APPENDIX F
FLUVIAL FLOOD LEVEL OVERLAY

DO NOT SCALE FROM THIS DRAWING.

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

NOTES:

1. Topographic Survey provided by Greenhatch Group, drawing no. 42824_T, dated 24.01.22.
2. Proposed site layout provided by Thrive Architects, drawing Sketch Layout Masterplan (CATE211030 SKMP-01 P3), dated 27.10.22.
3. Flood levels taken from Environment Agency provided flood level data dated 11.10.22.

KEY: -

- SITE BOUNDARY

INDICATIVE FLOOD LEVELS (OVERLAID AGAINST EXISTING SITE LEVELS):

- 1 IN 100 YEAR FLOOD LEVEL (19.65MAOD)
- 1 IN 100 YEAR PLUS 35% CLIMATE CHANGE FLOOD LEVEL (19.94MAOD)
- 1 IN 1000 YEAR FLOOD LEVEL (20.04MAOD)

Rev	Date	Amendment	Drawn	Chkd	Appd
P2	09.11.22	Updated with revised site layout	JL	MEC	MEC
P1	25.10.22	Draft for comment	JL	MEC	MEC

LDE
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Web: www.rsk.co.uk

Client

CATESBY STRATEGIC LAND LTD

Project Title

LAND NORTH OF MOAT ROAD, HEADCORN

Status

FINAL

Drawing Title

MODELLED FLUVIAL FLOOD LEVEL OVERLAY

Drawn	Date	Checked	Date	Approved	Date
JL	25.10.22	MEC	25.10.22	MEC	25.10.22

Scale	Orig Size	Dimensions
1:1000	A1	m

Project No.	File Name
680350	680350-01

Drawing No.						Rev.
680350					02	
Project No.	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.

Scale 1:1000
0 10 20 30 40 50m

ead
407000
367276

Camberley
T: 01276 749050
F: 01794 367276

chitects.co.uk

Rev	Description	Date	Au	Ch
P1	Preliminary Issue	16.10.22	VL/ci	--/--
P2	Revised Layout	21.10.22	VL/ci	
P3	Revised Layout	27.10.22	VL/ci	

Project	Moat Road, Headcorn
Drawing	Sketch Layout Master Plan - 01 -
Client	CATESBY ESTATES PLC
Job no.	CATE211030
Dwg no.	SKMP-01
Date	
Rev.	

File Location: Z:\001 HYDRO JOBS LIVE\680350 - HEADCORN CATESBY\4 DRAINAGE\DRAWINGS\680350-01-FLUVIAL FLOOD LEVELS (P2).DWG

APPENDIX G
IDB CORRESPONDENCE

Jemma Looney

From: Oliver Pantrey <Oliver@MedwayIDB.co.uk>
Sent: 03 October 2022 15:41
To: Jemma Looney
Subject: Re: Enquiry re. IDB constraints for site in Headcorn

Dear Jemma,

thank you for your email.

The site in question is on the boundary of the IDD and would discharge straight into the district. As a result, the development would be subject to the Boards sustainable development policy and byelaws which can be found here: Development – Upper Medway IDB

We would expect to see an improvement over the existing greenfield runoff rate (which is loosely worked at around 7l/sec/hec for the 1:100 event), and any calculations should take into account a 40% increase for CC in all instances. Ideally we would expect the site to attenuate well below the 7l/sec/ha with the modern techniques available, and I would suggest closer to 3 or 4l/sec/ha would be more likely to be approved by the Board as part of a responsible approach to development in and around our district.

Our planning and development is handled by our partner the WMA and they will likely respond to any further technical questions should you have them, but hopefully this is suitable to get started.

Kind regards

Oliver Pantrey

Upper Medway IDB
Upper North Hall
Bullen Court business Centre
East Peckham
Kent
TN12 5LX

Tel: 01622 934500

From: Enquiries <Enquiries@MedwayIDB.co.uk>
Sent: 29 September 2022 08:43
To: Oliver Pantrey <Oliver@MedwayIDB.co.uk>
Subject: FW: Enquiry re. IDB constraints for site in Headcorn

FYA

Kind regards

Lorna Carey
Finance Officer

Upper Medway IDB
Bullen Court Business Centre
Bullen Court Farm, Bullen Lane
East Peckham
Kent
TN12 5LX

Tel: 01622 934500
email: lorna@medwayidb.co.uk

From: Jemma Looney <JLooney@rsk.co.uk>
Sent: 28 September 2022 16:28
To: Enquiries <Enquiries@MedwayIDB.co.uk>
Subject: Enquiry re. IDB constraints for site in Headcorn

Good Afternoon,

We are Engineering Consultants who have been asked to produce a flood risk assessment for a site in the Headcorn area.

The address for the site is:
LAND NORTH OF MOAT RAOD
HEADCORN
KENT
TN27 9NT (approx.)

OS Grid ref: 582916, 144563

I have also attached a map of the site location.

We have noted, according to the available IDB coverage map online, that whilst the IDB do not cover the site itself, they cover an area directly to the south of Moat Road, associated with the River Beult to the south, and its tributaries. This area may contain watercourses which may present impacts to the site and therefore we would appreciate any further information you may hold, including any plans.

Please can you provide comments on any IDB constraints within this site area, regarding flood risk and drainage, including modelled levels, known historical flood events and any easement requirements. (Note - We have also contacted the Environment Agency to obtain flood level data for the site and are awaiting their response.)

It is likely that the proposed surface water drainage strategy for the site would be to discharge into the ordinary watercourse crossing Moat Road, which then discharges to the River Beult to the south. Please can you provide advice on any potential connections into this watercourse and what restrictions this would have i.e. discharge rates.

Please provide any comments on how you wish climate change to be incorporated.

If you need any additional information, please do not hesitate to contact us.

Many thanks for your time.
Kind regards,

Jemma Looney
Principal Hydrologist

Please note: My working days are Tuesdays, Wednesdays and Thursdays

LinkedIn

LDE
CIVILS | STRUCTURES | HYDROLOGY
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APPENDIX H
GREENFIELD RUNOFF CALCULATIONS

HR Wallingford
Working with water

Catchment A

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Jemma Looney
Site name:	Moat Road
Site location:	Headcorn

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:	51.17087° N
Longitude:	0.61562° E
Reference:	10665127
Date:	Oct 19 2022 16:39

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1.37

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	659	659
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	6.16	6.16
1 in 1 year (l/s):	5.24	5.24
1 in 30 years (l/s):	14.18	14.18
1 in 100 year (l/s):	19.66	19.66
1 in 200 years (l/s):	23.05	23.05

HR Wallingford
Working with water

Catchment B

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Jemma Looney
Site name:	Moat Road
Site location:	Headcorn

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:	51.17087° N
Longitude:	0.61562° E
Reference:	10665127
Date:	Oct 19 2022 16:39

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1.37

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	659	659
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	6.16	6.16
1 in 1 year (l/s):	5.24	5.24
1 in 30 years (l/s):	14.18	14.18
1 in 100 year (l/s):	19.66	19.66
1 in 200 years (l/s):	23.05	23.05

APPENDIX I
SURFACE WATER DRAINAGE CALCULATIONS
– UPDATED 04.12.23

Cascade Summary of Results for A_Basin 1 (v2) - FEH.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	B_Basin 1 (v2) - FEH.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m^3)	Status
15 min Summer	27.091	0.591	2.6	533.1	O K
30 min Summer	27.178	0.678	2.8	621.1	O K
60 min Summer	27.274	0.774	3.0	721.9	O K
120 min Summer	27.379	0.879	3.2	835.5	O K
180 min Summer	27.443	0.943	3.3	907.4	O K
240 min Summer	27.490	0.990	3.4	960.1	O K
360 min Summer	27.555	1.055	3.5	1035.4	O K
480 min Summer	27.601	1.101	3.5	1088.3	O K
600 min Summer	27.634	1.134	3.6	1127.9	O K
720 min Summer	27.660	1.160	3.6	1158.7	O K
960 min Summer	27.707	1.207	3.7	1215.8	Flood Risk
1440 min Summer	27.763	1.263	3.8	1283.8	Flood Risk
2160 min Summer	27.797	1.297	3.9	1325.7	Flood Risk
2880 min Summer	27.803	1.303	3.9	1334.1	Flood Risk
4320 min Summer	27.761	1.261	3.8	1282.2	Flood Risk
5760 min Summer	27.720	1.220	3.7	1231.4	Flood Risk
7200 min Summer	27.680	1.180	3.7	1182.8	O K
8640 min Summer	27.642	1.142	3.6	1136.9	O K
10080 min Summer	27.606	1.106	3.6	1094.4	O K
15 min Winter	27.155	0.655	2.8	597.2	O K
30 min Winter	27.249	0.749	2.9	696.0	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	208.499	27
30 min Summer	121.726	42
60 min Summer	71.066	72
120 min Summer	41.490	132
180 min Summer	30.285	190
240 min Summer	24.223	250
360 min Summer	17.681	370
480 min Summer	14.142	488
600 min Summer	11.892	608
720 min Summer	10.322	728
960 min Summer	8.340	966
1440 min Summer	6.174	1444
2160 min Summer	4.571	2160
2880 min Summer	3.693	2624
4320 min Summer	2.650	3332
5760 min Summer	2.094	4096
7200 min Summer	1.745	4904
8640 min Summer	1.503	5720
10080 min Summer	1.325	6560
15 min Winter	208.499	27
30 min Winter	121.726	41

Cascade Summary of Results for A_Basin 1 (v2) - FEH.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	27.355	0.855	3.1	809.2	O K
120 min Winter	27.470	0.970	3.3	937.5	O K
180 min Winter	27.541	1.041	3.5	1019.0	O K
240 min Winter	27.593	1.093	3.5	1078.9	O K
360 min Winter	27.665	1.165	3.7	1165.3	O K
480 min Winter	27.716	1.216	3.7	1226.4	Flood Risk
600 min Winter	27.754	1.254	3.8	1272.8	Flood Risk
720 min Winter	27.783	1.283	3.8	1309.3	Flood Risk
960 min Winter	27.838	1.338	3.9	1377.5	Flood Risk
1440 min Winter	27.905	1.405	4.0	1462.5	Flood Risk
2160 min Winter	27.952	1.452	4.1	1523.8	Flood Risk
2880 min Winter	27.968	1.468	4.1	1544.6	Flood Risk
4320 min Winter	27.917	1.417	4.0	1478.2	Flood Risk
5760 min Winter	27.870	1.370	4.0	1418.0	Flood Risk
7200 min Winter	27.819	1.319	3.9	1354.3	Flood Risk
8640 min Winter	27.769	1.269	3.8	1291.4	Flood Risk
10080 min Winter	27.719	1.219	3.7	1230.6	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
60 min Winter	71.066	70
120 min Winter	41.490	130
180 min Winter	30.285	188
240 min Winter	24.223	246
360 min Winter	17.681	364
480 min Winter	14.142	482
600 min Winter	11.892	598
720 min Winter	10.322	716
960 min Winter	8.340	950
1440 min Winter	6.174	1412
2160 min Winter	4.571	2084
2880 min Winter	3.693	2740
4320 min Winter	2.650	3464
5760 min Winter	2.094	4384
7200 min Winter	1.745	5328
8640 min Winter	1.503	6224
10080 min Winter	1.325	7072

Cascade Rainfall Details for A_Basin 1 (v2) - FEH.SRCX

Rainfall Model	FEH	F (1km)	2.466
Return Period (years)	100	Summer Storms	Yes
Site Location	GB 582850 144200 TQ 82850 44200	Winter Storms	Yes
C (1km)	-0.024	Cv (Summer)	0.750
D1 (1km)	0.334	Cv (Winter)	0.840
D2 (1km)	0.369	Shortest Storm (mins)	15
D3 (1km)	0.292	Longest Storm (mins)	10080
E (1km)	0.310	Climate Change %	+45

Time / Area Diagram

Total Area (ha) 1.371

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.457	4-8	0.457	8-12	0.457

Cascade Model Details for A_Basin 1 (v2) - FEH.SRCX

Storage is Online Cover Level (m) 28.000

Tank or Pond Structure

Invert Level (m) 26.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	800.0	1.500	1314.8

Hydro-Brake® Outflow Control

Design Head (m) 1.500 Hydro-Brake® Type Md6 SW Only Invert Level (m) 26.500
Design Flow (l/s) 4.1 Diameter (mm) 77

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	3.7	3.000	5.9	7.000	8.9
0.200	2.5	1.400	4.0	3.500	6.3	7.500	9.3
0.300	2.3	1.600	4.3	4.000	6.8	8.000	9.6
0.400	2.3	1.800	4.5	4.500	7.2	8.500	9.9
0.500	2.5	2.000	4.8	5.000	7.6	9.000	10.1
0.600	2.6	2.200	5.0	5.500	7.9	9.500	10.4
0.800	3.0	2.400	5.2	6.000	8.3		
1.000	3.4	2.600	5.5	6.500	8.6		

Cascade Summary of Results for B_Basin 1 (v2) - FEH.SRCX

Upstream Structures	Outflow To	Overflow To
A_Basin 1 (v2) - FEH.SRCX	B_Basin 2 (v2) - FEH.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m^3)	Status
15 min Summer	20.777	0.577	8.2	529.6	O K
30 min Summer	20.861	0.661	8.2	616.4	O K
60 min Summer	20.953	0.753	8.2	714.7	O K
120 min Summer	21.053	0.853	8.3	823.2	O K
180 min Summer	21.112	0.912	8.5	889.4	O K
240 min Summer	21.153	0.953	8.6	936.3	O K
360 min Summer	21.208	1.008	8.9	1000.1	Flood Risk
480 min Summer	21.243	1.043	9.0	1041.2	Flood Risk
600 min Summer	21.267	1.067	9.1	1069.2	Flood Risk
720 min Summer	21.283	1.083	9.2	1088.4	Flood Risk
960 min Summer	21.312	1.112	9.3	1122.4	Flood Risk
1440 min Summer	21.331	1.131	9.4	1146.1	Flood Risk
2160 min Summer	21.329	1.129	9.3	1143.6	Flood Risk
2880 min Summer	21.319	1.119	9.3	1131.5	Flood Risk
4320 min Summer	21.252	1.052	9.0	1052.1	Flood Risk
5760 min Summer	21.189	0.989	8.8	978.3	O K
7200 min Summer	21.130	0.930	8.6	909.6	O K
8640 min Summer	21.072	0.872	8.3	844.9	O K
10080 min Summer	21.016	0.816	8.2	783.3	O K
15 min Winter	20.839	0.639	8.2	593.8	O K
30 min Winter	20.932	0.732	8.2	691.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	208.499	27
30 min Summer	121.726	41
60 min Summer	71.066	72
120 min Summer	41.490	130
180 min Summer	30.285	190
240 min Summer	24.223	250
360 min Summer	17.681	368
480 min Summer	14.142	486
600 min Summer	11.892	606
720 min Summer	10.322	724
960 min Summer	8.340	964
1440 min Summer	6.174	1440
2160 min Summer	4.571	1800
2880 min Summer	3.693	2188
4320 min Summer	2.650	2988
5760 min Summer	2.094	3816
7200 min Summer	1.745	4680
8640 min Summer	1.503	5464
10080 min Summer	1.325	6352
15 min Winter	208.499	27
30 min Winter	121.726	41

Cascade Summary of Results for B_Basin 1 (v2) - FEH.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	21.033	0.833	8.2	801.8	O K
120 min Winter	21.143	0.943	8.6	924.5	O K
180 min Winter	21.208	1.008	8.9	1000.0	Flood Risk
240 min Winter	21.254	1.054	9.1	1054.0	Flood Risk
360 min Winter	21.316	1.116	9.3	1128.3	Flood Risk
480 min Winter	21.357	1.157	9.5	1177.3	Flood Risk
600 min Winter	21.385	1.185	9.6	1211.6	Flood Risk
720 min Winter	21.405	1.205	9.6	1236.2	Flood Risk
960 min Winter	21.441	1.241	9.8	1280.7	Flood Risk
1440 min Winter	21.473	1.273	9.9	1320.7	Flood Risk
2160 min Winter	21.475	1.275	9.9	1322.3	Flood Risk
2880 min Winter	21.459	1.259	9.9	1303.4	Flood Risk
4320 min Winter	21.378	1.178	9.5	1202.3	Flood Risk
5760 min Winter	21.294	1.094	9.2	1101.4	Flood Risk
7200 min Winter	21.212	1.012	8.9	1004.7	Flood Risk
8640 min Winter	21.132	0.932	8.6	912.8	O K
10080 min Winter	21.054	0.854	8.3	824.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
60 min Winter	71.066	70
120 min Winter	41.490	128
180 min Winter	30.285	186
240 min Winter	24.223	246
360 min Winter	17.681	362
480 min Winter	14.142	478
600 min Winter	11.892	596
720 min Winter	10.322	710
960 min Winter	8.340	940
1440 min Winter	6.174	1388
2160 min Winter	4.571	2016
2880 min Winter	3.693	2288
4320 min Winter	2.650	3208
5760 min Winter	2.094	4152
7200 min Winter	1.745	5048
8640 min Winter	1.503	5968
10080 min Winter	1.325	6864

Cascade Rainfall Details for B_Basin 1 (v2) - FEH.SRCX

Rainfall Model	FEH	F (1km)	2.466
Return Period (years)	100	Summer Storms	Yes
Site Location	GB 582850 144200 TQ 82850 44200	Winter Storms	Yes
C (1km)	-0.024	Cv (Summer)	0.750
D1 (1km)	0.334	Cv (Winter)	0.840
D2 (1km)	0.369	Shortest Storm (mins)	15
D3 (1km)	0.292	Longest Storm (mins)	10080
E (1km)	0.310	Climate Change %	+45

Time / Area Diagram

Total Area (ha) 1.369

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.456	4-8	0.456	8-12	0.456

Cascade Model Details for B_Basin 1 (v2) - FEH.SRCX

Storage is Online Cover Level (m) 21.500

Tank or Pond Structure

Invert Level (m) 20.200

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	820.0	1.300	1263.7

Hydro-Brake® Outflow Control

Design Head (m) 1.300 Hydro-Brake® Type Md6 SW Only Invert Level (m) 20.200
Design Flow (l/s) 10.0 Diameter (mm) 124

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	1.200	9.6	3.000	15.2	7.000	23.2
0.200	7.8	1.400	10.4	3.500	16.4	7.500	24.0
0.300	8.1	1.600	11.1	4.000	17.5	8.000	24.8
0.400	7.8	1.800	11.8	4.500	18.6	8.500	25.6
0.500	7.5	2.000	12.4	5.000	19.6	9.000	26.3
0.600	7.5	2.200	13.0	5.500	20.6	9.500	27.0
0.800	8.1	2.400	13.6	6.000	21.5		
1.000	8.8	2.600	14.1	6.500	22.4		

Cascade Summary of Results for B_Basin 2 (v2) - FEH.SRCX

Upstream Structures	Outflow To	Overflow To
B_Basin 1 (v2) - FEH.SRCX A_Basin 1 (v2) - FEH.SRCX	(None)	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m^3)	Status
15 min Summer	20.002	0.252	7.4	108.3	O K
30 min Summer	20.011	0.261	7.4	112.8	O K
60 min Summer	20.030	0.280	7.4	121.3	O K
120 min Summer	20.052	0.302	7.4	131.8	O K
180 min Summer	20.078	0.328	7.4	144.1	O K
240 min Summer	20.112	0.362	7.4	160.4	O K
360 min Summer	20.160	0.410	7.4	184.4	O K
480 min Summer	20.213	0.463	7.4	211.2	O K
600 min Summer	20.257	0.507	7.4	233.7	O K
720 min Summer	20.289	0.539	7.4	250.8	O K
960 min Summer	20.343	0.593	7.4	279.4	O K
1440 min Summer	20.391	0.641	7.4	305.9	O K
2160 min Summer	20.568	0.818	7.5	408.0	Flood Risk
2880 min Summer	20.565	0.815	7.4	406.0	Flood Risk
4320 min Summer	20.530	0.780	7.4	385.5	Flood Risk
5760 min Summer	20.567	0.817	7.4	407.5	Flood Risk
7200 min Summer	20.544	0.794	7.4	393.3	Flood Risk
8640 min Summer	20.515	0.765	7.4	376.6	Flood Risk
10080 min Summer	20.491	0.741	7.4	362.4	Flood Risk
15 min Winter	20.012	0.262	7.4	113.0	O K
30 min Winter	19.995	0.245	7.3	105.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	208.499	1206
30 min Summer	121.726	1440
60 min Summer	71.066	1924
120 min Summer	41.490	2378
180 min Summer	30.285	2682
240 min Summer	24.223	2880
360 min Summer	17.681	2880
480 min Summer	14.142	2880
600 min Summer	11.892	2880
720 min Summer	10.322	2880
960 min Summer	8.340	2880
1440 min Summer	6.174	2880
2160 min Summer	4.571	5588
2880 min Summer	3.693	5760
4320 min Summer	2.650	5760
5760 min Summer	2.094	7952
7200 min Summer	1.745	8792
8640 min Summer	1.503	9608
10080 min Summer	1.325	10360
15 min Winter	208.499	1437
30 min Winter	121.726	1440

Cascade Summary of Results for B_Basin 2 (v2) - FEH.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	20.044	0.294	7.4	128.2	O K
120 min Winter	20.088	0.338	7.4	149.1	O K
180 min Winter	20.141	0.391	7.4	175.0	O K
240 min Winter	20.190	0.440	7.4	199.4	O K
360 min Winter	20.277	0.527	7.4	244.4	O K
480 min Winter	20.335	0.585	7.4	275.2	O K
600 min Winter	20.375	0.625	7.4	297.1	O K
720 min Winter	20.404	0.654	7.4	313.2	O K
960 min Winter	20.452	0.702	7.4	340.0	Flood Risk
1440 min Winter	20.493	0.743	7.4	363.6	Flood Risk
2160 min Winter	20.620	0.870	7.6	439.1	Flood Risk
2880 min Winter	20.647	0.897	7.7	455.8	Flood Risk
4320 min Winter	20.641	0.891	7.7	452.2	Flood Risk
5760 min Winter	20.636	0.886	7.7	449.0	Flood Risk
7200 min Winter	20.615	0.865	7.6	436.3	Flood Risk
8640 min Winter	20.588	0.838	7.5	420.0	Flood Risk
10080 min Winter	20.558	0.808	7.4	401.9	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
60 min Winter	71.066	2238
120 min Winter	41.490	2744
180 min Winter	30.285	2880
240 min Winter	24.223	2880
360 min Winter	17.681	2880
480 min Winter	14.142	2880
600 min Winter	11.892	2880
720 min Winter	10.322	2880
960 min Winter	8.340	2880
1440 min Winter	6.174	2880
2160 min Winter	4.571	5760
2880 min Winter	3.693	4952
4320 min Winter	2.650	5760
5760 min Winter	2.094	8528
7200 min Winter	1.745	9376
8640 min Winter	1.503	10200
10080 min Winter	1.325	11008

Cascade Rainfall Details for B_Basin 2 (v2) - FEH.SRCX

Rainfall Model	FEH	F (1km)	2.466
Return Period (years)	100	Summer Storms	Yes
Site Location	GB 582850 144200 TQ 82850 44200	Winter Storms	Yes
C (1km)	-0.024	Cv (Summer)	0.750
D1 (1km)	0.334	Cv (Winter)	0.840
D2 (1km)	0.369	Shortest Storm (mins)	15
D3 (1km)	0.292	Longest Storm (mins)	10080
E (1km)	0.310	Climate Change %	+45

Time / Area Diagram

Total Area (ha) 0.000

Time (mins)	Area (ha)
0-4	0.000

Cascade Model Details for B_Basin 2 (v2) - FEH.SRCX

Storage is Online Cover Level (m) 20.750

Tank or Pond Structure

Invert Level (m) 19.750

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	400.0	1.000	641.0

Hydro-Brake® Outflow Control

Design Head (m) 1.000 Hydro-Brake® Type Md6 SW Only Invert Level (m) 19.750
Design Flow (l/s) 8.2 Diameter (mm) 119

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.8	1.200	8.9	3.000	14.0	7.000	21.4
0.200	7.1	1.400	9.6	3.500	15.1	7.500	22.1
0.300	7.3	1.600	10.2	4.000	16.2	8.000	22.9
0.400	7.0	1.800	10.8	4.500	17.1	8.500	23.6
0.500	6.8	2.000	11.4	5.000	18.1	9.000	24.2
0.600	6.8	2.200	12.0	5.500	18.9	9.500	24.9
0.800	7.4	2.400	12.5	6.000	19.8		
1.000	8.1	2.600	13.0	6.500	20.6		

APPENDIX J
SURFACE WATER DRAINAGE STRATEGY – UPDATED 04.12.23

DO NOT SCALE FROM THIS DRAWING.

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

NOTES:

1. Topographic Survey provided by Greenhatch Group, drawing no. 42824_T, dated 24.01.22.
2. Proposed site layout provided by Thrive Architects, drawing Sketch Layout Masterplan (CATE211030 SKMP-01 P3), dated 27.10.22.
3. Indicative surface water drainage strategy only, for planning purposes. To be finalised at detailed design stage. Not for construction.

KEY: -

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- INDICATIVE SURFACE WATER DRAINAGE NETWORK
- 1 IN 100 YEAR FLOOD LEVEL (19.65MAOD)
- 1 IN 100 YEAR PLUS 35% CLIMATE CHANGE FLOOD LEVEL (19.94MAOD)

SUDS:

- PERMEABLE PAVING
- DETENTION BASIN
- INDICATIVE SWALE LOCATION

Rev	Date	Amendment	Drawn	Chkd	Appd
P3	18.12.23	Updated drainage strategy	BD	MEC	MEC
P2	09.11.22	Updated with revised site layout	JL	MEC	MEC
P1	25.10.22	Draft for comment	JL	MEC	MEC

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Client
CATESBY STRATEGIC LAND LTD

Project Title
LAND NORTH OF MOAT ROAD, HEADCORN

Status
FOR PLANNING

Drawing Title
INDICATIVE SURFACE WATER DRAINAGE STRATEGY

Drawn	Date	Checked	Date	Approved	Date
JL	25.10.22	MEC	25.10.22	MEC	25.10.22

Scale	Orig Size	Dimensions
1:1000	A1	m

Project No.	File Name
680350	680350-02

Drawing No.						Rev.
680350					03	
Project No.	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.

Scale 1:1000
0 10 20 30 40 50m

ead
407000
367276
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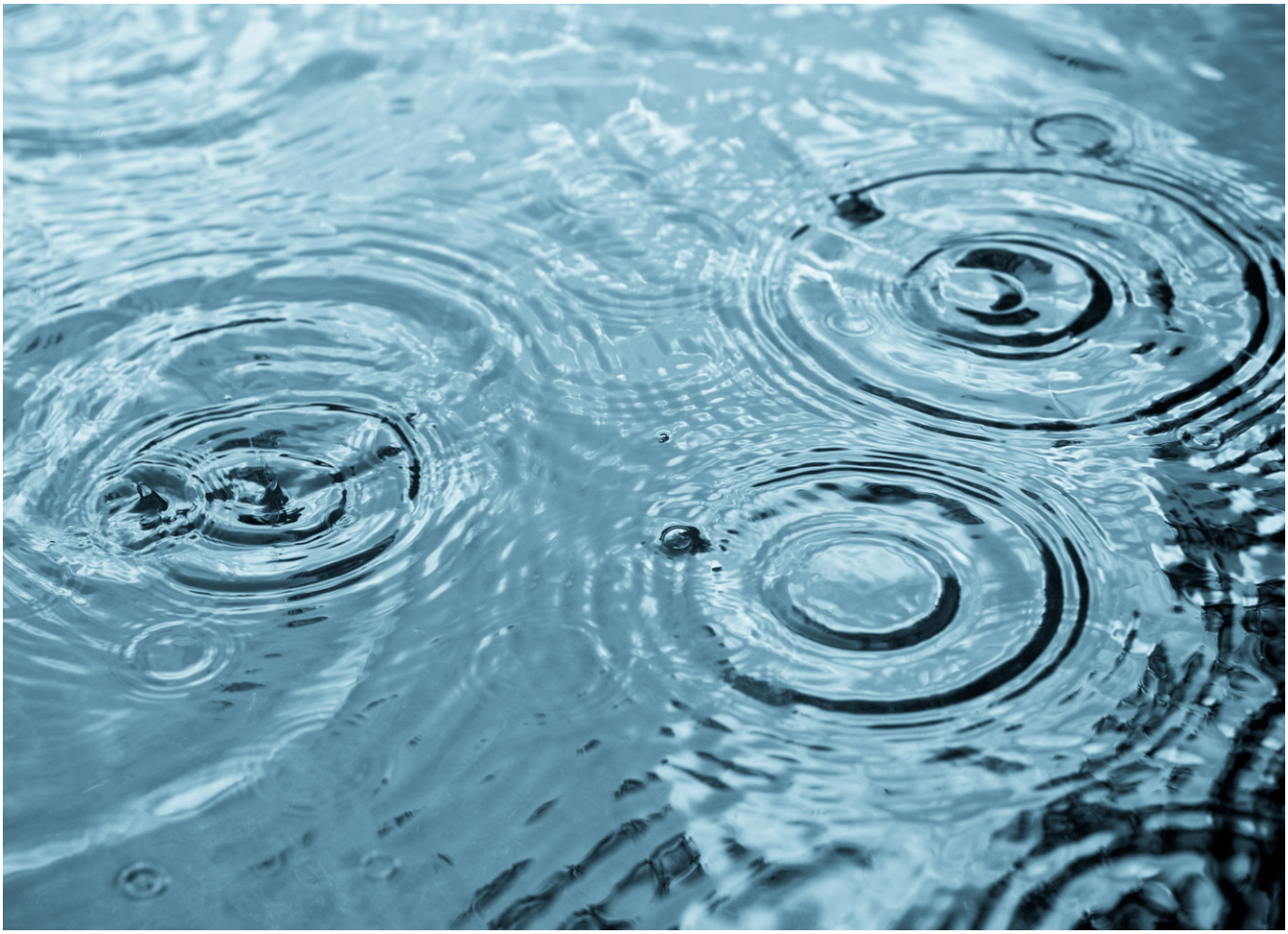
chitects.co.uk

Rev	Description	Date	Au	Ch
P1	Preliminary Issue	16.10.22	VL/ci	--/--
P2	Revised Layout	21.10.22	VL/ci	
P3	Revised Layout	27.10.22	VL/ci	

Project	Moat Road, Headcorn
Drawing	Sketch Layout Master Plan - 01 -
Client	CATESBY ESTATES PLC
Job no.	CATE211030
Dwg no.	SKMP-01
Date	
Rev.	

File Location: L:\001 HYDRO JOBS LIVE\680350 - HEADCORN CATESBY\4.DRAINAGE\DRAWINGS\680350-02-SW DRAINAGE STRATEGY (P4).DWG

APPENDIX K
SUDS MANAGEMENT STRATEGY



Catesby Strategic Land Ltd

Land north of Moat Road, Headcorn

Sustainable Drainage System (SuDS) Management Strategy

680350-R2(1)
November 2022

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

RSK GENERAL NOTES

Project No.: 680350-R2(1)

Site: Land north of Moat Road, Headcorn

Title: Sustainable Drainage System (SuDS) Management Strategy

Client: Catesby Strategic Land Ltd

Date: 09th November 2022

Office: Hemel Hempstead

Status: Final

Author	J Looney	**Technical reviewer**	M Cheeseman
Signature		Signature	
Date:	09th November 2022	Date:	09th November 2022

Quality reviewer	K Jackson
Signature	
Date:	09th November 2022

Issue No	Version/Details	Date issued	Author	Reviewed by	Approved by
R2(0)	680350-R2(0)	31.10.22	JL	MC	KJ
R2(1)	680350-R2(1)	09.11.22	JL	MC	KJ

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2 MAINTENANCE RESPONSIBILITIES 2
3 MAINTENANCE REGIME 3
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3.2 Detention Basins 4
3.3 Swales 5

APPENDICES
APPENDIX A INSPECTION CHECKLIST

1 INTRODUCTION

This management strategy has been prepared by RSK Land and Development Engineering Ltd on behalf of Catesby Strategic Land Ltd, to support the proposed surface water drainage strategy at Land north of Moat Road, Headcorn (The Development).

The SuDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of 100 years plus climate change. This is required so that The Development will not increase the risk of flooding to the site and its environs. All drainage on site is taken to the ditch on the southern site boundary via a pumped outfall. Such features include the following:

- Permeable paving;
- Detention Basins; and
- Swales.

This document outlines the long-term maintenance of the proposed surface water system and will refer to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, 'The SUDS Manual', 2015
- CIRIA Report C625, 'Model Agreements for Sustainable Water Management Systems', 2004; and
- Interpave, 'Permeable pavements: Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements', ed. 4, 2006.

2 MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For the Development, the drainage responsibilities will be divided between the following:

- **Private Landowner** – each Householder will be responsible for the maintenance of drainage features within individual property curtilages.
- **Communal Areas** - A Management company will be set up for the Development to maintain all permeable paving, detention basins, outfalls and any associated flow controls within communal areas. However, it should be noted that if, the Flood and Water Management Act 2010 is ever fully implemented this allows a surface water drainage system to be vested to the SUDS approving body (SAB) in this case Kent County Council. This would be reviewed at the time of any implementation of the act.

3 MAINTENANCE REGIME

As the maintenance of the communal SUDS features will be carried out via a Management Company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SUDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

3.1 Permeable Paving

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)

Maintenance schedule	Required action	Typical frequency
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.2 Detention Basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), as or required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), the annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required

Maintenance schedule	Required action	Typical frequency
	Relevel uneven surfaces and reinstate design levels	As required

3.3 Swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass- to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspection inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design level	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of soil surface	As required
	Remove build up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

APPENDIX A
INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

Inspection Date	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Silt/Sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible potentially problematic where water has to soak into the underlying								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
construction or ground (e.g. underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (check against approved planting regime)								
Does any part of the system require weeding, pruning or mowing? (check against maintenance frequency state in approved design).								
Is there any evidence of invasive species becoming established? If yes, state action required								
Are any check dams or weirs in good condition?								
Is there any evidence of any accidental damage to the system (e.g. wheel ruts?)								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects?								
Other observations								
Information appended (e.g. photos)								
Continue as current Increase maintenance Decrease maintenance								
Proposed date for next inspection								