Horsham District Council
Parkside
Chart Way
Horsham
West Sussex
RH12 IRL

Date: 13 May 2024
Your Ref: DC/23/0306
Our Ref: NA/3983/2024_001_r0
Email: natasha@herringtonconsulting.co.uk

Discharge of Condition 3 for the proposed development at Sluetts Farm Buildings, Two Mile Ash, Horsham, West Sussex

This letter has been prepared with reference to planning application reference DC/23/0306 and is aimed at discharging planning condition 3 (herein referred to as 'Condition 3') for the proposed development at the above address. Condition 3 relates to the safe management of surface water runoff through the use of Sustainable Drainage Systems (SuDS) and in addition, requires a strategy to manage the foul drainage.

The proposed development comprises the erection of a temporary agricultural workers dwelling.

The details of Condition 3 are quoted below:

Planning Condition 3

"No development shall commence until a drainage strategy detailing the proposed means of foul and surface water disposal has been submitted to and approved in writing by the Local Planning Authority. The development shall be carried out in accordance with the approved scheme.

Reason: As this matter is fundamental to ensure that the development is properly drained and to comply with Policy 38 of the Horsham District Planning Framework (2015)."

National Policy for SuDS

In accordance with the National Planning Policy Framework (NPPF, 2023), SuDS should be included within the proposed development scheme where it is practicable to do so. The proposed development must also maintain, or ideally reduce, the rate at which runoff is discharged offsite. This is to ensure that the offsite risk of surface water flooding is not increased by the development.

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Furthermore, the suitability of incorporating SuDS into the proposed development has been explored in accordance with Policy 38 of the Horsham District Planning Framework (2015).

Climate Change

The NPPF and supporting Planning Practice Guidance Suite (2022) state that residential development should be considered for a minimum of 100 years, but that the lifetime of a non-residential development depends on the characteristics of the development The development that is the subject of this assessment is classified as residential, and therefore a design life of 100 years has been assumed.

The Environment Agency (EA) provides guidance regarding the application of the climate change allowances relating to peak rainfall intensity and how they should be applied to the planning process. Recognising that the impact of climate change will vary across the UK, the allowances were updated in May 2022 to show the anticipated changes to peak rainfall across a series of management catchments. The proposed development site is located in the Arun and Western Streams Management Catchment, as defined by the 'Peak Rainfall Allowance' maps, hosted by the Department for Environment, Food and Rural Affairs.

For this development, an increase of 45% has been applied to the hydraulic drainage model constructed to inform the drainage strategy. Where this allowance has been applied the abbreviation "+45%cc" has been used.

Existing Site Drainage

The existing site drainage has not been surveyed, however correspondence with the applicant has confirmed that surface water runoff from the existing site and the surrounding farm buildings, drains to the pond located to the east of the site.

While the site does contain areas of existing hardstanding, the existing drainage for these areas is proposed to be maintained. Therefore, to quantify the runoff rates for the parts of the site to be developed, the greenfield runoff rates have been calculated using the FEH (Flood Estimation Handbook) methodology. The results are summarised in Table 1 below.

Return Period (years)	Existing Greenfield Runoff Rates (l/s)
QBar	0.022
30	0.052
100	0.072

Table 1 – Summary of greenfield peak runoff rates for the site.

Southern Water (SW) has provided sewer mapping as part of their asset location data for the site and surrounding area. An extract from this mapping, showing the location of public sewers in proximity to the site, is shown in Figure 1 below. A full-scale copy of this plan can be found within the enclosed documents.

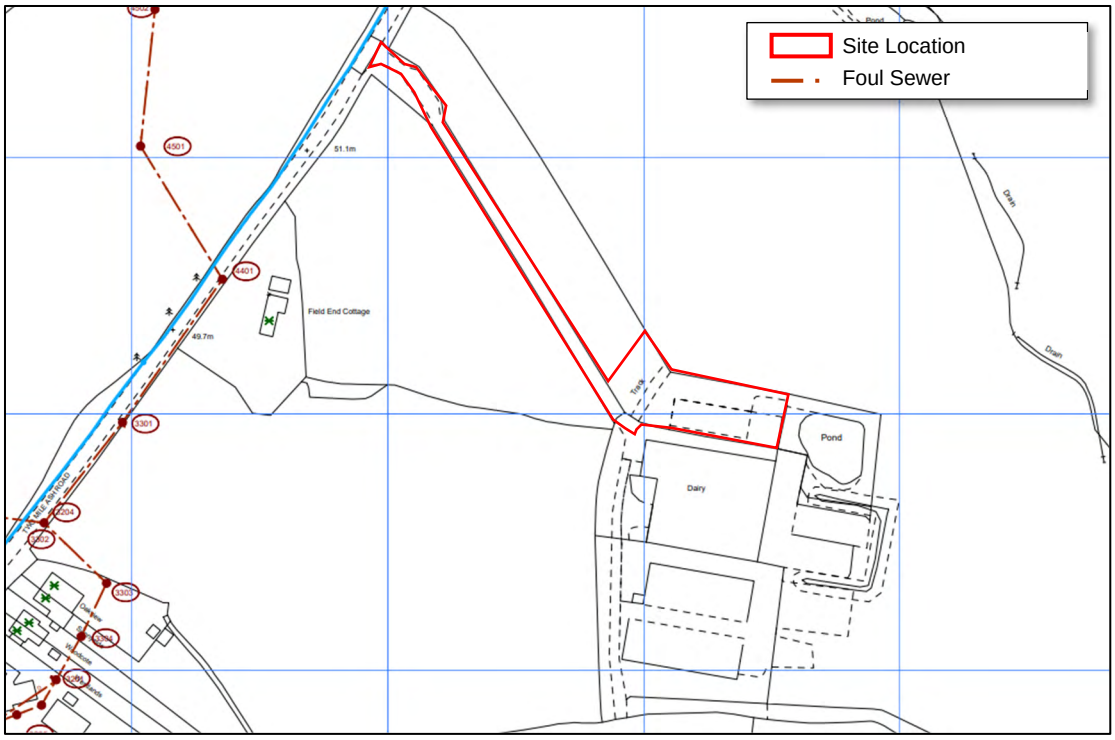


Figure 1 – Extract from SW asset location mapping for the area around Two Mile Ash Road.

As the impermeable area within the site boundary will increase under the development proposals, it will be necessary to provide mitigation measures to ensure that the rate at which runoff is discharged from the site is not increased. As a consequence, it is recommended that SuDS are incorporated into the scheme to manage surface water runoff and to replicate greenfield behaviour.

Drainage Hierarchy and Opportunities for Managing Surface Water Runoff

The following opportunities for managing the surface water runoff discharged from the development site are listed in order of preference:

Infiltration – Reference to the mapping hosted by the British Geological Survey (BGS) indicates that the site is located within an area that consists of both Weald Clay Formation (mudstone) and Horsham Stone Member (sandstone) bedrock. Figure 2 below delineates the bedrock types across the site. There are no superficial deposits overlying this.

While the Horsham Stone Member could provide sufficient infiltration rates to support the use of infiltration SuDS, there is insufficient space in this part of the site to comply with Building Regulations that require a 5m easement from any infiltration features to any structures. Conversely, the areas of the site where there may be sufficient space to accommodate infiltration SuDS, are located within the Weald Clay Formation where soakage rates are typically low, and the use of infiltration SuDS is not considered viable. Taking the above into consideration, the use of infiltration SuDS to manage surface water runoff is not considered a viable option for the proposed development.

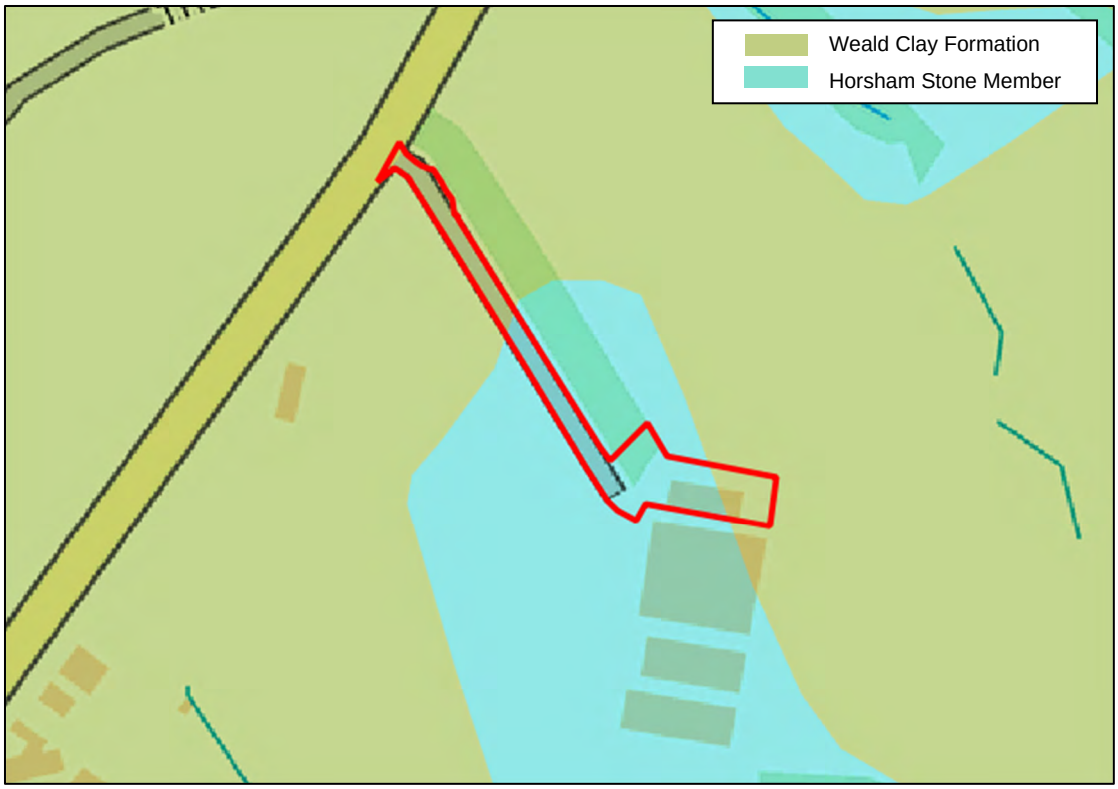


Figure 2 – Bedrock geology at the site location (© British Geological Survey, mapping contains Ordnance Survey Data © Crown copyright and database right 2024).

Discharge to Watercourses – Correspondence with the applicant has confirmed that there is an existing drainage ditch located to the west of the access road. A connection to this ditch is therefore considered to be the most viable option for discharging surface water runoff from the site.

Discharge to Public Sewer System – The remaining solution for draining surface water runoff from the proposed development is to a public sewer system. There are no surface water sewers located in proximity to the site and there is a more viable option available (watercourse). On this basis, discharge to the public sewer network is considered unsuitable.

Constraints and Further Considerations

The key constraints that are relevant to this development are listed below:

- There is limited open space to incorporate SuDS that require very large areas of land, such as wetlands and large infiltration basins.
- Due to the assumed poor infiltration rate, it will not be possible to reduce or maintain the volume of surface water runoff discharged from the development site.
- Ideally, post-development runoff rates should be restricted to greenfield runoff rates. However, on small sites where discharge rates are exceptionally low (less than 2.0 l/s) higher rates are generally considered acceptable, due to the technical limitations of flow control devices. In this case, a limiting discharge rate of 2.0 l/s is likely to be acceptable by the LPA.

- As part of the development, some existing structures will be retained and there may be limited opportunity to include SuDS within the existing buildings. Retrofitting SuDS into the retained parts of the development may present an unsustainable or unattainable situation, if a large part of the existing drainage onsite remains unchanged.

Proposed Surface Water Drainage System

A drainage layout plan has been included within the enclosed documents, along with supporting calculations to demonstrate how the objectives set out in Condition 3 can be achieved. The following SuDS have been proposed:

Rainwater Harvesting System – It is acknowledged that a rainwater harvesting (RWH) system is proposed to collect runoff from the existing hay barn. The collected runoff is to be used on the wider site, for animal drinking and wash down only. The proposed system will provide a significant volume of storage for stormwater that is not currently provided on site. As the barn currently discharges runoff to the pond, it is assumed that the system will maintain the existing overflow to this pond to the east of the site. As such, any overflow from the proposed RWH system has been excluded from this analysis as this is assumed to maintain the existing connection to the pond.

Geo-cellular storage tank – Surface water runoff discharged from the proposed temporary accommodation will be discharged via underground pipes to a geo-cellular storage tank located adjacent to the proposed building. Runoff will subsequently be discharged to a drainage ditch located adjacent to the access road. The rate at which runoff is discharged to the ditch will be restricted to a rate no greater than 0.9 l/s through the use of an orifice plate. In the event that the flow control device was to fail or become blocked, an overflow pipe has been specified to direct runoff directly from the top of the geo-cellular storage tank to the ditch.

The design parameters for the geo-cellular storage tank are summarised in Table 2 below.

Parameter	Design (1:100yr+45%cc event)
SuDS	Geo-cellular storage tank
Total area draining to tank, including a 10% allowance for urban creep	~38 m^2
Infiltration	Assumed unavailable based on typical characteristics of underlying geology
Area	1.5 m^2
Depth	400 mm
Porosity	95 %
Flow control device	26 mm orifice plate at invert level
Limiting discharge rate	0.9 l/s
Overflow device	Pipe *Connects from the top of the tank, directly to the outfall*

Table 2 – Summary of the proposed drainage system for the design event (1:100 +45%cc).

Surface Water Runoff Calculations

The results of the hydraulic drainage model are provided, alongside a drainage layout plan to demonstrate how the objectives set out in planning condition 3 can be achieved.

The performance of the proposed drainage system has been tested by applying a series of rainfall events with varying return periods. The calculations have been summarised in Table 3 below.

Return Period	Proposed discharge rate
1 in 2yr	0.4 l/s
1 in 30yr	0.6 l/s
1 in 100yr	0.7 l/s
1 in 100yr+45%cc	0.9 l/s

Table 3 – Summary of proposed discharge rates, up to and including, 1:100+ 45%cc events.

From Table 3 it is evident that with the inclusion of the proposed SuDS, there is potential to accommodate all of the surface water runoff from the site, up to and including, the design rainfall event. The rate at which surface water runoff is discharged from the proposed development will be restricted to a rate no greater than 0.9 l/s. Consequently, it is considered that this will be acceptable to the Local Planning Authority (LPA).

Indicative Drainage Layout Plan

Figure 3 below is an indicative drainage layout plan delineating how the proposed SuDS can be incorporated into the scheme proposals.

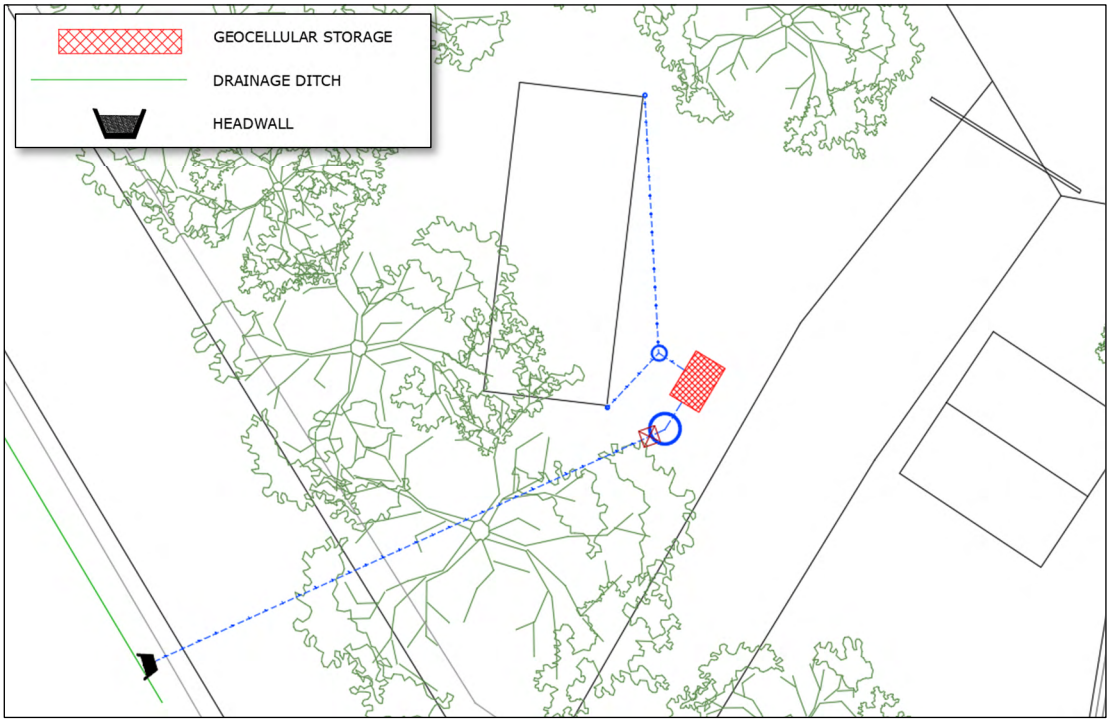


Figure 3 – Indicative drainage layout plan showing the proposed location of SuDS.

Design Exceedance

The proposed drainage system has been designed to accommodate surface water runoff generated under an extreme rainfall event, with a return period of 1 in 100 years, including a 45% increase in peak rainfall intensity (to account for the impacts of climate change). As such, this additional percentage increase complies with the EA's most contemporary guidance on climate change for the upper allowances.

If a rainfall event which exceeds the design parameters or a blockage in the drainage network was to occur, water is likely to overflow from the proposed SuDS and follow the topography of the surrounding area. As such, any water overflowing is likely to flow unattenuated to the drainage ditch to the west.

To minimise the risk of the uncontrolled discharge of floodwater from the geo-cellular storage tank, an overflow pipe has been incorporated into the design of this drainage feature. If the primary flow control device becomes blocked, this pipe will be used to bypass the flow control device, allowing excess water to drain directly to the ditch.

Furthermore, it is recognised that the drainage proposals will incorporate a significant volume of additional storage for storm water, which is not currently provided on the existing site. As a result, when compared to the existing site, it is likely that the volume of water discharged from the site during an extreme rainfall will be reduced, thus minimising the potential impact of flooding to the surrounding area.

In summary, with the inclusion of the SuDS discussed within this strategy, the proposed surface water drainage solution will not increase the risk of flooding at the site, or within the surrounding area, during an exceedance event and is, therefore, considered appropriate.

Maintenance and Management

General maintenance schedules have been produced for the proposed SuDS systems and have been included within the enclosed documents of this report. For developments such as this, that to some extent rely on the ongoing inspection and maintenance of SuDS, it will be necessary to ensure that measures are in place to maintain the system for the lifetime of the development.

For this site, the owner will be responsible for the inspection and maintenance for the site. It should, however, be noted that it may be necessary to involve specialist contractors to undertake specific maintenance tasks that are required.

Management of Foul Water

In general, there are two methods for draining effluent from proposed developments. The preferred solution is a connection to the public sewer network, which is controlled by the sewerage undertaker. Nonetheless, if there are no sewers located near to the development site, or if there are particular reasons why a connection to the public sewer system would not be possible, e.g. topography, cost, environmental concerns etc., then the use of package treatment systems or cesspits will be permitted.

In this case, correspondence with the applicant has confirmed that the wider site has an existing connection to the public foul sewer network located in Two Mile Ash Road. Figure 1 above shows the location of the public foul sewer within Two Mile Ash Road in relation to the development site.

It is therefore proposed that the development proposals will discharge foul water via a new connection into the existing discharge for the wider site. To convey foul water from the proposed temporary accommodation to the existing foul sewer, it is proposed to include a Type 1 pumping station. It is envisaged that a Klargester AquaPump, or similar, will be suitable to manage the foul loads, and will provide sufficient emergency capacity in the event of a power failure to store foul water for a period of up to 24 hours. Taking the above into consideration, discharging to the existing foul sewer network via a pumping station is considered to present the most viable solution for draining foul water from the site, an indicative layout is shown in Figure 4 below.

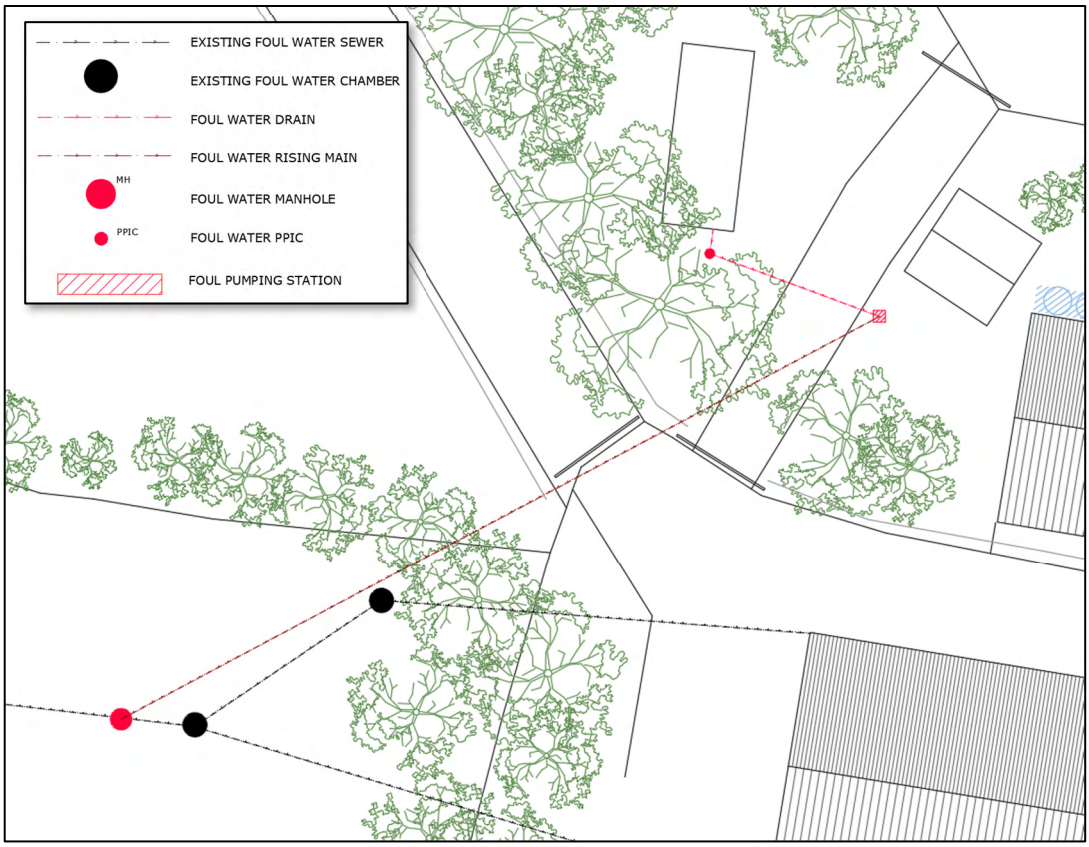


Figure 4 – Proposed connection to the existing foul sewer network.

The enclosed drainage layout plan provides an indicative foul drainage route to connect into the existing sewer. In accordance with the Design and Construction Guidance (DCG), the design peak flow rate for foul water discharged from the proposed development has been calculated to be 0.05 l/s.

It is recommended that a sewer capacity check is undertaken at the detailed design stage to allow the sewerage undertaker to confirm whether there is sufficient capacity within the existing public foul sewer and to confirm whether the proposed increase in the discharge rate from the new development is acceptable.

Summary

The opportunities for draining surface water runoff and foul effluent from the proposed development at Sluetts Farm, Horsham have been assessed, with the aim of discharging Condition 3. The analysis has shown that discharging surface water runoff at an attenuated rate from the proposed development to an existing ditch adjacent to the access road will present the most viable and sustainable solution for draining the site.

The proposed drainage system is designed to intercept surface water runoff from the roof of the proposed buildings, before directing water into a geo-cellular storage tank. In order to restrict the rate of discharge from the development, a flow control device is proposed, which has been specified to reduce the rate at which surface water runoff is discharged offsite (to better replicate the existing greenfield situation).

The calculations provided within this report clearly demonstrate that the rate of runoff under an extreme pluvial event, with a 1 in 100 year return period, including a 45% allowance for climate change, can be restricted to meet the requirements of the LPA.

A maintenance schedule for various SuDS is enclosed and provides details on how the owner can maintain the drainage system, to ensure continued operation for the lifetime of the development.

The opportunities for disposing of foul effluent from the site has also been considered and the appraisal demonstrates that the most viable solution is to connect via a Type 1 pumping station into the existing foul sewer, which discharges to the public foul sewer network in Two Mile Ash Road.

The information contained within this document provides details to demonstrate how surface water runoff and foul effluent will be managed on site and I trust that this information will be sufficient to enable Condition 3 to be discharged in full.

Yours faithfully,

Natasha Ames BA (Hons) MA GradCIWEM
Environmental Analyst (Water)

Enclosed documents:

- SW Asset Location Data
- Indicative Drainage Layout Plans
- Surface Water Management Calculations
- SuDS Maintenance Schedule

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.

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Southern Water

O.S. REF: TQ1528SE	Scale: 1:2500	Printed By: BoregoS	Date: 28-3-2023
Screen Print		Southern Water MapGuide Browser	
WARNING: BAC pipes are constructed of Bonded Asbestos Cement		Requested By:	
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement			

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KEY:

- SURFACE WATER DRAIN
- MH — SURFACE WATER MANHOLE
- PPIC — SURFACE WATER PPIC
- RWP — RAINWATER PIPE
- FLOW CONTROL DEVICE
- GEOCELLULAR STORAGE
- DRAINAGE DITCH
- HEADWALL

RWP

PPIC

RWP

MH

GEO-CELLULAR STORAGE TANK
AREA: 1.5 m²
DEPTH: 400 mm
POROSITY: 0.95

FLOW CONTROL CHAMBER
26mm ORIFICE
DISCHARGE RATES
1:2YR = 0.4 l/s
1:30YR = 0.6 l/s
1:100YR + 45%cc = 0.9 l/s

PROPOSED CONNECTION TO EXISTING DRAINAGE DITCH

HAY BA

SCALE 1 : 100 @ A1

1 m 0 10 m

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Rev	Description	Author	Checked	Date
P0	First issue	NA	EC	07/05/24

CLIENT: CHRIST'S HOSPITAL FOUNDATION

PROJECT: SLUETTS FARM, HORSHAM

SCALE	PROJ REF	ORIGINATOR	CHECKED BY
1:100	3983	NA	EC

HC DWG REF: 3983_DWG_r0

DWG TITLE: INDICATIVE SURFACE WATER DRAINAGE LAYOUT

DWG No.: HC-3983-501

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KEY:

- EXISTING FOUL WATER SEWER
- EXISTING FOUL WATER CHAMBER
- FOUL WATER DRAIN
- FOUL WATER RISING MAIN
- MH — FOUL WATER MANHOLE
- PPIC — FOUL WATER PPIC
- FOUL PUMPING STATION

PPIC

INDICATIVE LOCATION OF PROPOSED TYPE 1 FOUL PUMPING STATION (KLARGESTER AQUAPUMP, OR SIMILAR)

FOUL WATER RISING MAIN

MH

PROPOSED CONNECTION TO EXISTING FOUL WATER SEWER THAT SERVES THE WIDER SITE

DAIRY

SCALE 1 : 100 @ A1

1 m 0 10 m

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Rev	Description	Author	Checked	Date
P0	First issue	NA	EC	07/05/24

CLIENT: CHRIST'S HOSPITAL FOUNDATION

PROJECT: SLUETTS FARM, HORSHAM

SCALE	PROJ REF	ORIGINATOR	CHECKED BY
1:100	3983	NA	EC

HC DWG REF: 3983_DWG_r0

DWG TITLE: INDICATIVE FOUL WATER DRAINAGE LAYOUT

DWG No.: HC-3983-601

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Natasha Ames
Site name:	Sluetts Farm
Site location:	Horsham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.04342° N
Longitude:	0.35242° W
Reference:	1721785084
Date:	May 07 2024 09:28

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.265
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	777	776
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):		7.54
1 in 1 year (l/s):		6.41
1 in 30 years (l/s):		17.34
1 in 100 year (l/s):		24.05
1 in 200 years (l/s):		28.19

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	0.350
Return Period (years)	100	Maximum Rainfall (mm/hr)	200.0	Include Intermediate Ground	✓
Additional Flow (%)	45	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Inverts		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
TANK	0.003	4.00	56.000		5.018	3.259	1.000
MH			56.000		7.014	3.191	1.034
OUTFALL			55.800	600	22.049	3.184	1.087

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	TANK	MH	1.997	0.600	55.000	54.966	0.034	58.7	100	4.03	169.0
1.001	MH	OUTFALL	15.035	0.600	54.966	54.713	0.253	59.4	100	4.28	169.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.007	7.9	2.7	0.900	0.934	0.003	0.0	40	0.911
1.001	1.001	7.9	2.7	0.934	0.987	0.003	0.0	40	0.906

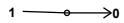
Flow+ v10.8 Copyright © 1988-2024 Causeway Technologies Ltd

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	1.997	58.7	100	Circular	56.000	55.000	0.900	56.000	54.966	0.934
1.001	15.035	59.4	100	Circular	56.000	54.966	0.934	55.800	54.713	0.987

Link	US Node	Node Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	TANK	Junction	MH		Junction	
1.001	MH	Junction	OUTFALL	600	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
TANK	5.018	3.259	56.000	1.000		Junction						
								0	1.000	55.000	100	Circular
MH	7.014	3.191	56.000	1.034		Junction		1	1.000	54.966	100	Circular
												
								0	1.001	54.966	100	Circular
OUTFALL	22.049	3.184	55.800	1.087	600	Manhole	Adoptable	1	1.001	54.713	100	Circular
												

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	10080	Check Discharge Volume	x

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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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	10	0	100	0	10	0
30	0	10	0	100	45	10	0

Node MH Online Orifice Control

Flap Valve	✓	Invert Level (m)	54.966	Design Flow (l/s)	1.5	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Depth (m)	1.050	Diameter (m)	0.026		

Node TANK Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Pit Width (m)	1.000	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	55.000	Pit Length (m)	1.500	Number Required	1
Safety Factor	2.0	Time to half empty (mins)	14	Depth (m)	0.400		

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Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	TANK	12	55.040	0.040	0.7	0.0571	0.0000	OK
15 minute summer	MH	13	55.045	0.079	0.9	0.0000	0.0000	OK
15 minute summer	OUTFALL	1	54.713	0.000	0.4	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 summer	TANK	1.000	MH	0.9	0.440	0.117	0.0085	
15 minute summer	MH	Orifice	OUTFALL	0.4				0.3

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Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	TANK	21	55.158	0.158	2.1	0.2251	0.0000	SURCHARGED
30 minute summer	MH	21	55.158	0.192	1.6	0.0000	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	54.713	0.000	0.6	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)
30 minute summer	TANK	1.000	MH	1.6	0.498	0.204	0.0156	
30 minute summer	MH	Orifice	OUTFALL	0.6				0.9

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Results for 100 year +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	TANK	22	55.216	0.216	2.0	0.3081	0.0000	SURCHARGED
30 minute summer	MH	22	55.216	0.250	2.5	0.0000	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	54.713	0.000	0.7	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)
30 minute summer	TANK	1.000	MH	2.5	0.522	0.319	0.0156	
30 minute summer	MH	Orifice	OUTFALL	0.7				1.2

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Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	TANK	22	55.351	0.351	2.9	0.5000	0.0000	SURCHARGED
30 minute summer	MH	22	55.351	0.385	1.9	0.0000	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	54.713	0.000	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)
30 minute summer	TANK	1.000	MH	1.9	0.526	0.243	0.0156	
30 minute summer	MH	Orifice	OUTFALL	0.9				1.7

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Operation and Maintenance Schedule – Geo-Cellular Storage System		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
	Remove debris and sediment from the catchment surface, wherever is presents a risk to the performance of the drainage system,	Monthly, or as required based on inspection frequencies.
	Remove sediment from pre-treatment structurers (e.g. sediment traps) and from internal forebays	Annually or as required based on inspection frequencies
Remedial Actions	Repair; inlets, outlets, overflow pipes, and vent mechanisms	As required, based on inspections
	Replace tank or geotextile if significant damage is observed or geotextile is torn.	As required
Monitoring	Inspect and check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed.	Following installation, and annually hereafter
	Survey inside of tank, and at any sediment trap mechanisms, for sediment build-up and remove sediment if necessary. Use inspections to develop a regular maintenance and inspection procedure for sediment removal.	Every 5 years, or as required if inspections show high siltation rates.

General Operation and Maintenance Table for Geo-Cellular Storage Systems