



Land off Rectory Road Hawkwell, Hockley

Drainage Technical Statement

Prepared by SPD Studio on behalf of Milenna Homes.

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SPD Studio General Notes

Report No.: SPD203 -002

Client: Milenna Homes

Site: Land off Rectory Road, Hawkwell, Hockley

Date: September 2023

Title: Drainage Technical Statement

Status: FINAL

Author

D.Lee

Technical Reviewer

D Cadby

Signature



Signature



Issue No	Version/ Details	Date Issued	Author	Reviewed by	Approved by
00	Draft	13.09.2023	DL	DC	DC
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1. Introduction

- 1.1. SPD Studio has been appointed by Milenna Homes to provide a surface and foul water drainage strategy to serve 4 new residential developments on the land off Rectory Road, Hawkwell.
- 1.2. An initial outline surface water strategy had already been undertaken by Cannon Consulting Engineers.

2. Surface Water Drainage /SuDS Strategy

EXISTING SITE

- 2.1. The site is located in Hawkwell, which forms part of Hockley, as illustrated below:



- 2.2. The site comprises a boundary area of circa 0.71ha and is bounded to the north by a mixture of green space and private residential properties; existing private residential properties and associated vehicular access to the east and west; and Rectory Road along the southern boundary.
- 2.3. A detailed topographical survey was undertaken by Survey Solutions in February 2022 which confirms that the site typically slopes from the south west to the north-east, with existing ground levels ranging from circa 22.20m - 20.70m AOD.

DEVELOPMENT PROPOSALS

- 2.4. It is proposed to develop the land and provide 4 residential dwellings with associated vehicular access, parking, amenity space and other supporting infrastructure.
- 2.5. The impermeable area associated with the proposed development scheme is calculated to be circa 1375m², with the remainder being soft landscaping. However, for the purposes of quantifying the impact of any future urban creep as a result of the construction of extensions to the proposed dwellings, a 10% allowance of 55m² has been applied to the proposed house roof area. Therefore, for the purposes of assessing surface water drainage and flood risk for this development, a total impermeable area of 1430m² (0.143ha) will be considered in the design of the surface water drainage.

SITE INVESTIGATION AND INFILTRATION TEST RESULTS

- 2.6. Currently no infiltration testing has been conducted for the site. However, an Infiltration SuDs GeoReport has been provided from the British Geological survey.
- 2.7. This shows there is very significant potential for one or more hazards associated with infiltration.
- 2.8. In this instance, the main hazard appears to be persistent or seasonally shallow groundwater, which is likely to be less than 3m BGL for at least part of the year.
- 2.9. A full site investigation with infiltration testing should still be undertaken to confirm this information.

DETAILED SURFACE WATER DRAINAGE STRATEGY

- 2.10. The detailed surface water drainage strategy being submitted by SPD Studio seeks to adopt the principles of the outline strategy produced by Cannon Consulting i.e. use of storage and a detention basin. However, an alternative surface water storage solution is now being proposed to make the strategy more SuDs compliant. The principles of the detailed surface water drainage strategy are summarised as follows:
 - The surface water drainage network has been designed to provide adequate storage for all storm events up to and including the calculated 1:100-year (+ 45% climate change allowance) critical storm event, with no above-ground flooding or surcharging occurring during the 1:30 year and 1:1 year storm events respectfully.
 - Due to the potential for inadequate soil conditions for infiltration the private access road and driveways will be lined permeable paving, which will act as a water treatment quality step, as well as storage. The surface water from the permeable pavement will drain down into the strategic network.
 - Plot 1-4 will be conveyed to the strategic network directly and attenuated within the detention basin to the north of the site.
 - Surface water will then discharge from the detention basin to Anglian Water manhole 0451 on the neighbouring residential development. Flows will be restricted to 1.0l/s by way of a hydrobrake.
 - The detention basin SuDS feature has been sized to accommodate the 1:100-year (+45% climate change allowance) volume.
 - Water butts will be provided for each plot as the development is in a critical drainage area.
- 2.11. A copy of the detailed surface water drainage strategy has been provided within **Appendix A**. Additionally, a copy of the surface water hydraulic simulation results has been provided within **Appendix B** for reference.

DETAILED FOUL WATER DRAINAGE STRATEGY

- 2.12. The foul water will run via a piped gravity system, to discharge into Anglian Water manhole 0400 on the neighbouring residential development. Anglian Water have confirmed they require no capacity check for four units.

3. Water Quality Treatment Assessment

3.1. The following series of tables outline the water quality assessment in accordance with CIRIA SuDS Manual 753. A residential scheme comprising 15 dwellings would fall within the low pollution hazard indices, as outlined in table 26.2, Chapter 26 of the CIRIA SuDS Manual 753.

Land-use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

TABLE 1: POLLUTION HAZARD INDICES FOR DIFFERENT LAND-USE CLASSIFICATIONS

Type of SuDS component	Mitigation indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention System	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
'Hydroplanter' Rain Garden System (Proprietary Treatment System*)	0.8	0.8	0.8
*Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1-year return period event, for inflow concentrations relevant to the contributing drainage area.		

TABLE 2: INDICATIVE SUDS MITIGATION INDICES

Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day			
Required mitigation indices			
Source	TSS	Metals	Hydro-carbons
Low	0.7	0.6	0.45
Mitigation Indices			
Permeable Pavement (Mitigation index ₁)	0.7	0.6	0.7
Detention Basin (Mitigation index ₂)	0.25 (0.5 x 0.5)	0.25 (0.5 x 0.5)	0.3 (0.6 x 0.5)
Total Performance	0.95	0.85	1.0
Check	Criteria Exceeded	Criteria Exceeded	Criteria Exceeded

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + (0.5 \times \text{mitigation index}_2)$$

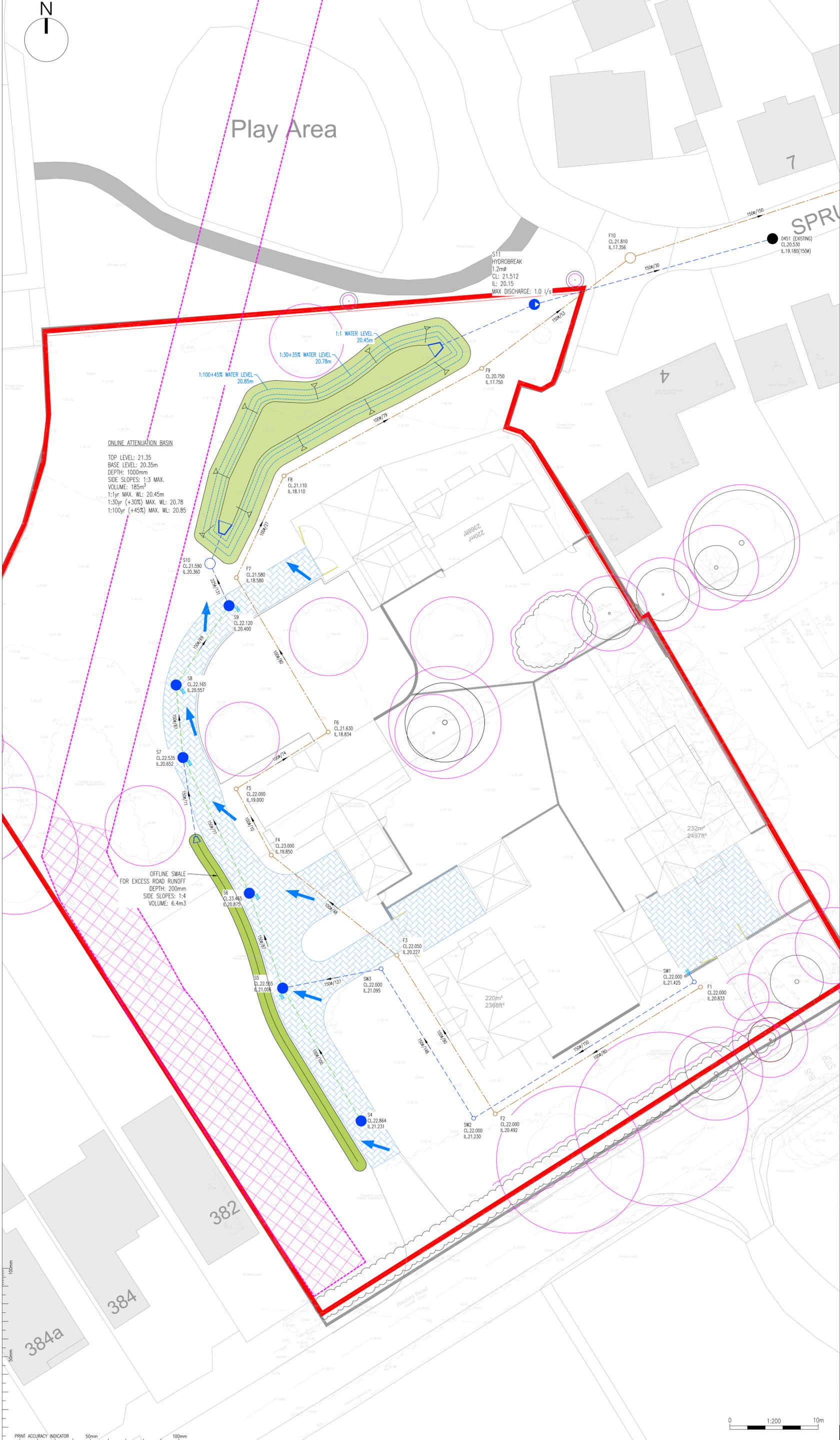
TABLE 3: INDICATIVE SUDS MITIGATION CRITERIA ASSESSMENT

- 3.2. The above tables 1-3 conclude that the proposed SuDS features provided in the drainage strategy not only satisfy, but exceed the water quality treatment criteria for the type and size of the application site in accordance with CIRIA SuDS Manual 753.

4. Achieving The 4 Pillars of SuDS Design

- 4.1. Through application of the Simple Index Approach, this report demonstrates that the proposed SuDS and surface water drainage scheme not only meets the required levels of surface water treatment for this low-risk development, but also provides a significant level of treatment above and beyond the required minimum.
- 4.2. The proposed SuDS scheme contributes to both the amenity and biodiversity value of the development through the incorporation of the detention basin feature and rain gardens, which offer visually attractive, vegetated areas as well as habitat opportunities for local wildlife.

Appendix A - Drainage Strategy



DRAINAGE STRATEGY NOTES

- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELATED ENGINEERS, ARCHITECTS & SUB-CONTRACTORS DRAWINGS. IN THE CASE OF DISCREPANCIES BETWEEN DRAWINGS REFER TO SPD STUDIO FOR CLARIFICATION.
- TOPOGRAPHICAL SURVEY UNDERTAKEN BY SURVEY SOLUTIONS, DRAWING REF. 39207PLS-01 DATED SEPTEMBER 2022.
- THIS DRAWING IS BASED ON THE PROPOSED SITE PLAN PRODUCED BY MILENNA HOMES, DRAWING REF. OC198-PL-028 DATED DECEMBER 2022.
- RAIN WATER PIPE & SOIL AND VENT PIPE LOCATIONS ARE TO BE CONFIRMED AT THE DETAILED DESIGN STAGE.
- ALL INVERT AND COVER LEVELS ARE TO BE CONFIRMED AT THE DETAILED DESIGN STAGE.
- PROPOSED SURFACE AND FOUL WATER DRAINAGE CONNECTIONS TO THE EXISTING WATER COURSE IS SUBJECT TO APPROVAL BY THE LEAD LOCAL FLOOD AUTHORITY.
- EXACT POSITION, TYPE AND NUMBER OF ABOVE GROUND DRAINAGE POINTS TO BE CONFIRMED BY ARCHITECT DURING THE DETAILED DESIGN STAGE. THEREFORE ALLOWANCE SHOULD BE MADE FOR INDIVIDUAL DRAINAGE CONNECTIONS ACCORDINGLY.
- EXTERNAL LEVELS AT LEVEL THRESHOLDS TO BE DESIGNED TO HAVE SUFFICIENT FALL AWAY FROM STRUCTURE TO OMIT THE NEED FOR THRESHOLD DRAINS.
- FOOTWAYS AND PATIO AREAS TO BE LAID TO FALL TO SOFT LANDSCAPED AREAS. LANDSCAPED AREAS TO BE NO HIGHER THAN ADJACENT HARD STANDING AREAS.

DRAINAGE STRATEGY DESIGN CRITERIA:

- PRELIMINARY SURFACE WATER ATTENUATION SIMULATIONS HAVE IDENTIFIED A POTENTIAL STORAGE REQUIREMENT OF 89-121m³ TO ACCOMMODATE A 1:100 YEAR RAINFALL EVENT (INCLUDING AN ADDITIONAL 45% FOR ANY POTENTIAL CLIMATE CHANGE IMPACT) BASED ON THE FOLLOWING DESIGN PARAMETERS:
 MS-60mm = 20,000mm
 RATIO, R = 0.400
 IMPERMEABLE AREA = 0.145 HECTARES
 1:100yr (+45%) DISCHARGE RATE = 1 l/s
- THE SURFACE WATER DETAILS ILLUSTRATED ON THIS PLAN ARE SUBJECT TO HYDRAULIC MODELING DURING THE DETAILED DESIGN STAGE TO ESTABLISH THE PEAK WATER LEVEL ASSOCIATED WITH A 1:100 YEAR RAINFALL EVENT (INCLUDING CLIMATE CHANGE).
- DISCHARGE LOCATION TO BE CONFIRMED BY OTHERS

KEY

- PRIVATE FOUL WATER PIPE
- FOUL WATER CHAMBER
- PRIVATE SURFACE WATER PIPE
- PRIVATE PERFORATED PIPE
- SURFACE WATER CHAMBER
- PRIVATE DRAINAGE HYDROBRAKE FLOW CONTROL
- SURFACE WATER HEADWALL
- PERMEABLE PAVING DIFFUSERS
- PRIVATE PERMEABLE PAVING CONSTRUCTION
- SURFACE WATER FLOW ROUTE
- OPEN SUDS ATTENUATION FEATURE
- HEADWALL
- TREE PROTECTION AREA
- HIGH PRESSURE GAS MAIN NO-BUILD EASEMENT
- SITE BOUNDARY

NOT FOR CONSTRUCTION

FOR INFORMATION ONLY

01	SITE LAYOUT UPDATED AND LLFA COMMENTS ADDED	GI	DL	09.10.23
00	FIRST ISSUE	GI	DL	13.09.23
REV	DESCRIPTION	DRAWN	CHECKED	DATE

SPD STUDIO
SUSTAINABLE. PLANNING. DESIGN

Unit 5 Tollgate Business Park, Colchester, CO3 8AB
T: 01206 265 224 | E: info@spd-studio.co.uk | W: www.spd-studio.co.uk

CLIENT
MILENNA HOMES

PROJECT TITLE
RECTORY ROAD, HAWKWELL

DRAWING TITLE
DRAINAGE STRATEGY

SCALE 1:200 @ A1	DRAWING STATUS FOR PLANNING
DRAWN BY GI	APPROVED BY DC
CHECKED BY DL	DATE SEP/23

DRAWING NO.
SPD203-E-300

REV
01



Appendix B - Strategic SuDS/Drainage Network Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
P.Pave1	0.021	5.00	22.000		585056.403	191394.860	0.400
S10			22.000	1200	585031.561	191379.581	0.689
S11			22.000	1200	585021.085	191396.513	0.887
S1	0.007	5.00	22.864	1200	585018.829	191379.341	1.633
S2			23.195	1200	585009.956	191394.267	2.197
S3			23.226	1200	585006.176	191405.058	2.334
S4			21.972	1200	584998.670	191420.516	1.252
S5			21.874	1200	584997.895	191428.738	1.237
P.Pave 6	0.122	5.00	21.593		585003.446	191435.773	0.400
S6			21.565	1200	585003.878	191437.726	1.209
S7			21.595	1200	585001.793	191442.499	1.274
S7_OUT			21.348	1200	585003.984	191448.051	1.067
S7_1		5.00	21.348	1200	585028.216	191467.301	1.067
S8			21.512	1200	585038.403	191471.827	1.359
0451 (EXISTING)			20.530	1200	585065.382	191479.309	1.350

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_1	S9	S10	28.922	0.600	21.600	21.311	0.289	100.1	150	5.48	50.0
1.001	S10	S11	19.817	0.600	21.311	21.113	0.198	100.1	150	5.96	50.0
1.002	S11	S2	11.513	0.600	21.113	20.998	0.115	100.1	150	6.16	49.6
1.000	S1	S2	17.457	0.012	21.231	20.998	0.233	74.9	100	5.35	50.0
1.003	S2	S3	11.411	0.012	21.006	20.892	0.114	100.1	150	6.36	48.9

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_1	1.004	17.7	2.8		0.539	0.021	0.0	41	0.739
1.001	1.004	17.7	2.8	0.539	0.737	0.021	0.0	41	0.739
1.002	1.004	17.7	2.8	0.737	2.047	0.021	0.0	40	0.733
1.000	0.823	6.5	0.9	1.533	2.097	0.007	0.0	26	0.592
1.003	0.933	16.5	3.7	2.039	2.184	0.028	0.0	48	0.753

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)
1.004	S3	S4	17.184	0.012	20.892	20.720	0.172	100.0	150	6.67	47.9
1.005	S4	S5	8.258	0.012	20.720	20.637	0.083	99.5	150	6.81	47.4
1.006	S5	S6	10.797	0.012	20.637	20.448	0.189	57.1	150	6.96	46.9
3.000	P.Pave 6	S6	2.000	0.012	21.193	20.529	0.664	3.0	150	5.01	50.0
1.007	S6	S7	5.208	0.012	20.356	20.321	0.035	148.8	225	7.05	46.6
1.008	S7	S7_OUT	5.969	0.012	20.321	20.281	0.040	149.2	225	7.14	46.3
4.000	S7_1	S8	11.148	0.012	20.281	20.153	0.128	87.1	150	5.19	50.0
4.001	S8	0451 (EXISTING)	27.997	0.012	20.153	19.180	0.973	28.8	150	5.45	50.0
1.000_1	P.Pave1	S10	29.165	0.600	21.600	21.311	0.289	100.9	100	5.64	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)
1.004	0.934	16.5	3.6	2.184	1.102	0.028	0.0	48	0.748
1.005	0.936	16.5	3.6	1.102	1.087	0.028	0.0	48	0.750
1.006	1.235	21.8	3.6	1.087	0.967	0.028	0.0	41	0.907
3.000	5.379	95.1	16.5	0.250	0.886	0.122	0.0	42	4.044
1.007	1.003	39.9	18.9	0.984	1.049	0.150	0.0	109	0.991
1.008	1.002	39.8	18.8	1.049	0.842	0.150	0.0	109	0.986
4.000	1.000	17.7	0.0	0.917	1.209	0.000	0.0	0	0.000
4.001	1.740	30.8	0.0	1.209	1.200	0.000	0.0	0	0.000
1.000_1	0.765	6.0	2.8	0.300	0.589	0.021	0.0	49	0.757

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_1	28.922	100.1	150			21.600		22.000	21.311	0.539
1.001	19.817	100.1	150	Plastic	22.000	21.311	0.539	22.000	21.113	0.737
1.002	11.513	100.1	150	Concrete	22.000	21.113	0.737	23.195	20.998	2.047
1.000	17.457	74.9	100	Plastic	22.864	21.231	1.533	23.195	20.998	2.097
1.003	11.411	100.1	150	Plastic	23.195	21.006	2.039	23.226	20.892	2.184

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000_1					S10	1200	Manhole	Adoptable
1.001	S10	1200	Manhole	Adoptable	S11	1200	Manhole	Adoptable
1.002	S11	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.003	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable

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)
1.004	17.184	100.0	150	Plastic	23.226	20.892	2.184	21.972	20.720	1.102
1.005	8.258	99.5	150	Plastic	21.972	20.720	1.102	21.874	20.637	1.087
1.006	10.797	57.1	150	Plastic	21.874	20.637	1.087	21.565	20.448	0.967
3.000	2.000	3.0	150	Plastic NT	21.593	21.193	0.250	21.565	20.529	0.886
1.007	5.208	148.8	225	Plastic	21.565	20.356	0.984	21.595	20.321	1.049
1.008	5.969	149.2	225	Plastic	21.595	20.321	1.049	21.348	20.281	0.842
4.000	11.148	87.1	150	Plastic	21.348	20.281	0.917	21.512	20.153	1.209
4.001	27.997	28.8	150	Plastic	21.512	20.153	1.209	20.530	19.180	1.200
1.000_1	29.165	100.9	100	Concrete	22.000	21.600	0.300	22.000	21.311	0.589

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.005	S4	1200	Manhole	Adoptable	S5	1200	Manhole	Adoptable
1.006	S5	1200	Manhole	Adoptable	S6	1200	Manhole	Adoptable
3.000	P.Pave 6		Junction		S6	1200	Manhole	Adoptable
1.007	S6	1200	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.008	S7	1200	Manhole	Adoptable	S7_OUT	1200	Manhole	Adoptable
4.000	S7_1	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable
4.001	S8	1200	Manhole	Adoptable	0451 (EXISTING)	1200	Manhole	Adoptable
1.000_1	P.Pave1		Junction		S10	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
P.Pave1	585056.403	191394.860	22.000	0.400						
						0	1.000_1	21.600	100	
S10	585031.561	191379.581	22.000	0.689	1200		1	1.000_1	21.311	100
						0	1.001	21.311	150	
S11	585021.085	191396.513	22.000	0.887	1200		1	1.001	21.113	150
						0	1.002	21.113	150	
S1	585018.829	191379.341	22.864	1.633	1200					
						0	1.000	21.231	100	
S2	585009.956	191394.267	23.195	2.197	1200		1	1.000	20.998	100
						2	1.002	20.998	150	
						0	1.003	21.006	150	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S3	585006.176	191405.058	23.226	2.334	1200		1	1.003	20.892	150
S4	584998.670	191420.516	21.972	1.252	1200		1	1.004	20.720	150
S5	584997.895	191428.738	21.874	1.237	1200		1	1.005	20.637	150
P.Pave 6	585003.446	191435.773	21.593	0.400			0	3.000	21.193	150
S6	585003.878	191437.726	21.565	1.209	1200		1	3.000	20.529	150
S7	585001.793	191442.499	21.595	1.274	1200		1	1.007	20.321	225
S7_OUT	585003.984	191448.051	21.348	1.067	1200		1	1.008	20.281	225
S7_1	585028.216	191467.301	21.348	1.067	1200		0	4.000	20.281	150
S8	585038.403	191471.827	21.512	1.359	1200		1	4.000	20.153	150
0451 (EXISTING)	585065.382	191479.309	20.530	1.350	1200		1	4.001	19.180	150

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	1360
FSR Region	England and Wales	Additional Storage (m³/ha)	0.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.4
Summer CV	0.750	30 year (l/s)	1.2
Winter CV	0.840	100 year (l/s)	1.6
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	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 %)
1	0	0	0
30	35	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.143	Betterment (%)	0
SAAR (mm)	540	QBar	0.5
Soil Index	4	Q 1 year (l/s)	0.4
SPR	0.47	Q 30 year (l/s)	1.2
Region	6	Q 100 year (l/s)	1.6
Growth Factor 1 year	0.85		

Node S8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	20.153	Product Number	CTL-SHE-0047-1000-1000-1000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node P.Pave 6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.193	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	5	Depth (m)	0.400
Safety Factor	2.0	Width (m)	46.700	Inf Depth (m)	
Porosity	0.35	Length (m)	10.000		

Node S7_1 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	24.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.281	Main Channel Slope (1:X)	500.0
Safety Factor	2.0	Time to half empty (mins)	0	Main Channel n	0.030

Inlets

S7_OUT

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	87.0	0.0	1.067	282.0	0.0

Node P.Pave1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.600	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	7	Depth (m)	0.400
Safety Factor	2.0	Width (m)	12.300	Inf Depth (m)	
Porosity	0.35	Length (m)	10.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	P.Pave1	12	21.643	0.043	3.0	0.4097	0.0000	OK
15 minute winter	S10	13	21.347	0.036	2.2	0.0411	0.0000	OK
15 minute winter	S11	13	21.149	0.036	2.2	0.0402	0.0000	OK
15 minute winter	S1	10	21.257	0.026	1.0	0.0295	0.0000	OK
15 minute winter	S2	13	21.050	0.052	2.9	0.0589	0.0000	OK
15 minute winter	S3	13	20.935	0.043	2.9	0.0491	0.0000	OK
15 minute winter	S4	14	20.765	0.045	2.9	0.0504	0.0000	OK
15 minute winter	S5	14	20.675	0.038	2.9	0.0430	0.0000	OK
15 minute winter	P.Pave 6	11	21.237	0.044	17.2	1.5839	0.0000	OK
15 minute winter	S6	12	20.472	0.116	17.1	0.1317	0.0000	OK
240 minute winter	S7	200	20.445	0.124	4.2	0.1403	0.0000	OK
240 minute winter	S7_OUT	200	20.445	0.164	4.2	0.1856	0.0000	OK
240 minute winter	S7_1	200	20.445	0.164	2.6	0.1856	0.0000	SURCHARGED
240 minute winter	S8	200	20.445	0.292	1.0	0.3299	0.0000	SURCHARGED
15 minute summer	0451 (EXISTING)	25	19.197	0.017	0.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	P.Pave1	1.000_1	S10	2.2	0.766	0.370	0.0847	
15 minute winter	S10	1.001	S11	2.2	0.684	0.125	0.0642	
15 minute winter	S11	1.002	S2	2.2	0.517	0.124	0.0496	
15 minute winter	S1	1.000	S2	1.0	0.475	0.148	0.0485	
15 minute winter	S2	1.003	S3	2.9	0.683	0.177	0.0487	
15 minute winter	S3	1.004	S4	2.9	0.676	0.176	0.0737	
15 minute winter	S4	1.005	S5	2.9	0.735	0.174	0.0325	
15 minute winter	S5	1.006	S6	2.9	0.839	0.132	0.0371	
15 minute winter	P.Pave 6	3.000	S6	14.7	3.684	0.155	0.0080	
15 minute winter	S6	1.007	S7	17.1	0.868	0.429	0.1026	
240 minute winter	S7	1.008	S7_OUT	4.2	0.437	0.105	0.1595	
240 minute winter	S7_OUT	Flow through pond	S7_1	2.6	0.041	0.000	14.0997	
240 minute winter	S7_1	4.000	S8	1.0	0.257	0.057	0.1963	
240 minute winter	S8	4.001	0451 (EXISTING)	0.8	0.749	0.027	0.0309	24.4

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	P.Pave1	13	21.687	0.087	9.8	1.6411	0.0000	OK
15 minute winter	S10	13	21.373	0.062	6.0	0.0700	0.0000	OK
15 minute winter	S11	14	21.174	0.061	6.0	0.0695	0.0000	OK
15 minute winter	S1	10	21.281	0.050	3.3	0.0568	0.0000	OK
15 minute winter	S2	12	21.087	0.089	8.5	0.1007	0.0000	OK
15 minute winter	S3	12	20.971	0.079	8.5	0.0897	0.0000	OK
15 minute winter	S4	12	20.801	0.081	8.5	0.0914	0.0000	OK
480 minute winter	S5	480	20.785	0.148	1.5	0.1677	0.0000	OK
15 minute winter	P.Pave 6	11	21.277	0.084	57.0	5.8185	0.0000	OK
480 minute winter	S6	472	20.785	0.429	7.7	0.4847	0.0000	SURCHARGED
480 minute winter	S7	464	20.784	0.463	7.6	0.5235	0.0000	SURCHARGED
480 minute winter	S7_OUT	472	20.784	0.503	7.6	0.5689	0.0000	OK
480 minute winter	S7_1	472	20.784	0.503	4.2	0.5690	0.0000	SURCHARGED
480 minute winter	S8	472	20.784	0.631	1.2	0.7131	0.0000	SURCHARGED
15 minute summer	0451 (EXISTING)	445	19.197	0.017	0.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	P.Pave1	1.000_1	S10	6.0	0.961	1.000	0.1798	
15 minute winter	S10	1.001	S11	6.0	0.892	0.338	0.1345	
15 minute winter	S11	1.002	S2	5.9	0.714	0.335	0.0993	
15 minute winter	S1	1.000	S2	3.2	0.599	0.501	0.0971	
15 minute winter	S2	1.003	S3	8.5	0.888	0.516	0.1093	
15 minute winter	S3	1.004	S4	8.5	0.887	0.513	0.1643	
15 minute winter	S4	1.005	S5	8.5	0.940	0.513	0.1073	
480 minute winter	S5	1.006	S6	1.5	0.617	0.068	0.1899	
15 minute winter	P.Pave 6	3.000	S6	53.0	4.586	0.558	0.0278	
480 minute winter	S6	1.007	S7	7.6	0.509	0.191	0.2071	
480 minute winter	S7	1.008	S7_OUT	7.6	0.287	0.190	0.2374	
480 minute winter	S7_OUT	Flow through pond	S7_1	4.2	0.033	0.001	62.7862	
480 minute winter	S7_1	4.000	S8	1.2	0.272	0.065	0.1963	
480 minute winter	S8	4.001	0451 (EXISTING)	0.8	0.749	0.027	0.0309	83.2

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	P.Pave1	14	21.714	0.114	13.7	2.7759	0.0000	FLOOD RISK
15 minute summer	S10	11	21.374	0.063	6.2	0.0712	0.0000	OK
15 minute summer	S11	17	21.177	0.064	6.2	0.0724	0.0000	OK
15 minute winter	S1	10	21.293	0.062	4.6	0.0698	0.0000	OK
15 minute winter	S2	11	21.099	0.101	10.5	0.1143	0.0000	OK
15 minute winter	S3	11	20.980	0.088	10.5	0.1000	0.0000	OK
600 minute winter	S4	585	20.946	0.226	1.6	0.2560	0.0000	SURCHARGED
600 minute winter	S5	585	20.946	0.309	1.6	0.3500	0.0000	SURCHARGED
15 minute winter	P.Pave 6	12	21.299	0.106	79.4	9.1665	0.0000	OK
600 minute winter	S6	585	20.948	0.592	8.7	0.6693	0.0000	SURCHARGED
600 minute winter	S7	585	20.946	0.625	8.6	0.7066	0.0000	SURCHARGED
600 minute winter	S7_OUT	585	20.946	0.665	8.6	0.7518	0.0000	OK
600 minute winter	S7_1	585	20.946	0.665	4.8	0.7520	0.0000	SURCHARGED
600 minute winter	S8	585	20.945	0.792	1.2	0.8962	0.0000	SURCHARGED
600 minute winter	0451 (EXISTING)	585	19.198	0.018	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	P.Pave1	1.000_1	S10	6.2	0.962	1.031	0.1891	
15 minute summer	S10	1.001	S11	6.2	0.906	0.349	0.1400	
15 minute summer	S11	1.002	S2	6.2	0.750	0.348	0.1083	
15 minute winter	S1	1.000	S2	4.5	0.678	0.698	0.1119	
15 minute winter	S2	1.003	S3	10.5	0.942	0.637	0.1271	
15 minute winter	S3	1.004	S4	10.7	0.912	0.650	0.2406	
600 minute winter	S4	1.005	S5	1.6	0.626	0.097	0.1454	
600 minute winter	S5	1.006	S6	1.6	0.592	0.071	0.1901	
15 minute winter	P.Pave 6	3.000	S6	58.6	4.457	0.616	0.0309	
600 minute winter	S6	1.007	S7	8.6	0.475	0.216	0.2071	
600 minute winter	S7	1.008	S7_OUT	8.6	0.300	0.215	0.2374	
600 minute winter	S7_OUT	Flow through pond	S7_1	4.8	0.034	0.001	93.4825	
600 minute winter	S7_1	4.000	S8	1.2	0.179	0.066	0.1963	
600 minute winter	S8	4.001	0451 (EXISTING)	0.9	0.767	0.029	0.0326	92.7

Appendix C - LLFA Pre Development Response

Essex County Council
Development and Flood Risk
Waste & Environment
E3 County Hall
Chelmsford
Essex CM1 1QH



Daniel Lee

Date: 3 October 2023
Our Ref SUDS-007071

Dear Mr Lee,

Pre-application Response – SUDSPA548115744 – Rectory Road, Hockley

Thank you for contacting us for pre-application advice which provides Essex County Council (ECC) with the opportunity to assess and advise on the proposed surface water drainage strategy for the aforementioned planning application.

As the Lead Local Flood Authority (LLFA) ECC provides advice on SuDS schemes for major developments. ECC have been statutory consultee on surface water since the 15th April 2015.

In providing advice this Council looks to ensure sustainable drainage proposals comply with the required standards as set out in the following documents:

- Non-statutory technical standards for sustainable drainage systems
- Essex County Council's (ECC's) adopted Sustainable Drainage Systems Design Guide
- The CIRIA SuDS Manual (C753)
- BS8582 Code of practice for surface water management for development sites.

Lead Local Flood Authority position

After reviewing the submitted documents please see a summary of our comments below:

ECC is statutory consultee to ensure the adoption of sustainable ways of surface water management where above ground storage is our preferred option when considering drainage strategies for new developments. Above ground storage options maximize the amenity and biodiversity benefits of SuDS. It is preferable that these are implemented throughout the development and integrated into the proposed landscaping as extensively as practicable.

Overall Drainage Strategy

The meeting with SPD Studio consultants had been arranged to discuss the site at Rectory Road, Hockley. The planning application seeks approval for 4 dwellings.

The proposed development is Greenfield. The written response is provided to ensure the development would meet the LLFA SuDS requirement.

We discussed Surface Water Run-off destinations and it was explained that the ground conditions on site are unlikely to be suitable for infiltration, however this would be evidenced in the drainage strategy and if viable would be utilised as extensively as possible. It was agreed that the primary Run-off destination would be to an existing Anglian Water Sewer.

It is proposed for the development to have a single outfall to the existing Anglian Water Sewer and discharge would be limited to the 1 in 1yr Greenfield rate for all events up to the 1 in 100 plus climate change.

Primary storage would be provided by an attenuation basin close to the outfall of the new Surface Water Drainage System, a Swale will be utilised at the side of the spine road and permeable paving.

It was felt that a all of the water quality requirements could be achieved through use of the attenuation basin and permeable paving.

Sewer Network Design should demonstrate that there is No Surcharging for the 1 in 1yr RP, No Flooding for the 1 in 30yr RP and if not contained within the system, details of overland flood flow routes should be provided for the 1 in 100yr +CC RP, which should demonstrate no internal flooding to properties.

Flood Risk Assessment

A flood risk assessment should consider all forms of flood risk.

These include:

- Flooding from the sea or tidal flooding;
- Flooding from land;
- Flooding from groundwater;
- Flooding from sewers; and
- Flooding from reservoirs, canals, and other artificial sources.

It should be considered how any existing flood risk will interact with the proposed development and associated drainage scheme.

Our records indicate that the proposed development is within a Critical Drainage Area and therefore all dwellings should have water butts and discharge rate should be kept to 1l/s.

Run off Destinations

Surface water run-off should be disposed of in line with the discharge hierarchy and should be investigated in the below order:

- Rainwater reuse
- Discharge via infiltration
- A hybrid Approach
- Discharge to a watercourse/surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

Rainwater re-use

In line with the updated 2020 Essex County Council SuDS Design Guide, rainwater re-use should be considered as part of any development. If this is not proposed as part of an application a clear explanation should be provided to demonstrate why this is not a viable option of source control on site. Essex is likely to experience increasing water scarcity in the near future so rainwater re-use needs to be strongly considered as part of any application for larger sites, however it should also be considered for smaller sites. If rainwater re-use is excluded without explanation, then the ECC SuDS team will ask for further information. For more detailed advice please read the following section in our new design guide:

<https://www.essexdesignguide.co.uk/suds/discharge-locations/rainwater-re-use/>

Watercourse or Sewer

If discharge to a watercourse or sewer is proposed, it must be ensured that the site discharges at a suitable rate and any appropriate permissions are in place. Details in regards to the level of the outfall in relation surface water in the outfall feature should also be submitted.

Where the discharge is to a watercourse, the outfall should be above the 1 in 100 plus climate change level or alternatively the effect of surcharging of the outfall should be modelled and appropriate measures should be put in place.

Peak Flow

If following the discharge hierarchy infiltration is not found to be feasible on site, discharge from the site should be limited to the Greenfield 1 in 1 year rate for all storm events up to and including the 1 in 100 (plus climate change) storm event.

Alternatively, surface water can be discharged at equivalent Greenfield rates with the inclusion of long-term storage. Information would need to be provided about the values used to calculate this rate and these would be reviewed on submission.

Please also note that we do not accept a flat rate of 5l/s discharging from the site if the Greenfield 1 in 1 year rate is below 5l/s. Historically 5l/s was applied to an outlet where Qbar was lower than 5l/s, as most devices would require an outlet orifice size smaller than 50mm, which would increase the susceptibility of blockage and failure.

There are now vortex flow control devices which can be designed to discharge at 1l/s, with 600mm shallow design head and still provide more than a 50mm diameter orifice. Furthermore, it is expected that appropriate measures should be put in place to remove materials that are likely to cause blockage before they reach the flow control device.

Storage requirements

It should be demonstrated how surface water up to the 1 in 100 year plus climate change event is managed within the development.

The Environment Agency updated their climate change allowance in May 2020 and we require the design to be to the upper end allowance (i.e. 40%, 45% which is applicable), unless this can be shown to make the development unviable, in which case the central allowance should be used with a sensitivity analysis carried out for the effects of the upper allowance. Please see the following link for more information on revised climate change allowances: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Furthermore a 10% allowance in storage calculations should be provided for urban creep on roof areas. Details regarding the half-drain time of any storage device should also be submitted for review which, in this instance could be demonstrated by the 1 in 30yr +CC RP, followed by the 1 in 10yr RP storm event as necessary. Half drain time should be calculated as per 30 year rainfall intensity allowance updated by Environment agency.

As part of the planning application, detailed calculations considering a range of summer and winter storms should be submitted for storage requirements.

Water Quality

There should be treatment in line with Chapter 26 of the CIRIA SuDS Manual C753 for all areas of the site.

Whether the site is considered a medium or low pollutant risk depends on the traffic movements expected on the development. If the development is expected to have over 300 traffic movements then the medium pollution indices should be applied

whereas the low pollution indices should be applied if less than 300 daily traffic movements are expected.

Considering impact of water pollution, in line with Paragraph 174 of the NPPF, priority should be given to SuDS and all SuDS options should be explored. If proprietary features are used however, it should be shown how these features will provide enough treatment in terms of total suspended solids, hydrocarbons and metals in line with Chapter 26.

It should be noted that trapped gullies and catch pits are generally not considered appropriate forms of pollution mitigation because of the high risk of remobilisation of pollutants using this method of treatment.

Residual Flood Risk

As part of any planning application it should be ensured that surface water is managed so that there is no flooding in a 1 in 30 year storm event and no internal flooding in a 1 in 100 year, inclusive of climate change storm event. Detail should also be given in regards to exceedance routes above the critical 1 in 100 year, inclusive of climate change storm event, which should be directed away from properties.

Maintenance and Adoption

The on-going maintenance of any features will be necessary to ensure that flooding does not occur due to failure of components. A maintenance plan should be provided as part of the planning application process detailing the maintenance activities and frequencies as well as who will be maintaining the system.

We understand that Anglian Water do adopt SuDS schemes within this region upon a scheme meeting their Adoption Criteria. If you intend to have them adopt your scheme, you will also need to provide proof that you have sent an Expression of Interest to them, or an Approval in Principle of your design.

Additional comments:

For a summary of what we require and when, please see the following link:
<https://www.essexdesignguide.co.uk/suds/what-we-expect/what-we-expect-to-see/>

Our ECC suds design guide 2020 can be found at the following link:
<https://www.essexdesignguide.co.uk/suds>

Our ECC new suds proforma can be found at the following link:
<https://www.essexdesignguide.co.uk/media/2272/essex-suds-water-quantity-and-quality-proforma-v11.pdf>

At some point during the planning stage, you would need to show how surface water will be managed during the construction phase.

You would also need to demonstrate how surface water impacts on the drainage system before and after development, and how the new development improves existing land drainage or surface water management.

Under Section 23 of the Land Drainage act (1991) any proposed structure that impacts on the cross-sectional area of a watercourse will require Ordinary Watercourse consent to be sought from Essex County Council. Such applications are separate from and are required in addition to the planning process.

Please note:

The advice provided by the Council's Officers is informal opinion only and is made without prejudice to any formal decision that may be given in the event of an application being submitted.

In particular, any advice given will not constitute a formal response or recommendation of the County Council. Any views or opinions expressed are in good faith and to the best of ability, without prejudice to the formal consideration of any application, which will ultimately be decided by the Local Planning Authority. The County Council cannot guarantee that new issues will not be raised following submission of a planning application and consultation upon it.

Officers cannot give guarantees about the final formal decision that will be made on planning or related applications. However, the advice contained within the written response will be considered by officers when considering any future planning application. This is subject to the proviso that circumstances and information may change or come to light that could alter the position. It should be noted that the weight given to pre-application advice will change if new material considerations arise.

Whilst we have no further comments at this stage, we strongly recommend you engage in pre-application consultation with any other organisations that maybe relevant to the proposed drainage strategy to avoid potential delays at the application stage. If you have any queries about any advice we have given please do not hesitate to contact us.

Yours sincerely,

Alison Vaughan

Senior Development and Flood Risk Officer

Team: Green Infrastructure and Sustainable Drainage

Service: Climate Action and Mitigation

Essex County Council

Internet: www.essex.gov.uk

Email: suds@essex.gov.uk