change:	0	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	104	m^2	*As supplied by Client*
Attenuation area:	81	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	4 hours and 0 minutes	0.2
30 mins	4 hours and 40 minutes	0.3
1 hour	5 hours and 10 minutes	0.3
2 hours	5 hours and 10 minutes	0.3
4 hours	4 hours and 40 minutes	0.3
6 hours	3 hours and 50 minutes	0.2
10 hours	2 hours and 30 minutes	0.2
24 hours	0 hours and 0 minutes	0.0
48 hours	0 hours and 0 minutes	0.0

Total attenuation required: 4.1 m^3
Half empty time: 0 hours and 10 minutes.

Output - Recommended Blue Roof System		
System Name:	ABG blueroof VF HD 108mm	
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.	
Total attenuation capacity:	7.8	m^3
Number of Blue Roof outlets:	2	

Notes:

1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
2. Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
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BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

abg creative geosynthetic engineering

Project Name:	14-19 Tottenham Mews, W1T 4AA - Level 5		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com.		
Notes/description:	Assumed paver-on-pedestals or hard landscaped finish - TBC. Potential for freestanding planters to be supported on top of the 'blue roof' system. Pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	100	years	*As supplied by Client*
Allowance for Climate Change:	40	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	104	m^2	*As supplied by Client*
Attenuation area:	81	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	5 hours and 10 minutes	0.3
30 mins	6 hours and 0 minutes	0.3
1 hour	6 hours and 30 minutes	0.4
2 hours	6 hours and 30 minutes	0.4
4 hours	6 hours and 10 minutes	0.3
6 hours	5 hours and 30 minutes	0.3
10 hours	4 hours and 10 minutes	0.3
24 hours	0 hours and 10 minutes	0.1
48 hours	0 hours and 0 minutes	0.0

Total attenuation required: 5.9 m^3
Half empty time: 1 hours and 40 minutes.

Output - Recommended Blue Roof System		
System Name:	ABG blueroof VF HD 108mm	
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.	
Total attenuation capacity:	7.8	m^3
Number of Blue Roof outlets:	2	

Notes:

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2. Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
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www.abgltd.com

BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	14-19 Tottenham Mews, W1T 4AA - Roof Level - 1-in-1yr. +0% CC		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com		
Notes/description:	Assumed ballast finish, with freestanding/ballasted PV panels - TBC. Maintenance access or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	1	year	*As supplied by Client*
Allowance for Climate Change:	0	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	260	m^2	*As supplied by Client*
Attenuation area:	220	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	1 hour and 40 minutes	0.1
30 mins	3 hours and 50 minutes	0.1
1 hour	5 hours and 10 minutes	0.2
2 hours	5 hours and 40 minutes	0.2
4 hours	5 hours and 50 minutes	0.2
6 hours	5 hours and 40 minutes	0.2
10 hours	4 hours and 40 minutes	0.1
24 hours	1 hour and 0 minutes	0.1
48 hours	0 hours and 0 minutes	0.0

Total attenuation required: 4.1 m^3

Half empty time: The critical storm does not result in the storage reaching half full

Output - Recommended Blue Roof System		
System Name:	ABG blueroof VF HD 108mm	
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.	
Total attenuation capacity:	21.3	m^3
Number of Blue Roof outlets:	2	

Notes:

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BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	14-19 Tottenham Mews, W1T 4AA - Roof Level - 1-in-30yr. +0% CC		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com		
Notes/description:	Assumed ballast finish, with freestanding/ballasted PV panels - TBC. Maintenance access or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	30	years	*As supplied by Client*
Allowance for Climate Change:	0	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	260	m^2	*As supplied by Client*
Attenuation area:	220	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	8 hours and 40 minutes	0.2
30 mins	10 hours and 20 minutes	0.2
1 hour	11 hours and 40 minutes	0.3
2 hours	12 hours and 30 minutes	0.3
4 hours	12 hours and 50 minutes	0.3
6 hours	12 hours and 30 minutes	0.3
10 hours	11 hours and 30 minutes	0.3
24 hours	6 hours and 40 minutes	0.2
48 hours	0 hours and 30 minutes	0.1

Total attenuation required: 10.2 m^3

Half empty time: The critical storm does not result in the storage reaching half full

Output - Recommended Blue Roof System		
System Name:	ABG blueroof VF HD 108mm	
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.	
Total attenuation capacity:	21.3	m^3
Number of Blue Roof outlets:	2	

Notes:

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BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	14-19 Tottenham Mews, W1T 4AA - Roof Level - 1-in-100yr. +0% CC		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com		
Notes/description:	Assumed ballast finish, with freestanding/ballasted PV panels - TBC. Maintenance access or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	100	years	*As supplied by Client*
Allowance for Climate Change:	0	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	260	m^2	*As supplied by Client*
Attenuation area:	220	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	10 hours and 20 minutes	0.2
30 mins	12 hours and 20 minutes	0.3
1 hour	13 hours and 50 minutes	0.3
2 hours	14 hours and 50 minutes	0.3
4 hours	15 hours and 20 minutes	0.3
6 hours	15 hours and 0 minutes	0.3
10 hours	14 hours and 10 minutes	0.3
24 hours	9 hours and 0 minutes	0.2
48 hours	1 hour and 40 minutes	0.1

Total attenuation required: 12.9 m^3
Half empty time: 2 hours and 0 minutes.

Output - Recommended Blue Roof System		
System Name:	ABG blueroof VF HD 108mm	
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.	
Total attenuation capacity:	21.3	m^3
Number of Blue Roof outlets:	2	

Notes:

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BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	14-19 Tottenham Mews, W1T 4AA - Roof Level		
Prepared for:	Elliott Wood, London		
Date:	23/10/2020		
ABG Project ID:	21447	Calculator version:	1.27
Prepared by:	Andrew Keer; 07525-808700; andrew@abgltd.com		
Notes/description:	Assumed ballast finish, with freestanding/ballasted PV panels - TBC. Maintenance access or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)			
Return period:	100	years	*As supplied by Client*
Allowance for Climate Change:	40	%	*As supplied by Client*
Location selected for FSR data:	London (Central)		

Input Parameters - Roof Information			
Total catchment area:	260	m^2	*As supplied by Client*
Attenuation area:	220	m^2	*As supplied by Client*
Maximum allowable runoff:	0.5	l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	13 hours and 10 minutes	0.3
30 mins	15 hours and 40 minutes	0.3
1 hour	17 hours and 30 minutes	0.4
2 hours	18 hours and 40 minutes	0.4
4 hours	19 hours and 30 minutes	0.4
6 hours	19 hours and 10 minutes	0.4
10 hours	18 hours and 40 minutes	0.4
24 hours	13 hours and 40 minutes	0.3
48 hours	5 hours and 10 minutes	0.2

Total attenuation required: 18.4 m^3
Half empty time: 6 hours and 10 minutes.

Output - Recommended Blue Roof System		
System Name:	ABG blueroof VF HD 108mm	
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.	
Total attenuation capacity:	21.3	m^3
Number of Blue Roof outlets:	2	

Notes:

1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
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1. DEFINITIONS

'Consultant' means ABG Geosynthetics Ltd and its legal successors. 'Client' means the person, firm, company or organisation for whom the Consultant is performing the Services. 'Agreement' means the contract referred to in Clause 2. 'Services' means the services to be performed by the Consultant in accordance with the proposal from the Consultant. 'Project' means the project or works for which the Client has commissioned the Services.

2. GENERAL

Unless and until a formal agreement is entered into, the Client's acceptance of the proposal for Services from the Consultant or a request for some or all the Services to be performed by the Consultant, shall constitute a binding
contract between the Client and the Consultant which contract will be subject to any terms and conditions contained or referred to in the aforementioned proposal and these terms and conditions. In the event of any conflict, the terms and conditions in the proposal shall prevail over these terms and conditions. The Agreement so formed shall supersede all previous understandings, commitments or agreements whether written or oral between the Client and the Consultant relating to the subject matter hereof. No person or entity shall have any rights in relation to this Agreement, whether as third parties or otherwise, save the parties to this Agreement. Should any term or condition of this Agreement be held to be unenforceable or invalid by the courts of any jurisdiction to which it is subject then such term or condition shall be disregarded and the remaining terms and conditions shall remain in full force and effect.

3. PERFORMANCE OF SERVICES AND SCOPE

The Consultant shall perform the Services using the degree of skill care and diligence to be expected from a consultant experienced in the provision of services of similar scope size and complexity. The Consultant shall use reasonable endeavours to complete the Services within the time or programme agreed but shall not be responsible for any delay beyond the reasonable control of the Consultant.

The fee contained in the proposal is for the scope of services as defined therein. If not already contained in the proposal the Consultant and the Client shall agree as an initial activity an integrated project services programme to
include the activities of all the parties to the Project relevant to the Services to be supplied by the Consultant. The
aforesaid programme shall show the key dates for final information and the delivery of such to the Consultant so as to enable the Consultant to carry out the services in an efficient once through manner to achieve the programme delivery dates for the Services.

The Consultant provides various services including Design and Product use advice which is distinct from a Design Service. The Design Service may or may not attract a fee.

Where the Consultant's services are of an advisory nature and dependent upon the degree of information and release thereof by the Client then the Client agrees that any reliance placed on the services by the Client shall take due account of such constraints.

4. CONFIDENTIALITY AND INTELLECTUAL PROPERTY RIGHTS

i. The Consultant and the Client shall keep confidential all information pertaining to the Services.

ii. Copyright for all reports, documents and the like produced by the Consultant in the performance of the Services
shall remain vested with the Consultant but the Consultant shall grant an irrevocable royalty free license to the Client to use such reports, documents and the like for any purpose in connection with the Project.

5. LIABILITY

i. The Consultant shall be liable to pay compensation to the Client arising out of or in connection with this
Agreement only if a breach of the duty of care in Clause 3 is established against the Consultant.

ii. Notwithstanding any other term to the contrary in this Agreement or any related document and whether the cause of action for any claim arises under or in connection with the Agreement in contract or in tort, in negligence or for breach of statutory duty or otherwise the Consultant shall have no liability to the Client in respect of any claim for loss or damage arising from acts of war or terrorism or arising from flooding, burst water mains or failed drainage or arising from any incidence of toxic mould or asbestos but otherwise in relation to any cause of action as aforesaid the total liability of the Consultant in the aggregate for all claims shall be limited to a sum equivalent to ten (10) times the fee payable under this Agreement or £50,000, whichever is the lesser, or such other sum as may be expressly stated in the Consultant's proposal, and further but without prejudice to the aforesaid limit of liability any such liability of the Consultant shall be limited to such sum or sums as it would be just and equitable for the Consultant to pay having regard to the Consultant's responsibility for the same and on the basis that all other parties appointed or to be appointed by the Client to perform related services in connection with the Project shall be deemed to have provided undertakings on terms no less onerous than this Agreement and shall be deemed to have paid to the Client such contribution as it would be just and equitable for them to pay having regard to their responsibility for any loss or damage and providing that it shall be deemed that such other parties have not limited or excluded their liability to the Client for such loss or damage in any way which may be prejudicial to the Consultant's liability under this clause. Nothing in this clause shall operate to exclude or limit the Consultant's liability for death or personal injury.

iii. The Client shall indemnify and keep indemnified the Consultant from and against all claims, demands,
proceedings, damages, costs and expenses arising out of or in connection with this Agreement or the Project
arising from acts of terrorism or arising otherwise in excess of the liability of the Consultant under this
Agreement or which may be made in respect of events occurring after the expiry of the period of liability stated
in this Agreement.

iv. No action or proceedings under or in connection with this Agreement shall be commenced against the Consultant after the expiry of one year from completion of the Services.

v. ABG Geosynthetics Ltd is not responsible for consequential, indirect or incidental losses.

6. INSURANCE

The Consultant shall arrange Professional Indemnity Insurance cover for the amount stated in Clause 5(ii). The Consultant will use all reasonable endeavours to maintain Professional Indemnity Insurance cover for the period stated in 5(iv) above, providing such insurance remains available to the Consultant at commercially reasonable rates.

7. CLIENT'S OBLIGATIONS

The Client shall supply, without charge and in such time so as not to delay or disrupt the performance of the Consultant in carrying out the Services, all necessary and relevant information, in his possession or available to him from his other agents or consultants and all necessary approvals or consents. Any deviation on any information from the proposal shall be confirmed in writing and any attendant consequential fees will be forwarded for approval by the Client before any changes are made. The Consultant shall not be liable for any consequential delays on site. Every reasonable effort will be made to mitigate against delays, however no liability for losses and costs will be accepted. The approval or consent by the Client to the Services shall not relieve the Consultant from any liability under this Agreement. All work undertaken by the Consultant must be ratified and signed off by the Client.

8. PAYMENT

i. The Client shall pay the Consultant for the Services in accordance with the proposal and this Agreement. If the Consultant performs any additional services or if the Services are delayed or disrupted for reasons beyond the
reasonable control of the Consultant then the Consultant shall be entitled to such additional fees as are fair and
reasonable in the circumstances. The Consultant may render an invoice at monthly intervals for services properly
performed. The agreed invoice, or in the event of a dispute the undisputed element, shall be paid within 28 days of receipt of the invoice by the Client. Any invoice paid after this period will attract interest at 3% above the base
rate of the central bank of the country of the currency of payment along with any collection costs which may occur.

ii. The Client shall not withhold any payment of any sum or part of a sum due to the Consultant under this
Agreement by reason of claims or alleged claims against the Consultant unless the amount to be withheld has
been agreed between the Client and the Consultant as due to the Client or such sum arises from an award in
adjudication, arbitration or litigation in favour of the Client and arises under or in connection with the Agreement.
Save as aforesaid all rights of set off at common law, in equity or otherwise which the Client may otherwise be
entitled to exercise are hereby expressly excluded.

9. TERMINATION

If a party is in breach of a material term of this Agreement and despite written notice from the other party fails to
remedy such breach within 30 days or such other period as may be agreed between the parties, then the other party shall be entitled to terminate this Agreement forthwith. The Consultant may seek to recoup costs incurred for works completed prior to termination.

10. DISPUTE RESOLUTION

Any dispute between the parties that cannot be settled by mutual agreement shall be referred for final settlement to the arbitration of a person agreed between the parties or failing such agreement appointed upon the application of either party by the President of the Chartered Institute of Arbitrators and the said arbitration shall be carried out in accordance with the Construction Industry Model Arbitration Rules 1998 or such other version current at the time of the referral under this clause. Where the Agreement is subject to a governing law other than that of England and Wales then any dispute between the parties that cannot be settled by mutual agreement shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules by one arbitrator appointed in compliance with the said Rules. In either case such rules as appropriate are deemed to be incorporated into this Agreement by reference.

11. COMPLIANCE WITH LAWS

This Agreement shall be governed by and construed in accordance with the law of England and Wales unless stated
otherwise in the proposal for services from the Consultant.

Changes to the above terms and conditions will only be considered if agreed in writing as
part of the appointment process prior to ABG Geosynthetics commencing work.

E London Borough of Camden Surface Water Drainage Pro-forma

Advice Note on contents of a Surface Water Drainage Statement

London Borough of Camden

1. Introduction

1.1 The Government has strengthened planning policy on the provision of sustainable drainage and new consultation arrangements for 'major' planning applications will come into force from 6 April 2015 as defined in the Written Ministerial Statement (18th Dec 2014).

1.2 The new requirements make Lead Local Flood Authorises statutory consultees with respect to flood risk and SuDS for all major applications. Previously the Environment Agency had that statutory responsibility for sites above 1ha in flood zone 1.

1.3 Therefore all 'major' planning applications submitted from 6 April 2015 are required demonstrate compliance with this policy and we'd encourage this is shown in a **Surface Water Drainage Statement**.

1.4 The purpose of this advice note is to set out what information should be included in such statements.

2. Requirements

2.1 It is essential that the type of Sustainable Drainage System (SuDS) for a site, along with **details of its extent and position**, is identified within the planning application to clearly demonstrate that the proposed SuDS can be accommodated within the development.

2.2 It will now not be acceptable to leave the design of SuDs to a later stage to be dealt with by planning conditions.

2.3 The NPPF paragraph 103 requires that developments do not increase flood risk elsewhere, and gives priority to the use of SuDS. Major developments must include SuDS for the management of run-off, unless demonstrated to be inappropriate. The proposed minimum standards of operation must be appropriate and as such, a **maintenance plan** should be included within the Surface Water Drainage Statement,clearly demonstrating that the SuDS have been designed to ensure that the maintenance and operation requirements are economically proportionate Planning Practice Guidance suggests that this should be considered by reference to the costs that would be incurred by consumers for the use of an effective drainage system connecting directly to a public sewer.

2.4 Camden Council will use planning conditions or obligations to ensure that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

2.5 Within Camden, SuDS systems must be designed in accordance with London Plan policy 5.13. This requires that developments should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve **greenfield run-off rates** and ensure that surface water run-off is managed as close to its source as possible in line with the following **drainage hierarchy**:

1 store rainwater for later use
2 use infiltration techniques, such as porous surfaces in non-clay areas
3 attenuate rainwater in ponds or open water features for gradual release
4 attenuate rainwater by storing in tanks or sealed water features for gradual release
5 discharge rainwater direct to a watercourse
6 discharge rainwater to a surface water sewer/drain
7 discharge rainwater to the combined sewer.

2.6 The hierarchy above seeks to ensure that surface water run-off is controlled as near to its source as possible to mimic natural drainage systems and retain water on or near to the site, in contrast to traditional drainage approaches, which tend to pipe water off-site as quickly as possible.

2.7 Before disposal of surface water to the public sewer is considered all other options set out in the drainage hierarchy should be exhausted. When no other practicable alternative exists to dispose of surface water other than the public sewer, the Water Company or its agents should confirm that there is adequate spare capacity in the existing system taking future development requirements into account.

2.8 Best practice guidance within the non-statutory technical standards for the design, maintenance and operation of sustainable drainage systems will also need to be followed. Runoff volumes from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the **greenfield runoff volume** for the same event.

2.9 Camden Development Policy 23 (Water) requires developments to reduce pressure on combined sewer network and the risk of flooding by limiting the rate of run-off through sustainable urban drainage systems. This policy also requires that developments in areas known to be at risk of surface water flooding are designed to cope with being flooded. Camden's SFRA surface water flood maps, updated SFRA figures 6 (LFRZs), and 4e (increased susceptibility to elevated groundwater) , as well as the Environment Agency updated flood maps for surface water (ufmfsw), should be referred to when determining whether developments are in an area at risk of flooding.

2.10 Camden Planning Guidance 3 (CPG3) requires developments to achieve a greenfield run off rate once SuDS have been installed. Where it can be demonstrated that this is not feasible, a minimum 50% reduction in run off rate across the development is required. Further guidance on how to reduce the risk of flooding can be found in CPG3 paragraphs 11.4-11.8.

2.11 Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.

3. Further information and guidance

3.1 Applicants are strongly advised to discuss their proposals with the Lead Local Flood Authority at the pre-application stage to ensure that an acceptable SuDS scheme is submitted.

3.2 For general clarification of these requirements please Camden's Local Planning Authority or Lead Local Flood Authority

Surface Water Drainage Pro-forma for new developments

This pro-forma accompanies our advice note on surface water drainage. Developers should complete this form and submit it to the Local Planning Authority, referencing from where in their submission documents this information is taken. The pro-forma is supported by the Defra/EA guidance on Rainfall Runoff Management and uses the storage calculator on www.UKsuds.com. This pro-forma is based on current industry best practice and focuses on ensuring surface water drainage proposals meet national and local policy requirements. The pro-forma should be considered alongside other supporting SuDS Guidance.

1. Site Details

Site	14 - 19 Tottenham Mews
Address & post code or LPA reference	14-19 Tottenham Mews, Fitzrovia, London, W1T 4AQ
Grid reference	529324 , 181796
Is the existing site developed or Greenfield?	Developed
Is the development in a LFRZ or in an area known to be at risk of surface or ground water flooding? If yes, please demonstrate how this is managed, in line with DP23?	No
Total Site Area served by drainage system (excluding open space) (Ha)*	0.054

***** The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers
Impermeable area (ha)	0.054	0.054	0	If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase. Section 6 must be filled in. If proposed impermeability is equal or less than existing, then section 6 can be skipped and section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)	Sewer	Sewer	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to Discharge Surface Water via

	Yes	No	Evidence that this is possible	Notes for developers
Existing and proposed MicroDrainage calculations	X		Yes	Please provide MicroDrainage calculations of existing and proposed run-off rates and volumes in accordance with a recognised methodology or the results of a full infiltration test (see line below) if infiltration is proposed.
Infiltration		x	yes	e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse		x	yes	e.g. Is there a watercourse nearby?
To surface water sewer		x	yes	Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above				e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?	X		yes	Evidence must be provided to demonstrate that the proposed Sustainable Drainage strategy has had regard to the SuDS hierarchy as outlined in Section 2.5 above.
Layout plan showing where the sustainable drainage infrastructure will be located on site.	X		Refer to architect's layouts showing the blue roof plan	Please provide plan reference numbers showing the details of the site layout showing where the sustainable drainage infrastructure will be located on the site. If the development is to be constructed in phases this should be shown on a separate plan and confirmation should be provided that the sustainable drainage proposal for each phase can be constructed and can operate independently and is not reliant on any later phase of development.

4. Peak Discharge Rates – This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event.

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s) (Proposed-Existing)	% Difference (difference /existing x 100)	Notes for developers
Greenfield QBAR	0.1	N/A	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 6 (QBAR) is proposed.
1 in 1	5	1.9	-3.1	62	Proposed discharge rates (with mitigation) should aim to be equivalent to greenfield rates for all corresponding storm events. As a minimum, peak discharge rates must be reduced by 50% from the existing sites for all corresponding rainfall events.
1 in 30	12.4	4.6	-7.8	63	
1in 100	16.1	5.9	-10.2	63	
1 in 100 plus climate change	N/A	7.6		63	The proposed 1 in 100 +CC peak discharge rate (with mitigation) should aim to be equivalent to greenfield rates. As a minimum, proposed 1 in 100 +CC peak discharge rate must be reduced by 50% from the existing 1 in 100 runoff rate sites.

5. Calculate additional volumes for storage –The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of stormwater that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream.

	Greenfield runoff volume (m^3)	Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3) (Proposed-Existing)	Notes for developers
1 in 1					Proposed discharge volumes (with mitigation) should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable and as a minimum should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30					
1in 100 6 hour					
1 in 100 6 hour plus climate change					The proposed 1 in 100 +CC discharge volume should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable. As a minimum, to mitigate for climate change the proposed 1 in 100 +CC volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.

6. Calculate attenuation storage – Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

		Notes for developers
Storage Attenuation volume (Flow rate control) required to meet greenfield run off rates (m^3)	NA	Volume of water to attenuate on site if discharging at a greenfield run off rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to reduce rates by 50% (m^3)		Volume of water to attenuate on site if discharging at a 50% reduction from existing rates. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to meet [OTHER RUN OFF RATE (as close to greenfield rate as possible] (m^3)	37m3	Volume of water to attenuate on site if discharging at a rate different from the above – please state in 1st column what rate this volume corresponds to. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m^3)		Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing
Percentage of attenuation volume stored above ground,	100	Percentage of attenuation volume which will be held above ground in swales/ponds/basins/green roofs etc. If 0, please demonstrate why.

7. How is Storm Water stored on site?

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on site storage. Firstly, can infiltration work on site?

			Notes for developers
Infiltration	**State the Site's Geology and known Source Protection Zones (SPZ)**		Avoid infiltrating in made ground. Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?		Infiltration rates should be no lower than $1x10^{-6}$ m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level		Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.

	Were infiltration rates obtained by desk study or infiltration test?		Infiltration rates can be estimated from desk studies at most stages of the planning system if a back up attenuation scheme is provided..
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.		Advice on contaminated Land in Camden can be found on our supporting documents webpage Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	**Yes/No? If the answer is No, please identify how the storm water will be stored prior to release**	No, a blue roof will attenuate surface water	If infiltration is not feasible how will the additional volume be stored?. The applicant should then consider the following options in the next section.

Storage requirements

The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at the greenfield run off rate. This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers
Please confirm what option has been chosen and how much storage is required on site.	Simple	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers
Which Drainage Systems measures have been used, including green roofs?	Blue Roof	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
Drainage system can contain in the 1 in 30 storm event without flooding	Yes	This a requirement for sewers for adoption & is good practice even where drainage system is not adopted.
Will the drainage system contain the 1 in 100 +CC storm event? If no please demonstrate how buildings and utility plants will be protected.	Yes	National standards require that the drainage system is designed so that flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.	No	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.
How will exceedance events be catered on site without increasing flood risks (both on site and outside the development)?	Blue roof has been designed for the 100 year + 40%cc event. Levels will fall away from thresholds.	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased. Exceedance events are defined as those larger than the 1 in 100 +CC event.
How are rates being restricted (vortex control, orifice etc)	Blue Roof orifice	Detail of how the flow control systems have been designed to avoid pipe blockages and ease of maintenance should be provided.
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	Development Manager	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
How is the entire drainage system to be maintained?	Refer to the SuDS Maintenance Schedule within the main Surface Water Drainage Statement	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than above please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided. Details must demonstrate that maintenance and operation requirements are economically proportionate. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence Please identify where the details quoted in the sections above were taken from. i.e. Plans, reports etc. Please also provide relevant drawings that need to accompany your proforma, in particular exceedance routes and ownership and location of SuDS (maintenance access strips etc

Pro-forma Section	Document reference where details quoted above are taken from	Page Number
Section 2		1
Section 3		2, 3
Section 4		3
Section 5		
Section 6		3
Section 7		3
Section 8		3,4

The above form should be completed using evidence from the Flood Risk Assessment and site plans. It should serve as a summary sheet of the drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

Form Completed By: William Hudson
Qualification of person responsible for signing off this pro-forma: MEng (hons)

Company: Elliott Wood Partnership
On behalf of (Client's details): Blackburn Ltd
Date: 13.11.20

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