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Outfall Swale (towards watercourse)

Outfall to Swale (North) (SW-1.035)
Flow Control (Hydro-Brake)
- IL: 56.65 mAOD
- Design Head: 1.05 m
- Design Flow: 22.0 l/s

Overflow (Orifice Plate)
- IL: 57.38 mAOD
- DIA: 200 mm

(refer to tables for discharge details)

Detention Basin (SW-1.005)
CL (min.): 62.30 mAOD
MWL: 62.00 mAOD
IL: 60.80 mAOD
Volume @ MWL: 627 m³
Flow Control (Hydro-Brake)
IL: 60.80 mAOD
Design Head: 1.20 m
Design Flow: 9.0 l/s

Pervious Pavement (SW-1.000)
CL (min.): 63.15 mAOD
IL: 62.35 mAOD
Depth (Attenuation): 0.60 m
Volume: 262 m³

Pervious Pavement (SW-2.000)
CL (min.): 62.75 mAOD
IL: 61.95 mAOD
Depth (Attenuation): 0.60 m
Volume: 214 m³

Pervious Pavement (SW-4.000)
CL (min.): 63.65 mAOD
IL: 62.85 mAOD
Depth (Attenuation): 0.60 m
Volume: 101 m³

NOTE

The proposed drainage strategy has been design to pass through a constant flow of 6.4 l/s (3.1 l/s/ha) from the 2.079 ha school site (SW-12.000)

Pervious Pavement (SW-15.000)
CL (min.): 58.50 mAOD
IL: 57.70 mAOD
Depth (Attenuation): 0.60 m
Volume: 152 m³
Attenuation Storage Tank (SW-1.035)
IL: 57.04 mAOD
Depth: 0.66 m
Volume: 435 m³

Pervious Pavement (SW-14.000)
CL (min.): 59.20 mAOD
IL: 58.40 mAOD
Depth (Attenuation): 0.60 m
Volume: 67 m³
Attenuation Storage Tank (SW-1.031)
IL: 56.98 mAOD
Depth: 1.32 m
Volume: 346 m³

Attenuation Storage Tank (SW-1.030)
IL: 56.98 mAOD
Depth: 1.32 m
Volume: 477 m³

Pervious Pavement (SW-11.000)
CL (min.): 61.00 mAOD
IL: 60.20 mAOD
Depth (Attenuation): 0.60 m
Volume: 43 m³

Flow Control (Orifice Plate)
- IL: 56.92 mAOD
- DIA: 205 mm

Pervious Pavement (SW-7.000)
CL (min.): 62.10 mAOD
IL: 61.30 mAOD
Depth (Attenuation): 0.60 m
Volume: 107 m³

Pervious Pavement (SW-9.000)
CL (min.): 60.25 mAOD
IL: 59.45 mAOD
Depth (Attenuation): 0.60 m
Volume: 193 m³

Pervious Pavement (SW-3.000)
CL (min.): 64.00 mAOD
IL: 63.20 mAOD
Depth (Attenuation): 0.60 m
Volume: 24 m³

Outfall to Swale (North) (SW-1.035)
Flow Control (Hydro-Brake)
- IL: 56.65 mAOD
- Design Head: 1.05 m
- Design Flow: 22.0 l/s

Overflow (Orifice Plate)
- IL: 57.38 mAOD
- DIA: 200 mm

(refer to tables for discharge details)

Pervious Pavement (SW-13.000)
CL (min.): 59.10 mAOD
IL: 58.30 mAOD
Depth (Attenuation): 0.60 m
Volume: 173 m³
Attenuation Storage Tank (SW-1.030)
IL: 56.98 mAOD
Depth: 1.32 m
Volume: 910 m³

Detention Basin (SW-1.027)
CL (min.): 59.25 mAOD
MWL: 58.95 mAOD
IL: 57.75 mAOD
Volume @ MWL: 509 m³
Flow Control (Hydro-Brake)
IL: 57.75 mAOD
Design Head: 1.20 m
Design Flow: 200.0 l/s

Pervious Pavement (SW-8.000)
CL (min.): 60.45 mAOD
IL: 59.65 mAOD
Depth (Attenuation): 0.60 m
Volume: 137 m³

Detention Basin (SW-1.021)
CL (min.): 60.10 mAOD
MWL: 59.80 mAOD
IL: 58.60 mAOD
Volume @ MWL: 1217 m³
Flow Control (Hydro-Brake)
IL: 58.60 mAOD
Design Head: 1.20 m
Design Flow: 23.0 l/s

Pervious Pavement (SW-6.000)
CL (min.): 61.65 mAOD
IL: 60.85 mAOD
Depth (Attenuation): 0.60 m
Volume: 139 m³

Pervious Pavement (SW-5.000)
CL (min.): 60.85 mAOD
IL: 60.05 mAOD
Depth (Attenuation): 0.60 m
Volume: 496 m³

Detention Basin (SW-1.018)
CL (min.): 60.25 mAOD
MWL: 59.95 mAOD
IL: 58.75 mAOD
Volume @ MWL: 806 m³
Flow Control (Orifice Plate)
IL: 58.75 mAOD
DIA: 180mm

Outfall Swale (towards watercourse)

Pervious Pavement (SW-22.000)
CL (min.): 59.55 mAOD
IL: 58.75 mAOD
Depth (Attenuation): 0.60 m
Volume: 16 m³

Outfall to Swale (South) (SW-16.010)
Flow Control (Hydro-Brake)
- IL: 57.80 mAOD
- Design Head: 0.45 m
- Design Flow: 3.7 l/s

Overflow (Hydro-Brake)
- IL: 58.50 mAOD
- Design Head: 0.50 m
- Design Flow: 8.0 l/s

(refer to tables for discharge details)

Detention Basin (SW-16.010)
CL (min.): 59.30 mAOD
MWL: 59.00 mAOD
IL: 57.80 mAOD
Volume @ MWL: 890 m³

Pervious Pavement (SW-20.000)
CL (min.): 60.65 mAOD
IL: 59.85 mAOD
Depth (Attenuation): 0.60 m
Volume: 21 m³

Pervious Pavement (SW-21.000)
CL (min.): 59.85 mAOD
IL: 59.05 mAOD
Depth (Attenuation): 0.60 m
Volume: 106 m³
Attenuation Storage Tank (SW-16.008)
IL: 58.39 mAOD
Depth: 0.66 m
Volume: 290 m³

Pervious Pavement (SW-18.000)
CL (min.): 63.00 mAOD
IL: 62.20 mAOD
Depth (Attenuation): 0.60 m
Volume: 60 m³

Pervious Pavement (SW-19.000)
CL (min.): 61.60 mAOD
IL: 60.80 mAOD
Depth (Attenuation): 0.60 m
Volume: 131 m³

Pervious Pavement (SW-17.000)
CL (min.): 63.25 mAOD
IL: 62.45 mAOD
Depth (Attenuation): 0.60 m
Volume: 87 m³

KEY
- Development Site Boundary
- Foul Water Sewer
- Foul Water Rising Main
- Surface Water Sewer
- Vortex Separator
- Swale
- Pervious Pavement
- Detention Basin
- Attenuation Storage Tank

Runoff Rates and Volumes (1 in 2 years)

Storm Duration (min)	Pre-Development (Greenfield) Runoff Rate (l/s)	Pre-Development (Greenfield) Runoff Volume (m³)	Post-Development Total Discharge Rate (l/s)	Post-Development Overflow Volume (m³)
15	20.0	274	19.2	0
30		346		
60		424		
120		598		
240		773		
360		867		
480		928		
960		1065		
1440		1146		
2880		1350		
4320		1524		

Runoff Rates and Volumes (1 in 30 years)

Storm Duration (min)	Pre-Development (Greenfield) Runoff Rate (l/s)	Pre-Development (Greenfield) Runoff Volume (m³)	Post-Development Total Discharge Rate (l/s)	Post-Development Overflow Volume (m³)
15	51.3	674	19.2	0
30		865		
60		1054		
120		1371	27.6	145
240		1723	30.9	505
360		1915	33.6	635
480		2040	36.5	832
960		2307	39.1	1097
1440		2447	38.8	1175
2880		2723	36.7	1125
4320		2946	35.5	891

Runoff Rates and Volumes (1 in 100 years)

Storm Duration (min)	Pre-Development (Greenfield) Runoff Rate (l/s)	Pre-Development (Greenfield) Runoff Volume (m³)	Post-Development Total Discharge Rate (l/s)	Post-Development Overflow Volume (m³)
15	72.6	894	19.2	0
30		1149		
60		1462	28.8	243
120		1925	32.9	690
240		2463	41.3	1304
360		2785	45.8	1668
480		2996	49.8	1907
960		3438	54.8	2364
1440		3647	54.8	2534
2880		3980	51.0	2560
4320		4200	45.5	2268

Runoff Rates and Volumes (1 in 100 years + 45%)

Storm Duration (min)	Pre-Development (Greenfield) Runoff Rate (l/s)	Pre-Development (Greenfield) Runoff Volume (m³)	Post-Development Total Discharge Rate (l/s)	Post-Development Overflow Volume (m³)
15	105.3	1297	25.9	102
30		1666	30.6	532
60		2120	38.3	1023
120		2791	45.0	1764
240		3572	54.4	2648
360		4038	59.8	3193
480		4344	63.4	3549
960		4985	68.5	4276
1440		5288	68.2	4561
2880		5771	65.6	4877
4320		6090	61.7	4843

Design Notes

1. Proposed site layout by FINC Architects (ref. 1643.100 Q).
2. Greenfield runoff rates for the undeveloped site have been established using the IH124 methodology with ICP SuDS correction for small catchments as implemented in Micro Drainage's Source Control.
3. Greenfield runoff volumes for the undeveloped site have also been established using Micro Drainage's Source Control.
4. The proposed detention basins have been designed in accordance with ECC's *The Sustainable Drainage Systems Design Guide for Essex*, with 1:3 side slopes and maximum water depth of 1.2m.
5. Check-dams will be required along the larger areas of pervious pavement to ensure that the noted attenuation volumes are achieved.
6. Private drainage from units adjacent to pervious pavements shall be connected to the SuDS features using diffusers (e.g., Polypipe's *Permavoid Rainwater Diffuser Unit* or similar).
7. The proposed surface water drainage strategy has been designed in accordance with Water UK's *Design and Construction Guidance* (June 2022) and *The Building Regulations 2010 Part H: Drainage and Waste Disposal* and in compliance with the *NPPF*, ECC's *The Sustainable Drainage Systems Design Guide for Essex* and current best practices to collect, convey and attenuate runoff from all areas being made impermeable by the proposed development (6.431 ha) before discharge into the watercourse crossing the site.
8. For details of the proposed network, refer to Micro Drainage printouts appended to the *Flood Risk Assessment and Drainage Strategy* report.
9. The proposed surface water drainage strategy has been designed so that:
   - Flooding does not occur on any part of the site for all events up to 3.3% AEP (1 in 30 years).
   - Flooding does not occur in any dwelling for all events up to 1.0% AEP (1 in 100 years) + 45% climate change allowance.
7. The performance of the proposed surface water drainage strategy has been tested for storm events with 50.0% AEP, 3.3% AEP and 1.0% AEP + 45% climate change and durations of 15 to 10080 minutes. The results of the simulations demonstrate how the proposed surface water drainage strategy can manage surface water flood risk at the development site without increasing flood risk elsewhere for storm events up to the 1.0% AEP + 45% climate change allowance.
8. Key discharge rates and volumes for a range of storm durations and return periods are summarised in the tables included in this drawing and confirm that (excess) runoff volumes from the proposed total impermeable area of 6.431 ha to be discharged at rates in exceedance of the 1 in 1 year greenfield rate of 19.4 l/s (3.1 l/s/ha) - but no higher than the equivalent greenfield runoff rates - will not exceed the equivalent greenfield runoff volumes. *(Note: the discharge rates presented in this drawing discount the 6.4 l/s from the school site)*
9. The suitability of the proposed surface water drainage strategy to manage the development's pollution risk has been confirmed using the simple index approach in *The SuDS Manual* (2015). If necessary, vortex separators can be provided immediately upstream of the proposed outfalls.

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Rev.	Date	Description	Drn / ChkId / App'd
P03	09/02/2024	Updated site layout (Rev Q). ECC comments addressed.	RM / RM / RM
P02	05/09/2023	Updated site layout (Rev P).	RM / RM / RM
P01	17/08/2023	First issue.	RM / RM / RM

Suitability: S2 - Suitable for Information

Client: Croudace Homes

Job: Officers' Meadow, Shenfield

Title: Sustainable Drainage Strategy Surface Water

Classification: FI_60_20

Scale @ A1: 1:1000

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Project - Originator - Volume/System - Level/Location - Type - Discipline - Number: C86054 - JNP-XX-XX-DR-C-2002
Document/Drawing Number

Revision: P03

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JNP Group Internal Project Number: C86054