

Designer's Response



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA

01273 424424
reception@civil.co.uk
www.civil.co.uk

Project	Land West of Allbrook Way, Allbrook
Project Number	23823
Comments Received from	Hampshire County Council LLFA Team dated 15 November 2024 Ref SWM/2024/0622
Date Comments Received	21 November 2024
Date of Response	25 November 2024

Comment / Query from LLFA		Designer's response
1	The flood risk assessment and drainage strategy submitted for the consented outline planning application for this development, proposed a discharge rate of 16.9l/s which was derived from the calculation of the Qbar greenfield runoff rate for a total site area of 3.3ha. The flood risk assessment also quoted a developed impermeable area of 1.3ha. The latest drainage model submitted has a an impermeable drained area of 1.213ha (confirmed in proposed drainage areas plan Dwg 43 Oct 2024). An assessment of runoff from areas not included in the model is also required, to include gardens and other green areas. If deemed necessary these areas should be included in the drainage model. If these green areas are not included in the model then they should also be excluded from the greenfield runoff calculation. Assuming the remaining 2ha of the site will continue to discharge via overland flow or via the proposed wetland, unrestricted, the total discharge from the site for the current proposals is expected to exceed Qbar. The drained area of the proposed drainage network should match the area used in the calculation of greenfield runoff that has been used to determine the allowable discharge rate.	Planning Condition 9 is very clear and notes ‘No development shall commence until a detailed surface water drainage scheme for the site, based on the principles within the submitted Flood Risk Assessment and Drainage Strategy (Cole Easdon Consultants, Ref: 6557, Issue 5, November 2020), has been submitted and approved in writing by the Local Planning Authority.’ The principle established in the Cole Easdon Consultants report is a discharge rate of 16.9l/s to the public sewer from an impermeable area of 1.3ha. The Reserved Matters maintains this agreed discharge rate to the public sewer at 16.9l/s and the impermeable area has remained at 1.213ha. This principle was agreed at Outline Planning and has been maintained as required by the requirements of Planning Condition 9.



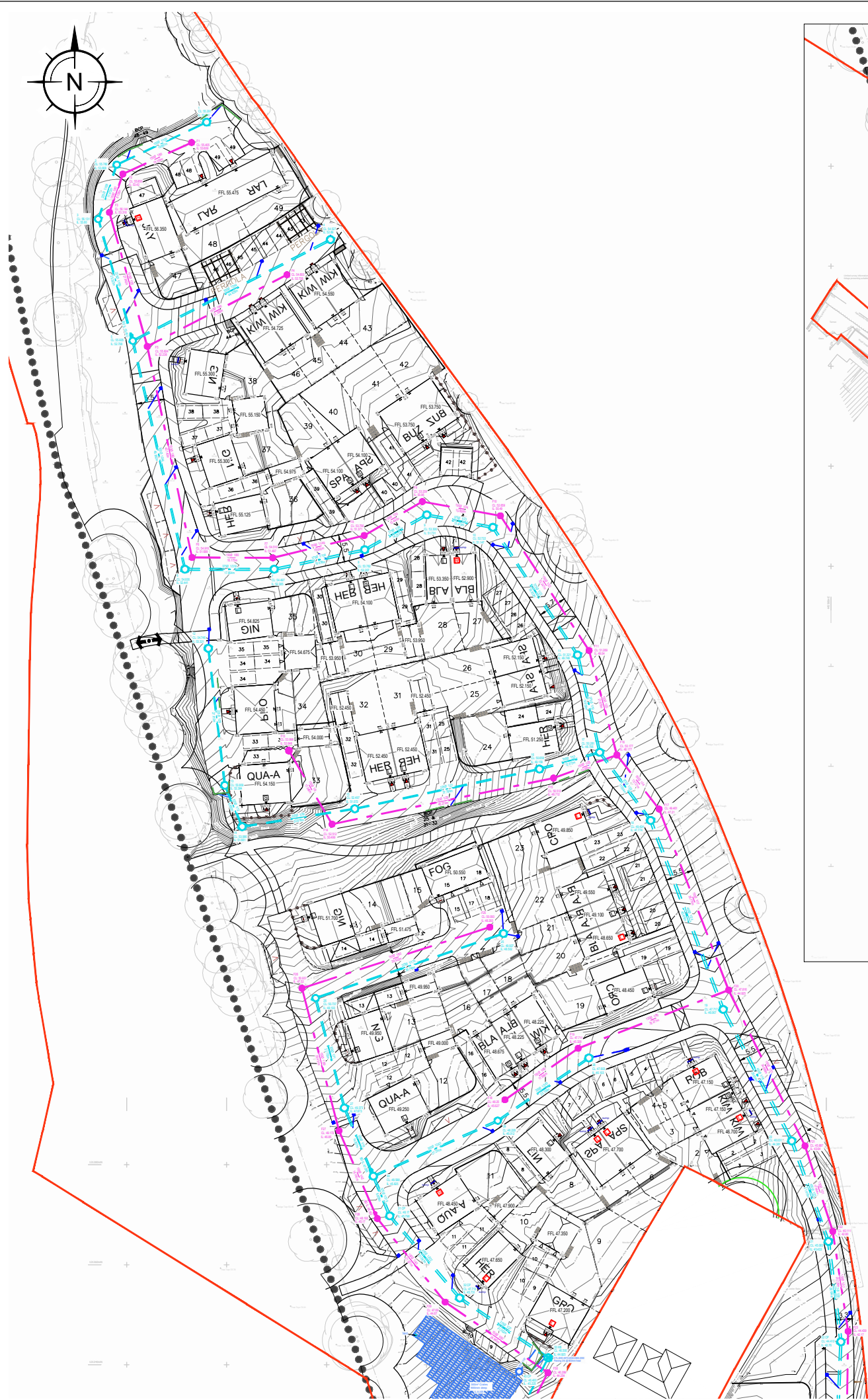
Comment / Query from LLFA	Designer's response
2 Both of the offline attenuation tanks, as shown on the proposed drainage layout plan, are shown at a level lower than the carrier drain. After a significant storm event in which the attenuation tanks are filled with water, they will not be able to drain fully, back into the network. As the tanks are to be lined, this water will remain in the tanks, reducing the available capacity for the next storm event. For example: the attenuation tank upstream of node 33, has tank invert level labelled as 44.40, the downstream node invert level node 33 is labelled as 44.925. based on pipe lengths and gradients shown in the drawing the invert level of the outlet pipe from the attenuation tank is estimated to be approximately 45.00, the tank is 0.8m depth, following a storm event in which the tank is filled with water, only the top 0.2m of the tank will be able to empty back into the carrier drain network, the remaining 0.6m depth of water will remain trapped in the tank. Raising the tank design level above the invert level of the carrier network could cause the tank to break ground level in the southern corner. The model does not detail the offline storage but rather assigns a storage volume to the nearest downstream node where the hydrobrake is located and therefore this issue is not shown in the modelling results. Consideration should be given to access to the attenuation tanks for inspection and maintenance. Consideration should be given to venting of the attenuation tanks to allow escape of air while the tanks are filled with water. The LLFA has concerns that this design flaw could present an increased risk of flooding to the existing dwellings and to the highway close to the location of the proposed attenuation tanks.	Noted, this is an error. Revised drawings 200C, 201C, 202C and 203C are attached. The crate invert levels are set approximately 50mm higher than the downstream node (manholes) to allow the storage to drain. Ground levels have been adjusted to suit and ensure the crates have suitable cover and are as shown on attached drawings 400E, 401C, 402C and 403C. The point on maintenance is noted and we confirm the manholes upstream of the storage tanks are designed as catchpits to capture silt and debris. This together with maintenance as noted in the maintenance schedule will prevent any debris and silt entering the storage area. A further catchpit at the crate entrance has been added to allow inspection of the crates. The storage crates will be vented and a note has been added to the drainage plans.

Comment / Query from LLFA	Designer's response
3 The previously reviewed FRA and the latest drainage strategy both highlight the requirement for an agreement with Southern Water for the proposed discharge into the public surface water sewer. The FRA also stated " Southern Water have expressed they will not accept discharge / overflow from ponds / basin or any open water features into their system." As the previous infiltration strategy is not viable, the latest proposed discharge strategy appears to be contrary to what Southern Water would accept. The FRA also stated: "Southern Water have confirmed that the existing system should be able to accept the development flows (both foul and restricted surface water at Qbar) without causing any capacity concerns." As mentioned above, it appears that the expected discharge from the site will exceed Qbar. Confirmation of an agreement with Southern Water is required, both in terms of the proposed discharge from open water features and the proposed discharge rate, to confirm the feasibility of the overall drainage scheme.	Southern Water are the Statutory Undertaker and have a duty to accept surface water discharge to the public sewer. Southern Water as noted agreed the rate of 16.9l/s from a basin as part of the outline application. The OFWAT ruling in 2018 made it clear that it is no longer a requisite to check available capacity. The new requirement is for the sewer authority to accept all discharge from new development sites into their nearest available sewer. In exchange they receive an enhanced connection payment per dwelling in order to fund network improvements. If the local network does not have available capacity and the improvement programme is not going to be completed until sometime after the development is complete, then the sewer authority (Southern Water) can work with the developers to agree temporary solutions to the capacity issue. For this site however Southern Water confirmed 16.9l/s was available to the public sewer. That discharge rate has been maintained as part of this Reserved Matters Application as it was agreed at Outline Planning Approval.
4 Confirmation of the location and invert level of the existing public surface water sewer in Knowle Hill is required to confirm viability of the discharge connection.	A survey of the existing public sewers in Knowle Hill is attached, the invert levels confirm a connection is viable. The existing public sewer location has been added to the drainage drawings.
5 The presence of existing ordinary watercourses has been noted as shown on the existing site levels plan. The LLFA would expect all existing ordinary watercourses to be maintained and protected during the works, including watercourses that may have been neglected. If any works are proposed affecting the existing ordinary watercourses then a consent is required as a separate permission to planning.	Noted.

Comment / Query from LLFA		Designer's response
6	The proposed location of the downstream defender treatment device is not clear on the drainage drawings. Data sheets containing the pollution mitigation indices for any proposed proprietary treatment devices should be submitted.	The location of the Downstream Defeder is clarified on the attached drainage drawings. The data sheet which details the pollution mitigation indices is also attached.
7	A review of the Drainage Management and Maintenance Schedule is required. Regular maintenance of storage structures is not mentioned, consideration should be given to removal of silt or blockages from the storage structures as required. The LPA should confirm they are satisfied with the proposed arrangements for future maintenance of the drainage infrastructure being the ultimate responsibility of the future homeowners.	The design together with the Drainage Management and Maintenance Schedule details the areas of maintenance required and notes for the storage structures Corrective Maintenance - Reconstruct storage structures if performance deteriorates or failure occurs (as required) Monitoring - Inspect storage structures to ensure they are fully emptying (annually) The regular maintenance of the upstream catchpits, inlet chambers and pipe network will prevent any silt and debris entering the system and is detailed in the schedule. As noted in the response to 2 above catchpits to allow inspection of the storage crates have been added.

Comment / Query from LLFA	Designer's response
8 The results for the 1 in 1 and 1 in 30 + cc rainfall events has not been submitted in the hydraulic calculations as required by Condition 9 section c.	Copies of the calculations for these rainfall events are attached.
9 An allowance for Urban Creep has only been added to the proposed roof areas, an allowance has not been included for private driveways or garages.	That is correct. Urban creep has been considered and provided as a 10% increase across the whole site for all proposed residential roof areas. Private driveways and garages were excluded as most of the private driveways are constrained by buildings, walls highway and garages and cannot be extended and it would be unusual to provide an extension to a garage, the loft of a garage may be converted but this does not alter drained area. A 10% increase in roof area across this site is considered a suitable allowance for urban creep.

Comment / Query from LLFA		Designer's response
10	There are inconsistencies between the exceedance flow route plan and the proposed levels plan in the northern section of the site. It must be demonstrated that the design levels will direct exceedance flow away for proposed dwellings.	This point will need to be more specific. There are no inconsistencies. Flows are directed away from dwellings. Permeable paving areas have low points that direct any exceedance to soft landscaping or onto the main access and main routes all direct surface water to soft landscaping and away from dwellings.



Drainage Key	
	Storm drainage
	Foul drainage
	Gullies
	Hydrobrake chamber
	Catchpit chamber
	Aquacell storage tanks

MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO SOFFIT (m)	EASTING (m)	NORTHING (m)
1	1350	Type C	55.291	53.941	1.200	445535.996	121488.460
2	1200	Type B	55.780	53.668	1.887	445518.018	121479.959
3	1200	Type B	56.131	53.600	2.306	445514.319	121469.100
4	1350	Type C	54.527	52.890	1.337	445560.787	121464.955
5	1200	Type B	56.935	52.708	2.927	445521.226	121444.737
6	1350	Type B	54.936	52.441	2.120	445531.673	121399.054
7	1350	Type B	54.497	52.385	1.737	445549.527	121399.054
8	1350	Type C	53.782	52.207	1.200	445567.650	121402.956
9	1350	Type C	53.306	51.731	1.200	445580.056	121409.933
10	1350	Type C	52.722	51.147	1.200	445593.282	121407.435
11	1350	Type C	51.321	49.746	1.200	445610.230	121381.912
12	1350	Type C	54.746	53.321	1.200	445536.341	121383.250
13	1350	Type C	53.809	52.384	1.200	445539.655	121355.837
14	1350	Type C	53.086	51.661	1.200	445543.119	121347.584
15	1350	Type C	52.497	51.072	1.200	445565.653	121351.175
16	1350	Type C	50.658	49.158	1.200	445602.587	121359.123
17	1350	Type C	50.281	48.706	1.200	445614.650	121362.450
18	1350	Type C	49.424	47.774	1.200	445624.836	121348.834
19	1350	Type C	47.717	46.067	1.200	445639.355	121311.048
20	1350	Type C	46.031	44.381	1.200	445653.073	121284.758
21	1350	Type C	45.083	43.433	1.200	445660.421	121264.839
22	1350	Type C	44.410	42.760	1.200	445662.902	121244.598
23	1350	Type C	42.549	40.899	1.200	445660.506	121190.166
25	1350	Type C	49.927	48.502	1.200	445595.387	121326.234
26	1200	Type B	50.737	48.193	2.244	445557.796	121313.324
27	1350	Type C	49.373	47.873	1.200	445563.580	121291.337
28	1350	Type C	47.603	46.103	1.200	445612.476	121301.359
29	1200	Type B	48.228	46.012	1.916	445594.265	121288.792
30	1350	Type B	48.588	45.825	2.386	445569.389	121277.709
31 CP	1350	Type B	48.170	45.798	1.997	445572.649	121269.750
32 CP	1350	Type B	47.713	45.731	1.607	445586.643	121253.339
33 HB	1350	Type C	46.500	44.925	1.425	445604.352	121241.393
34	1350	Type C	45.318	43.968	1.200	445591.306	121216.292
35	1350	Type C	44.400	42.975	1.200	445606.643	121206.699
37 HB	1350	Type C	42.200	41.000	0.975	445631.535	121167.741
38	1350	Type C	41.876	40.526	1.200	445659.228	121172.408
39	1350	Type C	40.937	39.587	1.200	445657.499	121147.222
40 HB	1350	Type C	39.879	38.529	1.200	445644.971	121123.420
41	1350	Type C	39.787	38.342	1.200	445643.056	121121.435
42 CP	1200	Catchpit	39.950	38.571	1.200	445651.901	121124.554
43 CP	1200	Catchpit	46.400	45.225	1.200	445598.539	121238.643

MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO SOFFIT (m)	EASTING (m)	NORTHING (m)
F1	1200	Type B	55.405	53.609	1.646	445532.984	121484.399
F2	1200	Type B	55.850	53.420	2.280	445519.245	121478.112
F3	1200	Type B	56.144	53.318	2.676	445516.550	121470.433
F4	1200	Type B	54.603	52.728	1.725	445552.094	121457.982
F5	1200	Type A	55.824	52.238	3.436	445524.125	121443.641
F6	1200	Type A	54.916	51.699	3.067	445533.077	121401.440
F7	1200	Type B	54.510	51.497	2.863	445549.252	121401.360
F8	1200	Type B	53.756	51.371	2.235	445567.537	121405.824
F9	1200	Type B	53.239	50.960	2.129	445579.149	121412.605
F10	1200	Type B	52.659	50.490	2.019	445594.793	121409.761
F11	1200	Type B	51.289	49.040	2.099	445612.523	121382.825
F13	1350	Type C	53.998	52.648	1.200	445552.458	121362.803
F14	1200	Type B	52.512	50.499	1.863	445561.079	121348.096
F15	1200	Type B	50.512	48.712	1.650	445605.402	121357.317
F16	1200	Type B	50.177	48.177	1.850	445618.081	121361.933
F17	1200	Type B	49.461	47.210	2.101	445626.526	121351.119
F18	1200	Type B	48.250	45.627	2.473	445595.689	121292.991
F19	1200	Type B	47.711	45.328	2.233	445610.332	121303.280
F20	1200	Type B	47.816	44.925	2.741	445640.434	121314.929
F21	1200	Type B	45.887	43.640	2.097	445655.717	121283.777
F22	1200	Type B	45.111	42.800	2.161	445661.264	121266.691
F23	1200	Type B	44.439	42.170	2.119	445664.349	121246.702
F24	1200	Type B	42.771	40.570	2.051	445663.597	121196.632
F25	1200	Type B	50.093	48.293	1.650	445592.657	121327.508
F26	1200	Type A	50.937	47.520	3.267	445555.072	121315.294
F27	1200	Type B	49.172	46.850	2.172	445562.487	121286.792
F28	1200	Type B	48.192	45.170	2.872	445570.144	121269.245
F29	1200	Type B	47.690	44.670	2.670	445583.719	121252.545
F30	1200	Type B	46.299	44.254	1.895	445604.279	121238.420
F31	1350	Type C	45.308	43.952	1.206	445593.139	121217.029
F32	1350	Type C	44.580	43.550	0.880	445604.762	121208.274
F33	1350	Type C	43.438	41.850	1.438	445601.101	121179.507
F34	1350	Type C	42.279	41.350	0.779	445615.652	121164.416
F35	1350	Type C	42.189	40.913	1.126	445650.361	121168.336
F36	1200	Type B	41.600	39.399	2.051	445660.863	121164.625
F37	1200	Type B	40.959	38.908	1.901	445659.576	121148.219
F38	1200	Type B	40.176	38.125	1.901	445651.634	121128.883
F39	1200	Type B	39.159	37.108	1.901	445636.396	121111.656
F40	1200	Type B	37.785	35.734	1.901	445638.016	121086.623
F41	1200	Type B	36.217	34.166	1.901	445629.431	121064.624

- GENERAL NOTES:
- All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 - This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 - The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 - Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

C | 25.11.24 [MJP] Levels to road adj plot 47 updated |SRM
F1 - F5 and 1 - 5 Cover Levels Updated. 42 CP added. Fin Drain
B | 18.10.24 [MJP] Minor updates to levels layout. |SRM
A | 17.10.24 [MJP] Minor updates to drainage layout |SRM

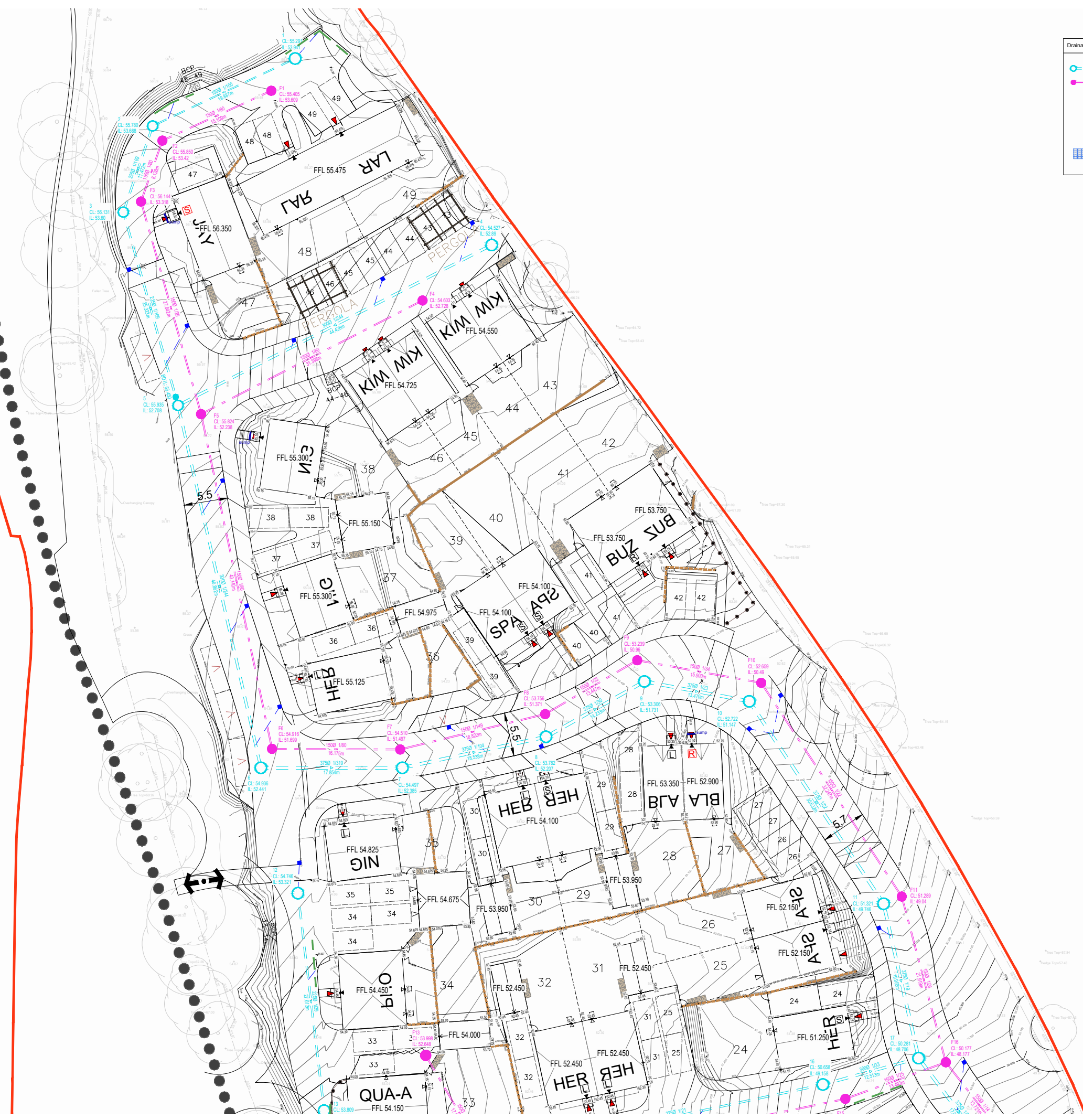
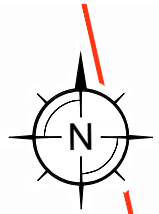
REV	DATE	INT	DESCRIPTION	CHK
-----	------	-----	-------------	-----

Issue Status FOR APPROVAL

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA

01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT	Bargate Home		
PROJECT	Knowel Hill Albrook Eastleigh		
TITLE	Proposed Drainage Layout Plan Whole Site		
DRAWN	DATE	PROJECT NO.	
M Pacifico	Oct 2024	23823	
ENGINEER	CHECKED	DWG NO.	REV
S Magowan		200	C
SCALE	1:500 @ A1		



Drainage Key

	Storm drainage
	Foul drainage
	Gullies
	Hydrobrake chamber
	Catchpit chamber
	Aquacell storage tanks

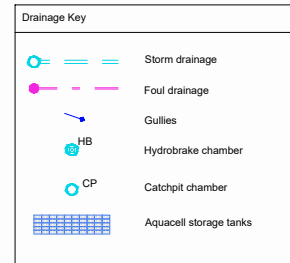
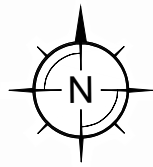
- GENERAL NOTES:
1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

C	25.11.24	[MJP]	Levels to road adj plot 47 updated.	[SRM]
F1 - F5	and 1 - 5	Cover Levels Updated.	42 CP added. Fin Drains	[SRM]
B	18.10.24	[MJP]	Minor updates to levels layout	[SRM]
A	17.10.24	[MJP]	Minor updates to drainage layout	[SRM]
REV	DATE	INT	DESCRIPTION	CHK

Issue Status **FOR APPROVAL**

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT		Bargate Home	
PROJECT			
Knowel Hill			
Albrook			
Eastleigh			
TITLE			
Proposed Drainage Layout Plan			
Sheet 1 of 3			
DRAWN		DATE	PROJECT NO.
M Pacifico		Oct 2024	23823
ENGINEER	CHECKED		
S Magowan			
SCALE	1:250 @ A1		DWG NO. REV.
			201 B



- GENERAL NOTES:
- All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 - This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 - The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 - Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

C	25.11.24	[MJP]	Levels to road adj plot 47 updated.	SRM
F	1 - F5 and 1 - 5	Cover Levels Updated.	42 CP added. Fin Drains	
B	18.10.24	[MJP]	Minor updates to levels layout	SRM
A	17.10.24	[MJP]	Minor updates to drainage layout	SRM

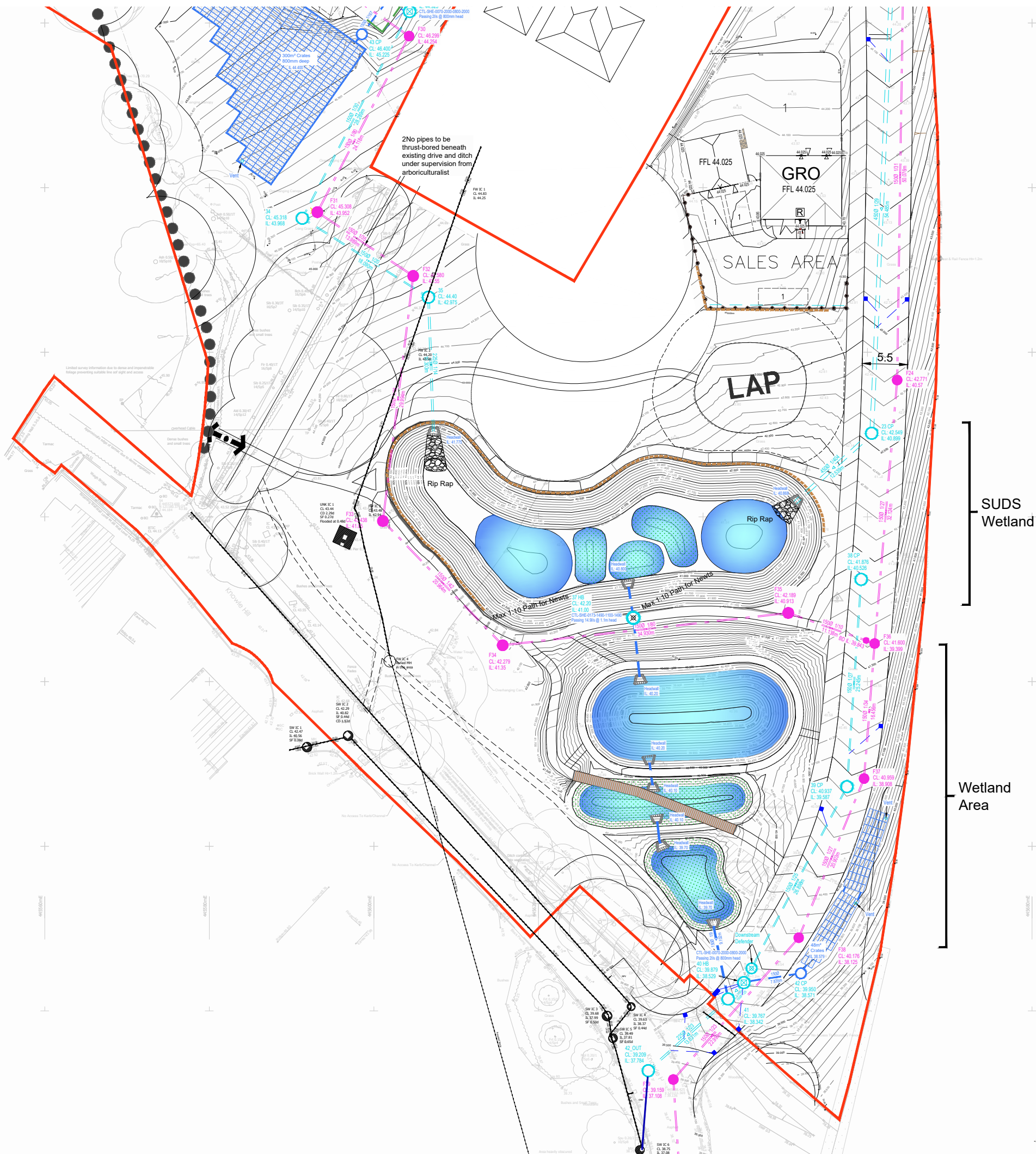
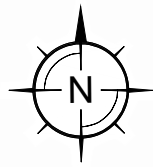
REV	DATE	INT	DESCRIPTION	CHK

Issue Status

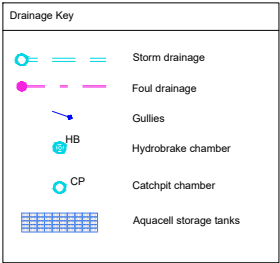
FOR APPROVAL

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT		Bargate Home	
PROJECT		Knowel Hill Albrook Eastleigh	
TITLE		Proposed Drainage Layout Plan Sheet 2 of 3	
DRAWN	DATE	PROJECT NO.	
M Pacifico	Oct 2024		23823
ENGINEER	CHECKED	DWG No.	REV
S Magowan		202	C
SCALE			
1:250 @ A1			



- GENERAL NOTES:
1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

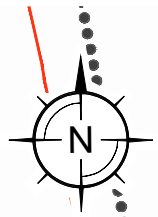


C	25.11.24	[MJP]	Levels to road adj plot 47 updated.	SRM
F1 - F5	and 1 - 5	Cover Levels Updated.	42 CP added. Fin Drains	SRM
B	18.10.24	[MJP]	Minor updates to levels layout.	SRM
A	17.10.24	[MJP]	Minor updates to drainage layout	SRM
REV	DATE	INT	DESCRIPTION	CHK

Issue Status **FOR APPROVAL**

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT	Bargate Home		
PROJECT	Knowel Hill Albrook Eastleigh		
TITLE	Proposed Drainage Layout Plan Sheet 3 of 3		
DRAWN	DATE	PROJECT NO.	
M Pacifico	Oct 2024		23823
ENGINEER	CHECKED	DWG No.	REV
S Magowan		203	C
SCALE	1:250 @ A1		



Key

Extra facing brickwork

Raised dpc

Retaining walls



- GENERAL NOTES:
1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

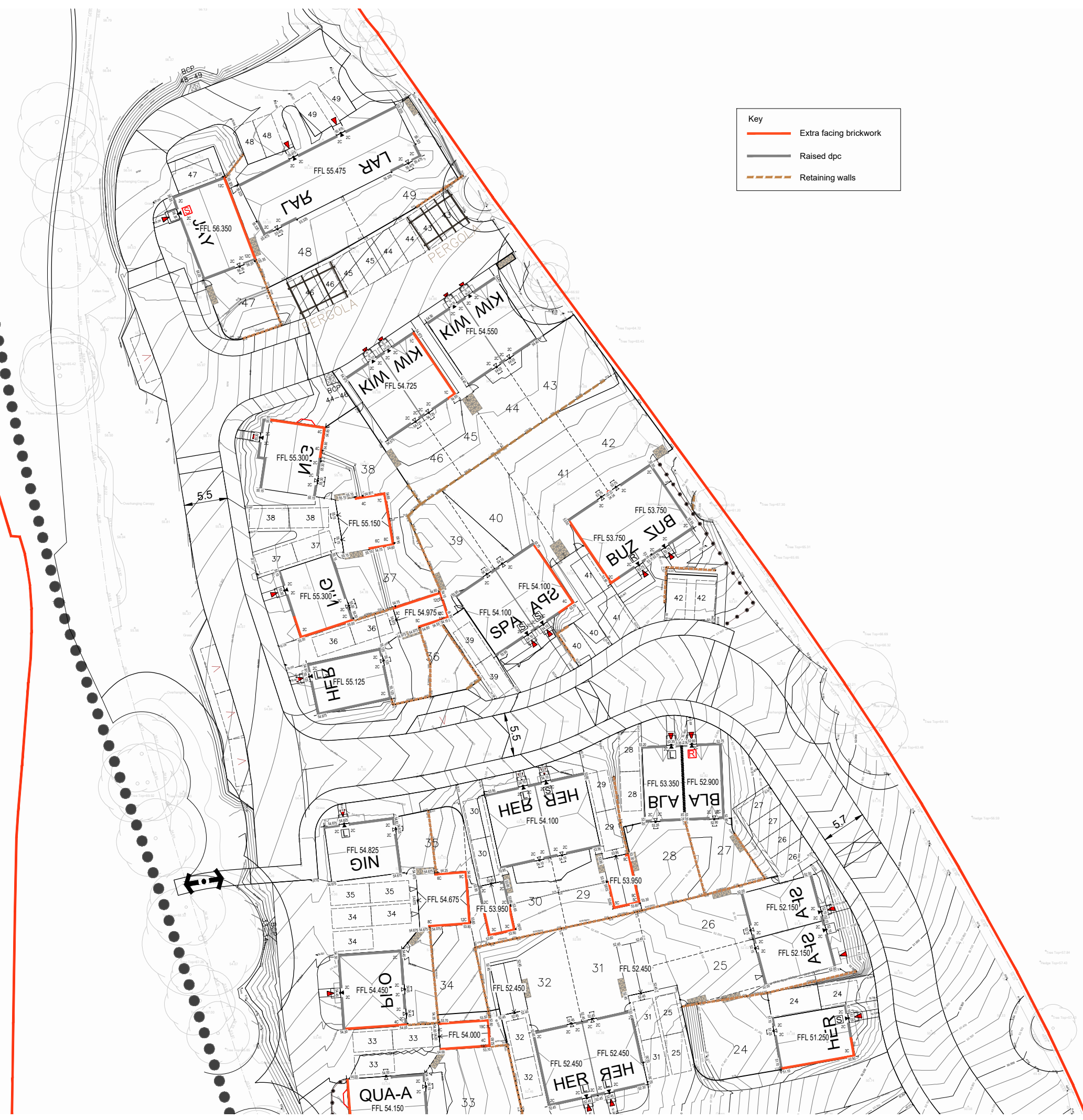
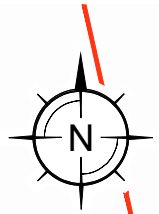
E	26.11.24	MJP	Minor amendments - Retaining wall to sales area	SRM
D	25.11.24	MJP	Levels to road adj plot 47 updated	SRM
C	25.11.24	MJP	Minor updates to mark up plans received	SRM
B	18.10.24	MJP	Minor corrections to levels	SRM
A	17.10.24	MJP	Minor corrections to levels	SRM

REV	DATE	INT	DESCRIPTION	CHK
-----	------	-----	-------------	-----

Issue Status **FOR APPROVAL**

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT		Bargate Home	
PROJECT		Knowel Hill Albrook Eastleigh	
TITLE		Proposed Levels Layout Plan Whole Site	
DRAWN	DATE	PROJECT NO.	
M Pacifico	Sept 2024	23823	
ENGINEER	CHECKED	DWG No.	REV
S Magowan		400	E
SCALE	1:500 @ A1		



Key

Extra facing brickwork

Raised dpc

Retaining walls

GENERAL NOTES:

1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

C	25.11.24	[MJP]	Levels to road adj plot 47 updated	SRM
B	18.10.24	[MJP]	Minor corrections to levels	SRM
A	17.10.24	[MJP]	Minor corrections to levels	SRM
REV	DATE	INT	DESCRIPTION	CHK

Issue Status

FOR APPROVAL

The Civil Engineering Practice

11 Tungsten Building

George Street

Fishergate

Sussex

BN41 1RA

01273 424424

reception@civil.co.uk

www.civil.co.uk

CLIENT

Bargate Home

PROJECT

Knowel Hill

Albrook

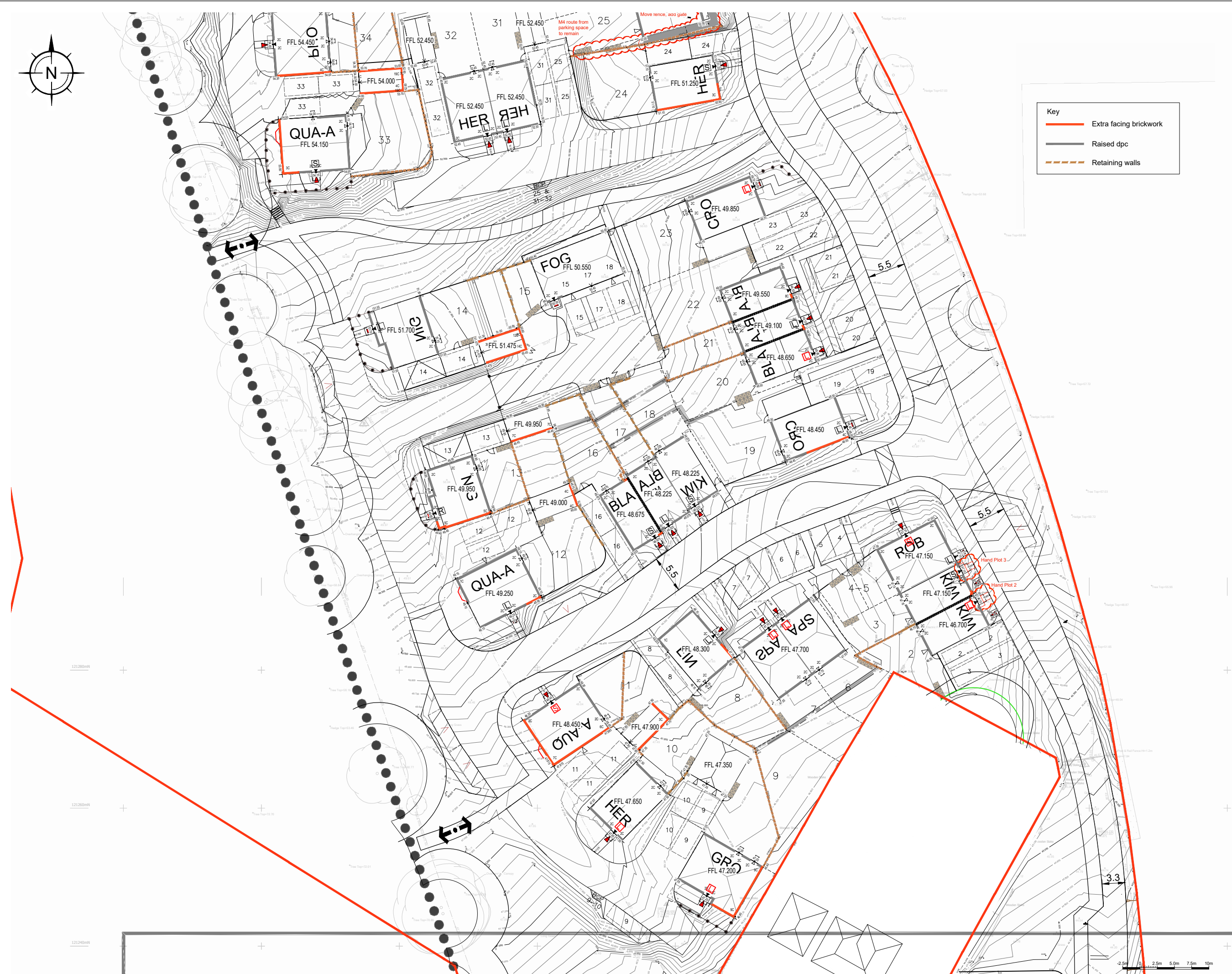
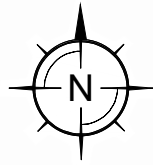
Eastleigh

TITLE

Proposed Levels Layout Plan

Sheet 1 of 3

DRAWN	DATE	PROJECT NO.	23823
M Pacifico	Sept 2024		
ENGINEER	CHECKED	DWG NO.	401
S Magowan		REV	C
SCALE			1:250 @ A1



Key

- Extra facing brickwork
- Raised dpc
- Retaining walls

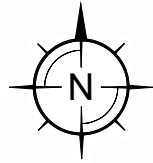
- GENERAL NOTES:
1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

C	25.11.24	[MJP]	Levels to road adj plot 47 updated	SRM
B	18.10.24	[MJP]	Minor corrections to levels	SRM
A	17.10.24	[MJP]	Minor corrections to levels	SRM
REV	DATE	INT	DESCRIPTION	CHK

Issue Status **FOR APPROVAL**

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT	Bargate Home				
PROJECT	Knowel Hill Albrook Eastleigh				
TITLE	Proposed Levels Layout Plan Sheet 2 of 3				
DRAWN	M Pacifico	DATE	Sept 2024	PROJECT NO.	23823
ENGINEER	S Magowan	CHECKED		DOC No.	402
SCALE	1:250 @ A1			REV	C



Key	
—	Extra facing brickwork
—	Raised dpc
—	Retaining walls

- GENERAL NOTES:**
1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
 2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
 3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
 4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

D 25.11.24	[MJP]	Levels to road adj plot 47 updated	[SRM]
B 18.10.24	[MJP]	Minor corrections to levels	[SRM]
A 17.10.24	[MJP]	Minor corrections to levels	[SRM]

REV	DATE	BY	DESCRIPTION	CHK
-----	------	----	-------------	-----

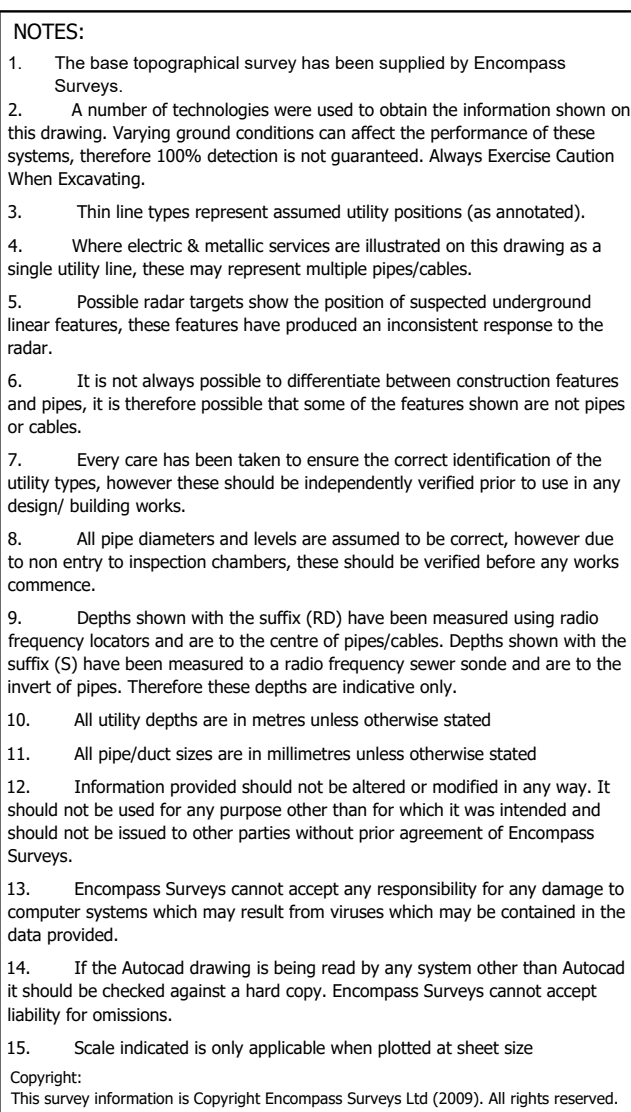
Issue Status **FOR APPROVAL**



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT Bargate Home
PROJECT Knowel Hill
Albrook
Eastleigh
TITLE Proposed Levels Layout Plan
Sheet 3 of 3

DESIGN	DATE	PROJECT NO.
M Pacifico	Sept 2024	23823
ENGINEER	CHECKED	DRG. NO.
S Magowan		403
SCALE		REV.
1:250 @ A1		B



Level Datum:
Levels are related to OSGB15 derived from the GPS network

Grid:
Grid is related to OSGB15 derived from GPS network

Northpoint:
The Northpoint position shown on this drawing has been located as accurately as possible, but is only indicative of true North



Client:	Bargate homes		
Survey Location:	Knowle Hill Allbrook way Eastleigh		
Survey type:	Utility	Scale:	1:200 @A0
Drawing ref:	ENC/081123/2493U1	Date:	NOV 23
Drawn/QA:	MH/DS	Plots:	1 of 2

The Downstream Defender® Select is the **new generation of advanced hydrodynamic separator** for treatment of urban surface water runoff. Its customisable performance and extended range of chamber sizes allows engineers to tailor their drainage designs to meet specific pollutant removal standards. The Downstream Defender® Select also offers easier installation with much more flexibility of pipe sizes and connections and can accept up to three inlets.



Key Features

- » Selectable performance levels for pollutant targets and retention.
- » Extended range of chamber sizes.
- » Can accept up to three inlet pipes.
- » Can accept a range of pipe sizes.
- » No moving parts and no power requirement.
- » Available in concrete or plastic chambers.

Fig 1. Downstream Defender® Select. **Advanced Vortex** models in concrete and plastic shown with **Hydro-Logic® Smart Monitoring** and **enhanced hydrocarbon (oil) retention** options.

Targeted pollutant removal

The Downstream Defender® Select performance can be tailored to remove some or all of the following pollutants:

Sediment (Total Suspended Solids)



The Downstream Defender® Select is a highly effective sediment/TSS removal device. It can be sized in a number of ways to suit the application and level of protection required (see Table 2).

Gross Pollutants



100% removal of floatable debris, such as food wrappers, Styrofoam cups and drinks cartons.

Sediment Bound Hydrocarbons (including Polycyclic Aromatic Hydrocarbons - PAHs)



PAHs have low solubility in water and are readily adsorbed onto sediment particles. Effective removal of sediment particles will also ensure the removal of many PAHs.

Liquid Hydrocarbons (oils)



Effective spill containment device at low flow rates. Note these systems are not considered oil separators according to the BS EN 858-1 and must not be used in applications where full certification is required.

Sediment Bound Heavy Metals and Nutrients



As an efficient device for removal of fine sediment, the Downstream Defender® Select is also effective for the removal of sediment bound pollutants.

Downstream Defender® Select model options

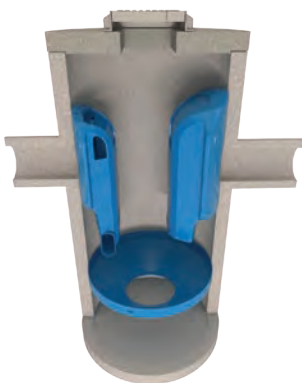
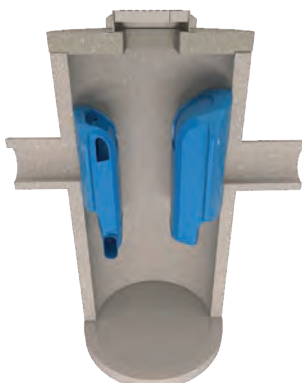
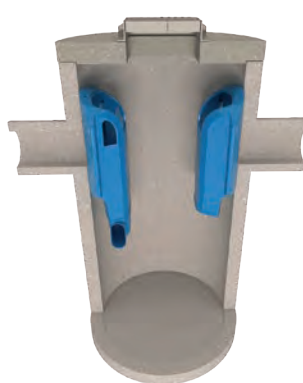
Downstream Defender® Select Model				
Key Pollutants	Advanced Vortex	Vortex Plus	Vortex	
	Our recommended model which provides sediments, litter and hydrocarbon (oil) removal with enhanced sediment retention up to four times the treatment flow rate.	Provides sediments, litter and hydrocarbon (oil) removal, with sediments retained at up to two times the treatment flow rate.	A simpler model providing removal of sediments, with retention up to two times the treatment flow rate.	
				
	Sediments	Coarse and fine	Coarse and fine	Coarse and fine
	Sediment retention	Retained up to 4 x treatment flow rate	Retained up to 2 x treatment flow rate	Retained up to 2 x treatment flow rate
	Litter, debris	✓	✓	✗
	Liquid hydrocarbons (oils)	✓	✓	✗
	Hydrocarbon (oil) retention	Option for increased retention on request	Option for increased retention on request	✗
	Sediment bound metals	✓	✓	✓

Table 1 - Downstream Defender® Select pollutant removal performance

The Downstream Defender® Select may be sized for different target particle sizes and removal efficiencies – contact us for site specific design.

Enhancement Options

Make Maintenance Smart

To help with SuDS maintenance plans and to ensure that maintenance is cost-effective, add Hydro-Logic® Smart Maintenance to any model and get automated maintenance alerts.

Hydro-Logic® Smart Maintenance can also reduce risk and save costs by reducing the need for inspection visits for units installed alongside roads or rail tracks.

The Hydro-Logic® Flexi Logger and ATEX/IECEX sensors capture real-time data for flow levels and/or sediment build-up. Level monitoring will enable the detection of blockages relating to the unit, and sediment level monitoring can be set to a trigger point and self-report to the client's maintenance team when maintenance is due.

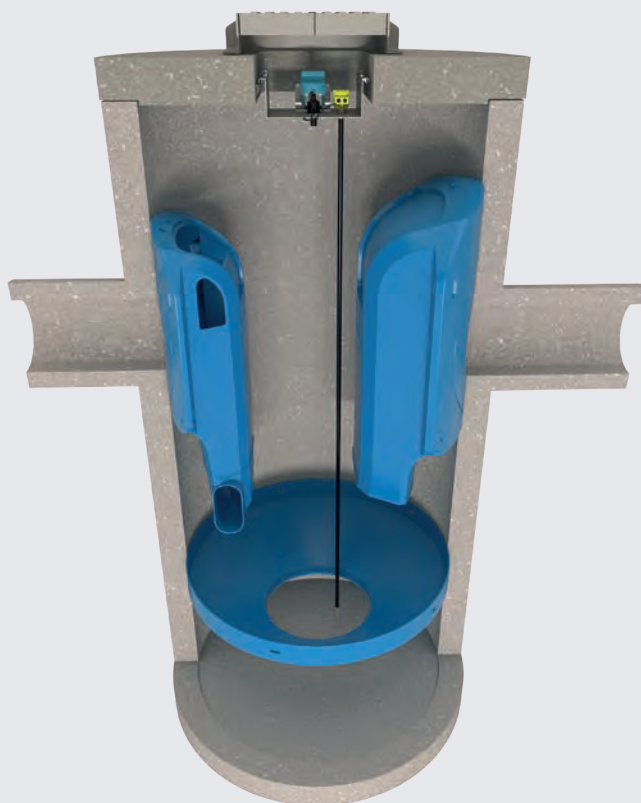


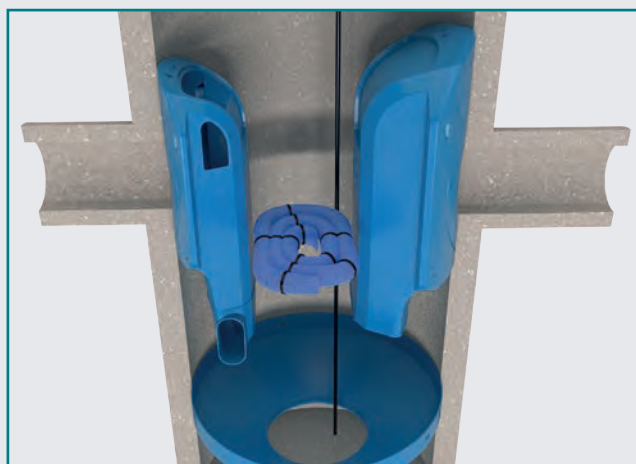
*Fig 2. Downstream Defender® Select
Hydro-Logic® Smart Maintenance.
Available for all models.*

Improve hydrocarbon retention

The option of storing hydrocarbons (oils) as solids can be added, providing increased retention, even at flow rates where the unit is bypassing.

This option is available for the [Advanced Vortex](#) and [Vortex Plus](#) models only.

Fig 3. Enhanced hydrocarbon (oil) retention option for the Downstream Defender® Select. Available for the [Advanced Vortex](#) and [Vortex Plus](#) models only.



Pollutant retention

It is important to ensure that pollutants in a rainfall event are retained throughout subsequent events. The Downstream Defender® Select offers engineers the option of specifying the retention performance of sediments. The **Vortex** and **Vortex Plus** models provide sediment retention up to twice the treatment flow rate, and the **Advanced Vortex**, with its benching skirt creating a calm sediment storage zone, provides sediment retention up to four times the treatment flow rate.

An option for enhancing the retention of hydrocarbons (oils) by storing them as a solid is available, ensuring no wash out during extremely high flows. This option is only available for the **Advanced Vortex** and **Vortex Plus** models

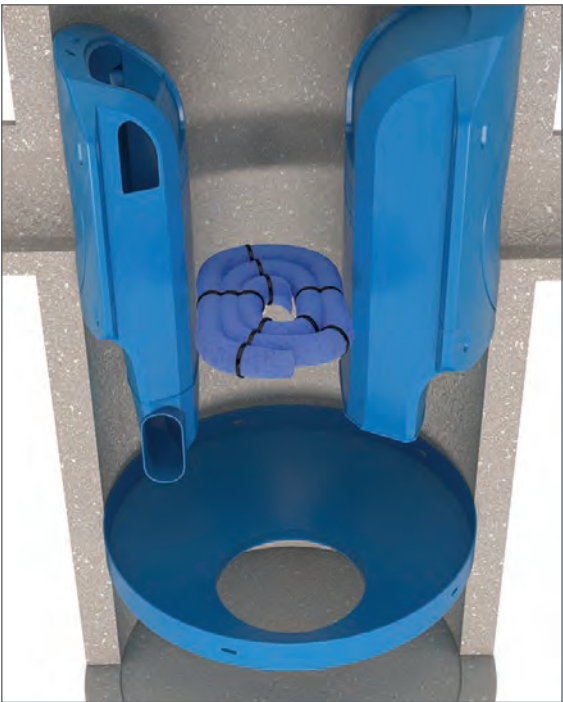


Fig 4. Downstream Defender® Select with enhanced sediment retention and enhanced hydrocarbon (oil) retention options.

The Simple Index Approach (SIA)

The Simple Index Approach outlined in CIRIA C753 The SuDS Manual is a water quality design method for sites with a low to medium risk pollution hazard level. Sites with a high risk pollution hazard level should consider a more precautionary approach.

The approach assigns pollution hazard indices to the given land use for three pollutant groups, total suspended solids (TSS), metals and hydrocarbons. SuDS components are then selected until their combined pollution mitigation index score is greater than the pollution hazard index for each pollutant group.

Model	Downstream Defender® Select Mitigation Indices ^{(a)(b)}		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons (Oils)
Vortex	0.3	0.2	0.2
Vortex Plus	0.5	0.4	0.5
Advanced Vortex	0.5	0.4	0.5
Notes: (a) All mitigation indices supplied by Hydro International Ltd are calculated using the methods laid out in the British Water How To Guide: Applying the CIRIA SuDS Manual Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. The Advanced Vortex and Vortex Plus models have also been independently verified by the WRc, with the WRc Performance Declaration available on request. (b) Mitigation Indices quoted for the Downstream Defender® Select are valid when the unit is designed according to the Treatment Flow Rate (see Table 3).			

Table 2 - SuDS Mitigation Indices for Downstream Defender® Select

Sizing a Downstream Defender® Select

The Downstream Defender® can be sized for different treatment goals and objectives. For design purposes, the selected model's Treatment Flow Rate should be greater than or equal to the site's Water Quality Flow Rate.

The hydraulic capacity of the selected model should be considered with respect to the peak discharge flow rate from the site.

If there is no treatment objective, just betterment, do not use a treatment flow rate and only compare the hydraulic capacity to the peak discharge flow rate.

Model diameter (m)	Treatment flow rate ^{(a)(b)} (l/s)	Hydraulic capacity ^(c) with recommended pipe size (l/s)	Hydraulic capacity ^(d) with maximum pipe size (l/s)	Maximum catchment area m ²	Maximum headloss at treatment flow rate (mm)
1.0	21	46	70	2800	160
1.2	30	84	107	4000	170
1.5	48	144	170	6400	220
1.8	69	217	278	9200	230
2.1	94	271	355	12500	240
2.4	123	422	529	16400	250
3.0	192	652	787	25600	260

Notes:

(a) The Treatment Flow Rate is based on an annualised removal efficiency of >50% of all particles up to 1000 microns with a mass-median particle size (D50) of 63 microns and a specific gravity of 2.65. The testing was conducted in line with the British Water Code of Practice.

(b) Alternative sizing based on different sediment grades available on request.

(c) Maximum flow rate that can pass through the chamber with a maximum headloss of 500mm. Figures shown are when using the recommended pipe size in Table 5.

(d) Maximum flow rate that can pass through the chamber with a maximum headloss of 500mm. Figures shown are when using the maximum pipe size in Table 5.

Table 3 - Downstream Defender® Select design information.

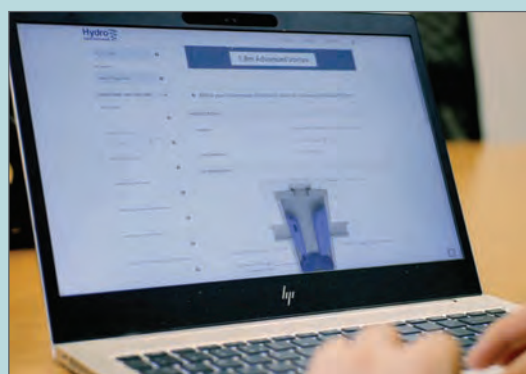
Model diameter (m)	Oil Storage Capacity (l)		Minimum sediment storage capacity ^(c) (m ³)
	Minimum liquid hydrocarbon (oil) storage capacity up to Treatment Flow Rate ^(a)	Solid state storage capacity with enhanced retention option ^(b)	
1.0	256	43-70	0.31
1.2	442	43-70	0.45
1.5	849	85-140	0.71
1.8	1458	85-140	1.02
2.1	2550	128-210	1.39
2.4	3586	170-280	1.81
3.0	6811	231-350	2.83

Notes:

- (a) Liquid oil storage capacity is valid up to the Treatment Flow Rate. Oil capture and retention is only available for the **Advanced Vortex** and **Vortex Plus** models only.
- (b) Permanent oil storage capacity when using the enhanced oil retention option (available for the **Advanced Vortex** and **Vortex Plus** models only).
- (c) Additional sediment storage capacity for all Downstream Defender[®] Select models (**Advanced Vortex**, **Vortex Plus** and **Vortex**) can be provided to extend maintenance intervals if required.

Table 4 - Downstream Defender[®] Select capacities.

Design your own Downstream Defender[®] Select with our Online Design Tool



Register free and design your own Downstream Defender[®] Select and try out different performance objectives.

Project designs can be saved and submitted for a free review by our expert technical team if required. General arrangement drawings and quotes can also be requested from the tool for any saved design.

visit hydro-int.design

Pipe sizes

Downstream Defender® Select can accept a range of **inlet / outlet pipe** sizes, removing the need for complicated pipe connections or couplers. The inlet pipe size must always be equal to or smaller than the outlet pipe size.

Additional pipe sizes may be accommodated, please contact us for assistance.

Chamber size	1.0 m	1.2 m	1.5 m	1.8 m	2.1 m	2.4 m	3.0 m
Pipe sizes	150	150	300	375	375	500	600
	225 ^{a)}	225	375 ^{a)}	400	400	600 ^{a)}	675 ^{b)}
	300	300 ^{a)}	400	450 ^{a)}	450	675 ^{b)}	750 ^{a)}
		375	450	500	500 ^{a)}	750	900
				600	600		
					675 ^{b)}		

Notes:

a) The recommended pipe size for optimum performance.

b) 675 mm is only available for concrete chambers.

Table 5 - Downstream Defender® Select pipe sizes.

Setting out

The Downstream Defender® Select can accommodate a change in pipe direction to suit site specific requirements and accept up to three inlet pipes.

Pipe angles can be adjusted to suit. Minimum angle between inlets and outlet is 90°.

For ease of installation the Downstream Defender® Select can now accept a range of pipe sizes.

Head loss across the chamber is kept to a minimum (see Table 3). The inlet and outlet pipes should be sized in accordance with Table 5.

Inlet and outlet pipe connections are at the same invert level.

Additional manhole sections can be provided to extend the chamber to meet site cover and invert levels or provide additional pollutant storage where required.



Fig 5. Downstream Defender® Select Advanced Vortex with *three inlet pipes*.

Dimensions and weights for concrete chambers

Material	Chamber Diameter - Internal (mm) (C)	Chamber Diameter External (mm) (includes base slab and any extrusions)	Recommended Inlet and Outlet Internal Diameter (mm) ⁽¹⁾	Minimum Depth to Invert (mm) (A) ⁽²⁾	Total Chamber Height Including cover (mm) (B) ⁽³⁾	Maximum Component Lift Weight (kg) ⁽⁴⁾
Concrete	1050	1420	225	1550	2390	2770
Concrete	1200	1460	300	1757	2831	2320
Concrete	1500	1760	375	2050	3276	3530
Concrete	1800	2160	450	2650	4090	5250
Concrete	2100	2650	500	2857	4364	6670
Concrete	2400	2950	600	3321	5375	8600
Concrete	3000	3480	750	3516	5437	14080

Notes:

- (1) Recommended inlet and outlet internal diameter. For alternative pipe sizes to allow for easier connections, please see Table 5.
- (2) Minimum depth to invert shown. Depth to invert can be increased if required.
- (3) Minimum chamber depth shown. Additional sediment storage capacity or increased depth to invert can be provided if required. Total chamber height for concrete units **includes** the cover.
- (4) Maximum component weight is based on a single inlet and includes internal components.

Table 6 - Downstream Defender® Select dimensions and weights for concrete chambers

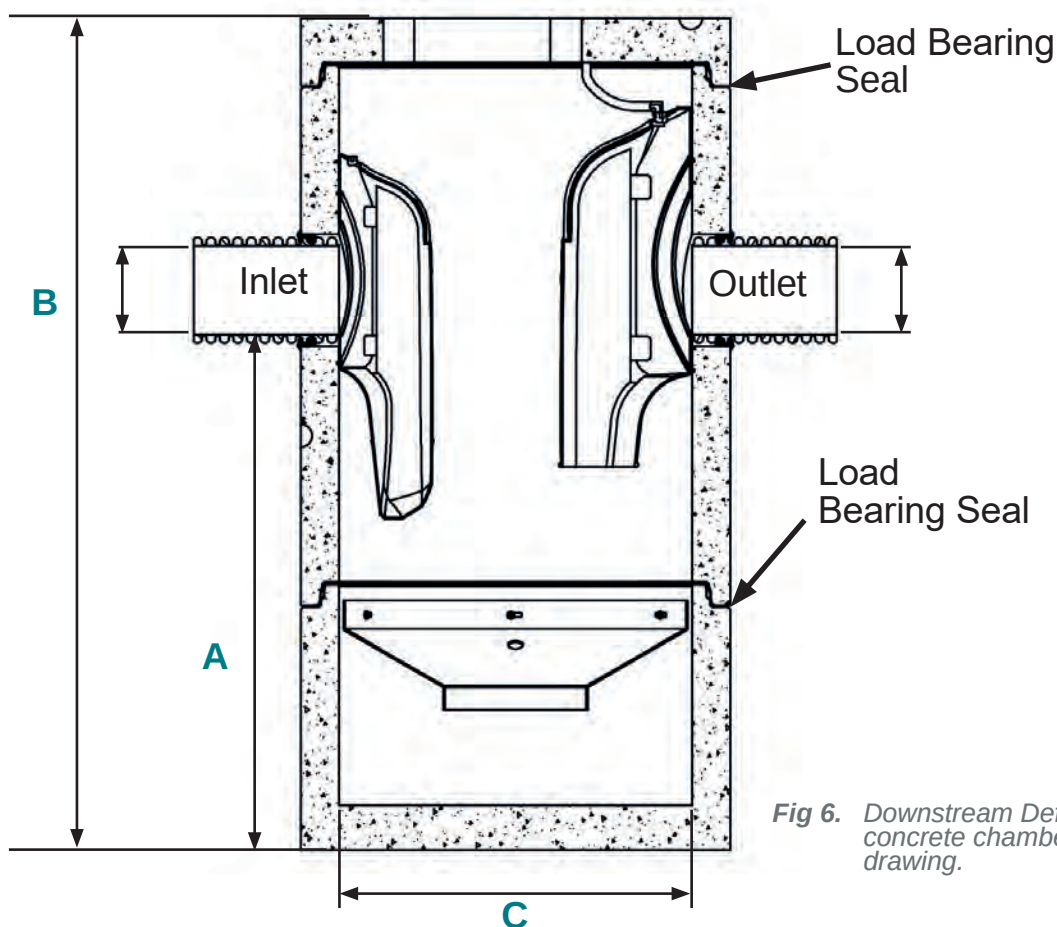


Fig 6. Downstream Defender® Select concrete chamber dimension drawing.

For General Arrangement drawings please email stormwater@hydro-int.com or submit a request at hydro-int.design

Dimensions and weights for plastic chambers

Material	Chamber Diameter - Internal (mm) (C)	Chamber Diameter External (mm) (includes base slab and any extrusions) (5)	Recommended Inlet and Outlet Internal Diameter (mm) (1)	Minimum Depth to Invert (mm) (A) (2)	Total Chamber Height Excluding Cover (mm) (B) (3)	Maximum Component Lift Weight (kg) (4)
HDPE Single Wall	1030	1282	225	1350	2012	125
HDPE Single Wall	1200	1435	300	1612	2512	170
HDPE Single Wall	1500	1735	375	1976	3012	240
HDPE Single Wall	1800	2317	450	2270	3490	410
HDPE Single Wall	2100	2630	500	2570	3920	750
HDPE Single Wall	2400	2930	600	2820	4440	950
HDPE Single Wall	3000	3530	750	3570	5270	1200

Notes:

- (1) Recommended inlet and outlet internal diameter. For alternative pipe sizes to allow for easier connections, please see Table 5.
- (2) Minimum depth to invert shown. Depth to invert can be increased if required.
- (3) Minimum chamber depth shown. Additional sediment storage capacity or increased depth to invert can be provided if required. Total chamber height for plastic units **excludes** the cover.
- (4) Maximum component weight is based on a single inlet and includes internal components.
- (5) Maximum external diameter includes lifting lugs and base slab.

Table 7 - Downstream Defender® Select dimensions and weights for plastic chambers

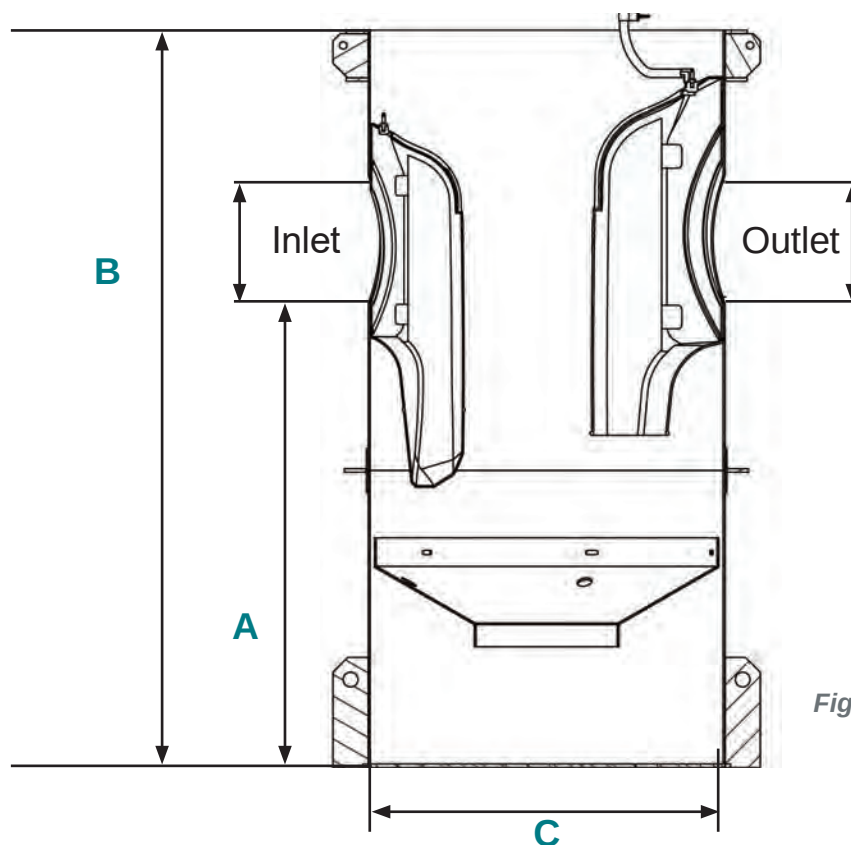


Fig 7. Downstream Defender® Select plastic chamber dimension drawing.

For General Arrangement drawings please email stormwater@hydro-int.com or submit a request at hydro-int.design

Maintenance for a Downstream Defender® Select

Periodic removal of captured pollutants is essential to the continuous, long-term functioning of your Downstream Defender® Select. The device will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the Downstream Defender® Select will no longer be able to store removed sediment and oil. Pollutant storage capacities are provided in Table 4.

If a Hydro-Logic® Smart Maintenance system is installed in the Downstream Defender® Select, when captured sediment volumes reach a predetermined level, the system will send an automated alert to request maintenance.

Maintenance events may include hydrocarbons (oils), floatables and sediment removal. These can be removed safely from the surface, no entry into the Downstream Defender® Select is required. The Hydro-Logic® Smart Maintenance system will need to be removed to allow access for the Jet Vac truck / Vacuum Tanker. This is easily done by carefully lifting the bracket holding the Hydro-Logic® Smart Maintenance package out of the unit and putting them to one side prior to inserting the Vacuum Tanker hose into the unit. The internal components of the Downstream Defender® Select do not need to be removed as the jet / vacuum hose can access the full depth of the unit through the centre of the chamber.



Determining a maintenance schedule

The frequency of clean-out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months or sooner to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge Judge® can be used to determine the level of accumulated solids stored in the sump.

To enable the provision of maintenance plans for planning applications, a typical maintenance schedule for a Downstream Defender® Select would be:

Activity	Frequency
Inspection	• Regularly during first year of installation. • Every 6 months after the first year of installation
Hydrocarbons (oils) and floatables removal	• Once per year, or as needed with sediment removal. • Following a spill in the drainage area.
Sediment removal	• As and when alerted by the Hydro-Logic® Smart Maintenance system, or • At intervals as determined by the first year's inspections • Following a spill in the drainage area.
Note: For most clean-outs it is not necessary to remove the entire volume of liquid in the vessel. Only removing the first few inches of oils/floatables and the sediment storage volume is required.	

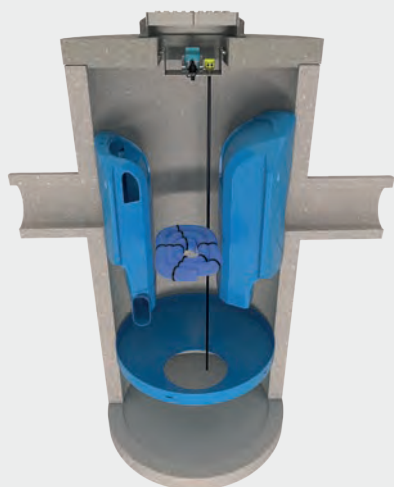
Table 8 - Typical maintenance schedule for a Downstream Defender® Select

We can provide full inspection and maintenance services for the Downstream Defender® Select, as well as for any other Sustainable Drainage Systems (SuDS) on your site - providing peace of mind and saving you time and money.

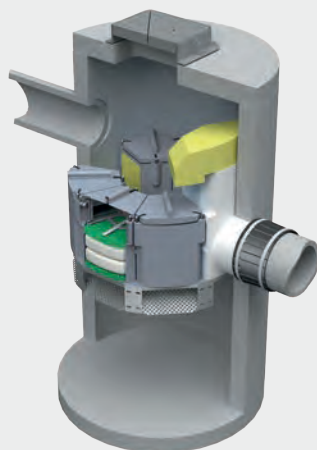
For more information, please call 01275 878371 or email sudservices@hydro-int.com

Our full range of stormwater treatment solutions

We have a range of stormwater treatment devices to treat stormwater flows of varying quality. All our solutions can work alongside, enable or enhance natural SuDS, helping to meet or improve on biodiversity and amenity targets.



[Downstream Defender® Select](#)



[Up-Flo™ Filter](#)



[Hydro Biofilter™](#)

Product		Description	Targeted pollutants						
			Sediments		Litter, debris	Liquid hydrocarbons	Sediment bound hydrocarbons, nutrients and heavy metals	Dissolved metals	Nutrients
Downstream Defender® Select	Vortex	Vortex separator	Coarse & fine	Retained up to 2 x treatment flow rate	✗	✗	✓	✗	✗
	Vortex Plus	Vortex plus separator	Coarse & fine	Retained up to 2 x treatment flow rate	✓	✓ Option for increased retention on request	✓	✗	✗
	Advanced Vortex	Advanced hydrodynamic vortex separator	Coarse & fine	Retained up to 4 x treatment flow rate	✓	✓ Option for increased retention on request	✓	✗	✗
Up-Flo™ Filter	Sand	Fluidised bed up flow filtration system with Sand media	Very fine sediment		✓	✓	✓	✗	✓
	CPZ	Fluidised bed up flow filtration system with CPZ media	Very fine sediment		✓	✓	✓	✓	✓
Hydro Biofilter™		Biofiltration system	Very fine and dissolved sediments		✓	✓	✓	✓	✓

To find out more about our range of stormwater treatment solutions visit hydro-int.com.

[Downstream Defender® Select](#)

[Up-Flo™ Filter](#)

[Hydro Biofilter™](#)

Patent: www.hydro-int.com/patents

Tel: +44 (0)1275 337937 stormwater@hydro-int.com

Hydro International
Unit 2, Rivermead Court, Kenn Business Park
Windmill Road, Kenn, Clevedon, BS21 6FT

Downstream Defender® Select Design Data F/0623



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.500
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.035	5.00	55.291	1200	445535.996	121488.460	1.350
2	0.004	5.00	55.979	1200	445518.018	121479.959	2.311
3	0.025	5.00	56.436	1200	445514.319	121469.100	2.836
4	0.083	5.00	54.390	1200	445560.787	121464.955	1.500
5	0.058	5.00	55.820	1200	445521.226	121444.737	3.112
6	0.018	5.00	54.936	1350	445531.673	121399.054	2.495
7	0.024	5.00	54.497	1350	445549.527	121399.054	2.112
8	0.039	5.00	53.782	1350	445567.650	121402.956	1.575
9	0.044	5.00	53.306	1350	445580.056	121409.933	1.575
10	0.058	5.00	52.722	1350	445593.292	121407.435	1.575
11	0.017	5.00	51.321	1350	445610.230	121381.912	1.575
12	0.078	5.00	54.746	1200	445536.341	121383.250	1.425
13			53.809	1200	445539.655	121355.837	1.425
14	0.009	5.00	53.086	1200	445543.119	121347.584	1.425
15	0.045	5.00	52.497	1200	445565.653	121351.175	1.425
16	0.022	5.00	50.658	1200	445602.587	121359.123	1.500
17	0.039	5.00	50.281	1350	445614.650	121362.450	1.575
18	0.070	5.00	49.424	1350	445624.836	121348.834	1.650
19	0.059	5.00	47.717	1350	445639.355	121311.048	1.650
20	0.013	5.00	46.031	1350	445653.073	121284.758	1.650
21	0.015	5.00	45.083	1350	445660.421	121264.639	1.650
22	0.041	5.00	44.410	1350	445662.902	121244.598	1.650
23	0.028	5.00	42.549	1350	445660.506	121190.166	1.650
24			42.200		445651.211	121181.750	1.365
25	0.056	5.00	49.927	1200	445595.387	121326.234	1.425
26	0.053	5.00	50.737	1200	445557.796	121313.324	2.544
27	0.009	5.00	49.373	1200	445563.580	121291.337	1.500
28	0.058	5.00	47.603	1200	445612.476	121301.359	1.500
29	0.017	5.00	48.228	1200	445594.265	121288.792	2.216
30	0.024	5.00	48.588	1350	445569.369	121277.709	2.763
31	0.018	5.00	48.170	1350	445572.649	121269.750	2.372
32	0.083	5.00	47.713	1350	445586.643	121253.339	1.982
33			46.500	1350	445604.352	121241.393	1.575
34			45.318	1200	445591.306	121216.292	1.350
35			44.400	1200	445606.643	121206.699	1.425
36			42.200		445607.233	121190.407	1.365
37		5.00	42.200	1500	445631.535	121167.741	1.400
38	0.044	5.00	41.876	1200	445659.228	121172.408	1.350
39			40.937	1200	445657.499	121147.222	1.350
40	0.027	5.00	39.879	1200	445644.971	121123.420	1.350
41			39.767	1200	445643.056	121121.435	1.425
42			39.209	1200	445633.357	121112.732	1.425

Links											
Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	19.887	0.600	53.941	53.743	0.198	100.4	150	5.33	55.3
1.001	2	3	11.472	0.600	53.668	53.600	0.068	168.7	225	5.52	54.6
1.002	3	5	25.323	0.600	53.600	53.450	0.150	168.8	225	5.94	52.9
2.000	4	5	44.428	0.600	52.890	52.708	0.182	244.1	300	5.74	53.7
1.003	5	6	46.862	0.600	52.708	52.516	0.192	244.1	300	6.72	50.1
1.004	6	7	17.854	0.600	52.441	52.385	0.056	318.8	375	7.02	49.0
1.005	7	8	18.538	0.600	52.385	52.207	0.178	104.1	375	7.19	48.5
1.006	8	9	14.233	0.600	52.207	51.731	0.476	29.9	375	7.26	48.3
1.007	9	10	13.470	0.600	51.731	51.147	0.584	23.1	375	7.32	48.1
1.008	10	11	30.632	0.600	51.147	49.746	1.401	21.9	375	7.45	47.7
1.009	11	17	19.958	0.600	49.746	48.706	1.040	19.2	375	7.53	47.5
3.000	12	13	27.613	0.600	53.321	52.384	0.937	29.5	225	5.19	55.9
3.001	13	14	8.950	0.600	52.384	51.661	0.723	12.4	225	5.23	55.7
3.002	14	15	22.818	0.600	51.661	51.072	0.589	38.7	225	5.41	55.0
3.003	15	16	37.780	0.600	51.072	49.233	1.839	20.5	225	5.63	54.1
3.004	16	17	12.513	0.600	49.158	48.781	0.377	33.2	300	5.70	53.8
1.010	17	18	17.004	0.600	48.706	47.849	0.857	19.8	375	7.60	47.3
1.011	18	19	40.479	0.600	47.774	46.067	1.707	23.7	450	7.76	46.8
1.012	19	20	29.654	0.600	46.067	44.381	1.686	17.6	450	7.86	46.5
1.013	20	21	21.419	0.600	44.381	43.433	0.948	22.6	450	7.95	46.2
1.014	21	22	20.194	0.600	43.433	42.760	0.673	30.0	450	8.04	45.9
1.015	22	23	54.485	0.600	42.760	40.899	1.861	29.3	450	8.28	45.3
1.016	23	24	12.539	0.600	40.899	40.868	0.031	404.5	450	8.49	44.8
4.000	25	26	39.746	0.600	48.502	48.268	0.234	169.9	225	5.66	54.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.002	17.7	7.0	1.200	2.086	0.035	0.0	65	0.943
1.001	1.004	39.9	7.6	2.086	2.611	0.039	0.0	66	0.776
1.002	1.003	39.9	12.1	2.611	2.145	0.064	0.0	85	0.882
2.000	1.002	70.8	16.1	1.200	2.812	0.083	0.0	97	0.815
1.003	1.002	70.8	37.0	2.812	2.120	0.205	0.0	154	1.012
1.004	1.009	111.4	39.5	2.120	1.737	0.223	0.0	153	0.924
1.005	1.775	196.0	43.2	1.737	1.200	0.247	0.0	119	1.435
1.006	3.324	367.1	49.8	1.200	1.200	0.286	0.0	93	2.351
1.007	3.786	418.2	57.3	1.200	1.200	0.330	0.0	93	2.679
1.008	3.889	429.5	66.8	1.200	1.200	0.387	0.0	99	2.857
1.009	4.152	458.6	69.4	1.200	1.200	0.404	0.0	98	3.026
3.000	2.419	96.2	15.8	1.200	1.200	0.078	0.0	61	1.792
3.001	3.739	148.7	15.7	1.200	1.200	0.078	0.0	49	2.442
3.002	2.108	83.8	17.3	1.200	1.200	0.087	0.0	69	1.668
3.003	2.899	115.3	25.8	1.200	1.200	0.132	0.0	73	2.356
3.004	2.738	193.5	30.0	1.200	1.200	0.154	0.0	79	2.006
1.010	4.083	451.0	102.0	1.200	1.200	0.597	0.0	120	3.324
1.011	4.188	666.1	112.8	1.200	1.200	0.667	0.0	124	3.154
1.012	4.865	773.7	121.9	1.200	1.200	0.726	0.0	120	3.595
1.013	4.291	682.4	123.4	1.200	1.200	0.739	0.0	129	3.292
1.014	3.722	591.9	125.2	1.200	1.200	0.754	0.0	139	2.975
1.015	3.768	599.2	130.1	1.200	1.200	0.795	0.0	142	3.042
1.016	1.004	159.7	133.0	1.200	0.882	0.822	0.0	315	1.118
4.000	1.000	39.8	10.9	1.200	2.244	0.056	0.0	80	0.856



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.001	26	27	22.735	0.600	48.193	47.873	0.320	71.0	300	5.87	53.2
4.002	27	30	14.807	0.600	47.873	47.088	0.785	18.9	300	5.93	52.9
5.000	28	29	22.126	0.600	46.103	46.012	0.091	243.1	300	5.37	55.2
5.001	29	30	27.251	0.600	46.012	45.900	0.112	243.3	300	5.82	53.4
4.003	30	31	8.608	0.600	45.825	45.798	0.027	318.8	375	6.08	52.4
4.004	31	32	21.567	0.600	45.798	45.731	0.067	321.9	375	6.43	51.1
4.005	32	33	21.362	0.600	45.731	44.925	0.806	26.5	375	6.53	50.7
4.006	33	34	28.289	0.600	44.925	43.968	0.957	29.6	150	6.79	49.9
4.007	34	35	18.090	0.600	43.968	43.050	0.918	19.7	150	6.92	49.4
4.008	35	36	16.303	0.600	42.975	41.775	1.200	13.6	225	7.00	49.1
7.000	37	41	47.718	0.600	40.800	38.342	2.458	19.4	225	5.27	55.6
6.000	38	39	25.245	0.600	40.526	39.587	0.939	26.9	150	5.22	55.8
6.001	39	40	26.898	0.600	39.587	38.529	1.058	25.4	150	5.44	54.9
6.002	40	41	2.758	0.600	38.529	38.417	0.112	24.6	150	5.46	54.8
6.003	41	42	13.031	0.600	38.342	37.784	0.558	23.4	225	5.54	54.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
4.001	1.867	132.0	21.0	2.244	1.200	0.109	0.0	81	1.378
4.002	3.636	257.0	22.6	1.200	1.200	0.118	0.0	59	2.264
5.000	1.004	70.9	11.6	1.200	1.916	0.058	0.0	82	0.745
5.001	1.003	70.9	14.6	1.916	2.388	0.075	0.0	92	0.793
4.003	1.009	111.4	41.1	2.388	1.997	0.217	0.0	157	0.934
4.004	1.004	110.9	43.5	1.997	1.607	0.235	0.0	163	0.945
4.005	3.531	390.0	58.4	1.607	1.200	0.319	0.0	97	2.562
4.006	1.858	32.8	57.4	1.425	1.200	0.319	0.0	150	1.893
4.007	2.279	40.3	56.9	1.200	1.200	0.319	0.0	150	2.321
4.008	3.568	141.9	56.5	1.200	0.200	0.319	0.0	99	3.376
7.000	2.983	118.6	0.0	1.175	1.200	0.000	0.0	0	0.000
6.000	1.949	34.4	9.0	1.200	1.200	0.044	0.0	52	1.638
6.001	2.005	35.4	8.8	1.200	1.200	0.044	0.0	51	1.665
6.002	2.037	36.0	14.2	1.200	1.200	0.071	0.0	65	1.918
6.003	2.719	108.1	14.1	1.200	1.200	0.071	0.0	55	1.899

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	19.887	100.4	150	Circular	55.291	53.941	1.200	55.979	53.743	2.086
1.001	11.472	168.7	225	Circular	55.979	53.668	2.086	56.436	53.600	2.611
1.002	25.323	168.8	225	Circular	56.436	53.600	2.611	55.820	53.450	2.145
2.000	44.428	244.1	300	Circular	54.390	52.890	1.200	55.820	52.708	2.812
1.003	46.862	244.1	300	Circular	55.820	52.708	2.812	54.936	52.516	2.120

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
2.000	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.003	5	1200	Manhole	Adoptable	6	1350	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.004	17.854	318.8	375	Circular	54.936	52.441	2.120	54.497	52.385	1.737
1.005	18.538	104.1	375	Circular	54.497	52.385	1.737	53.782	52.207	1.200
1.006	14.233	29.9	375	Circular	53.782	52.207	1.200	53.306	51.731	1.200
1.007	13.470	23.1	375	Circular	53.306	51.731	1.200	52.722	51.147	1.200
1.008	30.632	21.9	375	Circular	52.722	51.147	1.200	51.321	49.746	1.200
1.009	19.958	19.2	375	Circular	51.321	49.746	1.200	50.281	48.706	1.200
3.000	27.613	29.5	225	Circular	54.746	53.321	1.200	53.809	52.384	1.200
3.001	8.950	12.4	225	Circular	53.809	52.384	1.200	53.086	51.661	1.200
3.002	22.818	38.7	225	Circular	53.086	51.661	1.200	52.497	51.072	1.200
3.003	37.780	20.5	225	Circular	52.497	51.072	1.200	50.658	49.233	1.200
3.004	12.513	33.2	300	Circular	50.658	49.158	1.200	50.281	48.781	1.200
1.010	17.004	19.8	375	Circular	50.281	48.706	1.200	49.424	47.849	1.200
1.011	40.479	23.7	450	Circular	49.424	47.774	1.200	47.717	46.067	1.200
1.012	29.654	17.6	450	Circular	47.717	46.067	1.200	46.031	44.381	1.200
1.013	21.419	22.6	450	Circular	46.031	44.381	1.200	45.083	43.433	1.200
1.014	20.194	30.0	450	Circular	45.083	43.433	1.200	44.410	42.760	1.200
1.015	54.485	29.3	450	Circular	44.410	42.760	1.200	42.549	40.899	1.200
1.016	12.539	404.5	450	Circular	42.549	40.899	1.200	42.200	40.868	0.882
4.000	39.746	169.9	225	Circular	49.927	48.502	1.200	50.737	48.268	2.244
4.001	22.735	71.0	300	Circular	50.737	48.193	2.244	49.373	47.873	1.200
4.002	14.807	18.9	300	Circular	49.373	47.873	1.200	48.588	47.088	1.200
5.000	22.126	243.1	300	Circular	47.603	46.103	1.200	48.228	46.012	1.916
5.001	27.251	243.3	300	Circular	48.228	46.012	1.916	48.588	45.900	2.388
4.003	8.608	318.8	375	Circular	48.588	45.825	2.388	48.170	45.798	1.997
4.004	21.567	321.9	375	Circular	48.170	45.798	1.997	47.713	45.731	1.607

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	6	1350	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.005	7	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable
1.006	8	1350	Manhole	Adoptable	9	1350	Manhole	Adoptable
1.007	9	1350	Manhole	Adoptable	10	1350	Manhole	Adoptable
1.008	10	1350	Manhole	Adoptable	11	1350	Manhole	Adoptable
1.009	11	1350	Manhole	Adoptable	17	1350	Manhole	Adoptable
3.000	12	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable
3.001	13	1200	Manhole	Adoptable	14	1200	Manhole	Adoptable
3.002	14	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
3.003	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
3.004	16	1200	Manhole	Adoptable	17	1350	Manhole	Adoptable
1.010	17	1350	Manhole	Adoptable	18	1350	Manhole	Adoptable
1.011	18	1350	Manhole	Adoptable	19	1350	Manhole	Adoptable
1.012	19	1350	Manhole	Adoptable	20	1350	Manhole	Adoptable
1.013	20	1350	Manhole	Adoptable	21	1350	Manhole	Adoptable
1.014	21	1350	Manhole	Adoptable	22	1350	Manhole	Adoptable
1.015	22	1350	Manhole	Adoptable	23	1350	Manhole	Adoptable
1.016	23	1350	Manhole	Adoptable	24		Junction	
4.000	25	1200	Manhole	Adoptable	26	1200	Manhole	Adoptable
4.001	26	1200	Manhole	Adoptable	27	1200	Manhole	Adoptable
4.002	27	1200	Manhole	Adoptable	30	1350	Manhole	Adoptable
5.000	28	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
5.001	29	1200	Manhole	Adoptable	30	1350	Manhole	Adoptable
4.003	30	1350	Manhole	Adoptable	31	1350	Manhole	Adoptable
4.004	31	1350	Manhole	Adoptable	32	1350	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
4.005	21.362	26.5	375	Circular	47.713	45.731	1.607	46.500	44.925	1.200
4.006	28.289	29.6	150	Circular	46.500	44.925	1.425	45.318	43.968	1.200
4.007	18.090	19.7	150	Circular	45.318	43.968	1.200	44.400	43.050	1.200
4.008	16.303	13.6	225	Circular	44.400	42.975	1.200	42.200	41.775	0.200
7.000	47.718	19.4	225	Circular	42.200	40.800	1.175	39.767	38.342	1.200
6.000	25.245	26.9	150	Circular	41.876	40.526	1.200	40.937	39.587	1.200
6.001	26.898	25.4	150	Circular	40.937	39.587	1.200	39.879	38.529	1.200
6.002	2.758	24.6	150	Circular	39.879	38.529	1.200	39.767	38.417	1.200
6.003	13.031	23.4	225	Circular	39.767	38.342	1.200	39.209	37.784	1.200

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
4.005	32	1350	Manhole	Adoptable	33	1350	Manhole	Adoptable
4.006	33	1350	Manhole	Adoptable	34	1200	Manhole	Adoptable
4.007	34	1200	Manhole	Adoptable	35	1200	Manhole	Adoptable
4.008	35	1200	Manhole	Adoptable	36		Junction	
7.000	37	1500	Manhole	Adoptable	41	1200	Manhole	Adoptable
6.000	38	1200	Manhole	Adoptable	39	1200	Manhole	Adoptable
6.001	39	1200	Manhole	Adoptable	40	1200	Manhole	Adoptable
6.002	40	1200	Manhole	Adoptable	41	1200	Manhole	Adoptable
6.003	41	1200	Manhole	Adoptable	42	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
100	0	0	0
100	45	0	0

Node 33 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	44.925	Product Number	CTL-SHE-0070-2000-0800-2000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 37 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	40.800	Product Number	CTL-SHE-0173-1490-1100-1490
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	14.9	Min Node Diameter (mm)	1500

Node 40 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	38.529	Product Number	CTL-SHE-0070-2000-0800-2000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 36 Online Orifice Control

Flap Valve	x	Invert Level (m)	40.835	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.450		

Node 24 Online Orifice Control

Flap Valve	x	Invert Level (m)	40.835	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.600		

Node 33 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	44.925
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1185

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	300.0	0.0	0.800	300.0	0.0	0.801	0.0	0.0

Node 37 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	34.600
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	40.800	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)	364	Main Channel n	0.035

Inlets

36 | 24

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	339.0	0.0	1.400	848.0	0.0

Node 40 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	38.529
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	178

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	48.0	0.0	0.800	48.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	53.995	0.054	4.7	0.0606	0.0000	OK
15 minute summer	2	10	53.723	0.055	5.1	0.0623	0.0000	OK
15 minute summer	3	11	53.671	0.071	8.4	0.0807	0.0000	OK
15 minute summer	4	10	52.968	0.078	11.1	0.0886	0.0000	OK
15 minute summer	5	11	52.835	0.127	26.5	0.1438	0.0000	OK
15 minute summer	6	11	52.569	0.128	27.5	0.1831	0.0000	OK
15 minute summer	7	12	52.491	0.106	30.3	0.1516	0.0000	OK
15 minute summer	8	12	52.289	0.082	34.7	0.1169	0.0000	OK
15 minute summer	9	11	51.812	0.081	39.9	0.1166	0.0000	OK
15 minute summer	10	11	51.233	0.086	47.0	0.1230	0.0000	OK
15 minute summer	11	12	49.827	0.081	48.8	0.1164	0.0000	OK
15 minute summer	12	10	53.374	0.053	10.4	0.0597	0.0000	OK
15 minute summer	13	10	52.424	0.040	10.3	0.0453	0.0000	OK
15 minute summer	14	10	51.718	0.057	11.5	0.0643	0.0000	OK
15 minute summer	15	11	51.132	0.060	17.4	0.0674	0.0000	OK
15 minute summer	16	11	49.227	0.069	20.0	0.0778	0.0000	OK
15 minute summer	17	11	48.815	0.109	73.4	0.1564	0.0000	OK
15 minute summer	18	11	47.883	0.109	81.7	0.1561	0.0000	OK
15 minute summer	19	11	46.171	0.104	88.9	0.1489	0.0000	OK
15 minute summer	20	11	44.494	0.113	89.8	0.1620	0.0000	OK
15 minute summer	21	12	43.560	0.127	91.1	0.1818	0.0000	OK
15 minute summer	22	12	42.880	0.120	95.7	0.1721	0.0000	OK
15 minute summer	23	12	41.145	0.246	99.3	0.3515	0.0000	OK
15 minute summer	24	12	41.076	0.242	99.5	0.0000	0.0000	OK
15 minute summer	25	11	48.568	0.066	7.5	0.0746	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	4.6	0.833	0.260	0.1101	
15 minute summer	2	1.001	3	5.1	0.565	0.128	0.1049	
15 minute summer	3	1.002	5	8.3	0.788	0.209	0.2678	
15 minute summer	4	2.000	5	10.8	0.560	0.153	0.9550	
15 minute summer	5	1.003	6	25.4	0.927	0.359	1.2911	
15 minute summer	6	1.004	7	27.6	0.945	0.248	0.5231	
15 minute summer	7	1.005	8	30.5	1.416	0.155	0.4004	
15 minute summer	8	1.006	9	34.8	1.976	0.095	0.2507	
15 minute summer	9	1.007	10	39.6	2.185	0.095	0.2465	
15 minute summer	10	1.008	11	46.6	2.549	0.108	0.5598	
15 minute summer	11	1.009	17	48.4	2.222	0.105	0.4412	
15 minute summer	12	3.000	13	10.3	1.755	0.107	0.1634	
15 minute summer	13	3.001	14	10.3	1.643	0.069	0.0564	
15 minute summer	14	3.002	15	11.4	1.406	0.136	0.1851	
15 minute summer	15	3.003	16	17.2	2.075	0.149	0.3135	
15 minute summer	16	3.004	17	20.1	1.723	0.104	0.1460	
15 minute summer	17	1.010	18	72.8	2.888	0.162	0.4289	
15 minute summer	18	1.011	19	81.4	2.841	0.122	1.1592	
15 minute summer	19	1.012	20	88.2	3.001	0.114	0.8729	
15 minute summer	20	1.013	21	89.2	2.639	0.131	0.7269	
15 minute summer	21	1.014	22	91.4	2.587	0.154	0.7134	
15 minute summer	22	1.015	23	96.4	1.610	0.161	3.3356	
15 minute summer	23	1.016	24	99.5	1.204	0.623	1.0359	
15 minute summer	24	Flow through pond	37	96.9	0.160	0.007	40.8451	
15 minute summer	25	4.000	26	7.3	0.764	0.184	0.3799	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	11	48.264	0.071	14.2	0.0798	0.0000	OK
15 minute summer	27	11	47.924	0.051	15.3	0.0581	0.0000	OK
15 minute summer	28	10	46.171	0.068	7.8	0.0763	0.0000	OK
15 minute summer	29	11	46.089	0.077	10.0	0.0870	0.0000	OK
15 minute summer	30	11	45.968	0.143	28.2	0.2044	0.0000	OK
15 minute summer	31	11	45.933	0.135	30.5	0.1928	0.0000	OK
15 minute summer	32	10	45.840	0.109	41.3	0.1562	0.0000	OK
720 minute summer	33	465	45.079	0.154	7.0	44.1801	0.0000	SURCHARGED
720 minute summer	34	480	43.991	0.023	1.9	0.0257	0.0000	OK
720 minute summer	35	480	42.994	0.019	1.9	0.0210	0.0000	OK
240 minute summer	36	156	41.015	0.180	5.1	0.0000	0.0000	OK
240 minute summer	37	156	41.014	0.214	25.6	0.3777	0.0000	OK
15 minute summer	38	10	40.569	0.043	6.0	0.0482	0.0000	OK
15 minute summer	39	10	39.631	0.044	5.9	0.0495	0.0000	OK
120 minute summer	40	78	38.631	0.102	4.8	4.7843	0.0000	OK
180 minute summer	41	120	38.404	0.062	16.1	0.0696	0.0000	OK
180 minute summer	42	120	37.842	0.058	16.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	4.001	27	14.2	1.384	0.107	0.2341	
15 minute summer	27	4.002	30	15.3	1.971	0.060	0.1152	
15 minute summer	28	5.000	29	7.7	0.606	0.109	0.2838	
15 minute summer	29	5.001	30	9.8	0.706	0.139	0.3796	
15 minute summer	30	4.003	31	28.2	0.762	0.253	0.3189	
15 minute summer	31	4.004	32	30.7	1.055	0.277	0.6640	
15 minute summer	32	4.005	33	42.2	3.227	0.108	0.3074	
720 minute summer	33	Hydro-Brake®	34	1.9				
720 minute summer	34	4.007	35	1.9	1.169	0.048	0.0300	
720 minute summer	35	4.008	36	1.9	1.262	0.014	0.0251	
240 minute summer	36	Flow through pond	37	25.6	0.040	0.002	73.7109	
240 minute summer	37	Hydro-Brake®	41	14.3				
15 minute summer	38	6.000	39	5.9	1.434	0.172	0.1058	
15 minute summer	39	6.001	40	6.0	1.742	0.170	0.1352	
120 minute summer	40	Hydro-Brake®	41	1.8				
180 minute summer	41	6.003	42	16.1	1.898	0.149	0.1104	187.1

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	54.006	0.065	6.6	0.0733	0.0000	OK
15 minute summer	2	10	53.734	0.066	7.2	0.0752	0.0000	OK
15 minute summer	3	11	53.686	0.086	11.8	0.0970	0.0000	OK
15 minute summer	4	10	52.984	0.094	15.7	0.1061	0.0000	OK
15 minute summer	5	11	52.865	0.157	37.5	0.1779	0.0000	OK
15 minute summer	6	11	52.596	0.155	39.5	0.2221	0.0000	OK
15 minute summer	7	11	52.513	0.128	43.5	0.1831	0.0000	OK
15 minute summer	8	11	52.306	0.099	49.9	0.1416	0.0000	OK
15 minute summer	9	11	51.830	0.099	57.4	0.1421	0.0000	OK
15 minute summer	10	11	51.251	0.104	67.5	0.1488	0.0000	OK
15 minute summer	11	11	49.844	0.098	70.2	0.1406	0.0000	OK
15 minute summer	12	10	53.384	0.063	14.8	0.0717	0.0000	OK
15 minute summer	13	10	52.432	0.048	14.7	0.0537	0.0000	OK
15 minute summer	14	10	51.729	0.068	16.3	0.0773	0.0000	OK
15 minute summer	15	11	51.144	0.072	24.7	0.0810	0.0000	OK
15 minute summer	16	11	49.241	0.083	28.5	0.0940	0.0000	OK
15 minute summer	17	11	48.840	0.134	105.2	0.1921	0.0000	OK
15 minute summer	18	11	47.906	0.132	117.3	0.1888	0.0000	OK
15 minute summer	19	11	46.193	0.126	127.7	0.1804	0.0000	OK
15 minute summer	20	11	44.519	0.138	129.5	0.1979	0.0000	OK
15 minute summer	21	11	43.589	0.156	131.6	0.2238	0.0000	OK
15 minute summer	22	12	42.904	0.144	138.2	0.2066	0.0000	OK
15 minute summer	23	12	41.207	0.308	141.8	0.4402	0.0000	OK
15 minute summer	24	12	41.141	0.307	142.5	0.0000	0.0000	OK
15 minute summer	25	11	48.581	0.079	10.6	0.0895	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	6.5	0.910	0.365	0.1416	
15 minute summer	2	1.001	3	7.1	0.609	0.178	0.1351	
15 minute summer	3	1.002	5	11.7	0.864	0.294	0.3436	
15 minute summer	4	2.000	5	15.4	0.603	0.217	1.2454	
15 minute summer	5	1.003	6	36.2	1.020	0.512	1.6772	
15 minute summer	6	1.004	7	39.2	1.039	0.352	0.6803	
15 minute summer	7	1.005	8	43.3	1.548	0.221	0.5223	
15 minute summer	8	1.006	9	49.5	2.149	0.135	0.3309	
15 minute summer	9	1.007	10	57.1	2.384	0.136	0.3245	
15 minute summer	10	1.008	11	67.1	2.806	0.156	0.7325	
15 minute summer	11	1.009	17	69.6	2.421	0.152	0.5824	
15 minute summer	12	3.000	13	14.7	1.939	0.153	0.2105	
15 minute summer	13	3.001	14	14.6	1.811	0.098	0.0728	
15 minute summer	14	3.002	15	16.2	1.542	0.193	0.2397	
15 minute summer	15	3.003	16	24.4	2.286	0.212	0.4038	
15 minute summer	16	3.004	17	28.6	1.890	0.148	0.1892	
15 minute summer	17	1.010	18	104.8	3.162	0.232	0.5635	
15 minute summer	18	1.011	19	117.1	3.123	0.176	1.5179	
15 minute summer	19	1.012	20	127.2	3.280	0.164	1.1507	
15 minute summer	20	1.013	21	128.9	2.859	0.189	0.9663	
15 minute summer	21	1.014	22	130.8	2.827	0.221	0.9353	
15 minute summer	22	1.015	23	137.6	1.768	0.230	4.3405	
15 minute summer	23	1.016	24	142.5	1.317	0.892	1.3564	
15 minute summer	24	Flow through pond	37	131.0	0.178	0.010	57.6469	
15 minute summer	25	4.000	26	10.3	0.840	0.259	0.4879	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	10	48.277	0.084	20.1	0.0955	0.0000	OK
15 minute summer	27	11	47.934	0.061	21.6	0.0694	0.0000	OK
15 minute summer	28	10	46.184	0.081	11.0	0.0912	0.0000	OK
15 minute summer	29	10	46.104	0.092	14.2	0.1046	0.0000	OK
15 minute summer	30	11	46.000	0.175	40.1	0.2500	0.0000	OK
15 minute summer	31	11	45.960	0.162	43.7	0.2320	0.0000	OK
15 minute summer	32	10	45.858	0.127	58.9	0.1810	0.0000	OK
600 minute summer	33	420	45.123	0.198	9.5	56.6125	0.0000	SURCHARGED
600 minute summer	34	420	43.991	0.023	2.0	0.0260	0.0000	OK
600 minute summer	35	420	42.994	0.019	2.0	0.0213	0.0000	OK
240 minute summer	36	164	41.070	0.236	4.6	0.0000	0.0000	OK
240 minute summer	37	164	41.070	0.270	31.2	0.4767	0.0000	SURCHARGED
15 minute summer	38	10	40.577	0.051	8.4	0.0580	0.0000	OK
15 minute summer	39	10	39.637	0.050	8.3	0.0571	0.0000	OK
120 minute summer	40	80	38.671	0.142	6.4	6.6558	0.0000	OK
180 minute summer	41	124	38.405	0.063	16.6	0.0709	0.0000	OK
180 minute summer	42	124	37.843	0.059	16.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	4.001	27	20.0	1.519	0.152	0.3014	
15 minute summer	27	4.002	30	21.7	2.173	0.084	0.1480	
15 minute summer	28	5.000	29	10.9	0.650	0.154	0.3722	
15 minute summer	29	5.001	30	14.1	0.731	0.199	0.5288	
15 minute summer	30	4.003	31	40.4	0.842	0.362	0.4126	
15 minute summer	31	4.004	32	43.9	1.192	0.396	0.8348	
15 minute summer	32	4.005	33	60.0	3.440	0.154	0.4013	
600 minute summer	33	Hydro-Brake®	34	2.0				
600 minute summer	34	4.007	35	2.0	1.178	0.049	0.0306	
600 minute summer	35	4.008	36	2.0	1.272	0.014	0.0255	
240 minute summer	36	Flow through pond	37	31.2	0.045	0.002	97.2958	
240 minute summer	37	Hydro-Brake®	41	14.7				
15 minute summer	38	6.000	39	8.3	1.581	0.241	0.1328	
15 minute summer	39	6.001	40	8.4	1.795	0.238	0.1980	
120 minute summer	40	Hydro-Brake®	41	1.9				
180 minute summer	41	6.003	42	16.6	1.915	0.154	0.1132	242.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	54.056	0.115	15.7	0.1302	0.0000	OK
15 minute summer	2	11	53.782	0.114	17.0	0.1286	0.0000	OK
15 minute summer	3	11	53.745	0.145	28.0	0.1642	0.0000	OK
15 minute summer	4	11	53.065	0.175	37.1	0.1981	0.0000	OK
15 minute summer	5	11	53.037	0.329	89.3	0.3720	0.0000	SURCHARGED
15 minute summer	6	11	52.699	0.258	91.1	0.3697	0.0000	OK
15 minute summer	7	11	52.594	0.209	101.4	0.2994	0.0000	OK
15 minute summer	8	11	52.369	0.162	117.8	0.2323	0.0000	OK
15 minute summer	9	11	51.896	0.165	136.2	0.2356	0.0000	OK
15 minute summer	10	11	51.315	0.168	160.3	0.2405	0.0000	OK
15 minute summer	11	11	49.907	0.161	167.1	0.2307	0.0000	OK
15 minute summer	12	10	53.422	0.101	34.9	0.1145	0.0000	OK
15 minute summer	13	10	52.459	0.075	34.7	0.0847	0.0000	OK
15 minute summer	14	10	51.772	0.111	38.5	0.1257	0.0000	OK
15 minute summer	15	10	51.189	0.117	58.4	0.1322	0.0000	OK
15 minute summer	16	10	49.292	0.134	67.5	0.1516	0.0000	OK
15 minute summer	17	11	48.939	0.233	250.3	0.3339	0.0000	OK
15 minute summer	18	11	47.990	0.216	280.1	0.3087	0.0000	OK
15 minute summer	19	11	46.274	0.207	305.3	0.2957	0.0000	OK
15 minute summer	20	11	44.616	0.235	310.8	0.3357	0.0000	OK
15 minute summer	21	11	43.705	0.272	316.9	0.3888	0.0000	OK
15 minute summer	22	11	42.997	0.237	334.0	0.3393	0.0000	OK
15 minute summer	23	12	41.587	0.688	343.1	0.9849	0.0000	SURCHARGED
15 minute summer	24	12	41.391	0.557	338.7	0.0000	0.0000	OK
15 minute summer	25	10	48.633	0.131	25.0	0.1482	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	15.4	1.100	0.867	0.2785	
15 minute summer	2	1.001	3	16.8	0.716	0.422	0.2707	
15 minute summer	3	1.002	5	27.9	1.064	0.699	0.6631	
15 minute summer	4	2.000	5	36.5	0.718	0.515	2.5128	
15 minute summer	5	1.003	6	83.4	1.229	1.178	2.9810	
15 minute summer	6	1.004	7	91.2	1.272	0.819	1.2868	
15 minute summer	7	1.005	8	101.2	1.870	0.516	1.0091	
15 minute summer	8	1.006	9	117.4	2.553	0.320	0.6562	
15 minute summer	9	1.007	10	135.7	2.877	0.325	0.6355	
15 minute summer	10	1.008	11	159.8	3.433	0.372	1.4256	
15 minute summer	11	1.009	17	166.5	2.848	0.363	1.1706	
15 minute summer	12	3.000	13	34.7	2.413	0.361	0.3983	
15 minute summer	13	3.001	14	34.5	2.231	0.232	0.1391	
15 minute summer	14	3.002	15	38.3	1.897	0.457	0.4606	
15 minute summer	15	3.003	16	57.7	2.853	0.501	0.7659	
15 minute summer	16	3.004	17	67.4	2.164	0.348	0.4239	
15 minute summer	17	1.010	18	250.2	3.831	0.555	1.1096	
15 minute summer	18	1.011	19	280.1	3.835	0.421	2.9565	
15 minute summer	19	1.012	20	305.4	3.953	0.395	2.2913	
15 minute summer	20	1.013	21	310.6	3.384	0.455	1.9657	
15 minute summer	21	1.014	22	316.5	3.427	0.535	1.8650	
15 minute summer	22	1.015	23	331.3	2.399	0.553	6.6232	
15 minute summer	23	1.016	24	338.7	2.138	2.120	1.9867	
15 minute summer	24	Flow through pond	37	241.2	0.219	0.018	141.3151	
15 minute summer	25	4.000	26	24.4	1.044	0.614	0.9296	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	10	48.329	0.136	47.9	0.1534	0.0000	OK
15 minute summer	27	10	47.971	0.098	51.6	0.1103	0.0000	OK
15 minute summer	28	10	46.235	0.132	25.9	0.1490	0.0000	OK
15 minute summer	29	11	46.164	0.152	33.4	0.1719	0.0000	OK
15 minute summer	30	11	46.121	0.296	94.5	0.4233	0.0000	OK
15 minute summer	31	11	46.059	0.261	102.9	0.3740	0.0000	OK
15 minute summer	32	10	45.922	0.191	139.1	0.2735	0.0000	OK
360 minute winter	33	352	45.337	0.412	17.5	118.1353	0.0000	SURCHARGED
120 minute summer	34	470	43.991	0.023	2.0	0.0261	0.0000	OK
60 minute summer	35	315	42.994	0.019	2.0	0.0213	0.0000	OK
120 minute winter	36	120	41.360	0.525	12.5	0.0000	0.0000	OK
120 minute winter	37	120	41.355	0.555	61.2	0.9801	0.0000	SURCHARGED
15 minute summer	38	10	40.611	0.085	19.9	0.0966	0.0000	OK
15 minute summer	39	10	39.667	0.080	19.8	0.0901	0.0000	OK
60 minute winter	40	60	38.911	0.382	15.9	17.8455	0.0000	SURCHARGED
120 minute winter	41	66	38.405	0.063	16.9	0.0715	0.0000	OK
120 minute winter	42	66	37.844	0.060	16.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	4.001	27	47.6	1.882	0.360	0.5772	
15 minute summer	27	4.002	30	51.3	2.727	0.200	0.2788	
15 minute summer	28	5.000	29	25.6	0.795	0.361	0.7169	
15 minute summer	29	5.001	30	32.9	0.727	0.464	1.2452	
15 minute summer	30	4.003	31	95.2	1.084	0.854	0.7543	
15 minute summer	31	4.004	32	103.6	1.576	0.934	1.4915	
15 minute summer	32	4.005	33	140.9	3.898	0.361	0.8683	
360 minute winter	33	Hydro-Brake®	34	2.0				
120 minute summer	34	4.007	35	2.0	1.180	0.050	0.0307	
60 minute summer	35	4.008	36	2.0	1.275	0.014	0.0256	
120 minute winter	36	Flow through pond	37	61.2	0.077	0.005	234.7912	
120 minute winter	37	Hydro-Brake®	41	14.9				
15 minute summer	38	6.000	39	19.8	1.992	0.574	0.2506	
15 minute summer	39	6.001	40	19.6	1.909	0.553	0.3631	
60 minute winter	40	Hydro-Brake®	41	2.0				
120 minute winter	41	6.003	42	16.9	1.923	0.156	0.1145	450.9

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	54.112	0.171	19.5	0.1930	0.0000	SURCHARGED
15 minute summer	2	11	53.803	0.135	20.7	0.1523	0.0000	OK
15 minute summer	3	11	53.770	0.170	34.1	0.1922	0.0000	OK
15 minute summer	4	11	53.311	0.421	46.2	0.4762	0.0000	SURCHARGED
15 minute summer	5	11	53.222	0.514	107.0	0.5818	0.0000	SURCHARGED
15 minute summer	6	11	52.749	0.308	115.0	0.4409	0.0000	OK
15 minute summer	7	11	52.626	0.241	126.9	0.3448	0.0000	OK
15 minute summer	8	11	52.392	0.185	145.2	0.2644	0.0000	OK
15 minute summer	9	11	51.918	0.187	166.4	0.2676	0.0000	OK
15 minute summer	10	11	51.336	0.189	195.4	0.2709	0.0000	OK
15 minute summer	11	11	49.928	0.182	202.9	0.2602	0.0000	OK
15 minute summer	12	10	53.436	0.115	43.4	0.1302	0.0000	OK
15 minute summer	13	10	52.469	0.085	43.2	0.0962	0.0000	OK
15 minute summer	14	10	51.789	0.128	48.0	0.1445	0.0000	OK
15 minute summer	15	10	51.207	0.135	72.7	0.1524	0.0000	OK
15 minute summer	16	10	49.312	0.154	84.2	0.1744	0.0000	OK
15 minute summer	17	11	48.979	0.273	306.1	0.3901	0.0000	OK
15 minute summer	18	11	48.019	0.245	343.4	0.3506	0.0000	OK
15 minute summer	19	11	46.302	0.235	375.1	0.3363	0.0000	OK
15 minute summer	20	11	44.653	0.272	383.0	0.3889	0.0000	OK
15 minute summer	21	11	43.749	0.316	391.7	0.4524	0.0000	OK
15 minute summer	22	11	43.062	0.302	413.8	0.4319	0.0000	OK
15 minute summer	23	11	41.758	0.859	425.9	1.2287	0.0000	SURCHARGED
120 minute winter	24	118	41.493	0.658	131.5	0.0000	0.0000	OK
15 minute summer	25	10	48.655	0.153	31.2	0.1726	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	18.8	1.106	1.063	0.3322	
15 minute summer	2	1.001	3	20.8	0.730	0.520	0.3267	
15 minute summer	3	1.002	5	34.1	1.112	0.855	0.7759	
15 minute summer	4	2.000	5	42.1	0.750	0.595	3.1286	
15 minute summer	5	1.003	6	105.4	1.511	1.489	3.1258	
15 minute summer	6	1.004	7	114.3	1.334	1.025	1.5330	
15 minute summer	7	1.005	8	125.3	1.968	0.639	1.1943	
15 minute summer	8	1.006	9	143.6	2.667	0.391	0.7752	
15 minute summer	9	1.007	10	164.8	3.018	0.394	0.7452	
15 minute summer	10	1.008	11	193.9	3.572	0.451	1.6648	
15 minute summer	11	1.009	17	201.7	2.948	0.440	1.3848	
15 minute summer	12	3.000	13	43.2	2.532	0.449	0.4716	
15 minute summer	13	3.001	14	43.0	2.327	0.289	0.1655	
15 minute summer	14	3.002	15	47.7	1.984	0.569	0.5482	
15 minute summer	15	3.003	16	72.0	2.998	0.624	0.9085	
15 minute summer	16	3.004	17	84.0	2.166	0.434	0.5336	
15 minute summer	17	1.010	18	306.2	3.965	0.679	1.3098	
15 minute summer	18	1.011	19	343.8	4.000	0.516	3.4795	
15 minute summer	19	1.012	20	376.2	4.092	0.486	2.7254	
15 minute summer	20	1.013	21	383.9	3.501	0.563	2.3462	
15 minute summer	21	1.014	22	392.0	3.430	0.662	2.3429	
15 minute summer	22	1.015	23	411.3	2.771	0.686	7.3957	
15 minute summer	23	1.016	24	421.2	2.659	2.637	1.9867	
120 minute winter	24	Flow through pond	37	74.2	0.087	0.006	307.5859	
15 minute summer	25	4.000	26	30.4	1.092	0.765	1.1069	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	10	48.347	0.154	59.6	0.1746	0.0000	OK
15 minute summer	27	11	47.984	0.111	64.2	0.1251	0.0000	OK
15 minute summer	28	10	46.254	0.151	32.3	0.1710	0.0000	OK
15 minute summer	29	11	46.210	0.198	41.6	0.2239	0.0000	OK
15 minute summer	30	11	46.172	0.347	117.5	0.4972	0.0000	OK
15 minute summer	31	11	46.099	0.301	127.6	0.4304	0.0000	OK
15 minute summer	32	10	45.945	0.213	172.4	0.3055	0.0000	OK
480 minute winter	33	472	45.458	0.533	17.0	152.7142	0.0000	SURCHARGED
15 minute winter	34	69	43.991	0.023	2.0	0.0261	0.0000	OK
60 minute winter	35	557	42.994	0.019	2.0	0.0213	0.0000	OK
120 minute winter	36	124	41.491	0.656	11.5	0.0000	0.0000	OK
120 minute winter	37	122	41.485	0.685	74.2	1.2105	0.0000	SURCHARGED
15 minute summer	38	10	40.625	0.099	24.7	0.1119	0.0000	OK
15 minute summer	39	10	39.678	0.091	24.5	0.1033	0.0000	OK
60 minute winter	40	61	39.041	0.512	20.2	23.9409	0.0000	SURCHARGED
120 minute summer	41	62	38.405	0.063	16.9	0.0715	0.0000	OK
120 minute summer	42	62	37.844	0.060	16.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	4.001	27	59.2	1.979	0.449	0.6829	
15 minute summer	27	4.002	30	64.0	2.881	0.249	0.3291	
15 minute summer	28	5.000	29	31.9	0.822	0.449	0.9351	
15 minute summer	29	5.001	30	40.8	0.746	0.575	1.5877	
15 minute summer	30	4.003	31	118.0	1.166	1.059	0.8667	
15 minute summer	31	4.004	32	128.3	1.684	1.157	1.7139	
15 minute summer	32	4.005	33	174.3	4.003	0.447	1.0810	
480 minute winter	33	Hydro-Brake®	34	2.0				
15 minute winter	34	4.007	35	2.0	1.180	0.050	0.0307	
60 minute winter	35	4.008	36	2.0	1.275	0.014	0.0256	
120 minute winter	36	Flow through pond	37	74.2	0.087	0.006	307.5859	
120 minute winter	37	Hydro-Brake®	41	14.9				
15 minute summer	38	6.000	39	24.5	2.084	0.713	0.2973	
15 minute summer	39	6.001	40	24.3	1.926	0.687	0.3878	
60 minute winter	40	Hydro-Brake®	41	2.0				
120 minute summer	41	6.003	42	16.9	1.923	0.156	0.1145	559.6

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	54.593	0.652	28.3	0.7370	0.0000	SURCHARGED
15 minute summer	2	11	54.141	0.473	28.0	0.5355	0.0000	SURCHARGED
15 minute summer	3	11	54.102	0.502	45.5	0.5675	0.0000	SURCHARGED
15 minute summer	4	11	54.057	1.167	67.0	1.3203	0.0000	SURCHARGED
15 minute summer	5	11	53.889	1.181	150.4	1.3352	0.0000	SURCHARGED
15 minute summer	6	11	52.884	0.443	163.4	0.6335	0.0000	SURCHARGED
15 minute summer	7	11	52.702	0.317	181.6	0.4530	0.0000	OK
15 minute summer	8	11	52.447	0.240	211.1	0.3439	0.0000	OK
15 minute summer	9	11	51.978	0.247	244.8	0.3529	0.0000	OK
15 minute summer	10	10	51.386	0.239	289.0	0.3421	0.0000	OK
15 minute summer	11	11	50.048	0.302	303.0	0.4323	0.0000	OK
15 minute summer	12	10	53.467	0.146	63.0	0.1655	0.0000	OK
15 minute summer	13	10	52.491	0.107	62.7	0.1212	0.0000	OK
15 minute summer	14	10	51.829	0.168	69.7	0.1904	0.0000	OK
15 minute summer	15	10	51.252	0.180	105.5	0.2037	0.0000	OK
15 minute summer	16	11	49.645	0.487	121.9	0.5503	0.0000	SURCHARGED
15 minute summer	17	11	49.434	0.728	443.2	1.0417	0.0000	SURCHARGED
15 minute summer	18	11	48.085	0.311	490.1	0.4444	0.0000	OK
15 minute summer	19	12	46.599	0.532	536.6	0.7608	0.0000	SURCHARGED
15 minute summer	20	12	45.617	1.236	522.7	1.7693	0.0000	SURCHARGED
15 minute summer	21	12	44.832	1.399	510.1	2.0024	0.0000	FLOOD RISK
15 minute summer	22	12	44.056	1.296	536.1	1.8543	0.0000	SURCHARGED
30 minute summer	23	20	42.271	1.372	532.9	1.9639	0.0000	FLOOD RISK
30 minute summer	24	21	41.812	0.977	531.9	0.0000	0.0000	OK
15 minute summer	25	11	48.741	0.239	45.2	0.2701	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	25.1	1.426	1.417	0.3501	
15 minute summer	2	1.001	3	29.7	0.747	0.745	0.4563	
15 minute summer	3	1.002	5	48.4	1.216	1.213	1.0071	
15 minute summer	4	2.000	5	63.1	0.896	0.891	3.1286	
15 minute summer	5	1.003	6	149.6	2.124	2.112	3.3000	
15 minute summer	6	1.004	7	163.1	1.491	1.463	1.8708	
15 minute summer	7	1.005	8	181.1	2.084	0.924	1.6115	
15 minute summer	8	1.006	9	210.9	2.801	0.575	1.0776	
15 minute summer	9	1.007	10	244.6	3.271	0.585	1.0140	
15 minute summer	10	1.008	11	289.9	3.684	0.675	2.5868	
15 minute summer	11	1.009	17	297.5	3.026	0.649	2.0502	
15 minute summer	12	3.000	13	62.7	2.721	0.652	0.6348	
15 minute summer	13	3.001	14	62.4	2.450	0.420	0.2260	
15 minute summer	14	3.002	15	69.2	2.126	0.825	0.7524	
15 minute summer	15	3.003	16	104.1	3.178	0.903	1.3707	
15 minute summer	16	3.004	17	116.3	2.123	0.601	0.8812	
15 minute summer	17	1.010	18	436.6	4.067	0.968	1.7154	
15 minute summer	18	1.011	19	491.2	4.154	0.737	5.4151	
15 minute summer	19	1.012	20	512.9	4.139	0.663	4.6985	
15 minute summer	20	1.013	21	502.3	3.507	0.736	3.3937	
15 minute summer	21	1.014	22	511.8	3.351	0.865	3.1996	
15 minute summer	22	1.015	23	538.6	3.400	0.899	8.6328	
30 minute summer	23	1.016	24	531.9	3.357	3.329	1.9867	
30 minute summer	24	Flow through pond	37	268.1	0.149	0.020	353.9887	
15 minute summer	25	4.000	26	43.4	1.168	1.092	1.4466	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	10	48.387	0.194	85.0	0.2189	0.0000	OK
15 minute summer	27	11	48.010	0.137	91.9	0.1551	0.0000	OK
15 minute summer	28	11	46.554	0.451	46.8	0.5097	0.0000	SURCHARGED
15 minute summer	29	11	46.506	0.494	60.8	0.5586	0.0000	SURCHARGED
15 minute summer	30	11	46.407	0.582	169.6	0.8331	0.0000	SURCHARGED
15 minute summer	31	11	46.283	0.485	184.3	0.6942	0.0000	SURCHARGED
600 minute winter	32	585	46.021	0.290	20.4	0.4146	0.0000	OK
600 minute winter	33	585	46.021	1.096	20.4	229.7105	0.0000	SURCHARGED
600 minute winter	34	585	43.993	0.025	2.3	0.0280	0.0000	OK
600 minute winter	35	585	42.995	0.020	2.3	0.0228	0.0000	OK
180 minute winter	36	180	41.768	0.934	20.9	0.0000	0.0000	OK
180 minute winter	37	180	41.762	0.962	80.5	1.6991	0.0000	SURCHARGED
15 minute summer	38	11	40.789	0.263	35.9	0.2976	0.0000	SURCHARGED
15 minute summer	39	12	39.791	0.204	33.6	0.2310	0.0000	SURCHARGED
120 minute winter	40	118	39.315	0.786	16.9	36.7308	0.0000	SURCHARGED
120 minute summer	41	56	38.405	0.063	16.9	0.0715	0.0000	OK
120 minute summer	42	56	37.844	0.060	16.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	4.001	27	84.6	2.132	0.641	0.9028	
15 minute summer	27	4.002	30	91.6	3.135	0.356	0.4329	
15 minute summer	28	5.000	29	46.7	0.861	0.659	1.5581	
15 minute summer	29	5.001	30	59.6	0.847	0.841	1.9190	
15 minute summer	30	4.003	31	170.3	1.544	1.528	0.9494	
15 minute summer	31	4.004	32	185.1	1.848	1.669	2.0811	
600 minute winter	32	4.005	33	20.4	1.601	0.052	2.1542	
600 minute winter	33	Hydro-Brake®	34	2.3				
600 minute winter	34	4.007	35	2.3	1.229	0.057	0.0340	
600 minute winter	35	4.008	36	2.3	1.333	0.016	0.0283	
180 minute winter	36	Flow through pond	37	80.5	0.084	0.006	482.4868	
180 minute winter	37	Hydro-Brake®	41	14.9				
15 minute summer	38	6.000	39	33.6	2.155	0.974	0.4444	
15 minute summer	39	6.001	40	32.9	1.985	0.927	0.4735	
120 minute winter	40	Hydro-Brake®	41	2.0				
120 minute summer	41	6.003	42	16.9	1.923	0.156	0.1145	768.0