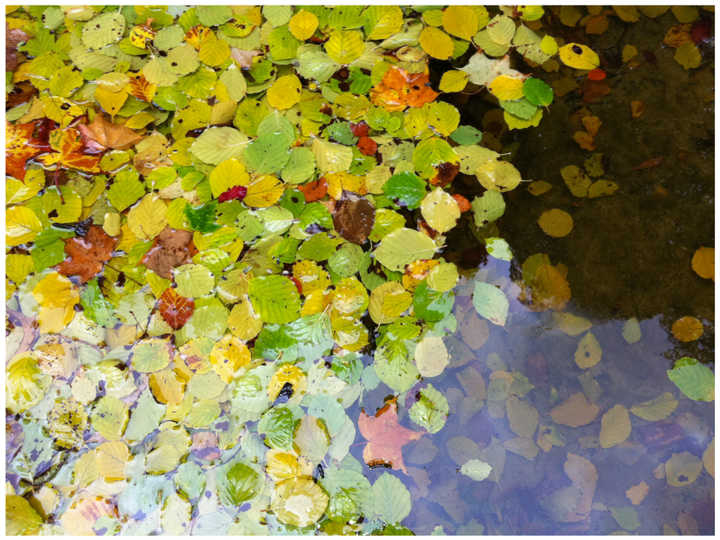
Infrastructure Design Studio

Infrastructure Design Studio Ltd
31 Dyer Street
Cirencester
Gloucestershire
GL7 2PP
Tel: 01285 655008

The Garden House
Hampstead



Planning Condition Discharge Report - Storm Drainage

Project Number 1377
Author: E. Partridge
Checked: M. Jones

September 2019

Purpose of the Report

This report has been prepared in order to discharge Planning Condition 8 of the planning consent for the various alterations and extensions to The Garden House, Vale of Health, NW3 1AN. Planning Reference: 2019/3988/P. This report should be read in conjunction with drawing **1377-C01**.

Condition 8

Prior to commencement of development, details of permeable hard surfacing and a Sustainable Urban Drainage System shall be submitted to and approved in writing by the local planning authority. The system shall be implemented as part of the development and thereafter retained and maintained.

Reason: To reduce the rate of surface water run-off from the buildings and limit the impact on the stormwater drainage system in accordance with policies CS13 and CS16 of the London Borough of Camden Local Development Framework Core Strategy and policies DP22, DP23, and DP32 of the London Borough of Camden Local Development Framework Development Policies.

Actions for Applicant:

2. Provide the greenfield runoff rate for the site
3. Provide the proposed discharge rate for the site
4. Provide calculations to support the proposed attenuation volume
5. Provide evidence that the attenuation tank will not be at risk of floatation
6. Provide evidence that the use of permeable paving to discharge via infiltration is suitable for the site given the presence of shallow groundwater levels
7. Provide further details of the drainage channel runs identified to drain the garden, outline their need and demonstrate that they will not have a detrimental impact on flood risk offsite
8. Provide evidence of consent/approval to discharge at the proposed rate and location into Vale of Heath Pond
9. Provide an updated drainage layout plan which details all elements of the proposed site drainage, including pipe size, gradients, invert levels and connections, location of the flow control device, proposed discharge rate and point(s) of discharge from the site
10. Provide site specific maintenance plan for the proposed SuDS and identify the party who will be responsible for future maintenance.

Addressing each point in order:

1. Provide the greenfield runoff rate for the site

A greenfield run-off calculation using the ICP Suds module of Microdrainage has been completed as shown in Appendix 1. This is for the whole site with a percentage of urban run-off to account for the existing property.

2. Provide the proposed discharge rate for the site

The run-off has been based on the use of a 20mm orifice control, which is the minimum recommended in CIRIA C753 the Suds Manual. The orifice controls attenuation storage in a cellular attenuation tank set beneath the patio as shown on Drawing 1377-C01. Microdrainage Calculations for the discharge are included as Appendix 2. The maximum discharge in a 100yr storm including 40% for climate change is 0.7l/s.

3. Provide calculations to support the proposed attenuation volume

Microdrainage Calculations for the attenuation are included as Appendix 2 showing the required attenuation volume to be 11.9m3 for a 100yr storm event including 40% climate change..

4. Provide evidence that the attenuation tank will not be at risk of floatation

Groundwater level has been established at 800mm below existing ground level. The cellular attenuation tank is set beneath the proposed patio area, which is raised above the existing ground to match the floor level of the house. The cells are only 600mm thick therefore the storage will be entirely above maximum groundwater level.

5. Provide evidence that the use of permeable paving to discharge via infiltration is suitable for the site given the presence of shallow groundwater levels

Permeable paving is only being used in the area to the east of the property, which is set at 1st floor level and well above the level of groundwater. This area is drained via a half perforated pipe leading to a downpipe that drops to ground level on the south elevation. Due to the presence of groundwater and poor infiltration potential, other areas of permeable paving have been removed.

6. Provide further details of the drainage channel runs identified to drain the garden, outline their need and demonstrate that they will not have a detrimental impact on flood risk offsite

The drain channel runs referred to are existing land drains running through the garden. These are being left in place and as they are existing will have no detrimental impact.

7. Provide evidence of consent/approval to discharge at the proposed rate and location into Vale of Heath Pond

There is nothing in the deeds of the property that expressly permits a drainage connection to the Vale of Heath Pond. However, as with all property, there are established rights of land drainage to the lower land provided the drainage is not concentrated such as to cause damage. By using an exfiltration area and limiting the flow rate as far as reasonably practicable we consider that the discharge complies with the spirit of established land drainage legislation and continues the existing run-off regime.

8. Provide an updated drainage layout plan which details all elements of the proposed site drainage, including pipe size, gradients, invert levels and connections, location of the flow control device, proposed discharge rate and point(s) of discharge from the site

Drawing 1377-C01 covers all the points requested. See Appendix 3. Discharge rates for a 100yr storm event are included in the calculations in Appendix 2. Pipe sizes have been checked against their contributing catchment areas and using 100dia drains at min 1:100 gradients the pipe capacities are more than adequate to carry the relevant flows.

9. Provide site specific maintenance plan for the proposed SuDS and identify the party who will be responsible for future maintenance.

See Appendix 4 for the site specific maintenance plan. The owner of the property will be responsible for maintenance of the drainage systems and a copy of the plan will be included in the operation and maintenance portfolio issued to the owners of the property.

Appendix 1 – Greenfield Run-off Rate Calculation

Infrastructure Design Studio		Page 1
31 Dyer Street Cirencester Glos GL7 2PP	Greenfield Runoff The Garden House	Micro Drainage
Date 04/09/2019 17:24 File 1377-GREENFIELD RUNOFF....	Designed by E. Partridge Checked by MJ	
Causeway	Source Control 2019.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	0.108	Urban	0.100
SAAR (mm)	630	Region Number	Region 6

Results l/s

QBAR Rural	0.4
QBAR Urban	0.5
Q1 year	0.4
Q1 year	0.4
Q30 years	1.1
Q100 years	1.5

Appendix 2 – Attenuation Storage Calculations – 100yr event + 40% Climate Change

Infrastructure Design Studio		Page 1
31 Dyer Street Cirencester Glos GL7 2PP	Attenuation Design The Garden House	
Date 05/09/2019 15:48 File 1377-ATTENUATION.SRCX	Designed by E. Partridge Checked by MJ	
Causeway	Source Control 2019.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 152 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	107.388	0.318	0.0	0.6	0.6	7.0	O K
30 min Summer	107.465	0.395	0.0	0.7	0.7	8.7	O K
60 min Summer	107.520	0.450	0.0	0.7	0.7	9.9	O K
120 min Summer	107.530	0.460	0.0	0.7	0.7	10.2	O K
180 min Summer	107.512	0.442	0.0	0.7	0.7	9.8	O K
240 min Summer	107.490	0.420	0.0	0.7	0.7	9.3	O K
360 min Summer	107.455	0.385	0.0	0.7	0.7	8.5	O K
480 min Summer	107.425	0.355	0.0	0.7	0.7	7.8	O K
600 min Summer	107.398	0.328	0.0	0.6	0.6	7.2	O K
720 min Summer	107.372	0.302	0.0	0.6	0.6	6.7	O K
960 min Summer	107.326	0.256	0.0	0.6	0.6	5.7	O K
1440 min Summer	107.250	0.180	0.0	0.6	0.6	4.0	O K
2160 min Summer	107.169	0.099	0.0	0.5	0.5	2.2	O K
2880 min Summer	107.117	0.047	0.0	0.5	0.5	1.0	O K
4320 min Summer	107.070	0.000	0.0	0.4	0.4	0.0	O K
5760 min Summer	107.070	0.000	0.0	0.3	0.3	0.0	O K
7200 min Summer	107.070	0.000	0.0	0.3	0.3	0.0	O K
8640 min Summer	107.070	0.000	0.0	0.2	0.2	0.0	O K
10080 min Summer	107.070	0.000	0.0	0.2	0.2	0.0	O K
15 min Winter	107.429	0.359	0.0	0.7	0.7	7.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	150.296	0.0	7.6	18
30 min Summer	97.078	0.0	9.8	33
60 min Summer	59.609	0.0	12.0	62
120 min Summer	35.340	0.0	14.3	114
180 min Summer	25.689	0.0	15.6	142
240 min Summer	20.371	0.0	16.5	174
360 min Summer	14.691	0.0	17.9	244
480 min Summer	11.640	0.0	18.9	312
600 min Summer	9.711	0.0	19.6	380
720 min Summer	8.371	0.0	20.3	448
960 min Summer	6.618	0.0	21.4	578
1440 min Summer	4.747	0.0	23.0	834
2160 min Summer	3.399	0.0	24.8	1192
2880 min Summer	2.680	0.0	26.1	1532
4320 min Summer	1.915	0.0	27.9	0
5760 min Summer	1.507	0.0	29.3	0
7200 min Summer	1.251	0.0	30.4	0
8640 min Summer	1.075	0.0	31.3	0
10080 min Summer	0.945	0.0	32.1	0
15 min Winter	150.296	0.0	8.5	18

Infrastructure Design Studio		Page 2
31 Dyer Street Cirencester Glos GL7 2PP	Attenuation Design The Garden House	
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Causeway	Source Control 2019.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	107.519	0.449	0.0	0.7	0.7	9.9	O K
60 min Winter	107.586	0.516	0.0	0.7	0.7	11.4	O K
120 min Winter	107.607	0.537	0.0	0.7	0.7	11.9	O K
180 min Winter	107.586	0.516	0.0	0.7	0.7	11.4	O K
240 min Winter	107.562	0.492	0.0	0.7	0.7	10.9	O K
360 min Winter	107.512	0.442	0.0	0.7	0.7	9.8	O K
480 min Winter	107.470	0.400	0.0	0.7	0.7	8.8	O K
600 min Winter	107.429	0.359	0.0	0.7	0.7	7.9	O K
720 min Winter	107.392	0.322	0.0	0.6	0.6	7.1	O K
960 min Winter	107.325	0.255	0.0	0.6	0.6	5.6	O K
1440 min Winter	107.221	0.151	0.0	0.5	0.5	3.3	O K
2160 min Winter	107.120	0.050	0.0	0.5	0.5	1.1	O K
2880 min Winter	107.070	0.000	0.0	0.4	0.4	0.0	O K
4320 min Winter	107.070	0.000	0.0	0.3	0.3	0.0	O K
5760 min Winter	107.070	0.000	0.0	0.2	0.2	0.0	O K
7200 min Winter	107.070	0.000	0.0	0.2	0.2	0.0	O K
8640 min Winter	107.070	0.000	0.0	0.2	0.2	0.0	O K
10080 min Winter	107.070	0.000	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	97.078	0.0	11.0	32
60 min Winter	59.609	0.0	13.5	60
120 min Winter	35.340	0.0	16.0	116
180 min Winter	25.689	0.0	17.5	150
240 min Winter	20.371	0.0	18.5	186
360 min Winter	14.691	0.0	20.0	262
480 min Winter	11.640	0.0	21.1	338
600 min Winter	9.711	0.0	22.0	410
720 min Winter	8.371	0.0	22.8	480
960 min Winter	6.618	0.0	24.0	616
1440 min Winter	4.747	0.0	25.8	868
2160 min Winter	3.399	0.0	27.7	1216
2880 min Winter	2.680	0.0	29.2	1468
4320 min Winter	1.915	0.0	31.3	0
5760 min Winter	1.507	0.0	32.8	0
7200 min Winter	1.251	0.0	34.1	0
8640 min Winter	1.075	0.0	35.1	0
10080 min Winter	0.945	0.0	36.0	0

Appendix 2 – Continued.

Infrastructure Design Studio		Page 3
31 Dyer Street Cirencester Glos GL7 2PP	Attenuation Design The Garden House	Micro Drainage
Date 05/09/2019 15:48 File 1377-ATTENUATION.SRCX	Designed by E. Partridge Checked by MJ	
Causeway	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.437	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.027

Time (mins) From:	To:	Area (ha)
0	4	0.027

Infrastructure Design Studio		Page 4
31 Dyer Street Cirencester Glos GL7 2PP	Attenuation Design The Garden House	Micro Drainage
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Model Details

Storage is Online Cover Level (m) 107.870

Infiltration Blanket Structure

Infiltration Coefficient Base (m/hr)	0.00000	Diameter/Width (m)	2.5
Safety Factor	1.0	Length (m)	9.3
Porosity	0.95	Cap Volume Depth (m)	0.600
Invert Level (m)	107.070		

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 106.800

Appendix 3 – Drainage Layout Drawing

SURFACE WATER INSPECTION CHAMBER SCHEDULE

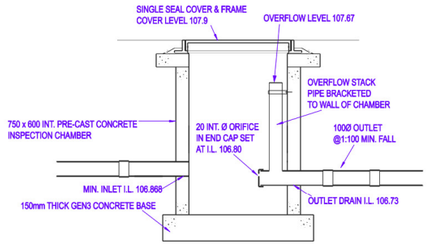
INSPECTION CHAMBER	COVER [1] LEVEL	INVERT LEVEL (OUTGOING PIPE)	INSPECTION CHAMBER [2] TYPE / OUTLET PIPE Ø	COVER [3] TYPE	NOTES
S1	108.30	107.7	450 PPIC/100	B	
S2	107.9	106.95	450 PPIC/100	B	
S3	107.9	106.73	750x600 CONC/100	G	FLOW CONTROL
S4	105.6	105.00	450 PPIC/100	B	
S5	110.50	110.05	300 PPIC/100	F	
S6	110.50	109.91	450 PPIC/100	B	

INSPECTION CHAMBER SCHEDULE NOTES

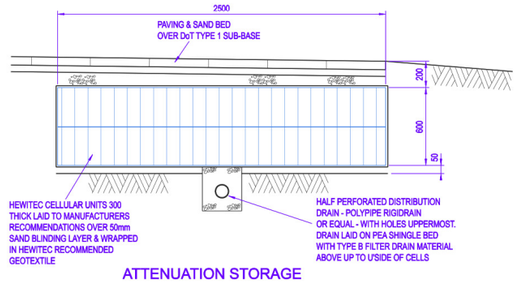
1 LEVELS TO BE ADJUSTED AS REQUIRED TO SUIT FINAL LEVELS & CROSSFALLS.

2 MINI-ACCESS = HEPWORTH MINI ACCESS CHAMBER SDAC1/1 OR EQUAL
PPIC = OSMA/WAVIN RANGE 450 IC OR EQUAL. BASES AS APPROPRIATE TO SIZE AND POSITIONS OF CONNECTING DRAINS

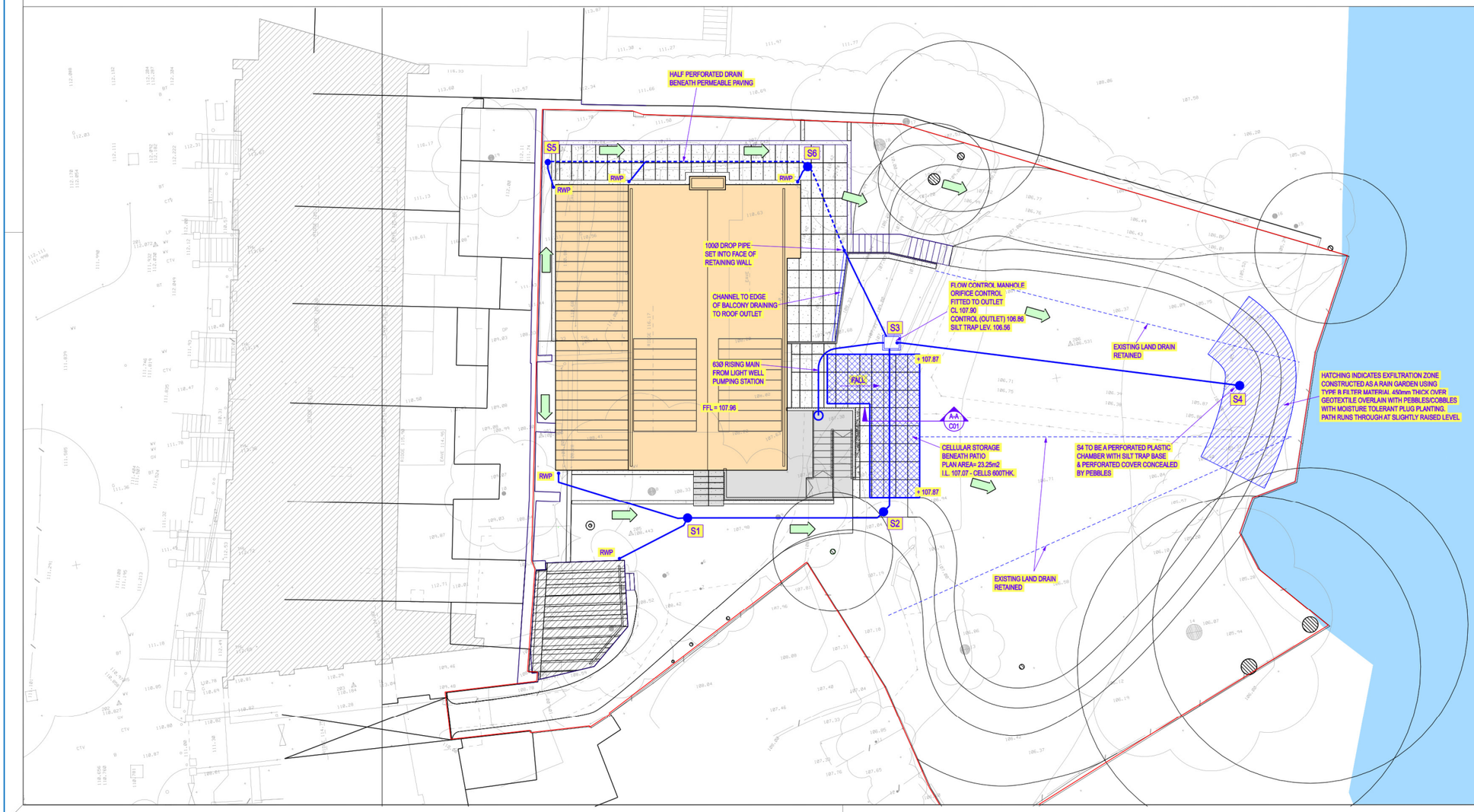
3 A= 600 SQ. C.I. PETER SAVAGE KD62C C250 LOADING
B= 450 SQ. C.I. PETER SAVAGE KD60C C250 LOADING
C= 450 SQ. GALV. STEEL INFILL PETER SAVAGE PS6002B SINGLE SEAL FACTA AAA LOADING
D= 300 SQ. GALV. STEEL INFILL PETER SAVAGE PS3900a DOUBLE SEAL FACTA AAA LOADING
E= 460 SQ. GALV. STEEL INFILL PETER SAVAGE PS3900b DOUBLE SEAL FACTA AAA LOADING
F= 300 SQ. C.I. ECCLES FOUNDRIES DU089 C250 LOADING
G = 750x600 PETER SAVAGE KD3540S OR EQUAL



FLOW CONTROL CHAMBER 1:20



ATTENUATION STORAGE SECTION A-A 1:20



NOTES

KEY

- PROPOSED PRIVATE STORM DRAINAGE. ALL DRAINS 100Ø PLASTIC UNLESS NOTED OTHERWISE.
- INSPECTION CHAMBERS
- 174.93 EXISTING LEVEL
- + 107.87 PROPOSED LEVEL
- S9 PROPOSED INSPECTION CHAMBER REF
- • RWP ROOFWATER DOWNPIPE
- DRAINAGE EXCEEDANCE/OVERLAND FLOW ROUTE

Rev	DATE	BY	AMENDMENT

DRAWING STATUS: For Condition Discharge

Infrastructure Design Studio
CONSULTING ENGINEERS
31 Dyer Street, Cirencester, Gloucestershire, GL7 2PP
Tel. (+44) 01285 655 008

CLIENT: Mr Vlachos

PROJECT: The Garden House

DRAWN BY: EP DATE: 03.09.19 | CHECKED: MS DATE: 03.09.19

TITLE: Storm Drainage Layout

SCALE	PROJECT No.	DRAWING No.	REV.
1:100 @ A1	1377	C01	A

Drawings\w\1377-C01.dgn 05/09/2019 17:36:29

Appendix 4 – Drainage Maintenance Schedule

Ref	Maintenance Item	Required Action	Frequency
01	**Below Ground Drainage Pipework**	Drainage to be fully jetted and inspected for integrity by CCTV survey.	10 yearly
		Where pipework is damaged or obstructed localized repairs will be needed immediately to ensure operation of drainage systems.	As required
02	**Manholes/ Chambers**	Inspect manholes and for integrity and debris. Remove cover and ensure water is flowing freely and unobstructed.	5 yearly
		Clean out blockages and repair damage	As required
		To be cleaned via jetting when any debris/ silt reduces the cross-sectional area by 20% or more. Inspection to include both the channel and silt trap/ gully outlets.	As required
03	**Roof Gutters**	Visually inspect gutters for leaves and debris.	Annually
		Clearing/jetting of gutters to remove build-up of debris and leaves to prevent carry of material to below ground system. Waste material to be disposed to refuse.	As required
04	**External Gullies**	Inspect surface water gullies and silt traps for silt depth and functionality	Annually
		To be cleared when silt exceeds 50% of catch pit depth	As required
05	**Overland Flow Paths**	Inspection of overland flow routes to ensure route not blocked by new structures, furniture, overgrown vegetation, fences, walls or debris. Remove and maintain as necessary	6 monthly
06	**Orifice Flow Control**	Remove cover and inspect, ensuring that water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually