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Kings Cross Methodist Church, London WC1H 8BW

Drainage Strategy Report

Ref: 180067/J Waugh
Approved By: Tapiwa Gavaza
Date: 07 February 2017
Version: 1

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1.0 EXECUTIVE SUMMARY

Conisbee have been appointed by West London Mission to prepare a drainage strategy for the proposed development site in Kings Cross, London. This report outlines the design carried out to date.

It is proposed to demolish the existing collection of buildings and provide a new church, community facilities and residential apartments for leasehold sale.

This design report provides an overview of the drainage principles to be used for the proposed development and future maintenance regime.

The site is categorised on the Environmental Agency maps as Flood Zone 1 with a low probability of flooding.

2.0 LIMITATIONS

This report is based on:

- Topographical survey, Callidus Surveys Ref. 12004
- Thames Water records
- Proposed floor plans, Dexter Moren Associates Ref. 0948. 22.01.2018.
- Ground Investigation and Basement Impact Assessment Report, GEA Ref. J14336.

The conclusions and recommendations contained within this report are based upon information provided by those listed above and upon the assumption that all relevant information received is accurate and correct.

3.0 EXISTING SITE CONDITIONS AND DRAINAGE

3.1 Existing Site Conditions

The site located on a terraced row fronting onto Birkenhead Street with the rear access onto Crestfield Street, Kings Cross, London WC1H 8BW (NGR 530320E, 182894N). The site is situated within the London Borough of Camden.

The existing property is a Methodist Church with community use.

The total area of the proposed development site is 803m^2.

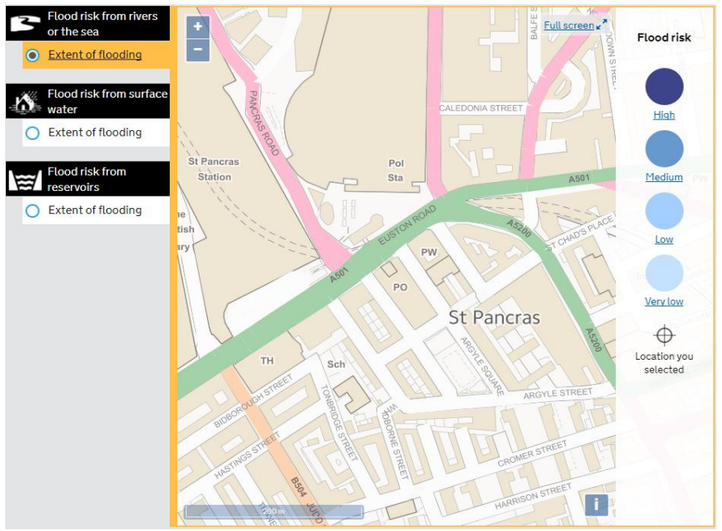


Figure 1: Flood Map (Source: flood-warning-information.service.gov.uk)

3.2 Geotechnical and Groundwater Information

A Ground investigation was report was undertaken by GEA, this found that the ground consists of London Clay to a depth of 24 m that overlies the Reading Formation

Based on Environment Agency information, the site is not located in a groundwater source protection zone.

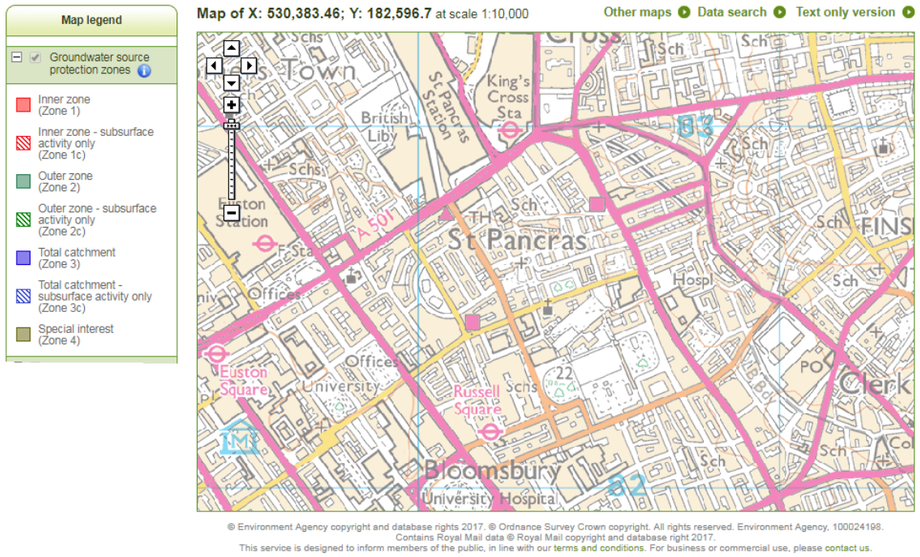


Figure 2: Surface Water Flood Risk Map (Source: flood-warning-information.service.gov.uk)

The site is considered to be at very low risk of surface water flooding.

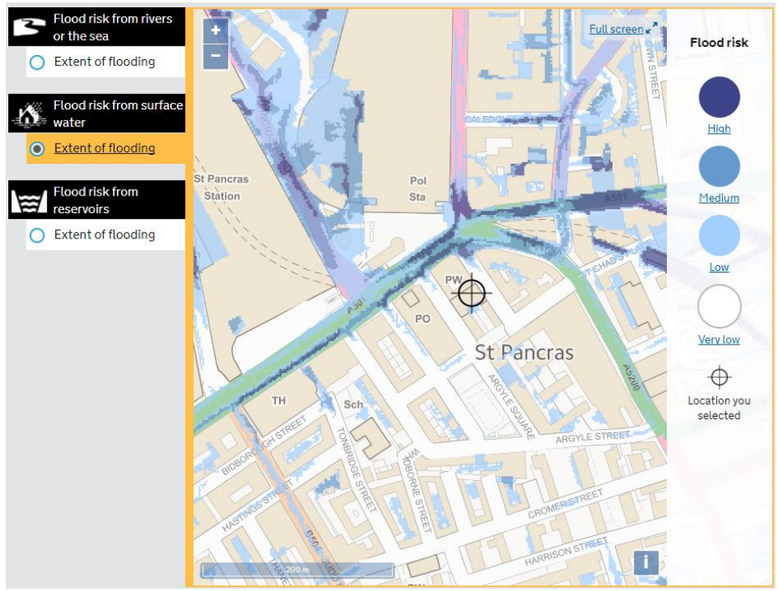


Figure 2: Ground Water Sources (Source: EA web site)

3.3 Existing Drainage

There is no drainage survey or CCTV information available at this stage, however from review of the topographical survey information we assume that there are connections to the combined public sewer to the front and rear of the building.

A review of the Thames Water (TW) Asset Search identified 1200 x 800 combined sewers to the front and rear of the existing church in Birkenhead Street and Crestfield Street.

Further investigations are required at the detailed design stage to determine the depths of the existing public sewers for connection, the presence of a private drainage network and also to establish if there are any third party drainage onsite that may need diverting.

4.0 PROPOSED SURFACE WATER DRAINAGE STRATEGY

4.1 Site Characteristics

- Total catchment area = 803m^2
- Total existing and propose impermeable area =803 m^2

4.2 Drainage Strategy Design

4.2.1 The Drainage strategy for the site has been developed based upon the following design:

- Sewers for Adoption 6th Edition
- Building Regulations – Part H
- BS EN 752, BS EN 12056
- Advice Note on Contents of a Surface Water Drainage Strategy – London Borough of Camden

4.3 Run-off Rates

4.3.1 The London Borough of Camden requires that developments should aim to achieve greenfield run-off rates, 2.2 l/s for the 1 in 1 year storm event. As the existing site is 100% impermeable it is not appropriate to design to greenfield run off rates as this would require volumes of attenuation that the proposed site layout cannot accommodate.

4.3.2 Therefore in line with The London Plan we looked at reducing the site run-off to 3x the greenfield rate, 6.6 l/s.

4.3.3 Having assessed the available attenuation opportunities for the site we achieved a discharge rate of 5 l/s.

4.4 SUDS Hierarchy

The London Borough of Camden requires that developments utilise SUDS unless there are practical reasons for not doing so and to 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.

4.4.1 As required by Camden green roofs are proposed across the development where possible. An integrated blue roof system is proposed to attenuate storm water at roof level.

4.4.2 The introduction of green roofs precludes storing rainwater for reuse, as the organic matter in the run-off can lead to maintenance complications for a rainwater harvesting system.

4.4.3 The constrained nature of the site does not allow for open water features.

4.4.4 The SUDS proposals for the site are to maximise attenuation at roof level where possible for gradual release via gravity into the combined sewer network. Any areas that cannot be attenuated at roof level will outfall to basement level where it will be pumped at a reduced rate up to the combined sewer; the additional volume of water will be attenuated at basement level.

4.4.5 There are no watercourses in the vicinity of the site.

4.4.6 There are no surface water sewers in the vicinity of the site.

4.4.7 As described above the storm water run-off from the site will outfall to the combined sewer network. Refer to Appendix B for the Thames Water sewer records and Appendix E for the proposed drainage layouts for further details.

4.5 Surface Water Drainage Proforma – London Borough of Camden

4.5.1 This proforma is focused on meeting national and local policy requirements and details site drainage characteristics as well as peak discharge rates and additional volumes of water as a result of the development. The completed proforma for this site can be found in Appendix C.

4.6 Surface Water Pumping Station

4.6.1 To drain storm water run-off for rainwater that cannot be attenuated at roof level a pumping station is required at basement level. Storage is required to prevent flooding at basement level in case of pump failure. To attenuate the volume of water generated for the 1 in 100 year storm event +40% climate change, which is 41.8 m^3 which will be located below the central light wells.

4.7 Storm Water Volume

4.7.1 There is no increase in impermeable area as a result of the development therefore there will be no increase in volume of rainwater discharging to the sewer network.

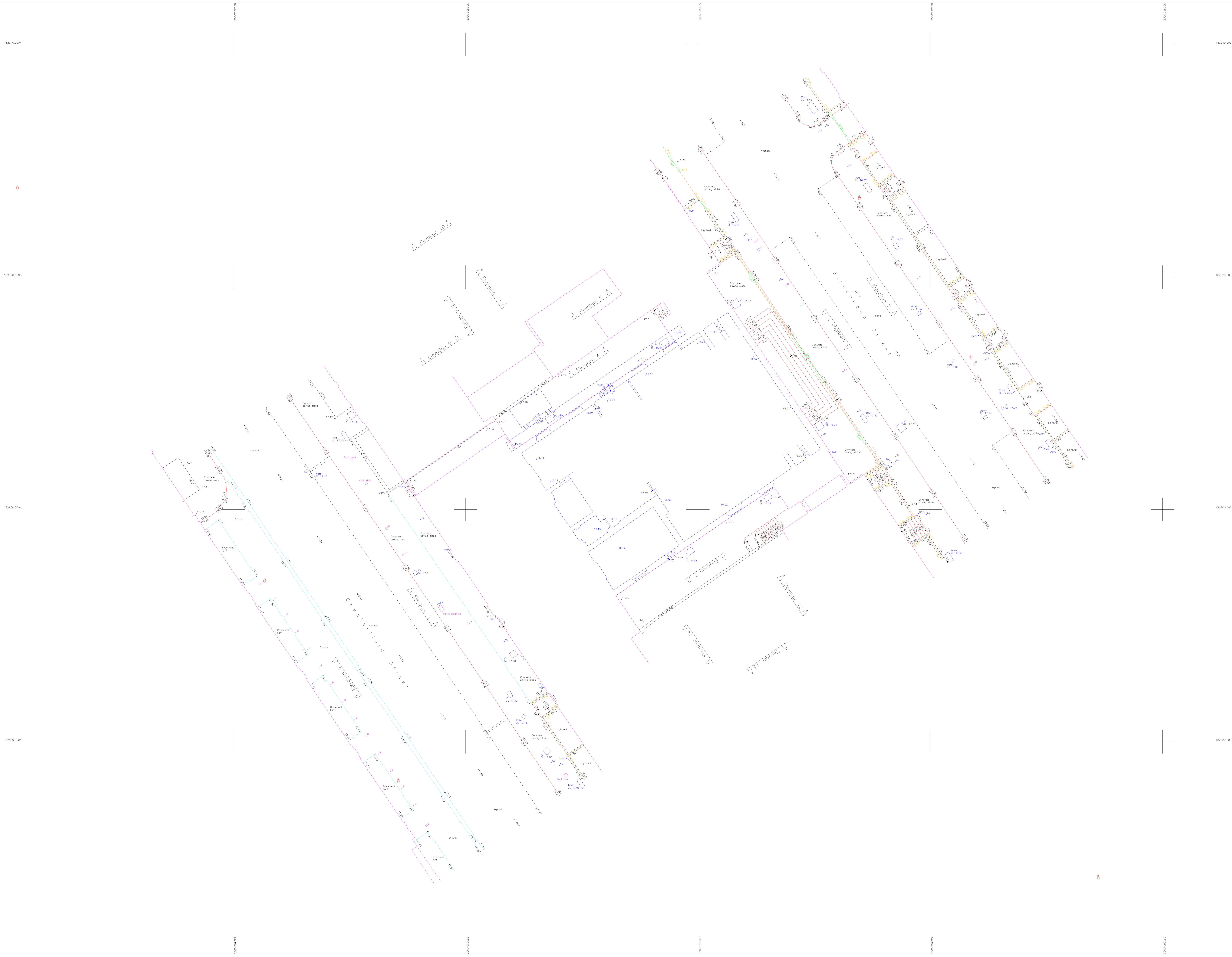
4.7.2 The introduction of green roofs will reduce the volume of storm water entering the sewer to some degree though irrigation and evapotranspiration. This will be increasingly beneficial for low intensity storm events.

5.0 PROPOSED FOUL WATER DRAINAGE STRATEGY

5.1.1 The majority of the development will discharge via gravity to the combined sewer network, this will be via two outfalls, these are to the north east in Birkenhead Street and to the south west in Crestfield Street.

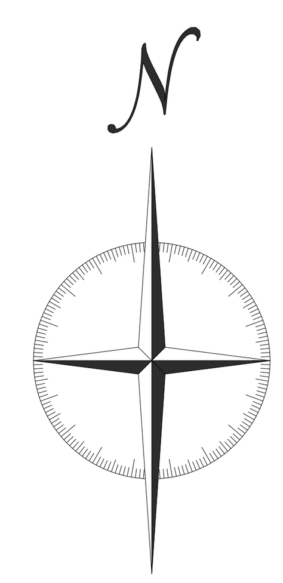
5.1.2 Where it is not possible to discharge via gravity the foul flows will need to be pumped from basement level. Storage is required to prevent foul water flooding at basement level in case of pump failure. Based on a 30 person office at basement level, we estimate that 3 m^3 emergency foul water storage will be required in the pump chambers. This will need to be reassessed at the detailed design stage.

APPENDIX A TOPOGRAPHICALSURVEY



NORTHPOINT

THE SURVEY GRID IS BASED ON ORDNANCE SURVEY NATIONAL GRID COORDINATES.



TOPOGRAPHICAL LEGEND

	survey station		banking
	gate		benchmark
ACU	air conditioning unit	LP	lamp post
AV	air vent	MP	marker post
B	bollard	MH	manhole
BB	belisha beacon	MRP	mooring post
BL	basement light	NB	notice board
BS	brick setts	NP	nameplate
BT	british telecom	NVG	navigation beacon
BW	brick wall	P	post
BWF	barbed wire fence	PM	parking meter
CATV	cable TV cover	PB	post box
CBF	close–board fence	PL	pavement light
CCTV	close circuit tv	PRF	post and rail fence
CL	cover level	PSW	pole stay wire
CLF	chain link fence	OHP	overhead powerline
Conc.	concrete	OHT	overhead telephone line
CPF	chestnut paling fence	RE	rodding eye
CPL	canopy line	RFP	reflector post
CPS	concrete paving slabs	RG	road gully
DLF	dilapidated fence	RS	road sign
DK	drop kerb	RTW	retaining wall
DP	down pipe	RWP	rain water pipe
EL	eaves level	SC	stopcock
ELCP	electricity control panel	SCB	scrub
ER	earth rod	SL	sump level
ESS	elec. sub–station	SNP	street name plate
EP	electricity pole	SPU	species unknown
EPY	electricity pylon	SV	stop valve
FB	flower bed	SVP	soil vent pipe
FIG	feeds into ground	SWCP	surface water catch pit
FLT	floodlight	SWIC	surface water IC
FH	fire hydrant	SWS	storm water sewer
FL	floor level	TCB	traffic control box
FP	footpath	TCMH	telecommunication mh
FGP	flagpole	TCP	telephone call box
FWS	foul water sewer	TCSU	traffic control signal unit
G	gully	THL	threshold level
GM	gas marker	TL	traffic light
GP	gas pipe	TLC	traffic light control box
GV	gas valve	TacP	tactile paving
HCL	hedge centreline	TP	telegraph pole
HR	hand rail	UTL	unable to lift
IC	inspection cover	VCS	vehicle control sensor
IL	invert level	VP	vent pipe
IRF	iron railing fence	WL	water level
JB	junction box	WM	water meter
KO	kerb outlet	WMF	wire mesh fence
LB	litter bin	WO	water outlet
LF	lattice fence	WT	water tap

LEVELLING

ALL LEVELS ARE BASED ON ORDNANCE SURVEY NATIONAL GRID (GPS).

COORDINATE TABLE

STATION	DESC'N	EASTING	NORTHING	LEVEL
S1	PK NAIL	530353.904	182926.918	16.870
S2	PK NAIL	530307.887	182913.174	17.218
S3	PK NAIL	530374.450	182868.433	18.276
S4	PK NAIL	530332.094	182854.278	18.324
S5	HILTI	530314.213	182876.765	17.761
S6	HILTI	530302.714	182893.934	17.301
S7	HILTI	530281.408	182927.742	16.545
S8	HILTI	530321.467	182958.526	16.386

callidus

Callidus Surveys
Dalton House
60 Windsor Avenue
London SW19 2RR

Project:

KINGS CROSS METHODIST MISSION
59 BIRKENHEAD STREET
LONDON, WC1H 8BB

SITE PLAN

Client:

DEXTER MOREN ASSOCIATES
57D JAMESTOWN ROAD
LONDON
NW1 7DB

Job No:	12004	Drawing I.D:	PSF
Drawn:	JG	Scale:	1/100
Checked:	JH	Date:	08/02/12

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e info@callidussurveys.co.uk
w www.callidussurveys.co.uk

THE SURVEY ASSOCIATION

APPENDIX B THAMES WATER ASSET SEARCH

Asset Location Search

CHECKED

Atkins Telecoms
Stats Enquiries Team,The Hub,5 Aztec West,Almonds,

BRISTOL
BS32 4RZ

Search address supplied Birkenhead Street, LONDON
WC1H 8BB

Your reference LM 34233

Our reference ALS/ALS Standard/2014_2908495

Search date 11 November 2014

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk

Asset Location Search

Search address supplied: Birkenhead Street, LONDON, WC1H 8BB

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Asset Location Search

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and

pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Asset Location Search

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2014_2908495

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 530320,182894

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.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5805	n/a	n/a
5707	18.95	12.16
5732	n/a	1.94
5733	n/a	1.91
5804	15.85	11.87
5734	n/a	n/a
16DH	n/a	n/a
1604	n/a	n/a
3603	n/a	n/a
3604	21.11	18
4606	n/a	n/a
0801	19.23	17.68
4103B	n/a	n/a
401C	n/a	n/a
511A	n/a	n/a
5013	n/a	n/a
5904	n/a	n/a
5010	n/a	n/a
5011	n/a	n/a
5102	18.12	12.76
5001	16.87	12.77
501A	n/a	n/a
5903	14.41	11.19
38ED	n/a	n/a
38EC	n/a	n/a
3805	n/a	n/a
38EA	n/a	n/a
3720	20.18	11.5
38EB	n/a	n/a
3901	n/a	n/a
4702	20.61	16.35
4710	20.18	n/a
48BG	n/a	n/a
48BA	n/a	n/a
48BF	n/a	n/a
48AJ	n/a	n/a
47BE	n/a	n/a
4901	17.07	12.21
48AH	n/a	n/a
4704	19.5	11.68
47BD	n/a	n/a
4905	16.1	n/a
47BC	n/a	n/a
4903	n/a	2.36
4033	15.4	n/a
4907	n/a	n/a
48CG	n/a	n/a
4711	20.17	11.48
48CH	n/a	n/a
4906	n/a	n/a
4034	n/a	n/a
1002	16.21	12.15
401A	n/a	n/a
401B	n/a	n/a
401D	n/a	n/a
1014	n/a	n/a
1018	11.67	11.26
3001A	16.66	12.48
3002A	16.78	n/a
4002A	16.54	14.35
3101B	16.75	n/a
4101B	16.55	11.28
4102	n/a	n/a
0103	n/a	n/a
411A	n/a	n/a
4101A	n/a	n/a
3101A	n/a	n/a
2103	11.65	11.38
4104A	17.06	13.03
3104A	n/a	n/a
0704	19.28	n/a
1702	n/a	n/a
1703	19.21	15.2
1924	n/a	2.37
1902	n/a	n/a
1901	16.51	13.99
1729	n/a	n/a
2968	n/a	n/a
2969	116.6	112.27
2903	n/a	n/a
2819	n/a	11.91
2804	16.99	12.96
271A	n/a	n/a
2703	20.25	n/a
2802	n/a	n/a
2702	20.34	16.05
2887	n/a	n/a
2806	n/a	n/a
2888	n/a	n/a
3801	n/a	n/a
3002B	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3940	16.26	n/a
3803	n/a	n/a
3941	n/a	n/a
37DF	n/a	n/a
3718	n/a	n/a
3719	17.12	11.56

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ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

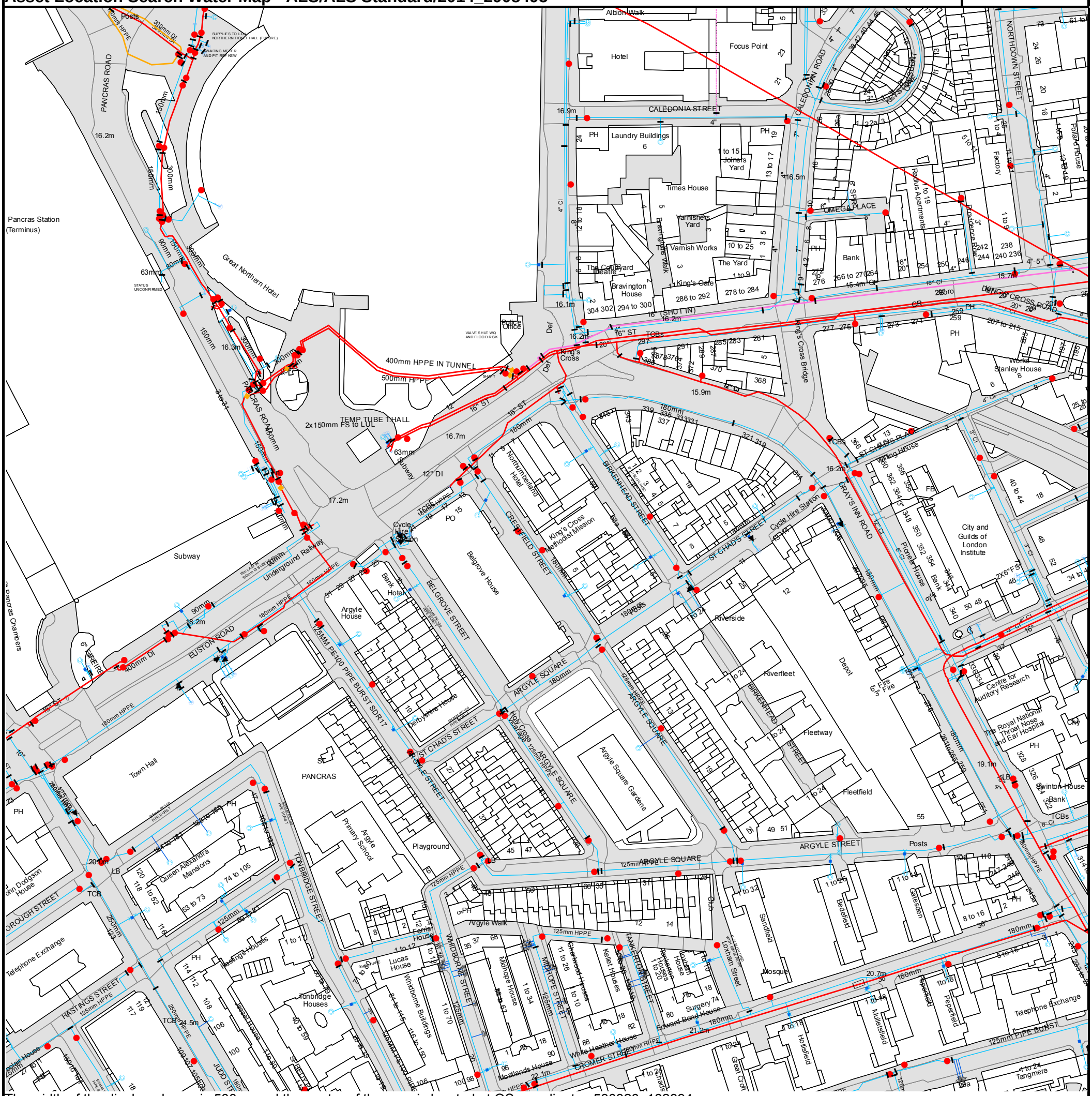
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2014_2908495



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 530320, 182894.

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ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

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1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
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If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to him at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0845 070 9148** quoting your invoice number starting CBA or ADS.	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

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TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

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APPENDIX C LONDON BOROUGH OF CAMDEN SURFACE WATER DRAINAGE PROFORMA FOR NEW DEVELOPMENTS

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	Kings Cross Methodist Church, LB Camden
Address & post code or LPA reference	Birkenhead Street, WC1H 8BW
Grid reference	51.53000° N 0.12243° W
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?	N/A
Total Site Area served by drainage system (excluding open space) (Ha)*	0.0803 Ha

***** 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)	0.0803	0.0803	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			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		e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse		x		e.g. Is there a watercourse nearby?
To surface water sewer		x		Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above		x		e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?	X			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			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	0.13	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	2.2	5	2.8	127%	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	5.5	5	-0.5	-9%	
1in 100	7.2	5	-2.2	-30%	
1 in 100 plus climate change	N/A	5	-	-	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	5.3	17.6	17.6	0	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	11.6	38.7	38.7	0	
1in 100 6 hour	15.1	50.3	50.3	0	
1 in 100 6 hour plus climate change	21.1	70.4	70.4	0	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)	89 to 115	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)	32 to 49	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)	28 to 44 (for 5.0 l/s)	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)	23 to 40	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,	79%	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)**	Overlying the London clay formation. No 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?	No	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	n/a	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?	n/a	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.	n/a	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 - The site footprint is to be 100% developed leaving no space for infiltration techniques. In any case the site is located over clay which has poor infiltration. Storm water will instead be restricted and attenuated at roof level prior to discharge in the combined sewer. Where it is not feasible to discharge via gravity the storm water will be attenuated and pumped from basement level.	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.	Option 1 - 41m Cubed	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?	Green and blue roofs. Cellular attenuation at basement level.	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 - Emergency storage is provided to attenuate the 100yr + 40% CC in case of system failure.	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.	Yes	**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)?	Exceedance events will be stored at basement level in landscaped courtyard area. The additional volume of water will be pumped to the sewer.	**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)	Siphon flow control to blue roof areas and pumped rate from basement	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.	Kings Cross Methodist Church	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?	This is described in the Sustainable Drainage Maintenance Plan.	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	180067 Drainage Strategy Report	1
Section 3	180067 Drainage Strategy Report	2
Section 4	180067 Drainage Strategy Report	Appendix D
Section 5	180067 Drainage Strategy Report	Appendix D
Section 6	180067 Drainage Strategy Report	Appendix D
Section 7	180067 Drainage Strategy Report	2
Section 8	180067 Drainage Strategy Report	2

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..Joel Waugh……
Qualification of person responsible for signing off this pro-forma CEng MICE (Tapiwa Gvaza).....

Company…Conisbee……,.....
On behalf of (Client's details) .....WLM.....
Date: 19.02.18…….....

APPENDIX D DRAINAGE CALCULATIONS

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Consulting Civil Engineers

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www.conisbee.co.uk

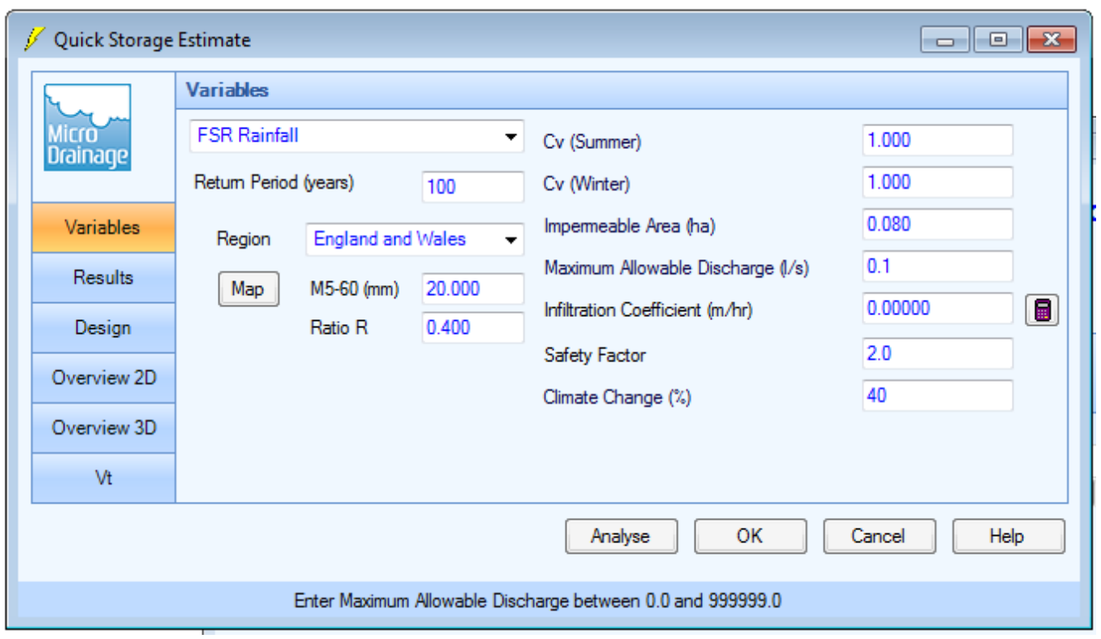
Kings Cross Methodist Church
Key Return Period Summaries

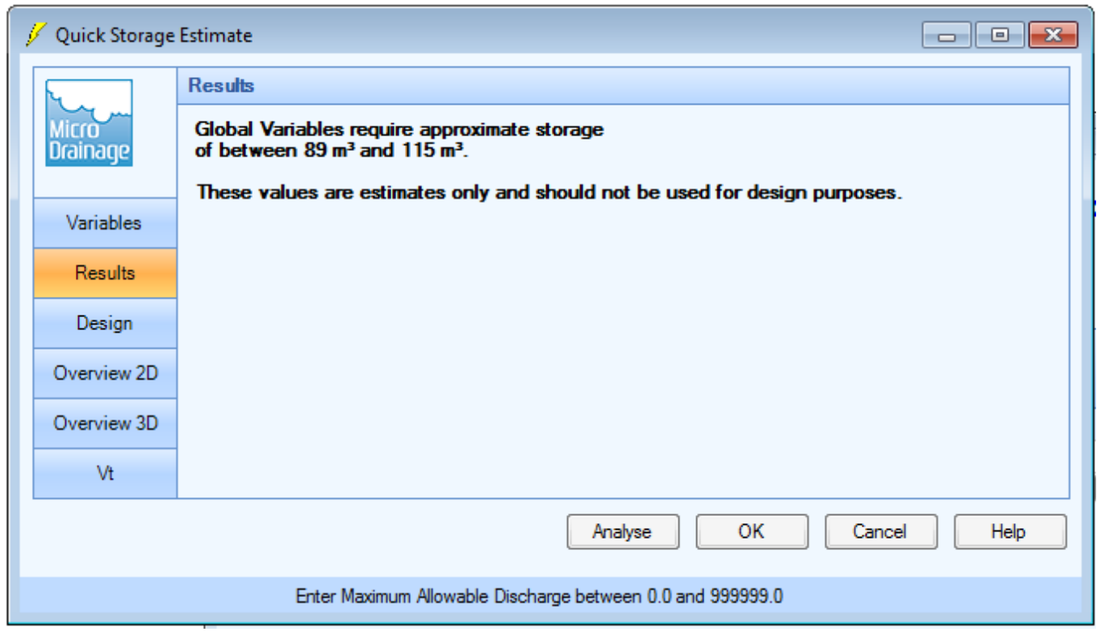
Site Total Area (m2)	803
Existing Site Impermeable Area to sewers (m2)	803
Proposed Site Impermeable Area to sewers (m2)	803
Previously developed %imp	100%
Post development %imp	100%
Volumetric Runoff Coefficient (C)	1
SPR of Soil	0.3

	Rainfall Depth (mm)		**Foul Peak Flow (l/s)**			**Surface Water Peak Flow (l/s)**				**Total Peak Flow (l/s)**			**Runoff Volume (m3)**			
Storm Duration	*30 minutes*	*6 hours*	Existing	Proposed	**Difference**	**Greenfield**	Existing	Proposed	**Difference**	Existing	Proposed	**Difference**	Greenfield	Existing	Proposed	**Difference**
1 year	*10.03*	*21.94*	0.8	1.0	**0.2**	**0.1**	2.2	5.0	**2.8**	3.0	6.0	**2.9**	5.3	17.6	17.6	**0.0**
10 year	*19.92*	*38.92*	0.8	1.0	**0.2**	-	4.4	5.0	**0.6**	5.2	6.0	**0.7**	-	31.3	31.3	**0.0**
30 year	*24.59*	*48.22*	0.8	1.0	**0.2**	**0.3**	5.5	5.0	**-0.5**	6.3	6.0	**-0.3**	11.6	38.7	38.7	**0.0**
100 year	*32.11*	*62.64*	0.8	1.0	**0.2**	**0.4**	7.2	5.0	**-2.2**	8.0	6.0	**-2.0**	15.1	50.3	50.3	**0.0**
100 year + 30%	*41.74*	*81.43*	0.8	1.0	**0.2**	**0.4**	9.3	5.0	**-4.3**	10.1	6.0	**-4.2**	19.6	65.4	65.4	**0.0**
100 year + 40%	*44.95*	*87.70*	0.8	1.0	**0.2**	**0.4**	10.0	5.0	**-5.0**	10.8	6.0	**-4.9**	21.1	70.4	70.4	**0.0**

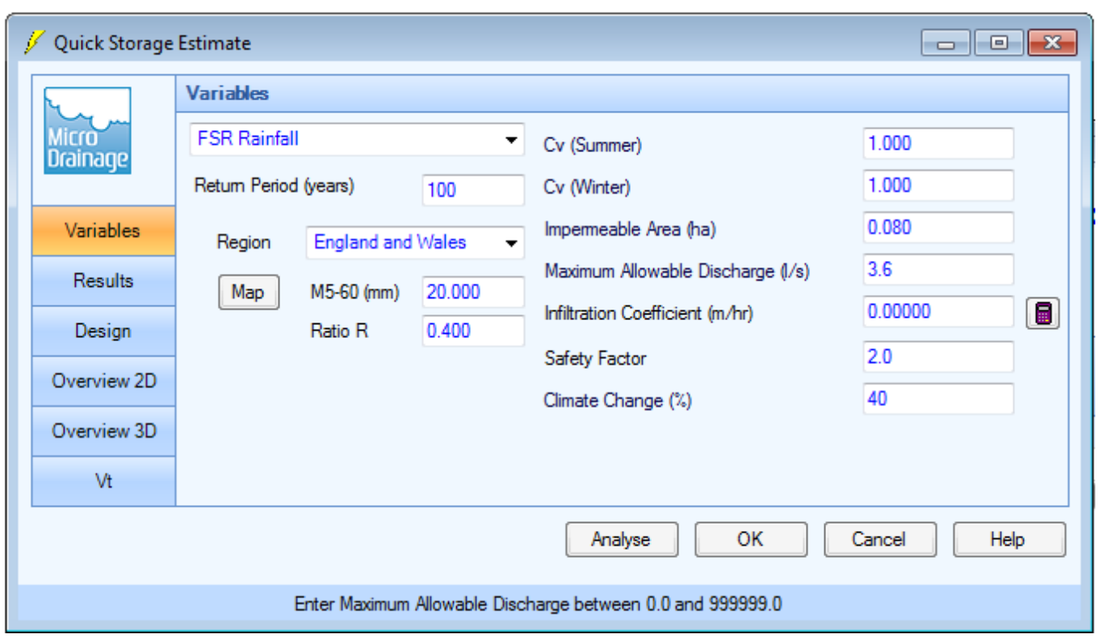
Notes
Peak Flow is Wallingford Rational method based on 30 minute storm duration
Peak Flow is Wallingford Rational method based on 6 hour storm duration

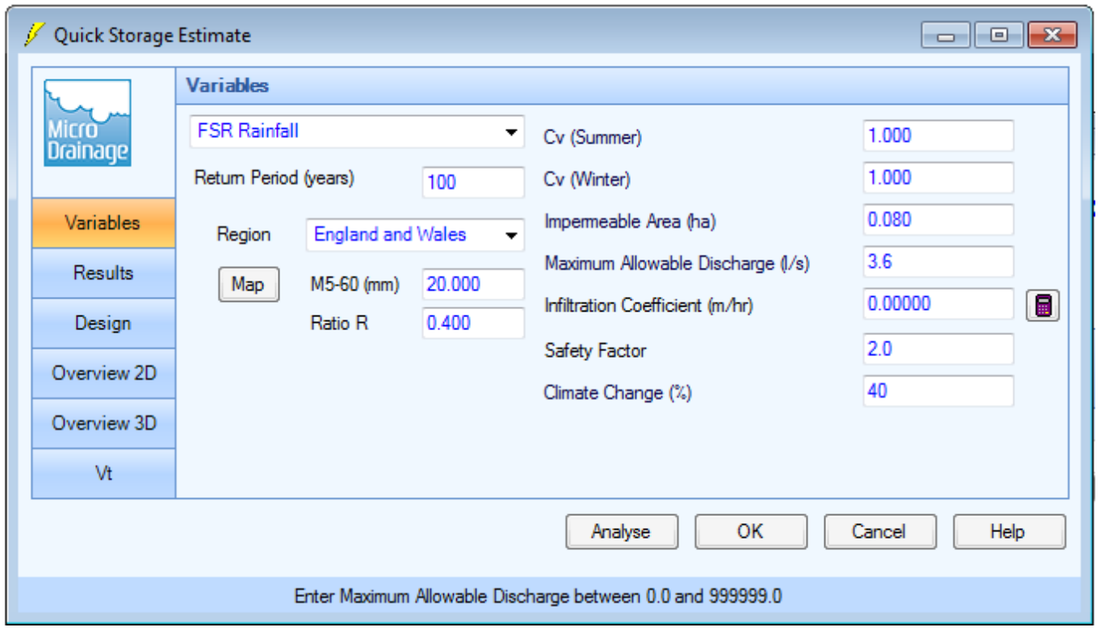
Storage Required to Meet Greenfield Runoff Rates



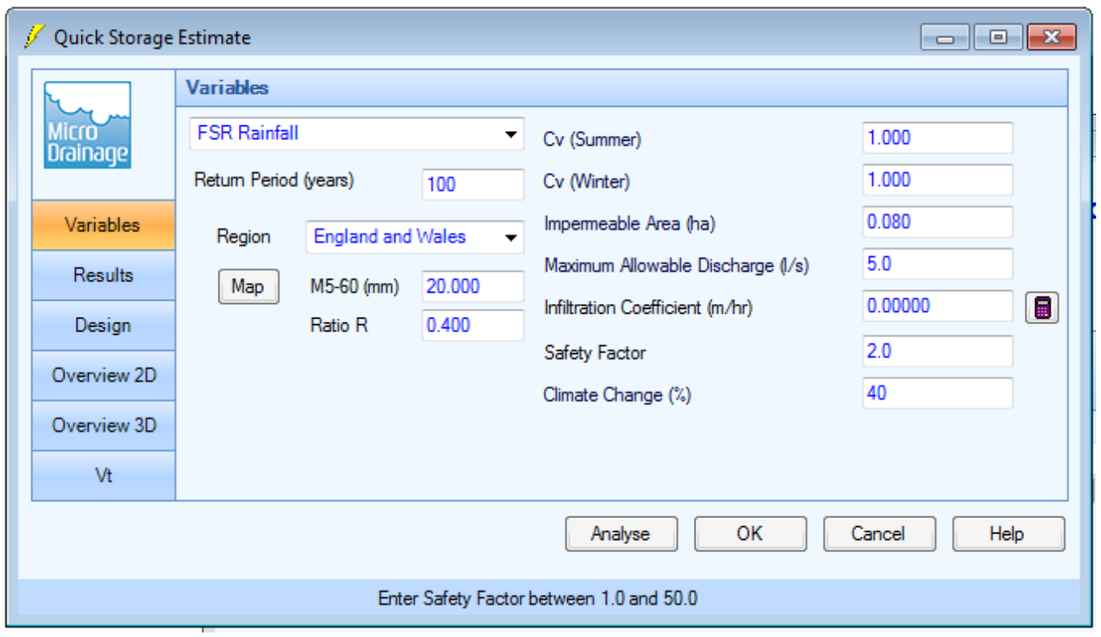


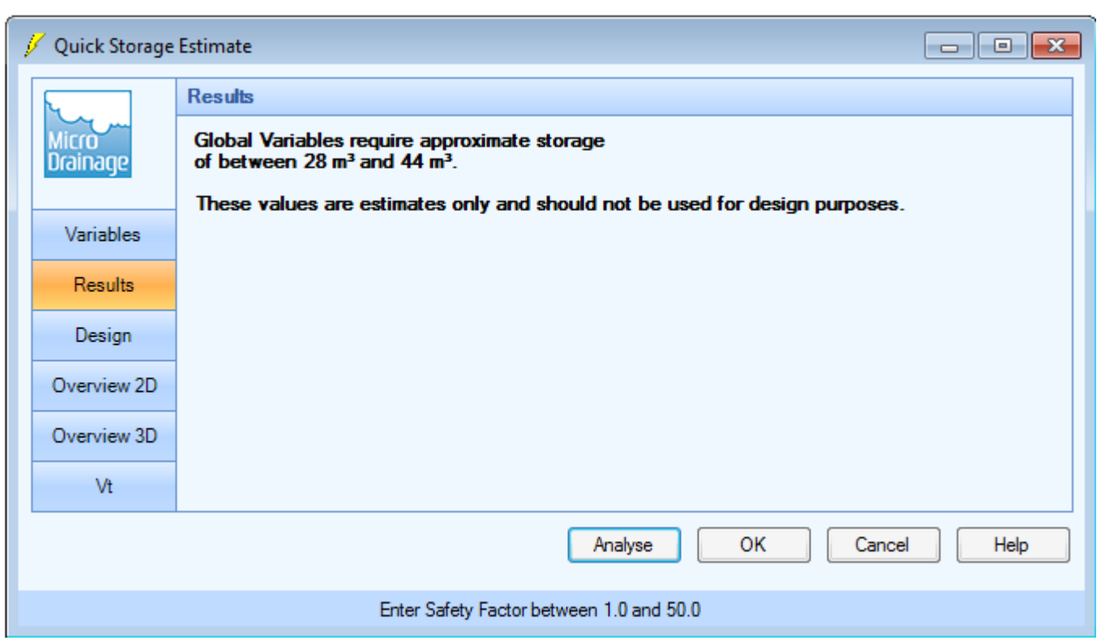
Storage Required to Reduce Rates by 50%





Storage Required to Reduce Rates to 5 l/s





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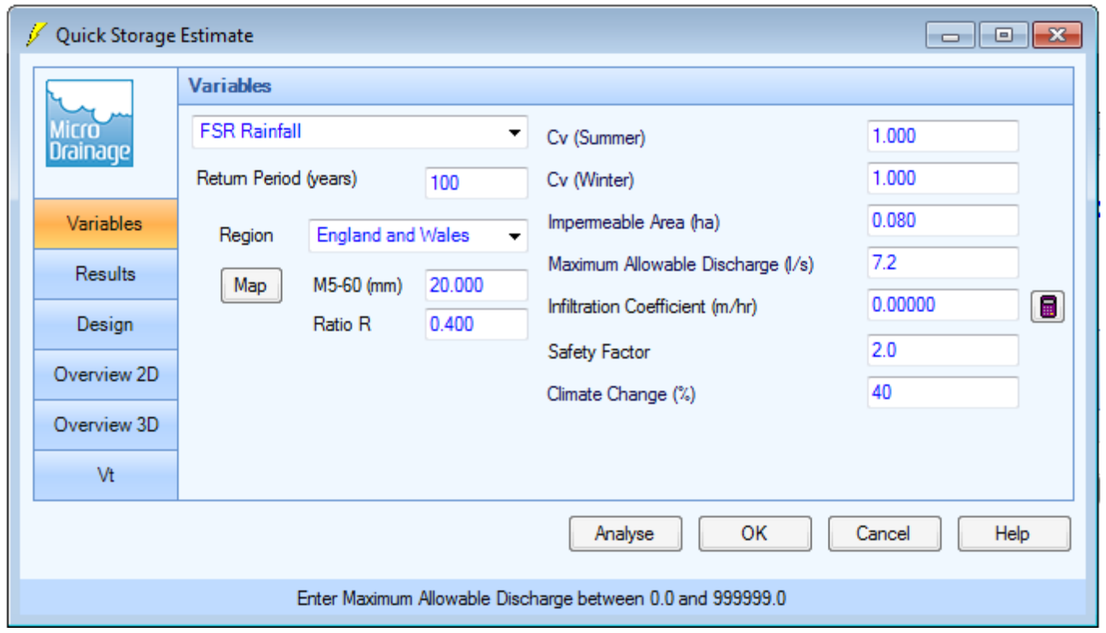
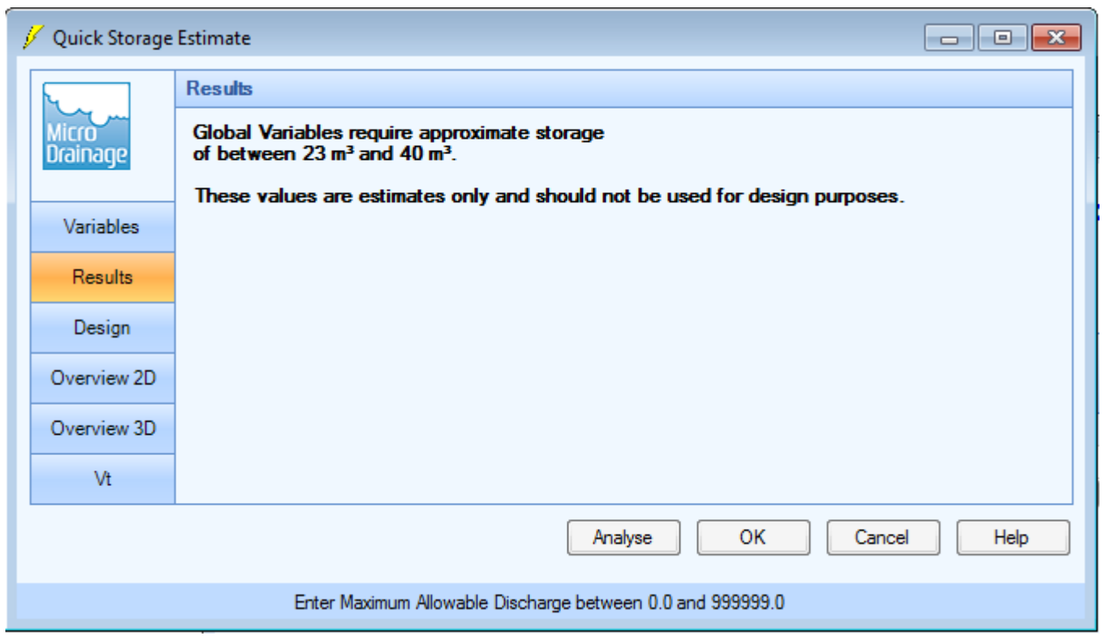
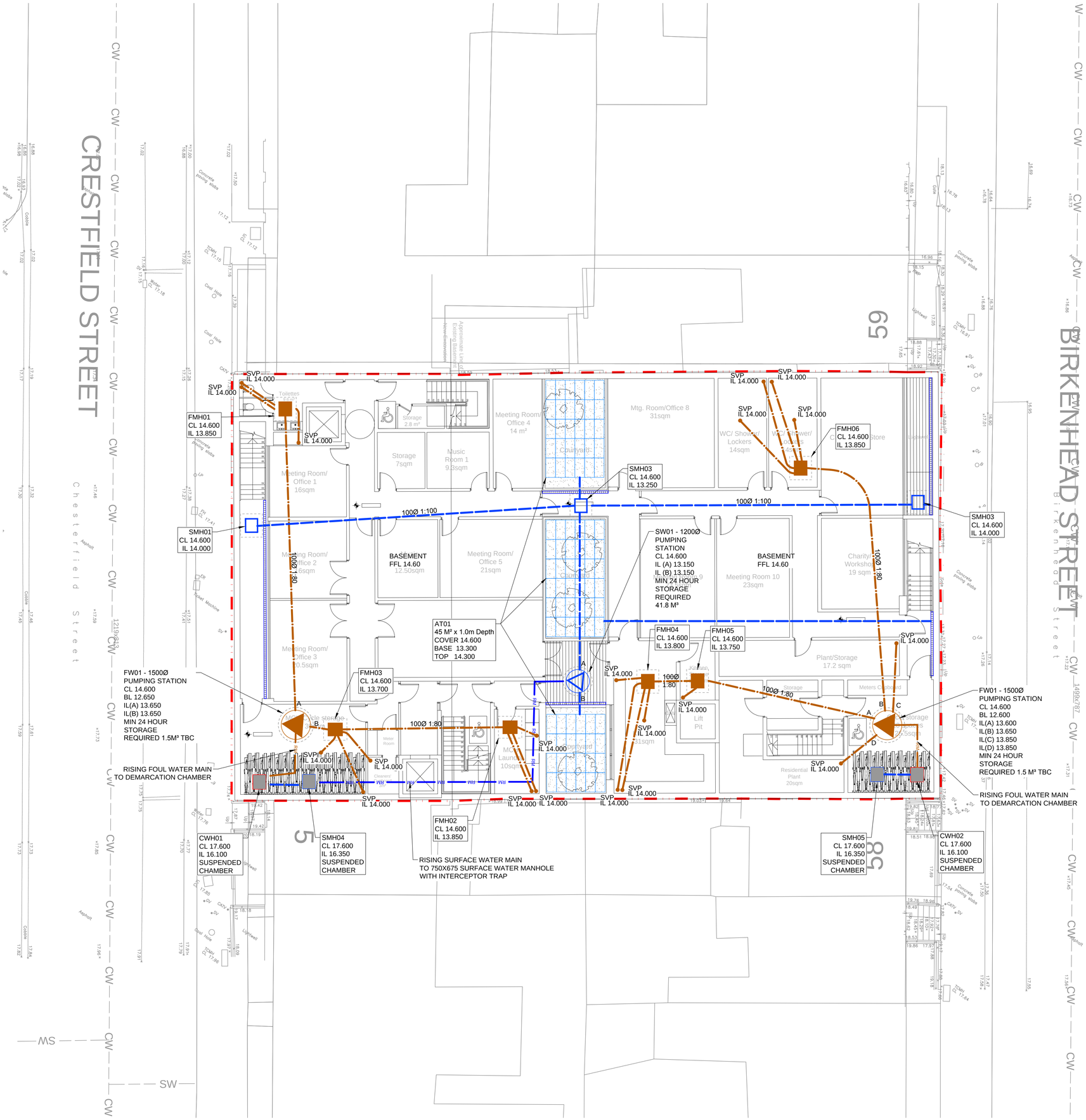




APPENDIX E DRAINAGE STRATEGY LAYOUTS



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LEGEND

- DEVELOPMENT BOUNDARY
- PRIVATE SURFACE WATER PIPE
- NEW PRIVATE SURFACE PUMP STATION
- PRIVATE SURFACE RISING MAIN
- PRIVATE SURFACE WATER PIPE
- PRIVATE FOUL RISING MAIN
- NEW PRIVATE FOUL PUMP STATION
- NEW PRIVATE SURFACE WATER MANHOLE
- NEW PRIVATE FOUL WATER MANHOLE
- RAIN WATER PIPE (INDICATIVE ONLY)
- PROPOSED SOIL VENT PIPE (INDICATIVE ONLY)
- NEW PRIVATE COMBINED WATER RECTANGULAR MANHOLE
- PROPOSED COMBINED WATER SEWER
- ACO DRAIN CHANNEL
- GEOCELLULAR ATTENUATION TANK

EXISTING DRAINAGE

- EXISTING COMBINED WATER

DESIGN NOTES :

EXISTING SITE AREA:	803 M²
SITE AREA:	803 M²
TOTAL EXISTING IMPERMEABLE AREA:	803 M²
TOTAL PROPOSED IMPERMEABLE AREA:	803 M²
PROPOSED SURFACE WATER DISCHARGE RATE BASED ON GREENFIELD RATE:	
1 IN 1 YEAR	0.1 L/S
1 IN 30 YEAR	0.3 L/S
1 IN 100 YEAR	0.4 L/S
PROPOSED RESTRICTED SURFACE WATER DISCHARGE RATE	5.0 L/S
TOTAL ATTENUATION FOR 100YS + 40%CC:	**41.0 M³**
PROPOSED PEAK FOUL WATER :	1.92 L/S

ATTENUATION NOTES

ABG BLUE ROOF - BIO DIVERSE ROOF	TOTAL AREA 356 M² VOLUME 32.3 M³
CELLULAR STORAGE TANK (DESIGNED FOR EMERGENCY STORAGE TO HOLD THE 100 YEAR STORM EVENT + 40%)	41.8 M³
1X SURFACE WATER PUMPING STATION 1200Ø	1.13 M³
TOTAL ATTENUATION	75.23 M³

NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Check
P2	20.02.18	Design & Attenuation Notes Added	JW	TG
P1	19.02.18	Issued for Planning	JW	TG

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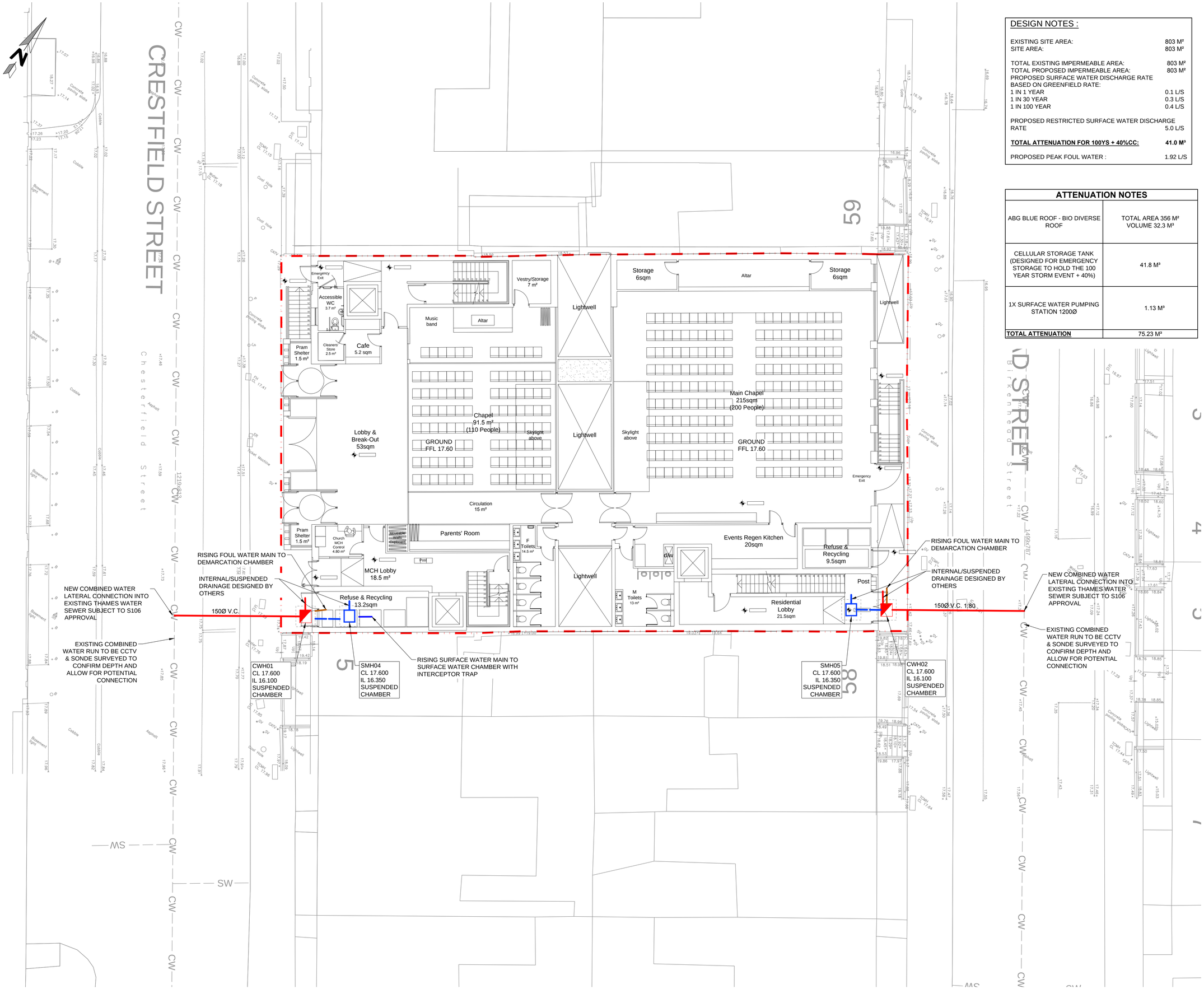
Drawing Status: PRELIMINARY

Project: METHODIST CHUCH KINGS CROSS WC1H

Title: DRAINAGE LAYOUT BASEMENT

Drawing No: **180067-CON-X-00-DR-C-1000**

Date: FEB 2018
Scale: 1:100@A1
Drawn: JP
Engineer: JW
Project No: **180067**
Revision: **P2**



DESIGN NOTES :

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PROPOSED PEAK FOUL WATER :	1.92 L/S

ATTENUATION NOTES

ABG BLUE ROOF - BIO DIVERSE ROOF	TOTAL AREA 356 M² VOLUME 32.3 M³
CELLULAR STORAGE TANK (DESIGNED FOR EMERGENCY STORAGE TO HOLD THE 100 YEAR STORM EVENT + 40%)	41.8 M³
1X SURFACE WATER PUMPING STATION 1200Ø	1.13 M³
TOTAL ATTENUATION	75.23 M³

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LEGEND

- DEVELOPMENT BOUNDARY
- PRIVATE SURFACE WATER PIPE
- RM — PRIVATE SURFACE RISING MAIN
- PRIVATE SURFACE WATER PIPE
- RM — PRIVATE FOUL RISING MAIN
- NEW PRIVATE SURFACE WATER MANHOLE
- NEW PRIVATE FOUL WATER MANHOLE
- RWP — RAIN WATER PIPE (INDICATIVE ONLY)
- SVP — PROPOSED SOIL VENT PIPE (INDICATIVE ONLY)
- NEW PRIVATE COMBINED WATER RECTANGULAR MANHOLE
- PROPOSED COMBINED WATER SEWER

EXISTING DRAINAGE

- CW — EXISTING COMBINED WATER

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Rev	Date	Description	Drawn	Check
P2	20.02.18	Design & Attenuation Notes Added	JW	TG
P1	19.02.18	Issued for Planning	JW	TG

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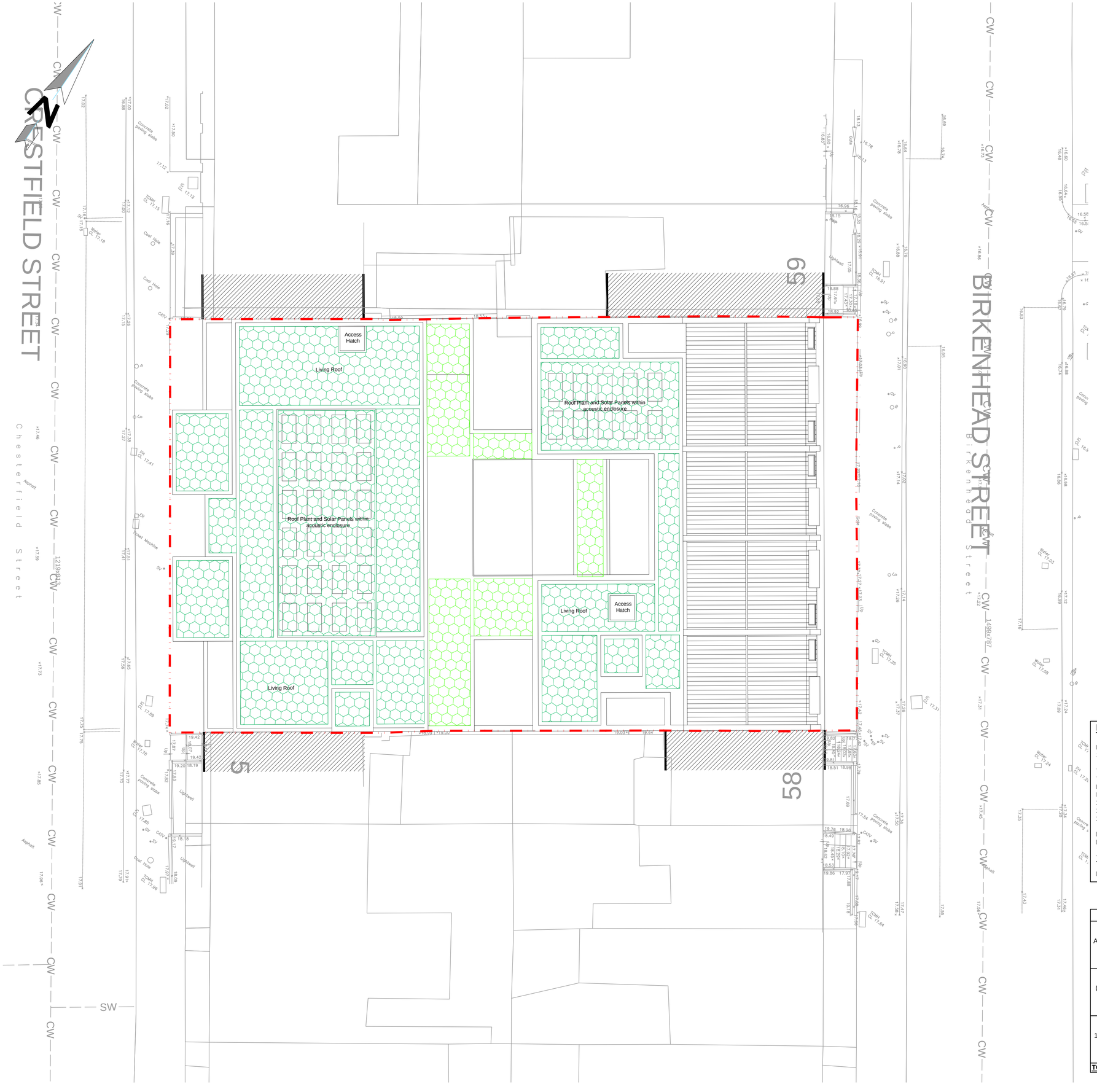
Drawing Status: PRELIMINARY

Project: METHODIST CHUCH KINGS CROSS WC1H

Title: DRAINAGE LAYOUT GROUND LEVEL

Drawing No: **180067-CON-X-00-DR-C-1001**

Date: FEB 2018
Scale: 1:100@A1
Drawn: JP
Engineer: JW
Project No: **180067**
Revision: **P2**



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ATTENUATION ROOF NOTES

1. ROOF DRAINAGE OUTLETS ARE TO BE DESIGNED BY THE M&E ENGINEER IN COMPLIANCE WITH BS EN 12056-3 AND ALL OUTLETS ARE TO BE COORDINATED WITH ROOF DRAINAGE PLANS TO ENSURE ADEQUATE SPACE IS ALLOWED FOR OUTLET CHAMBERS.

2. ONE ROOF WATER OUTLET AS DESIGNATED ON DRAINAGE LAYOUT PLANS IS TO BE INSTALLED USING THE ORIFICE FLOW CONTROL CHAMBER IN ORDER TO PROVIDE A CALCULABLE DISCHARGE FLOW .

3. ALL REMAINING ROOF WATER OUTLETS ARE TO BE INSTALLED USING THE WEIR OVERFLOW CHAMBER IN ORDER TO PROVIDE ADEQUATE DRAINAGE TO COMPLY WITH BS EN 12056-3 IN THE EVENT OF A BLOCKAGE OR ROUTINE MAINTENANCE OF THE ORIFICE FLOW CONTROL OUTLET.

4. ALL SVP AND SERVICE PENETRATIONS THROUGH THE ROOF SLAB SHALL BE INSTALLED WITH A WATERPROOF MEMBRANE CLAMPING DETAIL USING AN APPROPRIATE GULLY BODY UNIT.

5. THE MAXIMUM PERMISSIBLE COMPRESSIVE LOAD TO BE LOCATED ABOVE THE ATTENUATION ROOF IS 700KN/M²

6. WHERE A GREEN ROOF SURFACE BUILD-UP IS REQUIRED A SUITABLE ROOT BARRIER MEMBRANE IS TO BE SPECIFIED BY THE ARCHITECT TO ENSURE THAT NO ROOTS PENETRATE THE ATTENUATION LAYER TO AVOID ANY RISK OF SILT BUILD UP AND BLOCKAGES.

7. PRIOR TO INSTALLATION OF FLOW CONTROLS, 24 HOURS NOTICE SHOULD BE GIVEN TO THE DESIGN ENGINEER SO THAT OUTLET CHAMBERS CAN BE INSPECTED BEFORE CONNECTION TO THE DRAINAGE SYSTEM IS MADE.

8. INSULATION AND WATERPROOFING DETAILS ARE TO BE SPECIFIED BY THE ARCHITECT.

9. PERMATEX WICKING GEOTEXTILE SHALL BE USED TO SATURATE THE SUBSTRATE WHERE GREEN ROOF SURFACE BUILD-UPS ARE SPECIFIED. THE DESIGNED GEOTEXTILE ENABLES CAPILLARY ACTION UPTAKE OF WATER FROM THE ATTENUATION RESERVOIR TO THE SUBSTRATE.

LEGEND

DEVELOPMENT BOUNDARY

BLUE ROOF SYSTEM
ROOF LEVEL

BLUE ROOF SYSTEM
GROUND & 1ST FLOOR LEVEL

EXISTING DRAINAGE

CW EXISTING COMBINED WATER

DESIGN NOTES :

EXISTING SITE AREA:	803 M²
SITE AREA:	803 M²
TOTAL EXISTING IMPERMEABLE AREA:	803 M²
TOTAL PROPOSED IMPERMEABLE AREA:	803 M²
PROPOSED SURFACE WATER DISCHARGE RATE BASED ON GREENFIELD RATE:	
1 IN 1 YEAR	0.1 L/S
1 IN 30 YEAR	0.3 L/S
1 IN 100 YEAR	0.4 L/S
PROPOSED RESTRICTED SURFACE WATER DISCHARGE RATE	5.0 L/S
TOTAL ATTENUATION FOR 100YS + 40%CC:	**41.0 M³**
PROPOSED PEAK FOUL WATER :	1.92 L/S

ATTENUATION NOTES

ABG BLUE ROOF - BIO DIVERSE ROOF	TOTAL AREA 356 M² VOLUME 32.3 M³
CELLULAR STORAGE TANK (DESIGNED FOR EMERGENCY STORAGE TO HOLD THE 100 YEAR STORM EVENT + 40%)	41.8 M³
1X SURFACE WATER PUMPING STATION 1200Ø	1.13 M³
TOTAL ATTENUATION	75.23 M³

NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Check
P2	20.02.18	Design & Attenuation Notes Added	JW	TG
P1	19.02.18	Issued for Planning	JW	TG

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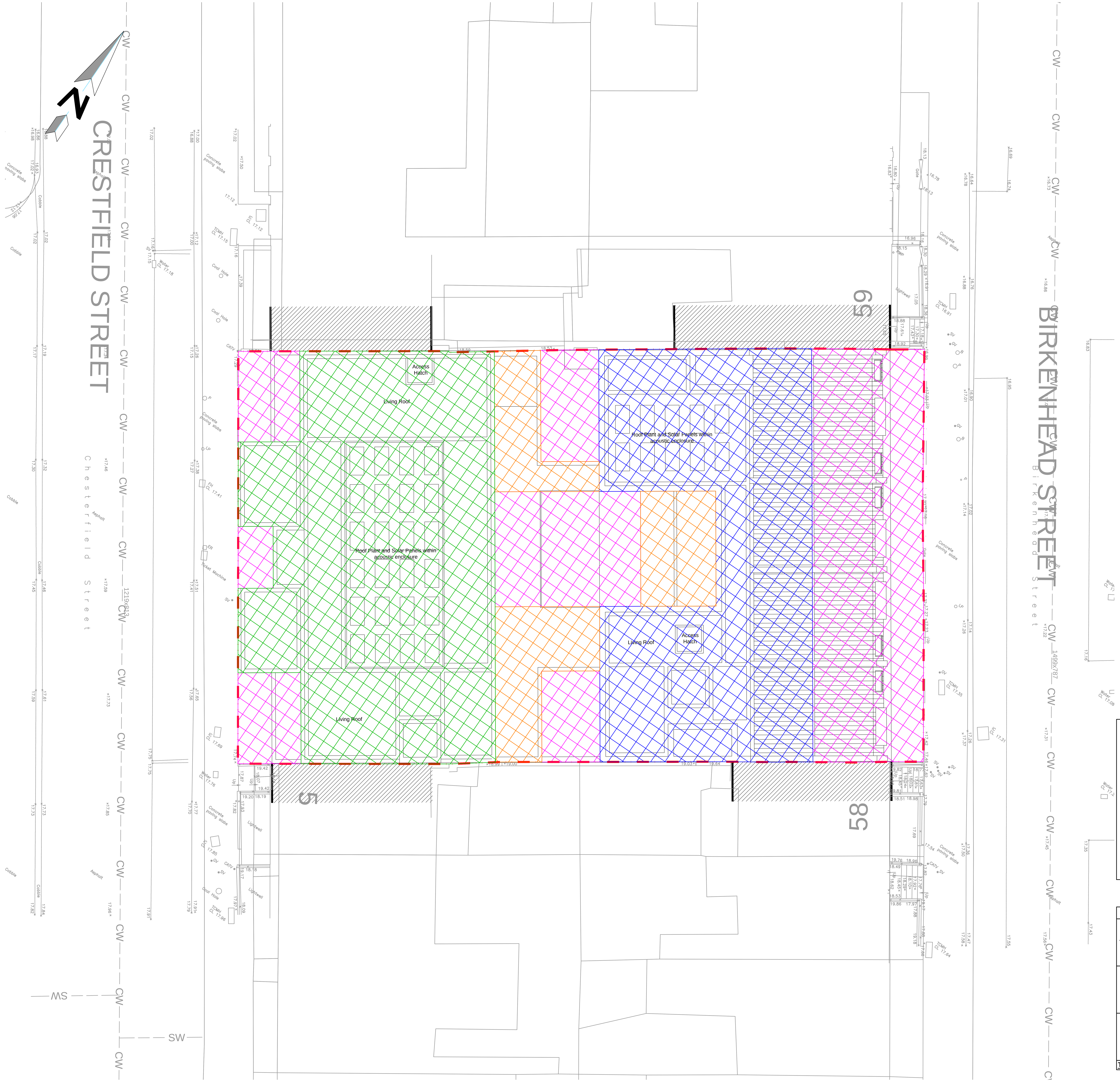
Drawing Status
PRELIMINARY

Project
METHODIST CHUCH
KINGS CROSS WC1H

Title
DRAINAGE LAYOUT
ROOF

Drawing No
180067-CON-X-00-DR-C-1002

Date FEB 2018
Scale 1:100@A1
Drawn JP
Engineer JW
Project No **180067**
Revision **P2**



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LEGEND

- DEVELOPMENT BOUNDARY
- UNCONTROLLED TO SURFACE WATER PUMP 250 M²
- EASTERN 150 MM BLUE ROOF SYSTEM 1.0 L/S 211 M²
- CENTRAL 95 MM BLUE ROOF SYSTEM 0.5 L/S 79 M²
- WESTERN 95 MM BLUE ROOF SYSTEM 0.5 L/S 262 M²

DESIGN NOTES :

EXISTING SITE AREA:	803 M²
SITE AREA:	803 M²
TOTAL EXISTING IMPERMEABLE AREA:	803 M²
TOTAL PROPOSED IMPERMEABLE AREA:	803 M²
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1 IN 30 YEAR	0.3 L/S
1 IN 100 YEAR	0.4 L/S
PROPOSED RESTRICTED SURFACE WATER DISCHARGE RATE	5.0 L/S
TOTAL ATTENUATION FOR 100YS + 40%CC:	**41.0 M³**
PROPOSED PEAK FOUL WATER :	1.92 L/S

ATTENUATION NOTES

ABG BLUE ROOF - BIO DIVERSE ROOF	TOTAL AREA 356 M² VOLUME 32.3 M³
CELLULAR STORAGE TANK (DESIGNED FOR EMERGENCY STORAGE TO HOLD THE 100 YEAR STORM EVENT + 40%)	41.8 M³
1X SURFACE WATER PUMPING STATION 1200Ø	1.13 M³
TOTAL ATTENUATION	75.23 M³

NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Check
P2	20.02.18	Hatch Colour Updated	JW	TG
P1	19.02.18	Issued for Planning	JW	TG

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Drawing Status: PRELIMINARY

Project: METHODIST CHUCH KINGS CROSS WC1H

Date: FEB 2018

Scale: 1:100@A1

Drawn: JP

Engineer: JW

Title: CATCHMENT PLAN

Project No: **180067**

Drawing No: **180067-CON-X-00-DR-C-1003**

Revision: **P2**

APPENDIX F SUSTAINABLE DRAINAGE MAINTENANCE PLAN

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Consulting Civil Engineers

King's Cross Methodist Church, WC1H 8BW

Sustainable Drainage Maintenance Plan

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Norwich
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Norwich NR3 1HA
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Cambridge
47 – 51 Norfolk Street
Cambridge CB1 2LD
Telephone 01223 656 058

design@conisbee.co.uk
www.conisbee.co.uk

Ref: 180067/J Waugh

Approved By: Tapiwa Gavaza

Date: 15 Feb 2018

Version: 1

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2.0 Organisation Responsible 3

3.0 Conventional Drainage Systems 3

4.0 SuDS Features 4

5.0 SuDS Programme 7

6.0 Operation and Maintenance Manual Records 7

1.0 INTRODUCTION

The purpose of this document is to outline the proposed maintenance schedule for the drainage system and all SuDS features for the proposed development of Kings Cross Methodist Church.

The maintenance schedule set out here complies with the CIRIA SuDS Manual (C753), which is identified as providing current best practice in the industry. The report does not replace manufacturers' requirements and these should be followed for each product in addition to the information in this document.

For the proposed extents of SuDS features on a plan drawing, please refer to the separate drainage layout plans and drainage strategy report.

2.0 ORGANISATION RESPONSIBLE

The client, West London Mission Circuit of the Methodist Church (WLM), will be responsible for undertaking maintenance of the proposed drainage for the whole life of the site.

3.0 CONVENTIONAL DRAINAGE SYSTEMS

3.1 Gullies, Silt Traps, Manholes, Catchpits & Pipework

On completion of construction, the internal surfaces of the sewers and manholes shall be thoroughly cleansed to remove all deleterious matter, without such matter being passed forward into the existing sewers.

All trapped gullies, silt traps, manholes and catchpits are to be regularly inspected every three months and cleared out on a regular frequency for the first nine months. After this period, the frequency can be reduced to every six months.

All drainage runs will be inspected once a year. The system is to be jetted clear if/when necessary.

3.2 Flow controls & Pumps

The inspection chambers and manholes containing the flow controls and pumps are to be regularly inspected once a year and any debris and silt are to be removed from the sump and manhole.

Blue roof flow controls and basement pumps should be maintained in accordance with the manufacturer's requirements.

4.0 SUDS FEATURES

4.1 Introduction

The following SuDS measures are proposed for the Kins Cross Methodist Church:-

- Below Ground Attenuation Tank
- Blue Roof & Green Roof

During the first year of the operation of all types of SuDS should be inspected at least monthly and after significant storm events to ensure that the system is functioning as designed and that no damage or faults are evident.

It is recommended that a report on the condition of the SuDS is undertaken further to an inspection at least once annually.

4.2 Below ground attenuation tank

Regular maintenance and inspection of below ground attenuation tanks are required to ensure the effective long term operation of attenuation tanks. The main activity is associated with dealing with debris and silt.

Before connecting a newly constructed upstream drainage system to an attenuation tank, the new drainage system should be jetted and cleaned thoroughly.

Table 1 provides the proposed operation and maintenance regime for the attenuation tanks. This is adapted from The SuDS Manual (C753).

Table 1: Operation and maintenance requirements for below ground attenuation tank

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal	Annually, or as

	forebays.	requested
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of the tank for sediment build –up and remove if necessary	Every 5 years or as required

4.3 Blue and Green Roofs

All blue and green roofs will be an extensive type build up. The green roof growing medium provides a mechanism for water to be intercepted and run-off to be slowed down, as well as insulation to the building, and biodiversity benefits. The roofs designated as blue roof will have a 100mm or 150mm deep drainage layer and flow control chamber.

Where the blue roof / green roof is accessed by residents or tenants, training and guidance information on operating and maintaining the roof should be provided to them.

Table 4 outlines the proposed operation and maintenance regime for the green roof. This is adapted from The SuDS Manual (C753). The manufacturer's specification and maintenance should take precedence over points listed below. The specific maintenance needs of the blue and green roofs should be monitored and maintenance schedules adjusted to suit site specific conditions.

Table 2: Operation and maintenance requirements for blue roof

Maintenance Schedule	Required Action	Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes (if accessible) 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	
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	
	Inspect underside of roof for evidence of leakage	
	Inspect flow control chamber for blue roof	
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	
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required — clippings should be removed and not allowed to accumulate	
	Clean and remove any material blocking the flow control inlet for blue roofs.	
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	

5.0 SUDS PROGRAMME

The proposed SuDS for the site will come on line approximately Summer 2019.

The contractor should ensure that during the construction phase that SuDS are not damaged by construction works.

6.0 OPERATION AND MAINTENANCE MANUAL RECORDS

6.1 Documents to be handed over

Conisbee will provide this document to WLM, who will provide the document to the construction contractor, and WLM will also include it in the Operation and Maintenance Manual.

WLM will have copies of the drainage design drawings which show locations of the proposed SuDS and any ‘as-builts’ provided by the contractor.

6.2 Maintenance Records

WLM will be provided with the standard proforma in Appendix B of The SuDS Manual to enable them to record the outcomes of inspections.