

Land off New Inn Road, Bartley SO40 2NA

Addendum to Drainage Report

A Drainage Report has been submitted to support the planning application for residential development at Land off New Inn Road, Bartley. The report included a surface water drainage strategy for the development which managed runoff by means of a dynamic groundwater discharge solution.

Since the strategy was prepared, further site surveys have identified an existing field ditch to the east of the development and within the client-controlled land. The natural topography falls in this direction. Therefore, the drainage strategy has been revised to manage runoff via this existing outfall route.

Figure 1 below identifies the ditch and its onward route. The photos are included in a drainage survey report in Appendix A. Topographical survey of the ditch is shown on the strategy plan in Appendix B.

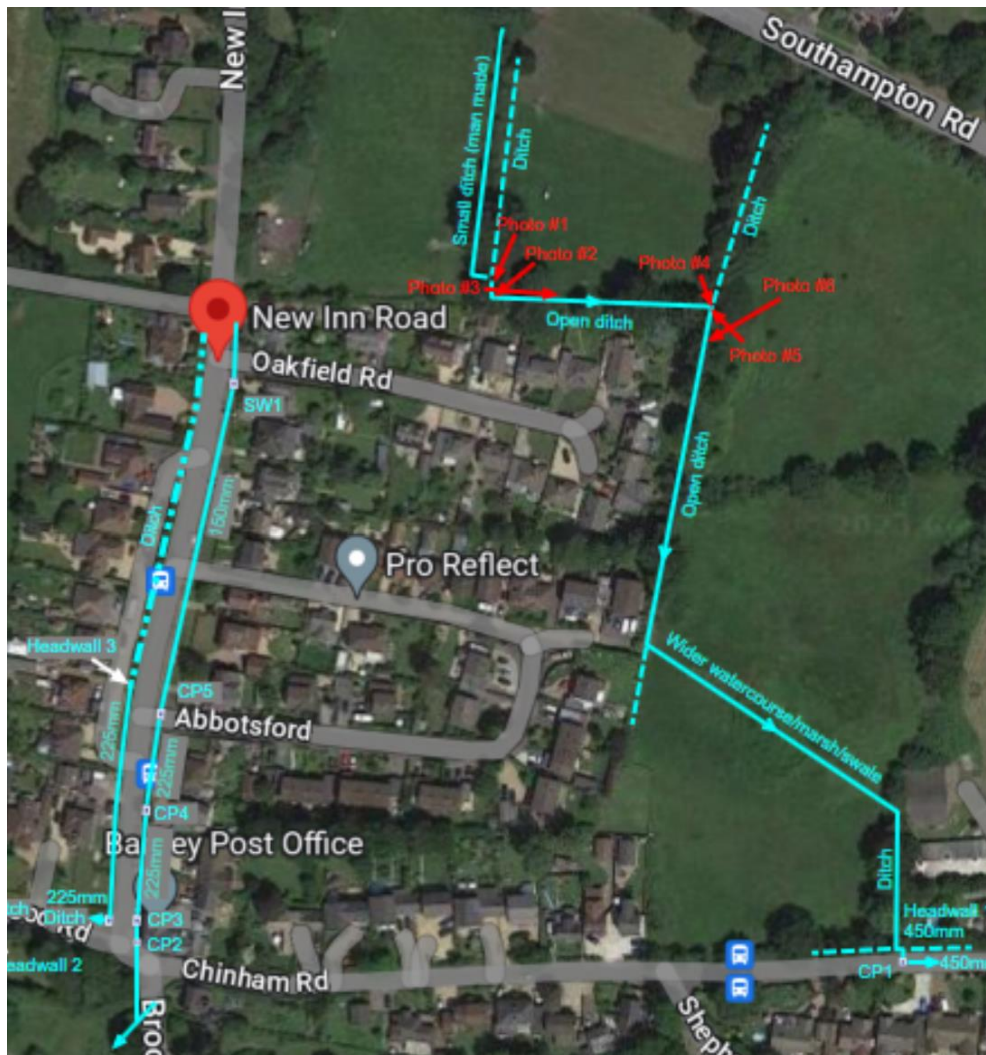


Figure 1: Existing ditch layout

Civil Engineering - Transport Planning - Flood Risk

GTA Civils & Transport, Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD
T: 01444 871444 E: enquiries@gtacivils.co.uk www: gtacivils.co.uk

GTA Civils & Transport Limited, Registered in England No. 11917461. VAT Registration No. 319 2609 02



To confirm that these are the existing flow routes for the site an overland flow analysis has been run using SCALGO Live software. Figure 2 illustrates the results. The existing flow pattern is consistent with the ditch routes.

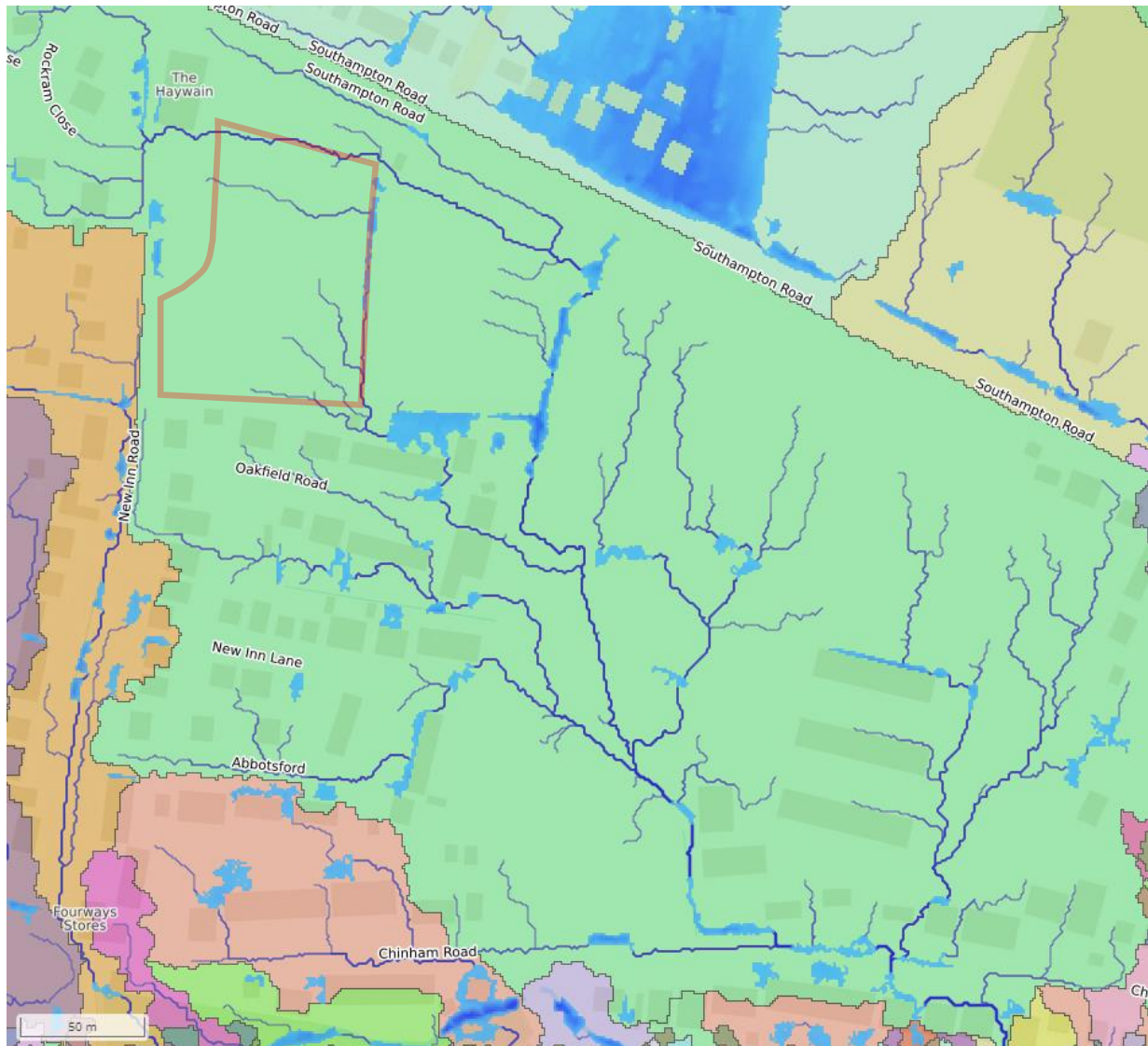


Figure 2: SCALGO Live analysis showing existing flow routes

Existing runoff rates have been calculated (see Appendix C). The greenfield Qbar rate is 5.9 l/s/ha. The development drainage catchment measures 0.167 ha, therefore the limiting discharge rate will be set to 1.0 l/s for all storm events up to the 1 in 100 annual probability (AP) plus 45% climate change allowance.

Storage volume will be provided as before within the permeable paving sub-base. The site falls from west-to-east. Therefore, the two internal roads which run in a north-south direction provide two opportune locations for sub-base storage cells. The east cell has been augmented with a cellular storage tank below the sub-base to provide sufficient volume.

Runoff from all vehicular surfaces will be routed through the permeable sub-base. This will provide sufficient runoff treatment in accordance with the Simple Index Approach outlined in The SuDS Manual (CIRIA, C753).

The amended drainage strategy drawing is included in Appendix B. MicroDrainage Network calculations are included in Appendix C to demonstrate that the proposed strategy will safely manage runoff for all events up to the 1 in 100 AP +45%.

Conclusion

The amended surface water drainage strategy is the most sustainable and practicable solution and will ensure that the development has no detrimental impact on groundwater or on off-site flood risk. The amended strategy complies with the NPPF.

Appendix A: Drainage survey report

Project**Project Name:** New Inn Road_ Bartley**Project Description:** CCTV Survey, Trace & Plot**Project Status:** Complete**Project Date:** 19/05/2023**Inspection Standard:** MSCC5 Sewers & Drainage GB (SRM5 Scoring)

EYES ON DRAINAGE

SPECIALIST CCTV SURVEYING



Table of Contents

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New Inn Road_ Bartley		19/05/2023

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**Project Information****Project Name**
New Inn Road_ Bartley**Project Number****Project Date**
19/05/2023**Client**

Company: gta Civils & Transport
Department: Maple House
Street: 192-198 London Road
Town or City: Burgess Hill
County: West Sussex
Post Code: RH15 9RD
Phone: 01444 871444

**Site**

Street: New Inn Road
Town or City: Bartley
County: Hampshire
Post Code: SO40 2NA

Contractor

Company: Eyes On Drainage Services Ltd
Contact: Jay Young
Department: Merrion House
Street: Bines Green
Town or City: Horsham
County: West Sussex
Post Code: RH13 8EH
Phone: 01403 710971
Mobile: 077111 84951
Email: info@eyesondrainage.co.uk





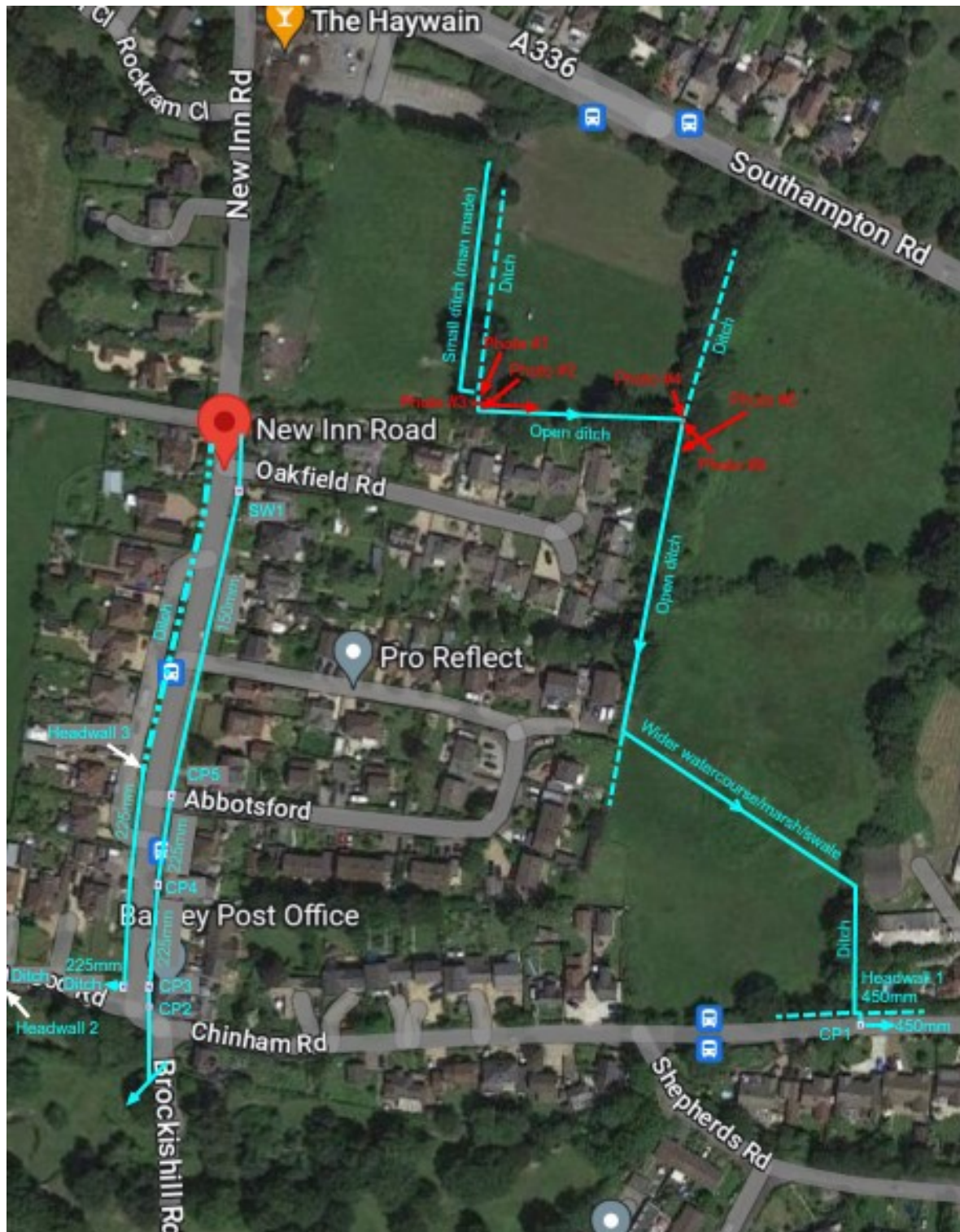
Project Information

Project Name
New Inn Road_Bartley

Project Number

Project Date
19/05/2023

Project Drawing, Page 'New Inn Road_ Bartley'



Scoring Summary

Project Name
New Inn Road_ Bartley**Project Number****Project Date**
19/05/2023

Structural Defects

Grade 3: Best practice suggests consideration should be given to repairs in the medium term.

Grade 4: Best practice suggests consideration should be given to repairs to avoid a potential collapse.

Grade 5: Best practice suggests that this pipe is at risk of collapse at any time. Urgent consideration should be given to repairs to avoid total failure.

Section	PLR	Grade	Description
2	CP2X	5	Hole in drain or sewer from 8 o'clock to 4 o'clock, finish

Service / Operational Condition

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
1	CP3X	3	Multiple defects
2	CP2X	3	Settled deposits, coarse, 15% cross-sectional area loss, finish

Abandoned Surveys

Section	PLR	Description
2	CP2X	Survey abandoned

Information

These scoring summaries are based on the SRM grading from the WRc.



Project Pictures

Project Name
New Inn Road_ Bartley

Project Number

Project Date
19/05/2023



CP1



CP1 (450mm inlet and outlet)



Headwall 1



Headwall 2



Headwall 3



Small ditch (man made)

Project Pictures

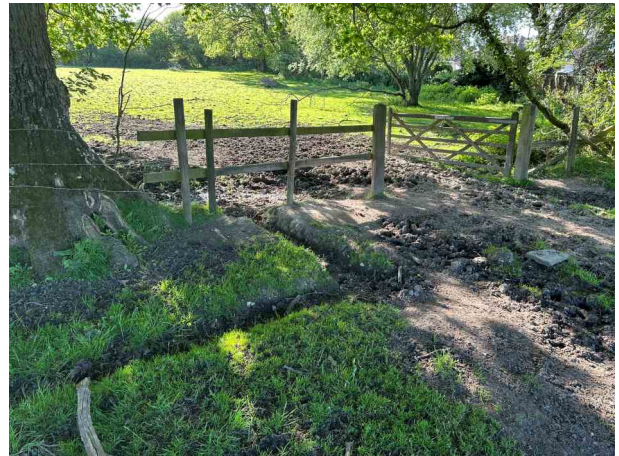
Project Name
New Inn Road_ Bartley

Project Number

Project Date
19/05/2023



Small ditch (man made)



Small ditch (man made)



CP3



CP4



CP5



SW1

Project Pictures

Project Name	Project Number	Project Date
New Inn Road_ Bartley		19/05/2023



Ditch, East side of New Inn Rd



Ditch, East side of New Inn Rd



Ditch, East side of New Inn Rd

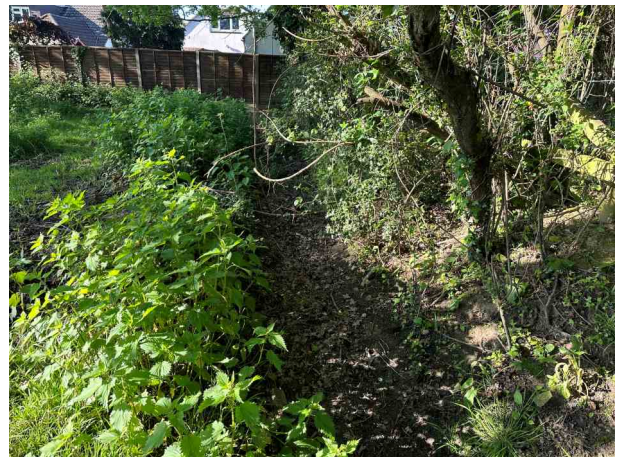


Photo #1



Photo #2

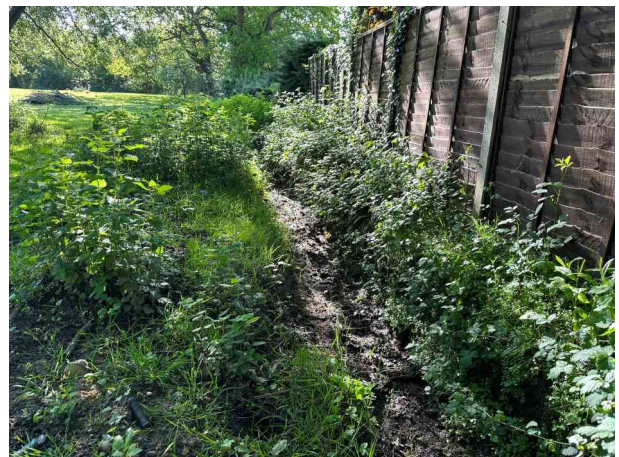


Photo #3



Project Pictures

Project Name
New Inn Road_ Bartley

Project Number

Project Date
19/05/2023



Photo #4



Photo #5



Photo #6



Swale



Swale



Section Profile

Project Name
New Inn Road_ Bartley

Project Number

Project Date
19/05/2023

Circular, 225 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
1	CP3	CP2	16/05/2023	New Inn Rd	Vitrified clay	7.60 m	7.60 m

Total: 1 Inspection x Circular 225 mm, 0 mm = 7.60 m Total Length and 7.60 m Inspected Length

Total: 1 Inspection = 7.60 m Total Length and 7.60 m Inspected Length



Section Summary

Project Name New Inn Road _ Bartley	Project Number	Project Date 19/05/2023
---	-----------------------	-----------------------------------

Number of sections	2
Total length of sections	38.00 m
Total length of inspected sections	38.00 m
Total length of not inspected sections	0.00 m
Number of abandoned inspections	1
Number of section inspection photos	26
Number of section inspection videos	2
Number of section inspection scans	0
Number of section inclination measurements	0

PLR:	CP3X	Upstream Node:	CP3
Inspection Direction:	Downstream	Downstream Node:	CP2
Inspected Length:	7.60 m	Dia/Height:	225 mm
Total Length:	7.60 m	Pipe Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	CP	Start node, catchpit, reference: CP3
2	0.00	WL	Water level, 0% of the vertical dimension
3	0.80	DES	Settled deposits, fine, 10% cross-sectional area loss, start
4	3.60	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
5	7.30	DES	Settled deposits, fine, 10% cross-sectional area loss, finish
6	7.30	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
7	7.60	CPF	Finish node, catchpit, reference: CP2

PLR:	CP2X	Upstream Node:	CP2
Inspection Direction:	Downstream	Downstream Node:	A
Inspected Length:	30.40 m	Dia/Height:	225 mm
Total Length:	30.40 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	CP	Start node, catchpit, reference: CP2
2	0.00	WL	Water level, 0% of the vertical dimension
3	0.50	FM	Fractures, multiple from 12 o'clock to 12 o'clock, start
4	0.90	FM	Fractures, multiple from 12 o'clock to 12 o'clock, finish
5	5.00	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
6	5.60	DER	Settled deposits, coarse, 20% cross-sectional area loss, change
7	6.00	DER	Settled deposits, coarse, 30% cross-sectional area loss, change
8	6.40	DER	Settled deposits, coarse, 40% cross-sectional area loss, change
9	7.00	H	Hole in drain or sewer from 8 o'clock to 4 o'clock, start

**Section Summary****Project Name**
New Inn Road_ Bartley**Project Number****Project Date**
19/05/2023

No.	m+	Code	Observation
10	7.00	GP	General photograph taken at this point
11	7.70	H	Hole in drain or sewer from 8 o'clock to 4 o'clock, finish
12	7.70	DER	Settled deposits, coarse, 15% cross-sectional area loss, change
13	18.30	GP	General photograph taken at this point
14	20.50	DER	Settled deposits, coarse, 20% cross-sectional area loss, change
15	21.60	DER	Settled deposits, coarse, 25% cross-sectional area loss, change
16	27.00	FM	Fractures, multiple from 8 o'clock to 3 o'clock
17	27.90	DER	Settled deposits, coarse, 15% cross-sectional area loss, change
18	28.20	FM	Fractures, multiple from 8 o'clock to 4 o'clock, start
19	29.00	FM	Fractures, multiple from 8 o'clock to 4 o'clock, finish
20	30.40	DER	Settled deposits, coarse, 15% cross-sectional area loss, finish
21	30.40	B	Broken pipe from 12 o'clock to 4 o'clock
22	30.40	LR	Line deviates right
23	30.40	SA	Survey abandoned



Section Inspection - 16/05/2023 - CP3X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
1	1	16/05/23	9:52	Not Specified	No Rain Or Snow	No	CP3X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
JY		BV21 CDX		Pearpoint P540	Not Specified	Highways Drainage	Not Specified

Town or Village:	Bartley	Inspection Direction:	Downstream	Upstream Node:	CP3
Road:	New Inn Rd	Inspected Length:	7.60 m	Upstream Pipe Depth:	
Location:	Footway	Total Length:	7.60 m	Downstream Node:	CP2
Surface Type:	Asphalt Footway	Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:66	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m	CP3	0.00	CP	Start node, catchpit, reference: CP3	00:00:00		
		0.00	WL	Water level, 0% of the vertical dimension	00:00:02	1	
		0.80	S02	DES Settled deposits, fine, 10% cross-sectional area loss, start	00:00:08	2	
		3.60	S01	DER Settled deposits, coarse, 10% cross-sectional area loss, start	00:00:25	3	
		7.30	F02	DES Settled deposits, fine, 10% cross-sectional area loss, finish	00:00:48		3
		7.30	F01	DER Settled deposits, coarse, 10% cross-sectional area loss, finish	00:00:48	4	3
		7.60	CPF	Finish node, catchpit, reference: CP2	00:00:47	5	
Depth: m	CP2						

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	4.0	2.9	22.0	4.0



Section Pictures - 16/05/2023 - CP3X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	CP3X		



1, 00:00:02, 0.00 m
Water level, 0% of the vertical dimension



2, 00:00:08, 0.80 m
Settled deposits, fine, 10% cross-sectional area loss, start



3, 00:00:25, 3.60 m
Settled deposits, coarse, 10% cross-sectional area loss, start



4, 00:00:48, 7.30 m
Settled deposits, coarse, 10% cross-sectional area loss, finish



5, 00:00:47, 7.60 m
Finish node, catchpit, reference: CP2



Section Inspection - 16/05/2023 - CP2X

Item No. 2	Insp. No. 1	Date 16/05/23	Time 9:58	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR CP2X
Operator JY		Vehicle BV21 CDX		Camera Pearpoint P540	Preset Length Not Specified	Legal Status Highways Drainage	Alternative ID Not Specified

Town or Village:	Bartley	Inspection Direction:	Downstream	Upstream Node:	CP2
Road:	New Inn Rd	Inspected Length:	30.40 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	30.40 m	Downstream Node:	A
Surface Type:	Asphalt Highway	Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Flow Control:	No flow control	Pipe Material:	Concrete		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:211	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m CP2 </							



Section Inspection - 16/05/2023 - CP2X

Item No. 2	Insp. No. 1	Date 16/05/23	Time 9:58	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR CP2X
Operator JY		Vehicle BV21 CDX		Camera Pearpoint P540	Preset Length Not Specified	Legal Status Highways Drainage	Alternative ID Not Specified

Scale: 1:211	Position [m]	Code	Observation	MPEG	Photo	Grade	
	27.00	FM	Fractures, multiple from 8 o'clock to 3 o'clock	00:03:06	17	4 / 2	
	27.90	C02	DER	Settled deposits, coarse, 15% cross-sectional area loss, change	00:03:13		
	28.20	S04	FM	Fractures, multiple from 8 o'clock to 4 o'clock, start	00:03:13	18	
	29.00	F04	FM	Fractures, multiple from 8 o'clock to 4 o'clock, finish	00:03:28		4 / 2
	30.40	F02	DER	Settled deposits, coarse, 15% cross-sectional area loss, finish	00:03:31		3
	30.40	B		Broken pipe from 12 o'clock to 4 o'clock	00:03:34	19	4
	30.40	LR		Line deviates right: Junction with unknown	00:03:35	20	
	30.40	SA	Survey abandoned: Unable to continue	00:04:00	21		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
5	165.0	16.0	485.0	5.0	4	3.0	1.8	55.0	3.0



Section Pictures - 16/05/2023 - CP2X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	CP2X		



1, 00:00:01, 0.00 m
Water level, 0% of the vertical dimension



2, 00:00:05, 0.50 m
Fractures, multiple from 12 o'clock to 12 o'clock, start



3, 00:00:05, 0.50 m
Fractures, multiple from 12 o'clock to 12 o'clock, start



4, 00:00:09, 0.90 m
Fractures, multiple from 12 o'clock to 12 o'clock, finish



5, 00:00:23, 5.00 m
Settled deposits, coarse, 10% cross-sectional area loss, start



6, 00:00:26, 5.60 m
Settled deposits, coarse, 20% cross-sectional area loss, change



Section Pictures - 16/05/2023 - CP2X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	CP2X		



7, 00:00:29, 6.00 m
Settled deposits, coarse, 30% cross-sectional area loss, change



8, 00:01:12, 6.40 m
Settled deposits, coarse, 40% cross-sectional area loss, change



9, 00:01:22, 7.00 m
Hole in drain or sewer from 8 o'clock to 4 o'clock, start



10, 00:01:22, 7.00 m
Hole in drain or sewer from 8 o'clock to 4 o'clock, start



11, 00:01:27, 7.00 m
General photograph taken at this point



12, 00:01:27, 7.00 m
General photograph taken at this point



Section Pictures - 16/05/2023 - CP2X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	CP2X		



New Inn Rd
Sec2

7.65m

13, 00:01:45, 7.70 m
Hole in drain or sewer from 8 o'clock to 4 o'clock, finish



New Inn Rd
Sec2

18.30m

14, 00:02:32, 18.30 m
General photograph taken at this point



New Inn Rd
Sec2

20.10m

15, 00:02:37, 20.50 m
Settled deposits, coarse, 20% cross-sectional area loss, change



New Inn Rd
Sec2

21.60m

16, 00:02:43, 21.60 m
Settled deposits, coarse, 25% cross-sectional area loss, change



New Inn Rd
Sec2

26.55m

17, 00:03:06, 27.00 m
Fractures, multiple from 8 o'clock to 3 o'clock



New Inn Rd
Sec2

27.90m

18, 00:03:13, 28.20 m
Fractures, multiple from 8 o'clock to 4 o'clock, start



Section Pictures - 16/05/2023 - CP2X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	CP2X		



19, 00:03:34, 30.40 m
Broken pipe from 12 o'clock to 4 o'clock



20, 00:03:35, 30.40 m
Line deviates right, Junction with unknown



21, 00:04:00, 30.40 m
Survey abandoned, Unable to continue

Disclaimer

Although every effort has been made to produce a thorough and precise report, Eyes On Drainage Services Ltd cannot be held liable for any discrepancies or omissions.

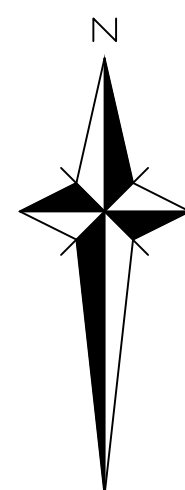
Furthermore Eyes On Drainage Services Ltd cannot be held responsible for any actions taken based on the information supplied within this report.

Appendix B: Drawings

113150

DESIGN NOTES

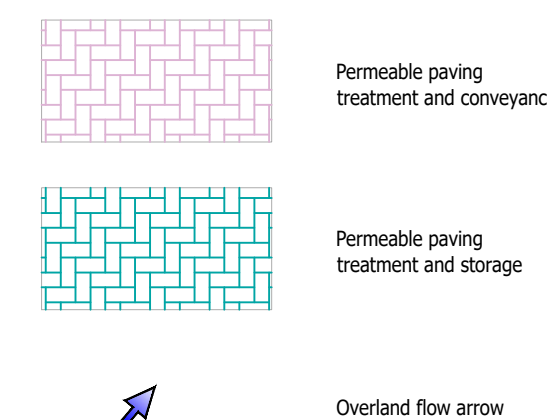
1. STORAGE DESIGN BASED ON PEAK 1 IN 100 YR STORM + 45%.
2. DISCHARGE TO EXISTING DITCH LIMITED TO GREENFIELD QBAR RATE.
3. DRAIN POINTS AND LOCATIONS TO BE CONFIRMED BY ARCHITECT.
4. CONTRACTOR TO ESTABLISH LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCING.
5. EXISTING TREES TO BE PROTECTED WHERE EXCAVATIONS RUN CLOSE.
5. APPROVAL TO BE GAINED FROM WATER AUTHORITY FOR CONNECTION TO FOUL SEWER



GENERAL NOTES

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations, record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.
2. Tender or billing drawings shall not be used for construction or the ordering of materials.
3. Do not scale. All dimensions and levels to be site confirmed.
4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements.
5. Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.
6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.

LEGEND



NEW MANHOLE TO BE CONSTRUCTED ON EXISTING 150mm SEWER
New 150mm foul connection to existing sewer SUBJECT TO SECTION 106 agreement. Exact level of existing sewer to be checked upstream and downstream before laying drainage

F7
CL: 28.972
IL: 26.748

ExF6004
CL: 28.79
IL: 26.65

Oakfield House

14

Site area
0.34ha

PP AREA 3
249m² PERMEABLE PAVING, MINIMUM SUB-BASE DEPTH 0.5m
STORAGE FOR 1/100 YEAR +45% STORM, MINIMUM VOIDS 30%.

CELLULAR STORAGE TANK BENEATH SUB-BASE FOR ADDITIONAL STORAGE VOLUME
5.5 x 6.5 x 0.5m = 17.0m³ CAPACITY (95% VOIDS)
TOP 27.20
BASE 26.70

SCP
Hydrobrake chamber
CL 27.808
SL 26.538
SL 26.838
Control to 1.0 l/s @ 1.35m design head
Unit: MD-SHE-0043-1000-1350-1000

DISCHARGE AT GREENFIELD QBAR
RATE OF 5.9 L/S/HA FOR ALL EVENTS UP TO 1 IN 100 YEAR + 45%.
CATCHMENT = 0.167 HA
THUS DISCHARGE RATE = 1.0 L/S

Proposed Headwall to existing ditch
IL 26.15

26.5

26

P5	Strategy amended with outfall to ditch	08.06.23	PH	MR
P4	Updated following LLFA comments	23.03.23	AE	MR
P3	ECO-90 Clusters added	22.09.2022	AE	MR
P2	Updated to latest layout	01.06.2022	CM	MR
P1	LAYOUT UPDATED	20/04/2022	CM	MR
P1	INITIAL ISSUE	11/04/2022	CM	MR
Rev	Amendments	Date	Dsn	Chk

Status PRELIMINARY

Client ENGLISH RURAL HOUSING ASSOCIATION

Architect

Project LAND OFF NEW INN ROAD BARTLEY

Title DRAINAGE STRATEGY PLAN

Date	APRIL 2022	Scale @ A1	1:200
Clients Ref.		Project Ref.	11089

gta Civils & Transport
Maple House, 192-198 London Road,
Burgess Hill, West Sussex, RH15 9RD
Tel: 01444 871444 Web: www.gtacivils.co.uk

Drawing Number	11089/1600	Rev.	P5
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Appendix C: Calculations

GTA Civils Ltd		Page 1
Gloucester House 66a Church Walk Burgess Hill, BN43 6LB	11089 New Inn Rd, Bartley Greenfield Runoff per Ha	
Date 08/06/2023 13:24 File	Designed by ph Checked by	
XP Solutions		Source Control 2020.1.3

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 900 Urban 0.000
Area (ha) 1.000 Soil 0.450 Region Number Region 7

Results 1/s

QBAR Rural 5.9
QBAR Urban 5.9

Q100 years 18.8

Q1 year 5.0
Q30 years 13.4
Q100 years 18.8

GTA Civils Ltd		Page 0
Gloucester House 66a Church Walk Burgess Hill, BN43 6LB	11089 New Inn Rd, Bartley Storm Network	
Date 08/06/2023 13:53 File 11089_Storm Network.mdx	Designed by ph Checked by mr	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	9.772	0.065	150.0	0.014	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	32.063	0.401	80.0	0.064	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	9.723	0.268	36.3	0.089	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	17.264	0.120	143.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.20	28.100	0.014	0.0	0.0	0.0	0.82	14.5	1.9
1.001	50.00	5.67	27.600	0.078	0.0	0.0	0.0	1.12	19.9	10.6
1.002	50.00	5.77	26.538	0.167	0.0	0.0	0.0	1.68	29.6	22.7
1.003	50.00	6.12	26.270	0.167	0.0	0.0	0.0	0.84	14.8«	22.7

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Online Controls for Surface Network 1

Orifice Manhole: S2, DS/PN: 1.001, Volume (m³): 1.6

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 27.600

Hydro-Brake® Optimum Manhole: S3, DS/PN: 1.002, Volume (m³): 2.5

Unit Reference	MD-SHE-0043-1000-1350-1000	Sump Available	Yes
Design Head (m)	1.350	Diameter (mm)	43
Design Flow (l/s)	1.0	Invert Level (m)	26.538
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	75
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	1.0	Kick-Flo®	0.387	0.6
Flush-Flo™	0.190	0.7	Mean Flow over Head Range	-	0.7

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

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

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Storage Structures for Surface Network 1

Porous Car Park Manhole: S2, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	27.900	Depression Storage (mm)	5
Max Percolation (l/s)	99.7	Width (m)	13.8	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	26.0	Membrane Depth (mm)	0

Complex Manhole: S3, DS/PN: 1.002

Cellular Storage

Invert Level (m)	26.700	Infiltration Coefficient Side (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	35.8	35.8	0.500	35.8	47.8	0.501	0.0	47.8

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	200.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	27.200	Depression Storage (mm)	5
Max Percolation (l/s)	67.8	Width (m)	14.8	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	16.5	Membrane Depth (mm)	0

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

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 430744 113117 SU 30744 13117 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 40, 45

PN	US/MH Name		Event	US/CL (m)	Water		Depth (m)	Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
					Level	Surcharged							
1.000	S1	15 minute	2 year Winter I+0%	28.876	28.142		-0.108	0.000	0.17	0.053		2.2	OK
1.001	S2	360 minute	2 year Winter I+0%	28.593	28.041		0.291	0.000	0.03	8.806	210	0.5	SURCHARGED
1.002	S3	720 minute	2 year Winter I+0%	27.888	27.179		0.491	0.000	0.03	17.187	396	0.7	SURCHARGED
1.003	S4	720 minute	2 year Winter I+0%	26.973	26.292		-0.128	0.000	0.05	0.027		0.7	OK

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

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 430744 113117 SU 30744 13117 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 40, 45

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S1	360 minute 30 year Winter I+40%	28.876	28.244	-0.006	0.000	0.07	0.199		0.9	OK
1.001	S2	360 minute 30 year Winter I+40%	28.593	28.243	0.493	0.000	0.03	31.003	444	0.7	SURCHARGED
1.002	S3	960 minute 30 year Winter I+40%	27.888	27.649	0.961	0.000	0.03	48.911	1040	0.9	FLOOD RISK
1.003	S4	960 minute 30 year Winter I+40%	26.973	26.295	-0.125	0.000	0.07	0.032		0.9	OK

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

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 430744 113117 SU 30744 13117 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 40, 45

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S1	480 minute 100 year Winter I+45%	28.876	28.346	0.096	0.000	0.07	0.346		0.9	SURCHARGED
1.001	S2	480 minute 100 year Winter I+45%	28.593	28.346	0.596	0.000	0.04	42.225	616	0.7	FLOOD RISK
1.002	S3	960 minute 100 year Winter I+45%	27.888	27.834	1.146	0.000	0.04	62.779	1376	1.0	FLOOD RISK
1.003	S4	960 minute 100 year Winter I+45%	26.973	26.296	-0.124	0.000	0.07	0.034		1.0	OK