MHA STRUCTURAL DESIGN

22064/No. 81 Belsize Park Gardens, NW3 4NJ

December 2023/ Technical Note in Response to Flood Officer's comments

Rev	Description	Date
-	For Discussion	1 December 2023

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Introduction

1. This technical note has been prepared in response to comments raised by the Flood officer in relation to the proposed development at 81 Belsize Park Gardens.
2. The flood officer's comments were in response to the Flood Risk Assessment and Drainage strategy report (Reference no. 22064-MHA-WS-XX-RP-C-100-P3_Flood Risk Assessment Report).
3. The technical note provides responses to these comments.

Response to Comments

1. "*The applicant has not provided sufficient information on why small-scale rainwater harvesting methods such as water butts can't be considered to demonstrate that the drainage hierarchy has been sufficiently considered to comply with London Plan Policy SI 13.*"

   Response:

   As it was highlighted in the flood risk assessment the site is already developed and the proposal is to change the current use of the building from Class E to F1. Therefore, there will be no significant redevelopment.

   Currently, all RWP along the external means of escape route of the building run into the ground. Therefore, any rainwater harvesting method will impact the width of the escape route. Regarding the two RWP along the frontage of the building, any rainwater harvesting system would have an impact on the planted beds and underground foundations.

2. "*The applicant proposes a green roof with a suggested substrate depth of between 20-40mm which is not the minimum required depth of 150mm.*"

   Response:

   The substrate depth has been revised to 150mm. This update has been captured within the revised proposed drainage strategy plan.

3. "*The proposed runoff rate from the site is greater than greenfield runoff rates and has not been agreed with the LLFA which does not comply with Defra Non-Statutory Technical Standards for Sustainable Drainage Systems S3 nor London Plan Policy SI 13.*"

   Response:

   The proposed runoff rates should be no higher than the existing rates as no changes are proposed to the impermeable area specifically the roof area, as the development proposes a change the use of the building from Class E to F1.

   However, in accordance with good practice, SuDS have been proposed to assist with the reduction of the existing runoff rates and provide a betterment wherever possible. The proposed runoff rates have been calculated to provide a betterment up to circa 50% in reduction from the existing rates. Please see table summary below.

Return Period	Existing Runoff Rate (l/s)	Proposed Runoff Rate (l/s)	Betterment (%)
1Year	8.9	4.3	51.6% Reduction
30 Year +35%CC	16.2	11.5	29.0% Reduction
100 Year +40%CC	18.5	12.9	30.2% Reduction

Table 1. Existing vs Proposed runoff rates

4. "*The greenfield and existing runoff rates evidence of calculation has not been provided. These need to be provided to demonstrate the method and calculation used to determine these.*"

   Response:

   The Greenfield runoff rates have been calculated in accordance with the Rainfall run-off management for urban developments issued by FCERM and the EA published in February 2021 and with the CIRIA SuDS Manual. The method of calculations used is the IH124 and the results have been presented in Table 2 below.

   The Existing runoff rates have been calculated in accordance with the CIRIA SuDS Manual (Section 24.5) by creating simulation of the existing network using InfoDrainage. The results are appended to this technical note.

   It is worth noting that the proposal is to change the use of the building. No change to hardstanding areas are proposed. Therefore, the existing runoff rates can be maintained. However, to adhere to the industry best practice and guidance a reduction to the existing runoff rate wherever possible should be sought (See Table 1 above).

Return Period	Greenfield Runoff Rate (l/s)	Existing Runoff Rate (l/s)
Q_{bar}	0.3	N/A
1 Year	0.3	8.9
30 Year	0.7	16.2
100 Year	1.0	18.5

Table 2. Greenfield & Existing Runoff Rates

5. "*The applicant has not provided the greenfield runoff volume nor the existing runoff volume which are required to confirm that the proposed runoff volume is as close as practicable to greenfield volume to comply with Defra Non- Statutory Technical Standards for Sustainable Drainage Systems S5.*"

   Response:

   The greenfield, existing and proposed runoff volumes have been calculated using the FSR method for the greenfield runoff volume and the simulation analysis for both the existing and proposed. These are presented in Table 3 below.

   It can be seen the proposed runoff volume has provided a 21% reduction from the existing runoff volume. This is very positive considering that the development proposal is the change of use of the building without any major redevelopment.

   The greenfield runoff volume calculations can be found in page 9 of the 22064-MHA-XX-CAL-C-101_Proposed Drainage Simulation analysis report. The existing & proposed runoff volume can be found in page 2 of both the 22064-MHA-XX-CAL-C-102_Proposed Runoff Volume and 22064-MHA-XX-CAL-C-103_Existing Runoff Volume report.

Greenfield Runoff Volume (m3)	Existing Runoff Volume (m3)	Proposed Runoff Volume (m3)
11.8	50.8	40.1

Table 3. Runoff Volume for the 1 in 100 Year Return Period 360 minutes event

6. *"The applicant has provided a different number, and a different area, of green roofing in the report and in the calculations. The total number and area of the green roofs should be clarified such that the volume of storage they will provide can be confirmed and compliance with Defra Non-Statutory Technical Standards for Sustainable Drainage Systems S5 and S6 can be confirmed."*

   Response:

   The green roof area in the network simulation analysis has been updated to match the green roof area proposed in the drainage strategy (circa 280m2).

7. *"The catchment area used in the drainage calculations for the site is 540m2 whilst the total site area is stated as 723m2 in the Flood Risk Assessment and as 819m2 in the Application Form which means that compliance with Defra Non-Statutory Technical Standards for Sustainable Drainage Systems S7 and S8 cannot be confirmed for the full site area. The applicant should clarify the total site area and use this in the drainage calculations to demonstrate that the storage features are sufficient to provide no flooding on site for the total area being drained."*

   Response:

   The site area on the application form (819 sqm) includes a strip of land in the neighbouring property's garden (No. 83). This land is outside of the applicant's ownership and no works are proposed on this land, except for works to trees (tree pruning) and the temporary siting of scaffolding to facilitate the development.

   In addition, at the front of the site, there is a small triangle of land that currently forms part of the forecourt of No. 81 but the Land Registry title shows this as within No. 83s ownership.

   The intention as part of this application is to make good this area and hand the land back to No. 83. As this land falls outside of the applicant's ownership, it is not appropriate to include it in the drainage strategy. As such, the site area that falls within the applicant's ownership is used for the drainage strategy (723 sqm).

   This application site area is explained further on page 36 of the submitted Design and Access Statement and at paragraphs 2.9- 2.12 of the submitted Planning Statement.

   The Drainage simulation analysis model has been revised to reflect the 723sqm catchment area and relevant green roof and permeable paving areas.

8. *"The applicant has not stated the owner of the maintenance tasks for the drainage features."*

   Response:

   The Fine Arts College will be responsible for the maintenance of the drainage features.

Conclusion

1. The proposal is to change the use of the building from Class E to Class F1 with no significant redevelopment. Existing roof area will remain unchanged.
2. SuDS features such as green roofs, permeable paving and rainwater garden have been proposed and all other options have been explored and exhausted.
3. The key constrain of the SuDS provision is the current limited space to provide any further SuDS features and the underground foundations.
4. The impermeable area has been reduced with the introduction of the green roofs and rainwater garden which has provided a betterment to the existing drainage. This is evident with the reduction of the existing runoff rate & volumes.
5. It appears that there is sufficient evidence and clarifications for the Flood Officer's holding objection to be removed.

NOTES

1. This drawing is to be read in conjunction with all relevant architects', engineers', and specialists' drawings, bills of quantities and specifications.
2. Do not scale off this drawing.
3. All dimensions are to be confirmed on site by the contractor.
4. Refer to MHA drawing 900 for all general notes.

BEDDING NOTES

1. GRANULAR PIPE BEDDING MATERIAL FOR PIPES, AND BACKFILLING FOR TEMPORARY DRAINS (TRENCH SUB-DRAINS), SHALL CONSIST OF AGGREGATES FROM NATURAL SOURCES OR SINTERED PULVERIZED-FUEL ASH COMPLYING WITH THE RELEVANT PROVISIONS OF BS.882 AND BS.3797, PART 2 RESPECTIVELY, SIZED IN ACCORDANCE WITH THE FOLLOWING TABLE:

NOMINAL BORE	ALTERNATIVE AGGREGATE SIZES (mm)	
	SINGLE-SIZED	GRADED
100	10	-
150	10 OR 14	14 TO 5
225 - 300	10, 14 OR 20	14 TO 5 OR 20 TO 5
375 - 525	14 OR 20	14 TO 5 OR 20 TO 5
EXCEEDING	14, 20 OR 40	14 TO 5, 20 TO 5 OR 40 TO 5

2. SELECTED BACKFILL MATERIAL, WHETHER SELECTED FROM LOCALLY EXCAVATED MATERIAL OR IMPORTED, SHALL CONSIST OF UNIFORM, READILY COMPACTIBLE MATERIAL, FREE FROM VEGETABLE MATTER, BUILDING RUBBISH & FROZEN MATERIAL, OR MATERIALS SUSCEPTIBLE TO SPONTANEOUS COMBUSTION, & EXCLUDING CLAY OF LIQUID LIMIT GREATER THAN 80 AND/OR PLASTIC LIMIT GREATER THAN 55 AND MATERIALS OF EXCESSIVELY HIGH MOISTURE CONTENT. CLAY LUMPS AND STONES SHALL BE RETAINED ON 75mm AND 37.5mm SIEVES RESPECTIVELY.

3. COMPRESSIBLE FILLER FOR INTERRUPTING CONCRETE PROTECTION TO PIPELINES SHALL CONSIST OF BITUMEN IMPREGNATED INSULATING BOARD TO BS.1142, PART 3 OR OTHER EQUALLY COMPRESSIBLE MATERIAL. THE THICKNESS OF COMPRESSIBLE FILLER SHALL BE AS FOLLOWS:

NOMINAL BORE OF PIPE (mm)	THICKNESS OF COMPRESSIBLE FILLER (mm)
LESS THAN 450	18
450 - 1200	36
EXCEEDING 1200	54

4. THE CONTRACTOR IS TO PROTECT BURIED PIPES (PARTICULARLY SHALLOW PIPES) FROM DAMAGE CAUSED BY LOADS IMPOSED BY CONSTRUCTION PLANT.

5. BELOW ROADS AND OTHER PAVED AREAS TRENCHES SHALL BE BACKFILLED WITH DfT SPECIFICATION TYPE 1 SUB-BASE MATERIAL UP TO ROAD/PAVING FORMATION LEVEL. ALL OTHER TRENCHES,UNLESS OTHERWISE SPECIFIED SHALL BE BACKFILLED TO FINISHED GROUND LEVEL OR UNDERSIDE OF TOPSOIL LAYER WITH WELL COMPACTED EXCAVATED MATERIAL.

GRANULAR BEDDINGS

1. DIMENSION Y: 1/6 BC OR 100mm UNDER BARRELS, AND 50mm MIN. UNDER SOCKETS WHICHEVER IS THE GREATER (400 MAX.). ROCK ETC 1/4 BC AND 150mm MIN UNDER SOCKETS (400mm MAX.)

2. DN : NOMINAL BORE OF PIPE
3. BC : EXTERNAL DIAMETER OF PIPE BARREL

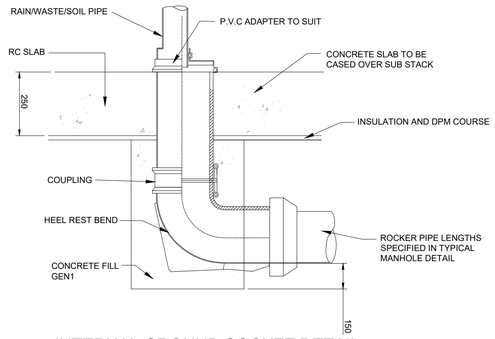
CONCRETE BEDDINGS

1. THE USE OF GRANULAR BEDDINGS BELOW CONCRETE BEDDINGS (BEDDING TYPES A2,A4,A6) ARE FOR USE IN WET CONDITIONS.
2. CONCRETE CRADLES MAY EXTEND TO SIDES OF TRENCH.
3. TRANSVERSE STEEL TO BE 0.4% MIN OF CONCRETE AT X-X (FM=3.4) UNLESS OTHERWISE STATED.
4. BEDDING BENEATH & AT SIDES OF PIPE TO BE WELL COMPACTED
5. BEDDING/BACKFILL DIRECTLY ABOVE PIPE TO BE LIGHTLY COMPACTED BY HAND. DIMENSION Y: 1/6BC OR 100mm UNDER BARRELS, AND 50mm UNDER SOCKETS WHICHEVER IS GREATER (SUBJECT TO 400mm MAX.).
6. DN = NOMINAL BORE OF PIPE.
7. BC = EXTERNAL DIAMETER OF PIPE BARREL.

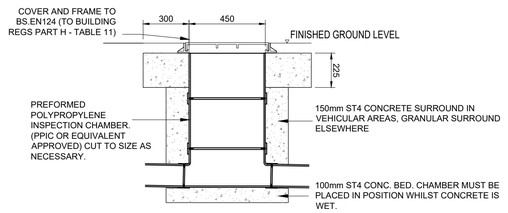
TRENCH WIDTH

1. THE MAXIMUM TRENCH WIDTHS ARE TO BE AS SHOWN BELOW UNLESS THE APPROVAL OF THE ENGINEER IS OBTAINED.

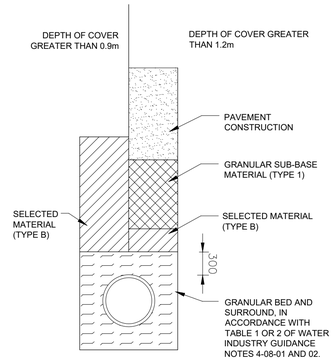
INTERNAL PIPE DIAMETER	MAXIMUM TRENCH WIDTH
100	600
150	600
225	700
300	850
375	1050
450	1150
525	1200
600	1350
675	1450
750	1500
825	1600
900	1900
975	2000
1050	2100
1200	2300



INTERNAL GROUND SOCKET DETAIL
1:20

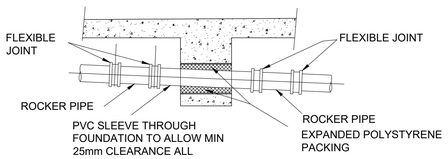


POLYPROPYLENE INSPECTION CHAMBER
MAX DEPTH
1.2m 1:20

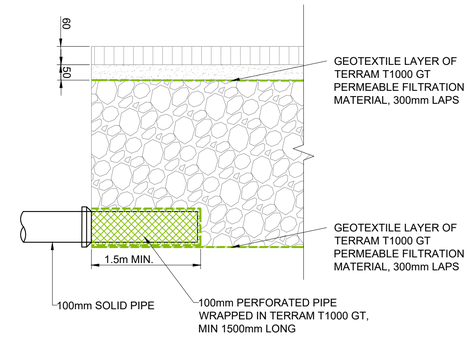


NOTES:
1. TYPE B BACKFILL TO CONSIST OF UNIFORM, READILY COMPACTABLE MATERIAL, FREE FROM VEGETABLE MATTER, BUILDING RUBBISH AND FROZEN MATERIAL, OR MATERIALS SUSCEPTABLE TO SPONTANEOUS COMBUSTION, AND EXCLUDING CLAY OF LIQUID LIMIT GREATER THAN 80 AND/OR PLASTIC LIMIT GREATER THAN 55, AND MATERIALS OF EXCESSIVELY HIGH MOISTURE CONTENT. CLAY LUMPS AND STONES SHALL BE RETAINED ON 75mm AND 37.5mm SIEVES RESPECTIVELY.
2. BACKFILL MATERIAL TO BE COMPACTED IN LAYERS NOT GREATER THAN 250mm THICK. HEAVY COMPACTION EQUIPMENT NOT TO BE USED FOR FIRST 250mm OF BACKFILL.
3. ALL PIPES SHALL HAVE FLEXIBLE JOINTS.

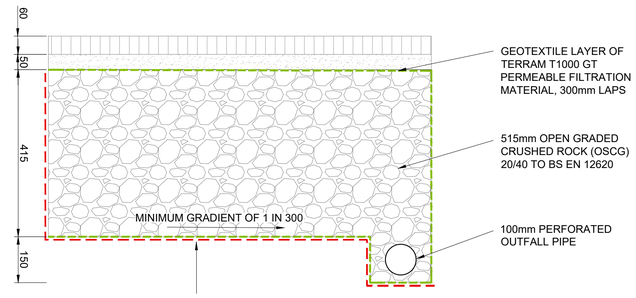
PIPE SURROUND & TRENCH REINSTATEMENT
1:20



PIPE PASSING THROUGH FOUNDATIONS
1:20

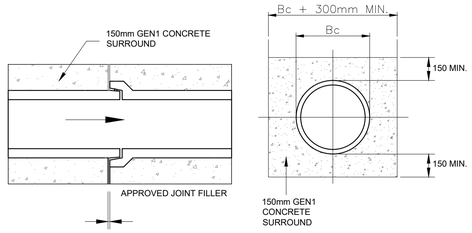


PERFORATED INLET
1:10

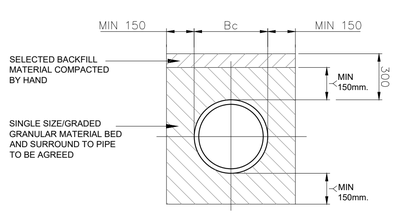


WHERE WITHIN 5m OF BUILDING FOUNDATIONS, BASE LINER LAYER OF 1000 GAUGE IMPERMEABLE POLYTHENE LINER, 300mm LAPS, TAPED JOINTS SHALL BE PROVIDED

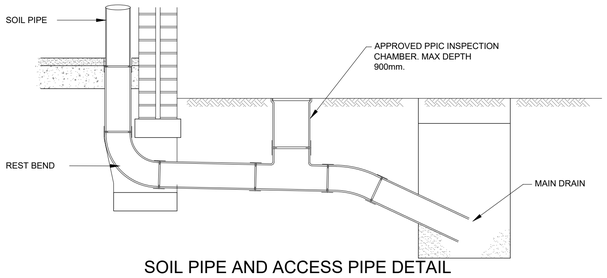
OUTFALL DETAIL THROUGH FREE DRAINING SUB-BASE
1:10



JOINT DETAIL OF TYPE Z BEDDING
1:20



TYPE S BEDDING
1:20



SOIL PIPE AND ACCESS PIPE DETAIL
1:20

Rev.	Date	Made by	Amendments
-	30.11.23	NLS	FIRST ISSUE

Status: PRELIMINARY

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Job Title: 81 BELSIZE PARK GARDENS

Drawing Title: DRAINAGE DETAILS

Scales			
AS SHOWN			
Drawn: NLS	Date: NOV 2023	Checked: BL	
Job No: 22064	Drawing No: 101	Revision: -	

NOTES

1. This drawing is to be read in conjunction with all relevant architects', engineers', and specialists' drawings, bills of quantities and specifications.
2. Do not scale off this drawing.
3. All dimensions are to be confirmed on site by the contractor.
4. Refer to MHA drawing 130 for all general notes.

KEY

- Existing Combined Drainage
- Proposed Surface Drainage
- Proposed Combined Drainage
- Proposed Foul Drainage
- Proposed Perforated Pipe
- Proposed RWP
- Proposed Green Roof Exact details TBC
- Proposed Pervious Pavement Depth: 0.5m
- Proposed Rainwater Garden
- Direction of Flood Exceedance Routes

Rev.	Date	Made by	Amendments
E	29.11.2023	FJ	Revised to suit Flood Officer's comments
D	03.11.2023	NLS	Added Exceedance Flow Routes
C	18.08.2023	FJ	Revised to suit site layout
B	18.08.2023	FJ	Revised to suit site layout
A	08.08.2023	FJ	Issued for Preliminary
-	31.07.2023	FJ	Initial issue - Draft

Status

PRELIMINARY

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Job Title

81 BELSIZE PARK GARDENS

Drawing Title

PROPOSED DRAINAGE STRATEGY LAYOUT

Scales			
1:200			
Drawn	FJ	Date	AUG 2023
Checked	CH		
Job No	22064	Drawing No	100
Revision	E		

1.000 - 172.93m

Type : Catchment Area

Area (ha)	0.02

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

2.000 - 60.01m

Type : Catchment Area

Area (ha)	0.005

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

1.000 - 22.04m

Type : Catchment Area

Area (ha)	0.003

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

1.001 - 16.32m

Type : Catchment Area

Area (ha)	0.002

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

1.003 - 20.96m

Type : Catchment Area

Area (ha)	0.002

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

Green Roof 1

Type : Catchment Area

Area (ha)	0.009

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	0.750
Winter Volumetric Runoff Coefficient	0.840
Depression Storage (mm)	40
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120
Urban Creep (%)	0

Green Roof 2

Type : Catchment Area

Area (ha)	0.008

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	0.750
Winter Volumetric Runoff Coefficient	0.840
Depression Storage (mm)	40
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120
Urban Creep (%)	0

Green Roof 3

Type : Catchment Area

Area (ha)	0.008

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	0.750
Winter Volumetric Runoff Coefficient	0.840
Depression Storage (mm)	40
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120
Urban Creep (%)	0

Green Roof 4&5

Type : Catchment Area

Area (ha)	0.003

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	0.750
Winter Volumetric Runoff Coefficient	0.840
Depression Storage (mm)	40
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120
Urban Creep (%)	0

Catchment Area

Type : Catchment Area

Area (ha)	0.002

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Catchment Area (1)

Type : Catchment Area

Area (ha)	0.003

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0

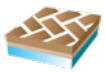
Catchment Area (Porous)

Type : Catchment Area

Area (ha)	0.005

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	0



Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	0.000
Depth (m)	0.200
Base Level (m)	-0.200
Paving Layer Depth (mm)	60
Membrane Percolation (m/hr)	3.0
Porosity (%)	30
Length (m)	11.512
Long. Slope (1:X)	350.00
Width (m)	3.839
Total Volume (m³)	1.856

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Green Roof 4&5 Catchment Area (Porous)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

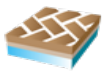
Outlet

Outgoing Connection	Pipe
Outlet Type	Free Discharge

Advanced

Base Infiltration Rate (m/hr)	0.0
Side Infiltration Rate (m/hr)	0.0
Safety Factor	2.0
Conductivity (m/hr)	500.0

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		



Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Level (m)	0.000
Depth (m)	0.200
Base Level (m)	-0.200
Paving Layer Depth (mm)	60
Membrane Percolation (m/hr)	3.0
Porosity (%)	30
Length (m)	38.750
Long. Slope (1:X)	500.00
Width (m)	1.972
Total Volume (m³)	3.210

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Advanced

Conductivity (m/hr)	500.0

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
1.000 - 22.04m	MH1		Time of Concentration	0.003	100	0	100	0.003
1.000 - 172.93m	MH1		Time of Concentration	0.020	100	0	100	0.020
1.001 - 16.32m	MH2		Time of Concentration	0.002	100	0	100	0.002
1.003 - 20.96m	MH3		Time of Concentration	0.002	100	0	100	0.002
2.000 - 60.01m	S1		Time of Concentration	0.005	100	0	100	0.005
Catchment Area	MH		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (1)	Porous Paving (1)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (Porous)	Porous Paving		Time of Concentration	0.005	100	0	100	0.005
Green Roof 1	MH1		Green Roof	0.009		0		0.009
Green Roof 2	MH		Green Roof	0.008		0		0.008
Green Roof 3	MH2		Green Roof	0.008		0		0.008
Green Roof 4&5	Porous Paving		Green Roof	0.003		0		0.003
TOTAL		**0.0**		**0.071**				**0.071**

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023		
	Designed by: FJ	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Use Catchment Values
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.400
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023		
	Designed by: FJ	Checked by:	Approved By:
Report Title: UK and Ireland Rural Runoff Calculator	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Greenfield Volume

FSR

Details

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.4
Area (ha)	0.072
SAAR (mm)	638.0
CWI	93.840
Urban User	0
Areal Reduction Factor	1.00
SPR	30
Storm Duration (mins)	360
Return Period (years)	100

Results

PR%	26.19
Greenfield Runoff Volume (m^3)	11.787

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-0.530	-0.487	0.043	3.3	0.027	0.000	3.3	1.539	OK
MH	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-0.750	-0.713	0.037	3.5	0.024	0.000	3.4	1.639	OK
MH2	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.230	-1.181	0.049	3.7	0.031	0.000	3.6	1.792	OK
MH4	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.750	-1.703	0.047	4.4	0.053	0.000	4.3	2.214	OK
S1	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-0.900	-0.891	0.009	0.7	0.001	0.000	0.6	0.306	OK
Outfall	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.900	-1.857	0.043	4.3	0.000	0.000	4.3	2.214	OK
MH3	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.310	-1.272	0.038	3.9	0.024	0.000	3.8	1.912	OK

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-0.530	-0.397	0.133	11.0	0.085	0.000	9.4	5.103	Surcharged
MH	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-0.750	-0.675	0.075	10.1	0.047	0.000	10.1	5.440	OK
MH2	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-1.230	-1.047	0.183	11.3	0.116	0.000	10.8	5.967	Surcharged
MH4	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-1.750	-1.573	0.177	12.9	0.200	0.000	12.0	7.475	Surcharged
S1	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-0.900	-0.885	0.015	2.2	0.002	0.000	2.2	1.105	OK
Outfall	FSR: 30 years: +35 %: 15 mins: Summer	0.000	-1.900	-1.800	0.100	11.3	0.000	0.000	11.5	6.648	OK
MH3	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-1.310	-1.226	0.084	11.7	0.053	0.000	10.8	6.379	OK

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-0.530	-0.197	0.333	14.8	0.212	0.000	11.5	6.864	Surcharged
MH	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-0.750	-0.533	0.217	12.5	0.138	0.000	10.4	7.312	Surcharged
MH2	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-1.230	-0.888	0.342	11.9	0.218	0.000	11.0	8.015	Surcharged
MH4	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-1.750	-1.514	0.236	13.8	0.267	0.000	13.4	10.184	Surcharged
S1	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-0.900	-0.883	0.017	3.0	0.003	0.000	2.9	1.623	OK
Outfall	FSR: 100 years: +40 %: 15 mins: Summer	0.000	-1.900	-1.800	0.100	12.9	0.000	0.000	12.9	9.040	OK
MH3	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-1.310	-1.052	0.258	11.9	0.164	0.000	12.0	8.572	Surcharged

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023		
	Designed by: FJ	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Use Catchment Values
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.400
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter

Junction	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	0.000	-0.530	-0.493	0.037	2.6	0.024	0.000	2.6	20.992	OK
MH	0.000	-0.750	-0.713	0.037	3.4	0.023	0.000	3.3	25.266	OK
MH2	0.000	-1.230	-1.177	0.053	4.2	0.034	0.000	4.1	30.251	OK
MH4	0.000	-1.750	-1.697	0.053	5.3	0.060	0.000	5.3	40.111	OK
S1	0.000	-0.900	-0.889	0.011	1.0	0.002	0.000	1.0	8.436	OK
Outfall	0.000	-1.900	-1.852	0.048	5.3	0.000	0.000	5.3	40.111	OK
MH3	0.000	-1.310	-1.269	0.041	4.3	0.026	0.000	4.3	31.679	OK

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023		
	Designed by: FJ	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Use Catchment Values
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.400
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Existing Network	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-0.530	-0.480	0.050	4.4	0.032	0.000	4.3	2.041	OK
MH	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-0.750	-0.701	0.049	5.8	0.031	0.000	5.6	2.692	OK
MH2	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.230	-1.153	0.077	7.4	0.049	0.000	7.1	3.482	OK
MH4	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.750	-1.671	0.079	9.2	0.089	0.000	8.9	4.485	OK
Outfall	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.900	-1.833	0.067	8.9	0.000	0.000	8.9	4.485	OK
MH3	FSR: 1 years: +0 %: 15 mins: Winter	0.000	-1.310	-1.254	0.056	7.4	0.036	0.000	7.3	3.617	OK

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Existing Network	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-0.530	0.001	0.531	14.2	0.898	0.561	9.7	6.814	Flood
MH	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-0.750	-0.174	0.576	14.2	0.367	0.000	10.4	9.007	Surcharged
MH2	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-1.230	-0.545	0.685	15.9	0.436	0.000	13.1	11.708	Surcharged
MH4	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-1.750	-1.355	0.395	17.8	0.447	0.000	16.8	15.117	Surcharged
Outfall	FSR: 30 years: +35 %: 15 mins: Summer	0.000	-1.900	-1.800	0.100	16.3	0.000	0.000	16.2	13.507	OK
MH3	FSR: 30 years: +35 %: 15 mins: Winter	0.000	-1.310	-0.755	0.555	14.1	0.353	0.000	14.1	12.188	Surcharged

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Existing Network	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 100 years: +40 %: 15 mins: Winter	0.000	-0.530	0.003	0.533	19.1	3.456	3.119	10.4	9.052	Flood
MH	FSR: 100 years: +40 %: 30 mins: Winter	0.000	-0.750	-0.075	0.675	13.0	0.430	0.000	11.1	15.847	Surcharged
MH2	FSR: 100 years: +40 %: 30 mins: Winter	0.000	-1.230	-0.380	0.850	15.0	0.541	0.000	14.0	20.571	Surcharged
MH4	FSR: 100 years: +40 %: 30 mins: Winter	0.000	-1.750	-1.212	0.538	19.9	0.608	0.000	19.5	26.545	Surcharged
Outfall	FSR: 100 years: +40 %: 15 mins: Summer	0.000	-1.900	-1.800	0.100	18.1	0.000	0.000	18.5	18.091	OK
MH3	FSR: 100 years: +40 %: 30 mins: Winter	0.000	-1.310	-0.615	0.695	14.9	0.442	0.000	14.4	21.402	Surcharged

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023		
	Designed by: FJ	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Use Catchment Values
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.400
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Project:	Date:		
81 BELSIZE PARK GARDENS Project No: 22064	31/07/2023 Designed by: FJ	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Existing Network	MHA STRUCTURAL DESIGN: London: +44 (0)207 375 6340 Cambridge: +44 (0)1223 776340 mhastructuraldesign.com		

FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter

Junction	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	0.000	-0.530	-0.492	0.038	2.7	0.024	0.000	2.7	23.159	OK
MH	0.000	-0.750	-0.712	0.038	3.6	0.024	0.000	3.6	30.532	OK
MH2	0.000	-1.230	-1.173	0.057	4.6	0.036	0.000	4.6	39.513	OK
MH4	0.000	-1.750	-1.692	0.058	5.9	0.066	0.000	5.9	50.887	OK
Outfall	0.000	-1.900	-1.848	0.052	5.9	0.000	0.000	5.9	50.887	OK
MH3	0.000	-1.310	-1.267	0.043	4.8	0.028	0.000	4.8	41.048	OK