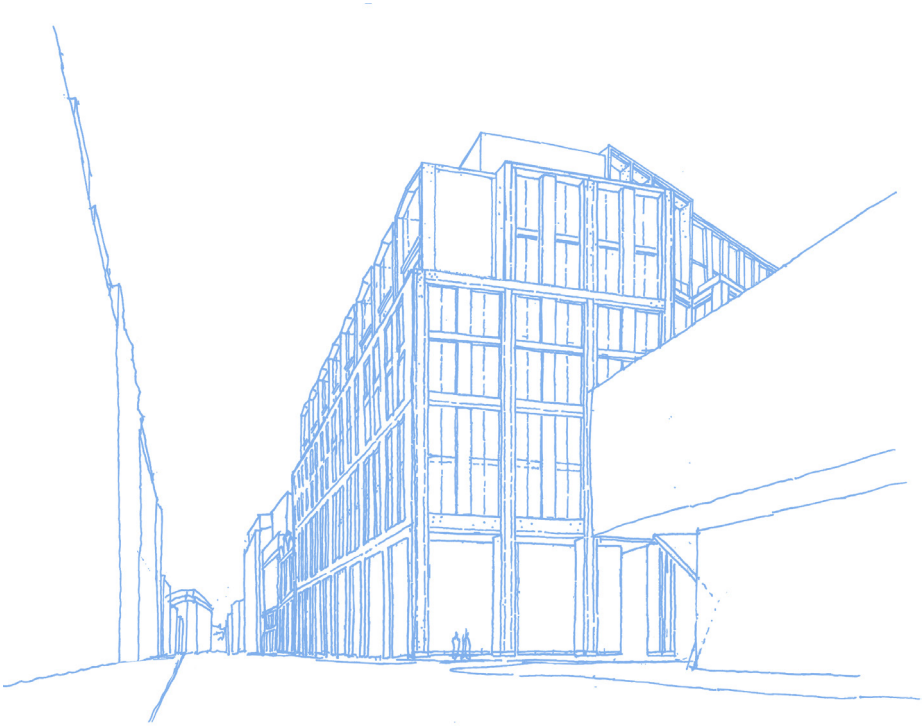
Prepared by Davies Maguire
On behalf of Royal London Mutual Insurance Society

Drainage Strategy Report

Castlewood House & Medius House, WC1A



January 2017

Davies Maguire

Castlewood House

Project No: 15-21

Drainage Strategy Report
DMAG-1521-DSR
January 2017

Produced for Royal London Mutual Insurance Society

20 Flaxman Terrace
London
WC1H 9AT

T +44 (0)20 7388 9406
E info@dmag.com
W dmag.com

Davies Maguire

Contents

REVISION HISTORY:

Rev	Date	Purpose/Status	Document Ref.
P01	25/08/16	Draft Issued For Comment	DMAG-1521-SDR
P02	12/10/16	Issued for Planning	DMAG-1521-SDR
P03	12/01/17	Updated Issue for Planning	DMAG-1521-SDR
P04	17/01/17	Updated with comments	DMAG-1521-SDR
P05	30/01/17	Final Planning Issue	DMAG-1521-SDR

QUALITY CONTROL:

Prepared by:

P. Chaplin / B. Torrance
Associate / Associate

Approved by:

Gareth Davies
Director

1. Executive Summary

The Castlewood House development is a mixed use scheme consisting of demolition of the existing building, at Castlewood House, and construction of a replacement ten storey mixed use building plus ground and two basement levels, and alterations to Medius House including partial demolition, retention of the existing façade and two floor. The site is presently occupied by commercial office buildings and primarily made up of impermeable hardstanding.

The site drainage is assumed to currently discharge into existing combined adopted sewers run adjacent to the site along New Oxford Street. Existing peak drainage discharge rates have been calculated based upon established methods and the calculations are appended to this report. Proposed foul peak discharge rates have been estimated based upon architectural drawings and schedules produced by Robin Partington & Partners.

The London Plan 2016 expects new developments to achieve green field run-off rates. Surface water discharge rates have been based upon a minimum 50% reduction of existing flow rate. This will be achieved through the provision of flow attenuating Sustainable Drainage Systems as discussed within this report.

A pre-development enquiry is yet to be submitted to Thames Water to verify and establish the available capacity within the existing adopted sewerage network to accommodate the proposed discharge from the development site. This will be undertaken during RIBA work stages 3 and 4 with final discharge rates developed during detailed design. In addition to this, an intrusive CCTV survey will be undertaken to verify the precise size, location and levels of all existing on-site drainage systems.

2. Introduction

The assessments and recommendations of this report are based on the information provided below;

- Architectural General Arrangements by Robin Partington & Partners.

2.1. Existing Site Context

The main portion of the existing site comprises Castlewood House, which occupies 77-91 New Oxford Street. It represents a post-war building comprising nine stories of commercial offices and two stories of basement housing office space and plant rooms.

The existing building on the eastern part of the site, Medius House, which occupies 63-69 New Oxford Street, represents five storeys of office, plus basement with a retail ground floor.

The building between Castlewood House and Medius House at 73-75 New Oxford Street comprises a four-storey Edwardian building. There are premises to the rear referenced the Bucknall Street Warehouses that occupies 12 Dyott Street and 2-4 Bucknall Street. These are mainly brick buildings dating from the 19th century.

The Castlewood House element of the site is proposed for redevelopment into a ten storey commercial office space over retail premises at ground floor/grade level and two basement levels.

Alterations to Medius House include partial demolition, retention of the existing façade and two floor extension to provide 20 affordable housing units.

The site is located at National Grid reference 181400N-529950E and occupies an overall area of 0.30ha.

Figure 1: Site Plan

2.2. Existing Drainage Consideration

The existing foul & surface water drainage from the development site is assumed to discharge into below ground combined public sewers beneath New Oxford Street and Earnshaw Street; this assumption is based on the Thames Water asset records for the area.

An intrusive CCTV investigative Survey is required to identify the precise route and on-site existing drainage arrangements particularly at the location of discharge points for both Foul and Surface Water from the existing development buildings into the utility sewerage network.

The existing peak discharge rate into the public sewer from the site has been calculated as follows. Existing peak discharge rates;

- Foul water – 15.02 l/s (10.24 l/s Castlewood + 4.78 l/s Medius) - (based on peak design flow rate to BS EN 12056-2:2000 table 2)
- Surface water – based on Wallingford procedure “Modified Rational Method” using FSR Rainfall Data
- The Castlewood House development site (Area = 0.260ha).
- The Medius House development site (Area = 0.044ha).

Table 1 - Existing Peak Surface Water Discharge Rate – Castlewood House

Storm Event	$Q_{1\ year}$	$Q_{30\ year}$	$Q_{100\ year}$
Discharge Rates (L/s)	21.83	53.61	89.99

- *without Climate Change*
- *hardstanding area of 3,830m^2 with peak runoff rates calculated for M5-15*

Table 2 - Existing Peak Surface Water Discharge Rate – Medius House

Storm Event	$Q_{1\ year}$	$Q_{30\ year}$	$Q_{100\ year}$
Discharge Rates (L/s)	3.7	9.07	15.23

- *without Climate Change*
- *hardstanding area of 430m^2 with peak runoff rates calculated for M5-15*

3. Design Standards and Criteria

3.1.1. It is proposed that all below ground surface and foul water drainage from the site is to be collected within separate gravity networks, where new systems are to be provided and installed, and thereon discharged off site to the adjacent Thames Water utility sewerage network within New Oxford Street.

3.1.2. Self-cleansing velocity in the foul & surface water drainage networks will be achieved in all instances and flows will generally be kept above 0.75 m/s and 1 m/s respectively within the pipelines to ensure that self-cleansing velocities are achieved. This is subject to the condition, location and level of the existing off-site below ground drainage and sewerage systems.

3.1.3. The development will be drained by dedicated and fully segregated surface and foul water systems designed in accordance with the following documents (where appropriate);

- Building Regulations - Approved document H;
- BS EN 12056: Parts 1-5: Gravity Drainage Systems Inside Buildings
- BS EN 752: Drain and Sewer Systems outside buildings
- Sustainable Drainage Systems - Design manual for England and Wales (CIRIA)
- Sewers for Adoption - 7th edition
- BS 8000-14: Workmanship On Building Sites: Code Of Practice For Below Ground Drainage
- The Local Authorities guidelines, rules and regulations (such as London Plan 2011)

3.1.4. To give a long design life, with minimum embodied energy, the buried pipe work will generally be vitrified clay where possible and cast iron when laid below or casting within or through new building foundations or the buildings structure. Chambers will generally be either polypropylene inspection chambers (if less than 1.2m to invert) or pre-cast concrete manholes (deeper than 1.2m to invert and in vehicle access areas), this is subject to availability of space for safe means of access. Non-entry polypropylene inspection chambers will be used where required up to depth of 3.0m. Foul drains will generally be DN150 in order to minimise the risk of blockage while connections from appliances and stacks will generally be DN100 in order to maintain self-cleansing flows.

3.1.5. The actual below ground drainage sizes will be determined once the sanitary discharge flow rates are available from Building Services Engineers; this will be developed during the design development stages.

3.1.6. It is envisaged that four surface water related credits will be targeted to achieve suitable BREEAM rating, and the fifth available credit will be considered during detailed design.

4. Existing Site Constraints with Public Sewers

4.1.1. The existing sites drainage outfall systems and sewerage connections into the Public utility Sewers will be retained and utilized, where possible, to avoid the need for any excavation within the busy highway (New Oxford Street) and in close proximity to existing live utility services and in public footway and highway. Due to the size, likely proximity and levels of the existing outfall connections it is likely that new communication pipes and connections will be required to serve the proposed development.

4.1.2. Restriction in the potential implementation of on-site SuDS and use of infiltration systems are unlikely to be viable due to the presence of shallow London Clay strata beds. These limitations will lead to the requirement for a positive discharge of surface water into off-site surface water sewerage systems. This assumptions with regards unfavourable permeable ground conditions below the site will be confirmed by site investigation survey works.

5. Stakeholder Consultations

5.1. Thames Water

5.1.1. A pre-development enquiry to Thames Water is required; this application is for Thames Water to understand proposals to connect to their sewers adjacent the proposed development site. The purpose of this application is to establish the capacity available in existing adopted utility sewerage network to accommodate the proposed discharge from the development site. Due to the size of the existing development and the proposed reduction in surface water discharge that is to be implemented, it is not envisaged that there will be capacity issues regarding the existing off-site utility sewerage systems.

5.1.2. The pre-development enquiry will include the option for reuse of existing outfall systems and sewerage connections into the public utility sewer network.

5.1.3. It is envisaged that a targeted minimum 50% reduction in the proposed peak surface water discharge rate in comparison to existing peak discharge rate will need to be accommodated. This will need to be confirmed with Thames Water guidelines given in the London Plan 2016. Confirmation of the public sewer capacity for the proposed foul water discharge rates from the new development is required. The increase in foul and waste water discharge units from the proposed development will reflect in foul water rates being increased from that discharged from the existing buildings on the site.

6. Proposed Drainage

6.1. Surface Water Drainage

6.1.1. The proposed surface water drainage strategy is based on an assumption of targeted minimum 50% net reduction in the peak discharge rate to an existing adopted network. Considering the proposed site layout and type of development, it is proposed that the surface water be attenuated primarily at roof level(s). If provided to supplement the roof attenuation requirements, attenuation tank or reservoirs will require location below ground, ideally at B1 basement level, to facilitate gravity discharge off-site with a restricted discharge to be connected to the existing Thames Water network. The precise outfall locations and discharge rates will be confirmed with Thames Water during the future Developed and Detailed Design stages.

6.1.2. Surface water attenuation at roof level will comprise blue roofing arrangements, these being located at the terrace levels of the building and on the upper roof levels(s) to manage storm water flows at source. The blue roof will provide a maximum 100mm of water attenuation over each of the noted areas facilitated by pre-formed polycarbonate cellular units positioned below either paved or blue roof surfacing. It is highlighted that the attenuation requirements are to be located within the redeveloped Castlewood House and Medius House elements of the scheme. Please refer to the Appendices for the attenuation volumes and proposed locations to meet the storm water management requirements.

6.1.3. The peak discharge rate from the proposed development for a 1 in 100 year return period will include an allowance for climate change in accordance with the guidelines published in the NPPF 2012. Depending on the design life of the development, 20% or 40% additional allowance in the rainfall intensity is required in the design. As a conservative approach, 40% allowance due to climate change has been considered in the design at this design development stage.

6.1.4. Please refer to below tables for the proposed surface water flow rates.

Table 3 - Proposed Peak Surface Water Discharge Rates - Castlewood House

Storm Event	$Q_{1\ year}$	$Q_{30\ year}$	$Q_{100\ year}$
Discharge Rates (l/s)	21.8	53.6	69.2
50% REDUCTION (London Plan) (l/s)=	10.9	26.8	34.6
Quick Storage Estimate (m^3) =			76

Table 4 - Proposed Peak Surface Water Discharge Rates - Medius House

Storm Event	$Q_{1\ year}$	$Q_{30\ year}$	$Q_{100\ year}$
Discharge Rates (l/s)	3.7	9.1	11.7
50% REDUCTION (London Plan) (l/s)=	1.85	4.55	5.85
Quick Storage Estimate (m^3) =			15

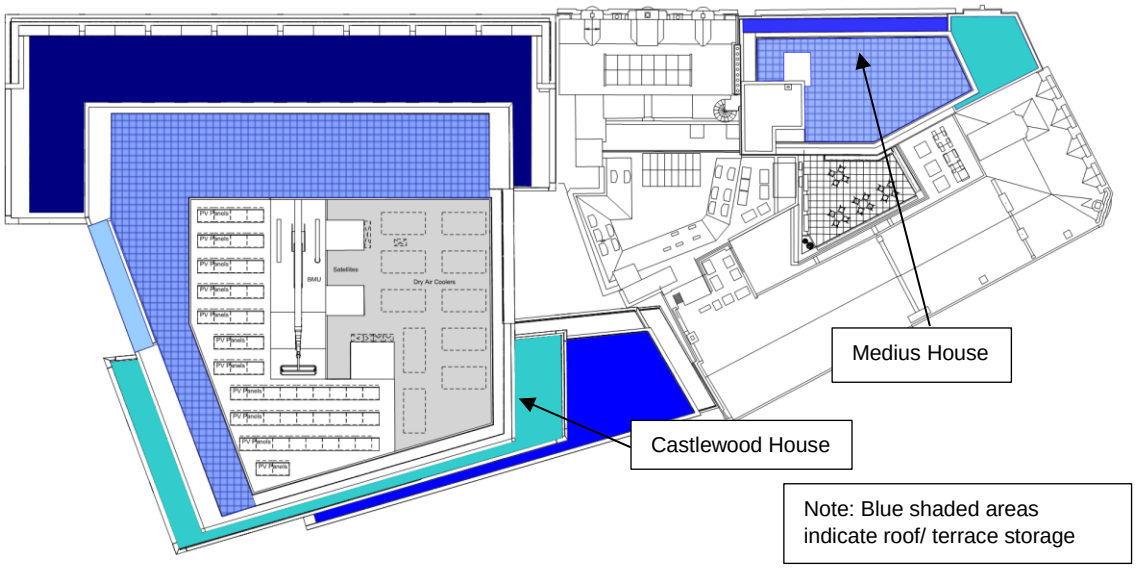


Figure 2: PROPOSED ROOF & TERRACE LEVEL ATTENUATION PLAN

6.1.5. The surface water will be primarily attenuated at roof level. This will be facilitated by a combination of blue roof systems comprising a sub-strate build-up with raised cellular storage arrangements. A flow control device, orifice plate or hydro-brake type flow control device will be incorporated to restrict the proposed discharge rate as appropriate. The proposed connection to the Thames Water public utility sewer will be via a demarcation manhole and outfall systems located within the site boundary.

6.1.6. The proposed connection applications into existing public sewers will be made to Thames Water under Section 106 of the Water Industry Act 1991.

6.2. Proposed Foul Water Drainage

6.2.1. The foul water drainage strategy is based on the unrestricted discharge rate from the development into existing Thames Water sewers assumed to be beneath New Oxford Street. The precise location and discharge rate will be confirmed with Thames Water during the next design stages.

6.2.2. Based on the proposed scheme proposals and sanitary provisions/layout, the peak foul water discharge rates have been calculated in accordance with BS EN 12056 Part 2 for the office units as shown below. The peak discharge rate will increase from 15.02 l/s to 15.14l/s, based upon proposed sanitary provisions and fixtures as detailed in Tables 5 and 6 below:

Castlewood House (New)	
Unit Floor Arrangement	Unit Floors
6 Gullies, 2 Toilet, 2 Basin	Basement L02
22 showers, 6 Toilets, 6 Basins, 3 Urinals, 1 Sink, 1 Kitchen Facility	Basement L01
2 Toilets, 2 Basins, 6 Retail Sinks	Ground Floor
82 Toilets, 82 Basins, 24 Urinals & 8 total Kitchen Sink Facilities	1st Floor to 8th Floor
7 Toilets, 7 Basins, 3 Urinals & 1 Kitchen Sink Facility	9th Floor

Medius House (New)	
Unit Floor Arrangement	Unit Floors
3 Floor Gullies, 1 Basin and 1 Sink	Basement
1 Toilets, 1 Basin, 1 Sink, 1 Shower, 1 Gully	Ground Floor
25 Toilets, 25 Basins, 20 Baths, 6 showers, 24 Kitchen Sinks with WM/DW	1st Floor to 7th Floor

6.2.3. It is envisaged that all building drainage will discharge to outfall systems, routed internally, at ground level/high level basement B1 under gravity to the external foul water drainage and sewerage network. Foul and waste water will thereon be discharged via gravity, off site, to the existing public sewers.

6.3. External Landscape Drainage

6.3.1. Where external public realm surface water drainage is required, such areas will be provided with suitably trapped gullies and linear slot-type channel drains recessed within the paved finishes. All drainage gullies and channel drains will comprise suitable silt traps and sumps to collect rainwater debris and prevent blockage of drainage pipelines. The discharge from these channels will be taken in to the common site surface water drainage network above the basement podium slab level and conveyed under gravity to the sewerage outfall systems.

7. SUDS Analysis

7.1.1. Surface water drainage systems will be developed in line with sustainable development collectively referred to as Sustainable Drainage Systems (SuDS). The objective of SuDS is to minimise the impact of the development on the quantity and quality of site runoff, and maximise amenity and biodiversity opportunities. Surface water sustainable drainage systems will be designed and installed in accordance with Planning Policy Statement 25 (PPS 25) and associated CIRIA 521, 522, 523, 625, 626, 609, 697 and 753 and associated reference documents.

7.1.2. **Castlewood House**

It has been calculated that the proposed attenuation system will require 75m³ of storage, designed to contain a 1 in 100 year storm event (incl. 40% allowance for Climate Change) without causing any flooding on site.

The attenuation volume is based on the proposed hardstanding area being drained at a minimum targeted 50% reduction of the existing flow rate (as per the London Plan). It has been identified that the following options and volumes are available as attenuation mediums;

- Blue Roofs; or
- Below Ground Attenuation Tanks (where required to supplement roof systems)

As previously described, the gravity surface water attenuation systems at roof level(s) will convey the collected rainwater to suitably-sized flow control devices and roof outlets which will discharge it into on site surface water drainage and thereon Thames Water public sewerage network.

The total impermeable area of the new-build Castlewood House is identified as being 0.260ha. Further hydraulic modelling will be required to identify the precise surface water attenuation volumes, upon further Developed Design analysis. The hydraulic modelling criteria used for the purpose of the initial hydraulic modelling and drainage design is as follows;

- FSR Rainfall Data
- M5-60(mm) – 20.9
- Ratio R – 0.438
- Climate Change (+30%) for 1 in 100 year return period
- Impermeable area: 0.260ha
- Maximum Allowable Discharge- 34.6 l/s

7.1.3. **Medius House**

It has been calculated that the proposed attenuation system will require 15m³ of storage designed to contain a 1 in 100 year storm event (incl. 40% allowance for Climate Change) without causing any flooding on site.

The attenuation volume of 15m³ is based on the proposed roofs/hardstanding area being drained at a minimum targeted 50% reduction of existing flow rate (as per the London Plan). It has been identified that the following options and volumes are available as attenuation mediums;

- Blue Roofs

As previously described, the gravity surface water attenuation systems at roof level(s) will convey the collected rainwater to suitably-sized flow control devices and roof outlets which will discharge it into on site surface water drainage and thereon Thames Water public sewerage network.

The total impermeable area of the new-build Medius House site is identified as being 0.044ha. Further hydraulic modelling will be required to identify the precise surface water attenuation

volumes, upon further Developed Design analysis. The hydraulic modelling criteria used for the purpose of the initial hydraulic modelling and drainage design is as follows;

- FSR Rainfall Data
- M5-60(mm) – 20.9
- Ratio R – 0.438
- Climate Change (+40%) for 1 in 100 year return period
- Impermeable area: 0.044ha
- Maximum Allowable Discharge- 5.85 l/s

7.1.4. The above criteria are to be input to the industry standard hydraulic modelling software, XP Solutions Micro Drainage.

8. Conclusions and Actions Moving Forward

8.1.1. It is proposed that the proposed below ground drainage of the Castlewood House development will discharge into the existing Thames Water combined sewer. Below ground drainage will discharge under gravity with the exception of basement drainage which will likely require pumping, depending upon confirmation of the Thames Water sewer invert levels.

8.1.2. Surface water drainage will be attenuated using SuDS. A minimum storage volume of 76m^3 and 15 m^3 will be provided for Castlewood House and Medius House respectively through a combination of roof and below ground storage systems to achieve at least a 50% reduction against existing estimated run off and flow rate, and it is therefore compliant with the London Plan.

8.1.3. A pre-development enquiry is yet to be submitted to Thames Water to verify and establish the available capacity within the existing adopted sewerage network to accommodate the proposed discharge from the development site. This will be undertaken during the future detailed design stage. In addition to this, an intrusive CCTV survey will be undertaken to verify the precise size, location and levels of all existing on-site drainage systems.

8.1.4. In order to progress the below ground drainage design, the following actions will be undertaken in the future detailed design stage:

- Confirmation from Thames Water regards the existing network capacity, from the pre-development application, and confirmation of the foul and surface water peak discharge rates from the site and location of all rainwater and sanitary connection points.
- Workshops with other design team members in relation to the drainage arrangement and to develop attenuation locations.

Appendices

Existing Castlewood House Surface Water Discharge Rates
Existing Castlewood House Foul Water Discharge Rates
Proposed Castlewood House Foul Water Discharge Rates
Castlewood House Quick Storage Estimate & Proposed Drainage Strategy Volumes

Existing Medius House Surface Water Discharge Rates
Existing Medius House Foul Water Discharge Rates
Proposed Medius House Foul Water Discharge Rates
Medius House Quick Storage Estimate & Proposed Drainage Strategy Volumes

Drawings:

Proposed Drainage Site Plan - 15-21-DM-XX-XX-DR-C-010
Proposed Drainage B1 &B2 Levels Plan - 15-21-DM-XX-XX-DR-C-011

LOCATION	**site wide**
Project :	**Medius House**
Project No :	
Title :	**EXISTING FOUL FLOW RATES**
Revision:	**1**

Made by : PMG
Date : 27 September 2016
Checked by : PC
Date : 27 September 2016

APPLIANCE	Discharge Units[1)] (du/l/s)	Number of appliances[2)]	Total of du's (l/s)
Toilet Bowl with flushing box	2	14	28
Basin	0.5	14	7
Bath	0.8	0	0
Shower Tray	0.6	0	0
Kitchen Sink	0.8	7	5.6
Urinal	0.5	0	0
Washing Machine	1.5	0	0
Dishwasher	0.8	7	5.6
Floor Gully	1.5	0	0
Bidet	0.5	0	0
Drinking fountain	0.05	9	0.45
Sprinkling tap	0.3	0	0

(ΣDu) total load (du-l/s) for this location	**46.65**

Total waste flow rate based on equation (l/s) (Qww) = K (√ du's)	**4.78**
Any pumped waste discharge (l/s) (Qp)	**0.00**
Any continuous discharge (e.g. condensate etc) (l/s) (Qc)	**0.00**
Peak design flow rate for stack/location (Qtot) (l/s)	**4.78**

Average flow (l/s)	**0.80** *

*average flow rates dependant upon fitting usage and building operation hours

Frequency of use factors (K)	
Intermittent use-e.g. domestic/guesthouse/	0.50
Frequent use- e.g. Restaurant/Office	0.70
Congested use- e.g. Public use	1.00
Special use- e.g. laboratory	1.20

Enter Frequency of use factor (from above)	**0.70**

Designers notes :

1) Wastewater discharge units in accordance with BS EN 12056-2:2000 table 2

2) The calculations are based on PECS Building Survey drawings and details and DMAG Site Survey of 27.9.16

LOCATION	**site wide**
Project :	**Castlewood House**
Project No :	
Title :	**EXISTING FOUL FLOW RATES**
Revision:	**1**

Made by : PMG
Date : 27 September 2016
Checked by : PC
Date : 27 September 2016

APPLIANCE	Discharge Units[1)] (du/l/s)	Number of appliances[2)]	Total of du's (l/s)
Toilet Bowl with flushing box	2	70	140
Basin	0.5	72	36
Bath	0.8	0	0
Shower Tray	0.6	0	0
Kitchen Sink	0.8	10	8
Urinal	0.5	27	13.5
Washing Machine	1.5	0	0
Dishwasher	0.8	9	7.2
Floor Gully	1.5	6	9
Bidet	0.5	0	0
Drinking fountain	0.05	9	0.45
Sprinkling tap	0.3	0	0

(ΣDu) total load (du-l/s) for this location	**214.15**

Total waste flow rate based on equation (l/s) (Qww) = K (√ du's)	**10.24**
Any pumped waste discharge (l/s) (Qp)	**0.00**
Any continuous discharge (e.g. condensate etc) (l/s) (Qc)	**0.00**
Peak design flow rate for stack/location (Qtot) (l/s)	**10.24**

Average flow (l/s)	**1.71** *

*average flow rates dependant upon fitting usage and building operation hours

Frequency of use factors (K)	
Intermittent use-e.g. domestic/guesthouse/	0.50
Frequent use- e.g. Restaurant/Office	0.70
Congested use- e.g. Public use	1.00
Special use- e.g. laboratory	1.20

Enter Frequency of use factor (from above)	**0.70**

Designers notes :

1) Wastewater discharge units in accordance with BS EN 12056-2:2000 table 2

2) The calculations are based on PECS Building Survey drawings and details and DMAG Site Survey of 27.9.16

Sheet number	**01/01**
Date	**10/01/2017**
Eng	**PMG**
Checked	**PC**

Project Medius House

Estimation of Urban Realm Peak Flow Rate Runoff

The aim of this calculation is to determine the peak discharge runoff rate of the existing brownfield site for 1:30 and 1:100 year return period events based on The Wallingford Procedure 'Modified Rational Method'

Q = Proposed Runoff Rates
C = Dimensionless Coefficient
I = Rainfall Intensity mm/hr
A = Area (ha)

FSR M5-60 = 20.9
Ratio R = 0.438

A = 0.044

$$Q = 2.78 \times C \times I \times A$$

Z1 from Fig A.3b for 15 min duration= 0.625

M5-15 = 0.625 x 21 = 13.0625 mm

Z2 values taken from Table A1 of Volume 4 of Modified Rational Method for 13.063mm rainfall

Storm Event	**$Q_{1\ year}$**	**$Q_{2\ year}$**	**$Q_{10\ year}$**	**$Q_{20\ year}$**	**$Q_{30\ year}$**	**$Q_{100\ year}$**	**$Q_{100\ year + 30\%\ C/C}$**
Ratio Z2	8.03	10.38	16.07	18.65	19.72	25.47	33.11
Average Point Intensity	32.1338	41.5388	64.2675	74.59	78.8975	101.89	132.45
Areal Reduction Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94

Storm Event	**$Q_{1\ year}$**	**$Q_{2\ year}$**	**$Q_{10\ year}$**	**$Q_{20\ year}$**	**$Q_{30\ year}$**	**$Q_{100\ year}$**	**$Q_{100\ year + 30\%\ C/C}$**
Rainfall (mm/hr)	30.21	39.05	60.41	70.11	74.16	95.77	124.51
Discharge Rates (l/s)	3.69	4.78	7.39	8.58	9.07	11.72	15.23

Existing peak surface water runoff (100 year)= 11.7 l/s

Existing peak surface water runoff (30 year) = 9.1 l/s

Existing peak surface water runoff (20 year) = 8.6 l/s

Existing peak surface water runoff (10 year) = 7.4 l/s

Existing peak surface water runoff (1 year) = 3.7 l/s

Sheet number	**01/01**
Date	**10/01/2017**
Eng	**PMG**
Checked	**PC**

Project Castlewood House

Estimation of Urban Realm Peak Flow Rate Runoff

The aim of this calculation is to determine the peak discharge runoff rate of the existing brownfield site for 1:30 and 1:100 year return period events based on The Wallingford Procedure 'Modified Rational Method'

Q = Proposed Runoff Rates
C = Dimensionless Coefficient
I = Rainfall Intensity mm/hr
A = Area (ha)

FSR M5-60 = 20.9
Ratio R = 0.438

A = 0.260

$$Q = 2.78 \times C \times I \times A$$

Z1 from Fig A.3b for 15 min duration= 0.625

M5-15 = 0.625 x 21 = 13.0625 mm

Z2 values taken from Table A1 of Volume 4 of Modified Rational Method for 13.063mm rainfall

Storm Event	**$Q_{1\ year}$**	**$Q_{2\ year}$**	**$Q_{10\ year}$**	**$Q_{20\ year}$**	**$Q_{30\ year}$**	**$Q_{100\ year}$**	**$Q_{100\ year + 30\%\ C/C}$**
Ratio Z2	8.03	10.38	16.07	18.65	19.72	25.47	33.11
Average Point Intensity	32.1338	41.5388	64.2675	74.59	78.8975	101.89	132.45
Areal Reduction Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94

Storm Event	**$Q_{1\ year}$**	**$Q_{2\ year}$**	**$Q_{10\ year}$**	**$Q_{20\ year}$**	**$Q_{30\ year}$**	**$Q_{100\ year}$**	**$Q_{100\ year + 30\%\ C/C}$**
Rainfall (mm/hr)	30.21	39.05	60.41	70.11	74.16	95.77	124.51
Discharge Rates (l/s)	21.83	28.22	43.67	50.68	53.61	69.23	89.99

Existing peak surface water runoff (100 year)= 69.2 l/s

Existing peak surface water runoff (30 year) = 53.6 l/s

Existing peak surface water runoff (20 year) = 50.7 l/s

Existing peak surface water runoff (10 year) = 43.7 l/s

Existing peak surface water runoff (1 year) = 21.8 l/s

LOCATION	**site wide**
Project :	**Medius House**
Project No :	
Title :	**PROPOSED FOUL FLOW RATES - MEDIUS HOUSE BUILDING**
Revision:	**2**

Made by : PMG
Date : 10 January 2017
Checked by : PC

Date : 10 January 2017

APPLIANCE	Discharge Units[1)] (du/l/s)	Number of appliances[2)]	Total of du's (l/s)
Toilet Bowl with flushing box	2	25	50
Basin	0.5	25	12.5
Bath	0.8	20	16
Shower Tray	0.6	7	4.2
Kitchen Sink	0.8	24	19.2
Urinal	0.5	0	0
Washing Machine	1.5	24	36
Dishwasher	0.8	24	19.2
Floor Gully	1.5	4	6
Bidet	0.5	0	0
Drinking fountain	0.05	0	0
Sprinkling tap	0.3	0	0

(ΣDu) total load (du-l/s) for this location	163.1

Total waste flow rate based on equation (l/s) (Qww) = K (√ du's)	6.39
Any pumped waste discharge (l/s) (Qp)	0.00
Any continuous discharge (e.g. condensate etc) (l/s) (Qc)	0.00
Peak design flow rate for stack/location (Qtot) (l/s)	6.39

Average flow (l/s)	1.06 *

*average flow rates dependant upon fitting usage and building operation hours

Frequency of use factors (K)	
Intermittent use-e.g. domestic/guesthouse/	0.50
Frequent use- e.g. Restaurant/Office	0.70
Congested use- e.g. Public use	1.00
Special use- e.g. laboratory	1.20

Enter Frequency of use factor (from above)	0.50

Designers notes :

1) Wastewater discharge units in accordance with BS EN 12056-2:2000 table 2

2)The calculations are based on Robin Partington & Partners drawings and details

LOCATION	**site wide**
Project :	**Castlewood House**
Project No :	
Title :	**PROPOSED FOUL FLOW RATES - CASTLEWOOD HOUSE**
Revision:	**2**

Made by : PMG
Date : 10 January 2017
Checked by : PC

Date : 10 January 2017

APPLIANCE	Discharge Units[1)] (du/l/s)	Number of appliances[2)]	Total of du's (l/s)
Toilet Bowl with flushing box	2	99	198
Basin	0.5	100	50
Bath	0.8	0	0
Shower Tray	0.6	22	13.2
Kitchen Sink	0.8	16	12.8
Urinal	0.5	30	15
Washing Machine	1.5	0	0
Dishwasher	0.8	10	8
Floor Gully	1.5	6	9
Bidet	0.5	0	0
Drinking fountain	0.05	0	0
Sprinkling tap	0.3	0	0

(ΣDu) total load (du-l/s) for this location	306

Total waste flow rate based on equation (l/s) (Qww) = K (√ du's)	8.75
Any pumped waste discharge (l/s) (Qp)	0.00
Any continuous discharge (e.g. condensate etc) (l/s) (Qc)	0.00
Peak design flow rate for stack/location (Qtot) (l/s)	8.75

Average flow (l/s)	1.46*

*average flow rates dependant upon fitting usage and building operation hours

Frequency of use factors (K)	
Intermittent use-e.g. domestic/guesthouse/o	0.50
Frequent use- e.g. Restaurant/Office	0.70
Congested use- e.g. Public use	1.00
Special use- e.g. laboratory	1.20

Enter Frequency of use factor (from above)	0.50

Designers notes :

1) Wastewater discharge units in accordance with BS EN 12056-2:2000 table 2

2) The calculations are based on Robin Partington & Partners drawings and details

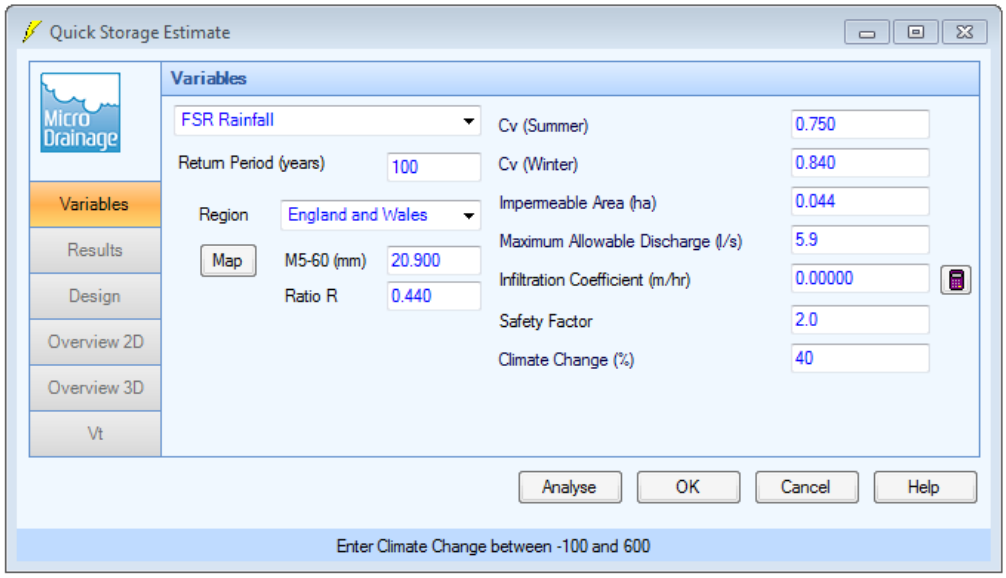
Medius House - Quick storage estimate

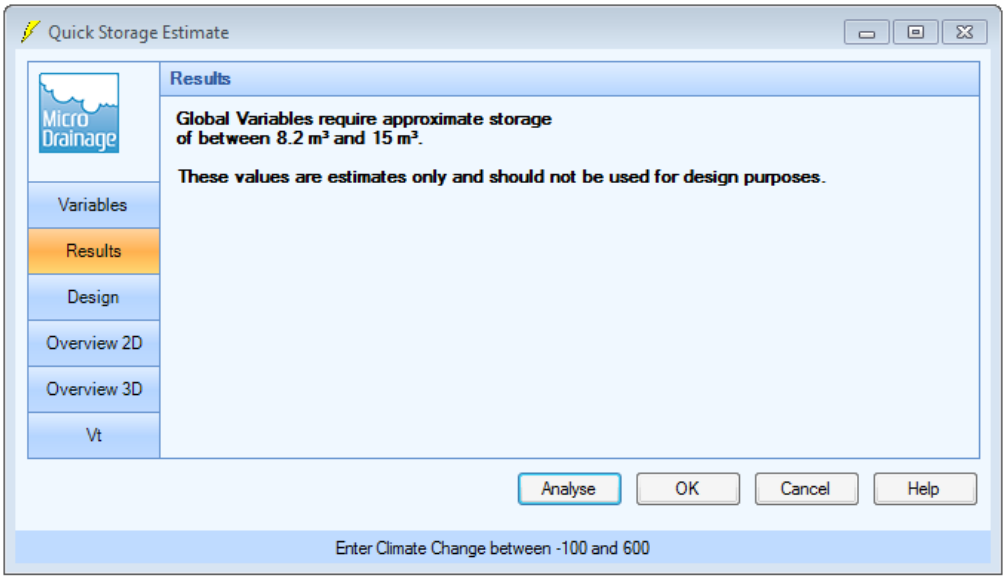
Site location: LONDON

Site area: 0.044ha

Existing discharge rate: 11.7 L/s

Proposed flow rate: 5.85 L/s





Results:

Volume required = 15 m^3

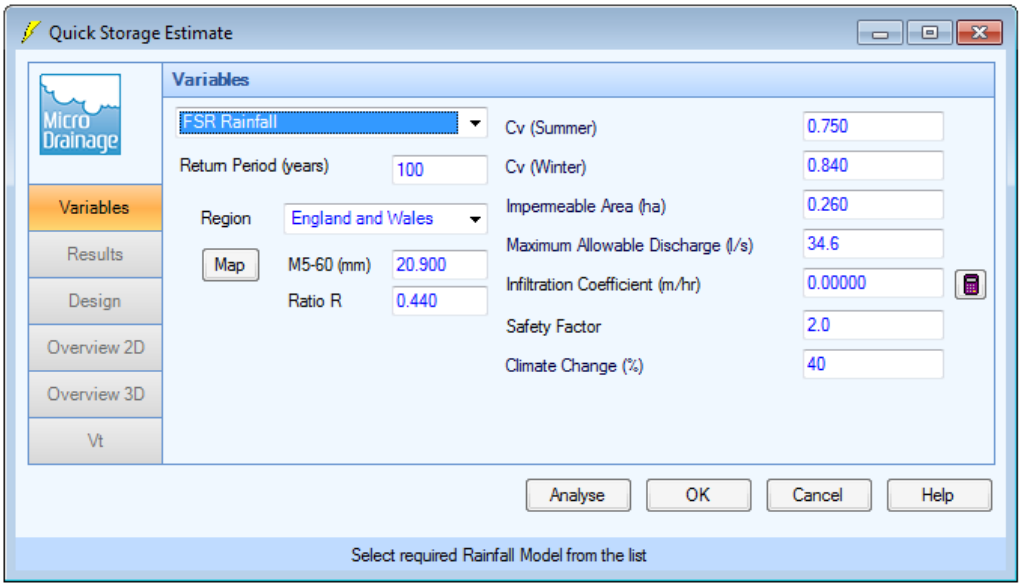
Castlewood House - Quick storage estimate

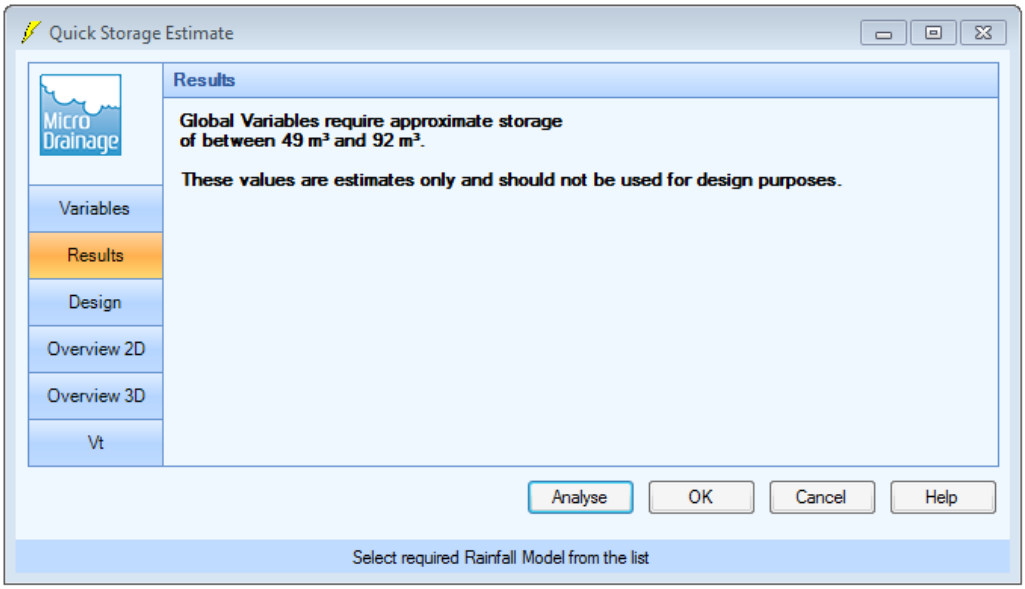
Site location: LONDON

Site area: 0.260ha

Existing discharge rate: 69.2 L/s

Proposed flow rate: 34.6 L/s





Results:

Volume required = 76 m^3

Proposed Drainage Strategy - Castlewood House

Attenuation Requirement = 76m³

80mm Attenuation Layer

Terrace Level 10 = 380m² * (80%*95%*90mm) = 32.5m³

Large Terrace Level 8 = 330m² * (80%*95%*80mm) = 25.1m³

Terrace Level 8 = 100m² * (80%*95%*80mm) = 7.6m³

Small Terrace Level 8 = 26m² * (80%*95%*80mm) = 1.98m³

Terrace Level 5 = 140m² * (80%*95%*80mm) = 10.64m³

(Note 90mm depth of water proposed on Level 10 Terrace)

Total Available = 77.8m3

Proposed Drainage Strategy - Medius House

Attenuation Requirement = 15m³

80mm Attenuation Crates

Terrace Level 8 = 140m² * (80%*95%*80mm) = 10.64m³

Terrace Level 7 = 75m² * (80%*95%*80mm) = 5.7m³

Terrace Level 6 = 22m² * (80%*95%*80mm) = 1.6m³

Total Available = 17m³

NOTE:
DRAINAGE INFORMATION SHOWN IS PRELIMINARY ONLY, TO BE FURTHER DEVELOPED AND COORDINATED WITH THE ARCHITECT AND MEP ENGINEER DURING NEXT DESIGN STAGE.

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
3. ALL HEIGHTS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

Rev	Description	Date	By	App
P01	P1 ISSUED FOR PLANNING	12/01 2017	NR	BT

Stage: PRELIMINARY

Davies Maguire
20 Flaxman Terrace
London
WC1H 9AT
T +44 (0)20 7388 9406
E info@dmag.com
W dmag.com

Client: ROYAL LONDON ASSET MANAGEMENT

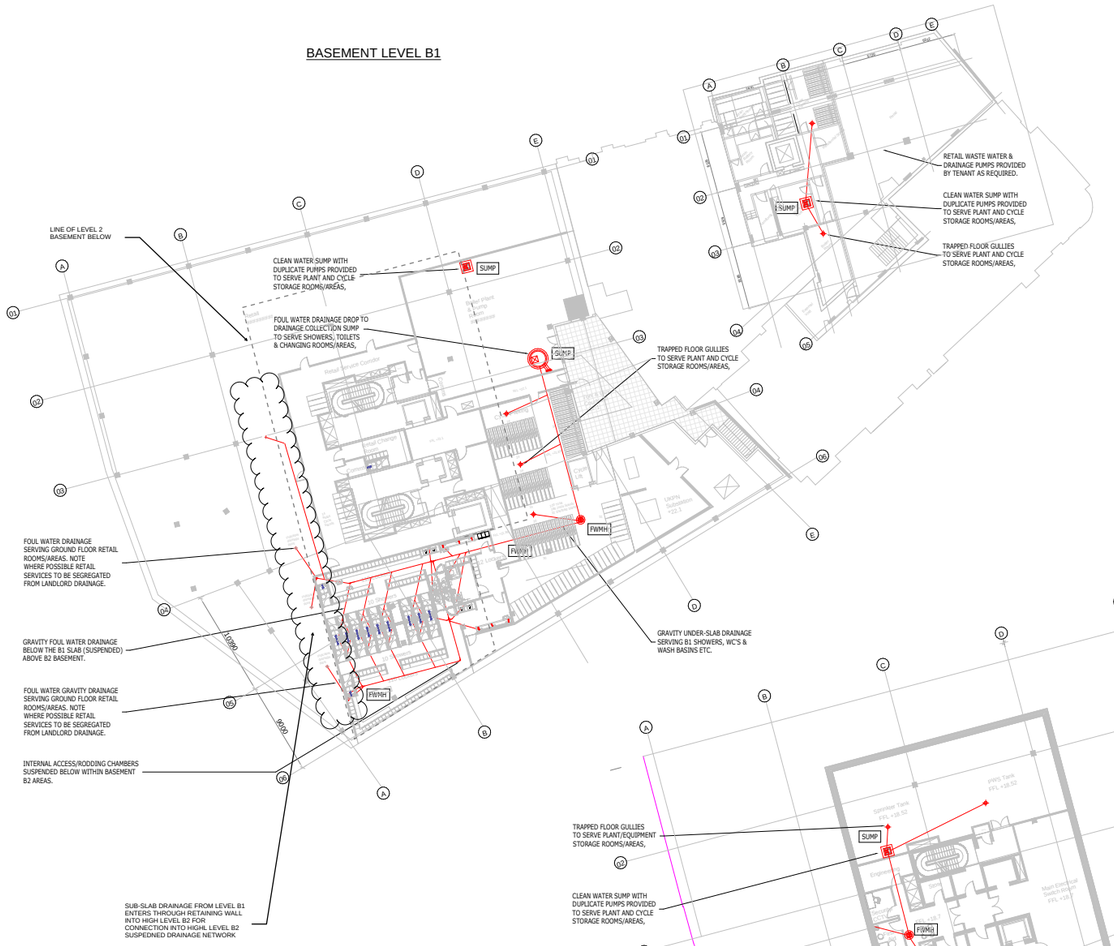
Project Title: CASTLEWOOD HOUSE LONDON W1A

Drawing Title: PROPOSED DRAINAGE SITE PLAN

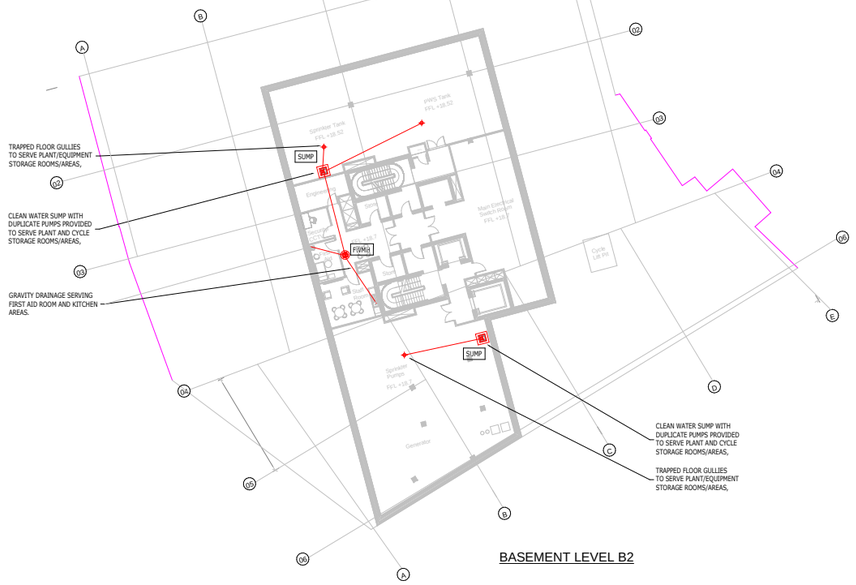
Drawn by:	Date Issued:	Scale @ A1:
NR	JAN 2017	N.T.S.

Project No.:	Originator	Zone	Level	Type	Role	Number	Rev:
15-21	DM-XX-XX-DR-C-010						P01

BASEMENT LEVEL B1



BASEMENT LEVEL B2



NOTE:
DRAINAGE INFORMATION SHOWN IS PRELIMINARY ONLY, TO BE FURTHER DEVELOPED AND COORDINATED WITH THE ARCHITECT AND MEP ENGINEER DURING NEXT DESIGN STAGE.

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
3. ALL HEIGHTS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

Rev	Description	Date	By	App
P01	P1 ISSUED FOR PLANNING	12/01 2017	NR	BT

Stage: PRELIMINARY

Davies Maguire
20 Flaxman Terrace
London
WC1H 9AT
T +44 (0)20 7388 9406
E info@dmag.com
W dmag.com

Client: ROYAL LONDON ASSET MANAGEMENT

Project Title: CASTLEWOOD HOUSE LONDON W1A

Drawing Title: PROPOSED DRAINAGE B1 & B2 LEVELS

Drawn by:	Date Issued:	Scale @ A1:
NR	JAN 2017	N.T.S.

Project No.:	Originator	Zone	Level	Type	Role	Number	Rev:
15-21	DM-XX-XX-DR-C-011						P01