
Job name: Arborfield Cross – RM Drainage Strategy

Job No: BR31444

Note No: BR31444-JNP-92-XX-RP-C-1100

Date: 25/08/2026

Prepared by: KK

Subject: DReserved Matters Drainage Strategy

1. Introduction

1.1 JNP Group were instructed by Croudace Homes to prepare a drainage strategy to support the Application for approval of Reserved Matters pursuant to Outline Planning Permission 250735 comprising the erection of 70 dwellings and associated infrastructure. Details of scale, layout, landscaping and appearance to be considered.

1.2

1.3 The development comprises 70 dwellings with associated infrastructure and open space, in an area of approximately 5.51 hectares (ha). The site is bounded by School Road to the south, Wood Lane to the east, natural hedging to the north and west, and is currently characterised by undeveloped greenfield land.

1.4 The scheme has received outline planning approval under planning application number 250735. As part of the approved outline planning application, a Flood Risk Assessment was undertaken and submitted which remains valid. The proposed drainage strategy below and attached is in accordance with the approved FRA.

1.5 Condition 8 of the outline planning approval relate to drainage matters and is proposed to be discharged by the information provided in this report.

1.6 Each planning condition item is repeated in blue in the following sections, with supporting information provided in black underneath. Supplementary information is included in the appendices.

1.7 The Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA) are both Wokingham Borough Council (WBC).

2. Condition 8

(a) Evidence of infiltration testing to BRE 365 standards (or equivalent) to support any proposed infiltration methods

2.1 Infiltration has not been proposed as the means of surface water disposal. The ground investigation report prepared by Stantec, reference number - 333801775-STN-XX-XX-GE-RP-1000, advises that soakaways and infiltration systems in general are considered unsuitable for the site because of the primarily cohesive strata underlying the site.

- 2.2 In addition, ground water monitoring suggests a 1m unsaturated zone would likely not be achieved given the depth of the proposed attenuation basins.

(b) Use of SuDS following the SuDS hierarchy, preferably infiltration;

- 2.3 With infiltration discounted, and in line with the SuDS hierarchy, discharge to an above-ground surface water body has been identified as the most appropriate solution. The scheme proposes three principal swale corridors conveying surface water to four linked detention basins, which provide attenuation prior to controlled discharge to an existing ditch along the northern site boundary.

(c) Full drainage calculations to demonstrate the performance of soakaways or capacity of attenuation features to cater for 1 in 100 years flood event with a 40% allowance for climate change and runoff controlled at 1.7l/s/ha or preferably better;

- 2.4 Based on the RM layout, the post-development impermeable area has been estimated at 1.53 ha. In accordance with Condition 8, surface water runoff will be restricted to the greenfield rate of 1.7 l/s/ha, resulting in an allowable discharge rate of 2.6 l/s.

- 2.5 Attenuation storage requirements have been calculated to accommodate the critical 1 in 100-year rainfall event, including a 40% allowance for climate change and 10% urban creep, resulting in an estimated storage volume of approximately 2,133 m³. No flooding during this storm event occurs in the surface water model.

- 2.6 Detailed hydraulic calculations and results are provided in Appendix B.

(d) Calculations demonstrating that there will be no flooding of pipes for events up to and including the 1 in 100-year flood event with a 40% allowance for climate change and how exceedance flows will be managed;

- 2.7 Supporting hydraulic calculations are provided in Appendix B, showing no flooding as requested. Exceedance flow routing presented on the exceedance plan in Appendix D. The exceedance covers flows due to failure or storm events above the design critical storm.

(e) Assessment of SuDS components as listed in the CIRIA SuDS Manual (and justification for exclusion of any if necessary);

- 2.8 In accordance with the National Standards for Sustainable Drainage Systems (SuDS), infiltration-based systems were initially considered but discounted due to the presence of low permeability London Clay Formation underlying the site, as discussed previously, as well as the lack of 1m unsaturated zone below infiltrating features.

- 2.9 A range of SuDS components have been considered in accordance with the CIRIA SuDS Manual (C753) as part of the overall treatment train. The proposed strategy adopts swales for conveyance and detention basins for attenuation.

- 2.10 Green/blue roofs were considered, but it is not appropriate for the scale of the development. The additional structural requirements, maintenance obligations and associated costs are not considered proportionate to the drainage benefit that would be achieved.

- 2.11 Rain gardens were considered but have been discounted due to the site's steep topography and the

significant extent of carriageway proposed for adoption, which limits opportunities for their effective incorporation into the drainage strategy.

- 2.12 Permeable paving was also discounted due to the steep gradients across the site, which would reduce its effectiveness in providing both attenuation and water quality treatment benefits.

(f) Separate drainage systems for any proposed adopted highways and residential dwellings;

- 2.13 The Proposed Drainage Strategy (ref. BR31444-JNP-92-XX-DR-C-2001 Proposed Drainage Strategy) shows proposed adoptable systems as well as indicative private drainage. The main drainage will be put forward for adoption through a NAV (NAV TBC).

(g) A demonstration of how surface water runoff is going to be catered for, given that parts of the development site already suffer from surface water flooding;

- 2.14 The proposed drainage strategy drawing is included in Appendix A (drawing ref. BR31444-JNP-92-XX-DR-C-2001)
- 2.15 Surface water is to be directed towards the three main swales conveying water towards the three detention basins at the northern corner of the site.
- 2.16 Due to varying site levels and slopes exceeding 3%, check dams will be incorporated within the swales at regular intervals (approximately 15–20 m) in accordance with the CIRIA SuDS Manual (C753), to manage flow velocities, promote filtration, and increase attenuation.
- 2.17 The three swales will discharge to the attenuation basins where orifice controls in the form of orifice outlets will attenuate the surface water in the upper attenuation basins (2 and 3). These basins will allow for water treatment prior to the final basin and outfall from site. The final proposed attenuation basin is proposed to have a permanent body of water in the base. This is to promote biodiversity and amenity value.
- 2.18 The final basin will discharge offsite at a controlled rate of 1.7l/s/ha (agreed greenfield rate).
- 2.19 For exceedance flow routes please refer to the Exceedance Plan in Appendix D (drawing ref. BR31444-JNP-92-XX-DR-C-2003 Exceedance Plan)
- 2.20 We have identified an existing overland SW flood route which the existing FRA did not identify.

This overland flood route has been picked up at the site boundary and safely routed through the site and discharged to the northern boundary where an existing watercourse exists.

There is an existing ditch along the southern portion of the site. Within this ditch is a localised low point which is thought to discharge the SW overflow across the site. It is proposed to construct an overflow bund to intercept any exceedance from the ditch and route this flow through the development.

The flow path drains a portion of the existing school to the south. Unfortunately, we are not able to verify how much of the catchment drainage across the proposed development and therefore we have assumed the full catchment flows across the site.

The hardstanding areas, within the catchment, have been allowed for within our calculations at

100% impermeable area while the soft landscape areas have been allowed for at 30% of the area.

For the 1:100yr + 40% climate change storm event, the offsite flow potentially entering the proposed site is approximately 775l/s as calculated.

Due to the steep nature of the site, this has been accommodated by a 450mm diameter pipes through the site to the attenuation basins. An overflow weir has been proposed to the relevant basins as part of the strategy to allow the overland flow route to pass through the development when the basins are full. These have been indicated on the plan. The exceedance flow plan indicates this route as well for clarity.

(h) Groundwater monitoring confirming seasonal high groundwater levels in the area;

- 2.21 Groundwater was not encountered during the Ground Investigation (GI). GI Report by Stantec (ref. 333801775-STN-XX-XX-GE-RP-1000) however, groundwater monitoring was undertaken at the site which indicated groundwater between the range of 1.8m – 3m. This was identified as a perched water table. It was evident that a min 1m unsaturated zone could not be provided and therefore infiltration was discounted from the scheme. As we do not intend to infiltrate surface water, it is not proposed or deemed necessary to obtain full winter groundwater monitoring.

(i) A drainage strategy plan indicating the location and sizing of SuDS features, with the base of any SuDS features located at least 1m above the seasonal high water table level;

- 2.22 The proposed drainage strategy drawing is included in Appendix A (drawing ref. BR31444-JNP-92-XX-DR-C-2001).

(j) Details demonstrating how any SuDS for this development would be managed throughout the lifespan of the development and who will be responsible for maintenance.

2.23 Swales

- The swale/ditch will be the responsibility of the management company or NAV should they be willing to adopt the swales.
- After mowing, the grass clippings are to be removed from the site.
- Sediment testing will be required before excavation to determine its classification and appropriate disposal methods.
- The recommended maintenance requirements are outlined in the following table:

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris.	Monthly, or as required
	Cut grass – to retain grass height within specified design range.	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours.	Monthly, or when required
	Inspect vegetation coverage.	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or reseed	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

2.24 Detention Basins

- The detention basin will be the responsibility of the management company or NAV should they be willing to adopt the attenuation basins.
- Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from site.
- Grass clippings should be disposed of off-site or outside the detention basin area to remove nutrients and pollutants.
- The recommended maintenance requirements for the detention basins are outlined in the table below:

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris.	Monthly, or as required
	Cut grass – for spillways and access routes.	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin.	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required
	Inspect inlets and outlets for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage.	Monthly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check flow control.	Annually
	Tidy all dead growth before start of growing season.	Annually
	Remove sediment from inlets, outlets and forebay.	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth.	As required
	Prune and trim any trees and remove cuttings.	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required.	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseedling or re-turfing.	As required
	Realignment of rip-rap.	As required
	Repair/rehabilitation of inlets, outlets and overflows.	As required
	Relevel uneven surfaces and reinstate design levels.	As required

3. Conclusion

- 3.1 JNP Group were instructed by Croudace Homes to prepare a drainage strategy to support the reserved matter planning application for the proposed residential development to the north of School Road at Arborfield Cross.
- 3.2 Infiltration has been discounted in accordance with the ground investigation provided by Stantec.

- 3.3 Surface water will discharge at the greenfield rate agreed to the existing ditch along the northern boundary.
- 3.4 Swales have been proposed across the development to intercept and convey SW flows through the site.
- 3.5 The surface water strategy caters for storm events up to and including the 1:100yr + 40% climate change.
- 3.6 We proposed to route an existing offsite surface water flow path through the development and the proposed basins, where any exceedance will be allowed for through overflow weirs.
- 3.7 This technical note and its appendices provide the information required to discharge condition 8 of the outline planning approval reference 250735 and we therefore request the condition be discharged.

Document Issue Record

Technical Note No	Rev	Date	Prepared	Reviewed	Approved
RP-C-1100	P01	27/06/2026	KK	RSH	RSH
RP-C-1100	P02	25/08/2026	Kk	RSH	RSH
RP-C-1100	P03	10/09/2026	Kk	RSH	RSH

List of Appendices

<i>Appendix A</i>	<i>Development Proposals (from Croudace Homes)</i>
<i>Appendix B</i>	<i>Proposed Drainage Strategy and Calculations</i>
<i>Appendix C</i>	<i>Proposed Impermeable Areas</i>
<i>Appendix D</i>	<i>Exceedance Plan</i>
<i>Appendix E</i>	<i>Typical Drainage Construction Details</i>
<i>Appendix F</i>	<i>Ground Investigation Report</i>

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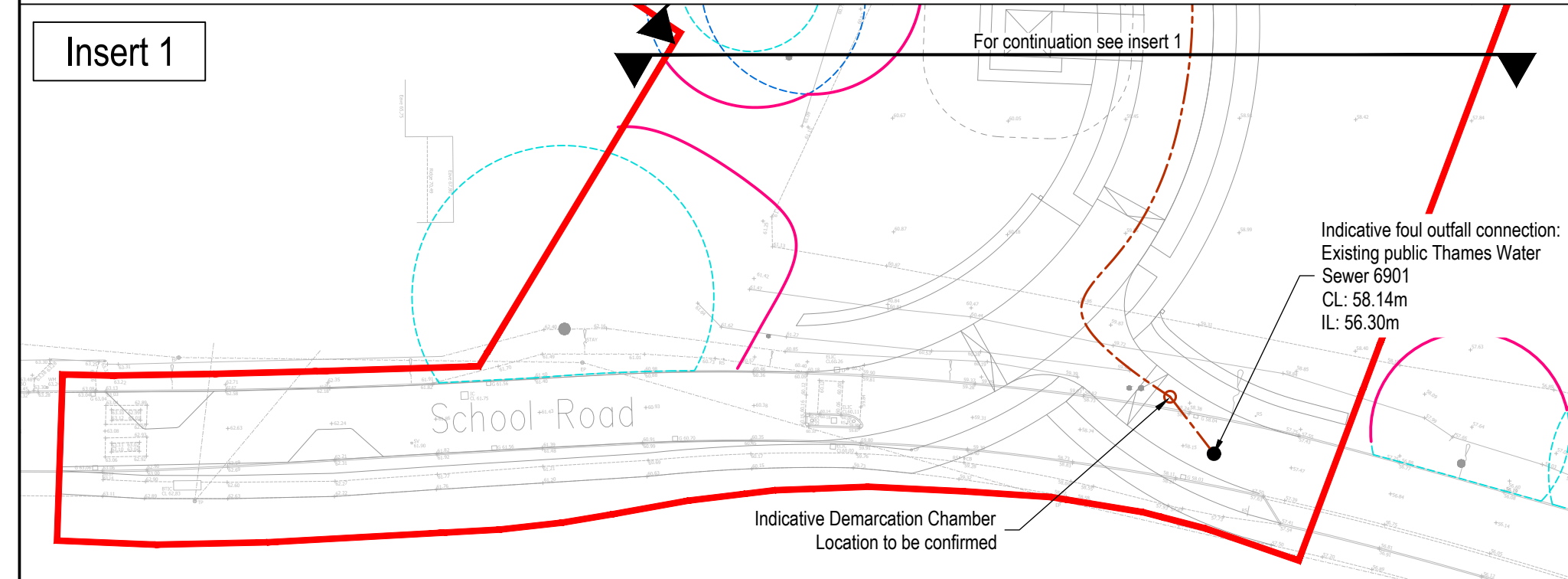
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Appendix A

Development Proposals

Appendix B

Proposed Drainage Strategy and Calculations



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
1	0.058	5.00	59.029		476641.221	167029.406	0.550	58.479
2	0.088	5.00	51.915		476695.545	167106.803	0.550	51.365
3	0.056	5.00	50.100		476662.966	167145.443	0.550	49.550
4			50.150		476640.776	167152.531	1.500	48.650
5	0.082	5.00	58.881	1200	476633.779	167027.037	1.518	57.363
6	0.117	5.00	56.047	1200	476584.365	167060.125	2.649	53.398
7	0.094	5.00	53.133	1200	476607.777	167103.566	2.958	50.175
8	0.033	5.00	50.399	1350	476626.588	167146.982	1.659	48.740
9_OUT	0.064	5.00	49.600	1350	476607.793	167175.124	1.300	48.300
Basin2		5.00	49.600	1200	476580.821	167190.633	1.300	48.300
10	0.082	5.00	55.497	1200	476564.101	167066.027	1.518	53.979
11	0.052	5.00	54.907	1200	476527.053	167073.011	1.631	53.276
12	0.090	5.00	55.285	1200	476482.431	167081.391	1.460	53.825
13	0.049	5.00	55.107	1200	476507.333	167076.692	1.913	53.194
14	0.034	5.00	54.851	1350	476508.561	167083.743	1.837	53.014
16	0.025	5.00	52.691	1350	476527.476	167108.053	2.027	50.664
17	0.071	5.00	51.912	1200	476571.112	167113.233	1.500	50.412
18	0.043	5.00	52.277	1200	476534.383	167113.374	2.018	50.259
19	0.031	5.00	52.316	1350	476530.528	167117.555	2.231	50.085
21			51.129	1350	476530.365	167156.525	1.654	49.475
23	0.089	5.00	55.218	1200	476444.558	167096.924	1.425	53.793
24	0.039	5.00	54.276	1200	476428.966	167116.555	1.425	52.851
25	0.059	5.00	53.746		476431.168	167126.886	1.246	52.500
26	0.052	5.00	51.057		476485.848	167174.177	0.857	50.200
26_OUT	0.133	5.00	50.200		476513.366	167185.983	1.300	48.900
Basin3		5.00	50.200	2100	476520.165	167195.967	1.300	48.900
29_OUT			49.500	1200	476575.142	167198.177	1.300	48.200
Basin1		5.00	49.500	1200	476571.226	167213.383	1.300	48.200
27_OUT			48.200	1200	476579.051	167227.083	0.200	48.000
28_OUT			49.500	1350	476530.737	167206.912	1.300	48.200
22_OUT			50.200	1350	476528.900	167179.373	1.300	48.900
15			53.160		476523.683	167100.826	1.650	51.510
20			51.800		476531.572	167134.045	1.922	49.878
9	0.028	5.00	49.700	1350	476615.120	167165.399	1.270	48.430
22			51.000	1350	476530.023	167161.388	1.650	49.350

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	2	94.559	0.030	58.479	51.365	7.114	13.3	500	5.41	50.0
1.001	2	3	50.541	0.030	51.365	49.550	1.815	27.8	500	5.73	49.6
3.004	15	16	8.162	0.600	51.510	50.664	0.846	9.7	450	5.92	48.8
1.003	4	9	28.702	0.030	48.650	48.580	0.070	410.0	300	7.50	43.4
2.000	5	6	59.469	0.600	57.363	53.398	3.965	15.0	225	5.29	50.0
2.001	6	7	49.348	0.600	53.398	51.708	1.690	29.2	225	5.63	50.0
2.002	7	8	47.316	0.600	50.175	48.890	1.285	36.8	300	5.93	48.7
2.003	8	9	21.696	0.600	48.740	48.430	0.310	70.0	450	6.08	48.1
3.007	20	21	22.512	0.600	49.885	49.475	0.410	54.9	450	6.21	47.7
9.000	Basin2	29_OUT	9.443	0.600	48.300	48.200	0.100	94.4	150	5.15	50.0
3.000	10	11	37.701	0.600	53.979	53.351	0.628	60.0	225	5.37	50.0
3.001	11	13	20.061	0.600	53.276	53.194	0.082	244.6	300	5.71	49.6
4.000	12	13	25.341	0.600	53.825	53.269	0.556	45.6	225	5.22	50.0
3.002	13	14	7.157	0.600	53.194	53.164	0.030	238.6	300	5.82	49.2
3.003	14	15	22.815	0.600	53.014	51.510	1.504	15.2	450	5.90	48.8
3.005	16	19	9.980	0.600	50.664	50.085	0.579	17.2	450	5.95	48.6
5.000	17	18	36.729	0.600	50.412	50.259	0.153	240.0	300	5.61	50.0
5.001	18	19	5.687	0.600	50.259	50.235	0.024	240.0	300	5.70	49.7
3.006	19	20	16.523	0.600	50.085	49.878	0.207	80.0	450	6.07	48.2
3.009	22	22_OUT	18.020	0.600	49.350	49.300	0.050	360.4	450	6.52	46.6
6.000	23	24	25.070	0.600	53.793	52.851	0.942	26.6	225	5.16	50.0
6.001	24	25	10.563	0.600	52.851	52.500	0.351	30.1	225	5.24	50.0
6.002	25	26	72.293	0.030	52.500	50.200	2.300	31.4	500	5.72	49.6
6.003	26	26_OUT	29.944	0.030	50.200	49.500	0.700	42.8	500	5.95	48.6
1.004	9	9_OUT	12.176	0.030	48.430	48.400	0.030	405.9	450	8.03	41.8
8.000	Basin3	28_OUT	15.217	0.600	48.900	48.700	0.200	76.1	375	5.12	50.0
3.008	21	22	4.875	0.600	49.475	49.350	0.125	39.0	450	6.23	47.6

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	3.848	3848.1	10.8	0.050	0.050	0.060	0.0	26	0.729
1.001	2.659	2658.6	27.3	0.050	0.050	0.152	0.0	54	0.771
3.004	6.572	1045.2	56.0	1.200	1.577	0.318	0.0	70	3.572
1.003	0.293	20.7	33.1	1.200	0.820	0.211	0.0	300	0.297
2.000	3.395	135.0	15.2	1.293	2.424	0.084	0.0	51	2.263
2.001	2.430	96.6	36.8	2.424	1.200	0.204	0.0	96	2.270
2.002	2.599	183.7	52.5	2.658	1.209	0.298	0.0	109	2.251
2.003	2.432	386.8	57.7	1.209	0.820	0.332	0.0	116	1.767
3.007	2.748	437.0	84.9	1.465	1.204	0.493	0.0	133	2.145
9.000	1.034	18.3	0.0	1.150	1.150	0.000	0.0	0	0.000
3.000	1.691	67.2	15.2	1.293	1.331	0.084	0.0	73	1.373
3.001	1.001	70.7	24.7	1.331	1.613	0.138	0.0	122	0.914
4.000	1.942	77.2	17.0	1.235	1.613	0.094	0.0	72	1.568
3.002	1.013	71.6	50.2	1.613	1.387	0.282	0.0	185	1.094
3.003	5.240	833.3	56.1	1.387	1.200	0.318	0.0	78	3.032
3.005	4.916	781.9	60.3	1.577	1.781	0.343	0.0	83	2.956
5.000	1.010	71.4	13.3	1.200	1.718	0.074	0.0	87	0.776
5.001	1.010	71.4	21.2	1.718	1.781	0.118	0.0	112	0.883
3.006	2.274	361.7	85.8	1.781	1.472	0.493	0.0	148	1.875
3.009	1.065	169.4	83.0	1.200	0.450	0.493	0.0	222	1.059
6.000	2.546	101.2	16.8	1.200	1.200	0.093	0.0	62	1.902
6.001	2.393	95.2	23.9	1.200	1.021	0.132	0.0	77	2.005
6.002	2.502	2502.4	34.6	0.746	0.357	0.193	0.0	63	0.789
6.003	2.145	2145.1	43.6	0.357	0.200	0.248	0.0	78	0.759
1.004	0.386	61.3	86.2	0.820	0.750	0.570	0.0	450	0.391
8.000	2.079	229.6	0.0	0.925	0.425	0.000	0.0	0	0.000
3.008	3.263	518.9	84.8	1.204	1.200	0.493	0.0	122	2.429

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)
7.000	Basin1	27_OUT	15.777	0.600	48.200	48.000	0.200	78.9	150	5.23	50.0
1.002	3	4	23.295	0.030	49.550	48.650	0.900	25.9	500	5.87	49.0

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)
7.000	1.133	20.0	0.0	1.150	0.050	0.000	0.0	0	0.000
1.002	2.758	2757.6	37.3	0.050	1.000	0.211	0.0	63	0.869

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	240
Rainfall Events	Singular	Additional Storage (m³/ha)	20.0
Summer CV	1.000	Starting Level (m)	
Winter CV	1.000	Check Discharge Rate(s)	x
Analysis Speed	Detailed	Check Discharge Volume	x
Skip Steady State	x		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	30	0	0
100	40	0	0

Node 27_OUT Surcharged Outfall

Overrides Design Area	x	Depression Storage Depth (mm)	0
Overrides Design Additional Inflow	x	Evapo-transpiration (mm/day)	0
Depression Storage Area (m²)	0		
Applies to All storms			

Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.150	1440	0.150

Node Basin1 Online Hydro-Brake® Control

Flap Valve	x
Replaces Downstream Link	x
Invert Level (m)	48.200
Design Depth (m)	1.000
Design Flow (l/s)	2.6
Objective	(HE) Minimise upstream storage
Sump Available	✓
Product Number	CTL-SHE-0077-2600-1000-2600
Min Outlet Diameter (m)	0.100
Min Node Diameter (mm)	1200

Node Basin2 Online Orifice Control

Flap Valve	x	Invert Level (m)	48.300	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.100		

Node Basin3 Online Hydro-Brake® Control

Flap Valve	x
Replaces Downstream Link	x
Invert Level (m)	48.900
Design Depth (m)	1.000
Design Flow (l/s)	3.6
Objective	(HE) Minimise upstream storage
Sump Available	✓
Product Number	CTL-SHE-0090-3600-1000-3600
Min Outlet Diameter (m)	0.150
Min Node Diameter (mm)	1200

Node Basin1 Pond Storage Structure

Invert Level (m)	48.200	Analyse flow through structure	x
Time to half empty (mins)			

Inlets

28_OUT | 29_OUT

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	571.2	1.000	944.8	1.001	0.0

Node Basin2 Pond Storage Structure

Invert Level (m)	48.300	Analyse flow through structure	x
Time to half empty (mins)			

Inlets

9_OUT

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	387.8	1.000	722.2	1.001	0.0

Node Basin3 Pond Storage Structure

Invert Level (m)	48.900	Analyse flow through structure	x
Time to half empty (mins)			

Inlets

22_OUT | 26_OUT

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	549.6	1.000	1090.4	1.001	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	58.503	0.024	10.1	0.0521	0.0000	OK
15 minute summer	2	12	51.414	0.049	24.9	0.1641	0.0000	OK
15 minute summer	3	12	49.607	0.057	32.2	0.1211	0.0000	OK
15 minute summer	4	14	48.905	0.255	31.3	0.0000	0.0000	OK
15 minute summer	5	10	57.412	0.049	14.2	0.1094	0.0000	OK
15 minute summer	6	11	53.491	0.093	34.3	0.1902	0.0000	OK
15 minute summer	7	11	50.283	0.108	49.1	0.1920	0.0000	OK
15 minute summer	8	11	48.853	0.113	54.7	0.2064	0.0000	OK
2880 minute summer	9_OUT	2580	48.526	0.226	5.4	0.0000	0.0000	OK
2880 minute summer	Basin2	2580	48.524	0.224	4.4	96.6766	0.0000	SURCHARGED
15 minute summer	10	10	54.050	0.071	14.3	0.1587	0.0000	OK
15 minute summer	11	11	53.406	0.130	23.0	0.2316	0.0000	OK
15 minute summer	12	10	53.894	0.069	15.9	0.1660	0.0000	OK
15 minute summer	13	11	53.387	0.193	46.7	0.3209	0.0000	OK
15 minute summer	14	11	53.093	0.079	52.3	0.1426	0.0000	OK
15 minute summer	16	11	50.745	0.081	56.6	0.1362	0.0000	OK
15 minute summer	17	10	50.495	0.083	12.5	0.1750	0.0000	OK
15 minute summer	18	11	50.376	0.117	19.7	0.1838	0.0000	OK
15 minute summer	19	11	50.235	0.150	81.3	0.2579	0.0000	OK
15 minute summer	21	11	49.646	0.171	81.5	0.2451	0.0000	OK
15 minute summer	23	10	53.852	0.059	15.7	0.1447	0.0000	OK
15 minute summer	24	10	52.929	0.078	22.3	0.1320	0.0000	OK
15 minute summer	25	11	52.561	0.061	32.4	0.0593	0.0000	OK
15 minute summer	26	12	50.273	0.073	40.7	0.0931	0.0000	OK
600 minute summer	26_OUT	465	49.177	0.277	10.9	0.0000	0.0000	OK
600 minute summer	Basin3	465	49.174	0.274	10.5	174.2635	0.0000	OK
2880 minute summer	29_OUT	2580	48.523	0.323	3.5	0.0000	0.0000	OK
2880 minute summer	Basin1	2520	48.521	0.321	3.8	205.1541	0.0000	SURCHARGED

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 summer	1	1.000	2	9.6	0.446	0.003	2.1318	
15 minute summer	2	1.001	3	22.8	0.661	0.009	1.7557	
15 minute summer	3	1.002	4	31.3	0.310	0.011	4.1291	
15 minute summer	4	1.003	9	24.5	0.498	1.183	1.4841	
15 minute summer	5	2.000	6	14.0	1.322	0.104	0.6481	
15 minute summer	6	2.001	7	33.7	2.199	0.348	0.7557	
15 minute summer	7	2.002	8	49.3	2.193	0.268	1.0642	
15 minute summer	8	2.003	9	54.8	0.784	0.142	1.6579	
2880 minute summer	Basin2	9.000	29_OUT	3.5	0.590	0.194	0.1662	
15 minute summer	10	3.000	11	13.9	1.328	0.207	0.3959	
15 minute summer	11	3.001	13	22.7	0.590	0.321	0.7733	
15 minute summer	12	4.000	13	15.8	1.271	0.204	0.3947	
15 minute summer	13	3.002	14	46.6	1.055	0.651	0.3160	
15 minute summer	14	3.003	15	52.4	3.116	0.063	0.3839	
15 minute summer	16	3.005	19	56.6	1.761	0.072	0.3275	
15 minute summer	17	5.000	18	12.2	0.600	0.170	0.7561	
15 minute summer	18	5.001	19	19.5	0.821	0.273	0.1351	
15 minute summer	19	3.006	20	81.4	1.869	0.225	0.7202	
15 minute summer	21	3.008	22	81.4	1.198	0.157	0.3317	
15 minute summer	23	6.000	24	15.6	1.513	0.154	0.2591	
15 minute summer	24	6.001	25	22.1	2.151	0.233	0.1091	
15 minute summer	25	6.002	26	31.8	0.717	0.013	3.3490	
15 minute summer	26	6.003	26_OUT	38.3	0.735	0.018	1.5591	
600 minute summer	Basin3	8.000	28_OUT	3.6	0.767	0.016	0.0708	
2880 minute summer	Basin1	7.000	27_OUT	2.6	0.226	0.130	0.1649	300.7

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	27_OUT	1	48.150	0.150	1.1	0.0000	0.0000	OK
2880 minute summer	28_OUT	2520	48.525	0.325	3.5	0.0000	0.0000	OK
600 minute summer	22_OUT	465	49.177	0.277	14.0	0.0000	0.0000	OK
15 minute summer	15	11	51.578	0.068	52.4	0.0000	0.0000	OK
15 minute summer	20	11	50.015	0.137	81.4	0.0000	0.0000	OK
15 minute summer	9	12	48.758	0.328	76.8	0.6112	0.0000	OK
15 minute summer	22	11	49.578	0.228	81.4	0.3268	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 summer	15	3.004	16	52.4	3.048	0.050	0.1407	
15 minute summer	20	3.007	21	81.5	1.752	0.187	1.0507	
15 minute summer	9	1.004	9_OUT	76.5	0.809	1.248	1.1430	
15 minute summer	22	3.009	22_OUT	80.6	1.101	0.476	1.3264	

Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 99.73%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	58.531	0.052	38.9	0.1134	0.0000	OK
15 minute summer	2	11	51.470	0.105	97.9	0.3535	0.0000	OK
15 minute summer	3	11	49.671	0.121	131.1	0.2575	0.0000	OK
30 minute summer	4	23	49.631	0.981	117.7	0.0000	0.0000	SURCHARGED
15 minute summer	5	10	57.462	0.099	54.9	0.2215	0.0000	OK
15 minute summer	6	12	54.409	1.011	132.8	2.0587	0.0000	SURCHARGED
15 minute summer	7	11	50.422	0.247	169.4	0.4368	0.0000	OK
15 minute summer	8	12	49.337	0.597	188.7	1.0930	0.0000	SURCHARGED
10080 minute summer	9_OUT	8040	49.011	0.711	5.5	0.0000	0.0000	OK
10080 minute summer	Basin2	8040	49.009	0.709	4.1	362.1558	0.0000	SURCHARGED
15 minute summer	10	11	54.388	0.409	55.0	0.9162	0.0000	SURCHARGED
15 minute summer	11	11	53.953	0.677	85.0	1.2103	0.0000	SURCHARGED
15 minute summer	12	11	54.186	0.361	61.4	0.8736	0.0000	SURCHARGED
15 minute summer	13	11	53.794	0.600	175.0	0.9958	0.0000	SURCHARGED
15 minute summer	14	11	53.170	0.156	196.9	0.2828	0.0000	OK
15 minute summer	16	11	50.853	0.188	212.7	0.3166	0.0000	OK
15 minute summer	17	10	50.598	0.186	48.0	0.3931	0.0000	OK
15 minute summer	18	11	50.527	0.268	75.7	0.4217	0.0000	OK
15 minute summer	19	11	50.456	0.371	306.4	0.6366	0.0000	OK
15 minute summer	21	11	50.083	0.608	302.9	0.8704	0.0000	SURCHARGED
15 minute summer	23	10	53.917	0.124	60.6	0.3028	0.0000	OK
15 minute summer	24	10	53.035	0.184	85.9	0.3094	0.0000	OK
15 minute summer	25	11	52.624	0.124	125.0	0.1211	0.0000	OK
15 minute summer	26	11	50.350	0.150	157.4	0.1916	0.0000	OK
720 minute winter	26_OUT	705	49.663	0.763	17.8	0.0000	0.0000	OK
720 minute winter	Basin3	720	49.660	0.760	15.8	580.9353	0.0000	SURCHARGED
10080 minute summer	29_OUT	8040	49.008	0.808	2.8	0.0000	0.0000	OK
5760 minute winter	Basin1	5700	49.006	0.806	3.8	586.2819	0.0000	SURCHARGED

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 summer	1	1.000	2	37.7	0.666	0.010	5.6591	
15 minute summer	2	1.001	3	94.4	1.000	0.036	4.7852	
15 minute summer	3	1.002	4	129.1	0.396	0.047	39.6334	
30 minute summer	4	1.003	9	68.3	0.974	3.299	2.0212	
15 minute summer	5	2.000	6	54.5	1.724	0.404	1.6823	
15 minute summer	6	2.001	7	112.4	2.825	1.163	1.9591	
15 minute summer	7	2.002	8	167.9	2.835	0.914	3.1330	
15 minute summer	8	2.003	9	185.4	1.171	0.479	3.4376	
10080 minute summer	Basin2	9.000	29_OUT	2.8	0.538	0.152	0.1662	
15 minute summer	10	3.000	11	51.6	1.420	0.767	1.4994	
15 minute summer	11	3.001	13	84.8	1.205	1.199	1.4127	
15 minute summer	12	4.000	13	58.6	1.473	0.758	1.0078	
15 minute summer	13	3.002	14	174.9	2.485	2.442	0.4989	
15 minute summer	14	3.003	15	196.9	4.467	0.236	1.0065	
15 minute summer	16	3.005	19	212.7	2.199	0.272	1.0103	
15 minute summer	17	5.000	18	46.8	0.823	0.655	2.0595	
15 minute summer	18	5.001	19	74.4	1.237	1.041	0.3471	
15 minute summer	19	3.006	20	305.0	2.406	0.843	2.3419	
15 minute summer	21	3.008	22	302.4	1.909	0.583	0.7724	
15 minute summer	23	6.000	24	60.2	2.078	0.595	0.7177	
15 minute summer	24	6.001	25	85.2	2.956	0.896	0.3008	
15 minute summer	25	6.002	26	123.0	1.020	0.049	9.0395	
15 minute summer	26	6.003	26_OUT	154.2	1.084	0.072	4.2581	
720 minute winter	Basin3	8.000	28_OUT	3.6	0.769	0.016	0.0712	
5760 minute winter	Basin1	7.000	27_OUT	2.6	0.226	0.130	0.1649	670.2

Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 99.73%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	27_OUT	1	48.150	0.150	2.5	0.0000	0.0000	OK
5760 minute winter	28_OUT	5700	49.011	0.811	3.6	0.0000	0.0000	OK
720 minute winter	22_OUT	705	49.663	0.763	22.7	0.0000	0.0000	OK
15 minute summer	15	11	51.644	0.134	196.9	0.0000	0.0000	OK
15 minute summer	20	11	50.261	0.383	305.0	0.0000	0.0000	OK
15 minute summer	9	12	49.236	0.806	232.4	1.5041	0.0000	SURCHARGED
15 minute summer	22	11	49.947	0.597	302.4	0.8540	0.0000	SURCHARGED

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 summer	15	3.004	16	196.8	3.872	0.188	0.4173	
15 minute summer	20	3.007	21	302.9	1.970	0.693	3.3761	
15 minute summer	9	1.004	9_OUT	232.9	1.518	3.798	1.7477	
15 minute summer	22	3.009	22_OUT	301.9	1.919	1.783	2.7212	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	58.542	0.063	53.8	0.1356	0.0000	OK
15 minute summer	2	11	51.489	0.124	135.5	0.4190	0.0000	OK
30 minute summer	3	24	49.810	0.260	193.3	0.5538	0.0000	OK
30 minute summer	4	23	49.821	1.171	240.6	0.0000	0.0000	SURCHARGED
15 minute summer	5	11	57.499	0.136	75.8	0.3050	0.0000	OK
15 minute summer	6	12	56.002	2.604	181.4	5.3050	0.0000	FLOOD RISK
15 minute summer	7	12	51.749	1.574	220.1	2.7851	0.0000	SURCHARGED
15 minute summer	8	12	49.690	0.950	239.6	1.7401	0.0000	SURCHARGED
7200 minute winter	9_OUT	7080	49.173	0.873	5.4	0.0000	0.0000	OK
7200 minute winter	Basin2	7080	49.171	0.871	4.0	468.6313	0.0000	SURCHARGED
15 minute summer	10	11	55.165	1.186	76.0	2.6573	0.0000	SURCHARGED
15 minute summer	11	11	54.377	1.101	115.6	1.9677	0.0000	SURCHARGED
15 minute summer	12	11	54.811	0.986	84.8	2.3848	0.0000	SURCHARGED
15 minute summer	13	11	54.085	0.891	238.0	1.4801	0.0000	SURCHARGED
15 minute summer	14	11	53.198	0.184	267.8	0.3347	0.0000	OK
15 minute summer	16	12	51.308	0.644	287.8	1.0837	0.0000	SURCHARGED
15 minute summer	17	12	51.349	0.937	66.3	1.9777	0.0000	SURCHARGED
15 minute summer	18	12	51.236	0.977	96.5	1.5342	0.0000	SURCHARGED
15 minute summer	19	12	51.154	1.069	399.3	1.8349	0.0000	SURCHARGED
15 minute summer	21	12	50.399	0.924	398.2	1.3223	0.0000	SURCHARGED
15 minute summer	23	11	53.979	0.186	83.7	0.4532	0.0000	OK
15 minute summer	24	11	53.347	0.496	117.3	0.8343	0.0000	SURCHARGED
15 minute summer	25	11	52.645	0.145	168.4	0.1420	0.0000	OK
15 minute summer	26	11	50.375	0.175	216.0	0.2234	0.0000	OK
720 minute winter	26_OUT	720	49.874	0.974	23.8	0.0000	0.0000	OK
720 minute winter	Basin3	720	49.871	0.971	20.1	797.8076	0.0000	SURCHARGED
7200 minute winter	29_OUT	7080	49.171	0.971	2.7	0.0000	0.0000	OK
7200 minute winter	Basin1	7080	49.170	0.970	3.8	734.9703	0.0000	SURCHARGED

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 summer	1	1.000	2	52.2	0.731	0.014	7.1587	
15 minute summer	2	1.001	3	131.6	1.095	0.049	8.9603	
30 minute summer	3	1.002	4	240.6	0.370	0.087	58.1161	
30 minute summer	4	1.003	9	69.3	0.985	3.351	2.0212	
15 minute summer	5	2.000	6	73.2	2.086	0.542	1.9302	
15 minute summer	6	2.001	7	143.8	3.615	1.488	1.9428	
15 minute summer	7	2.002	8	213.8	3.037	1.164	3.3320	
15 minute summer	8	2.003	9	237.5	1.499	0.614	3.4376	
7200 minute winter	Basin2	9.000	29_OUT	2.7	0.604	0.149	0.1662	
15 minute summer	10	3.000	11	69.5	1.746	1.033	1.4994	
15 minute summer	11	3.001	13	114.7	1.628	1.621	1.4127	
15 minute summer	12	4.000	13	79.6	2.001	1.030	1.0078	
15 minute summer	13	3.002	14	237.5	3.373	3.315	0.4989	
15 minute summer	14	3.003	15	268.1	4.846	0.322	1.2897	
15 minute summer	16	3.005	19	281.3	2.108	0.360	1.5813	
15 minute summer	17	5.000	18	56.7	0.828	0.794	2.5864	
15 minute summer	18	5.001	19	91.0	1.292	1.274	0.4005	
15 minute summer	19	3.006	20	396.9	2.506	1.097	2.6180	
15 minute summer	21	3.008	22	399.1	2.519	0.769	0.7724	
15 minute summer	23	6.000	24	81.8	2.092	0.808	0.9392	
15 minute summer	24	6.001	25	115.9	3.149	1.218	0.3529	
15 minute summer	25	6.002	26	168.7	1.087	0.067	11.3703	
15 minute summer	26	6.003	26_OUT	210.8	1.179	0.098	5.3534	
720 minute winter	Basin3	8.000	28_OUT	3.6	0.769	0.016	0.3786	
7200 minute winter	Basin1	7.000	27_OUT	2.6	0.226	0.130	0.1649	892.2

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	27_OUT	1	48.150	0.150	2.6	0.0000	0.0000	OK
7200 minute winter	28_OUT	7080	49.174	0.974	3.6	0.0000	0.0000	OK
720 minute winter	22_OUT	720	49.875	0.975	32.8	0.0000	0.0000	OK
15 minute summer	15	11	51.673	0.163	268.1	0.0000	0.0000	OK
15 minute summer	20	12	50.823	0.945	396.9	0.0000	0.0000	SURCHARGED
15 minute summer	9	12	49.516	1.086	290.1	2.0256	0.0000	FLOOD RISK
15 minute summer	22	12	50.162	0.812	399.1	1.1626	0.0000	SURCHARGED

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 summer	15	3.004	16	265.7	3.818	0.254	0.8584	
15 minute summer	20	3.007	21	398.2	2.513	0.911	3.5669	
15 minute summer	9	1.004	9_OUT	289.8	1.846	4.726	1.8267	
15 minute summer	22	3.009	22_OUT	399.7	2.523	2.360	2.8121	

Appendix C

Proposed Impermeable Areas

Legend

-  Indicative site boundary
-  Impermeable area: Roads / Parking
-  Impermeable area: House / Garage
-  Impermeable area: Driveway
-  Impermeable area: Footway

Total site area: 5.51 ha
Total site area to be drained: 4.98 ha

Impermeable Areas

Total roads: 5108 m²
Total parking: 498 m²
Total driveway: 2956 m²
Total footway: 1045 m²
Total houses/garages with urban creep (10%): 5768 m²

Total Impermeable area: 1.54 ha

1. Where this drawing has been issued in electronic .dwg format, it has been done so in good faith. JNP Group do not take any responsibility for any inaccuracies in the electronic data, which should be checked against the paper (or .pdf) drawing issue. Any apparent discrepancies should be immediately reported to JNP Group. The electronic .dwg file should not be assumed to be to scale and should not be used for 'overlying', setting out or checking of any third party information. All dimensions should be taken from the paper (or .pdf) version of the drawing. Electronic drawings may contain third party information. JNP Group take no responsibility for this information, which should be checked against the originators paper drawing(s).
2. All dimensions are millimetres (mm), and levels are in metres (m) unless noted otherwise and should be checked on site prior to construction/fabrication.
3. Do not scale from this drawing. Only figured dimensions are to be relied upon. Do not hesitate to get in touch with JNP Group if additional information is required.
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Health & Safety Note

The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety information on this drawing, this should immediately be brought to the attention of the designer.

References

- Topographical Survey provided by Croudace, ref. ENC/020524/3336-S1
- Site layout by Croudace, ref. DES/0203/101
- Tree survey by Croudace, ref. SJA TPP 25033-041
- Proposed Levels by Croudace, ref. 0203-RM-01

P02	26/08/2026	Update to site layout	KKRSHR3
P01	25/08/2026	First issue	KKRSHR3
Rev	Date	Description	On / Off / Ag

S3 - Suitable for Review & Comment

Client Log



Client: Croudace Homes

Job: Land to the north of School Road, Arborfield Cross

Title: Proposed Impermeable Areas

Classification: FI_60_20	    
Scale @ A1: 1:500	

Project - Originator - Volume/System - Level/Location - Type - Discipline - Number	Revision
BR31444 - JNP - 92 -XX- DR -C- 2003	P0

Appendix D

Exceedance Plan