



**157 Milton Road, Cowplain, Hampshire
PO8 8RE**

**Surface Water Drainage Strategy
dated December 2019**

1.0 Background Information

- 1.1 The site known as 157 Milton Road, Cowplain, Hampshire PO8 8RE is located on the corner of Milton Road and Pyrford Close as shown by the location and site plans included within Appendix A.
- 1.2 The site is a former petrol station which has been demolished to ground level with existing foundations and drainage removed as part of the demolition works.
- 1.3 The site is to be developed for residential purposes with the construction of 9no. 2 bedroom flats in two blocks with associated parking, cycle and refuse storage.
- 1.4 There are no records of the former drainage regime on the site.
- 1.5 This drainage strategy has been formed in accordance with the requirements of the HCC Flood & Water Management Template.

2.0 Sensitivity of Discharge Points

- 2.1 Extracts from the 'Ground and Water' contamination assessment, included within Appendix B, includes a statement stating that:-

'Examination of the Environment Agency records show that the site falls within a Zone 1 (Subsurface Activity) Groundwater Source Protection Zone (SP2) as classified on the Policy and Practice for the Protection of Groundwater'.
- 2.2 The same report also indicates ground conditions with made ground over cohesive head deposits over the Lambeth Group clay with low permeability characteristics.
- 2.3 The above statements negate the use of infiltration methods for the disposal of surface water run off from the site. It is therefore proposed that attenuated flows be discharged to the adjacent public surface water sewer via a hydro-break. Southern Water sewer records are included within Appendix E.

3.0 Existing Surface Water Flows

- 3.1 The site is a brownfield site with previous structure demolished to ground level.

4.0 Existing Drainage Network

- 4.1 The site of the former petrol station has been demolished to ground level with existing foundations and drainage runs removed as part of

the demolition works. There are no records of the demolished drainage network.

5.0 Failures of the Existing Drainage Regime

- 5.1 There are no records of failures of the former drainage regime.

6.0 Proposed Drainage Patterns

- 6.1 The Hamill Davies drawings, included within Appendix C, show that the site is to be laid out with hardstanding areas with surface water patterns following existing ground levels.
- 6.2 The hardstanding is to be formed using a tanked permeable paving form of construction with sufficient storage within the lower porous sub-base to contain the 1 in 100 year storm with a 40% climate change allowance to prevent the discharge of surface water to the surrounding areas.

7.0 Surface Water Treatment

- 7.1 Surface water treatment is to be achieved, in accordance with Ciria SuDS Manual C753, using permeable paving and a petrol interceptor prior to discharge to the adjacent public surface water sewer.

8.0 Infiltration

- 8.1 For the reasons outlined in Section 2 discharge of surface water via soakaways and other infiltration devices is not feasible on this site.

9.0 Run off Rate Calculations

- 9.1 Please refer to the drainage calculations included within Appendix D for existing and proposed run off rate calculations for the 1 in 1 storm event with 40% climate change as well as the 1 in 100 year event with 40% climate change.

10.0 Run off Volume Calculations

- 10.1 Please refer to drainage calculations within Appendix D for existing and proposed run-off volume calculations which demonstrate that the depth of porous paving shown on the HDL drawings included within Appendix C is sufficient to contain the 1 in 100 year, 6hour rainfall event with 40% climate change allowance. The calculations demonstrate that the attenuated run off volume does not exceed the greenfield run off volume.

11.0 Storage / Attenuation

- 11.1 The calculations included within Appendix D demonstrate that sufficient storage / attenuation will be provided for the 1in 100 year storm with 40% climate change allowance.

12.0 Runn off Exceedance Design Criteria

- 12.1 The run off exceedance design criteria has been considered and hardstanding areas formed with a gentle fall towards the Pryford Close and Milton Road as per the existing ground levels.

13.0 Maintenance Regimes

- 13.1 The surface blocks have a design life equivalent to standard block paving.
- 13.2 All paved surfaces will require occasional cleaning. In normal circumstances regular sweeping will be sufficient. Cleaning should be carried out in the Spring and after leaf fall in Autumn.
- 13.3 Lighter coloured blocks may exhibit tyre marks and may require more cleaning and maintenance.
- 13.4 Following routine maintenance it may be necessary to redress the surface with 2 – 4mm clean gritstone.
- 13.5 Ultimately after 25 years or more areas of the laying course may become filled with silts and toxins. If this occurs the surface blocks should be uplifted and the affected areas of laying course material and geotextile disposed of. The existing sub base can be left insitu. Fresh geotextile and laying course stone should be installed and the existing surface blocks re-laid.
- 13.6 A management company will be set up by the developer with responsibility for the maintenance of all common areas of the site including external areas and on-site foul and surface water drainage.

14.0 Urban Creep

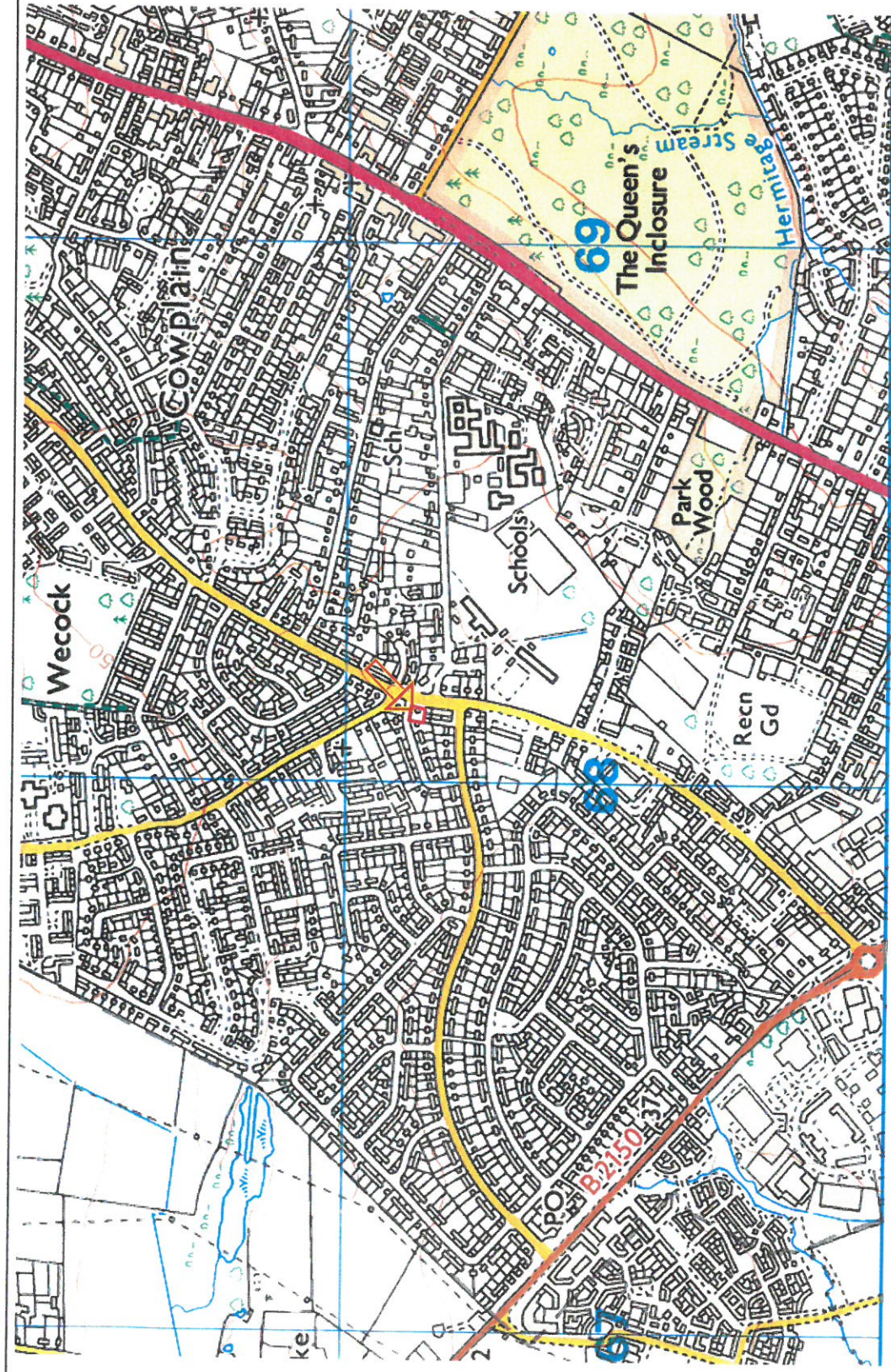
- 14.1 The drainage calculations, included within Appendix D, allows for a 10% increase in impermeable areas to take account of urban creep.

15.0 HCC Pre-Application Advice Service

- 15.1 No advice has been sought from the HCC pre-application advice service.

Appendix A

Location & Site Plan



NOT TO SCALE

APPROXIMATE SITE BOUNDARY

Project: 157 Milton Road, Cowplain, Hampshire PO8 8RE		Figure 1	
Client: D & K Contracting Services Limited		Date: August 2019	ground&water
Site Location Plan		Ref: GWPR3208	



NOT TO SCALE

Project:

157 Milton Road, Cowplain, Hampshire PO8 8RE

Client:

D & K Contracting Services Limited

Date:

August 2019

Site Development Area

Ref:

GWPR3208

Figure 2

ground&water

Appendix B

Extracts from Contamination Assessment

Contamination Assessment: Site of former Underground Fuel Tank

CLIENT	D & K Contracting Services Limited
SITE ADDRESS	157 Milton Road, Cowplain, Hampshire PO8 8RE
PROJECT NUMBER	The site location plan is provided in Figure 1. The site development area can be seen in Figure 2 and an aerial view in Figure 3. GWPR3208. This reports Terms and Conditions can be seen within Appendix A.
ENGINEER ON-SITE	Darina Jurovskaja, Ground and Water Limited
DATE	13 th August 2019
RELEVANT DOCUMENTATION	This Report must be read in conjunction with the following: • Ground and Water Desk Study Report – GWPR1606/DS/May 2016; • Ground and Water Ground Investigation Report – GWPR1606/GIR/May 2016; • Ground and Water Remediation Validation Certificate – GWPR2540/RVC/ June 2018; • Ground and Water Contamination Assessment – GWPR2677/CAR/July 2018.
GEOLOGY	The British Geological Survey Solid and Drift Geology Map for the Fareham area (Sheet no. 316) revealed the site to be situated on the superficial Head Deposits overlying the bedrock deposits of the London Clay Formation. No areas of Worked Ground or Made Ground were noted in a 250m radius of the site.
HYDROGEOLOGY and HYDROLOGY	A study of the aquifer maps on the Environment Agency website revealed the site to be located on a Secondary (Undifferentiated) Aquifer relating to the superficial deposits of the Head Deposits and Unproductive Strata relating to the bedrock deposits of the London Clay Formation.

Superficial (Drift) deposits are permeable unconsolidated (loose) deposits, for example, sands and gravels. The bedrock is described as solid permeable formations e.g. sandstone, chalk and limestone.

Secondary aquifers include a wide range of drift deposits with an equally wide range of water permeability and storage capacities. Secondary (A) Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;

Unproductive strata are rock layers with low permeability that have negligible significance for water supply or river base flow. These were formerly classified as non-aquifers.

Examination of the Environment Agency records showed that the site fell within a **Zone I (Subsurface Activity)** Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater.

The nearest surface water features to the site was a small stream ~560m north, an unidentified brook ~850m south-west and Billy's Lake ~770m north-west of the site.

From analysis of hydrogeological and topographical maps groundwater was anticipated to be encountered at shallow to moderate depth (2.00m - 5.00m) below existing ground level (bgl) and it was considered that

groundwater was flowing in a south-westerly direction in line with local topography towards the Wallington River.

Examination of the Environment Agency records showed that the site was situated within an area benefitting from flood defences and an Environment Agency **Flood Zone 1**.

**PROPOSED
REMEDIAL
STRATEGY &
REMEDIAL
UNDERTAKEN**

Human Health – Tank removal and potential TPH contamination

It was recommended that further investigation was required to provide more certainty on the hydrocarbon risk beneath the site.

According to the previous report by Ground & Water Limited (ref. GWPR2677/CAR/July 2018), 5No. tanks were removed from the car park and placed in the north-west corner of the site. Each tank was cylindrical in shape and was approximately 2.10m tall by 4m long. The excavation left a pit of ~7.60m x 15.70m. The initial depth of the pit was unknown but believed to be ~2.10m due to the height of the tanks. Upon removal of the tanks the pit was partially backfilled to ensure stability of the party wall.

**INVESTIGATION
LOCATIONS & SCOPE
OF WORK**

A site visit was undertaken on the 28th June 2019 and comprised the drilling of 4No. Windowless Sampler Boreholes (WS1 – WS4) to depths of between 2.00 – 4.00m bgl. A single 50mm combined ground-gas and groundwater well was installed in WS4 to a depth of 4.00m bgl. A trial hole location plan can be seen in Figure 5.

It should be noted that trial holes WS5 and WS6 located in the northern portion of the site could not be drilled due to the refusal on concrete at depths of between 0.20 – 0.30m bgl.

**GROUND
CONDITIONS**

It should be noted that WS2 refused due to the density of Made Ground.
A summary of the strata encountered can be seen below.

Broad Summary of Strata Encountered (WS1 – WS4)		
Strata	Depth Encountered (m bgl)	Thickness (m)
CRUSHED CONCRETE	GL	0.30 – 0.40
MADE GROUND (all trial holes): Dark brown/black/orangish brown silty sandy gravelly clay. Sand is fine to coarse grained. Gravel is fine to coarse, angular to sub-rounded flint, brick, concrete, claystone, clinker, ash, plastic and wood material.	0.30 – 0.60	0.20 – >1.60
HEAD DEPOSITS (WS1, WS3 and WS4): Greenish grey to orangish brown silty sandy, locally gravelly, CLAY. Sand is fine to medium grained. Gravel is fine to coarse, angular to sub-angular flint. Carbonaceous material was noted in WS1 between 0.50 – 0.90m bgl.	0.50 – 2.00	0.90 – 1.90
LAMBETH GROUP (WS1, WS3 and WS4): Red/grey/brown mottled silty CLAY.	2.20 – 3.00	>1.60 – >3.00

A strong hydrocarbon type (diesel) odour was noted within all trial holes at varying depths. A summary can be seen overleaf.

ROOTS GROUNDWATER CONTAMINATION TESTING

Summary of Hydrocarbon Odours Encountered	
Trial Hole	Depth Encountered (m bgl)
WS1	1.00
WS2	1.75 – 2.00
WS3	0.60 – 2.20
WS4	0.40 – 3.00

For more details on the encountered ground conditions please refer to the trial hole logs in Appendix B.

Roots were noted in all trial holes between depths of 0.50 – 1.00m bgl.

Perched water was noted in all trial holes (WS1 – WS4) within Made Ground at a depth of 1.00m bgl.

10No. samples were screened for speciated TPH Fuel Oils, including a full aliphatic/aromatic split and BTEX compounds as these were the contaminants of concern identified in the Conceptual Site Model (Ground and Water Ground Investigation Report – GWPR1606/GIR/May 2016). The depth of sampling, type of material and methodology of sampling can be seen below:

Methodology for Sampling Locations and Chemical Laboratory Testing		
Trial Hole/Geology	Depth (m bgl)	Sampling Strategy
WS1 (Made Ground)	0.30	Samples representative of Made Ground and natural ground targeting the area of former tanks with strong hydrocarbon odour.
WS1 (Head Deposits)	0.50	
WS2 (Made Ground)	0.60	
WS2 (Made Ground)	1.80	
WS3 (Lambeth Group)	2.30	
WS4 (Head Deposits)	2.30	
WS3 (Made Ground)	0.80	Samples representative of Made Ground and natural ground immediately surrounding proposed water pipes across site.
WS3 (Head Deposits)	1.30	
WS4 (Made Ground)	0.80	
WS4 (Made Ground)	1.30	Anticipated installation depth of 0.80 – 1.30m bgl.

The analysis suite is presented below and comprised:

- Fuel Oils – Speciated TPH including full aliphatic/aromatic split: (WS1/0.30m, WS1/0.50m, WS2/0.60m, WS3/0.80m, WS3/1.30m, WS4/0.80m, WS4/1.30m and WS4/2.30m bgl);
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene): (WS1/0.30m, WS1/0.50m, WS2/0.60m, WS3/0.80m, WS3/1.30m, WS4/0.80m, WS4/1.30m and WS4/2.30m bgl).

Testing was undertaken to review the presence of any residual contamination from the sides and base of the tank removal void/area. The results of the screening can be seen in Appendix D.

HUMAN HEALTH RISK ASSESSMENT

The results of the chemical laboratory testing were compared to the LQM/CIEH Sutable 4 Use Levels (S4UL) for a '**Residential with homegrown produce**' land-use scenario, as this was considered the most appropriate land-use scenario. A proposed development plan can be seen in Figure 4 and the Assessment Criteria can be seen in Appendix D.

It should be noted that previous site investigations (GWPR1606/GIR/May 2016, GWPR2540/RVC/June 2018 and GWPR2677/CAR/July 2008) revealed no elevated levels of determinants in excess of the C4SL LLTC for a '**Residential with homegrown produce**' land-use scenario.

No levels of Speciated TPH Aliphatic/Aromatic or BETEX compounds were found to exceed the guideline levels for a '*Residential with Homegrown Produce*' land-use scenario, therefore, there is no vapour risk and no further remediation required.

No significant risk to controlled waters is deemed to be present by the residual lighter end hydrocarbons detected during the investigation. Following source removal any residual hydrocarbons will attenuate with time.

CONTAMINATION RISK ASSESSMENT (WRAS)

The results of the chemical laboratory testing can be viewed within Appendix C.

No elevated levels of determinands were noted at depths of between 0.80 – 1.30m bgl, the anticipated depth at which water supply pipes are likely to be installed.

However, elevated levels of BTEX were noted at depths of 0.50m bgl and 2.30 – 2.80m bgl in the southern portion of the site, affecting a water supply to the proposed development (residential block of flats) (ref. GWPR2677/CAR/July 2018). It should be noted that the water supply for the proposed development (block of flats) may run through the area of the backfilled former tanks and, therefore, consideration could be given to upgrading the pipework in this area as a precaution.

A water supply pipe risk assessment has been undertaken and can be seen in Appendix E.

This report should be issued to the appropriate water supply company for confirmation.

The following Figures and Appendices complete this report:

Figure 1	Site Location Plan
Figure 2	Site Development Area
Figure 3	Aerial View of Site
Figure 4	Proposed Development Plan
Figure 5	Trial Hole Location Plan
Appendix A	Terms and Conditions
Appendix B	Trial Hole Logs
Appendix C	Chemical Laboratory Test Results
Appendix D	Soil Assessment Criteria
Appendix E	Water Supply Pipe Risk Assessment

Appendix C

Hamill Davies Drainage Drawings



3. ANY DIMENSIONS/LEVELS INDICATED "yd" REFER TO ASSUMED/EXISTING DIMENSIONS WHICH ARE TO BE SITE CHECKED PRIOR TO THE COMMENCEMENT OF ANY WORK.

DRAINAGE NOTES:

DE, INVERT LEVELS AND POSITIONS OF EXISTING DRAININGS / CHAMBERS / VENTERS WHERE ANY CONNECTIONS ARE TO BE MADE SHALL BE CHECKED AND COMPARED TO THE DRAWING PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY, ENVIRONMENT AGENCY AND IN CONFORMANCE WITH ALL RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND 'SPECIFICATIONS FOR ADAPTATION AS APPROPRIATE'.
3. ALL DRAINAGE SHALL COMPLY WITH THE TYPICAL DETAILS AND THE REQUIREMENTS OF BSIN 72.
4. THE CONTRACTOR SHALL SUBMIT A DRAINAGE SCHEDULE OR DRAWINGS FOR MANHOLE TYPES, SIZES, DEPTHS, SPACINGS, ETC. TO THE LOCAL AUTHORITY FOR APPROVAL.
5. FOR SETTING OUT DIMENSIONS OF SLOPS, OWNER'S CITY, REFER TO THE

DRAWINGS.

JOINTS. ALL PIPES OF 375mm DIAMETER AND OVER, TO BE SULPHATE RESISTING CONCRETE CLASS M WITH SOCKETTED FLEXIBLE JOINTS.

07. ENDS OF INCOMING BRANCHES SHALL BE AT SPRING LEVEL TO THE MAIN PIPE AND FORMED GENERALLY USING CHANNEL PIPES AND SLIPPER BENDS, CUT TO SUIT.

D9. ALL GULLY AND DRAINAGE CHANNEL CONNECTIONS SHALL BE 150MM DIAMETER AND TRAPPED UNLESS OTHERWISE SPECIFIED.

D9. ALL FOUL AND RWP CONNECTIONS SHALL BE 100MM DIAMETER UNLESS OTHERWISE SPECIFIED.

D10. ALL PRE-CAST CONCRETE UNITS IN THE DRAINAGE WORKS SHALL BE MANUFACTURED USING SULPHATE RESISTING CEMENT.

D11. BRICK/CORERS AND FRAMES SHALL BE TO BS20124 AND UNITEMARKED.
COVER AND FRAMES SHALL BE HEAVY DUTY D400 IN CARPAGES AND
VEHICULAR AREAS AND MEDIUM DUTY B125 IN FOOTWAYS AND SOFT LANDSCAPING.

D12. REFER TO STRUCTURAL DRAWINGS FOR DETAILS OF MANHOLES AND DRAINS CONSTRUCTED WITHIN FLOOR SLABS AND FOUNDATIONS.

D13. COVER LEVELS ARE TO BE ADJUSTED LOCALLY TO SOFT FINISHED GROUND LEVELS.

D14. HEALTH & SAFETY: THE WORKS SHALL BE CARRIED OUT BY SPECIALIST CONTRACTOR WITH OVERSEAS EXPERIENCE WITH THE URBAN AT-RISK OF COLLAPSE.

COMPLIANT AND EXPERIENCED CONTRACTORS WHO ARE MEMBERS OF A
RECOGNISED NATIONAL ORGANISATION.
OPERATIVES SHALL HAVE RECEIVED FULL AND APPROPRIATE TRAINING FOR THE

D15. PIPES TO BE LAID TO A MINIMUM GRADIENT OF 1:150 UNLESS NOTED OTHERWISE.

EXISTING DRAINAGE KEY.

	EXISTING CEMENTAL NLI.
--	------------------------

EXISTING SANITARY WATER INLET/OUT/DRAINAGE
EXISTING FOUA WATER MANHOLE/ DRAINAGE

DRAINAGE KEY:

——— RAINWATER PIPE (100M/1.50 MIN.) / INSPECTION
 - - - - - CHAMBER

4- - - - - FORWARD OUTLET - REFER DRG. No.

19-3422-551 FOR FORMATE DETAILS.

— — — — —
HYDROBAY FIBER OPTIC CONNECTED TO 110mm
PVC-U PIPE WITH FORGEPAVE TOP HAT SEAL AT
OUTLET TO HYDROBAY.

FORMATIVE POROUS PAVING - REFER TO DRG. No. 19-1472-551 AND ENCLOSED DETAILS



FIG. 12. JYLL-201 FOR SUBMITTAL DETAILS
(AREA = 290m²).

— — — — — PETROL INTERCEPTOR CONDOR NSB1.5/1.

100M PLASTIC PIPE

[illegible]

PRELIMINARY

●

[illegible]

PRELIMINARY		HOL/12.19	HOL/12.19	HOL/12.19
PI		Reviewed by and date	Checked by and date	Approved by and date
Number	Investment			

ORIGINAL DRAWING SIZE - A1	X-REFS: -
CAD REF	-
	-

Cost	D & K
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	Building No.

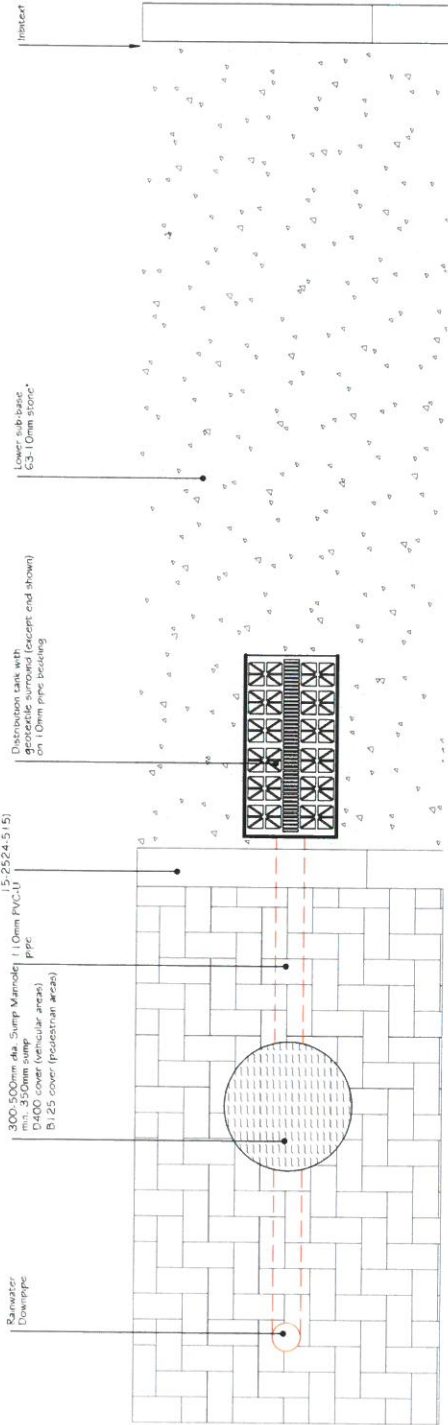
HAMIL DAVIES LIMITED	PAYMENT LAT/OUT	
	Payable	Debit
	PROF BUDGET	Debit

Consulting Civil and Structural Engineers	PHILADELPHIA	Designed	1:25 @ A1
	leading office SEANMORE	leading leader	Service

Telephone	01489 893 596	19-3422-501	P1
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NOTES:

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3. ANY DIMENSIONS/LEVELS INDICATED "M" REFER TO ASSUMED/EXISTING FINISH LEVELS WHICH ARE TO BE SITE CHECKED PRIOR TO THE COMMENCEMENT OF ANY WORK.



NOTES:

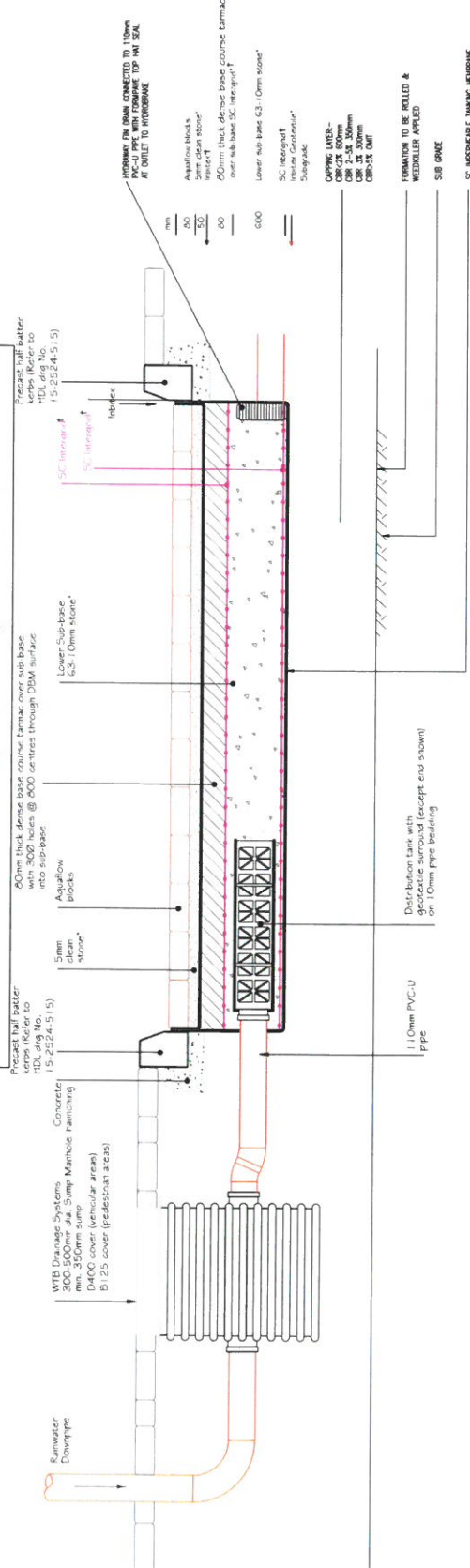
- † Supplied by WTB Geotextiles
- Specification for sub-base and laying course:-
The sub-base shall be laid to the correct level and have a minimum 10% fines and 15% M₂₅ when tested in accordance with BS-6122 Part 4.

Grading of lower sub-base stone

STONE SIZE	% PASSING
100mm	100
63mm	90-100
37.5mm	60-80
20mm	15-30
10mm	0-5

Downpipe drainage into Tanked System - Plan

* Depth of Subbase Material Dependent on Specific Site Percolation Tests



Downpipe drainage into Tanked System - Section

FORMPAVE STORMWATER SOURCE CONTROL SYSTEM

PRELIMINARY

Sheet	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
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Appendix D

Drainage Calculations

NOTES

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3. ANY DIMENSIONS/LEVELS INDICATED "M" REFER TO ASSUMED/EXISTING DIMENSIONS/LEVELS WHICH ARE TO BE CHECKED PRIOR TO THE COMMENCEMENT OF ANY WORK.



HARDSTANDING = 850m²
TOTAL = 850m²



ROOFS = 314m²
HARDSTANDING = 290m²
TOTAL = 604m²



PRELIMINARY

Sheet	Project	Revision	Date	By	Check
P1	PRELIMINARY	1	10/12/19	10/12/19	10/12/19
ORIGINAL DRAWING SIZE - A1					
CAD REF.					

HDL
HAMILTON
DAVIES
LIMITED
Consulting Civil
Engineers

PRELIMINARY
19-3422-911
P1

157 MILTON ROAD, COMPLAIN

IMPERMEABLE AREAS

PRELIMINARY

19-3422-911

P1

PRE-DEVELOPMENT IMPERMEABLE AREAS

POST-DEVELOPMENT IMPERMEABLE AREAS



HAMILL DAVIES LIMITED

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Ivydale, Lower Chase Road, Swanmore,
Hampshire, SO32 2PB
Tel: 01489 893 596 Fax: 01489 890 715
brian.w.hamill@btopenworld.com

Job No. 19-3422		
Sheet no. 1		
Date 11/12/19		
By B.H.	Checked	Reviewed

MasterDrain
HY 10.07

Project 157 Milton Road, Cowplain
Title BREEAM SUR1 calculations for Waterlooville

Data:-

Hydrology (FSR):-
Location = Waterlooville ✓
Long reference = 468110
M5-60 (mm) = 20
r = 0.35
Hyd. area = 7
Hydrograph = Summer

WRAP = 4
Grid reference = SU6810
SAAR (mm/yr) = 800
Soil = 0.47
Hyd. zone = 7
Area = England & Wales

Site values used in design:-

Total site area = 0.0850 ha ✓
Pre-dev area drained = 0.0850 ha
Imperm runoff factor = 98%

Climate change factor = 40% ✓
Post-dev area drained = 0.0664 ha
Perm runoff factor = 20%

URBAN
CHOP
↓
 0.004×1.1
= 0.0044 ha.

Pre-development
Area to soakaways = 0.0000 ha
Perv. area to SUDS = 0.0000 ha
Post-development
Area to soakaways = 0.0000 ha
Perv. area to SUDS = 0.0000 ha

Area to other SUDS = 0.0000 ha
Pre-dev flow to drain = 0.00 l/s

Area to other SUDS = 0.0000 ha ✓
Post-dev flow to drain = 0.48 l/s

Calculations:-

Revised Post-dev Imperm. area = 0.066 ha
Equiv. Post-dev Imperm. area = 0.065 ha
Equiv. Post-dev Perm. area = 0.004 ha
Total Pre-dev equiv. area ha = 0.083 ha
Total Post-dev equiv. area ha = 0.069 ha
100 yr 6 hour mean intensity = 10.98mm/hr

Results:-

Pre-dev peakflow runoff (l/s) (m³/s)										CCF	Final	R.P.
R.P.	15	30	60	120	240	360	480	600	Max			
1	27.1	18.4	12.0	7.4	4.8	3.6	2.9	2.5	27.1	N/A	27.1	1
30	65.9	43.9	27.9	17.3	10.4	7.7	6.2	5.3	65.9	N/A	65.9	30
100	85.4	57.4	36.7	22.7	13.5	10.0	8.0	6.7	85.4	N/A	85.4	100

Post-dev peakflow runoff (l/s)										CCF	Final	R.P.
R.P.	15	30	60	120	240	360	480	600	Max			
1	22.4	15.2	9.9	6.1	4.0	3.0	2.4	2.1	22.4	40	31.4	1
30	54.4	36.2	23.1	14.3	8.6	6.4	5.1	4.3	54.4	40	76.2	30
100	70.5	47.4	30.3	18.7	11.2	8.2	6.6	5.6	70.5	40	98.8	100

100 year 6 hour (x Climate Change Factor) storm gives:-

Pre-dev runoff volume m³ = 54.9m³
Post-dev rainfall volume = 63.4m³
Post-dev volume m³ (excess above SUDS) = 63.4m³
100 yr 6 hour mean intensity = 10.98mm/hr
Pre-dev volume to drain at 0 l/s = 0.0 m³
Post-dev volume to drain at .48 l/s = 10.5 m³
Post-dev storage volume = 52.9m³
Post-dev 5mm imperm volume = 3.3 m³
Post-dev 5mm perm volume = 0.9 m³

$Q_{BAR(rural)} = 0.480 \text{ l/s}$ or 5.644 l/s/ha or 0.000 cumecs - from IoH 124.

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

- 1 in 100 year storm
- 40% climate change
- 100% URBAN CHOP

Area of permeable paving 290m²
Depth of Polaris substrate required

$$= 52.9 / 290 \times 0.33 = 0.55 \text{ m.}$$

Approx 600 mm depth of Polaris SUB BASE



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Job No.	19-3422	
Sheet no.	2	
Date	11/12/19	
By	B.H.	
Checked		
Reviewed		

Project 157 Milton Road, Cowplain

Title BREEAM SUR1 calculations for Waterlooville

Data summary.

Use the data below for the SUR1 form

Site areas:-

Total site area	=	0.0850 ha	;850.0 m ²	[3A]
Pre-development impermeable area	=	0.0850 ha		[3B]
Pre-development permeable area	=	0.0000 ha		
Post-development impermeable area	=	0.0664 ha		[3C]
Post-development permeable area	=	0.0186 ha		

Peak runoff:-

Pre-development 1 year storm (15min)	=	27.1 l/s	[6A]
Pre-development 100 year storm (15min)	=	85.4 l/s	[6C]
Post-development 1 year storm (15min)	=	22.4 l/s	[6B]
Post-development 100 year storm (15min)	=	70.55 l/s	[6D]

Greenfield runoff:-

$Q_{BAR(rural)} = 0.480 \text{ l/s}$ or 5.644 l/s/ha or 0.000 cumecs - from IoH 124.

Climate change factor:-

CCF = 40%

Volumes:-

Pre-development 100 yr/6hr storm	[12A]	=	76.8m ³
Post-development 100 yr/6hr storm (add. volume with no SUDS)	[12B]	=	63.4m ³
Post-development 100 yr/6hr storm (add. volume with SUDS)		=	63.4m ³
Post-development add. predicted volume (No SUDS)	[12C]	=	-13.4m ³

You may also require

Data relating to the infiltration test calculations (if applicable)
Evidence to show runoff reduction (if applicable)
Information on calculation methods (if applicable see next sheet)

Note

Numbers in square brackets relate to the
Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1



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Job No.	19-3422		
Sheet no.	3		
Date	11/12/19		
By	B.H.	Checked	Reviewed

Project 157 Milton Road, Cowplain

Title BREEAM SUR1 calculations for Waterlooville

Definitions and methods

Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

Site values and factors

Areas of the site should be entered in hectares (10000 m²). If the Pre-development site is a green field, this box is blank.

Climate Change Factor is initially set at 20% - this may be changed as required.

Greenfield runoff is calculated using the method described in LoH 124.

Runoff factors

The impermeable runoff factor is initially set at 98%

The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development

The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.

All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff.

These are then summated.

This gives a total pre-development equivalent area, and a similar figure for the post-development area.

The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.

The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.

The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as l/s. Figures in red indicate m³/s

The peak value is measured, multiplied by the CCF and the total maximum rate is shown.

The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.

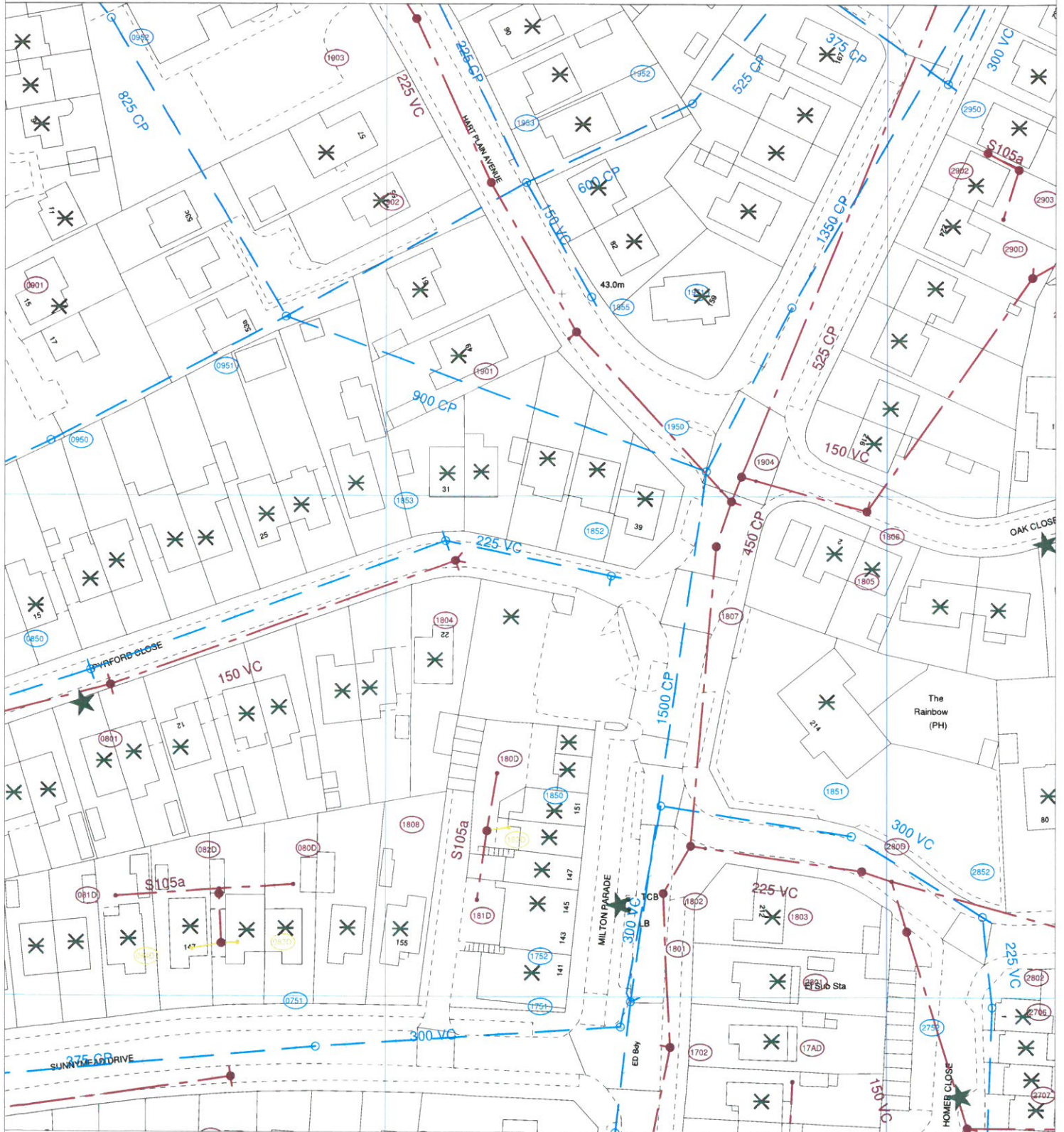
Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS.

Qbar(rural) is calculated in accordance with the procedure laid down in LoH 124

Appendix E

Southern Water Sewer Records

SOUTHERN WATER



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 determined on site.

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530

O.S. REF: SU6810NW

Scale: 1:1000

Screen Print

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (LINK) materials may include Bonded Asbestos Cement



Printed By: banuh

Date: 28-5-2019

Southern Water MapGuide Browser

Requested By:



Appendix F

HCC Flood & Water Management Template

Hampshire County Council's Flood and Water Management Team have created this template
In order for the team to be able to act as a statutory consultee for surface water drainage for
This check list is designed to help developers provide the correct information and

FOR ALL APPLICATIONS WE ARE ASKED TO COMMENT ON WE WILL THIS FORM AND SUBMIT WITH ANY SURFA

	Information required:
1	Background information on the proposed design. Including proposal; site; plans of surface water drainage and any SuDS featured in the scheme
2	Evidence that the applicant understands the sensitivity of discharge points relating to the receiving water body. Where this is main river or discharging through contaminated land the LPA may have to consult the Environment Agency (EA)
3	Evidence of and information on the existing surface water flow paths of undeveloped (greenfield) sites
4	Evidence of and information on the existing drainage network for previously developed (brownfield) sites
5	Identification of and information on areas that may have been affected by failures in the existing drainage regime
6	Evidence that the proposed drainage will follow the same pattern as the existing . This avoids directing flow to other locations.
7	Information evidencing that the correct level of water treatment exists in the system in accordance with the Ciria SuDS Manual C753
8	Where infiltration is used for drainage , evidence that a suitable number of infiltration tests have been completed. These need to be across the whole site; within different geologies and to a similar depth to the proposed infiltration devices. Tests must be completed according to the BRE 365 method or another recognised method including British Standard BS 5930: 2015
9	If not using infiltration for drainage - Existing and proposed run-off rate calculations completed according to a suitable method such as IH124 or FEH. Information is available from UK Sustainable Drainage: Guidance and Tools. Calculations must show that the proposed run off rates do not exceed the existing run-off rates. This must be shown for a one in one year event plus climate change and a one in one hundred year event plus climate change.
10	If not using infiltration for drainage - Existing and proposed run-off volume calculations completed according to a suitable method such as IH124 or FEH. Calculations must show that, where reasonably practical, runoff volume should not exceed the greenfield runoff volume for the same event. This must be shown for a 1 in 100 year, 6 hour rainfall event
11	Evidence that enough storage/attenuation has been provided without increasing the runoff rate or volume. This must be shown for a 1 in 100 year plus climate change event
12	Evidence that runoff exceeding design criteria has been considered . Calculations and exceedance flow diagram/plans must show where above ground flooding might occur and where this would pool and flow.

13	Maintenance regimes of entire surface water drainage system including individual SuDS features, including a plan illustrating the organisation responsible for each element. Evidence that those responsible/adopting bodies are in discussion with the developer. For larger/phased sites, we need to see evidence of measures taken to protect and ensure continued operation of drainage features during construction.
14	Evidence that Urban Creep has been considered in the application and that a 10% increase in impermeable area has been used in calculations to account for this.
15	Did you take advantage of Hampshire County Council's Pre-Application advice service (details below)? If so, please insert your pre-application reference number here.

SuDS Manual

[http://www.ciria.org/Memberships/The SuDs Manual C753 Chapters.aspx](http://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx)

Guidance for Climate Change percentages

[http://www.susdrain.org/files/resources/briefings/1610 briefing climate change briefing note.pdf](http://www.susdrain.org/files/resources/briefings/1610_briefing_climate_change_briefing_note.pdf)

British Standard for Infiltration tests BS 5930: 2015

<http://hantsfilewebservices.it2000.hants.gov.uk/linkviewer/LinkViewer.aspx?PIDv1=90%203%20ICM8%20ICM>

HCC's Pre-application Service

<http://documents.hants.gov.uk/flood-water-management/Surfacewaterandpre-applicationguide-Nov2015.pdf>

UK Sustainable Drainage: Guidance and Tools

<http://www.uksuds.com/>



Hampshire
County Council