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DRAINAGE STATEMENT

CEDAR END,
EASTERGATE LANE,
EASTERGATE

ARUN DISTRICT COUNCIL BN/82/24/DOC

ARCH ASSOCIATES

DRAINAGE STATEMENT

for

Cedar End, Eastergate Lane,
Eastergate

Client:
Shopland Gray

ISSUE		A	B	C
Issued By	C Hendry	C. Hendry		
Date	18.06.2024	24.07.2024		
Purpose	Information	Information		
Approved By	CH	CH		

Project No. AAL404

ARUN DISTRICT COUNCIL BN/82/24/DOC

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1.0 Introduction

It is proposed to develop existing site at Cedar End to provide one new dwelling. Following a successful planning application, ref: BN/65/22/PL, the client has commissioned Arch Associates Limited to prepare the detailed drainage design and associated Drainage Statement Report to submit for a discharge of planning condition 5, which is given below:

5 Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Design considerations must take full account of the 'Supplementary Requirements for Surface Water Drainage Proposals' produced by Arun District Council, and are an overriding factor in terms of requirements. Winter groundwater monitoring to establish highest annual ground water levels and winter percolation testing to BRE 365, or similar approved, will be required to support the design of any infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W SP1, W DM1, W DM2 and W DM3 of the Arun Local Plan. This is required to be a pre commencement condition because it is necessary to implement the surface water drainage system prior to commencing any building works.

2.0 Drainage Strategy at Planning Stage

No formal Drainage Strategy report was submitted at planning stage but we note that a drainage strategy plan was indicated within the site layout prepared by Symmetry Architecture. The strategy suggested that the foul run-off is to be drained into the existing drainage network to the front of the site via gravity and that the surface water run-off from the proposed roof is to be infiltrated to ground via the use of buried crate soakaways. The new entrance drive and parking to the property is to be of gravel construction and will therefore infiltrate to ground and not contribute any run-off to the soakaways.

3.0 Proposed Foul and Surface Water Drainage

Foul Water

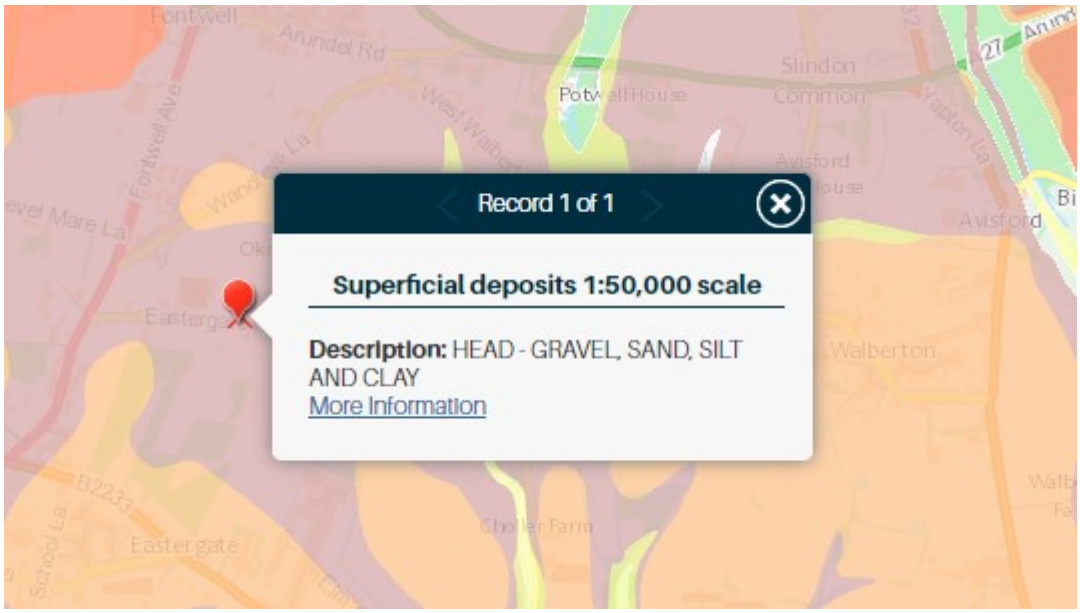
The foul water from the dwellings is to be directed to the public foul sewer in Eastergate Lane by gravity. All pipes and manholes will be in accordance with the Sewage Sector Guidance. Connection to the sewer will be made via a Section 106 Agreement with Southern Water. Maintenance of the foul drainage is outlined in the accompanying Arch Associates Drainage Maintenance Manual. CCTV survey of the existing site drainage arrangement confirms an on-site foul lateral drain running into the road along the southern boundary.

Surface Water

Infiltration to BRE365 was undertaken in December 2023, January and February 2024 and the report can be found in Appendix 2.

A trench was dug to 3m depth and circa 700mm of water was filled at the base, following which readings were taken. An average infiltration rate of 3.23×10^{-5}m/s (0.11628m/hr) has been used within our FLOW hydraulic modelling.

This infiltration rate reflects the more granular soils of the head deposits present on site, which overly the London Clay formation at depth.



The depth of the infiltration testing over the winter months was also intended to act as winter groundwater monitoring as they extended to 3m, which is more than 1m below the designed base of the proposed soakaway units. Refer to Appendix 1 for the drainage general arrangement layout.

Rainwater falling on the 271m^2 of impermeable roof will be directed into a crate soakaway. The entrance drive and parking bays are to be laid in permeable gravel construction and thus can be ignored from the piped gravity fed system. Rainwater falling on these areas will be directly infiltrated to ground mimicking the pre-development scenario.

Should exceedance flows occur due to a blockage in the piped system, or otherwise, then the exceedance flows will naturally flow to the south as this follows the natural gradient of

the site. The flows would most likely infiltrate into the gravel track before ever reaching Eastergate Lane. Refer to Appendix 5.

4.0 Maintenance of SUDS features

The maintenance regime of the surface water drainage system and its components is outlined within the accompanying Arch Associates Limited SuDS Maintenance Manual.

5.0 Water Quality

Based on the guidance in CIRIA C753, the following analysis has been undertaken with the relative mitigation indices for the proposed levels of treatment taken from CIRIA C753. The resultant assessment is summarised within the Table below.

Element	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roofing	Low	0.2	0.2	0.05
	Pollution Mitigation Indices			
300mm Minimum soils with good infiltration potential		0.4	0.3	0.3
Total		0.4	0.3	0.3
Sufficiency		**Sufficient**	**Sufficient**	**Sufficient**

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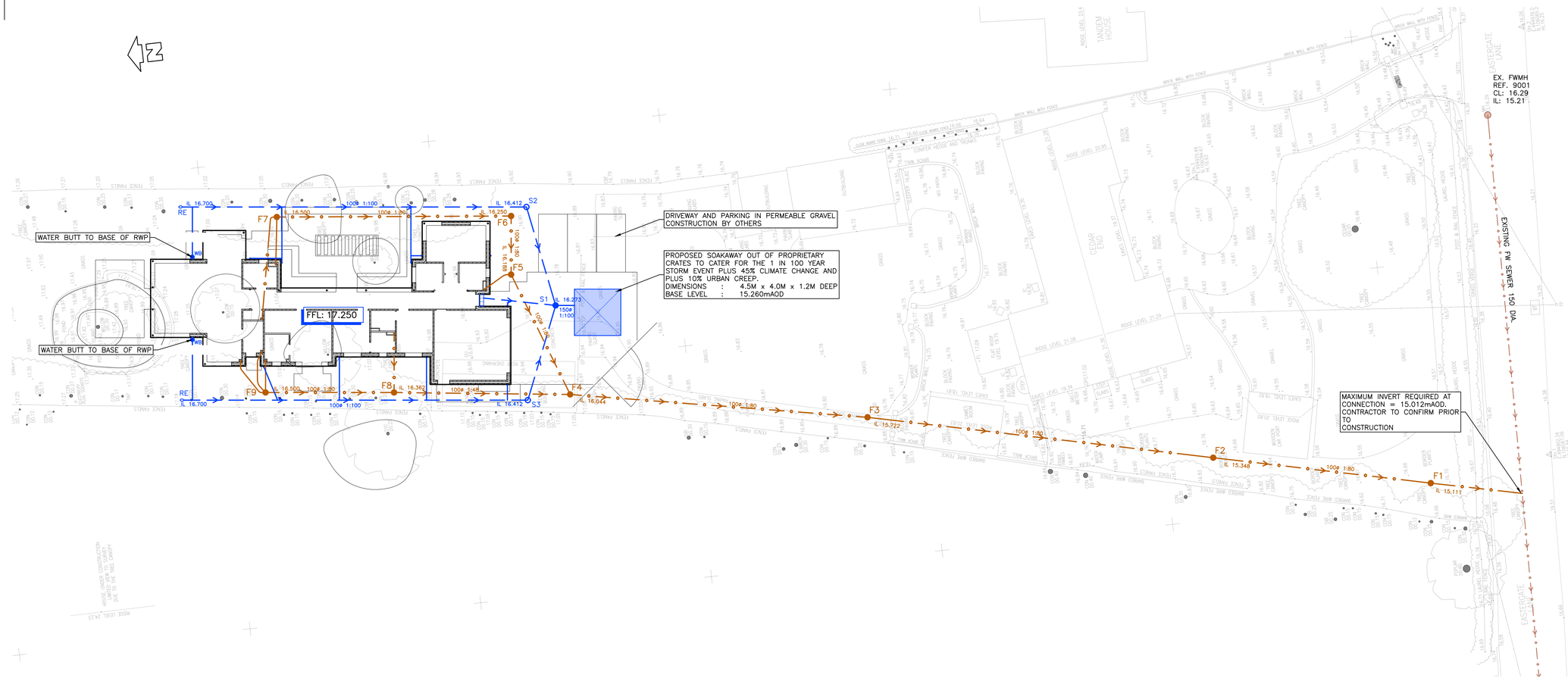
APPENDIX 1

Drainage Strategy Drawing



SURFACE WATER MANHOLE SCHEDULE

REF.	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	TYPE / SIZE	COVER CLASS AND SIZE	COMMENTS
S1	17.100	16.273	0.827	TYPE D / 450 Dia.	C250 / 450x450	300 SUMP CATCHPIT
S2	17.100	16.412	0.688	TYPE D / 450 Dia.	A15 / 450x450	~
S3	17.100	16.412	0.688	TYPE D / 450 Dia.	A15 / 450x450	~

FOUL WATER MANHOLE SCHEDULE

REF.	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	TYPE / SIZE	COVER CLASS AND SIZE	COMMENTS
F1	16.680	15.110	1.570	TYPE D / 450 Dia.	C250 / 450x450	~
F2	16.700	15.348	1.352	TYPE D / 450 Dia.	C250 / 450x450	~
F3	16.800	15.722	1.078	TYPE D / 450 Dia.	C250 / 450x450	~
F4	17.100	16.044	1.056	TYPE D / 450 Dia.	C250 / 450x450	~
F5	17.100	16.188	0.912	TYPE D / 450 Dia.	A15 / 450x450	~
F6	17.100	16.250	0.850	TYPE D / 450 Dia.	A15 / 450x450	~
F7	17.100	16.500	0.600	TYPE D / 450 Dia.	A15 / 450x450	~
F8	17.100	16.362	0.738	TYPE D / 450 Dia.	A15 / 450x450	~
F9	17.100	16.500	0.600	TYPE D / 450 Dia.	A15 / 450x450	~

Scale 1:200
0m 10.0 20.0

DRAINAGE LEGEND

- EXISTING SURFACE / STORM WATER SEWER / MANHOLE
- EXISTING FOUL WATER SEWER / MANHOLE
- S1 — SURFACE WATER MANHOLE / INSPECTION CHAMBER / ACCESS CHAMBER (SEE SCHEDULE FOR DETAILS).
- CATCHPIT MANHOLE (SEE SCHEDULE FOR DETAILS).
- 100 DIA. / 1:80 — 100mm Dia. PVCu. SN8 STORM WATER DRAIN (U.N.O.)
- RWP — RAIN WATER DOWNPIPE (LOCATION AS ARCHITECTS DRGS).
- RE — RODDING EYE.
- SOAKAWAY OUT OF PROPRIETARY CRATE SYSTEM
- ACO DRAIN / SUMP.
- F1 — FOUL WATER MANHOLE / INSPECTION CHAMBER / ACCESS CHAMBER (SEE SCHEDULE FOR DETAILS).
- 100 DIA. / 1:80 — 100mm Dia. PVCu. SN8 FOUL WATER DRAIN (U.N.O.)
- SVP — SOIL VENT PIPE / STUB STACK (LOCATION AS ARCHITECTS DRGS).

NOTES

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6. MAIN CONTRACTOR TO PROVIDE AND FIX SUITABLE BRACING AND PROPPING FOR ALL ELEMENTS IN THE TEMPORARY CONDITION DURING CONSTRUCTION STAGE, SUCH AS TO ENSURE STRUCTURE STABILITY AT ALL TIMES.
7. IT IS THE CONTRACTORS SOLE RESPONSIBILITY FOR ASCERTAINING SAFE DISPOSAL OF ANY OFF-SITE EXCAVATED SPOIL. NO CLAIM RESULTING FROM ABNORMAL TIP REQUIREMENTS WILL BE ENTERTAINED.

KEY TO HEALTH AND SAFETY SYMBOLS

THESE NOTES ARE BASED ON THE USE OF EXPERIENCED AND COMPETENT CONTRACTORS CARRYING OUT THE WORK USING AN APPROVED SAFE METHOD OF WORKING

- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION
- INDICATES A RESIDUAL RISK AS A WARNING
- INDICATES A RESIDUAL RISK FOR INFORMATION

Rev.	Date	Description	By
P02	24.07.2024	RW BUTTS & MINOR IL REVISIONS	CH
P01	18.06.2024	PRELIMINARY ISSUE	CH

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Architect
SYMMETRY ARCHITECTURE

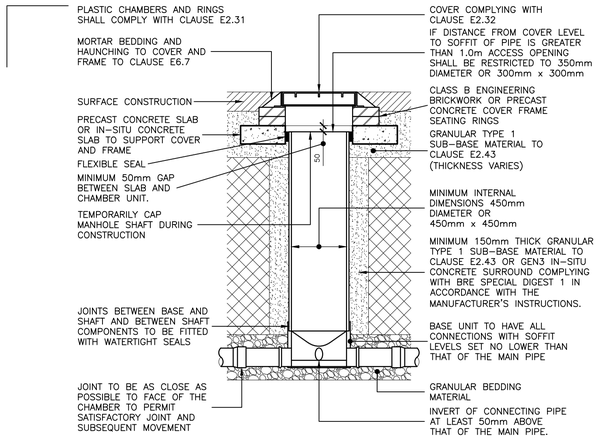
Project title
LAND AT REAR OF CEDAR END, EASTERGATE, EASTERGATE LANE, FONTWELL, PO20 3SJ.

Drawing title
SITE PLAN SHOWING PROPOSED DRAINAGE LAYOUT.

Scale	Paper size	Date	Drawn by	Checked by	Status
1:200	A1	JUNE 2024	JMB	CH	

Name
Project code: Originator | Functional breakdown | Spatial breakdown | Form | Discipline | Number | Revision
AAL404-AAL-ED-XX-DP-C-5000-P02

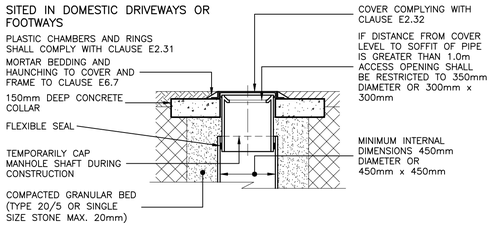
ARUN DISTRICT COUNCIL BNB/24/0OC



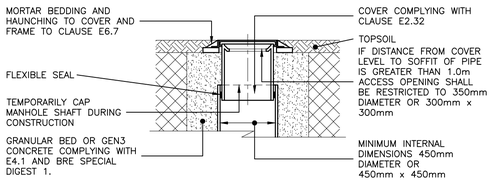
NOTE: WHERE THE ACCESS CHAMBER IS IN THE HIGHWAY (INCLUDING ANY FOOTWAY) THE HIGHWAY AUTHORITY MAY HAVE SPECIFIC REQUIREMENTS

TYPICAL INSPECTION CHAMBER DETAIL – TYPE D
DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE UP TO 3m
FLEXIBLE MATERIAL CONSTRUCTION FOR USE IN AREAS SUBJECT TO VEHICLE LOADING
(SCALE 1:25@A1)

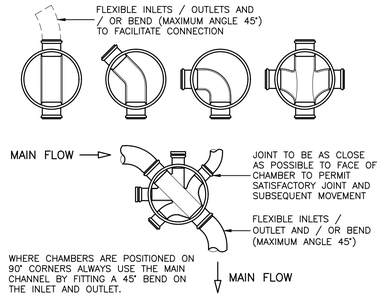
SITED IN DOMESTIC DRIVEWAYS OR FOOTWAYS



SITED IN DOMESTIC GARDENS

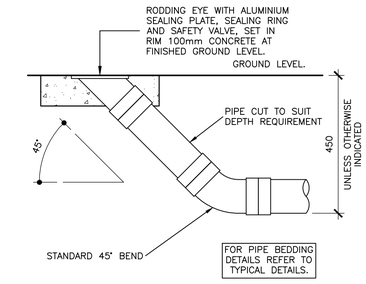


TYPICAL INSPECTION CHAMBER DETAIL – TYPE D
FLEXIBLE MATERIAL CONSTRUCTION ALTERNATIVE TOP DETAILS FOR USE IN AREAS OF LIGHT VEHICLE LOADING AND LANDSCAPED AREAS
(SCALE 1:25@A1)



NOTE: WHERE A BEND IS USED IMMEDIATELY OUTSIDE THE MANHOLE, THIS MAY BE USED AS A ROCKER PIPE.

TYPICAL BASE LAYOUTS FOR TYPE D CHAMBERS
(SCALE 1:25@A1)



RODDING EYE DETAIL
(SCALE 1:10@A1)
TO BE USED IN PEDESTRAIN AND LANDSCAPED AREAS NOT SUBJECT TO VEHICULAR LOADING. MAXIMUM DEPTH TO INVERT 600mm.

NOTES

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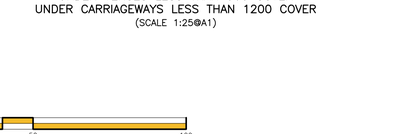
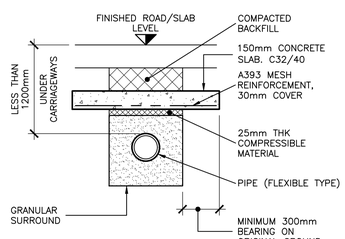


IN UNIFORM SOILS
V = 1/6 BC (150mm MIN., UNDER BARREL AND COLLAR)
IN MIXED SOILS CONTAINING IRREGULAR HARD SPOTS
V = 1/4 BC (200mm. MIN)
DESIGN D1 (UNDER VERGES – >900 COVER)
DESIGN D2 (UNDER CARRIAGEWAYS – >1200 COVER)

BEDDING DETAIL – CLASS 'S'

V = 1/4 D (150mm MIN., UNDER BARREL AND COLLAR)
DESIGN D3 (UNDER VERGES – <900 COVER)
DESIGN D4 (UNDER CARRIAGEWAYS – <1200 COVER)

BEDDING DETAIL – CLASS 'Z'



ALTERNATIVE PROTECTION OF A SHALLOW PIPELINE USING A SLAB
UNDER VERGES LESS THAN 900 COVER
UNDER CARRIAGEWAYS LESS THAN 1200 COVER
(SCALE 1:25@A1)

CRATE SOAKAWAY
[OUT OF WAVIN / INTESIO 'AQUACELL' CRATES OR SIMILAR APPROVED PROPRIETARY MODULAR SYSTEM. REFER TO GA FOR DIMENSIONS]
(SCALE 1:25@A1)

Scale 1:1
0mm 50 100

Rev.	Date	Description	By
P01	24.07.2024	PRELIMINARY ISSUE FOR COMMENT	XXX

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Client
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Architect
SYMMETRY ARCHITECTURE

Project title
LAND AT REAR OF CEDAR END, EASTERGATE, EASTERGATE LANE, FONTWELL, PO20 3SJ.

Drawing title
DRAINAGE DETAILS.

Scale	Paper size	Date	Drawn by	Checked by	Status
AS SHOWN	A1	JUNE 2024	JMB	CH	

Name
Project code: Originator | Functional breakdown | Spatial breakdown | Form | Discipline | Number | Revision
AAL404-AAL-ED-XX-DD-C-5050-P01

ARUN DISTRICT COUNCIL BN182AXDOC

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APPENDIX 2

Infiltration Testing/GW Monitoring



Infiltration Testing Results

Ground Water Monitoring

The Bungalow, Eastergate



Written and Produced by Hamland Homes Limited

Introduction

Following the Planning Permission granted by Arun DC under reference BN/65/22/PL dated 30th November 2022 with reference to the above site, Condition 5 stipulates:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Design considerations must take full account of the 'Supplementary Requirements for Surface Water Drainage Proposals' produced by Arun District Council, and are an overriding factor in terms of requirements. Winter groundwater monitoring to establish highest annual ground water levels and winter percolation testing to BRE 365, or similar approved, will be required to support the design of any infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

Scope of Investigation

BRE 365 Soakaway/Infiltration Test's were carried out in the months of December 23, January 24 and February 2024.

A trench 600mm wide, 2000mm long and 3000mm deep was excavated on site in the location shown in Appendix I. The trench was then mass filled with water and then water level recorded as shown in the tables below:

Material/Strata Observed

Material	Top Depth (mgbl)	Bottom Depth (mbgl)	Description
MADE GROUND	0.00	0.10	Grey slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to subangular of red bricks and flints. Roots present.
MADE GROUND	0.10	0.35	Brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse. Roots present

HEAD DEPOSITS	0.35	0.80	Reddish brown gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse.
HEAD DEPOSITS	0.80	2.90	Cream clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse.

Trial Pit Log - Cedar End

Depth	Level	Legend	Description
0.10			Grey slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to subangular of red bricks and flints. Roots present. (MADE GROUND)
0.35			Brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse. Roots present. (MADE GROUND)
0.80			Reddish brown gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse. (HEAD DEPOSITS)
2.90			Cream clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. (HEAD DEPOSITS)

December 2023:

Time (mins)	Depth to Water Surface
0	0.00
5	0.18
10	0.23
15	0.29
20	0.36
30	0.39
45	0.48
60	0.54
90	0.56
120	0.61

December 2023:

Time (mins)	Depth to Water Surface
0	0.00
5	0.20
10	0.24
15	0.31
20	0.33
30	0.40
45	0.46
60	0.52
90	0.55
112	0.63

December 2023:

Time (mins)	Depth to Water Surface
0	0.00
5	0.18
10	0.25
15	0.32
20	0.34
30	0.41
45	0.47
60	0.50
90	0.55
129	0.64

January 2024:

Time (mins)	Depth to Water Surface
0	0.00
5	0.18
10	0.25
15	0.26
20	0.28
30	0.33
45	0.41
60	0.49
90	0.60
131	0.70

January 2024:

Time (mins)	Depth to Water Surface
0	0.00
5	0.20
10	0.26
15	0.27
20	0.29
30	0.32
45	0.40
60	0.48
90	0.57
120	0.68

January 2024:

Time (mins)	Depth to Water Surface
0	0.00
5	0.22
10	0.26
15	0.28
20	0.30
30	0.36
45	0.42
60	0.51
90	0.58
128	0.71

February 2024:

Time (mins)	Depth to Water Surface
0	0.00
5	0.25
10	0.32
15	0.34
20	0.36
30	0.40
45	0.44
60	0.51
90	0.60
124	0.71

February 2024:

Time (mins)	Depth to Water Surface
0	0.00
5	0.23
10	0.30
15	0.32
20	0.33
30	0.38
45	0.41
60	0.52
90	0.61
127	0.70

February 2024:

Time (mins)	Depth to Water Surface
0	0.00
5	0.25
10	0.30
15	0.31
20	0.34
30	0.41
45	0.45
60	0.50
90	0.63
120	0.69

Cedar End
Trial Pit Location


bph







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APPENDIX 3

Drainage Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	10	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	4.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
J1	4.00	17.100		19.000	80.000	0.400
S2		17.100	450	47.800	80.000	0.688
J3	4.00	17.100		19.000	63.350	0.400
S3		17.100	450	47.800	63.350	0.688
S1		17.100	450	50.300	71.500	1.127
J6		17.100		52.300	71.500	0.847

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	J1	S2	28.800	0.600	16.700	16.412	0.288	100.0	100	4.62	50.0
1.001	S2	S1	8.860	0.600	16.412	16.323	0.089	100.0	100	4.82	50.0
1.002	S1	J6	2.000	0.600	16.273	16.253	0.020	100.0	150	4.85	50.0
2.000	J3	S3	28.800	0.600	16.700	16.412	0.288	100.0	100	4.62	50.0
2.001	S3	S1	8.525	0.600	16.412	16.327	0.085	100.0	100	4.81	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	2.5	0.300	0.588	0.013	0.0	45	0.733
1.001	0.769	6.0	2.5	0.588	0.677	0.013	0.0	45	0.733
1.002	1.005	17.8	5.0	0.677	0.697	0.025	0.0	54	0.863
2.000	0.769	6.0	2.5	0.300	0.588	0.013	0.0	45	0.733
2.001	0.769	6.0	2.5	0.588	0.673	0.013	0.0	45	0.733

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	28.800	100.0	100	Circular	17.100	16.700	0.300	17.100	16.412	0.588
1.001	8.860	100.0	100	Circular	17.100	16.412	0.588	17.100	16.323	0.677
1.002	2.000	100.0	150	Circular	17.100	16.273	0.677	17.100	16.253	0.697
2.000	28.800	100.0	100	Circular	17.100	16.700	0.300	17.100	16.412	0.588

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	J1		Junction		S2	450	Manhole	Adoptable
1.001	S2	450	Manhole	Adoptable	S1	450	Manhole	Adoptable
1.002	S1	450	Manhole	Adoptable	J6		Junction	
2.000	J3		Junction		S3	450	Manhole	Adoptable

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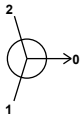
Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.001	8.525	100.0	100	Circular	17.100	16.412	0.588	17.100	16.327	0.673

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.001	S3	450	Manhole	Adoptable	S1	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
J1	19.000	80.000	17.100	0.400			0	1.000	16.700	100
S2	47.800	80.000	17.100	0.688	450	1 	1	1.000	16.412	100
							0	1.001	16.412	100
J3	19.000	63.350	17.100	0.400			0	2.000	16.700	100
S3	47.800	63.350	17.100	0.688	450	1 	1	2.000	16.412	100
							0	2.001	16.412	100
S1	50.300	71.500	17.100	1.127	450	1 2 	1	2.001	16.327	100
							2	1.001	16.323	100
							0	1.002	16.273	150
J6	52.300	71.500	17.100	0.847		1 	1	1.002	16.253	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	40	10	0
100	45	10	0

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Node J6 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.11628	Invert Level (m)	15.260	Depth (m)	1.200
Side Inf Coefficient (m/hr)	0.11628	Time to half empty (mins)	563	Inf Depth (m)	
Safety Factor	3.0	Pit Width (m)	4.000	Number Required	1
Porosity	0.95	Pit Length (m)	4.500		

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Results for 30 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	J1	11	16.843	0.143	1.7	0.0000	0.0000	FLOOD RISK
15 minute summer	1.000:50%	11	16.840	0.284	10.2	0.0000	0.0000	SURCHARGED
15 minute summer	S2	12	16.571	0.159	7.8	0.0252	0.0000	SURCHARGED
15 minute summer	J3	11	16.843	0.143	1.7	0.0000	0.0000	FLOOD RISK
15 minute summer	2.000:50%	11	16.841	0.285	10.2	0.0000	0.0000	SURCHARGED
15 minute summer	S3	12	16.570	0.158	7.8	0.0252	0.0000	SURCHARGED
15 minute summer	S1	12	16.390	0.117	15.2	0.0186	0.0000	OK
240 minute winter	J6	236	16.198	-0.055	3.4	16.0358	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	J1	1.000	1.000:50%	1.9	-0.289	0.313	0.1127
15 minute summer	J1	1.000	S2	7.8	0.997	1.292	0.1127
15 minute summer	S2	1.001	S1	7.6	0.973	1.259	0.0669
15 minute summer	J3	2.000	2.000:50%	1.9	-0.291	0.313	0.1127
15 minute summer	J3	2.000	S3	7.8	0.998	1.293	0.1127
15 minute summer	S3	2.001	S1	7.6	0.974	1.260	0.0644
15 minute summer	S1	1.002	J6	15.2	1.083	0.859	0.0281
240 minute winter	J6	Infiltration		0.4			

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Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	J1	11	17.037	0.337	3.6	0.0000	0.0000	FLOOD RISK
15 minute summer	1.000:50%	11	17.035	0.479	13.2	0.0000	0.0000	SURCHARGED
15 minute summer	S2	12	16.657	0.245	9.4	0.0389	0.0000	SURCHARGED
15 minute summer	J3	11	17.037	0.337	3.6	0.0000	0.0000	FLOOD RISK
15 minute summer	2.000:50%	11	17.035	0.479	13.2	0.0000	0.0000	SURCHARGED
15 minute summer	S3	12	16.655	0.243	9.4	0.0386	0.0000	SURCHARGED
360 minute winter	S1	344	16.542	0.269	3.2	0.0427	0.0000	SURCHARGED
360 minute winter	J6	344	16.541	0.288	3.2	20.5286	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	J1	1.000	1.000:50%	-3.6	-0.461	-0.597	0.1127
15 minute summer	J1	1.000	S2	9.4	1.198	1.553	0.1127
15 minute summer	S2	1.001	S1	9.1	1.162	1.505	0.0682
15 minute summer	J3	2.000	2.000:50%	-3.6	-0.460	-0.596	0.1127
15 minute summer	J3	2.000	S3	9.4	1.200	1.555	0.1127
15 minute summer	S3	2.001	S1	9.1	1.165	1.510	0.0656
360 minute winter	S1	1.002	J6	3.2	0.735	0.180	0.0352
360 minute winter	J6	Infiltration		0.4			

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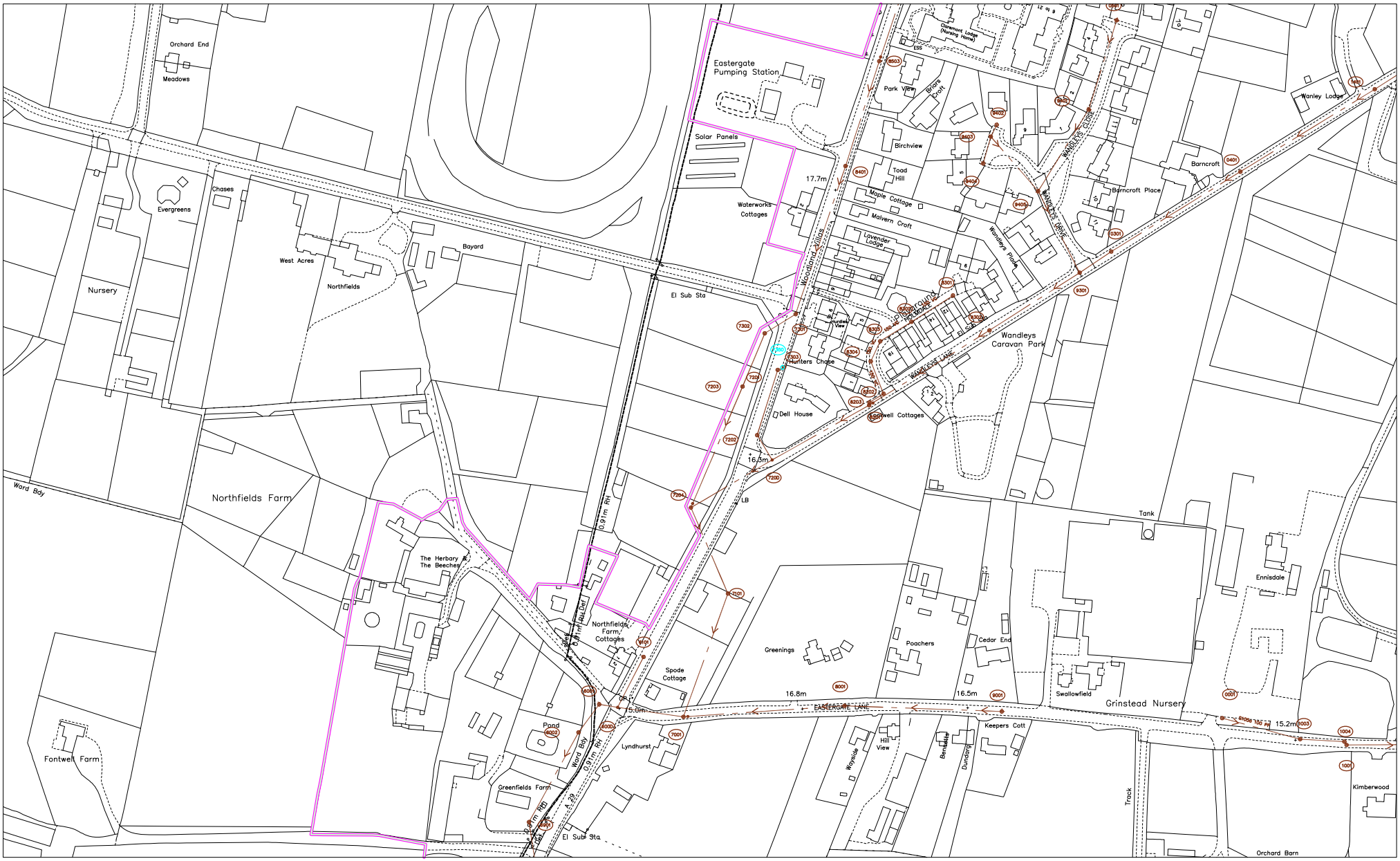
APPENDIX 4

Asset Location Plan

SEWER RECORDS PAGE 1 OF 2

106547



105969

494255

495197

O.S. REF. SU9406SE	Drawn by: okuneyf	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
	Scale: 1:2500	
Title: 284436_Land at Northfield Cott	Date: 09/03/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

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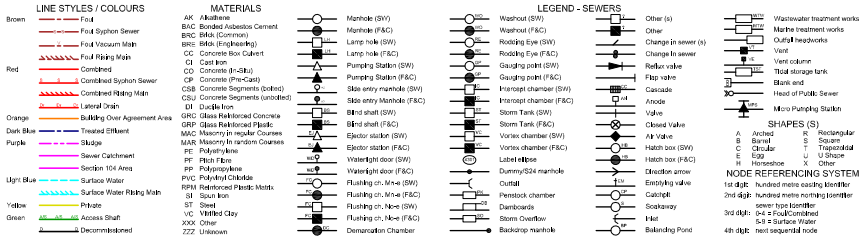
SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape
0001X			100	PF	CIRC
0301X	18.42		150	VC	CIRC
0401X	19.05	17.58	150	VC	CIRC
0501X	21.39	20.19	150	VC	CIRC
1001X	15.19	13.38	175	VC	CIRC
1003X			150	PF	CIRC
1004X			150	PF	CIRC
1401X	20.48	18.61	150	VC	CIRC
6001X	14.81	13.09	225	VC	CIRC
6002X	15.11	12.93	225	VC	CIRC
600DX	14.93		225	VC	CIRC
6101X	15.31		100	VC	CIRC
6901X	15.42	12.92	225	VC	CIRC
7001X	15.8		225	VC	CIRC
7101X	16.11	13.73	225	VC	CIRC
7201X	16.79	15.6	100	VC	CIRC
7202X	16.54	14.58	100	VC	CIRC
7203X	16.58	15.01	225	VC	CIRC
7204X	16.36	13.89	225	VC	CIRC
720DX	16.45	14.1	150	VC	CIRC
7301X	17.02	15.74	225	VC	CIRC
7302X	17.23	15.65	225	VC	CIRC
7303X	16.92	15.72	100	CI	CIRC
8001X	16.89	14.63	150	VC	CIRC
8201X	17.01	14.67	150	VC	CIRC
8202X	17.34	14.82	150	VC	CIRC
8203X	17.07	14.73	150	VC	CIRC
8301X	16.72	15.67	150	VC	CIRC
8302X	16.37	15.23	150	VC	CIRC
8303X	16.6	15.07	150	VC	CIRC
8304X	16.8	14.96	150	VC	CIRC
8401X	17.98	16.17	225	VC	CIRC
8503X	19.36	16.8	225	VC	CIRC
9001X	16.24	15.21	150	VC	CIRC
9301X	18.26	16.84	150	VC	CIRC
9302X	18.25	16.48	150	VC	CIRC
9401X	20.11	18.79	150	VC	CIRC
9402X	19.17	19.16	150	VC	CIRC
9403X	19.16	17.83	150	VC	CIRC
9404X	19.1	17.99	150	VC	CIRC
9405X	18.76	17.33	150	VC	CIRC

Node	Cover	Invert	Size	Material	Shape

Node	Cover	Invert	Size	Material	Shape

Node	Cover	Invert	Size	Material	Shape



Drawn by:	okuneyf
Title:	284436_Land at Northfield Cott
Date:	09/03/2018

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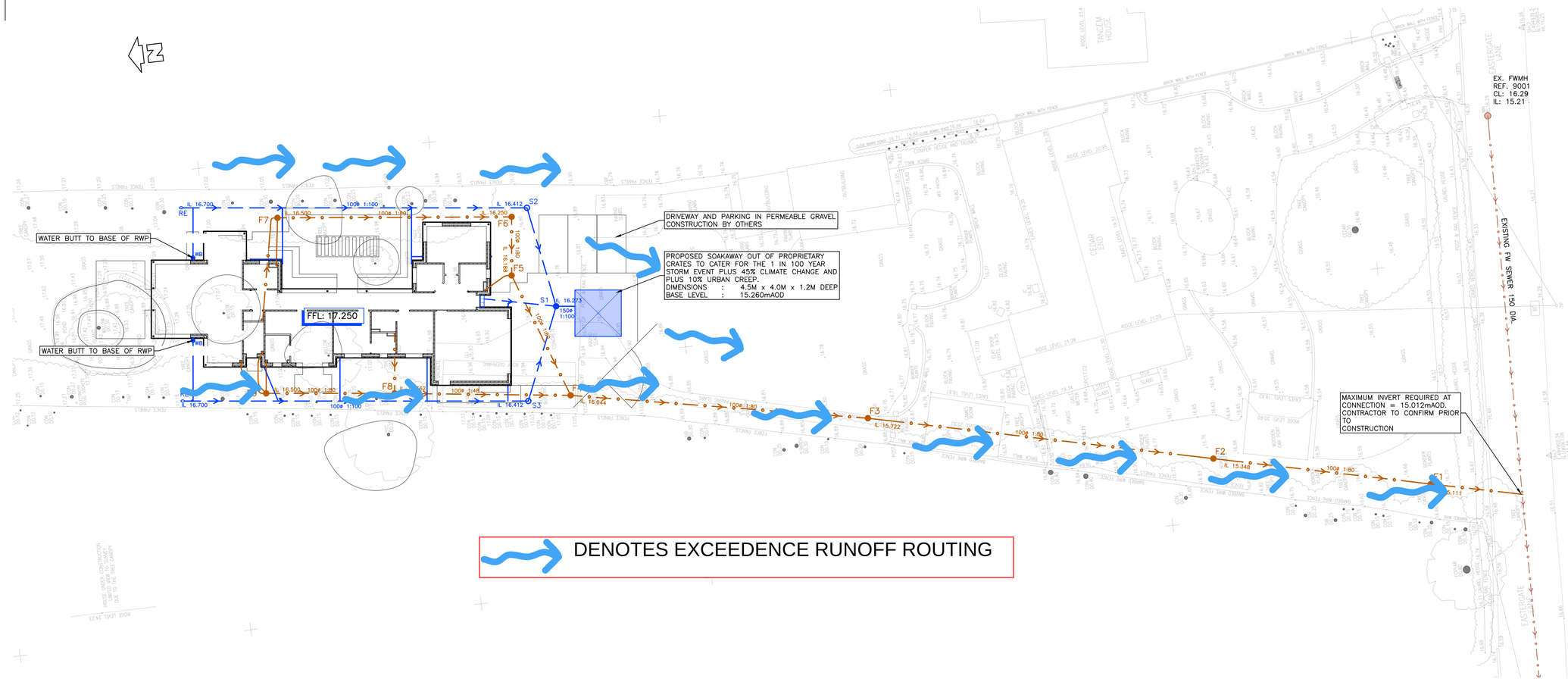
APPENDIX 5

Exceedance Routing



SURFACE WATER MANHOLE SCHEDULE

REF.	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	TYPE / SIZE	COVER CLASS AND SIZE	COMMENTS
S1	17.100	16.273	0.827	TYPE D / 450 Dia.	C250 / 450x450	300 SUMP CATCHPIT
S2	17.100	16.412	0.688	TYPE D / 450 Dia.	A15 / 450x450	~
S3	17.100	16.412	0.688	TYPE D / 450 Dia.	A15 / 450x450	~

FOUL WATER MANHOLE SCHEDULE

REF.	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	TYPE / SIZE	COVER CLASS AND SIZE	COMMENTS
F1	16.680	15.110	1.570	TYPE D / 450 Dia.	C250 / 450x450	~
F2	16.700	15.348	1.352	TYPE D / 450 Dia.	C250 / 450x450	~
F3	16.800	15.722	1.078	TYPE D / 450 Dia.	C250 / 450x450	~
F4	17.100	16.044	1.056	TYPE D / 450 Dia.	C250 / 450x450	~
F5	17.100	16.188	0.912	TYPE D / 450 Dia.	A15 / 450x450	~
F6	17.100	16.250	0.850	TYPE D / 450 Dia.	A15 / 450x450	~
F7	17.100	16.500	0.600	TYPE D / 450 Dia.	A15 / 450x450	~
F8	17.100	16.362	0.738	TYPE D / 450 Dia.	A15 / 450x450	~
F9	17.100	16.500	0.600	TYPE D / 450 Dia.	A15 / 450x450	~

Scale 1:200
0m 10.0 20.0

DRAINAGE LEGEND

- EXISTING SURFACE / STORM WATER SEWER / MANHOLE
- EXISTING FOUL WATER SEWER / MANHOLE
- S1 — SURFACE WATER MANHOLE / INSPECTION CHAMBER / ACCESS CHAMBER (SEE SCHEDULE FOR DETAILS).
- CATCHPIT MANHOLE (SEE SCHEDULE FOR DETAILS).
- 100 DIA. / 1:80 — 100mm Dia. PVCu. SN8 STORM WATER DRAIN (U.N.O.)
- RWP — RAIN WATER DOWNPIPE (LOCATION AS ARCHITECTS DRGS).
- RE — RODDING EYE.
- SOAKAWAY OUT OF PROPRIETARY CRATE SYSTEM
- ACO DRAIN / SUMP.
- F1 — FOUL WATER MANHOLE / INSPECTION CHAMBER / ACCESS CHAMBER (SEE SCHEDULE FOR DETAILS).
- 100 DIA. / 1:80 — 100mm Dia. PVCu. SN8 FOUL WATER DRAIN (U.N.O.)
- SVP — SOIL VENT PIPE / STUB STACK (LOCATION AS ARCHITECTS DRGS).

NOTES

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GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND DETAILS.
2. ALL FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS.
3. ANY DISCREPANCIES BETWEEN THIS DRAWING AND OTHER INFORMATION IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORKS ON SITE.
4. THE MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE SETTING OUT AND ACCURACY OF ALL DIMENSIONS.
5. THE CONTRACTOR IS TO ENSURE THE STABILITY AND STRUCTURAL INTEGRITY OF THE EXISTING PROPERTY AT ALL TIMES DURING WORKS AND IS TO BE RESPONSIBLE FOR ALL PROPPING AND SHORING AS REQUIRED.
6. MAIN CONTRACTOR TO PROVIDE AND FIX SUITABLE BRACING AND PROPPING FOR ALL ELEMENTS IN THE TEMPORARY CONDITION DURING CONSTRUCTION STAGE, SUCH AS TO ENSURE STRUCTURE STABILITY AT ALL TIMES.
7. IT IS THE CONTRACTORS SOLE RESPONSIBILITY FOR ASCERTAINING SAFE DISPOSAL OF ANY OFF-SITE EXCAVATED SPOIL. NO CLAIM RESULTING FROM ABNORMAL TIP REQUIREMENTS WILL BE ENTERTAINED.

KEY TO HEALTH AND SAFETY SYMBOLS

THESE NOTES ARE BASED ON THE USE OF EXPERIENCED AND COMPETENT CONTRACTORS CARRYING OUT THE WORK USING AN APPROVED SAFE METHOD OF WORKING

- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION
- INDICATES A RESIDUAL RISK AS A WARNING
- INDICATES A RESIDUAL RISK FOR INFORMATION

Rev.	Date	Description	By
P02	24.07.2024	RW BUTTS & MINOR IL REVISIONS	CH
P01	18.06.2024	PRELIMINARY ISSUE	CH

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Client
NJS PARTNERSHIPS LTD.

Architect
SYMMETRY ARCHITECTURE

Project title
LAND AT REAR OF CEDAR END, EASTERGATE, EASTERGATE LANE, FONTWELL, PO20 3SJ.

Drawing title
SITE PLAN SHOWING PROPOSED DRAINAGE LAYOUT.

Scale	Paper size	Date	Drawn by	Checked by	Status
1:200	A1	JUNE 2024	JMB	CH	

Name
Project code: Originator | Functional breakdown | Spatial breakdown | Form | Discipline | Number | Revision
AAL404-AAL-ED-XX-DP-C-5000-P02

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APPENDIX 6

LLFA Tracker

Surface Water Drainage Comment Tracker

Application Reference: BN/82/24/DOC **Site Name: Cedar End Eastergate Lane Eastergate PO20 3SJ**	**Initial Issue Date: 17/07/2024** **Issue Date:** **Reviewer Reference: ADC/SB**

Summary and Recommendation:

Condition 5: **Objection**

Please note: Any DOC application should only have a maximum of two consultation responses. If this is the second response for an open application and there are still comments outstanding, then please object to the application.

	ADC Drainage Comments	Designer Response			
Date:	**17/07/2024**				
Condition Number: 5					
Comment Number					
1.	Please submit winter groundwater monitoring results. This is stipulation of the condition and essential to establish if infiltration is viable. Peak groundwater levels influence the depth that a soakaway is set to or the cover necessary on attenuation storage. If storage doesn't adequately account for the risk of groundwater ingress or buoyancy then flood risk may be increased as a result of the development.	The client has provided 3m trial pits over December, January and February, which did not encounter groundwater. The proposed depth of the soakaway is 2m, so the free-board is achieved and strata reported as consistant below 0.8m depth.			
2.	Please submit further winter infiltration testing. The applicant has submitted evidence of three infiltration tests. However, these were completed on three separate days in different months rather than three tests in quick succession as prescribed by BRE DG 365. Each test was abandoned after 120 mins and none of the tests appear to record the time for water to fall from 75% to 25% of the pit depth. These tests cannot therefore be used to generate a reliable infiltration rate in accordance with BRE DG 365. The test depth of 3m risks penetrating peak groundwater levels but would need to be confirmed with winter groundwater monitoring as per point 1. Testing must be in the proposed location and depth of any proposed infiltration structure. This may result in two separate test depths, one for the soakaway and one for the permeable paving.	Refer to client infiltration testing results. We understand that the testing time represents the time at which the pit emptied. The lowest rate has been used in our FLOW model.			

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	The dates of all tests and the calculations to establish the design infiltration rate must be submitted.				
3.	Please submit further geotechnical information relating to the strata evidenced on site. Please state the depths that each stratum is evidenced at.	Refer to client testing report, which now includes a log for the strata and photos.			
4.	Disposal method – Rainwater reuse should be maximised where possible in line with the SUDS hierarchy. Please adjust the design to introduce rainwater reuse where possible.	Water butt for re-use now added to the drawing.			
5.	Disposal method – Infiltration is proposed, which we support, however the applicant has not evidenced that the strategy is viable with an approved testing method.	Refer to updated test data from the client.			
6.	Please submit revised calculations to support the design, these should use the following inputs: • **FEH 2022 rainfall data** • CV value of 1 for design and simulation events, both summer and winter storms. • Design infiltration rate applied to the sides of the soakaway only (not the base). • Design infiltration rate applied to the base of permeable paving only (not the sides). • Climate change allowance of 45% on the 1% AEP event. • Climate change allowance of 40% on the 3.3% and 10% AEP events. • An allowance of 10% for urban creep. • Additional storage set to zero unless it can be evidenced where this storage is provided.	BRE365 was used previously due to small size of development. A FLOW model is now provided to allow us to use FEH 2022. CV of 1 is adopted, 45% climate change is adopted for 1 in 100 year event, 10% urban creep is adopted. No additional storage proposed			
7.	Please provide an assessment of water treatment for the updated design.	Assessment now included			
8.	A revised drainage layout must be provided which corresponds with the supporting calculations.	Provided			

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9.	Construction detail drawings for all drainage components must be provided for the updated design.	Provided			
10.	Please confirm that no existing or proposed trees are near the proposed soakaway or pipes. Please indicate any areas that may need tree root protection on the layout as appropriate.	We confirm that there are no existing or proposed trees that will impact on the the drainage			

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