# technical note

elliottwood

| | | | |
|---|---|---|---|
| Title: | The Network Building – Planning Condition 31 Discharge Technical Note | Date Approved: | January 2023 |
| Discipline: | Civil Engineering | Author: | Harry Hunter |
| Note Ref: | TN-C-0002 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Issued for discharge of planning condition 31 | | | | |
| revision: | P1 | prepared by: | Harry Hunter<br>BEng (Hons) | checked by: | Paul Davis<br>BEng (Hons)<br>MSc CEng MICE | approved by: | Paul Davis<br>BEng (hons)<br>MSc CEng MICE |
| date: | 17 Jan 2023 | signature: |  | signature: |  | signature: |  |


## Summary

This Technical Note has been produced to satisfy condition 31 of the approved planning application Ref: 2020/5624/P for the development at Network Building (95-100 Tottenham Court Road & 76-80 Whitfield Street) and 88 Whitfield Street.


## Condition 31

Condition 31 has been repeated below for clarity:

> *The development shall provide rainwater storage in a blue roof with a minimum of 125 cubic metres of storage volume, collecting from a minimum catchment area of 1550sqm.*
>
> *Prior to commencement of the superstructure, full details of the sustainable drainage system for the building shall be submitted to and approved in writing by the local planning authority, including details to demonstrate:*
>
> a. *System design to accommodate all storms up to and including a 1:100 year storm with a 40% provision for climate change such that flooding does not occur in any part of a building or in any utility plant susceptible to water.*
> b. *Blue roof runoff rate of no more than 2.7 litres/second; and*
> c. *A lifetime maintenance strategy.*
>
> *All such systems shall be installed prior to first occupation of the development, and thereafter retained and maintained in accordance with the approved maintenance strategy.*
>
> *Reason: to reduce the rate of surface water run-off from the buildings and limit the impact on the storm-water drainage system in accordance with policies CC2 and CC3 of the London Borough of Camden Local Plan Policies.*

## Response to Planning Conditions

### Condition 31a

The proposed surface water drainage network is comprised of blue/green roofs, discharging to an above ground gravity network, suspended at high level within the basement. The above ground network discharges to a 300mm and a 150mm combined drain, each connected to the Thames Water combined sewers located within Whitfield Street and Howland Street respectively. M&E engineers Norman Disney & Young are responsible for the design of the above ground drainage network. Their respective design proposals are included in **Appendix A**. Please refer to the Sustainable Drainage Strategy document ref 2170754-EWP-ZZ-XX-RP-0002 submitted at planning stage for details of the overall drainage strategy.

Bauder have prepared design calculations and drawings for the proposed blue/green roof. The provided calculations show sufficient storage is provided for each of the blue roof structures for the peak storm event which is the 1:100yr + 40%CC. Please refer to **Appendix B** for the Bauder Blue Roof Calculations and drawings.

### Condition 31b

The Bauder Blue Roof calculation contained within **Appendix B** show the blue roof outfalls to be 1.53 l/s from the 8$^{th}$ floor and 0.86 l/s from the 9$^{th}$ floor blue roof structures, for a peak 1:100yr + 40%CC storm event. The peak discharge rate from the combined blue roof outlets is therefore 2.39 l/s.

Condition 31c

The maintenance strategy for the blue/green roof SuDS feature is as below:

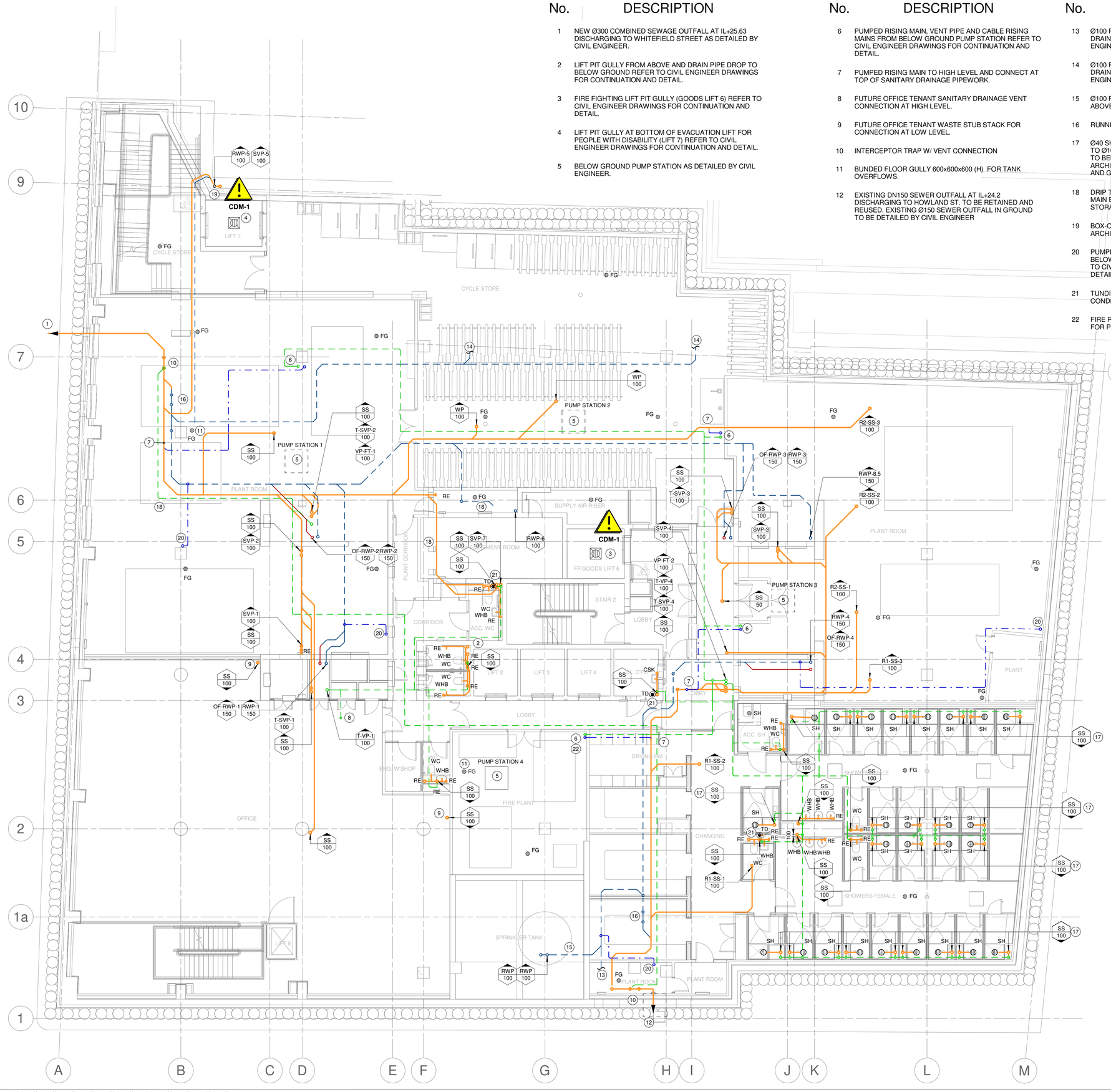
All SuDS will be maintained by the building management company for the lifetime of the development in accordance with the SuDS Manual as summarised below. Maintenance requirements for the blue/green roof will be supplied by the specialist designer.

Green/Blue Roofs:

| Maintenance Schedule | Required Action | Recommended Frequency |
|---|---|---|
| Regular inspections | Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability | Annually and after severe storms |
| | Inspect soil substrate for evidence of erosion channels and identify any sediment sources | Annually and after severe storms |
| | Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system | Annually and after severe storms |
| | Inspect underside of roof for evidence of leakage | Annually and after severe storms |
| Regular maintenance | Remove debris and litter to prevent clogging of inlet drains and interference with plant growth | Six monthly and annually or as required |
| | During establishment (ie year one), replace dead plants as required | Monthly (but usually responsibility of manufacturer) |
| | Post establishment, replace dead plants as required<br>(where > 5% of coverage) | Annually (in autumn) |
| | Remove fallen leaves and debris from deciduous plant foliage | Six monthly or as required |
| | Remove nuisance and invasive vegetation, including weeds | Six monthly or as required |
| | Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate | Six monthly or as required |
| Remedial actions | If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled | As required |
| | If drain inlet has settled, cracked or moved, investigate and repair as appropriate | As required |

# Appendix A

NDY Above Ground Drainage Proposals




## No. DESCRIPTION

1 NEW Ø300 COMBINED SEWAGE OUTFALL AT IL+25.63 DISCHARGING TO WHITEFIELD STREET AS DETAILED BY CIVIL ENGINEER.

2 LIFT PIT GULLY FROM ABOVE AND DRAIN PIPE DROP TO BELOW GROUND REFER TO CIVIL ENGINEER DRAWINGS FOR CONTINUATION AND DETAIL.

3 FIRE FIGHTING LIFT PIT GULLY (GOODS LIFT 6) REFER TO CIVIL ENGINEER DRAWINGS FOR CONTINUATION AND DETAIL.

4 LIFT PIT GULLY AT BOTTOM OF EVACUATION LIFT FOR PEOPLE WITH DISABILITY (LIFT 7) REFER TO CIVIL ENGINEER DRAWINGS FOR CONTINUATION AND DETAIL.

5 BELOW GROUND PUMP STATION AS DETAILED BY CIVIL ENGINEER.

## No. DESCRIPTION

6 PUMPED RISING MAIN, VENT PIPE AND CABLE RISING MAINS FROM BELOW GROUND PUMP STATION REFER TO CIVIL ENGINEER DRAWINGS FOR CONTINUATION AND DETAIL.

7 PUMPED RISING MAIN TO HIGH LEVEL AND CONNECT AT TOP OF SANITARY DRAINAGE PIPEWORK.

8 FUTURE OFFICE TENANT SANITARY DRAINAGE VENT CONNECTION AT HIGH LEVEL.

9 FUTURE OFFICE TENANT WASTE STUB STACK FOR CONNECTION AT LOW LEVEL.

10 INTERCEPTOR TRAP W/ VENT CONNECTION

11 BUNDED FLOOR GULLY 600x600x600 (H) FOR TANK OVERFLOWS.

12 EXISTING DN150 SEWER OUTFALL AT IL+24.2 DISCHARGING TO HOWLAND ST. TO BE RETAINED AND REUSED. EXISTING Ø150 SEWER OUTFALL IN GROUND TO BE DETAILED BY CIVIL ENGINEER

## No. DESCRIPTION

13 Ø100 RAINWATER PIPE CONNECT TO CHANNEL DRAINAGE AT HOWLAND STREET AS DETAILED BY CIVIL ENGINEER

14 Ø100 RAINWATER PIPE CONNECT TO CHANNEL DRAINAGE AT CYPRESS PLACE AS DETAILED BY CIVIL ENGINEER

15 Ø100 RAINWATER PIPE TO BE CAST IRON PIPE RUNNING ABOVE SPRINKLER TANK

16 RUNNING INTERCEPTOR TRAP FOR RAINWATER.

17 Ø40 SHOWER GULLY FROM SHOWER TRAY CONNECTS TO Ø100 STUB STACK C/W WASTE TRAP AND FITTINGS TO BELOW GROUND DRAINAGE SYSTEM. REFER TO ARCHITECTURAL DOCUMENTATION FOR SHOWER TRAY AND GULLY DETAILS

18 DRIP TRAYS WITH LEAK DETECTION TO BE PROVIDED IN MAIN EQUIPMENT ROOM AND ABOVE COLD WATER STORAGE TANK

19 BOX-OUT FOR DRAINAGE STACKS. REFER TO ARCHITECTURAL DOCUMENTATION FOR DETAILS.

20 PUMPED RISING MAIN AND CABLE RISING MAINS FROM BELOW GROUND CAVITY SYSTEM PUMP STATION. REFER TO CIVIL ENGINEER DRAWINGS FOR CONTINUATION AND DETAIL.

21 TUNDISH WITH WATERLESS TRAP AT HIGH LEVEL FOR CONDENSATE DISCHARGE FROM LANDLORDS VRF.

22 FIRE RATED BOX-OUT TO BE PROVIDED IN FIRE PLANT FOR PUMPED RISING MAIN AND VENT PIPE.

| Rev | Description | Date |
|---|---|---|
| P01 | STAGE 3 DRAFT ISSUE | 06.05.22 |
| P02 | STAGE 3 ISSUE | 27.05.22 |
| P03 | STAGE 3 ISSUED FOR INFORMATION | 26.08.22 |
| P04 | STAGE 4 DRAFT ISSUE | 11.11.22 |
| P05 | STAGE 4 DRAFT ISSUE | 22.11.22 |
| T01 | STAGE 4 TENDER ISSUE | 30.11.22 |

## CDM NOTES

DURING THE DESIGN PHASE, CONSIDERATION HAS BEEN GIVEN TO SITE SPECIFIC HAZARD IDENTIFICATION. A SCHEDULE OF CDM RISK ITEMS IS INCLUDED WITHIN THESE DOCUMENTS HOWEVER IT SHOULD BE NOTED THAT ONLY SIGNIFICANT AND UNUSUAL RISKS HAVE BEEN IDENTIFIED. THE CONTRACTOR MUST CARRY OUT THEIR OWN RISK ASSESSMENT AS OTHER UNIDENTIFIED RISKS MAY EXIST. WHERE RISK(S) HAVE BEEN IDENTIFIED ON THIS DRAWING PLEASE REFER TO THE CDM SCHEDULE LOCATED ON THE LEGEND SHEET FOR DETAILS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Company Registration No. 3890617


NDY QA SYSTEM
Reason For issue
STAGE 4
Authorisation
By AE : 30 NOV 2022
Verification Of Latest Amendment
By BC : 30 NOV 2022



Project
# NETWORK BUILDING
95-100 Tottenham Court Road

Title
PUBLIC HEALTH SERVICES
BASEMENT FLOOR
SANITARY & RAINWATER DRAINAGE LAYOUT

Project No. U14024-001H
Revit Version 2020
Design JN
Drawn ICE
Scale 1 : 100 @ A1
Project Commencement MAR. 2022
DRAWING IN COLOUR
Drawing No. NWB-NDY-ZZ-B1-DR-P-5201
Revision T01

A1V
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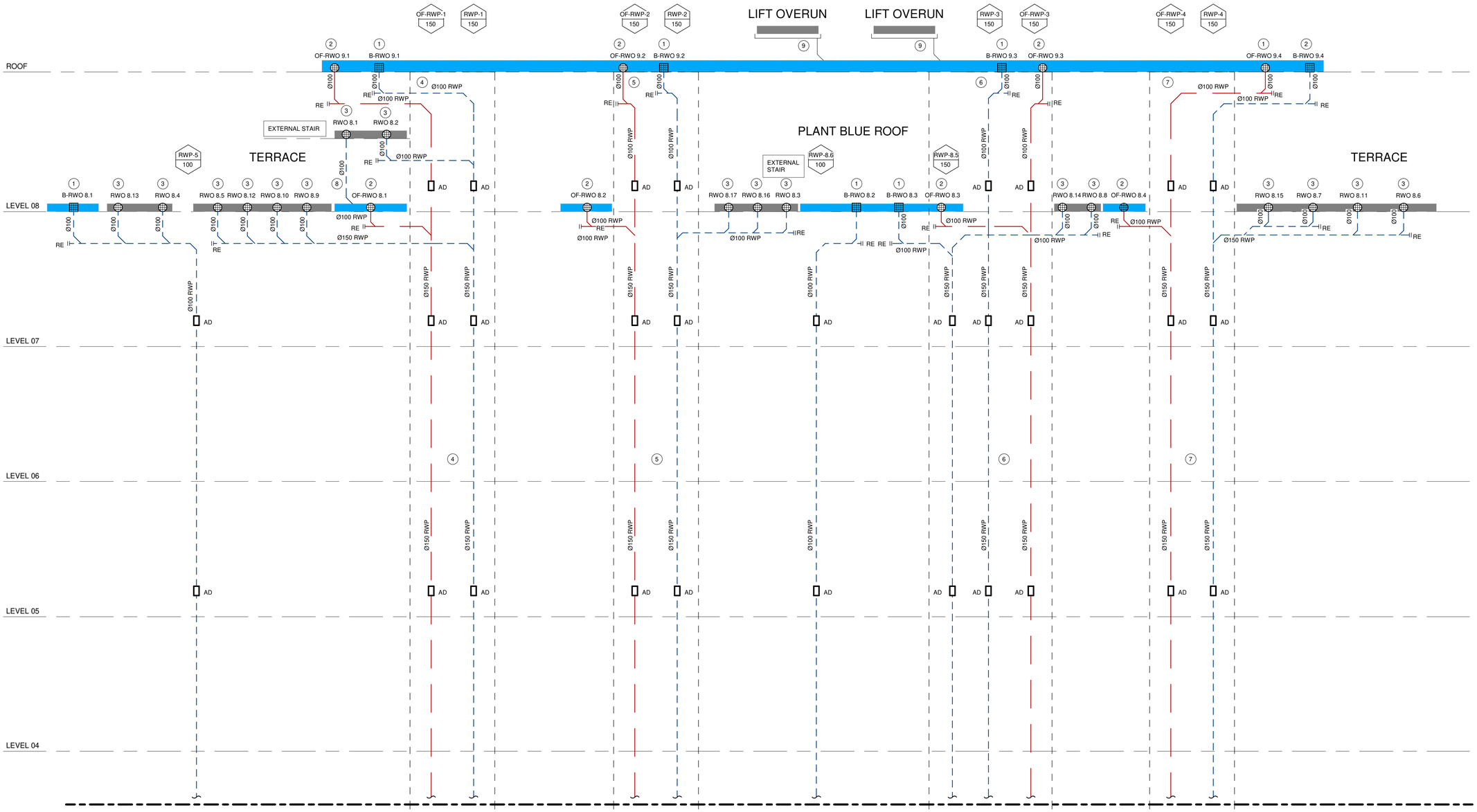
When reproduced at correct scale this line measures 150mm

## BLUE ROOF AND GREEN/BLUE ROOF




FOR CONTINUATION REFER DRAWING No. NWB-NDY-ZZ-XX-SC-P-5206

## No. DESCRIPTION

1 BLUE ROOF OUTLET.

2 BLUE ROOF OVERFLOW OUTLET.

3 CONVENTIONAL RAINWATER OUTLET AND OVERFLOW OUTLET.

4 SOUTH CORE RISERS AT GRID 3-C.

5 WEST CORE RISERS AT GRID 4-C.

6 NORTH CORE RISERS AT GRID 4-G.

7 EAST CORE RISERS AT GRID 3-G.

8 RAIN WATER PIPE TERMINATES WITH A RAIN WATER SHOE AND DISCHARGE ABOVE CATCHMENT AREA BELOW.

9 RAINWATER GUTTER AND DOWNPIPE AT LIFT OVERRUNS. REFER TO ARCHITECTURAL DOCUMENTATION FOR DETAILS.

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|---|---|---|
| P01 | STAGE 3 DRAFT ISSUE | 06.05.22 |
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NDY QA SYSTEM

Reason For Issue: STAGE 4

Authorisation: AE : 30 NOV 2022

Verification Of Latest Amendment: BC : 30 NOV 2022



Project

# NETWORK BUILDING

95-100 Tottenham Court Road

Title

PUBLIC HEALTH SERVICES
RAINWATER DRAINAGE SYSTEM
SCHEMATIC - SHEET 1 OF 2

Project No. U14024-001H

Revit Version 2020

Design JN

Drawn ICE

Scale N.T.S.

Project Commencement MAR. 2022

DRAWING IN COLOUR

Drawing No. NWB-NDY-ZZ-XX-SC-P-5205

Revision T01

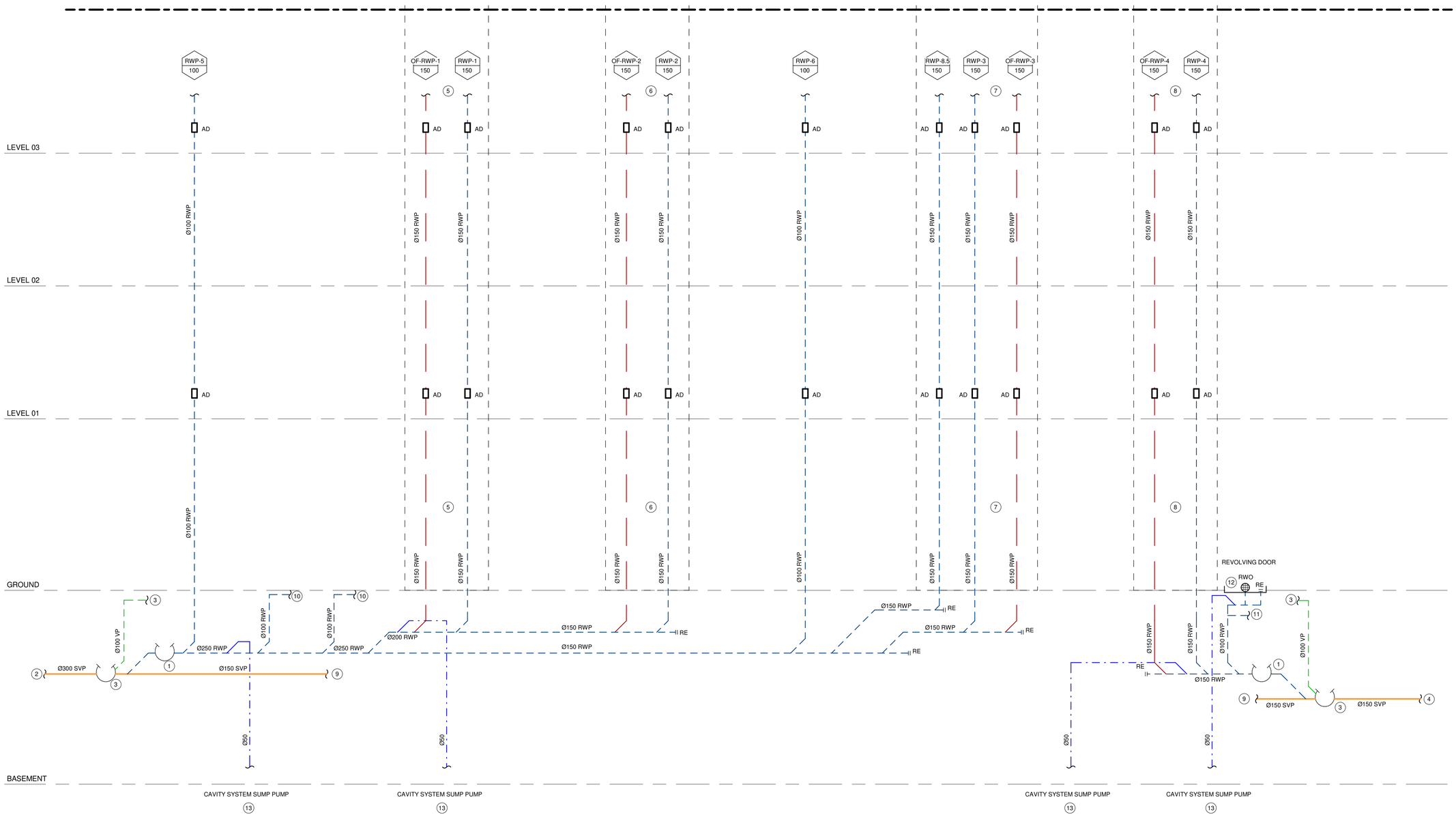
A1V

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

When reproduced at correct scale this line measures 150mm

| No. | DESCRIPTION |
|---|---|
| 1 | RUNNING INTERCEPTOR TRAP FOR RAINWATER |
| 2 | NEW Ø300 COMBINED SEWER OUTFALL INTO WHITFIELD STREET. REFER TO CIVIL ENGINEER DOCUMENTATION FOR SEWER OUTFALL DETAIL AND CONTINUATION. |
| 3 | INTERCEPTOR TRAP VENT PIPE RUN THROUGH BUILDING AND DISCHARGE TO ATMOSPHERE AT ROOF LEVEL. REFER TO ABOVE GROUND FOUL DRAINAGE SCHEMATIC FOR CONTINUATION AND DETAIL. |
| 4 | EXISTING Ø150 COMBINED SEWER OUTFALL INTO HOWLAND STREET. REFER TO CIVIL ENGINEER DOCUMENTATION FOR SEWER OUTFALL DETAIL AND CONTINUATION. |
| 5 | SOUTH CORE RISERS AT GRID 3-C. |
| 6 | WEST CORE RISERS AT GRID 4-C. |
| 7 | NORTH CORE RISERS AT GRID 4-G. |
| 8 | EAST CORE RISERS AT GRID 3-G. |
| 9 | SANITARY DRAINAGE PIPEWORK RUN AT HIGH LEVEL OF BASEMENT FLOOR. REFER TO ABOVE GROUND FOUL DRAINAGE SCHEMATIC FOR CONTINUATION AND DETAIL. |
| 10 | Ø100 RAINWATER PIPE CONNECT TO CHANNEL DRAINAGE AT CYPRESS PLACE AS DETAILED BY CIVIL ENGINEER. |
| 11 | Ø100 RAINWATER PIPE CONNECTS TO CHANNEL DRAINAGE AT HOWLAND STREET AS DETAILED BY CIVIL ENGINEER. |
| 12 | CONVENTIONAL RAINWATER OUTLET. |
| 13 | BELOW GROUND CAVITY SYSTEM PUMP STATION AS DETAILED BY CIVIL ENGINEER WITH PUMPED RAINWATER RISING MAINS FROM BELOW GROUND AND INTERFACE WITH ABOVE GROUND SYSTEMS. REFER TO CIVIL ENGINEER DRAWINGS FOR CONTINUATION INTO BELOW GROUND DRAINAGE SYSTEMS. |

FOR CONTINUATION REFER DRAWING No. NWB-NDY-ZZ-XX-SC-P-5205

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Project
# NETWORK BUILDING
95-100 Tottenham Court Road

Title
PUBLIC HEALTH SERVICES
RAINWATER DRAINAGE SYSTEM
SCHEMATIC - SHEET 2 OF 2

Project No. U14024-001H
Revit Version 2020
Design JN
Drawn ICE
Scale N.T.S.
Project Commencement MAR. 2022
DRAWING IN COLOUR
Drawing No. NWB-NDY-ZZ-XX-SC-P-5206
Revision T01

A1V
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
When reproduced at correct scale this line measures 150mm

# Appendix B

Bauder Blue Roof Design Information

# BlueRoofDesign Software

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

**Date:** 09/01/2023 **Revision:** C (1317) **Page:** 1

**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 8th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 621 m² | x 100 % |
| Additional Area | 277 m² | x 100 % |
| Effective Area | 898 m² | |

## Storage Details:

| | |
|---|---|
| Length | 621 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 100 years |
| Climate Change Factor | 40 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 21.0 | 251.8 | 18.7 |
| 10 min | 30.9 | 185.5 | 27.4 |
| 15 min | 37.1 | 148.3 | 32.7 |
| 30 min | 47.9 | 95.7 | 41.6 |
| 45 min | 54.2 | 72.3 | 46.4 |
| 60 min | 58.7 | 58.7 | 49.6 |
| 2 hours | 69.7 | 34.8 | 55.8 |
| 6 hours | 86.8 | 14.5 | 57.5 |
| 24 hours | 112.1 | 4.7 | 47.7 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 8 holes |
| Sump Depth | None |
| Discharge rate | 1.53 l/s |
| Outlet | 2 No |
| Flow Per Outlet | 0.77 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 3.75 hrs |
| Hmax | 99 mm |
| Required Volume | 58.2 m³ |
| Time to half empty | 5.3 hrs |
| Roof Loading | 93.72 Kg/m² |

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product.

Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissions or otherwise arising therefrom.

Details practices principles values and calculations should be verified for accuracy and suitability for the required purpose for use.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. The H-Max is measured from the mean roof level

Overflow discharge requirements based on a CAT1 storm event to BSEN12056-3:2000.

Total flow rate: 898m2x0.023l/s/m2 = 20.65l/s.

NOTE: Roof loading data shown in the results section is for the blue roof only. For total loading of blue roof and overflows then Hmax + 35mm should be factored in.

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**Date:** 09/01/2023 **Revision:** C (1317) 

**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 8th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 621 m² | x 100 % |
| Additional Area | 277 m² | x 100 % |
| Effective Area | 898 m² | |

## Storage Details:

| | |
|---|---|
| Length | 621 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 100 years |
| Climate Change Factor | 0 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 15.0 | 179.8 | 13.3 |
| 10 min | 22.1 | 132.5 | 19.5 |
| 15 min | 26.5 | 105.9 | 23.3 |
| 30 min | 34.2 | 68.4 | 29.5 |
| 45 min | 38.7 | 51.6 | 32.9 |
| 60 min | 42.0 | 42.0 | 35.1 |
| 2 hours | 49.8 | 24.9 | 39.1 |
| 6 hours | 62.0 | 10.3 | 39.5 |
| 24 hours | 80.1 | 3.3 | 31.4 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 8 holes |
| Sump Depth | None |
| Discharge rate | 1.27 l/s |
| Outlet | 2 No |
| Flow Per Outlet | 0.64 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 3.28 hrs |
| Hmax | 68 mm |
| Required Volume | 40.2 m³ |
| Time to half empty | 4.4 hrs |
| Roof Loading | 64.73 Kg/m² |

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product.

Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissions or otherwise arising therefrom.

Details practices principles values and calculations should be verified for accuracy and suitability for the required purpose for use.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. The H-Max is measured from the mean roof level

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**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 8th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 621 m² | x 100 % |
| Additional Area | 277 m² | x 100 % |
| Effective Area | 898 m² | |

## Storage Details:

| | |
|---|---|
| Length | 621 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 30 years |
| Climate Change Factor | 0 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 11.8 | 141.4 | 10.5 |
| 10 min | 17.1 | 102.5 | 15.1 |
| 15 min | 20.4 | 81.4 | 17.8 |
| 30 min | 26.1 | 52.2 | 22.4 |
| 45 min | 29.5 | 39.3 | 24.9 |
| 60 min | 31.9 | 31.9 | 26.4 |
| 2 hours | 37.9 | 18.9 | 29.2 |
| 6 hours | 47.8 | 8.0 | 29.5 |
| 24 hours | 62.9 | 2.6 | 23.3 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 8 holes |
| Sump Depth | None |
| Discharge rate | 1.1 l/s |
| Outlet | 2 No |
| Flow Per Outlet | 0.55 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 3.13 hrs |
| Hmax | 51 mm |
| Required Volume | 29.9 m³ |
| Time to half empty | 3.8 hrs |
| Roof Loading | 48.15 Kg/m² |

All results based on input data. Please check that input data has been correctly interpreted.

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| | | |
|---|---|---|
| BlueRoof | 621 m² | x 100 % |
| Additional Area | 277 m² | x 100 % |
| Effective Area | 898 m² | |

## Storage Details:

| | |
|---|---|
| Length | 621 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 1 years |
| Climate Change Factor | 0 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 5.0 | 59.9 | 4.4 |
| 10 min | 6.9 | 41.7 | 6.1 |
| 15 min | 8.2 | 32.8 | 7.1 |
| 30 min | 10.6 | 21.1 | 8.9 |
| 45 min | 12.0 | 16.1 | 9.9 |
| 60 min | 13.2 | 13.2 | 10.5 |
| 2 hours | 16.1 | 8.0 | 11.5 |
| 6 hours | 21.5 | 3.6 | 12.1 |
| 24 hours | 30.2 | 1.3 | 9.3 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 8 holes |
| Sump Depth | None |
| Discharge rate | 0.7 l/s |
| Outlet | 2 No |
| Flow Per Outlet | 0.35 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 5.17 hrs |
| Hmax | 21 mm |
| Required Volume | 12.1 m³ |
| Time to half empty | 2.4 hrs |
| Roof Loading | 19.48 Kg/m² |

All results based on input data. Please check that input data has been correctly interpreted.

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Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk



**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 9th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 606 m² | x 100 % |
| Additional Area | 52 m² | x 100 % |
| Effective Area | 658 m² | |

## Storage Details:

| | |
|---|---|
| Length | 606 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 100 years |
| Climate Change Factor | 40 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 21.0 | 251.8 | 13.7 |
| 10 min | 30.9 | 185.5 | 20.2 |
| 15 min | 37.1 | 148.3 | 24.1 |
| 30 min | 47.9 | 95.7 | 30.7 |
| 45 min | 54.2 | 72.3 | 34.5 |
| 60 min | 58.7 | 58.7 | 37.0 |
| 2 hours | 69.7 | 34.8 | 42.2 |
| 6 hours | 86.8 | 14.5 | 45.4 |
| 24 hours | 112.1 | 4.7 | 40.3 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 2 holes |
| Sump Depth | None |
| Discharge rate | 0.86 l/s |
| Outlet | 5 No |
| Flow Per Outlet | 0.17 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 5.33 hrs |
| Hmax | 79 mm |
| Required Volume | 45.5 m³ |
| Time to half empty | 7.4 hrs |
| Roof Loading | 75.08 Kg/m² |

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Overflow discharge requirements based on a CAT1 storm event to BSEN12056-3:2000.

Total flow rate: 658m2x0.023l/s/m2 = 15.13l/s.

NOTE: Roof loading data shown in the results section is for the blue roof only. For total loading of blue roof and overflows then Hmax + 35mm should be factored in.

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**Date:** 09/01/2023 **Revision:** C (1317) 

**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 9th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 606 m² | x 100 % |
| Additional Area | 52 m² | x 100 % |
| Effective Area | 658 m² | |

## Storage Details:

| | |
|---|---|
| Length | 606 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 100 years |
| Climate Change Factor | 0 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 15.0 | 179.8 | 9.8 |
| 10 min | 22.1 | 132.5 | 14.4 |
| 15 min | 26.5 | 105.9 | 17.2 |
| 30 min | 34.2 | 68.4 | 21.9 |
| 45 min | 38.7 | 51.6 | 24.5 |
| 60 min | 42.0 | 42.0 | 26.2 |
| 2 hours | 49.8 | 24.9 | 29.7 |
| 6 hours | 62.0 | 10.3 | 31.3 |
| 24 hours | 80.1 | 3.3 | 27.1 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 2 holes |
| Sump Depth | None |
| Discharge rate | 0.71 l/s |
| Outlet | 5 No |
| Flow Per Outlet | 0.14 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 4.23 hrs |
| Hmax | 55 mm |
| Required Volume | 31.4 m³ |
| Time to half empty | 6.1 hrs |
| Roof Loading | 51.82 Kg/m² |

All results based on input data. Please check that input data has been correctly interpreted.

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**Date:** 09/01/2023 **Revision:** C (1317) 

**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 9th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 606 m² | x 100 % |
| Additional Area | 52 m² | x 100 % |
| Effective Area | 658 m² | |

## Storage Details:

| | |
|---|---|
| Length | 606 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 30 years |
| Climate Change Factor | 0 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity | | Required |
|---|---|---|---|
| | mm | mm/h | storage(m³) |
| 5 min | 11.8 | 141.4 | 7.7 |
| 10 min | 17.1 | 102.5 | 11.1 |
| 15 min | 20.4 | 81.4 | 13.2 |
| 30 min | 26.1 | 52.2 | 16.6 |
| 45 min | 29.5 | 39.3 | 18.5 |
| 60 min | 31.9 | 31.9 | 19.8 |
| 2 hours | 37.9 | 18.9 | 22.3 |
| 6 hours | 47.8 | 8.0 | 23.5 |
| 24 hours | 62.9 | 2.6 | 20.3 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 2 holes |
| Sump Depth | None |
| Discharge rate | 0.62 l/s |
| Outlet | 5 No |
| Flow Per Outlet | 0.12 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 4.1 hrs |
| Hmax | 41 mm |
| Required Volume | 23.5 m³ |
| Time to half empty | 5.3 hrs |
| Roof Loading | 38.78 Kg/m² |

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**Date:** 09/01/2023 **Revision:** C (1317) 

**Client:**

**Project:** B222852_Network Building

**Location:** London, W1T 4TP

**Roof Location:** 9th Floor

## Roof Details:

| | | |
|---|---|---|
| BlueRoof | 606 m² | x 100 % |
| Additional Area | 52 m² | x 100 % |
| Effective Area | 658 m² | |

## Storage Details:

| | |
|---|---|
| Length | 606 m |
| Width | 1 m |
| Depth | 100 mm |
| Porosity | 95 % |
| Slope | none |

## Rainfall Details - FSR Method:

| | |
|---|---|
| Return Period | 1 years |
| Climate Change Factor | 0 % |
| r value | 0.44 |
| M5-60 | 20.7 mm |

Summer Storm Profile

| Duration | Intensity mm | mm/h | Required storage(m³) |
|---|---|---|---|
| 5 min | 5.0 | 59.9 | 3.3 |
| 10 min | 6.9 | 41.7 | 4.5 |
| 15 min | 8.2 | 32.8 | 5.3 |
| 30 min | 10.6 | 21.1 | 6.6 |
| 45 min | 12.0 | 16.1 | 7.4 |
| 60 min | 13.2 | 13.2 | 8.0 |
| 2 hours | 16.1 | 8.0 | 9.0 |
| 6 hours | 21.5 | 3.6 | 9.8 |
| 24 hours | 30.2 | 1.3 | 8.5 |

## Outflow Details:

| | |
|---|---|
| Attenuation Control | BlueRoof Outlet |
| Control | 2 holes |
| Sump Depth | None |
| Discharge rate | 0.39 l/s |
| Outlet | 5 No |
| Flow Per Outlet | 0.08 l/s |

## Result:

| | |
|---|---|
| Outcome | **Pass** |
| Critical Storm Duration | 7.3 hrs |
| Hmax | 17 mm |
| Required Volume | 9.8 m³ |
| Time to half empty | 3.5 hrs |
| Roof Loading | 16.17 Kg/m² |

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