
Land North West of Southwater

LLFA Response

To: Eleanor Read - WSCC
From: Darren Brown
Cc: Aaron Wadhams/ Simon Purcell
Ref: TN-LLFA-001
Date: 2026-05-18
Subject: DC/26/0366 – Land North West of Southwater

Introduction

Following the LLFA Response received 2nd April this technical note has been prepared to provide clarification and additional information as requested.

SuDS Hierarchy

LLFA Comment

While the proforma says in Section 7 that infiltration tests have been completed, these have not been provided.

WSP Response

Site investigation was undertaken by GESL 5 infiltration tests were carried out across the Site, with two tests being unable to produce an infiltration rate due to the lack in fall in head. The remaining tests gave results between 2.47x10⁻⁸m/s and 8.61x10⁻⁸m/s, confirming the “slowly permeable” nature of the soils. A copy of the GESL report has been appended to this response. Further infiltration testing should be undertaken at reserved matters stage for each phase as the site progresses.

Concerns regarding outfall locations

LLFA Comment

It is unclear where the swale for Basin 4 will discharge to, as the watercourse is not on the drawing.

Similarly, it appears that Basin 2 is proposed to discharge into a ditch that, based on the topographical survey, does not have onward connectivity, as there is a label “ditch fades in this area”. Based on the information submitted it is assumed that the watercourse is culverted from the location of the ‘pond’, under Two Mile Ash Road, then the watercourse reopens within the grounds of Christs Hospital School. The details of this culvert (route, capacity and condition) and onwards connectivity of the watercourse are unknown currently and as such further investigation is required. This is to ensure that this watercourse is able to receive flows without increasing flood risk elsewhere. If it is found that the watercourse cannot receive these flows, alternatives will need to be explored at outline stage, to ensure there is a viable method of draining the north catchment. This is not something we can condition for reserved matters/detailed design stage, as if it is found that the watercourse does not have onward

connectivity, this is likely to require alterations to the parameter plan. For avoidance of doubt, the onward connectivity of all watercourses that it is proposed to discharge surface water at restricted rates to, must be demonstrated at outline stage.

WSP Response

Basin 4

Following further site investigations, the exiting culvert beneath Two Mile Ash Road was located (see photo below). It passes beneath the road along the red arrow and discharges into an existing watercourse on the western verge. This watercourse drains South for a short length before turning 90 degrees and heading west along the Northern boundary of Newlands before connecting to the Ordinary Watercourse along the green arrows below.

The existing culvert was heavily silted, Berkeley instructed the culvert to be jetted and CCTV undertaken on 5th June 2026 which confirmed connectivity. The full report will be appended to this note once available.





Location A - Culvert Crossing

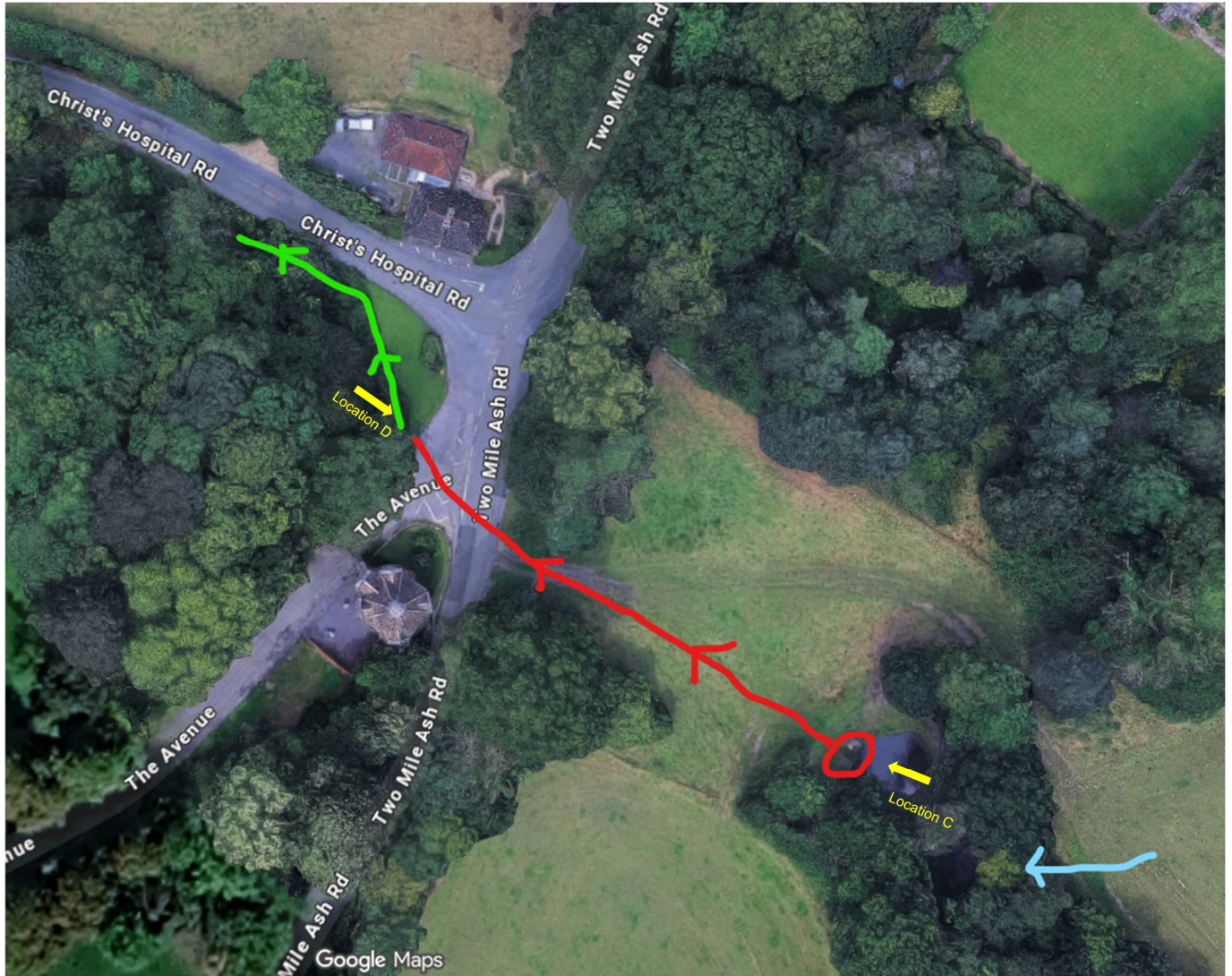


Location B – Existing Watercourse

Basin 2

Following the investigation connectivity of the Basin 2 outfall could not be located and is believed to have been culverted/filled historically to provide agricultural access. As such the proposed outfall has been relocated to discharge directly to the ordinary watercourse/pond, see updated strategy drawing appended to this note.

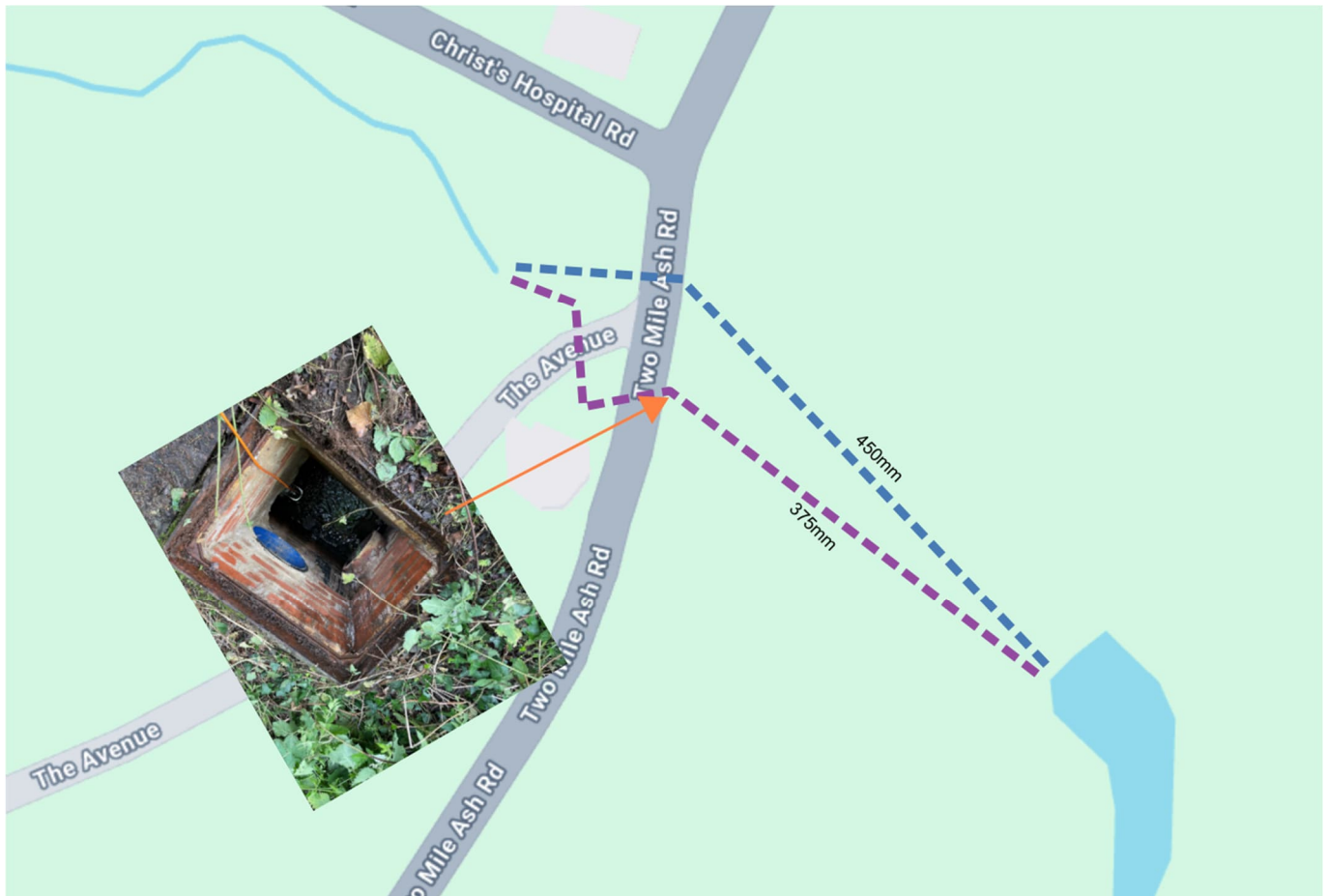
The existing pond then has two flow control weir chambers as seen in the photos below these were partially blocked at time of visit but flow was still possible to pass over the weir inlets. Following the visit it is was believed to be culverted along the red line to the north of Two Mile Ash Road where an existing headwall was located flows then continue along the existing watercourse highlighted green. The existing headwall provides outfall to the watercourse for two large culverts in the direction of the control structure located on the edge of the existing pond see photo below. Again, full connectivity could not be proven, and further clearance and CCTV surveys were commissioned to identify the connection. The CCTV was undertaken on 5th June 2026 and the identified routes of the 2 connections are shown below. Full report will be appended to this note once available.



Location C – Pond Outfall to Culvert



Location D – Culvert Outfall to Watercourse



Basin 2 CCTV Results

Calculations

LLFA Comment

As stated in pre-app, a C_v value of 1 shall be used in calculations. Whilst we cannot check the outputs for Annex D adequately currently (see Point 8/9), paragraph 8.3.4 states that C_v values are set at 0.75 and 0.84 instead.

We would expect the total volume in the hydraulic calculations to correspond with the drainage layout. For example, for Basin 3, the drainage layout says the storage volume will be 425m^3 , whereas the calculations say 427.176m^3 . It is important these match.

This means that we currently cannot check the post development greenfield runoff rates and volumes properly in Annex D.

In the hydraulic calculations, there seems to be no outputs demonstrating the correct impermeable area has been used. In addition, we are currently unable to check the input parameters for the calculations, as this is not provided within the current outputs. We typically see quick storage estimates for an outline application.

WSP Response

C_v values of 0.75 and 0.84 have been used for the calculations. While we understand that the reasoning for use of a C_v of 1 is primarily a precautionary and risk-based assumption rather than a physically representative parameter. Its indiscriminate use can lead to inefficiencies and misalignment with SuDS objectives and it is not deemed appropriate for this site. A C_v value of 1 would fail to reflect the SuDS based approach to the Surface water strategy for the site and would over provide for the surface water network by over sizing pies and storage, increasing cost and embodied carbon. The SuDS example included with in the FRA gives indication how the proposed development would achieve the interception of the first 5mm of rainfall for all storms in line with national SuDS guidance. However, as a sensitivity test, we have assessed the impact of adopting a C_v value of 1. This would result in an increase in the

size of the ponds as shown on the plan appended. This shows that the ponds can be accommodated within the areas of open space without impacting on the net developable areas or play space. The storage volumes have been rounded from the Infodrainage results and will need to be finalised. Updated calculations and quick storage estimates have also been appended to this note. Full details of the and design of the drainage systems will be developed further at reserved matters stage.

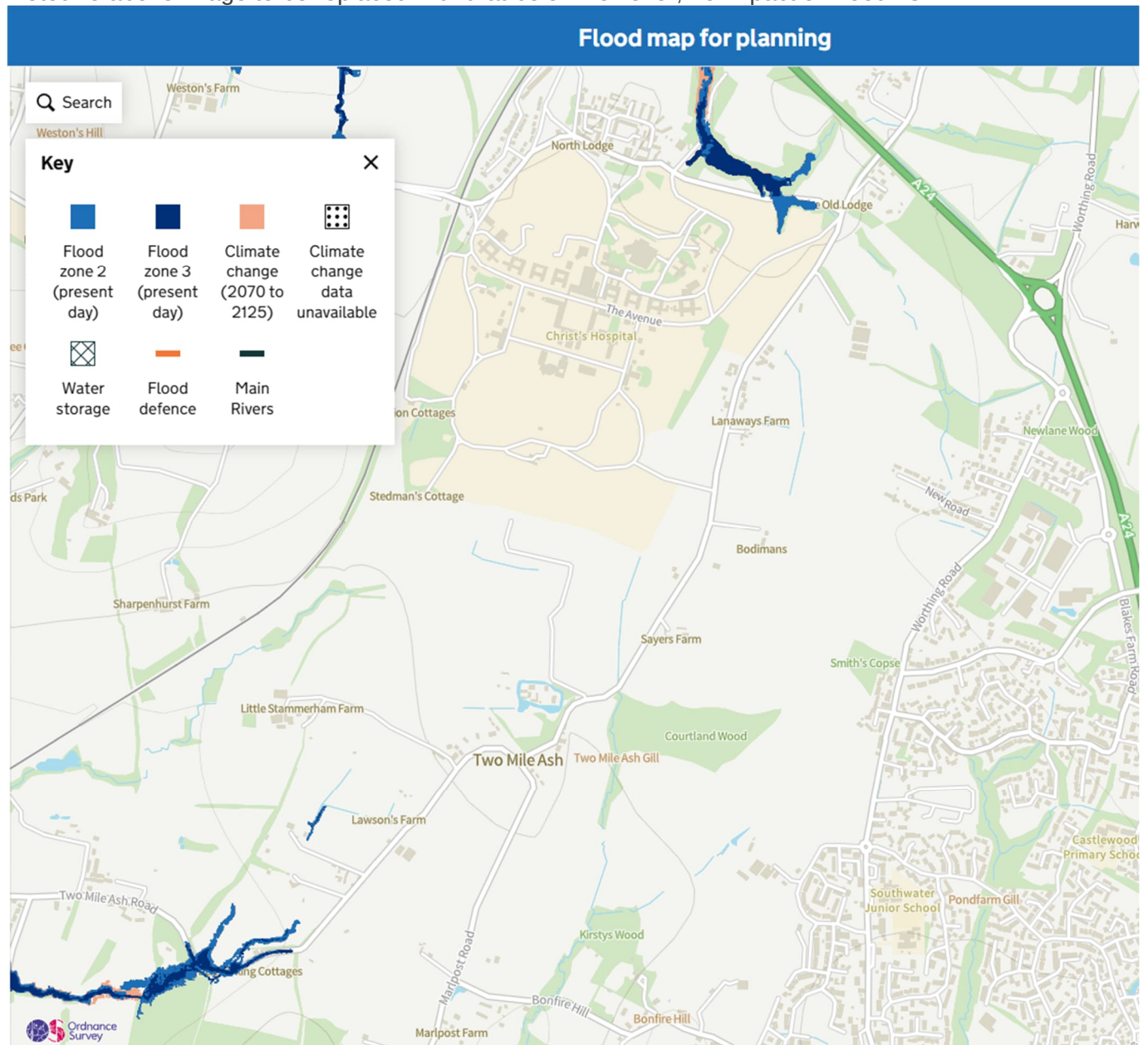
Surface Water Flood Risk

LLFA Comment

We would suggest that the Risk of Flooding for Surface Water map is not of a suitable scale for this site. We have compared it with the proposed masterplan using internal mapping, however local residents, the LPA and other relevant consultees may not be able to do this. In addition, and as stated on GOV.UK, the Flood Map for Planning mapping should be used for planning, rather than the Check Your Long Term Flood Risk Mapping.

WSP Response

Noted re above image to be replaced with that below however, no impact on flood risk.



Impermeable areas missing from drainage layout

LLFA Comment

There appears to be areas which will be impermeable, which have not been considered in the current drainage strategy. For example, there is proposed to be a basin located in the area of the main secondary school building. Based on the drainage layout, it is unclear how the school area will drain. In addition, the Land Use Parameter Plan shows 'Potential Car Park Surfacing' in a small red line outside of the residential development area. The drainage layout is unclear as to how this area will drain. There may be other areas which will be impermeable, which are not adequately included in the outline drainage strategy drawing, such as the Gypsy and Traveller Pitches. We would suggest ensuring the catchment plan is altered to show the proposed impermeable area for each area of the site (based on the required volumes of attenuation in Annex D).

WSP Response

Both the proposed primary and Secondary schools and also the Traveller site will be subject to their own storage requirements and restricted discharge rates. Both sites have existing watercourse along their boundaries providing outfall opportunities. These potential outfalls have been identified on the updated surface water strategy plan Appended to this note. Berkeley are providing the land for these uses but it will be the subsequent developers responsibility to comply with any requirements of the LLFA when these sites come forward

Proposals to infill ordinary watercourses

LLFA Comment

We have some concerns that it is proposed to infill open watercourses within the red line boundary, to allow for the construction of built development. As stated within pre-app all watercourses must be retained. Where there is opportunity to remove culverts (de-culverting) and re-open watercourses within the red line boundary, the LLFA would support this (please see comment about Ordinary Watercourse Consent).

In addition, we would disagree with 2.4.2, as there appears to be more than two ordinary watercourses within the site, as detailed in the topographical survey.

WSP Response

Only two Ordinary watercourses were identified within the SFRA, the remainder of the ditches are deemed to be field boundary ditches only with no flow being conveyed to or from the ditch and only collecting local runoff from adjacent field only. As part of the development this field ditch will become redundant and as such will be infilled and appropriate landscaping and BNG measures have been implemented to facilitate its removal.

Other comments

LLFA Comment

Although not a significant issue for outline planning applications, we disagree with some of the comments made in paragraph 8.2.2 in regard to non-potable use/rainwater harvesting. Higher cost is not a reason to disregard the use of rainwater harvesting. As West Sussex is seriously water stressed (this is very unlikely to change), greater consideration needs to be given to rainwater harvesting. This will also reduce water demand on the mains supply network. There are other developments which are residential which include rainwater harvesting.

We support suggestions to include rain gardens, bio retention areas and permeable paving within the residential parcels. For the school, we would also strongly encourage the use of source control SuDS features.

WSP Response

At outline stage it is not anticipated that individual properties will have rainwater harvesting systems in place however opportunities to utilise such systems could be provided within both the primary and secondary schools and also commercial land uses. This should be implemented at detailed application stage.

LLFA Comment

Within the underlying layout for the drainage strategy there are 'potential basins' – it is unclear what the function of these will be.

WSP Response

These are errors on base mapping and have been removed see updated plan appended to this note.

LLFA Comment

While foul drainage is outside our remit, there appears to be at least one clash between the surface water drainage and the foul drainage. For example, in the north of the site, basin 1 seems to be in a very similar location to the proposed location of the northern pumping station. This could create adoption issues as the site progresses

WSP Response

Drainage elements have been coordinated however further coordination will be undertaken at detailed stage.

LLFA Comment

The quality of the hydraulic calculations is poor and incredibly difficult to read. For example, see below. Due to the issues raised above, and difficulty reading the calculations, we have not completed a full review of this set of calculations, as these are likely to change.

WSP Response

The quality of the calculations is believed to have been caused by a PDF scaling issue to reduce to 10MB for upload. Please see revised calculations appended to this note.

LLFA Comment

We would suggest that the watercourse lines on the drainage strategy may not be accurate. For example, it is very rare for a watercourse to be completely straight, unless it is underground as a culverted watercourse.

WSP Response

Routes of Watercourse have been taken directly from the SFRA. It is believed that this culvert identified has been culverted beneath Christs Hospital land.

LLFA Comment

Also related to watercourses, we have some concerns in relation to the topographical survey of the northern main watercourse, which has labels including: 'unable to locate headwall in this area due to flooding' 'evidence of broken pipe' and 'area flooded at time of survey'. The applicant is reminded that all watercourses within their land ownership must be maintained under the Land Drainage Act.

WSP Response

Above is noted and existing watercourses and culverts on site will be cleared as part of the development proposals where required.

LLFA Comment

To allow us to ensure ground raising does not impact surface water flood risk, it would be helpful if the top of bank and the base levels of the proposed attenuation features are also included in the drainage layout. We are aware the levels are not being set at outline.

WSP Response

Base and top of bank levels have been added to all basins on the appended surface water strategy plan.

Updated Surface Water Mapping

It was noted that the EA Surface water mapping was updated on 26th May 2026. WSP undertook a review to compare the current mapping against that submitted within the FRA and concluded very minimal differences within the data. The EA briefing note published alongside the release of the revised mapping notes that the data for present day surface water flood extents remain unchanged within the

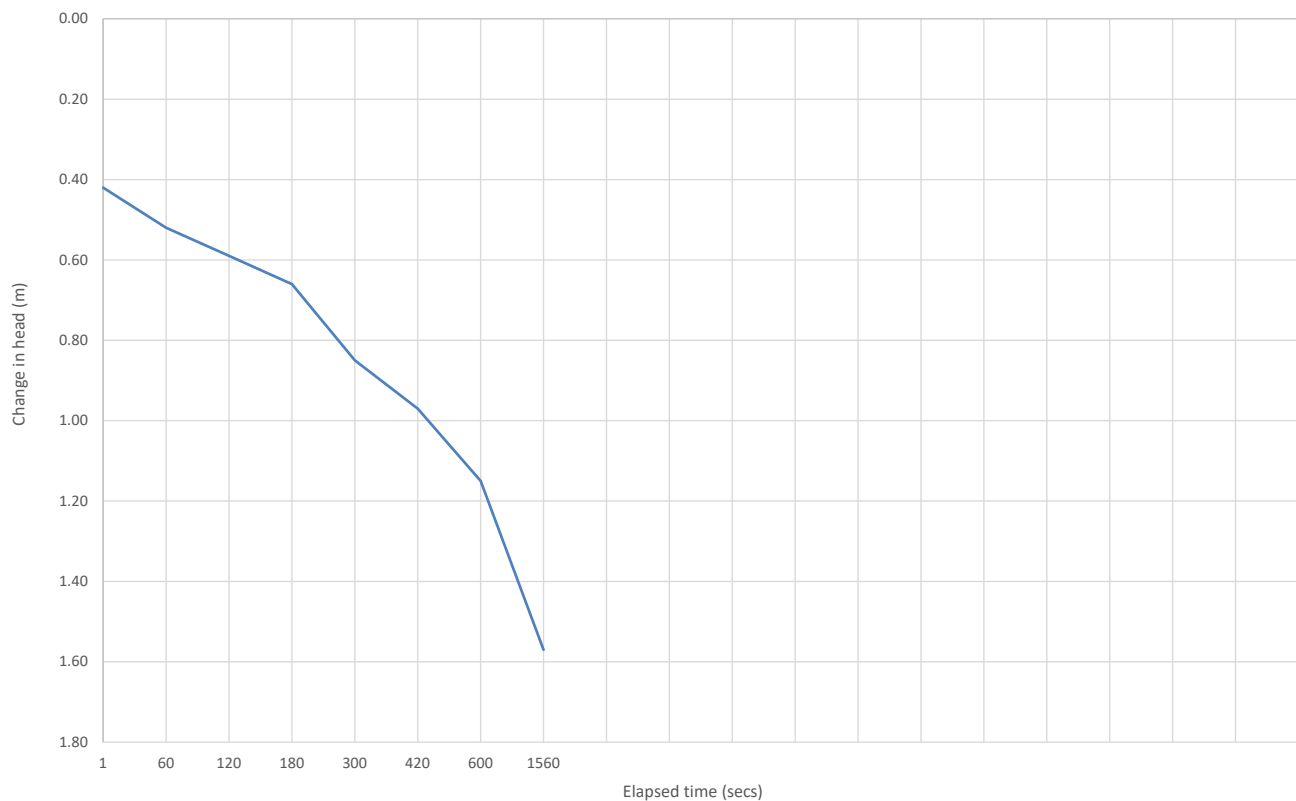


revised mapping. The revised mapping now includes an option to include climate change within the flood extents and also incorporates flood depth data previously only available from the “Check Your Long Term Flood Risk” data set which was already considered within the current FRA.

The minimal changes identified relate to the inclusion of climate change allowances the location of these do not impact the proposed development due to proposed levels being raised already in these areas to enable gravity drainage to the proposed on-site SuDs features.

Infiltration Tests

Location	Northwest Southwater	Position	WS04			Date:	08/06/2022
Borehole depth (m bgl)	3.9			Standing water level (m bgl)		3.66	
Casing height above ground level (m)	-	Depth of casing below ground level (m bgl)		-	Casing diameter (m)		0.01

[illegible]

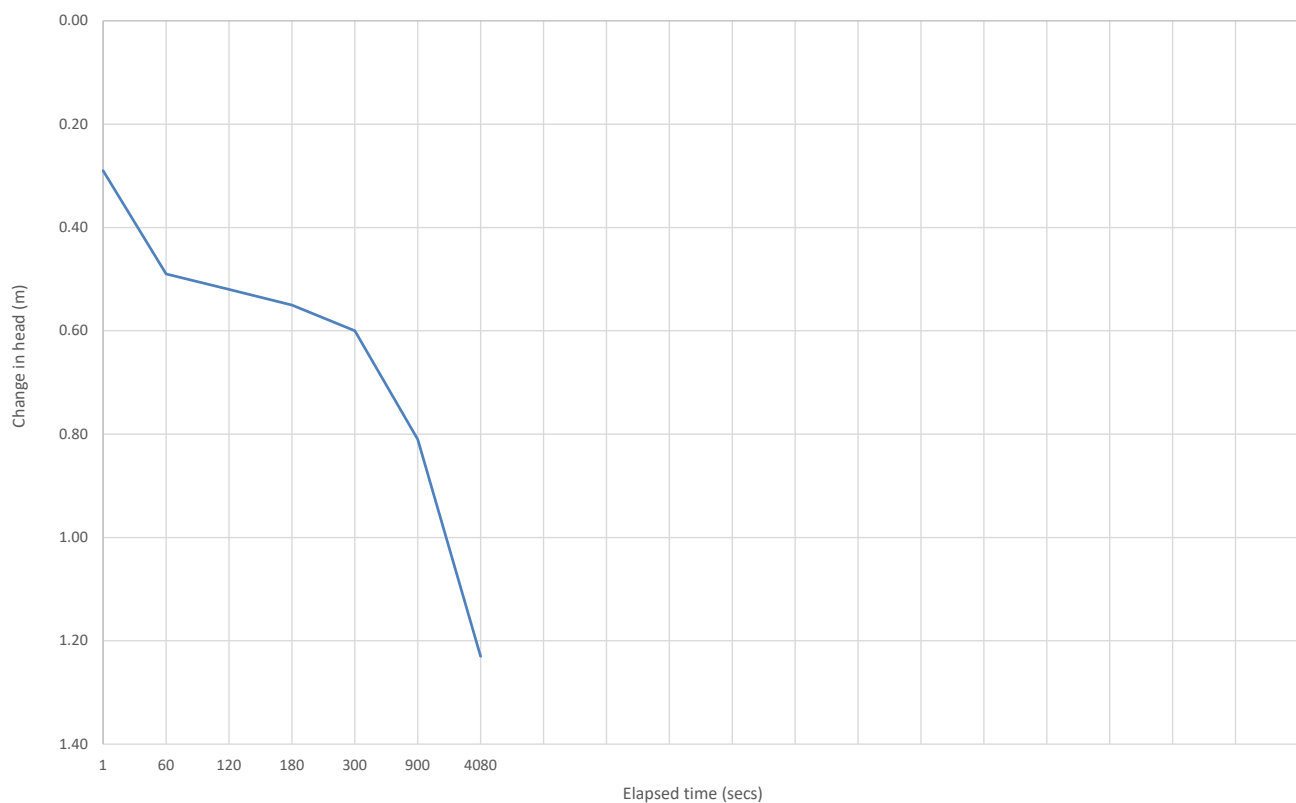
L =	1.15
D =	0.01
L/D =	115.00
F=	1.33

t0	0.60	
t	1560.00	
h0	0.42	
h	1.57	
S =	0.0001	
k =	-5.00E-08 m/s	(negative value means falling head of water)

Project:	Northwest Southwater			Title	Variable Head Permeability Test - WS04
Client:	Berkeley Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net 	
Ref No:	GE20620	Rev:	v1		
Drawn:	VB/JC	Date:	08/06/2022		
Figure:	WS04	Scale:	Not To Scale		



Location	Northwest Southwater	Position	WS11	Date:	08/06/2022
Borehole depth (m bgl)	3.13	Standing water level (m bgl)	1.38		
Casing height above ground level (m)	-	Depth of casing below ground level (m bgl)	-	Casing diameter (m)	0.01

[illegible]

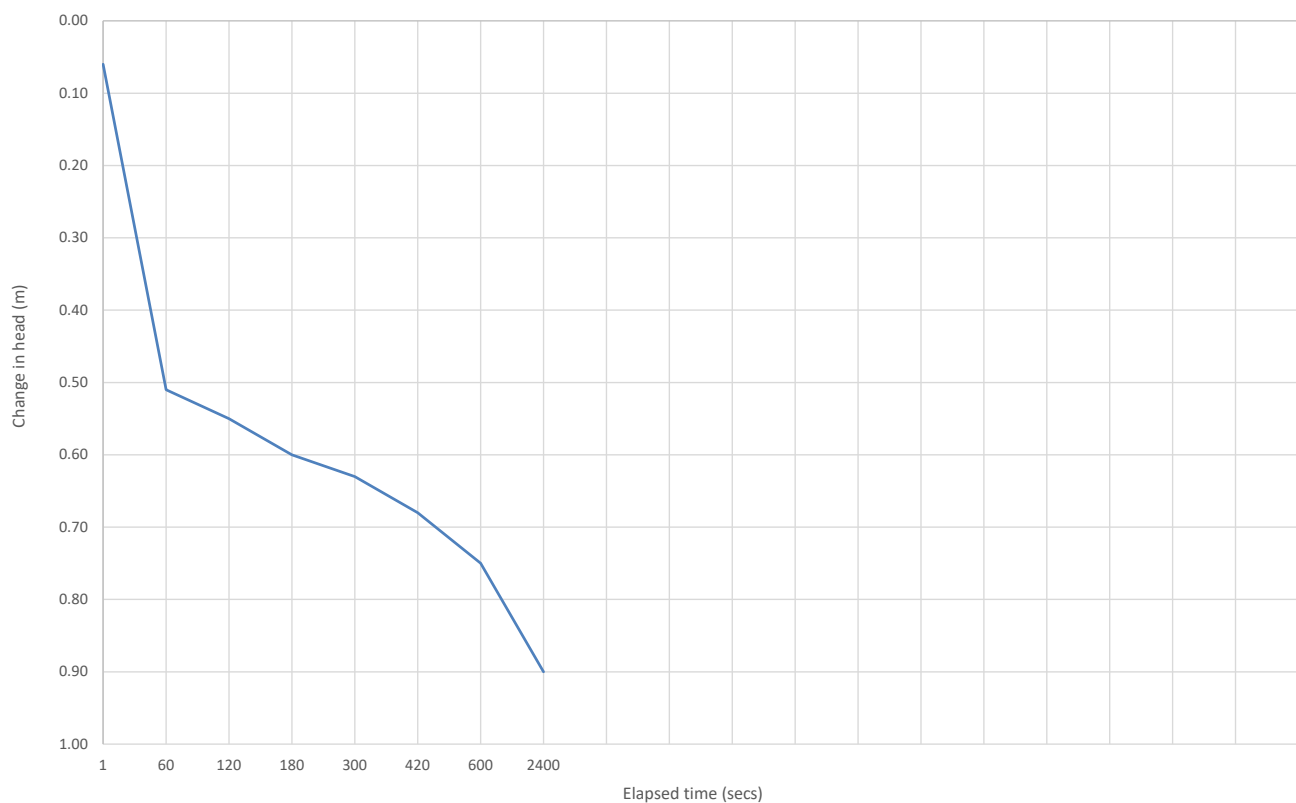
L =	0.94
D =	0.01
L/D =	94.00
F=	1.13

t0	0.60	
t	4080.00	
h0	0.29	
h	1.23	
S =	0.0001	
k =	-2.47E-08 m/s	(negative value means falling head of water)

Project:	Northwest Southwater			Title	Variable Head Permeability Test - WS11
Client:	Berkeley Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	
Ref No:	GE20620	Rev:	v1		
Drawn:	VB/JC	Date:	08/06/2022		
Figure:	WS11	Scale:	Not To Scale		



Location	Northwest Southwater	Position	WS16			Date:	08/06/2022
Borehole depth (m bgl)	4.01			Standing water level (m bgl)		3.98	
Casing height above ground level (m)	-	Depth of casing below ground level (m bgl)		-	Casing diameter (m)	0.01	

[illegible]

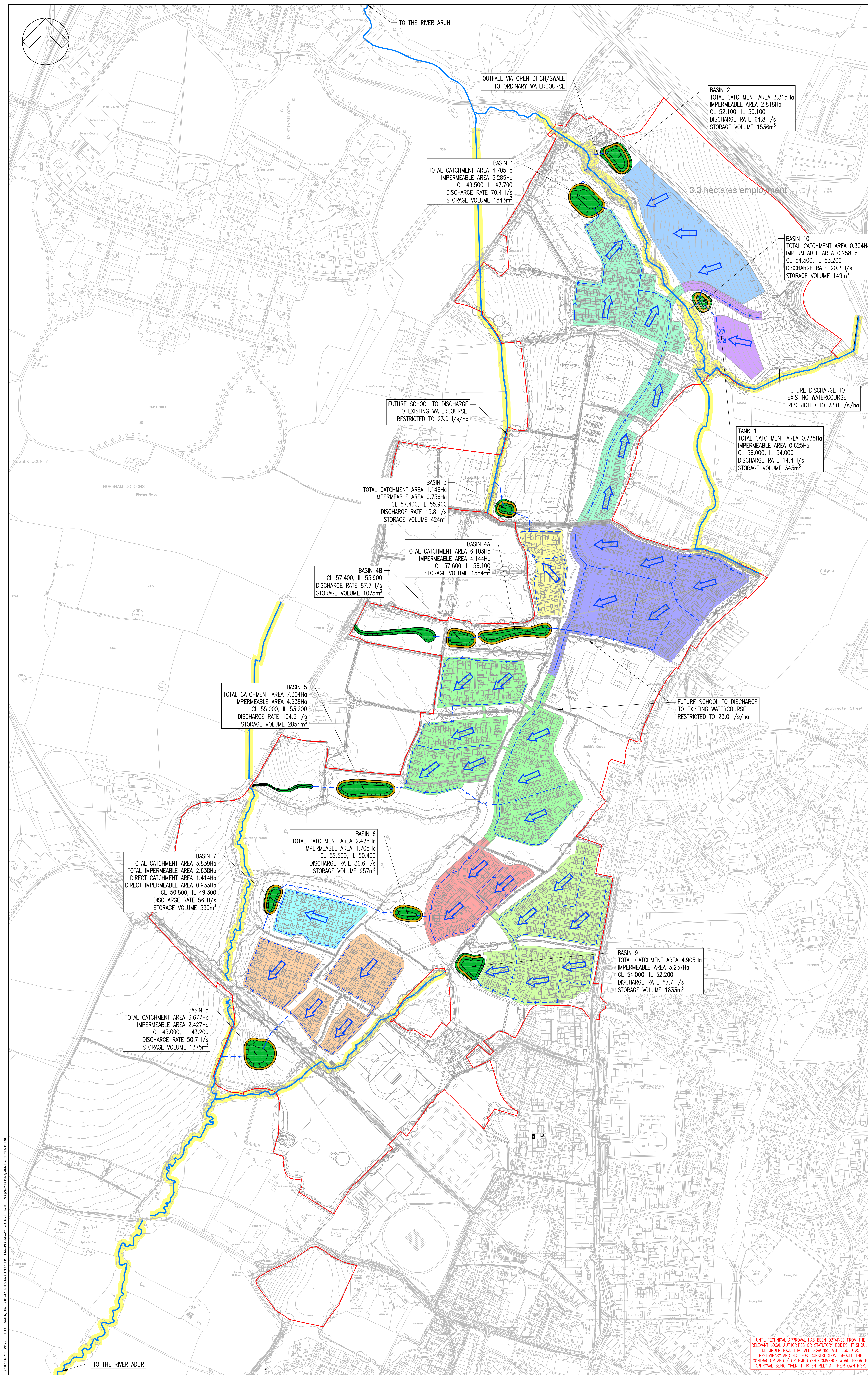
L =	0.84
D =	0.01
L/D =	84.00
F=	1.03

t0	0.60	
t	2400.00	
h0	0.06	
h	0.90	
S =	0.0001	
k =	-8.61E-08 m/s	(negative value means falling head of water)

Project:	Northwest Southwater			Title	Variable Head Permeability Test - WS16
Client:	Berkeley Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net 	
Ref No:	GE20620	Rev:	v1		
Drawn:	VB/JC	Date:	08/06/2022		
Figure:	WS16	Scale:	Not To Scale		



Revised Drainage Strategy



NOTES:

DO NOT SCALE

1.

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM.

2.

DRAINAGE DESIGN IS OUTLINE AT THIS STAGE AND WILL BE SUBJECT TO CHANGE AT LATER STAGES OF DESIGN.

3.

DRAINAGE DESIGNED IN ACCORDANCE WITH CIRIA REPORT C753 THE SUDS MANUAL & SEWER SECTOR GUIDANCE APPENDIX C: DESIGN AND CONSTRUCTION GUIDANCE.

4.

ALL ATTENUATION FEATURES HAVE BEEN DESIGNED TO ACCOMMODATE THE 1 IN 100 YEAR RETURN PERIOD RAINFALL EVENT PLUS 45% CLIMATE CHANGE WITH 300mm FREEBOARD.

5.

PARCEL IMPERMEABILITY BASED ON THE FOLLOWING:

- RESIDENTIAL – 60% IMPERMEABLE
- EMPLOYMENT – 85% IMPERMEABLE
- SPINE ROAD – 85% IMPERMEABLE

5.

RESIDENTIAL PARCELS INCLUDE A 10% ALLOWANCE FOR URBAN CREEP.

6.

FLOW CONTROLS TO LIMIT SURFACE WATER RUNOFF TO GREENFIELD RUNOFF RATE FOR 1 IN 100 YEAR RETURN PERIOD RAINFALL EVENT OF 23.0 l/s/ha.

7.

NORTHERN CATCHMENT TOTAL SURFACE WATER DISCHARGE OF 171.3 l/s. SOUTHERN CATCHMENT TOTAL SURFACE WATER DISCHARGE OF 366.5 l/s.

8.

DISCHARGE RATES PRO-RATED TO IMPERMEABLE AREA BEFORE URBAN CREEP ALLOWANCE INCLUDED.

9.

ACCESS FOR MAINTENANCE TO BE PROVIDED FOR ALL SURFACE WATER STORAGE FEATURES.

KEY

SITE BOUNDARY

EXISTING ORDINARY WATERCOURSE & EASEMENT (8m FROM TOP OF BANK)

PROPOSED SURFACE WATER SEWER

PROPOSED SURFACE WATER ATTENUATION BASIN

PROPOSED SURFACE WATER STORAGE TANK

INDICATIVE EXCEEDENCE OVERLAND FLOW ROUTING

BASIN 1 CATCHMENT

BASIN 2 CATCHMENT

BASIN 3 CATCHMENT

BASIN 4A & 4B CATCHMENT

BASIN 5 CATCHMENT

BASIN 6 CATCHMENT

BASIN 7 CATCHMENT

BASIN 8 CATCHMENT

BASIN 9 CATCHMENT

BASIN 10 CATCHMENT

UNTIL TECHNICAL APPROVAL HAS BEEN OBTAINED FROM THE RELEVANT LOCAL AUTHORITIES OR STATUTORY BODIES IT SHOULD BE UNDERSTOOD THAT ALL DRAWINGS ARE ISSUED AS PRELIMINARY AND NOT FOR CONSTRUCTION. SHOULD THE CONTRACTOR AND / OR EMPLOYER COMMENCE WORK PRIOR TO APPROVAL BEING GIVEN, IT IS ENTIRELY AT THEIR OWN RISK.

PROJ

18/05/2026

KW

BASIN 4 AMENITY, ORDINARY WATERCOURSE DESIGN NOT ASSESS

CHK

DSB

REV

29/01/2028

KW

FIRST ISSUE

CHK

DSB

REV

DATE

BY

DESCRIPTION

CHK

APP

ISSUING STATUS

S2 - FOR INFORMATION

wsp

Unit 9 The Chase
John Tule Road
Farnham Business Park
Hertford
SG13 7NL, UK
T+44 (0) 1992 526 000
F+44 (0) 1992 528 001
wsp.com

CLIENT

BERKELEY

PROJECT

NORTH SOUTHWATER

ADDITIONAL

KPK STUDIOS

TITLE

OUTLINE SURFACE WATER DRAINAGE STRATEGY

SCALE @ A0

1:2500

DRAWN

DSB

APPROVED

DSB

PROJECT NO.

700014597

DESIGNED

KW

DRAWN

KW

DATE

May 26

DRAWING NO.

NSW-WSP-XX-XX-DR-DR-0001

REV.

P02

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Sensitivity Test Cv 1

Quick Storage Estimates

Northern Catchment

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

7.742

Volumetric Runoff Coefficient

0.840

Discharge Rate (L/s)

171.3

Infiltration Rate (m/hr)

0.0

Safety Factor

2.0

Quick

Calculate

Create New

From Library

All

FEH - North 2022

FEH - South 2022

Method

FEH

Number of Storms

20

Max. Run Time (mins)

2880

Input

Results

2D Graph

OK

Cancel

Create New

Help

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 3774m³ - 5327m³.

These values are estimates only and should not be used for final design purposes.

Input

Results

2D Graph

OK

Cancel

Create New

Help

Southern Catchment

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

17.384

Volumetric Runoff Coefficient

0.840

Discharge Rate (L/s)

366.5

Infiltration Rate (m/hr)

0.0

Safety Factor

2.0

Quick

Calculate

Create New

From Library

All

FEH - North 2022

FEH - South 2022

Method

FEH

Number of Storms

20

Max. Run Time (mins)

2880

Input

Results

2D Graph

OK

Cancel

Create New

Help

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 8733m³ - 12307m³.

These values are estimates only and should not be used for final design purposes.

Input

Results

2D Graph

OK

Cancel

Create New

Help

Drainage Calculations

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: North				



Basin 3

Type : Pond

Dimensions

Exceedance Level (m)	57.400
Depth (m)	1.500
Base Level (m)	55.900
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	427.176

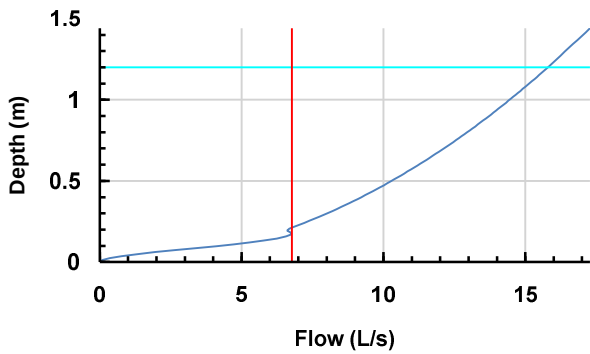
Depth (m)	Area (m²)	Volume (m³)
0.000	242.95	0.000
1.200	482.58	427.176
1.500	555.21	582.718

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	55.900
Design Depth (m)	1.200
Design Flow (L/s)	15.8
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐

Unit Reference	CCU-0120-1580-1200-1580
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Advanced

Perimeter	Circular
Length (m)	70.733
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: North				

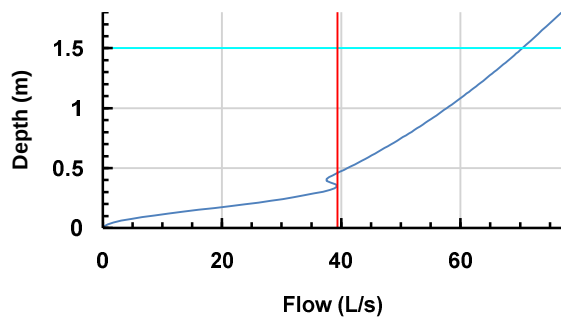


Basin 1

Type : Pond

Dimensions			
Exceedance Level (m)		49.500	
Depth (m)		1.800	
Base Level (m)		47.700	
Freeboard (mm)		300	
Initial Depth (m)		0.000	
Porosity (%)		100	
Average Slope (1:X)		3.255	
Total Volume (m³)		1873.425	
Depth (m)		Area (m²)	Volume (m³)
0.000		955.17	0.000
1.500		1567.91	1873.425
1.800		1704.91	2364.205

Outlets	
Outlet	
Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	47.700
Design Depth (m)	1.500
Design Flow (L/s)	70.4
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐
Unit Reference	CCU-0242-7040-1500-7040



Advanced	
Perimeter	Circular
Length (m)	55.636
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026		
	Designed by: KW	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: North	Company Address:		



Basin 2

Type : Pond

Dimensions

Exceedance Level (m)	52.100
Depth (m)	2.000
Base Level (m)	50.100
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.148
Total Volume (m³)	1569.393

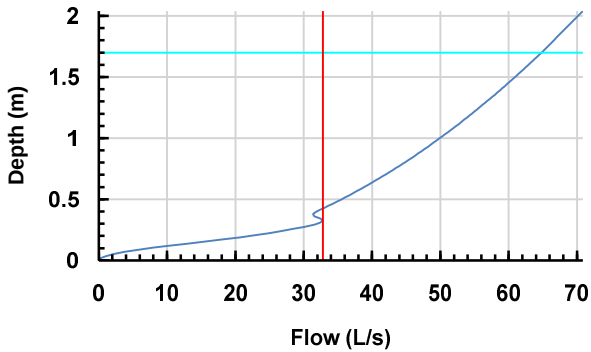
Depth (m)	Area (m²)	Volume (m³)
0.000	572.14	0.000
2.000	1491.80	1991.861

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	50.100
Design Depth (m)	1.700
Design Flow (L/s)	64.8
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐

Unit Reference	CCU-0225-6480-1700-6480
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Advanced

Perimeter	Circular
Length (m)	106.758
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: North				

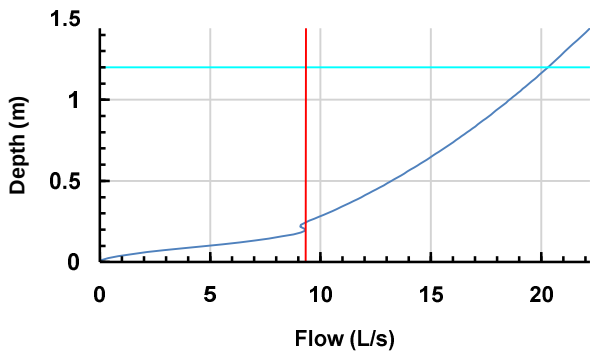


Basin 10

Type : Pond

Dimensions		
Exceedance Level (m)		54.500
Depth (m)		1.300
Base Level (m)		53.200
Freeboard (mm)		300
Initial Depth (m)		0.000
Porosity (%)		100
Average Slope (1:X)		3.525
Total Volume (m³)		152.609
Depth (m)	Area (m²)	Volume (m³)
0.000	81.40	0.000
1.000	237.42	152.609
1.300	293.95	232.163

Outlets	
Outlet	
Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	53.200
Design Depth (m)	1.200
Design Flow (L/s)	20.3
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐
Unit Reference	CCU-0137-2030-1200-2030



Advanced	
Perimeter	Circular
Length (m)	39.835
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: North				



Tank 1

Type : Tank

Dimensions

Exceedance Level (m)	56.000
Depth (m)	2.000
Base Level (m)	54.000
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	95
Average Slope (1:X)	-10.897
Total Volume (m³)	357.068

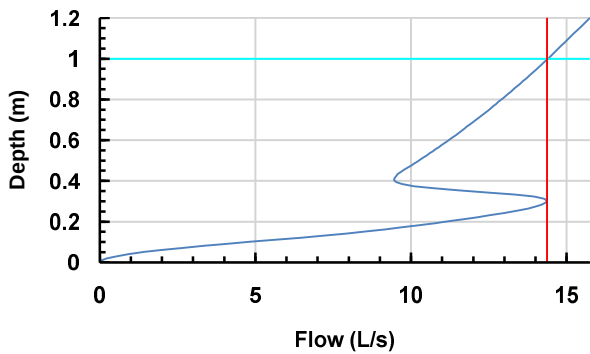
Depth (m)	Area (m²)	Volume (m³)
0.000	375.000	0.000
1.000	375.000	356.250
1.001	0.001	356.369

Outlets

Outlet

Outgoing Connection	No Delay
Outlet Type	Hydro-Brake®
Invert Level (m)	54.000
Design Depth (m)	1.000
Design Flow (L/s)	14.4
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0163-1440-1000-1440
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Advanced

Perimeter	Rectangular
Length (m)	18.636

North Southwater:		Date: 09/01/2026			
		Designed by: KW	Checked by:		Approved By:
Report Details: Type: Inflow Summary Storm Phase: North		Company Address:			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Tank 1		Time of Concentration	0.735	85	0	85	0.625
Catchment Area (15)	Basin 1		Time of Concentration	0.555	66	0	66	0.366
Catchment Area (16)	Basin 1		Time of Concentration	0.364	66	0	66	0.240
Catchment Area (17)	Basin 1		Time of Concentration	0.133	66	0	66	0.088
Catchment Area (18)	Basin 1		Time of Concentration	2.710	66	0	66	1.789
Catchment Area (20)	Basin 2		Time of Concentration	3.315	85	0	85	2.818
Catchment Area (21)	Basin 3		Time of Concentration	1.146	66	0	66	0.756
Catchment Area (24)	Basin 10		Time of Concentration	0.304	85	0	85	0.259
Catchment Area (25)	Basin 1		Time of Concentration	0.945	85	0	85	0.803
TOTAL		0.0		10.207				7.744

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	Company Address:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall		
FEH - North 2022		Type: FEH
Site Location	GB 515668 128281 TQ 15668 28281	
Rainfall Version	2022	
Summer	☒	
Winter	☒	

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45.000

Storm Durations

Duration (mins)	Run Time (mins)
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Summary Storm Phase: North				



FEH - North 2022: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item:
Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 3	FEH - North 2022: 100 years: +45 %: 180 mins: Winter	57.093	57.093	1.193	1.193	123.7	423.789	0.000	0.000	15.8	269.052	0.793	OK
Basin 1	FEH - North 2022: 100 years: +45 %: 180 mins: Winter	49.181	49.179	1.481	1.479	537.4	1842.589	0.000	0.000	69.9	1177.185	1.646	OK
Basin 2	FEH - North 2022: 100 years: +45 %: 180 mins: Winter	51.775	51.775	1.675	1.675	460.8	1535.883	0.000	0.000	64.3	1098.157	2.135	OK
Basin 10	FEH - North 2022: 100 years: +45 %: 240 mins: Winter	54.184	54.182	0.984	0.982	44.9	148.416	0.000	0.000	18.4	420.059	2.748	OK
Tank 1	FEH - North 2022: 100 years: +45 %: 180 mins: Winter	54.966	54.966	0.966	0.966	102.2	344.214	0.000	0.000	14.2	230.085	3.600	OK

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: South				



Basin 4A

Type : Pond

Dimensions

Exceedance Level (m)	57.600
Depth (m)	1.500
Base Level (m)	56.100
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	6.462
Total Volume (m³)	1603.807

Depth (m)	Area (m²)	Volume (m³)
0.000	855.00	0.000
1.200	1885.00	1603.807
1.500	2155.00	2209.355

Outlets

Outlet

Outgoing Connection	Pipe
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	91.699
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026		
	Designed by: KW	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: South	Company Address:		



Basin 5

Type : Pond

Dimensions

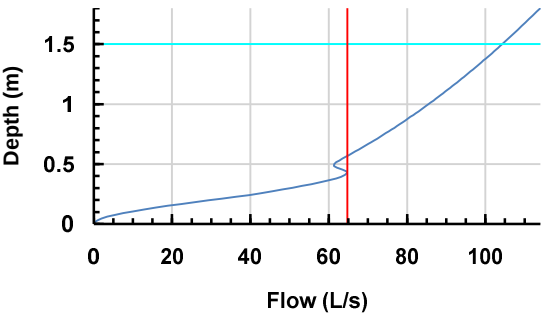
Exceedance Level (m)	55.000
Depth (m)	1.800
Base Level (m)	53.200
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	2872.138

Depth (m)	Area (m²)	Volume (m³)
0.000	1576.83	0.000
1.500	2273.89	2872.138
1.800	2428.57	3577.381

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	53.200
Design Depth (m)	1.500
Design Flow (L/s)	104.3
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐
Unit Reference	CCU-0295-1043-1500-1043



Advanced

Perimeter	Circular
Length (m)	69.855
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: South				

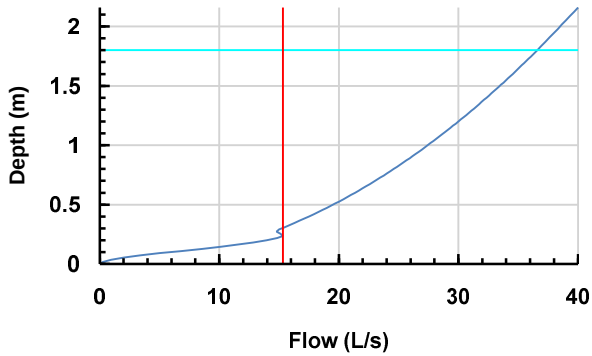


Basin 6

Type : Pond

Dimensions		
Exceedance Level (m)	52.500	
Depth (m)	2.100	
Base Level (m)	50.400	
Freeboard (mm)	300	
Initial Depth (m)	0.000	
Porosity (%)	100	
Average Slope (1:X)	3.00	
Total Volume (m³)	961.169	
Depth (m)	Area (m²)	Volume (m³)
0.000	329.66	0.000
1.500	682.92	743.533
2.100	859.85	1205.344

Outlets	
Outlet	
Outgoing Connection	No Delay
Outlet Type	Hydro-Brake®
Invert Level (m)	50.400
Design Depth (m)	1.800
Design Flow (L/s)	36.6
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐
Unit Reference	CCU-0166-3660-1800-3660



Advanced	
Perimeter	Circular
Length (m)	68.212
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026		
	Designed by: KW	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: South	Company Address:		



Basin 7

Type : Pond

Dimensions

Exceedance Level (m)	50.800
Depth (m)	1.500
Base Level (m)	49.300
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.672
Total Volume (m³)	538.182

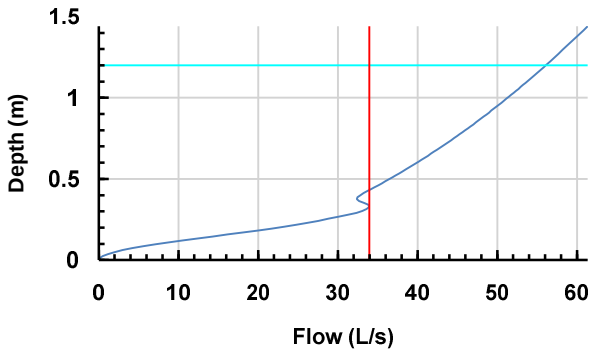
Depth (m)	Area (m²)	Volume (m³)
0.000	292.65	0.000
1.200	625.10	538.182
1.500	721.90	740.059

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	49.300
Design Depth (m)	1.200
Design Flow (L/s)	56.1
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐

Unit Reference	CCU-0228-5610-1200-5610
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Advanced

Perimeter	Circular
Length (m)	84.627
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026		
	Designed by: KW	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: South	Company Address:		



Basin 8

Type : Pond

Dimensions

Exceedance Level (m)	45.000
Depth (m)	1.800
Base Level (m)	43.200
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	1403.857

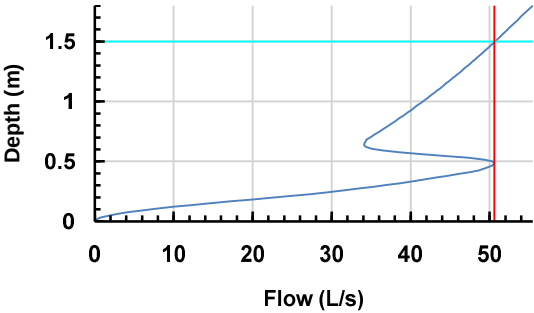
Depth (m)	Area (m²)	Volume (m³)
0.000	703.19	0.000
1.500	1189.82	1403.857
1.800	1302.42	1777.566

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	43.200
Design Depth (m)	1.500
Design Flow (L/s)	50.7
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0272-5070-1500-5070
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Advanced

Perimeter	Circular
Length (m)	73.145
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026		
	Designed by: KW	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: South	Company Address:		



Basin 9

Type : Pond

Dimensions

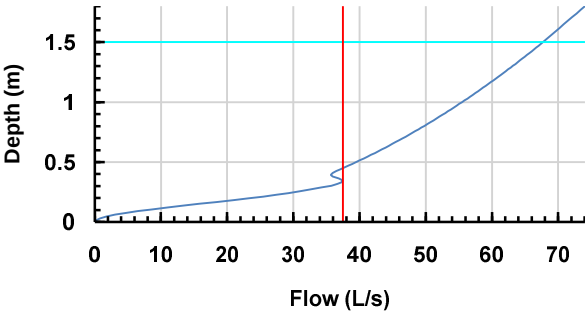
Exceedance Level (m)	54.000
Depth (m)	1.800
Base Level (m)	52.200
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.367
Total Volume (m³)	1842.814

Depth (m)	Area (m²)	Volume (m³)
0.000	927.86	0.000
1.500	1556.15	1842.814
1.800	1697.76	2330.746

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	52.200
Design Depth (m)	1.500
Design Flow (L/s)	67.7
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☐
Unit Reference	CCU-0237-6770-1500-6770



Advanced

Perimeter	Circular
Length (m)	64.695
Friction Scheme	Manning's n
n	0.045

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: South				



Basin 4B

Type : Pond

Dimensions

Exceedance Level (m)	57.400
Depth (m)	1.500
Base Level (m)	55.900
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.384
Total Volume (m³)	1093.059

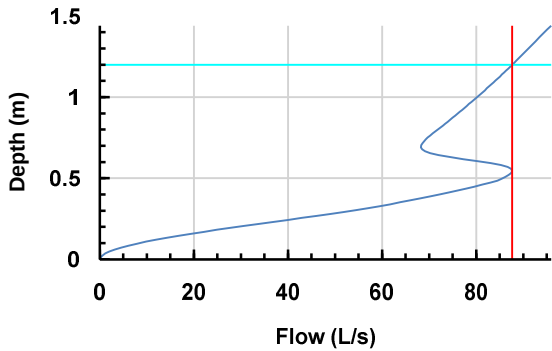
Depth (m)	Area (m²)	Volume (m³)
0.000	703.00	0.000
1.200	1136.00	1093.059
1.500	1261.00	1452.446

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	55.900
Design Depth (m)	1.200
Design Flow (L/s)	87.7
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0350-8770-1200-8770
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Advanced

Perimeter	Circular
Length (m)	72.117
Friction Scheme	Manning's n
n	0.045

North Southwater:		Date: 09/01/2026			
		Designed by: KW	Checked by:		Approved By:
Report Details: Type: Inflow Summary Storm Phase: South		Company Address:			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Basin 4A		Time of Concentration	5.503	66	0	66	3.632
Catchment Area (1)	Basin 4A		Time of Concentration	0.609	85	0	85	0.518
Catchment Area (2)	Basin 5		Time of Concentration	1.587	66	0	66	1.047
Catchment Area (3)	Basin 5		Time of Concentration	2.330	66	0	66	1.538
Catchment Area (4)	Basin 5		Time of Concentration	0.614	85	0	85	0.522
Catchment Area (5)	Basin 5		Time of Concentration	2.799	66	0	66	1.847
Catchment Area (6)	Basin 6		Time of Concentration	0.542	85	0	85	0.461
Catchment Area (7)	Basin 6		Time of Concentration	1.872	66	0	66	1.236
Catchment Area (8)	Basin 7		Time of Concentration	1.414	66	0	66	0.933
Catchment Area (9)	Basin 8		Time of Concentration	1.374	66	0	66	0.907
Catchment Area (10)	Basin 8		Time of Concentration	1.346	66	0	66	0.888
Catchment Area (11)	Basin 9		Time of Concentration	2.693	66	0	66	1.777
Catchment Area (12)	Basin 9		Time of Concentration	2.163	66	0	66	1.428
Catchment Area (13)	Basin 8		Time of Concentration	0.977	66	0	66	0.645
TOTAL		0.0		25.822				17.378

North Southwater:	Date: 09/01/2026			
	Designed by: KW	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	Company Address:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall		
FEH - South 2022		Type: FEH
Site Location	GB 515223 127060 TQ 15223 27060	
Rainfall Version	2022	
Summer	☒	
Winter	☒	

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45.000

Storm Durations

Duration (mins)	Run Time (mins)
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880

North Southwater:		Date: 09/01/2026			
		Designed by: KW	Checked by:		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: South		Company Address:			



FEH - South 2022: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item:
Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 4A	FEH - South 2022: 100 years: +45 %: 60 mins: Winter	57.289	57.289	1.189	1.189	1466.7	1583.214	0.000	0.000	340.1	1286.116	1.284	OK
Basin 5	FEH - South 2022: 100 years: +45 %: 240 mins: Winter	54.692	54.692	1.492	1.492	661.0	2853.211	0.000	0.000	104.0	2281.650	0.659	OK
Basin 6	FEH - South 2022: 100 years: +45 %: 180 mins: Winter	52.194	52.195	1.794	1.795	281.2	956.891	0.000	0.000	35.6	625.143	0.445	OK
Basin 7	FEH - South 2022: 100 years: +45 %: 180 mins: Winter	50.494	50.494	1.194	1.194	185.0	534.222	0.000	0.000	56.0	956.597	0.736	OK
Basin 8	FEH - South 2022: 100 years: +45 %: 180 mins: Winter	44.677	44.675	1.477	1.475	404.5	1374.472	0.000	0.000	50.3	877.126	2.093	OK
Basin 9	FEH - South 2022: 100 years: +45 %: 180 mins: Winter	53.694	53.695	1.494	1.495	531.4	1832.204	0.000	0.000	67.6	1140.100	0.576	OK
Basin 4B	FEH - South 2022: 100 years: +45 %: 240 mins: Winter	57.084	57.084	1.184	1.184	232.5	1074.356	0.000	0.000	87.4	1924.733	1.711	OK

CCTC Survey
