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# 300 Gray's Inn Road, London

Sustainable Drainage Strategy

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Remarks: | Draft Issue | | | | |
| Revision | P1 | Prepared by: | Harry Hunter BEng (Hons) | Checked by: | Keri Trimmer MEng (Hons) CEng MICE | Approved by: | Keri Trimmer MEng (Hons) CEng MICE |
| Date: | 21/04/23 | Signature |  | Signature |  | Signature |  |
| Revision | P2 | Prepared by: | Harry Hunter BEng (Hons) | Checked by: | Keri Trimmer MEng (Hons) CEng MICE | Approved by: | Keri Trimmer MEng (Hons) CEng MICE |
| Date: | 05/05/23 | Signature |  | Signature |  | Signature |  |

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# One

## Executive Summary

Elliott Wood Partnership Ltd have been appointed to produce a Sustainable Drainage Strategy in support of the proposed redevelopment of the site at 300 Gray's Inn Road, London, WC1 8DX.

The site is situated on the junction to the east of Gray's Inn Road and south of Acton Street. The national grid reference for the site is 530607 E, 182700 N.

The existing site is located within a Flood Zone 1 area and is at low risk of flooding from all other sources. A site-specific Flood Risk Assessment has been completed for the site. Please refer to document 2220567-EWP-ZZ-XX-RP-C-0001-Flood Risk Assessment for details.

The existing development is comprised of two existing conjoined commercial buildings of 8 and 3 storeys respectively. There is a single vehicular access on the northern boundary of the site which leads to an enclosed courtyard area via an undercroft. The site is designated as commercial land use.

The proposed development comprises the refurbishment and extension of the existing building to provide residential flats (Class C3) and commercial, business and service use (Class E) including external alterations for new facades to all elevations, the introduction of terraces, reconfiguration of entrances and servicing arrangements, new hard and soft landscaping, provision of cycle parking and other ancillary works. Two additional stories are to be added to the existing 8-storey building and two additional floors adding to the existing 3-storey building. The existing vehicular access will be stopped up to provide pedestrian access to refuse and cycle stores.

Thames Water sewer record mapping indicates the development site is served by a network of combined sewers within Gray's Inn Road and Acton Street.

Surface water runoff from the proposed development will be attenuated in a combination of Blue Roofs, permeable paving and below ground storage, ensuring water is dealt with as close to source as possible while also improving the quality of water discharged from site. Whilst not possible to restrict the offsite discharge rate to greenfield runoff rates, the sustainable drainage solutions on site will reduce the offsite discharge rate by over 81% in the 1 in 1 year storm event, with greater reductions for the more critical storm events.

# Two

## Introduction

Elliott Wood Partnership Ltd have been appointed to provide a Sustainable Drainage Strategy to support the full planning application for the proposed development at 300 Gray's Inn Road, London, WC1 8DX, located within the London Borough of Camden.

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

This report has been prepared in accordance with the GOV.UK *Sustainable Drainage Systems: Non-statutory Technical Standards, London Local Plan 2021, London Borough of Camden Local Plan*

# Three

## Site Context

The site is situated on the junction to the east of Gray's Inn Road and south of Acton Street. The national grid reference for the site is 530607 E, 182700 N.

The River Thames runs approximately 2000m to the south of the site. The site area is approximately 0.084ha.

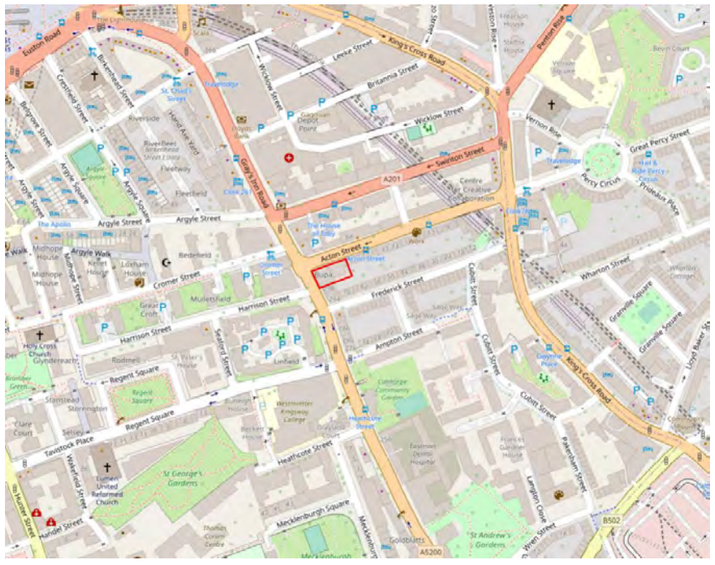


*Figure 1: Site Location*

A topographic survey of the site was undertaken by Point 2 Surveyors Ltd in February 2023; this can be found in **Appendix A**.

The topographic survey shows that the levels to the west and north of the site are fairly consistent with a level of approximately 20.00mAOD. The levels begin to falls to the north west of the site towards the vehicular access where levels are broadly 500mm lower at 19.50mAOD. From here, the levels fall to the courtyard to the south which has general levels of 19.70mAOD. The low point is currently the gully within the rear courtyard, recorded as 18.69mAOD.

The existing development is comprised of two existing conjoined commercial buildings of 8 and 3 storeys respectively. There is a single vehicular access on the northern boundary of the site which leads to an enclosed courtyard area via an undercroft. The site is designated as commercial land use.

The total area of the site is approximately 840m$^2$, all of which is currently considered to be impermeable area.

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# Four

## Underlying Geology

Site specific investigations have not yet been carried out, however, a review of the BGS maps show the site is situated on a bedrock of London Clay Formation with no superficial deposits. The nearest historical borehole is located to the south west of the site on the junction between Gray's Inn Road and Sidmouth Street. This borehole indicates made ground above a layer of silty clay before reaching silty clay with pockets of grey sandy silt (Blue London Clay).

## Existing Drainage

Public sewer records have been obtained from Thames Water. An extract of the asset plan is shown in Figure 2 below.

These show that the catchment area is served by a network of combined water sewers. The closest sewer is 1372x813mm egg shaped sewer located to the north of the site within Acton Street and runs in an easterly direction. A combined trunk sewer is located within Gray's Inn Road to the west of the site. This combined sewer is 1829mm dia and is approximately 18.2m deep to invert level.

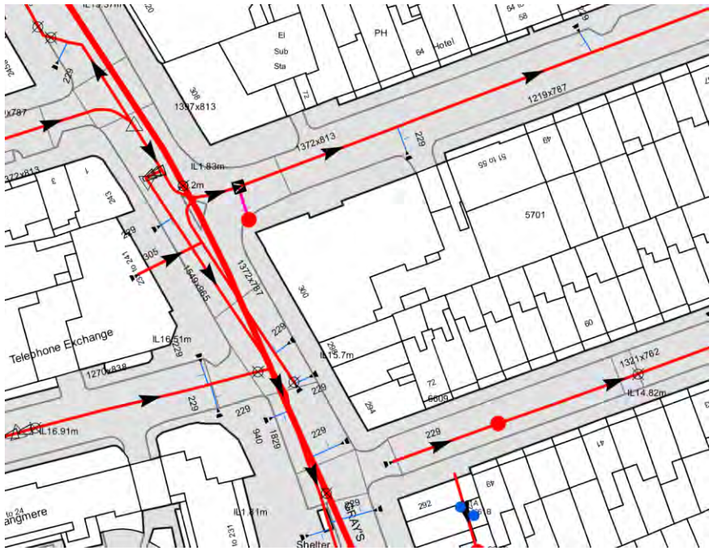


*Figure 2: Extract from Thames Water sewer records*

A CCTV survey of the existing drainage arrangement has been arranged however was not concluded at the time of this report.

### 4.1

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

$$Q = 2.78C.i.A$$

*Where Q = Existing peak runoff (l/s), C = non-dimensional runoff coefficient=1.0, i = Rainfall intensity (see table 1) and A = total catchment area being drained=0.084ha*

*Table 1: Existing Surface Water Run-off rates*

| Return Period | Rainfall Intensity (mm/hr) | Existing run-off (l/s) |
|---|---|---|
| 1yr | 31.74 | 7.2 |
| 30yr | 79.87 | 18.2 |
| 100yr | 101.89 | 23.2 |

Note that the rainfall intensities used in the above and below calculations have been based on average rainfall intensities for a 15-minute storm using the Wallingford Procedure. The calculations will be included in **Appendix D.**

# Five

## Proposed Development

### 5.1

The proposed development comprises the refurbishment and extension of the existing building to provide residential flats (Class C3) and commercial, business and service use (Class E) including external alterations for new facades to all elevations, the introduction of terraces, reconfiguration of entrances and servicing arrangements, new hard and soft landscaping, provision of cycle parking and other ancillary works. Two additional stories are to be added to the existing 8-storey building and two additional floors adding to the existing 3-storey building. The existing vehicular access will be stopped up to provide pedestrian access to refuse and cycle stores.

Please refer to **Appendix B** for Proposed Development Plans.


*Figure 3: Proposed Ground Floor Plan*

# Six

## Proposed Drainage

### 6.1

The surface water drainage system has been designed in accordance with the requirements of Planning Practice Guidance (PPG) and the London Borough of Camden SuDS Policy. The following drainage hierarchy has therefore been considered:

1) Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2) Rainwater infiltration to ground at or close to source.
3) Rainwater attenuation in green infrastructure features for gradual release (for example blue/green roofs, rain gardens).
4) Rainwater discharge direct to a watercourse (unless not appropriate)
5) Controlled rainwater discharge to a surface water sewer or drain.
6) Controlled rainwater discharge to a combined sewer.

### 6.2 Appraising the use of Rainwater Harvesting

It is not proposed to use rainwater harvesting techniques for the scheme due to the required space for an appropriately sized tank, and the additional complexity involved with the routing of mains water supply within the proposed building. The demand on the potable water supply will be reduced as much as possible through the use of low flow appliances. In addition to this, it is proposed to introduce Polysync smart flow controls for the rainwater outlets for the blue roof. The Polysync smart flow control relies on telemetric data to retain water for reuse and will empty in advance of a peak storm event to ensure there is sufficient capacity within the blue roof at all times. This will provide natural irrigation of the proposed green finish over the blue roof and reduce the demand on potable water.

### 6.3 Appraising the use of Infiltration Techniques

In order to comply with building regulations, infiltration techniques such as soakaways must not be installed within 5m of a building or highway. Due to the density of buildings on the site it is not possible to achieve this 5m offset from buildings.

The underlying geology also indicates that it is likely to comprise clay, with possibility of extensive made ground above.

Based on the above, infiltration has not been deemed feasible for this site.

### 6.4 Appraising the use of Open Water Features

As the external areas will be used as pedestrian use and cycle parking, the available space for open water features is limited. Open water features are also deemed not to be feasible due to the proposed usage of the site.

### 6.5 Appraising the use of above and below ground attenuation

The current proposals include the use of blue roofs as indicated on the Proposed Below Ground Drainage Strategy. A blue roof system restricts surface water at the rainwater outlets and provides temporary attenuation at roof level through the use of a layer of 129mm thick geocellular crate. A blue roof manages surface water closer to source (in line with CIRIA guidance) and provides attenuation that would otherwise be required below ground. Select areas of blue roof will incorporate a living roof finish, achieving the benefits of both a green and blue roof.

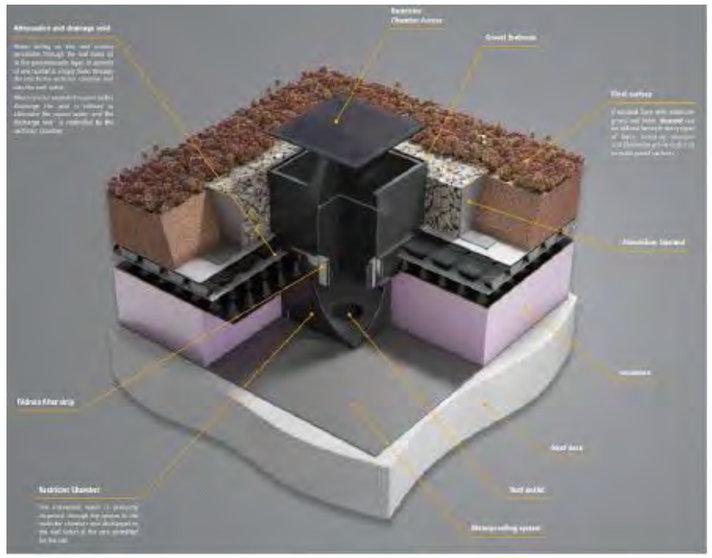

*Figure 4: Typical blue roof construction (indicated with a living roof finish) (Source ABG Roofing Ltd)*

Surface water will be discharged from the development site at a restricted rate to mimic greenfield runoff rates as close as possible, with attenuation provided by a below ground geocellular attenuation tank. Although the existing combined sewer within Gray's Inn Road is approximately 4.30m deep, the external levels on site are approximately 1.30m lower than the surrounding levels and it is therefore proposed pump surface water runoff to a manhole at high level within the rear courtyard and then discharging to the public sewer network via gravity. By pumping the surface water runoff to a high level provides additional flood protection by reducing the risk of flooding from sewer surcharge. The tank will be designed to attenuate all modelled storm events below ground, up to and including the 1 in 100-year return + 40% climate change allowance.

### 6.6 Appraising the use of permeable surfaces

The proposed development includes approximately 52m$^2$ of external hardstanding areas which is proposed to be constructed with permeable surfacing and will provide attenuation storage in coordination with the geocellular attenuation tank. The permeable paving will be wrapped in a geotextile to allow for secondary losses to the subsoil and provide irrigation to the adjacent landscaping. The introduction of permeable paving will help control surface water runoff at source, providing attenuation and filtration of runoff on these areas. In addition, there are areas of proposed loose gravel finish, which will infiltrate to the underlying soil.

### 6.7

The evaluation of SuDS is demonstrated in Table 2 below.

*Table 2: Evaluation of SuDS techniques*

| SuDS Technique | Y/N | Comment |
|---|---|---|
| Rainwater reuse | Y | Polysync smart flow controls are proposed for outlets from the blue roof to retain water ahead of a peak storm event to be used for irrigation purposes for the green roof finish. |
| Open Water features | N | The confined nature of the development makes open water features unfeasible. |
| Infiltration devices (i.e. Soakaways) | N | Soakaways are not deemed feasible for this site due to restricted space on site not allowing a minimum of 5m from buildings or roads. The underlying ground conditions are also not conducive to infiltration |
| Blue Roofs | Y | A blue roof system is proposed for the flat roof area of the new building. This will allow surface water from the building to be restricted significantly and reduce the need for below ground attenuation tanks. |
| Green Roofs | Y | Green roofs are proposed on the flat roof areas where there is a blue roof attenuation structure below. |
| Permeable Surfaces | Y | The proposed development will introduce new areas of permeable paving to a site which is currently 100% impermeable. This will help improve the quality of surface water runoff drained via these areas and provide attenuation, increasing the time of entry into the sewer network. |
| Tanked systems | Y | It is proposed to discharge surface water runoff via a gravity connection to a below ground geocellular attenuation tank before being pumped to a manhole at high level in the rear courtyard. From here surface water runoff will discharge to the public combined sewer via a gravity network. |

### 6.8

The London Borough of Camden and London Plan guidance states that developments should aim to achieve greenfield runoff rates. The greenfield runoff for the site has been calculated using Micro Drainage and are shown in Table 3.

| Return Period | Greenfield Runoff Rate (l/s) |
|---|---|
| 1 in 1 year | 0.3 |
| 1 in 30 years | 0.7 |
| 1 in 100 years | 1.0 |

*Table 3: Greenfield Runoff Rates (from Micro Drainage)*

### 6.9

It is proposed to utilise a packaged pumping station which will restrict surface water from the positively drained roof areas of the development site to a peak discharge of 1.0l/s for all storms up to an including the 1 in 100 year return + 40% climate change allowance. The available space for the geocellular attenuation tank is situated at a level broadly 1.30m lower than the ground floor of the building and it is therefore proposed to pump runoff from the tank. This ensures that the wider surface water network can be installed at a higher level, reducing the risk of flooding from sewer surcharge and allows for a gravity connection to the public sewer within Gray's Inn Road.

The development will also utilise a blue roof system to reduce the runoff rate from the proposed buildings, with runoff from the blue roof areas being restricted to 0.6 and 0.6 l/s respectively. This in turn reduces the volume of attenuation required below ground by dealing with the rainwater closer to the source and slowing down the rate at which surface water from the buildings reach the below ground attenuation tank. ABG Ltd have provided calculations for the proposed blue roof systems to be located at the 10$^{th}$ floor and 5$^{th}$ floor roof level. The ABG Ltd Calculations have been included within Appendix C.

It is proposed for the lower hardstanding area to be constructed utilising permeable surfaces. This will not only increase the time of entry into the accepting sewer network, but will also provide treatment of surface water runoff at source, improving the quality of water on site. The permeable pavement is to discharge to the proposed surface water network via an orifice plate flow control with a peak discharge rate of 0.1 l/s.

### 6.10

The proposed below ground surface water drainage network has been modelled using Microdrainage software to determine to required volume of attenuation. The modelling has determined that approximately 18m$^3$ of below ground attenuation is required in order to restrict the 400m$^2$ of the development site to a peak discharge of 1.0/s. In addition to this, the remaining 374m$^2$ of catchment area collected by the blue roofs is to be discharged at a combined rate of 1.2 l/s, resulting in a peak discharge rate of 2.2 l/s for all modelled storm events up to and including the 1:100yr + 40% CC. The MicroDrainage network calculations have been included in Appendix D.

### 6.11

The post-development runoff improvement against the existing runoff has been provided in Table 4.

*Table 4: Post Development Runoff Rate Comparison*

| Return Period | Existing Runoff Rate (l/s) | Proposed Runoff Rate (l/s) | Percentage Betterment |
|---|---|---|---|
| 1 in 1 year | 7.2 | 1.4 | 81.5% |
| 1 in 30 years | 18.2 | 1.8 | 91.1% |
| 1 in 100 years | 23.2 | 2.0 | 91.4% |
| 1 in 100 years + 40% Climate Change | N/A | 2.2 | >91.4% |

As can be seen in the table above, although it is not possible to achieve greenfield runoff rates from the post-development site for the 1 in 1yr return event, greenfield rates can be achieved for both the 1 in 30 and 1 in 100yr + 40% CC events. The proposed SuDS strategy reduces surface water runoff by 81.5% in the 1 in 1 year return, with greater reductions in larger storm events. The London Plan stipulates that for all new developments, offsite discharge rates should aim to be reduced to greenfield runoff rates as close as possible. The proposed SuDS strategy also draws on the CIRIA Four Pillars of SuDS by enhancing the amenity space available on site, and improve water quality through the water filtration benefits provided by the permeable paving.

### 6.12

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

The proposed below ground drainage layout has been included within Appendix F.

### 6.13

A Pre-planning enquiry was submitted to Thames Water to confirm the capacity of the accepting network within Gray's Inn Road. Thames Water have confirmed there is sufficient capacity in the existing network to serve the proposed development.

# Seven

## Maintenance Requirements

### 7.1

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

Modular System / Blue Roofs

| Maintenance Schedule | Required Action | Recommended Frequency |
|---|---|---|
| Regular | Inspect and identify any areas that are not operating correctly. If required, take remedial action.<br>Debris removal from catchment surface (where may cause risks to performance)<br>Remove sediment from pre-treatment structures | Monthly for 3 months, then six monthly<br>Monthly<br>Annually, or as required |
| Remedial actions | Repair/rehabilitation of inlets, outlets, 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 and after large storms |

Gullies / Linear channels

Inspection and removal of debris from silt trap once a year; preferably after leaf fall in the autumn.

Drainage pipes, manholes and silt traps

Inspect manholes & silt traps for build-up of silt and general debris once a year; preferably after leaf fall in the autumn. If silt/debris is building up, then clean with jetting lorry / gully sucker and inspect pipe – repeat cleaning if required. If the pipes to be jetted are plastic then a high flow, low pressure setting should be used so that the pipes are not damaged.

Unusual / unresolved problems

If the drainage system is still holding water following cleaning with a jetter, or the jetting of the system removes excessive amounts of debris this may indicate greater issues within the system. A CCTV survey is likely to be required and further advice should be sought from a drainage engineer.

NOTE: Manhole covers can be heavy and suitable lifting equipment / procedures should be used. Where possible, personnel should not enter manholes to carry out maintenance.

Pervious Pavements

| Maintenance Schedule | Required Action | Recommended Frequency |
|---|---|---|
| Regular | Brushing and vacuuming (standard cosmetic sweep over whole surface) | Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment |
| Occasional | Stabilise and mow contributing and adjacent areas | As required |
| | Removal of weeds or management using glyphosates applied directly into the weeds by an applicator rather than spraying | As required – once per year on less frequently used pavements |
| Remedial actions | Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving | As required |
| | Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material | As required |
| | Rehabilitation of surface and upper substructure by remedial sweeping | Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging) |
| Monitoring | Initial inspection | Monthly for three months after installation |
| | Inspect for evidence of poor operation and/or weed growth – if required, take remedial action | Three-monthly, 48 h after large storms in first six months |
| | Inspect silt accumulation rates and establish appropriate brushing frequencies | Annually |
| | Monitor inspection chambers | Annually |

# Eight

## Foul Water Drainage Strategy

### 8.1

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

# Nine

## Conclusion

### 9.1

In summary, following the advice and guidance provided by the London Borough of Camden, a SuDS strategy has been produced for the planning application associated with 300 Gray's Inn Road.

### 9.2

The SuDS Hierarchy has been followed in order to employ the most suitable and practicable SuDS techniques to improve surface water run off rates from the site. The proposed development will restrict surface water run off to the public sewer to a peak discharge of 2.2/s for the red line boundary. This provides a betterment on existing of over 90% for the 1 in 100-year event + 40% climate change event.

### 9.3

A blue roof system over at 10$^{th}$ and 5$^{th}$ floor roof areas for each building will reduce the peak runoff from the building area and provide surface water treatment of runoff at source.

The building and positively drained areas of the proposed development will drain to existing Thames Water sewer via a package pumping station downstream of the geocellular attenuation tank at a restricted rate of 1.0/s in all storm returns up to an including the 1 in 100 year return + 40% climate change allowance. Surface water will be stored in a combination of a porous subbase, below ground geocellular attenuation tank and blue roofs.

### 9.4

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

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# Appendices

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# A Topographic Survey


Key

| | | | |
|---|---|---|---|
| A/C | Air Conditioning Unit | IC | Inspection Cover |
| B | Bollard | JB | Junction Box |
| BP | Brick paving | LP | Lamp Post |
| BT | BT Inspection Cover | MH | Man Hole Cover |
| CATV | Cable Television Inspection Cover | PB | Post Box |
| CH | Coal Hole | PL | Pavement Light |
| CPS | Concrete Paving Slab | PO | Post |
| DK | Dropped Kerb | RL | Ridge Level |
| DP | Down Pipe | S/O | Smoke Outlet |
| EL | Eaves Level | SRFC | Surface Change |
| FH | Fire Hydrant | SV | Stop Valve |
| G | Gully | TCB | Telephone Call Box |
| GP | Gate Post | TP | Tactile Paving |
| ILB | Illuminated Bollard | W | Water Inspection Cover |
| IRS | Illuminated Road Sign | WM | Water Meter |

N

Notes:

Levels are related to Ordnance Survey Datum via GPS Observations.

Survey location is related to Ordnance Survey Grid via GPS Observations.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Project:

Electric House
Croydon
CR0 2AG

Title:

Topographic Survey

Note: Simple 2D Topographic Survey has been exported from the project 3D Revit Model:
2601-POINT2-01-ZZ-M3-G-0001
The Revit model is the primary source of information for the project.

| Drawn By: | Scale: | Date: |
|---|---|---|
| AF | 1:100 | February 2023 |

Dwg No: LS2601/T

A0

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17 Slingsby Place
London
WC2E 9AB

0207 836 5828

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# B Proposed Development Plans


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General Notes:

- Do not scale off this drawing.
- Use figured dimensions only.
- All dimensions to be verified prior to the commencement of any work or the production of any shop drawing.
- All omissions and discrepancies to be reported to the Architect immediately.
- This drawing is to be read in conjunction with all related Architect's and Engineer's drawings and any other relevant information.
- **EXISTING BUILDING DISCLAIMER:** This is a project with an existing building, hence all Designs are based on available surveys. All proposals to be reviewed on site prior to construction to ensure suitability of design in relation to existing conditions.

**NOTES:**
- All building and context information based on survey information provided on 14th June 2022

**KEY:**

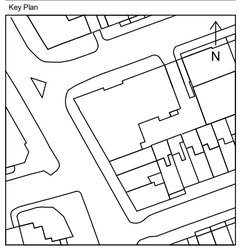
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan




1:100 graphical scale 0.00m 0.50m 1.00m 2.00m 3.00m 4.00m

NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed LGF Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - B1 - DR - A - PL-3099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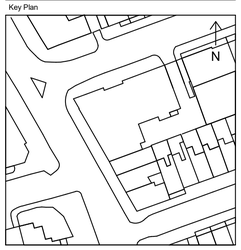
**NOTES:**
- All building and context information based on survey information provided on 14th June 2022

**KEY:**
- Site Boundary
- Primary Entrance
- Secondary Entrance
- Retained Existing Structure
- Proposed Structure

**USES:**
- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan




1:100 graphical scale 0.00m 0.50m 1.00m 2.00m 3.00m 4.00m

NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed Ground Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01
Suitability Code

Drawing No.
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www.hapticarchitects.com

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**NOTES:**
- All building and context information based on survey information provided on 14th June 2022

**KEY:**

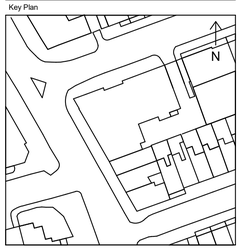
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan




1:100 graphical scale 0.00m 0.50m 1.00m 2.00m 3.00m 4.00m NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 1st Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01
Suitability Code

Drawing No.
GIR - HAP - ZZZ - 01 - DR - A - PL-3101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**NOTES:**
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**KEY:**

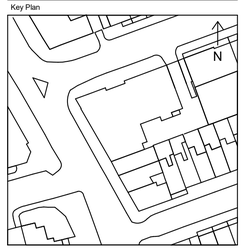
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan




1:100 graphical scale 0.00m 0.50m 1.00m 2.00m 3.00m 4.00m NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 2nd Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01
Suitability Code

Drawing No.
GIR - HAP - ZZZ - 02 - DR - A - PL-3102


HAPTIC
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**NOTES:**
- All building and context information based on survey information provided on 14th June 2022

**KEY:**

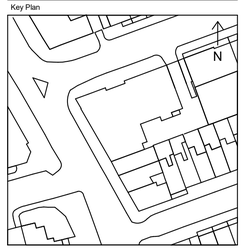
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| PL01 | 26.05.23 | EG | JPB | Planning Submission |
|---|---|---|---|---|
| revision | date | by | appr | description |

Key Plan

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NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 3rd Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision
PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 03 - DR - A - PL-3103


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**NOTES:**
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**KEY:**

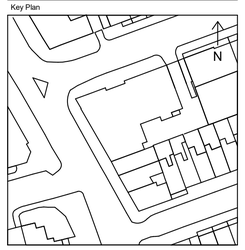
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan




1:100 graphical scale 0.00m 0.50m 1.00m 2.00m 3.00m 4.00m

NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 4th Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 04 - DR - A - PL-3104



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**KEY:**

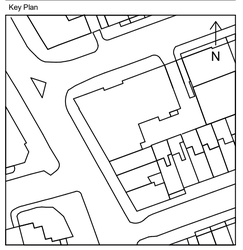
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| PL01 | 26.05.23 | EG | JPB | Planning Submission |
|---|---|---|---|---|
| revision | date | by | appr | description |

Key Plan

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NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 5th Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 05 - DR - A - PL-3105


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**KEY:**

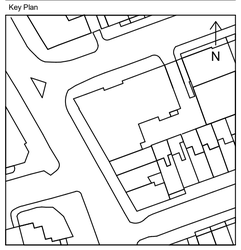
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan

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NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 6th Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 06 - DR - A - PL-3106


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**KEY:**

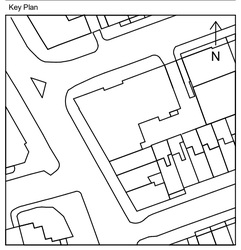
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| PL01 | 26.05.23 | EG | JPB | Planning Submission |
|---|---|---|---|---|
| revision | date | by | appr | description |

Key Plan

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NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 7th Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 07 - DR - A - PL-3107



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**KEY:**

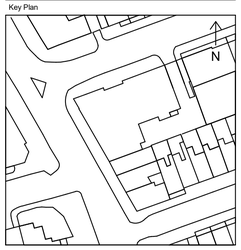
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan

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NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 8th Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 08 - DR - A - PL-3108


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**NOTES:**
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**KEY:**

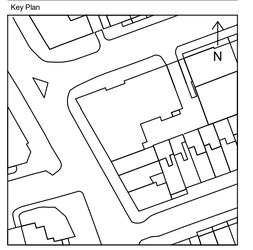
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan

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NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed 9th Floor Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision PL01

Suitability Code

Drawing No.
GIR - HAP - ZZZ - 09 - DR - A - PL-3109



HAPTIC

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**NOTES:**
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**KEY:**

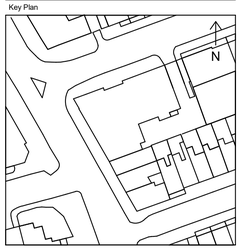
- Site Boundary
- Retained Existing Structure
- Proposed Structure

**USES:**

- Commercial
- Residential : 1B2P
- Residential : 2B4P
- Residential : 3B5P
- External Amenity
- Residential Entrance Lobby
- Circulation
- Refuse Store
- Cycle Store
- Plant
- Staff WCs
- Green Roof

| revision | date | by | appr | description |
|---|---|---|---|---|
| PL01 | 26.05.23 | EG | JPB | Planning Submission |

Key Plan




1:100 graphical scale 0.00m 0.50m 1.00m 2.00m 3.00m 4.00m

NORTH

Client
Platignum Properties Ltd.

Project Name
300 Gray's Inn Road

Project Address
300 Gray's Inn Rd, London WC1X 8DX

Design Stage
Planning

Drawing Title
Proposed Roof Plan

| Scale | Sheet Size | Date |
|---|---|---|
| 1 : 100 | A1 | 26/05/23 |
| 1 : 200 | A3 | |

| Drawn | Checked | Approved |
|---|---|---|
| EG | JPB | SG |

Revision: PL01

Suitability Code:

Drawing No.
GIR - HAP - ZZZ - RF - DR - A - PL-3110

C ABG Ltd Blue Roof Calculations

# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

| | | | |
|---|---|---|---|
| Project Name: | 300 Grays Inn Road, London, WC1X - Blue Roof 1 | | |
| Prepared for: | Elliott Wood, London. | | |
| Date: | 17/05/2023 | | |
| ABG Project ID: | 24772 | Calculator version: | 1.30 |
| Prepared by: | Andrew Keer, andrew.keer@abgltd.com, 07525-808700 | | |
| Notes/description: | Green roof, with free-standing/ballasted, PV panels to be installed, on top of the 'blue roof' system (recommended). Maintenance access only. Warm roof/inverted roof, construction, with zero falls - TBC. | | |

Blue Roof Estimate

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

| **Input Parameters - Roof Information** | | | |
|---|---|---|---|
| Total catchment area: | 235 | $m^2$ | *As supplied by Client* |
| Attenuation area: | 178 | $m^2$ | *As supplied by Client* |
| Maximum allowable runoff: | 0.7 | l/s | *As supplied by Client* |

**Output - Rainfall Calculation**

| Duration | Time to Empty | Restricted Outflow (l/s) |
|---|---|---|
| 15 mins | 7 hours and 10 minutes | 0.5 |
| 30 mins | 8 hours and 20 minutes | 0.5 |
| 1 hour | 9 hours and 10 minutes | 0.6 |
| 2 hours | 9 hours and 40 minutes | 0.6 |
| 4 hours | 9 hours and 30 minutes | 0.6 |
| 6 hours | 9 hours and 0 minutes | 0.6 |
| 10 hours | 7 hours and 40 minutes | 0.5 |
| 24 hours | 2 hours and 50 minutes | 0.2 |
| 48 hours | 0 hours and 0 minutes | 0.0 |

**Total attenuation required: 14.5 $m^3$**
**Half empty time: 2 hours and 10 minutes.**

| **Output - Recommended Blue Roof System** | |
|---|---|
| System Name: | ABG blueroof VF HD 129mm |
| Description: | The blue roof depth of 129mm, already includes for a 25mm deep, reservoir board. No. of control positions TBC by design team, and also with the structural engineer's deflection analysis. Additional 'tell-tale'/emergency parapet overflow outlets, may also be added by the architect. |
| Total attenuation capacity: | 20.2 $m^3$ |
| Number of Blue Roof outlets: | 2 |

Notes:

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

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# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

| | |
|---|---|
| Project Name: | 300 Grays Inn Road, London, WC1X - Blue Roof 2 |
| Prepared for: | Elliott Wood, London. |
| Date: | 17/05/2023 |
| ABG Project ID: | 24772 Calculator version: 1.30 |
| Prepared by: | Andrew Keer, andrew.keer@abgltd.com, 07525-808700 |
| Notes/description: | Green roof, with free-standing/ballasted, PV panels to be installed, on top of the 'blue roof' system (recommended). Maintenance access only. Warm roof/inverted roof, construction, with zero falls - TBC. |

Blue Roof Estimate

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

| **Input Parameters - Roof Information** | | | |
|---|---|---|---|
| Total catchment area: | 139 | $m^2$ | *As supplied by Client* |
| Attenuation area: | 99 | $m^2$ | *As supplied by Client* |
| Maximum allowable runoff: | 0.6 | l/s | *As supplied by Client* |

**Output - Rainfall Calculation**

| Duration | Time to Empty | Restricted Outflow (l/s) |
|---|---|---|
| 15 mins | 4 hours and 0 minutes | 0.5 |
| 30 mins | 4 hours and 40 minutes | 0.5 |
| 1 hour | 5 hours and 10 minutes | 0.6 |
| 2 hours | 5 hours and 10 minutes | 0.6 |
| 4 hours | 4 hours and 40 minutes | 0.5 |
| 6 hours | 3 hours and 50 minutes | 0.5 |
| 10 hours | 2 hours and 30 minutes | 0.3 |
| 24 hours | 0 hours and 0 minutes | 0.0 |
| 48 hours | 0 hours and 0 minutes | 0.0 |

**Total attenuation required: 7.5 $m^3$**
**Half empty time: 1 hours and 0 minutes.**

**Output - Recommended Blue Roof System**

| | |
|---|---|
| System Name: | ABG blueroof VF HD 129mm |
| Description: | The blue roof depth of 129mm, already includes for a 25mm deep, reservoir board. No. of control positions TBC by design team, and also with the structural engineer's deflection analysis. Additional 'tell-tale'/emergency parapet overflow outlets, may also be added by the architect. |
| Total attenuation capacity: | 11.2 $m^3$ |
| Number of Blue Roof outlets: | 2 |

Notes:

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

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# D MicroDrainage Network Calculations

## STORM SEWER DESIGN by the Modified Rational Method

### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

| | | | |
|---|---|---|---|
| Return Period (years) | 100 | PIMP (%) | 100 |
| M5-60 (mm) | 21.000 | Add Flow / Climate Change (%) | 0 |
| Ratio R | 0.441 | Minimum Backdrop Height (m) | 0.200 |
| Maximum Rainfall (mm/hr) | 50 | Maximum Backdrop Height (m) | 1.500 |
| Maximum Time of Concentration (mins) | 30 | Min Design Depth for Optimisation (m) | 1.200 |
| Foul Sewage (l/s/ha) | 0.000 | Min Vel for Auto Design only (m/s) | 1.00 |
| Volumetric Runoff Coeff. | 0.750 | Min Slope for Optimisation (1:X) | 500 |

Designed with Level Soffits

### Network Design Table for Storm

« - Indicates pipe capacity < flow

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S2.000 | 0.582 | 0.000 | 0.0 | 0.024 | 4.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S2.001 | 0.635 | 0.000 | 0.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S2.002 | 0.935 | 0.050 | 18.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S3.000 | 8.495 | 0.300 | 28.3 | 0.002 | 4.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.001 | 6.343 | 0.100 | 63.4 | 0.038 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.002 | 8.733 | 0.500 | 17.5 | 0.004 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.003 | 3.376 | 0.100 | 33.8 | 0.001 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S4.000 | 0.564 | 0.100 | 5.6 | 0.005 | 4.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S4.001 | 2.634 | 0.200 | 13.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S3.004 | 1.552 | 0.000 | 0.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S3.005 | 5.556 | -3.080 | -1.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

### Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S2.000 | 50.00 | 4.14 | 54.580 | 0.024 | 0.0 | 0.0 | 0.0 | 0.07 | 0.5« | 3.2 |
| S2.001 | 50.00 | 4.29 | 54.580 | 0.024 | 0.0 | 0.0 | 0.0 | 0.07 | 0.5« | 3.2 |
| S2.002 | 50.00 | 4.30 | 19.600 | 0.024 | 0.0 | 0.0 | 0.0 | 1.79 | 14.1 | 3.2 |
| S3.000 | 50.00 | 4.07 | 19.100 | 0.002 | 0.0 | 0.0 | 0.0 | 1.90 | 33.6 | 0.2 |
| S3.001 | 50.00 | 4.16 | 18.800 | 0.040 | 0.0 | 0.0 | 0.0 | 1.26 | 22.4 | 5.4 |
| S3.002 | 50.00 | 4.22 | 18.700 | 0.043 | 0.0 | 0.0 | 0.0 | 2.42 | 42.8 | 5.9 |
| S3.003 | 50.00 | 4.25 | 18.200 | 0.045 | 0.0 | 0.0 | 0.0 | 1.74 | 30.7 | 6.0 |
| S4.000 | 50.00 | 4.00 | 18.000 | 0.005 | 0.0 | 0.0 | 0.0 | 3.28 | 25.7 | 0.7 |
| S4.001 | 50.00 | 4.02 | 18.000 | 0.005 | 0.0 | 0.0 | 0.0 | 2.14 | 16.8 | 0.7 |
| S3.004 | 50.00 | 4.53 | 16.200 | 0.050 | 0.0 | 0.0 | 0.0 | 0.09 | 1.6« | 6.7 |
| S3.005 | 50.00 | 5.53 | 16.200 | 0.050 | 0.0 | 0.0 | 0.0 | 0.09 | 1.6« | 6.7 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S5.000 | 0.512 | 0.000 | 0.0 | 0.014 | 4.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S5.001 | 0.731 | 0.000 | 0.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S5.002 | 1.115 | 0.050 | 22.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S2.003 | 20.460 | 0.280 | 73.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S5.000 | 50.00 | 4.12 | 37.000 | 0.014 | 0.0 | 0.0 | 0.0 | 0.07 | 0.5« | 1.9 |
| S5.001 | 50.00 | 4.30 | 37.000 | 0.014 | 0.0 | 0.0 | 0.0 | 0.07 | 0.5« | 1.9 |
| S5.002 | 50.00 | 4.31 | 19.500 | 0.014 | 0.0 | 0.0 | 0.0 | 1.64 | 12.9 | 1.9 |
| S2.003 | 50.00 | 5.91 | 19.280 | 0.088 | 0.0 | 0.0 | 0.0 | 0.90 | 7.1« | 11.9 |

## Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SBR1 | 55.080 | 0.500 | Open Manhole | 300 | S2.000 | 54.580 | 100 | | | | |
| SBR1 FC | 55.080 | 0.500 | Open Manhole | 300 | S2.001 | 54.580 | 100 | S2.000 | 54.580 | 100 | |
| SBR1 DP | 55.080 | 35.480 | Open Manhole | 300 | S2.002 | 19.600 | 100 | S2.001 | 54.580 | 100 | 34980 |
| SSW1 | 19.867 | 0.767 | Open Manhole | 450 | S3.000 | 19.100 | 150 | | | | |
| SSW2 | 19.540 | 0.740 | Open Manhole | 450 | S3.001 | 18.800 | 150 | S3.000 | 18.800 | 150 | |
| SSW3 | 19.400 | 0.700 | Open Manhole | 450 | S3.002 | 18.700 | 150 | S3.001 | 18.700 | 150 | |
| SSW4 | 18.800 | 0.600 | Open Manhole | 450 | S3.003 | 18.200 | 150 | S3.002 | 18.200 | 150 | |
| SPP | 18.800 | 0.800 | Open Manhole | 450 | S4.000 | 18.000 | 100 | | | | |
| SPPFC | 18.800 | 0.900 | Open Manhole | 450 | S4.001 | 18.000 | 100 | S4.000 | 17.900 | 100 | |
| STANK | 18.800 | 2.600 | Open Manhole | 1200 | S3.004 | 16.200 | 150 | S3.003 | 18.100 | 150 | 1900 |
| | | | | | | | | S4.001 | 17.800 | 100 | 1550 |
| SPUMP | 18.800 | 2.600 | Open Manhole | 1500 | S3.005 | 16.200 | 150 | S3.004 | 16.200 | 150 | |
| SBR2 | 37.542 | 0.542 | Open Manhole | 300 | S5.000 | 37.000 | 100 | | | | |
| SBRFC2 | 37.500 | 0.500 | Open Manhole | 1200 | S5.001 | 37.000 | 100 | S5.000 | 37.000 | 100 | |
| SBRDP2 | 37.500 | 18.000 | Open Manhole | 1200 | S5.002 | 19.500 | 100 | S5.001 | 37.000 | 100 | 17500 |
| SSW2 | 20.102 | 0.822 | Open Manhole | 450 | S2.003 | 19.280 | 100 | S2.002 | 19.550 | 100 | 270 |
| | | | | | | | | S3.005 | 19.280 | 150 | |
| | | | | | | | | S5.002 | 19.450 | 100 | 170 |
| S | 20.000 | 1.000 | Open Manhole | 0 | | OUTFALL | | S2.003 | 19.000 | 100 | |

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| SBR1 | 530608.018 | 182695.016 | 530608.018 | 182695.016 | Required | |
| SBR1 FC | 530608.193 | 182694.460 | 530608.193 | 182694.460 | Required | |
| SBR1 DP | 530608.386 | 182693.856 | 530608.386 | 182693.856 | Required | |
| SSW1 | 530615.033 | 182695.902 | 530615.033 | 182695.902 | Required | |
| SSW2 | 530623.028 | 182698.773 | 530623.028 | 182698.773 | Required | |
| SSW3 | 530625.172 | 182692.804 | 530625.172 | 182692.804 | Required | |
| SSW4 | 530616.954 | 182689.852 | 530616.954 | 182689.852 | Required | |
| SPP | 530614.002 | 182690.422 | 530614.002 | 182690.422 | Required | |

## Manhole Schedules for Storm

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| SPPFC | 530614.529 | 182690.622 | 530614.529 | 182690.622 | Required | |
| STANK | 530615.695 | 182692.984 | 530615.695 | 182692.984 | Required | |
| SPUMP | 530614.256 | 182692.406 | 530614.256 | 182692.406 | Required | |
| SBR2 | 530608.535 | 182695.223 | 530608.535 | 182695.223 | Required | |
| SBRFC2 | 530608.724 | 182694.747 | 530608.724 | 182694.747 | Required | |
| SBRDP2 | 530608.997 | 182694.069 | 530608.997 | 182694.069 | Required | |
| SSW2 | 530608.730 | 182692.986 | 530608.730 | 182692.986 | Required | |
| S | 530589.857 | 182685.085 | | | No Entry | |

## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S2.000 | o | 100 | SBR1 | 55.080 | 54.580 | 0.400 | Open Manhole | 300 |
| S2.001 | o | 100 | SBR1 FC | 55.080 | 54.580 | 0.400 | Open Manhole | 300 |
| S2.002 | o | 100 | SBR1 DP | 55.080 | 19.600 | 35.380 | Open Manhole | 300 |
| S3.000 | o | 150 | SSW1 | 19.867 | 19.100 | 0.617 | Open Manhole | 450 |
| S3.001 | o | 150 | SSW2 | 19.540 | 18.800 | 0.590 | Open Manhole | 450 |
| S3.002 | o | 150 | SSW3 | 19.400 | 18.700 | 0.550 | Open Manhole | 450 |
| S3.003 | o | 150 | SSW4 | 18.800 | 18.200 | 0.450 | Open Manhole | 450 |
| S4.000 | o | 100 | SPP | 18.800 | 18.000 | 0.700 | Open Manhole | 450 |
| S4.001 | o | 100 | SPPFC | 18.800 | 18.000 | 0.700 | Open Manhole | 450 |
| S3.004 | o | 150 | STANK | 18.800 | 16.200 | 2.450 | Open Manhole | 1200 |
| S3.005 | o | 150 | SPUMP | 18.800 | 16.200 | 2.450 | Open Manhole | 1500 |
| S5.000 | o | 100 | SBR2 | 37.542 | 37.000 | 0.442 | Open Manhole | 300 |
| S5.001 | o | 100 | SBRFC2 | 37.500 | 37.000 | 0.400 | Open Manhole | 1200 |
| S5.002 | o | 100 | SBRDP2 | 37.500 | 19.500 | 17.900 | Open Manhole | 1200 |
| S2.003 | o | 100 | SSW2 | 20.102 | 19.280 | 0.722 | Open Manhole | 450 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| S2.000 | 0.582 | 0.0 | SBR1 FC | 55.080 | 54.580 | 0.400 | Open Manhole | 300 |
| S2.001 | 0.635 | 0.0 | SBR1 DP | 55.080 | 54.580 | 0.400 | Open Manhole | 300 |
| S2.002 | 0.935 | 18.7 | SSW2 | 20.102 | 19.550 | 0.452 | Open Manhole | 450 |
| S3.000 | 8.495 | 28.3 | SSW2 | 19.540 | 18.800 | 0.590 | Open Manhole | 450 |
| S3.001 | 6.343 | 63.4 | SSW3 | 19.400 | 18.700 | 0.550 | Open Manhole | 450 |
| S3.002 | 8.733 | 17.5 | SSW4 | 18.800 | 18.200 | 0.450 | Open Manhole | 450 |
| S3.003 | 3.376 | 33.8 | STANK | 18.800 | 18.100 | 0.550 | Open Manhole | 1200 |
| S4.000 | 0.564 | 5.6 | SPPFC | 18.800 | 17.900 | 0.800 | Open Manhole | 450 |
| S4.001 | 2.634 | 13.2 | STANK | 18.800 | 17.800 | 0.900 | Open Manhole | 1200 |
| S3.004 | 1.552 | 0.0 | SPUMP | 18.800 | 16.200 | 2.450 | Open Manhole | 1500 |
| S3.005 | 5.556 | -1.8 | SSW2 | 20.102 | 19.280 | 0.672 | Open Manhole | 450 |
| S5.000 | 0.512 | 0.0 | SBRFC2 | 37.500 | 37.000 | 0.400 | Open Manhole | 1200 |
| S5.001 | 0.731 | 0.0 | SBRDP2 | 37.500 | 37.000 | 0.400 | Open Manhole | 1200 |
| S5.002 | 1.115 | 22.3 | SSW2 | 20.102 | 19.450 | 0.552 | Open Manhole | 450 |
| S2.003 | 20.460 | 73.1 | S | 20.000 | 19.000 | 0.900 | Open Manhole | 0 |

## Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|---|---|---|---|---|---|---|
| 2.000 | - | - | 100 | 0.024 | 0.024 | 0.024 |
| 2.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 2.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.000 | User | - | 100 | 0.002 | 0.002 | 0.002 |
| 3.001 | - | - | 100 | 0.038 | 0.038 | 0.038 |
| 3.002 | User | - | 100 | 0.004 | 0.004 | 0.004 |
| 3.003 | User | - | 100 | 0.001 | 0.001 | 0.001 |
| 4.000 | - | - | 100 | 0.005 | 0.005 | 0.005 |
| 4.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.004 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.005 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 5.000 | - | - | 100 | 0.014 | 0.014 | 0.014 |
| 5.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 5.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 2.003 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| | | | | Total | Total | Total |
| | | | | 0.088 | 0.088 | 0.088 |

## Network Classifications for Storm

| PN | USMH Name | Pipe Dia (mm) | Min Cover Depth (m) | Max Cover Depth (m) | Pipe Type | MH Dia (mm) | MH Width (mm) | MH Ring Depth (m) | MH Type |
|---|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 100 | 0.400 | 0.400 | Unclassified | 300 | 0 | 0.400 | Unclassified |
| S2.001 | SBR1 FC | 100 | 0.400 | 0.400 | Unclassified | 300 | 0 | 0.400 | Unclassified |
| S2.002 | SBR1 DP | 100 | 0.452 | 35.380 | Unclassified | 300 | 0 | 35.380 | Unclassified |
| S3.000 | SSW1 | 150 | 0.590 | 0.617 | Unclassified | 450 | 0 | 0.617 | Unclassified |
| S3.001 | SSW2 | 150 | 0.550 | 0.590 | Unclassified | 450 | 0 | 0.590 | Unclassified |
| S3.002 | SSW3 | 150 | 0.450 | 0.550 | Unclassified | 450 | 0 | 0.550 | Unclassified |
| S3.003 | SSW4 | 150 | 0.450 | 0.550 | Unclassified | 450 | 0 | 0.450 | Unclassified |
| S4.000 | SPP | 100 | 0.700 | 0.800 | Unclassified | 450 | 0 | 0.700 | Unclassified |
| S4.001 | SPPFC | 100 | 0.700 | 0.900 | Unclassified | 450 | 0 | 0.700 | Unclassified |
| S3.004 | STANK | 150 | 2.450 | 2.450 | Unclassified | 1200 | 0 | 2.450 | Unclassified |
| S3.005 | SPUMP | 150 | 0.672 | 2.450 | Unclassified | 1500 | 0 | 2.450 | Unclassified |
| S5.000 | SBR2 | 100 | 0.400 | 0.442 | Unclassified | 300 | 0 | 0.442 | Unclassified |
| S5.001 | SBRFC2 | 100 | 0.400 | 0.400 | Unclassified | 1200 | 0 | 0.400 | Unclassified |
| S5.002 | SBRDP2 | 100 | 0.552 | 17.900 | Unclassified | 1200 | 0 | 17.900 | Unclassified |
| S2.003 | SSW2 | 100 | 0.722 | 0.900 | Unclassified | 450 | 0 | 0.722 | Unclassified |

## Free Flowing Outfall Details for Storm

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) |
|---|---|---|---|---|---|---|
| S2.003 | S | 20.000 | 19.000 | 0.000 | 0 | 0 |

## Simulation Criteria for Storm

| | | | |
|---|---|---|---|
| Volumetric Runoff Coeff | 0.750 | Additional Flow - % of Total Flow | 0.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start (mins) | 0 | Inlet Coeffiecient | 0.800 |
| Hot Start Level (mm) | 0 | Flow per Person per Day (l/per/day) | 0.000 |
| Manhole Headloss Coeff (Global) | 0.500 | Run Time (mins) | 60 |
| Foul Sewage per hectare (l/s) | 0.000 | Output Interval (mins) | 1 |

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0

## Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Profile Type | Summer |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 21.000 | Storm Duration (mins) | 30 |
| Ratio R | 0.441 | | |

## Online Controls for Storm

### Orifice Manhole: SBR1 FC, DS/PN: S2.001, Volume (m³): 0.0

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 54.580

### Orifice Manhole: SPPFC, DS/PN: S4.001, Volume (m³): 0.1

Diameter (m) 0.009 Discharge Coefficient 0.600 Invert Level (m) 18.000

### Pump Manhole: SPUMP, DS/PN: S3.005, Volume (m³): 4.6

Invert Level (m) 16.200

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 1.0000 | 0.700 | 1.0000 | 1.300 | 1.0000 | 1.900 | 1.0000 | 2.500 | 1.0000 |
| 0.200 | 1.0000 | 0.800 | 1.0000 | 1.400 | 1.0000 | 2.000 | 1.0000 | 2.600 | 1.0000 |
| 0.300 | 1.0000 | 0.900 | 1.0000 | 1.500 | 1.0000 | 2.100 | 1.0000 | 2.700 | 1.0000 |
| 0.400 | 1.0000 | 1.000 | 1.0000 | 1.600 | 1.0000 | 2.200 | 1.0000 | 2.800 | 1.0000 |
| 0.500 | 1.0000 | 1.100 | 1.0000 | 1.700 | 1.0000 | 2.300 | 1.0000 | 2.900 | 1.0000 |
| 0.600 | 1.0000 | 1.200 | 1.0000 | 1.800 | 1.0000 | 2.400 | 1.0000 | 3.000 | 1.0000 |

### Orifice Manhole: SBRFC2, DS/PN: S5.001, Volume (m³): 0.6

Diameter (m) 0.037 Discharge Coefficient 0.600 Invert Level (m) 37.000

## Storage Structures for Storm

### Cellular Storage Manhole: SBR1, DS/PN: S2.000

Invert Level (m) 54.580 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 178.0 | 178.0 | 0.110 | 178.0 | 183.9 | 0.111 | 0.0 | 183.9 |

### Porous Car Park Manhole: SPP, DS/PN: S4.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 10.0 |
| Max Percolation (l/s) | 14.4 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 18.300 | Membrane Depth (mm) | 0 |

### Cellular Storage Manhole: STANK, DS/PN: S3.004

Invert Level (m) 16.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 12.0 | 12.0 | 1.800 | 12.0 | 36.9 | 1.801 | 0.0 | 36.9 |

### Cellular Storage Manhole: SBR2, DS/PN: S5.000

Invert Level (m) 37.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 99.0 | 99.0 | 0.150 | 99.0 | 105.0 | 0.151 | 0.0 | 105.0 |

## 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | M5-60 (mm) | 20.900 |
| Region | England and Wales | Ratio R | 0.442 |
| Cv (Summer) | 0.750 | | |
| Cv (Winter) | 0.840 | | |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | ON |
| DVD Status | OFF |
| Inertia Status | OFF |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 240, 360, 480, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 480 Winter | 1 | +0% | | | | | 54.600 | -0.080 |
| S2.001 | SBR1 FC | 480 Winter | 1 | +0% | 100/120 Winter | | | | 54.602 | -0.078 |
| S2.002 | SBR1 DP | 480 Winter | 1 | +0% | | | | | 19.608 | -0.092 |
| S3.000 | SSW1 | 15 Winter | 1 | +0% | | | | | 19.107 | -0.143 |
| S3.001 | SSW2 | 15 Winter | 1 | +0% | 100/15 Summer | | | | 18.854 | -0.096 |
| S3.002 | SSW3 | 15 Winter | 1 | +0% | | | | | 18.739 | -0.111 |
| S3.003 | SSW4 | 15 Winter | 1 | +0% | 100/15 Summer | | | | 18.255 | -0.095 |
| S4.000 | SPP | 120 Winter | 1 | +0% | 1/15 Winter | | | | 18.303 | 0.203 |
| S4.001 | SPPFC | 120 Winter | 1 | +0% | 1/15 Winter | | | | 18.354 | 0.254 |
| S3.004 | STANK | 60 Winter | 1 | +0% | 1/15 Summer | | | | 16.409 | 0.059 |
| S3.005 | SPUMP | 60 Winter | 1 | +0% | 1/15 Summer | | | | 16.408 | 0.058 |
| S5.000 | SBR2 | 360 Winter | 1 | +0% | | | | | 37.019 | -0.081 |
| S5.001 | SBRFC2 | 360 Winter | 1 | +0% | | | | | 37.019 | -0.081 |
| S5.002 | SBRDP2 | 360 Winter | 1 | +0% | | | | | 19.507 | -0.093 |
| S2.003 | SSW2 | 240 Winter | 1 | +0% | | | | | 19.308 | -0.072 |

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 0.000 | 0.03 | | 604 | 0.1 | OK | |
| S2.001 | SBR1 FC | 0.000 | 0.03 | | | 0.1 | OK | |
| S2.002 | SBR1 DP | 0.000 | 0.02 | | | 0.1 | OK | |
| S3.000 | SSW1 | 0.000 | 0.01 | | | 0.3 | OK | |
| S3.001 | SSW2 | 0.000 | 0.27 | | | 5.1 | OK | |
| S3.002 | SSW3 | 0.000 | 0.15 | | | 5.6 | OK | |
| S3.003 | SSW4 | 0.000 | 0.29 | | | 5.8 | OK | |
| S4.000 | SPP | 0.000 | 0.04 | | 19 | 0.3 | SURCHARGED | |
| S4.001 | SPPFC | 0.000 | 0.01 | | | 0.1 | SURCHARGED | |

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| S3.004 | STANK | 0.000 | 0.12 | | 38 | 1.3 | SURCHARGED | |
| S3.005 | SPUMP | 0.000 | 0.11 | | | 1.0 | SURCHARGED | |
| S5.000 | SBR2 | 0.000 | 0.03 | | 369 | 0.1 | OK | |
| S5.001 | SBRFC2 | 0.000 | 0.03 | | | 0.1 | OK | |
| S5.002 | SBRDP2 | 0.000 | 0.02 | | | 0.1 | OK | |
| S2.003 | SSW2 | 0.000 | 0.17 | | | 1.2 | OK | |

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | M5-60 (mm) | 20.900 |
| Region | England and Wales | Ratio R | 0.442 |
| Cv (Summer) | 0.750 | | |
| Cv (Winter) | 0.840 | | |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | ON |
| DVD Status | OFF |
| Inertia Status | OFF |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 240, 360, 480, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 240 Winter | 30 | +0% | | | | | 54.620 | -0.060 |
| S2.001 | SBR1 FC | 480 Winter | 30 | +0% | 100/120 Winter | | | | 54.631 | -0.049 |
| S2.002 | SBR1 DP | 240 Winter | 30 | +0% | | | | | 19.616 | -0.084 |
| S3.000 | SSW1 | 15 Winter | 30 | +0% | | | | | 19.116 | -0.134 |
| S3.001 | SSW2 | 15 Summer | 30 | +0% | 100/15 Summer | | | | 18.906 | -0.044 |
| S3.002 | SSW3 | 15 Summer | 30 | +0% | | | | | 18.772 | -0.078 |
| S3.003 | SSW4 | 15 Summer | 30 | +0% | 100/15 Summer | | | | 18.312 | -0.038 |
| S4.000 | SPP | 120 Winter | 30 | +0% | 1/15 Winter | | | | 18.348 | 0.248 |
| S4.001 | SPPFC | 240 Winter | 30 | +0% | 1/15 Winter | | | | 18.403 | 0.303 |
| S3.004 | STANK | 60 Winter | 30 | +0% | 1/15 Summer | | | | 16.856 | 0.506 |
| S3.005 | SPUMP | 60 Winter | 30 | +0% | 1/15 Summer | | | | 16.855 | 0.505 |
| S5.000 | SBR2 | 240 Winter | 30 | +0% | | | | | 37.037 | -0.063 |
| S5.001 | SBRFC2 | 240 Winter | 30 | +0% | | | | | 37.037 | -0.063 |
| S5.002 | SBRDP2 | 240 Winter | 30 | +0% | | | | | 19.514 | -0.086 |
| S2.003 | SSW2 | 240 Winter | 30 | +0% | | | | | 19.313 | -0.067 |

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 0.000 | 0.09 | | 334 | 0.4 | OK | |
| S2.001 | SBR1 FC | 0.000 | 0.08 | | | 0.3 | OK | |
| S2.002 | SBR1 DP | 0.000 | 0.05 | | | 0.3 | OK | |
| S3.000 | SSW1 | 0.000 | 0.02 | | | 0.7 | OK | |
| S3.001 | SSW2 | 0.000 | 0.84 | | | 15.8 | OK | |
| S3.002 | SSW3 | 0.000 | 0.46 | | | 17.3 | OK | |
| S3.003 | SSW4 | 0.000 | 0.89 | | | 17.7 | OK | |
| S4.000 | SPP | 0.000 | 0.04 | | 77 | 0.3 | SURCHARGED | |
| S4.001 | SPPFC | 0.000 | 0.01 | | | 0.1 | SURCHARGED | |

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| S3.004 | STANK | 0.000 | 0.18 | | 90 | 1.9 | SURCHARGED | |
| S3.005 | SPUMP | 0.000 | 0.11 | | | 1.0 | SURCHARGED | |
| S5.000 | SBR2 | 0.000 | 0.08 | | 207 | 0.3 | OK | |
| S5.001 | SBRFC2 | 0.000 | 0.08 | | | 0.3 | OK | |
| S5.002 | SBRDP2 | 0.000 | 0.05 | | | 0.3 | OK | |
| S2.003 | SSW2 | 0.000 | 0.24 | | | 1.6 | OK | |

## 100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

### Simulation Criteria

| | | | |
|---|---|---|---|
| Areal Reduction Factor | 1.000 | Additional Flow - % of Total Flow | 0.000 |
| Hot Start (mins) | 0 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start Level (mm) | 0 | Inlet Coeffiecient | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day) | 0.000 |
| Foul Sewage per hectare (l/s) | 0.000 | | |

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | M5-60 (mm) | 20.900 |
| Region | England and Wales | Ratio R | 0.442 |
| Cv (Summer) | 0.750 | | |
| Cv (Winter) | 0.840 | | |

| | |
|---|---|
| Margin for Flood Risk Warning (mm) | 300.0 |
| Analysis Timestep | 2.5 Second Increment (Extended) |
| DTS Status | ON |
| DVD Status | OFF |
| Inertia Status | OFF |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 240, 360, 480, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100 |
| Climate Change (%) | 0, 0, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 240 Winter | 100 | +40% | | | | | 54.652 | -0.028 |
| S2.001 | SBR1 FC | 240 Winter | 100 | +40% | 100/120 Winter | | | | 54.702 | 0.022 |
| S2.002 | SBR1 DP | 240 Winter | 100 | +40% | | | | | 19.621 | -0.079 |
| S3.000 | SSW1 | 15 Winter | 100 | +40% | | | | | 19.120 | -0.130 |
| S3.001 | SSW2 | 15 Winter | 100 | +40% | 100/15 Summer | | | | 19.077 | 0.127 |
| S3.002 | SSW3 | 15 Winter | 100 | +40% | | | | | 18.842 | -0.008 |
| S3.003 | SSW4 | 15 Winter | 100 | +40% | 100/15 Summer | | | | 18.500 | 0.150 |
| S4.000 | SPP | 120 Winter | 100 | +40% | 1/15 Winter | | | | 18.425 | 0.325 |
| S4.001 | SPPFC | 120 Winter | 100 | +40% | 1/15 Winter | | | | 18.478 | 0.378 |
| S3.004 | STANK | 120 Winter | 100 | +40% | 1/15 Summer | | | | 17.632 | 1.282 |
| S3.005 | SPUMP | 120 Winter | 100 | +40% | 1/15 Summer | | | | 17.631 | 1.281 |
| S5.000 | SBR2 | 120 Winter | 100 | +40% | | | | | 37.065 | -0.035 |
| S5.001 | SBRFC2 | 120 Winter | 100 | +40% | | | | | 37.064 | -0.036 |
| S5.002 | SBRDP2 | 120 Winter | 100 | +40% | | | | | 19.521 | -0.079 |
| S2.003 | SSW2 | 120 Winter | 100 | +40% | | | | | 19.319 | -0.061 |

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| S2.000 | SBR1 | 0.000 | 0.18 | | 279 | 0.7 | OK | |
| S2.001 | SBR1 FC | 0.000 | 0.15 | | | 0.6 | SURCHARGED | |
| S2.002 | SBR1 DP | 0.000 | 0.09 | | | 0.6 | OK | |
| S3.000 | SSW1 | 0.000 | 0.04 | | | 1.3 | OK | |
| S3.001 | SSW2 | 0.000 | 1.52 | | | 28.5 | SURCHARGED | |
| S3.002 | SSW3 | 0.000 | 0.81 | | | 30.5 | OK | |
| S3.003 | SSW4 | 0.000 | 1.59 | | | 31.5 | SURCHARGED | |
| S4.000 | SPP | 0.000 | 0.04 | | 166 | 0.3 | SURCHARGED | |
| S4.001 | SPPFC | 0.000 | 0.01 | | | 0.1 | SURCHARGED | |

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| S3.004 | STANK | 0.000 | 0.19 | | 194 | 2.0 | SURCHARGED | |
| S3.005 | SPUMP | 0.000 | 0.11 | | | 1.0 | SURCHARGED | |
| S5.000 | SBR2 | 0.000 | 0.16 | | 144 | 0.6 | OK | |
| S5.001 | SBRFC2 | 0.000 | 0.16 | | | 0.6 | OK | |
| S5.002 | SBRDP2 | 0.000 | 0.10 | | | 0.6 | OK | |
| S2.003 | SSW2 | 0.000 | 0.32 | | | 2.2 | OK | |

E London Borough of Camden Surface Water Drainage Pro-forma

Camden

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## 1. Project & Site Details

| | |
|---|---|
| Project / Site Name (including sub-catchment / stage / phase where appropriate) | 300 Grays Inn Road |
| Address & post code | 300 Grays Inn Road, London, WC1 8DX |
| OS Grid ref. (Easting, Northing) | E 530607 |
| | N 182700 |
| LPA reference (if applicable) | |
| Brief description of proposed work | Proposed roof extension and change of use from commercial to commercial and residential |
| Total site Area | 840 $m^2$ |
| Total existing impervious area | 840 $m^2$ |
| Total proposed impervious area | 840 $m^2$ |
| Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)? | No |
| Existing drainage connection type and location | Unknown |
| Designer Name | Harry Hunter |
| Designer Position | Senior Civil Engineer |
| Designer Company | Elliott Wood Partnership |

## 2. Proposed Discharge Arrangements

### 2a. Infiltration Feasibility

| | |
|---|---|
| Superficial geology classification | None |
| Bedrock geology classification | London Clay |
| Site infiltration rate | N/A m/s |
| Depth to groundwater level | N/A m below ground level |
| Is infiltration feasible? | No |

### 2b. Drainage Hierarchy

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

### 2c. Proposed Discharge Details

| | |
|---|---|
| Proposed discharge location | o existing combined sewer in Grays Inn Roa |
| Has the owner/regulator of the discharge location been consulted? | Yes |

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## 3. Drainage Strategy

### 3a. Discharge Rates & Required Storage

| | *Greenfield (GF) runoff rate (l/s)* | *Existing discharge rate (l/s)* | *Required storage for GF rate ($m^3$)* | *Proposed discharge rate (l/s)* |
|---|---|---|---|---|
| *Qbar* | 0.3 | | | |
| *1 in 1* | 0.3 | 7.2 | 72 | 1.4 |
| *1 in 30* | 0.7 | 18.2 | 61 | 1.8 |
| *1 in 100* | 1 | 23.2 | 57 | 2 |
| *1 in 100 + CC* | | | | 2.2 |
| *Climate change allowance used* | | 40% | | |
| 3b. Principal Method of Flow Control | | Pump | | |

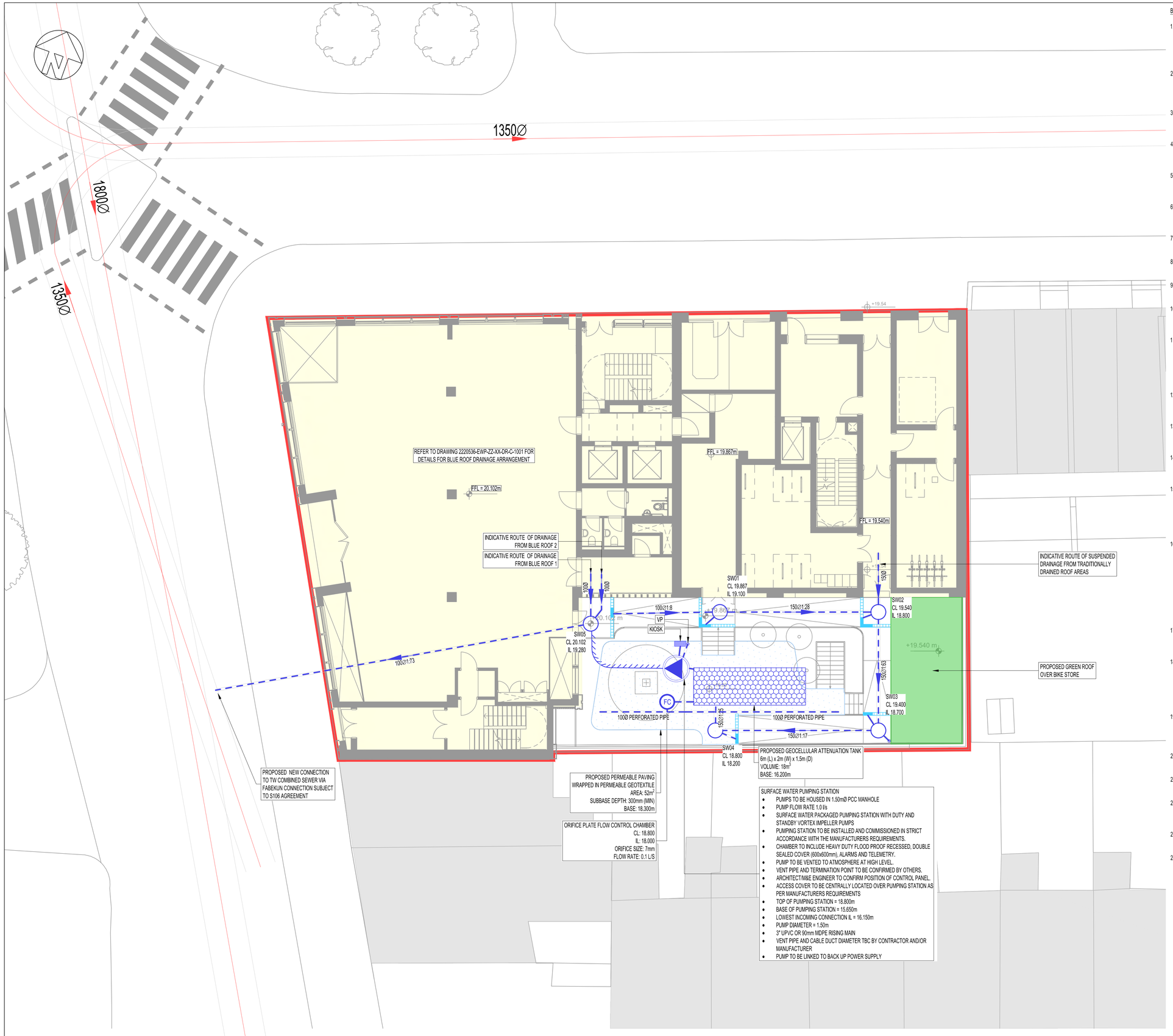
### 3c. Proposed SuDS Measures

| | *Catchment area ($m^2$)* | *Plan area ($m^2$)* | *Storage vol. ($m^3$)* |
|---|---|---|---|
| Rainwater harvesting | 0 | | 0 |
| Infiltration systems | 0 | | 0 |
| Green roofs | 0 | 0 | 0 |
| Blue roofs | 374 | 277 | 28 |
| Filter strips | 0 | 0 | 0 |
| Filter drains | 0 | 0 | 0 |
| Bioretention / tree pits | 0 | 0 | 0 |
| Pervious pavements | 52 | 52 | 5 |
| Swales | 0 | 0 | 0 |
| Basins/ponds | 0 | 0 | 0 |
| Attenuation tanks | 450 | | 18 |
| **Total** | **876** | **329** | **51** |

## 4. Supporting Information

| **4a. Discharge & Drainage Strategy** | *Page/section of drainage report* |
|---|---|
| Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results | Page 2 / Section 4 |
| Drainage hierarchy (2b) | Page 3 / Section 6 |
| Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location | Page 52 |
| Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations | Page 6, Appendix D |
| Proposed SuDS measures & specifications (3b) | Page 3 / Section 6 |
| **4b. Other Supporting Details** | *Page/section of drainage report* |
| Detailed Development Layout | Appendix B |
| Detailed drainage design drawings, including exceedance flow routes | Appendix F |
| Detailed landscaping plans | Appendix B |
| Maintenance strategy | Section 7 |
| Demonstration of how the proposed SuDS measures improve: | |
| a) water quality of the runoff? | Section 6 |
| b) biodiversity? | Section 6 |
| c) amenity? | Section 6 |

# F Proposed Below Ground Drainage Strategy




## BELOW GROUND DRAINAGE NOTES

1. THE LOCATION AND LEVEL OF EXISTING DRAINAGE CONNECTIONS AND EXISTING SERVICES IS TO BE CHECKED PRIOR TO COMMENCEMENT OF DRAINAGE WORKS. ANY VARIANCE TO THE DETAILS ON THIS DRAWING AND THE SCHEDULE IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
2. THE DESIGN IS BASED ON THE INFORMATION AVAILABLE ON THE DATE OF ISSUE FROM OTHER PARTIES (EG. ARCHITECT AND M & E ENGINEER), IT IS SUBJECT TO CHANGE RESULTING FROM UPDATES TO THE AVAILABLE INFORMATION FROM OTHERS.
3. THE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE NBS SPECIFICATIONS, ASSOCIATED MANHOLE SCHEDULE AND STANDARD DRAINAGE DETAIL DRAWINGS WHERE APPLICABLE.
4. THE POSITIONS OF FOUL AND SURFACE WATER DRAINAGE POINTS ARE INDICATIVE ONLY, REFER TO THE ARCHITECTS DRAWINGS FOR SETTING OUT DETAILS.
5. PRIVATE FOUL AND SURFACE WATER DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS PART H, BS EN752 AND BS EN12056.
6. DRAINS AT GROUND LEVEL ARE TO BE CONSTRUCTED USING VITRIFIED CLAY PIPES TO BS EN 295-1 SUPER STRENGTH SPECIFICATION (HEPWORTH SUPERSLEVE) OR SIMILAR APPROVED.
7. ALL SOIL CONNECTIONS UNDER BUILDINGS TO BE 100mm DIA LAID AT A MINIMUM GRADIENT OF 1/40 UNLESS NOTED OTHERWISE.
8. ALL SURFACE WATER CONNECTIONS TO BE 150mm DIAMETER AND TO BE LAID AT A MINIMUM GRADIENT OF 1/80 UNLESS NOTED OTHERWISE .
9. ALL SOIL CONNECTIONS AND RAINWATER PIPES SHOULD BE RODDABLE FROM GROUND LEVEL.
10. RAINWATER DOWN PIPES ARE TO CONNECT TO A DRAIN VIA A REST BEND. WHERE DRAINAGE IS COMBINED A 'P' TRAP MUST ALSO BE PROVIDED.
11. IN CASES OF IN SITU CONCRETE FLOOR SLABS, DRAINS ARE TO BE CAST INTEGRAL WITH THE SLAB WHERE PIPE COVER TO THE CROWN IS LESS THAN 300mm. - NOTE SPECIAL PROVISIONS APPLY TO BASEMENT FLOOR SLABS - SEE DETAILED DRAINAGE AND STRUCTURAL DRAWINGS. CONCRETE ENCASEMENT TO BE REINFORCED AS PER DRAINAGE DETAIL.
12. IN CASES OF SUSPENDED FLOORS WHERE A VOID OF 300mm OR MORE EXISTS BELOW FLOOR DRAINS ARE TO BE SUSPENDED USING A PROPRIETARY HANGER SYSTEM OR CAST INTEGRAL WITH THE FLOOR.
13. WHERE DRAINS PASS THROUGH FOUNDATIONS OR OTHER RIGID STRUCTURES A LINTEL OR SLEEVE IS TO BE USED AND PROVISION FOR FLEXIBILITY IS TO BE MADE USING ROCKER PIPES.
14. BACKFILLING OF DRAIN TRENCHES ADJACENT TO BUILDING OR OTHER STRUCTURES IS TO BE IN ACCORDANCE WITH DIAGRAM 8 OF THE BUILDING REGULATIONS.
15. EXISTING FOUNDATIONS AND RETAINING WALLS MUST NOT BE UNDERMINED BY NEW DRAINAGE RUNS UNLESS AGREED IN WRITING WITH THE STRUCTURAL ENGINEER. CONTRACTOR TO SUBMIT METHOD STATEMENTS AND TEMPORARY WORKS PROPOSALS TO THE STRUCTURAL ENGINEER FOR COMMENT PRIOR TO COMMENCEMENT OF WORKS.
16. ALL DRAINAGE EXCAVATIONS SHOULD BE RISK ASSESSED BY THE CONTRACTOR TO ENSURE TRENCH SAFETY / STABILISATION MEASURES ARE CONSIDERED DURING THE CONSTRUCTION PERIOD. ANY EXCAVATIONS LEFT EXPOSED SHOULD BE INSPECTED BY A COMPETENT PERSON ON A DAILY BASIS. GROUND CONDITIONS SHOULD BE MONITORED AND TOOL BOX TALKS SHOULD INCLUDE SITE INVESTIGATION INFORMATION TO AID THE CONTRACTORS ONGOING RISK ASSESSMENT AND METHOD OF EXCAVATION. ALL EXCAVATIONS SHOULD BE ASSESSED BY A COMPETENT PERSON FOR CONFINED SPACES REQUIREMENTS.
17. THE CONTRACTOR IS TO CONSIDER PHASING OF THE DRAINAGE INSTALLATION AND ARE TO PROVIDE TEMPORARY DRAINAGE MEASURES THEY DETERMINE ARE REQUIRED.
18. SuDS ARE TO BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE WITHIN THE CIRIA SUDS MANUAL C753 (WITH PARTICULAR ATTENTION DRAWN TO CHAPTER 31) AND CIRIA GUIDANCE ON THE CONSTRUCTION OF SuDS C768. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONSIDER CONSTRUCTION PROGRAMME OF SuDS.
19. DETAILED DESIGN OF GEOCELLULAR ATTENUATION CRATES IS A CDP ITEM AND SHOULD BE BASED ON LEVEL, LAYOUT AND VOLUME DETAILS SHOWN. DETAILED DESIGN INFORMATION SHOULD BE PROVIDED TO THE CIVIL ENGINEER TO PASS COMMENT.
20. ALL MANHOLE COVER LEVELS SHOWN ARE APPROXIMATE AND ARE TO SUIT THE FINAL GROUND OR BUILDING LEVELS .
21. MANHOLE COVERS IN BLOCK PAVED AREAS ARE TO BE RECESSED UNLESS NOTED OTHERWISE.
22. ALL EXTERNAL FOUL AND COMBINED WATER MANHOLE COVERS IN FOOTPATHS AND PAVED AREAS (OTHER THAN ROADS) ARE TO BE NON-VENTILATING AND SINGLE SEALED UNLESS NOTED OTHERWISE.
23. ALL EXTERNAL SURFACE WATER MANHOLE COVERS ARE TO BE NON-VENTILATING UNLESS NOTED OTHERWISE.
24. ALL MANHOLE COVERS ARE TO BE INSTALLED SQUARE TO PAVING, KERB LINES OR BUILDINGS.

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

LEGEND

- SURFACE WATER MANHOLE
- EXISTING COMBINED WATER
- PROPOSED SURFACE WATER
- PROPOSED SURFACE WATER PACKAGED PUMPING STATION
- PROPOSED SURFACE WATER RISING MAIN
- SURFACE WATER ATTENUATION IN RC BOX
- FLOW CONTROL CHAMBER
- PROPOSED LINEAR CHANNEL DRAIN WITH HEELGUARD GRATING
- PROPOSED PERMEABLE PAVING
- PROPOSED GREEN ROOF
- EXISTING BUILDING
- PROPOSED BUILDING
- SITE BOUNDARY

**NOT FOR CONSTRUCTION**

| | | | | | |
|---|---|---|---|---|---|
| P3 | S2 | 19.05.23 | HHu | PDa | Issued for Planning |
| P2 | S2 | 05.05.23 | HHu | PDa | Issued for Planning - Draft |
| P1 | S2 | 21.04.23 | HHu | PDa | Issued for Planning - Draft |
| rev | sc | date | by | chk | description |

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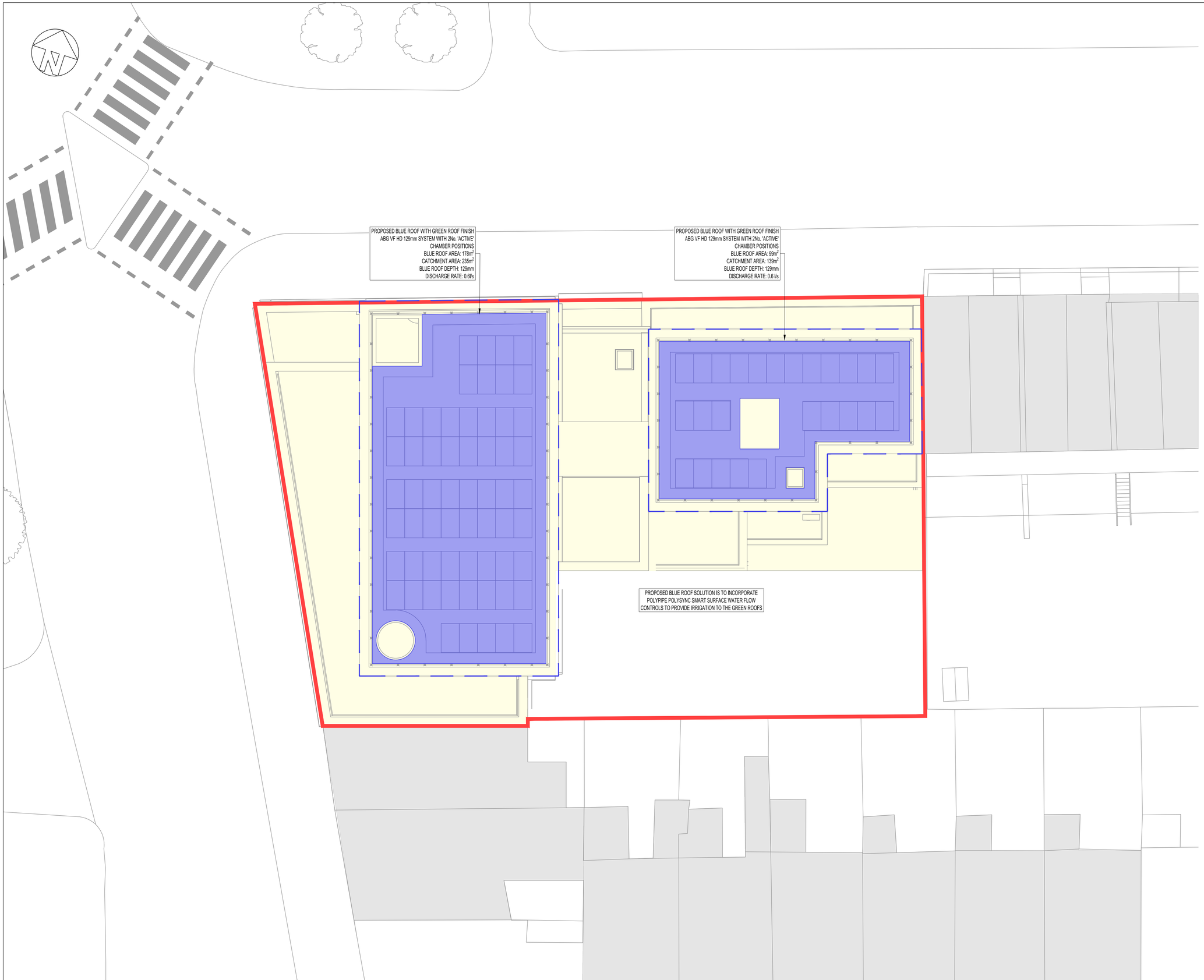
Project
300 Gray's Inn Road,
London

Drawing title
Proposed Below Ground Drainage General Arrangement

| Scale (s) | Date | Drawn |
|---|---|---|
| 1:100@ A1; 1:200@ A3 | April 2023 | HHu |

Drawing status: Preliminary
Status: S2 Revision: P3

| Project no. | Originator | Zone | Level | Type | Role | drg no. |
|---|---|---|---|---|---|---|
| 2220567 | - EWP | - ZZ | - XX | - DR | - C | - 1000 |




This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

BELOW GROUND DRAINAGE NOTES

1. THE LOCATION AND LEVEL OF EXISTING DRAINAGE CONNECTIONS AND EXISTING SERVICES IS TO BE CHECKED PRIOR TO COMMENCEMENT OF DRAINAGE WORKS. ANY VARIANCE TO THE DETAILS ON THIS DRAWING AND THE SCHEDULE IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
2. THE DESIGN IS BASED ON THE INFORMATION AVAILABLE ON THE DATE OF ISSUE FROM OTHER PARTIES (EG. ARCHITECT AND M & E ENGINEER), IT IS SUBJECT TO CHANGE RESULTING FROM UPDATES TO THE AVAILABLE INFORMATION FROM OTHERS.
3. THE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE NBS SPECIFICATIONS, ASSOCIATED MANHOLE SCHEDULE AND STANDARD DRAINAGE DETAIL DRAWINGS WHERE APPLICABLE.
4. ALL SURFACE WATER CONNECTIONS TO BE 150mm DIAMETER AND TO BE LAID AT A MINIMUM GRADIENT OF 1:80 UNLESS NOTED OTHERWISE .
5. RAINWATER DOWN PIPES ARE TO CONNECT TO A DRAIN VIA A REST BEND. WHERE DRAINAGE IS COMBINED A 'P' TRAP MUST ALSO BE PROVIDED.
6. ANY PIPE OR GULLY OR OTHER FITTING OR DUCT PENETRATING THE BASEMENT SLAB OR WALL IS TO BE WATERPROOFED USING HYDROPHILIC STRIPS OR PUDDLE FLANGES TO ENSURE A WATER TIGHT JOINT. CONCRETE SURROUND TO DRAINAGE PIPES AND FITTINGS MAY BE REQUIRED IN CERTAIN CASES - REFER TO DETAILED DRAINAGE DRAWINGS AND RELEVANT STRUCTURAL DETAILS.
7. THE CONTRACTOR IS TO CONSIDER PHASING OF THE DRAINAGE INSTALLATION AND ARE TO PROVIDE TEMPORARY DRAINAGE MEASURES THEY DETERMINE ARE REQUIRED.
8. SuDS ARE TO BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE WITHIN THE CIRIA SUDS MANUAL C753 (WITH PARTICULAR ATTENTION DRAWN TO CHAPTER 31) AND CIRIA GUIDANCE ON THE CONSTRUCTION OF SuDS C768. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONSIDER CONSTRUCTION PROGRAMME OF SuDS.

LEGEND

- PROPOSED BLUE ROOF
- EXISTING BUILDING
- PROPOSED BUILDING
- SITE BOUNDARY

| rev | sc | date | by | chk | description |
|---|---|---|---|---|---|
| P2 | S2 | 19.05.23 | HHu | PDa | Issued for Planning |
| P1 | S2 | 21.04.23 | HHu | PDa | Issued for Planning - Draft |

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Project
300 Gray's Inn Road,
London

Drawing title
Proposed Blue Roof
General Arrangement

| Scale (s) | Date | Drawn |
|---|---|---|
| 1:100@ A1; 1:200@ A3 | April 2023 | HHu |

Drawing status: Preliminary — Status: S2 — Revision: P2

| Project no. | Originator | Zone | Level | Type | Role | drg no. |
|---|---|---|---|---|---|---|
| 2220567 | - EWP | - ZZ | - XX | - DR | - C | - 1001 |

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