



Land North West of Southwater

LLFA Response

To: Eleanor Read - WSCC
From: Darren Brown
Cc: Aaron Wadhams/ Simon Purcell
Ref: TN-LLFA-001 ([Rev: P02](#))
Date: [2026-07-14](#)
Subject: DC/26/0366 – Land North West of Southwater

Introduction

Following the LLFA Response received 2nd April [and further response received 2nd July](#), 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.

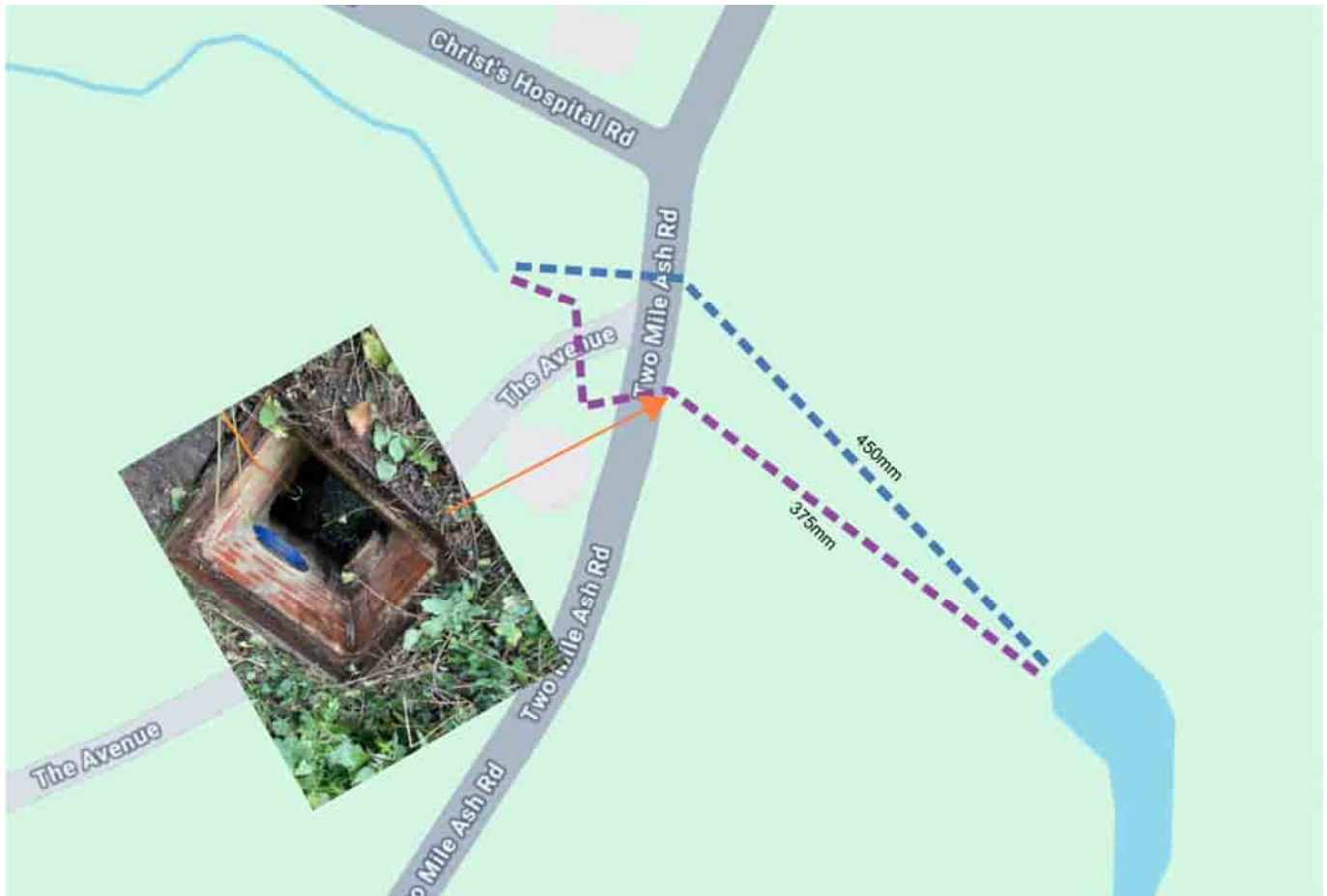
The existing pond then has two flow control weir chambers as seen in the photos below these were partially blocked at time of visit but flow was still possible to pass over the weir inlets. Following the visit it is was believed to be culverted along the red line to the north of Two Mile Ash Road where 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

Maintenance Easement's

LLFA Comment

As stated in pre-app, the appropriate maintenance easements for the watercourses and SuDS feature must be clearly shown on drawings. This is not the case currently.

WSP Response

3m Easements shown to all watercourses see updated Surface Water Strategy drawing.

Calculations

LLFA Comment

As stated in pre-app, a Cv 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 Cv 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 425m³, whereas the calculations say 427.176m³. 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

Cv values of 0.75 and 0.84 have been used for the calculations. While we understand that the reasoning for use of a Cv 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 Cv 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 pipes and storage, increasing cost and embodied carbon. The SuDS example included within 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 Cv 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 design of the drainage systems will be developed further at reserved matters stage.

Surface Water Flood Risk

LLFA Comment

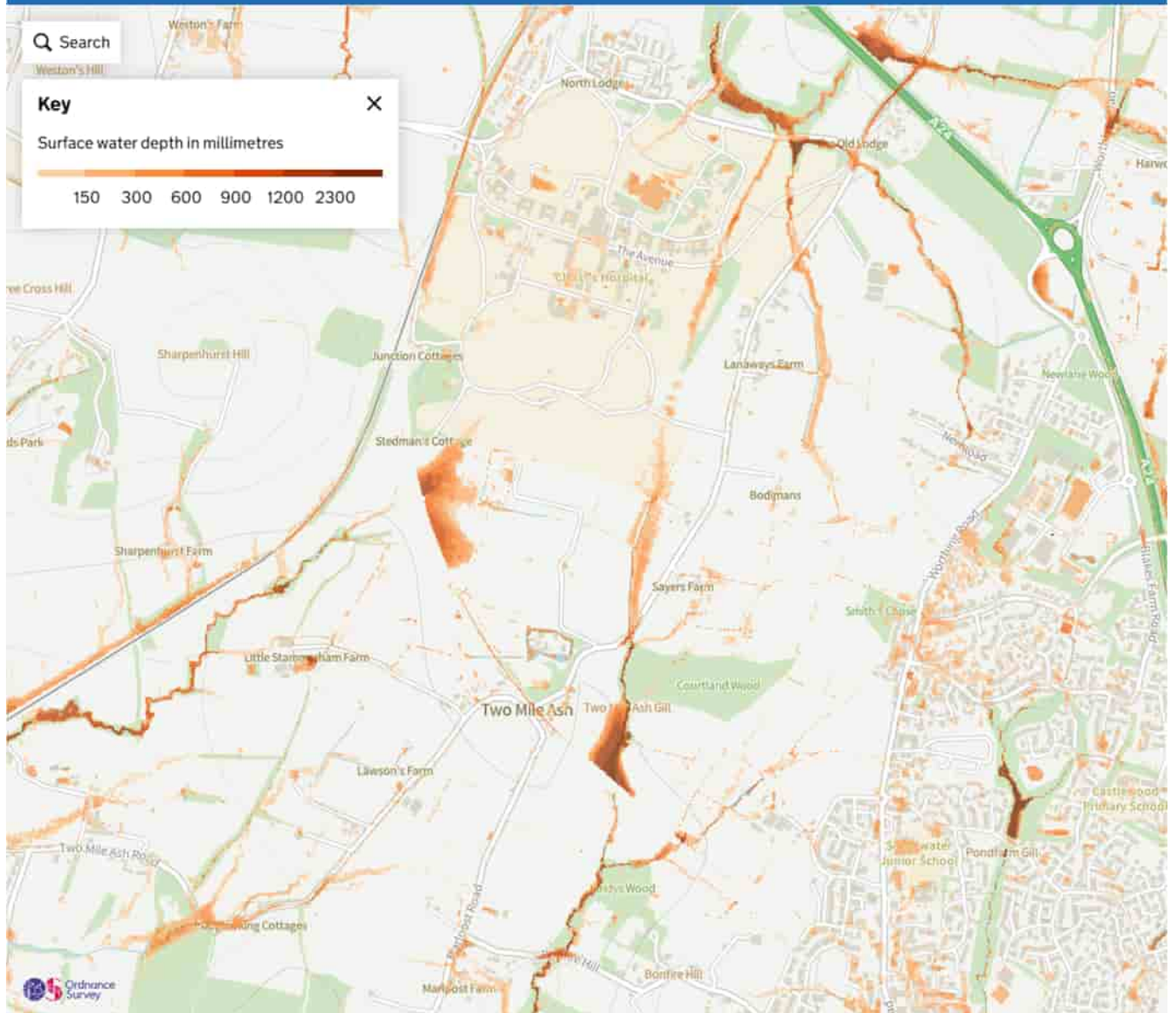
We would suggest that the Risk of Flooding for Surface Water map is not of a suitable scale for this site. We have compared it with the proposed masterplan using internal mapping, however local residents, the LPA and other relevant consultees may not be able to do this. In addition, and as stated on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

This is partially addressed. The fluvial flood zones rather than the surface water flood risk mapping have been included in the written response. We request the surface water flood risk from Flood Map for Planning is submitted. The climate change layers will also need to be submitted. It is essential that up to date mapping is used at outline stage, to ensure there are no future conflicts at reserved matters.

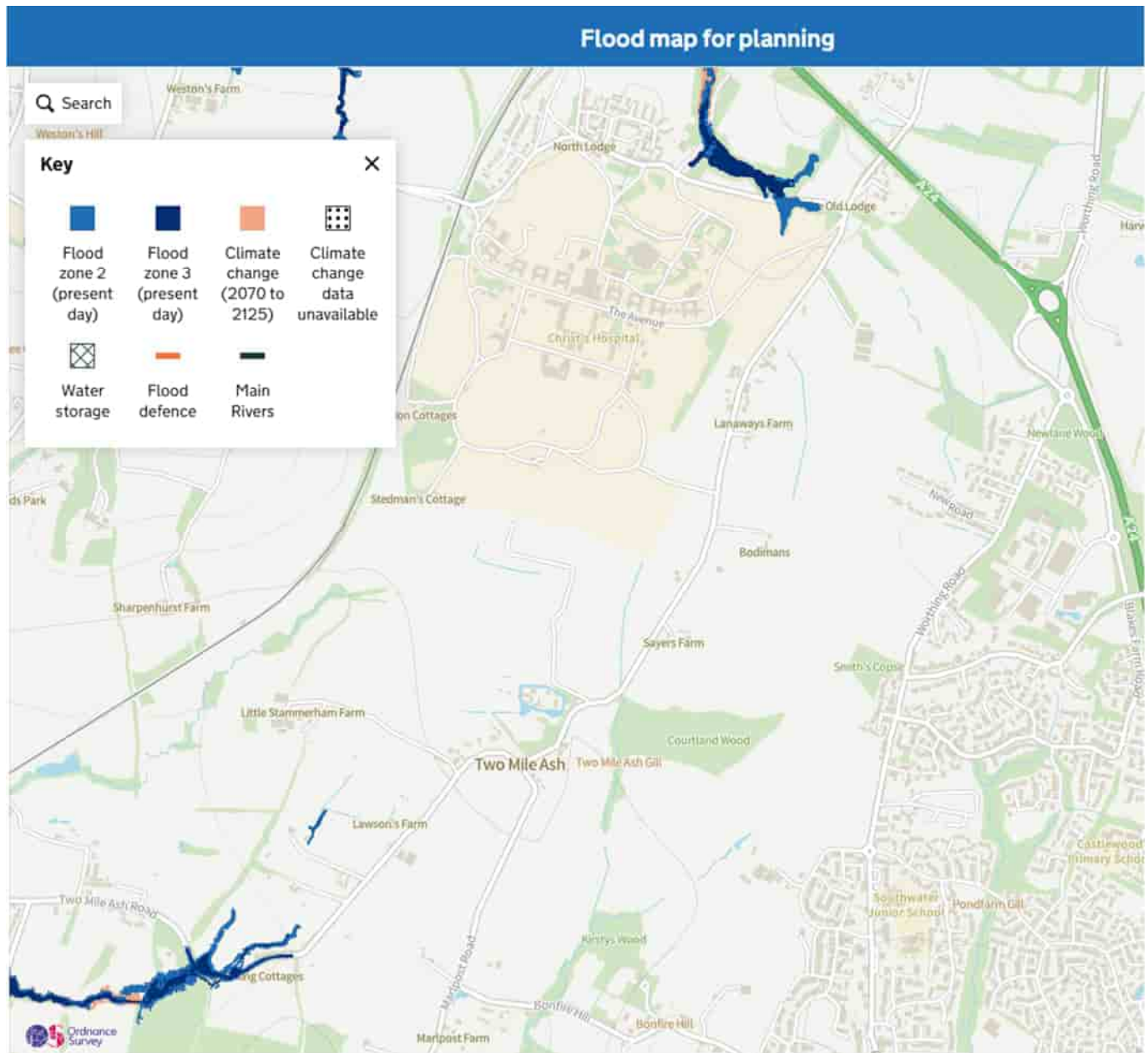
WSP Response

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

Flood map for planning



Surface Water Flood Map for Planning (1 in 100 year including Climate Change)



Fluvial Flood Map for Planning (including Climate Change)

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.

This is not adequately addressed. SFRAs do not include all ordinary watercourses as many are not currently mapped. All Ordinary watercourses (including field ditches) should be retained and will require a suitable clear buffer (minimum 3m) from the top of the bank to be retained for future maintenance access. Any proposal to infill a watercourse requires Ordinary Watercourse Consent, which is unlikely to be given except where required for access, and in these instances, it would need to be culverted with the large diameter pipe, and over the shortest length practical.

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. These exiting ditches and associated 3m buffers have been added to the Surface water strategy drawing. As part of the development the majority of these field ditches are to be maintained. One ditch requires a minor diversion and a number where these are required to be culverted to enable development these will be subject to Ordinary Watercourse consents and have been added to the updated Surface Water Strategy Plan appended to this note

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.

We would suggest altering the watercourse lines based on topographical and CCTV outputs, to better reflect the site's natural drainage.

WSP Response

Routes of Watercourse have been taken directly from the SFRA. It is believed that this ordinary watercourse identified has been culverted beneath Christs Hospital land. Much of this is outside land controlled by the client and inaccessible to undertake further CCTV/topographical survey. This area is outside any built development area proposals and will remain in its current form as part of the development. Where CCTV/survey has been possible the surveyed routes have been reflected on the updated Surface Water Strategy Plan appended to this note.

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.

In several locations ground raising of over 1m is proposed. This could significantly alter existing surface water flood risk. Can the applicant confirm whether this has been assessed and the outcome of the proposed ground raising?

WSP Response

Base and top of bank levels have been added to all basins on the appended surface water strategy plan. Ground levels have been raised to form the basin storage within the parcel boundaries only and outside of all existing watercourse buffers except where they are identified for diversion/culverting.. Runoff within the plot boundaries will be collected by the plot surface water drainage system and drained via the basins. This will minimise on plot SW flooding for the 1:100 plus climate change rainfall events and overland flow routes for exceedance events will be considered as part of each RM application. Where

Surface water flood routes are identified to be receiving flow from outside the proposed development these routes will be maintained by the proposed development.

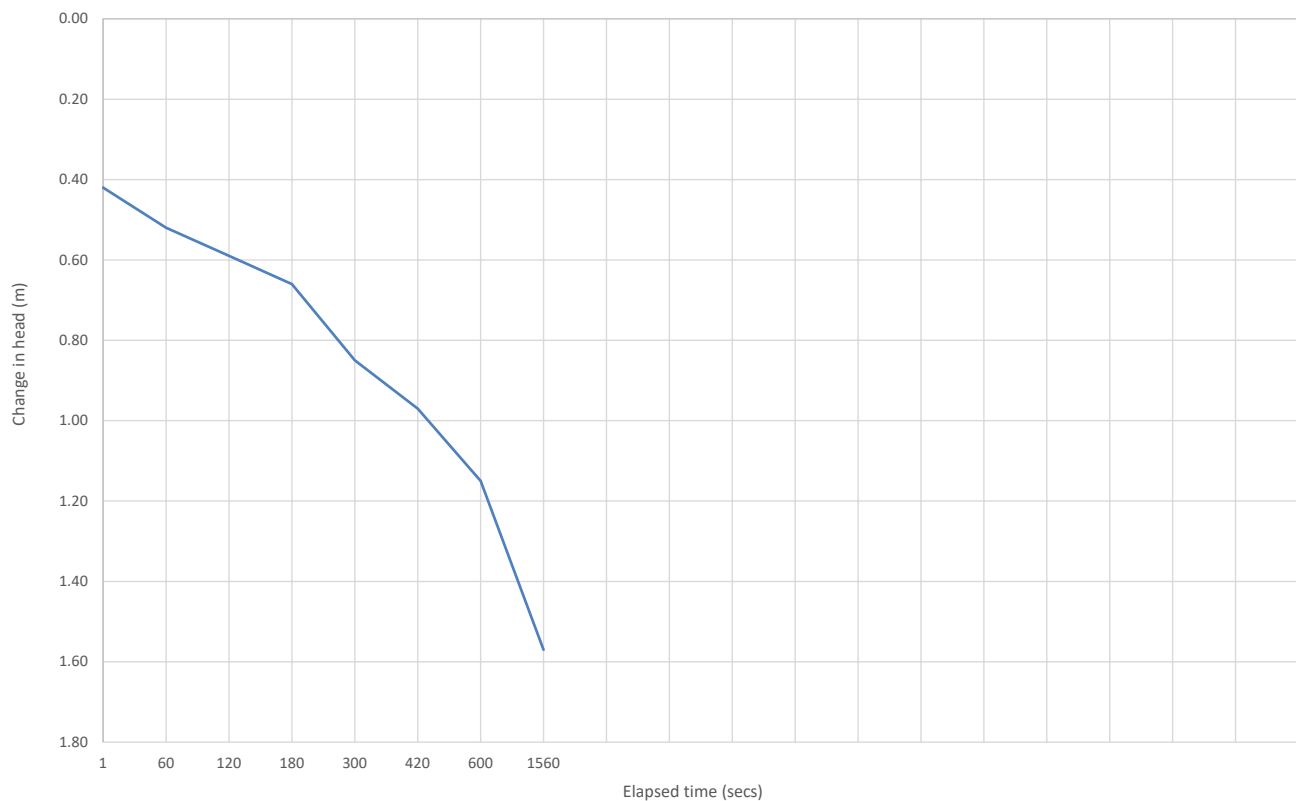
Updated Surface Water Mapping

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]

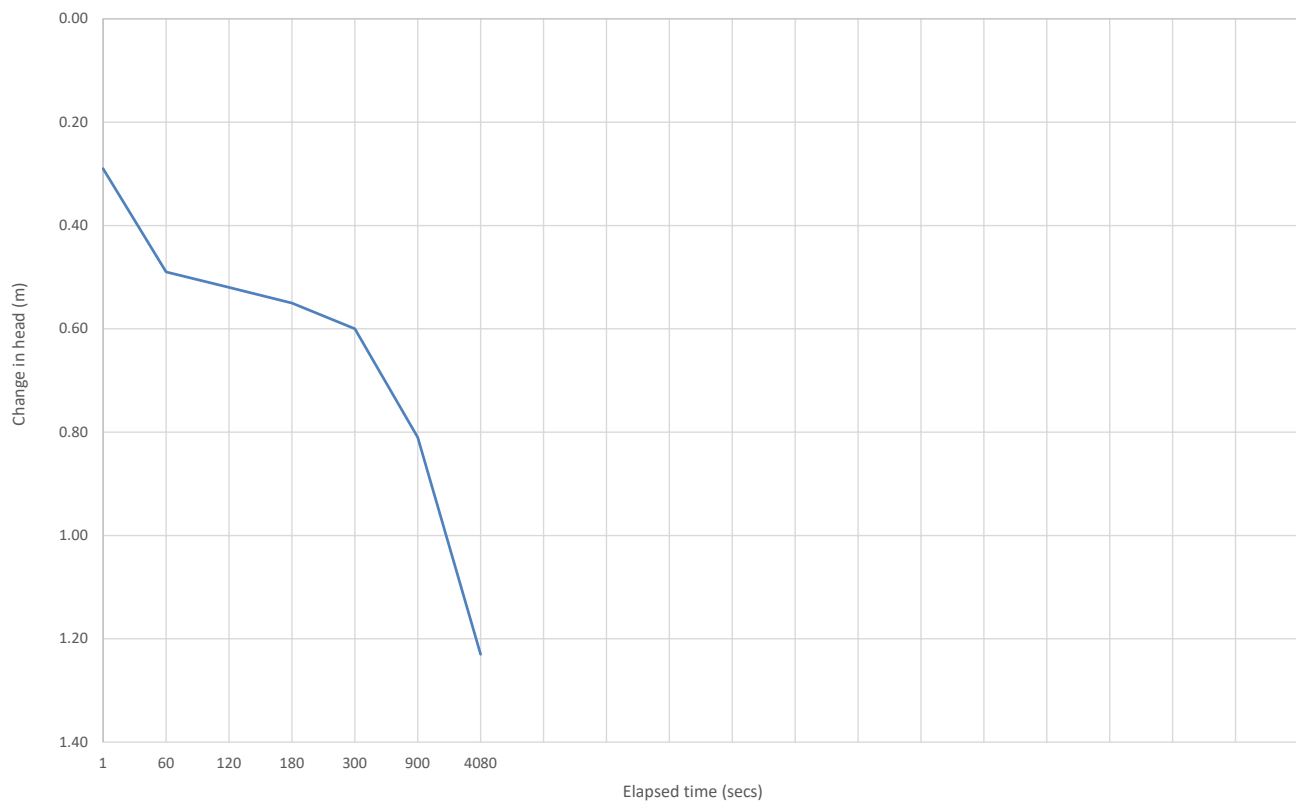
L =	1.15
D =	0.01
L/D =	115.00
F=	1.33

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]

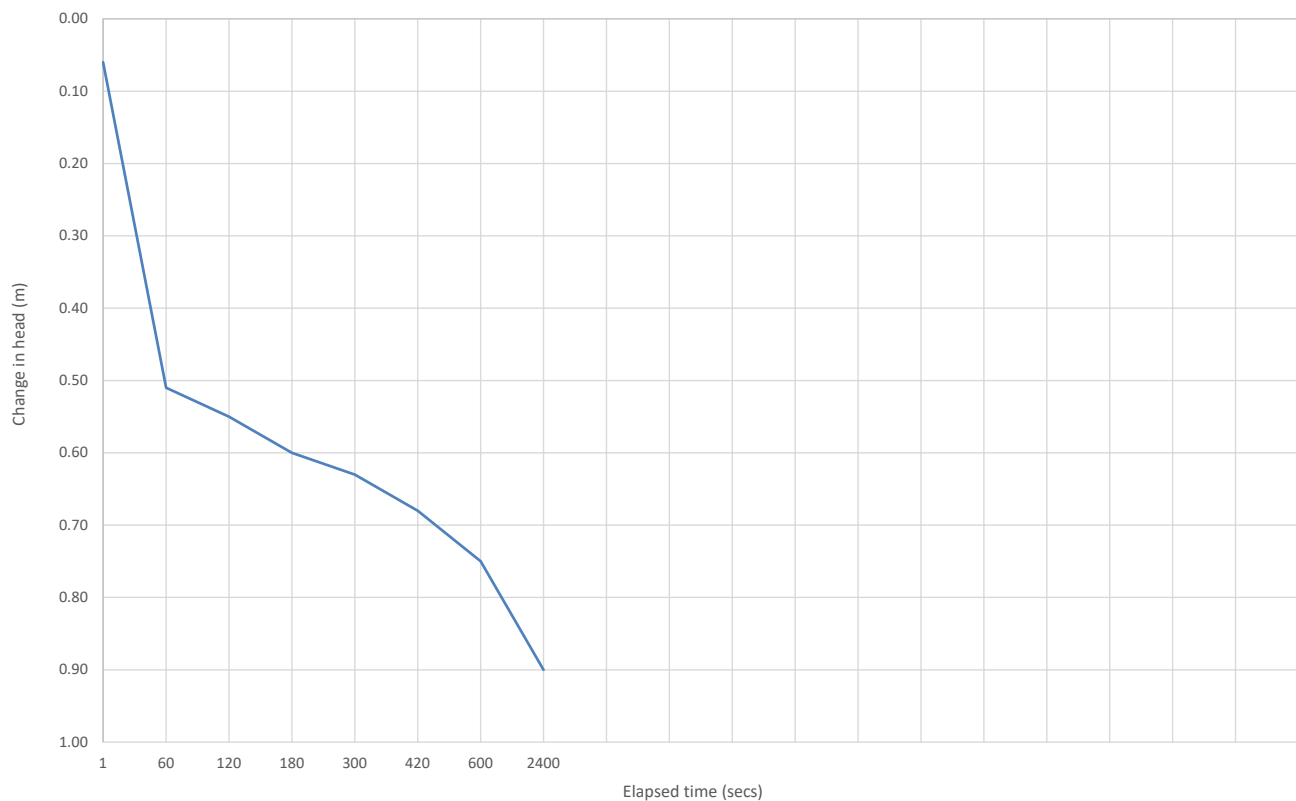
L =	0.94
D =	0.01
L/D =	94.00
F=	1.13

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]

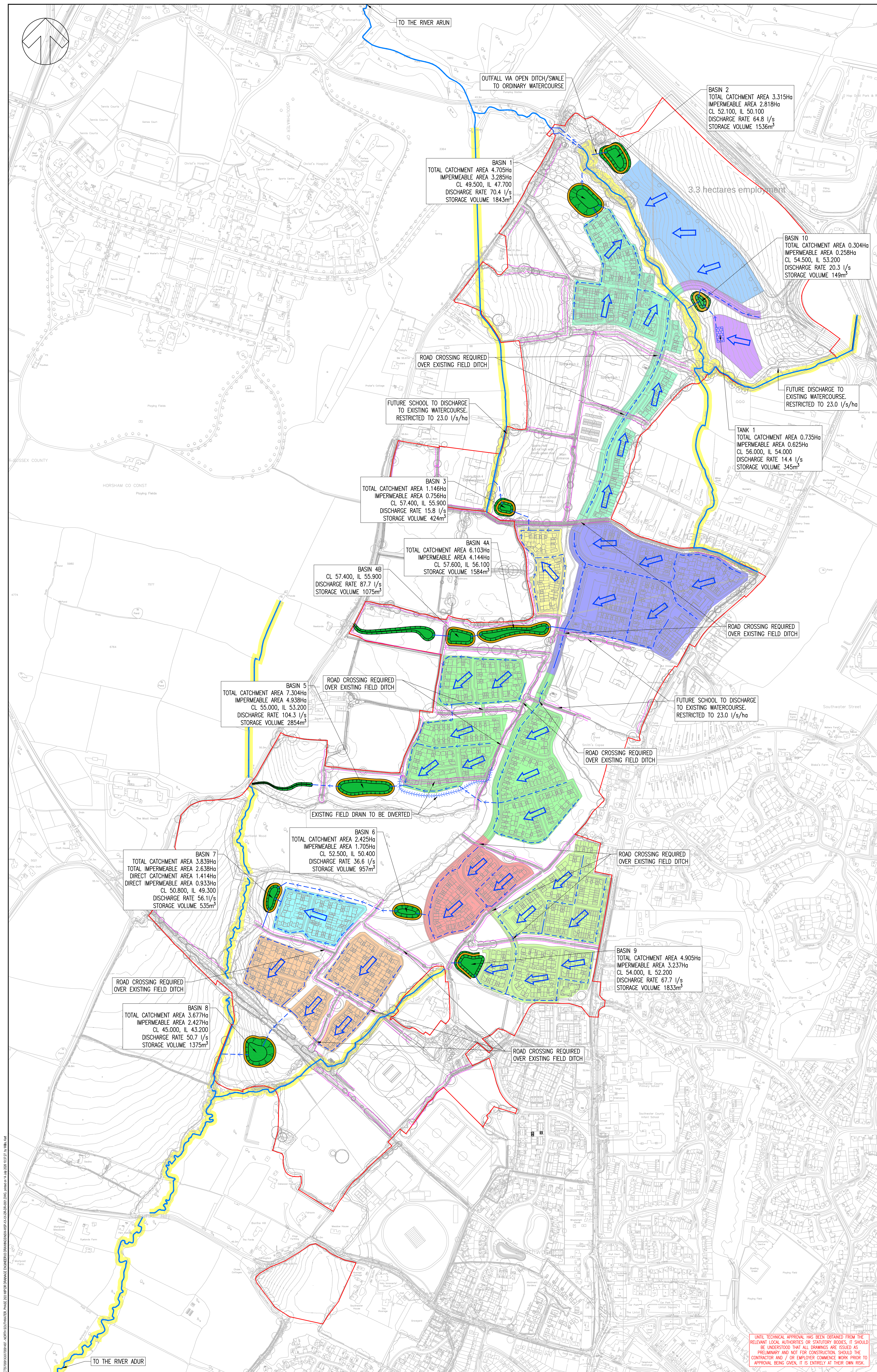
L =	0.84
D =	0.01
L/D =	84.00
F=	1.03

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)

EXISTING FIELD DITCH EASEMENT (3m FROM TOP OF BANK)

PROPOSED DIVERSION OF EXISTING FIELD DITCH

PROPOSED SURFACE WATER SEWER

PROPOSED SURFACE WATER ATTENUATION BASIN

PROPOSED SURFACE WATER STORAGE TANK

INDICATE 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

14/07/2026

KW

FIELD DITCH EASEMENT ADDED

DSB

DSB

PROJ

18/05/2026

KW

BASIN 4 AMENITIES, ORDINARY WATERCOURSE EASEMENT ADDED

DSB

DSB

PROJ

29/01/2026

KW

FIRST ISSUE

DSB

DSB

REV

DATE

BY

DESCRIPTION

CHK

APP

ISSUING STATUS

S2 - FOR INFORMATION

wsp

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

700914597

DESIGNED

KW

DRAWN

KW

DATE

July 26

DRAWING NO.

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

REV.

P03

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