Technical Note

Project:	Anyards Road, Cobham	SMA Ref:	7073/TN01
Subject:	Response to LLFA comments	Revision:	01
Prepared by:	E Lebbon	Date:	10/01/2024
Checked by:	J O'Kelly	Date:	15/01/2024

1.0 INTRODUCTION

1.1. This Technical Note (TN) has been undertaken by Stuart Michael Associates (SMA) on behalf of Shanly Homes to support the full planning application of 26 residential units at Anyards Road, Cobham.

1.2. Comments were provided by the Lead Local Flood Authority (LLFA) on 19th December 2023 in objection to the proposals on the application *2023/2889*. The comments are included as **Appendix A.**

2.0 RESPONSE TO COMMENTS

1. Insufficient information has been provided and significant issues have been identified, to overcome this, the following changes and information are required:

a) The application site proposes 26 residential dwellings and therefore is classified as 'Major Development'. Any planning application classified as Major Development will need to include a detailed drainage strategy. As per the NPPF, all 'major' planning applications being determined must include full details about surface water drainage and sustainable drainage systems, which is a material consideration.

b) Paragraph 169 of NPPF states 'Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits.'

c) A combined surface water discharge rate of 6 litres/sec is proposed from the application site and is not considered a practicable minimum discharge rate. Many low flow control devices are available on the market to enable very low discharge rates to be achieved. We do not have a minimum acceptable discharge rate, each application is assessed on a site-by-site basis, taking into consideration self-cleansing velocity, space for attenuation, outfall level and blockage risk etc. Supporting evidence must be submitted justify the discharge rate proposed.

2.1. The drainage strategy has been updated to incorporate further detailed information and an increased use of SuDS features across the proposed redevelopment.

2.2. It is considered that sufficient SuDS were proposed for the access roads and parking areas, incorporating porous paving and bio-retention where feasible. Further localised SuDS have been proposed in the form of rain water pipe planters on communal buildings where a management company will help to ensure their performance through maintenance. Water butts have been proposed at the rear of all single dwellings for rainwater harvesting purposes.

2.3. Since the Flood Risk Assessment and Drainage Strategy was submitted, Thames Water has provided a response stating that they would not accept 6l/s discharge of surface water from the

site but would accept a combined discharge of 1l/s. This Thames Water letter is included as **Appendix B**.

2.4. The drainage strategy has therefore been updated to a combined discharge of 1l/s. To achieve this, both access roads are now proposed as porous construction. The use of Hydrobrake flow controls allow the western and southern outfalls from the development to discharge at 0.1l/s and 0.9l/s respectively.

2.5. The updated Drainage Strategy drawing is included as **Appendix C.**

2.6. The updated surface water calculations are included as **Appendix D**, showing that all surface water runoff can be contained within the SuDS system for all storm events up to and including the 1 in 100 year plus climate change event.

3. In accordance with Technical Standard S3: 'For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.' No evidence has been provided which confirms how the Technical Standard has been met. Predevelopment Greenfield-run-off rates have not been established.

2.7. The pre-development greenfield runoff-rates from the Site have been calculated and are presented below in **Table 1** and are included as **Appendix E**.

Table 1: Pre-development greenfield runoff-rates

Return Period 1 in X year	**Greenfield Discharge Rate (l/s)**
1	1.74
QBAR	2.04
30	4.7
100	6.52

2.8. **Table 2** below shows the actual post-development discharge rates compared with pre-development greenfield runoff rates.

Table 2: Pre-development and post-development Runoff Rates

Return Period 1 in X year	**Greenfield Runoff Rate (l/s)**	**Post-development Runoff Rates (l/s)**
1	1.74	-
2	N/A	0.8
QBAR	2.04	-
30	4.7	0.8
100	6.52	0.9
100+CC	N/A	1.0

2.9. **Table 2** shows that post-development rates provide a betterment to the greenfield runoff rates, with all storm events restricted to less than the 1 year event, and are in accordance with the outflow requirements requested by Thames Water.

4. The development offers the opportunity to utilise a range of sustainable surface water management techniques which not only contribute to a reduction in discharge rates from the site, but provide amenity, biodiversity and water quality improvements and contribute to mitigating climate change by considering both drought and flood conditions. Justification should be provided as to why SuDS features such as; downpipe planters, attenuating tree pits, raingardens etc have not been utilised.

2.10. Further localised SuDS have been proposed in the form of rain water pipe planters on communal buildings where a management company will help to ensure their performance through maintenance. Water butts have been proposed at the rear of all single dwellings for rainwater harvesting purposes and can be seen on the enclosed Drainage Strategy drawing.

Appendix A

LLFA Comments

Case Officer: Mike Burch
E-mail: SUDS@surreycc.gov.uk

Recommendation (mark one with X)

Further/amended information required	
No objection	
No objection – Subject to conditions	
Objection	**X**

SURREY COUNTY COUNCIL

Flood Risk, Planning, and
Consenting Team
Whitebeam Lodge
Merrow Lane
Guildford
Surrey
GU4 7BQ

Our ref: **LLFA-EL-23-1636**
Your ref: **2023/2889**
Date: **19/12/2023**

Dear Planning Authority,

Land Off Anyards Road and Copse Road Cobham Surrey KT11 2LH

Thank you for consulting Surrey County Council (SCC) as the Lead Local Flood Authority (LLFA) on the above Full Planning Application. We have reviewed the surface water drainage strategy for the proposed development and assessed it against the requirements of the NPPF, its accompanying PPG and the Non-Statutory Technical Standards for sustainable drainage systems.

As part of our statutory consultee role our advice relates to surface water flood risk and surface water drainage only, the Environment Agency should be contacted for advice in relation to fluvial flood risk.

Consultation request date: 08/12/2023
The following documents submitted as part of the above application have been reviewed and should be referred to as part of any future submissions:

- Flood Risk Assessment and Drainage Strategy, Stuart Michael Associates, October 2023, revision 01, document reference: 7073.FRA;

We object to the proposed development. The proposed surface water drainage scheme does not meet the requirements set out in the NPPF, its accompanying PPG and the Non-Statutory Technical Standards for sustainable drainage systems.
Insufficient information has been provided and significant issues have been identified, to overcome this, the following changes and information are required:

The application site proposes 26 residential dwellings and therefore is classified as 'Major' Development. Any planning application classified as Major Development will need to include a detailed drainage strategy. As per the NPPF, all 'major' planning applications being determined must include full details about surface water drainage and sustainable drainage systems, which is a material consideration.

Paragraph 169 of NPPF states '*Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

a) take account of advice from the lead local flood authority;
b) have appropriate proposed minimum operational standards;

c) *have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
d) *where possible, provide multifunctional benefits'.*

A combined surface water discharge rate of **6 litres/sec** is proposed from the application site and is not considered a practicable minimum discharge rate. Many low flow control devices are available on the market to enable very low discharge rates to be achieved. We do not have a minimum acceptable discharge rate, each application is assessed on a site-by-site basis, taking into consideration self-cleansing velocity, space for attenuation, outfall level and blockage risk etc. Supporting evidence must be submitted justify the discharge rate proposed.

In accordance with **Technical Standard S3**:
'For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.'
No evidence has been provided which confirms how the Technical Standard has been met. Predevelopment Greenfield run-off rates have not been established.

The development offers the opportunity to utilise a range of sustainable surface water management techniques which not only contribute to a reduction in discharge rates from the site, but provide amenity, biodiversity and water quality improvements and contribute to mitigating climate change by considering both drought and flood conditions. Justification should be provided as to why SuDS features such as; downpipe planters, attenuating tree pits, raingardens etc have not been utilised.

Should the Applicant wish to discuss our concerns in more detail we provide a pre-application advice service, details of which are available on our website:

Planning Advice - Sustainable Drainage Systems (SuDS) - Surrey County Council (surreycc.gov.uk)

A full list of the information we expect to receive as part of Full Planning Application can also be found using the above link.

We are not satisfied that the proposed drainage scheme meets the requirements set out in the aforementioned documents; however, in the event that planning permission be granted by the Local Planning Authority, suitably worded conditions should be applied to ensure that the SuDS Scheme is properly implemented and maintained throughout the lifetime of the development. Suggested conditions are below:

1) The development hereby permitted shall not commence until details of the design of a surface water drainage scheme have been submitted to and approved in writing by the planning authority. The design must satisfy the SuDS Hierarchy and be compliant with the national Non-Statutory Technical Standards for SuDS, NPPF and Ministerial Statement on SuDS. The required drainage details shall include:

a) Evidence that the proposed final solution will effectively manage the 1 in 30 (+35% allowance for climate change) & 1 in 100 (+40% allowance for climate change) storm events and 10% allowance for urban creep, during all stages of the development. If infiltration is deemed unfeasible, associated discharge rates and storage volumes shall be provided using a maximum discharge rate equivalent to the pre-development Greenfield run-off and including multifunctional sustainable drainage systems.
b) Detailed drainage design drawings and calculations to include: a finalised drainage layout detailing the location of drainage elements, pipe diameters, levels, and long and cross

sections of each element including details of any flow restrictions and maintenance/risk reducing features (silt traps, inspection chambers etc.).

c) A plan showing exceedance flows (i.e. during rainfall greater than design events or during blockage) and how property on and off site will be protected from increased flood risk.
d) Details of drainage management responsibilities and maintenance regimes for the drainage system.
e) Details of how the drainage system will be protected during construction and how runoff (including any pollutants) from the development site will be managed before the drainage system is operational.

Reason: To ensure the design meets the national Non-Statutory Technical Standards for SuDS and the final drainage design does not increase flood risk on or off site.

2) Prior to the first occupation of the development, a verification report carried out by a qualified drainage engineer must be submitted to and approved by the Local Planning Authority. This must demonstrate that the surface water drainage system has been constructed as per the agreed scheme (or detail any minor variations), provide the details of any management company and state the national grid reference of any key drainage elements (surface water attenuation devices/areas, flow restriction devices and outfalls), and confirm any defects have been rectified.

Reason: To ensure the Drainage System is designed to the National Non-Statutory Technical Standards for SuDS.

If there are any further queries please contact the Flood Risk, Planning, and Consenting Team via SUDS@surreycc.gov.uk. Please use our reference number in any future correspondence.

Yours faithfully

Mike Burch
Critical Drainage Specialist
For the Flood Risk, Planning, and Consenting Team

Appendix B

Thames Water correspondence

James O'Kelly
SMA Ltd.
jok@stuartmichael.co.uk

Wastewater pre-planning

Our ref DS6104866

14 November 2023

Pre-planning enquiry: Confirmation of sufficient capacity

Dear James,

Thank you for providing information on your development at Anyards Road, Cobham, KT11 2LH.

Your proposal included a foul sewer connection by gravity to existing foul sewer just downstream of TQ10607601, and two surface water connections to the existing surface water sewers at rates of 5l/s and 1l/s, it is our opinion that the discharge rate is too high.

The area of the development is 0.456 hectares and comprises of 33 new residential units.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2) rainwater infiltration to ground at or close to source
3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4) rainwater discharge direct to a watercourse (unless not appropriate)
5) controlled rainwater discharge to a surface water sewer or drain

Where connection to the public sewerage network is required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS which is 2l/s/ha or that stated within the sites planning approval.

The proposed site is only half a hectare, therefore we would recommend 1.0l/s maximum discharge for both connections in line with 2l/s/ha.

If the above surface water hierarchy has been followed and if the flows are restricted to a total of 1.0l/s then Thames Water would not have any objections to the proposal.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

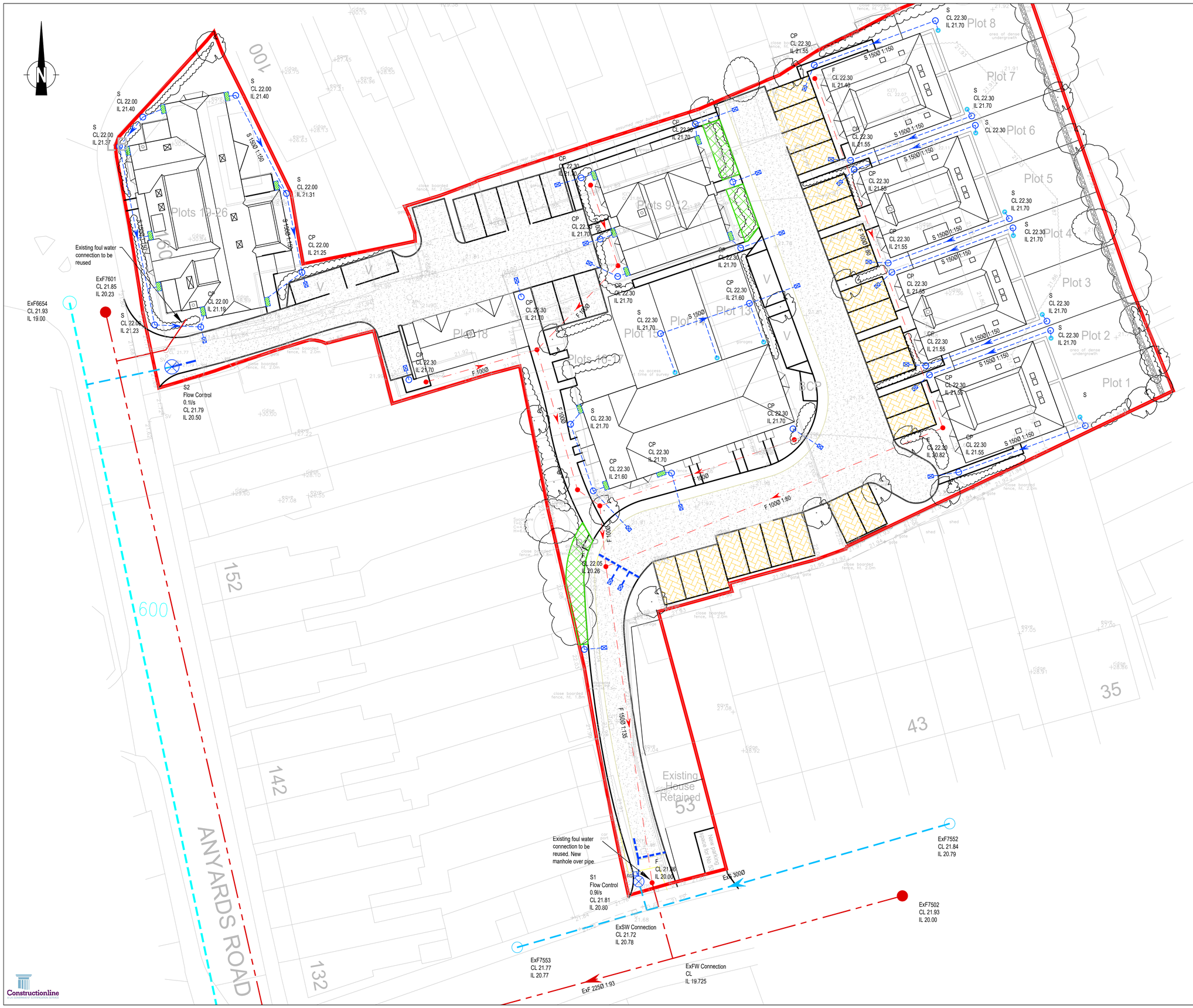
If you've any further questions, please contact Salma Haque on 0800 0093921.

Yours sincerely

Dan Rees
Technical and Regulatory Manager
Service Delivery

Appendix C

Drainage Strategy Drawing



KEY

- EXISTING THAMES WATER FOUL WATER SEWER
- FOUL WATER DRAIN
- SURFACE WATER DRAIN
- EXISTING THAMES WATER SURFACE WATER SEWER
- POROUS BLOCK PAVING
- POROUS MACADAM
- BIO RETENTION AREA
- RWP PLANTER
- WATER BUTT

Rev	Description	Drn	Chk	Date
A	DISCHARGE RATES & STRATEGY UPDATED	JOK		09.01.24

REVISIONS

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SHANLY HOMES

JOB TITLE

ANYARDS ROAD,
COBHAM

DRAWING TITLE

DRAINAGE STRATEGY

DATE	DRAWN	CHECKED
OCT 2023	CG	JOK

DRAWING No	REV	SCALE
7073.400	A	1:1000 @A1

Appendix D

Surface Water Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 510777 160638 TQ 10777 60638
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	5.594	0.050	111.9	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	5.218	0.020	260.9	0.178	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	8.470	0.050	169.4	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	9.587	0.100	95.9	0.086	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.10	20.850	0.000	0.0	0.0	0.0	0.95	16.8	0.0
S1.001	50.00	5.24	20.800	0.178	0.0	0.0	0.0	0.62	10.9«	24.1
S2.000	50.00	5.18	21.050	0.000	0.0	0.0	0.0	0.77	13.6	0.0
S2.001	50.00	5.34	20.500	0.086	0.0	0.0	0.0	1.03	18.1	11.6

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.178	0.178	0.178
2.000	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.086	0.086	0.086
				Total	Total	Total
				0.264	0.264	0.264

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	S	21.720	20.780	0.000	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S2.001	S	21.700	20.400	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 2	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	2	Winter Storms	No
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 510777 160638 TQ 10777 60638	Cv (Winter)	0.840
Data Type	Point	Storm Duration (mins)	30

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S1 PCP, DS/PN: S1.001, Volume (m³): 1.2

Unit Reference	MD-SHE-0044-9000-1000-9000
Design Head (m)	1.000
Design Flow (l/s)	0.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	44
Invert Level (m)	20.800
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	0.9	Kick-Flo®	0.394	0.6
Flush-Flo™	0.194	0.7	Mean Flow over Head Range	-	0.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.7	0.800	0.8	2.000	1.2	4.000	1.7	7.000	2.2
0.200	0.7	1.000	0.9	2.200	1.3	4.500	1.8	7.500	2.2
0.300	0.7	1.200	1.0	2.400	1.3	5.000	1.9	8.000	2.3
0.400	0.6	1.400	1.0	2.600	1.4	5.500	1.9	8.500	2.4
0.500	0.7	1.600	1.1	3.000	1.5	6.000	2.0	9.000	2.4
0.600	0.7	1.800	1.2	3.500	1.6	6.500	2.1	9.500	2.5

Hydro-Brake® Optimum Manhole: S2 PCP, DS/PN: S2.001, Volume (m³): 1.8

Unit Reference	MD-SHE-0012-1000-1500-1000
Design Head (m)	1.500
Design Flow (l/s)	0.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	12
Invert Level (m)	20.500
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	0.1	Kick-Flo®	0.109	0.0
Flush-Flo™	0.044	0.0	Mean Flow over Head Range	-	0.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0	0.300	0.1	0.500	0.1	0.800	0.1	1.200	0.1
0.200	0.0	0.400	0.1	0.600	0.1	1.000	0.1	1.400	0.1

Hydro-Brake® Optimum Manhole: S2 PCP, DS/PN: S2.001, Volume (m³): 1.8

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.600	0.1	2.400	0.1	4.000	0.1	6.000	0.2	8.000	0.2
1.800	0.1	2.600	0.1	4.500	0.2	6.500	0.2	8.500	0.2
2.000	0.1	3.000	0.1	5.000	0.2	7.000	0.2	9.000	0.2
2.200	0.1	3.500	0.1	5.500	0.2	7.500	0.2	9.500	0.2

Storage Structures for Storm

Porous Car Park Manhole: S1 PCP, DS/PN: S1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	100.0
Max Percolation (l/s)	222.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	20.800	Membrane Depth (mm)	0

Porous Car Park Manhole: S2 PCP, DS/PN: S2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	42.0
Max Percolation (l/s)	116.7	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	21.000	Membrane Depth (mm)	0

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FEH Data Type	Point
FEH Rainfall Version		2013 Cv (Summer)	0.950
Site Location	GB 510777 160638 TQ 10777 60638	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S1.000	SDUMMY	480 minute 2 year Winter I+0%	21.810	21.065	0.065	0.000	0.00		0.0
S1.001	S1 PCP	480 minute 2 year Winter I+0%	21.810	21.065	0.115	0.000	0.08		0.7
S2.000	SDUMMY	10080 minute 2 year Summer I+0%	22.000	21.282	0.082	0.000	0.00		0.0
S2.001	S2 PCP	10080 minute 2 year Summer I+0%	22.000	21.282	0.632	0.000	0.00		0.1

PN	US/MH Name	Status
S1.000	SDUMMY	SURCHARGED
S1.001	S1 PCP	SURCHARGED
S2.000	SDUMMY	SURCHARGED
S2.001	S2 PCP	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FEH Data Type	Point
FEH Rainfall Version		2013 Cv (Summer)	0.950
Site Location	GB 510777 160638 TQ 10777 60638	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S1.000	SDUMMY	720 minute 30 year Winter I+0%	21.810	21.304	0.304	0.000	0.00		0.0
S1.001	S1 PCP	720 minute 30 year Winter I+0%	21.810	21.305	0.355	0.000	0.08		0.7
S2.000	SDUMMY	2880 minute 30 year Winter I+0%	22.000	21.516	0.316	0.000	0.00		0.0
S2.001	S2 PCP	2880 minute 30 year Winter I+0%	22.000	21.517	0.867	0.000	0.01		0.1

PN	US/MH Name	Status
S1.000	SDUMMY	SURCHARGED
S1.001	S1 PCP	SURCHARGED
S2.000	SDUMMY	SURCHARGED
S2.001	S2 PCP	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FEH Data Type	Point
FEH Rainfall Version		2013 Cv (Summer)	0.950
Site Location	GB 510777 160638 TQ 10777 60638	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S1.000	SDUMMY	720 minute 100 year Winter I+0%	21.810	21.468	0.468	0.000	0.00		0.0
S1.001	S1 PCP	720 minute 100 year Winter I+0%	21.810	21.468	0.518	0.000	0.08		0.8
S2.000	SDUMMY	2880 minute 100 year Winter I+0%	22.000	21.690	0.490	0.000	0.00		0.0
S2.001	S2 PCP	2880 minute 100 year Winter I+0%	22.000	21.690	1.040	0.000	0.01		0.1

PN	US/MH Name	Status
S1.000	SDUMMY	SURCHARGED
S1.001	S1 PCP	SURCHARGED
S2.000	SDUMMY	SURCHARGED
S2.001	S2 PCP	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	0.950
Site Location	GB 510777 160638 TQ 10777 60638	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S1.000	SDUMMY	960 minute 100 year Winter I+40%	21.810	21.741	0.741	0.000	0.00		0.0
S1.001	S1 PCP	960 minute 100 year Winter I+40%	21.810	21.741	0.791	0.000	0.10		0.9
S2.000	SDUMMY	4320 minute 100 year Winter I+40%	22.000	21.989	0.789	0.000	0.00		0.0
S2.001	S2 PCP	4320 minute 100 year Winter I+40%	22.000	21.990	1.340	0.000	0.01		0.1

PN	US/MH Name	Status
S1.000	SDUMMY	FLOOD RISK
S1.001	S1 PCP	FLOOD RISK
S2.000	SDUMMY	FLOOD RISK
S2.001	S2 PCP	FLOOD RISK

Appendix E

Greenfield Runoff Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Ellie Lebbon
Site name:	Anyards Road
Site location:	Cobham

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:	51.33403° N
Longitude:	0.41158° W
Reference:	258358768
Date:	Jan 08 2024 16:47

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 0.472

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.492
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	640	768
Hydrological region:	6	6
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):		2.04
1 in 1 year (l/s):		1.74
1 in 30 years (l/s):		4.7
1 in 100 year (l/s):		6.52
1 in 200 years (l/s):		7.64

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.