Project Name	: Land off Reeds Lane, Sayers Common
Job No	: 22-258
Note Title	: Flood Risk Assessment and Drainage Strategy Addendum No. 1
Author	: JW
Checked	: GG
Approved	: GG
Date	: November 2025

1.0 INTRODUCTION

1.1 Background

1.1.1 Odyssey was commissioned by Antler Homes to provide flood risk and drainage advice, incorporating a surface water and foul drainage strategy, in support of a planning application for residential development at Sayers Common.

1.1.2 The Flood Risk Assessment (FRA) and Drainage Strategy was submitted to Mid Sussex District Council in June 2025 as part of planning application (reference DM/25/1434).

1.1.3 Following the submission of the planning application, comments on the proposed drainage strategy were received from West Sussex County Council in their capacity as the Lead Local Flood Authority (LLFA). A copy of the LLFA comments is provided in **Appendix A**.

1.1.4 This FRA Addendum, which should be read in conjunction with the submitted FRA and Drainage Strategy (reference 22-258-05), addresses the comments from LLFA.

2.0 RESPONSE TO THE LLFA COMMENTS

2.1.1 The LLFA provided the following comments (***in bold italics***) in September 2025. Odyssey's response directly follows each comment.

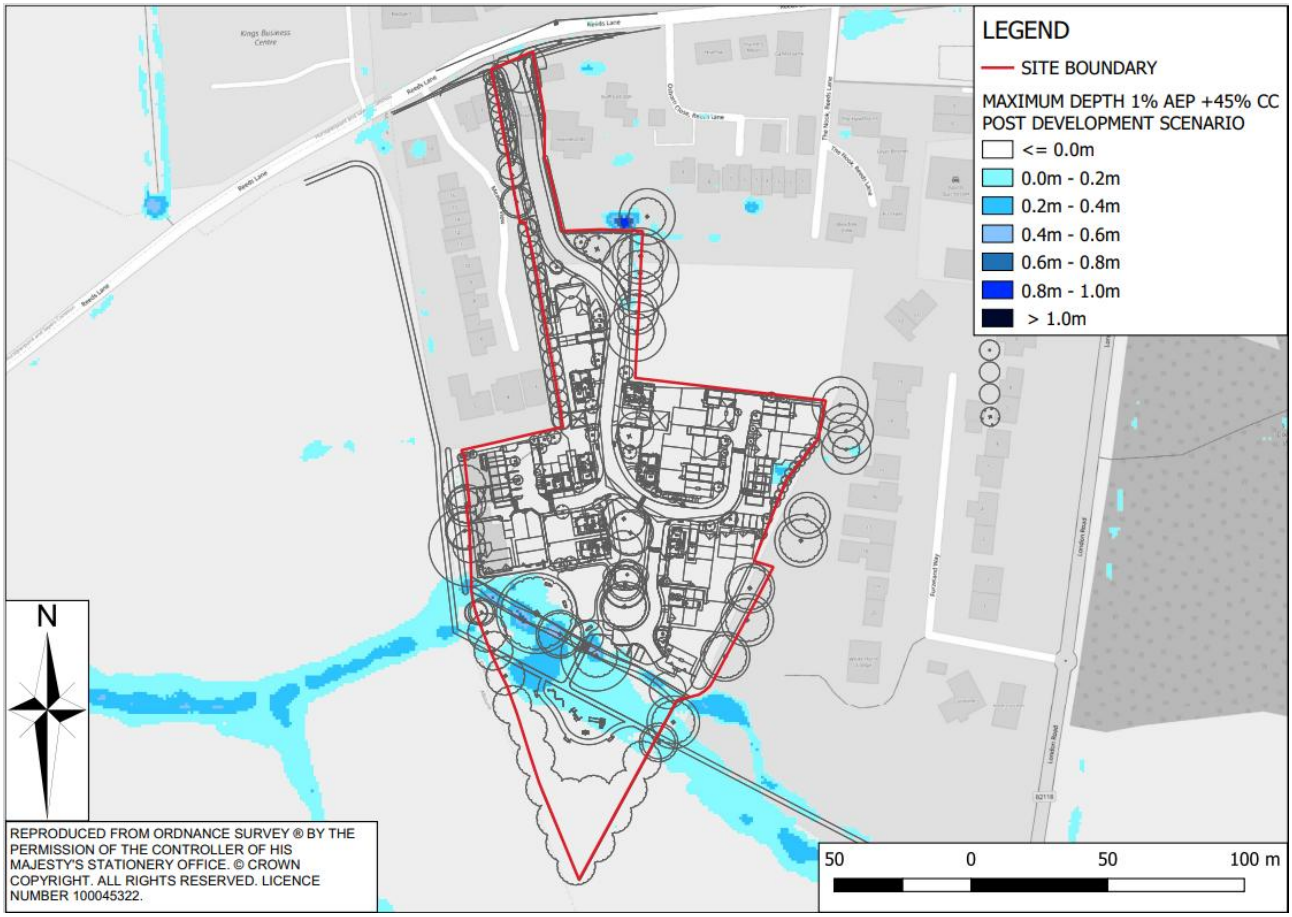
"We have concerns that there are several issues with the Flood Risk Assessment and Drainage Strategy which could increase flood risk elsewhere. We require further information to address the following:

1. Flood storage for the ordinary watercourse in the south of the site will be lost as a result of the ground raising towards the west of the site. As stated in PPG Flood risk and coastal change, on-site level for level compensatory storage accounting for climate change for the lifetime of the development should be provided. This is to ensure surface water which naturally collects in the lower areas of the site currently (in the watercourse floodplain) is not displaced, as this would increase flood risk within the site or elsewhere."

2.1.2 The proposed raising of levels near the ordinary watercourse does impact on the flood plain however, as presented in the Pluvial Modelling Report in Appendix G of the submitted Flood Risk Assessment and Drainage Strategy (reference 22-258-05), modelling has been undertaken and demonstrates the new flood extents, resultant of the flood plain changes, are accommodated on site without increasing flood risk off site. This demonstrates flood compensation area has already been provided on other parts of the site for the 1 in 100 year flood event including climate change.

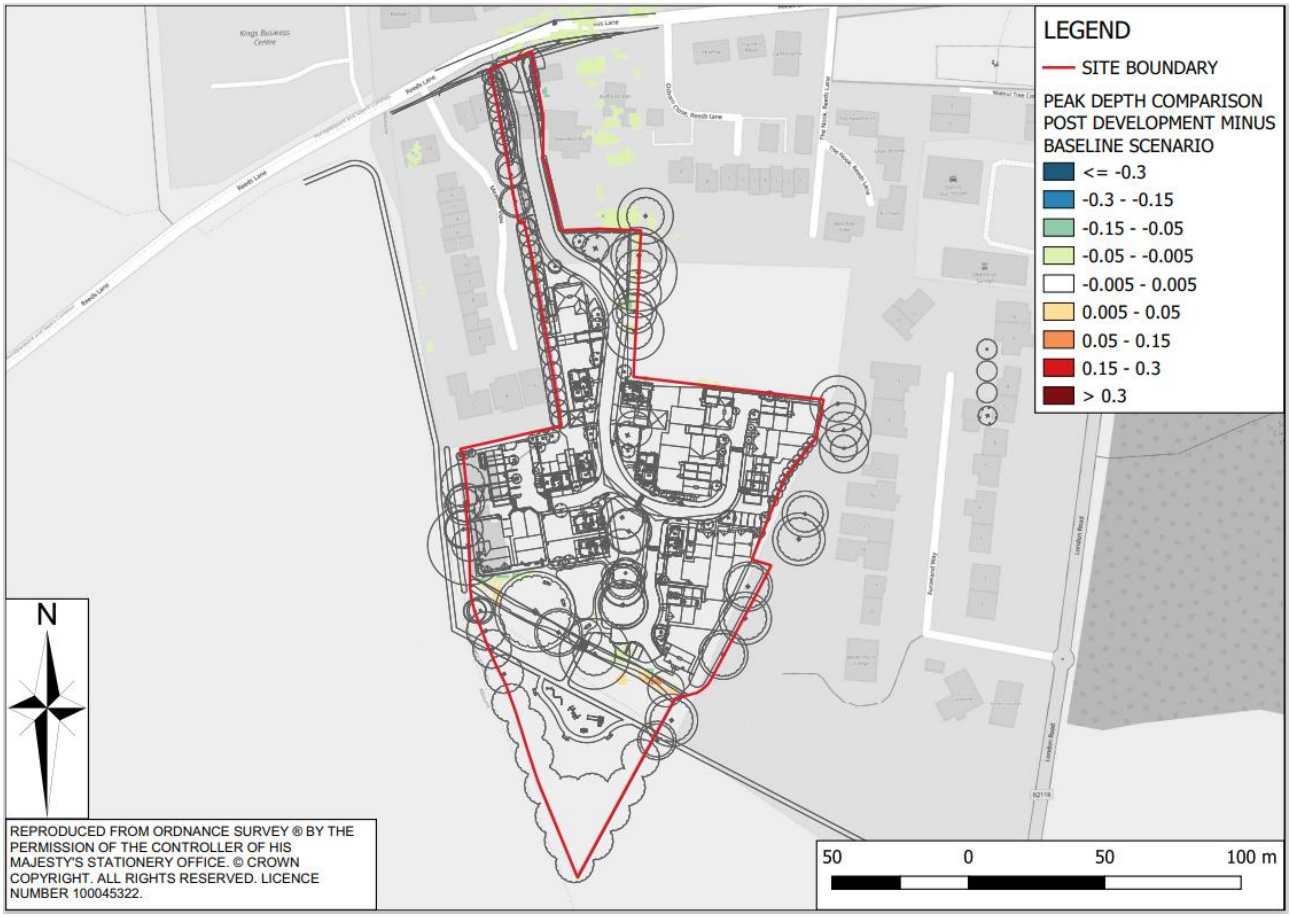
2.1.3 The Post Development modelling results for the 1 in 100 year + 45% climate change allowance have been extracted from the Pluvial Modelling Report and are shown in **Figure 2.1**. The updated site layout has been incorporated into **Figure 2.1** and shows the dwellings would not be impacted by the pluvial flood extents.

Figure 2.1: Peak Flood Depth for 1% AEP + 45%CC Event – Post-Development Scenario



2.1.4 The peak depth comparison mapping, comparing the pre- and post- development scenarios, updated for the new site layout is presented in **Figure 2.2**. **Figure 2.2** shows that there is no increase in flood risk off site as a result of the development.

Figure 2.2: Pre-Development and Post-Development Peak Depth Comparison

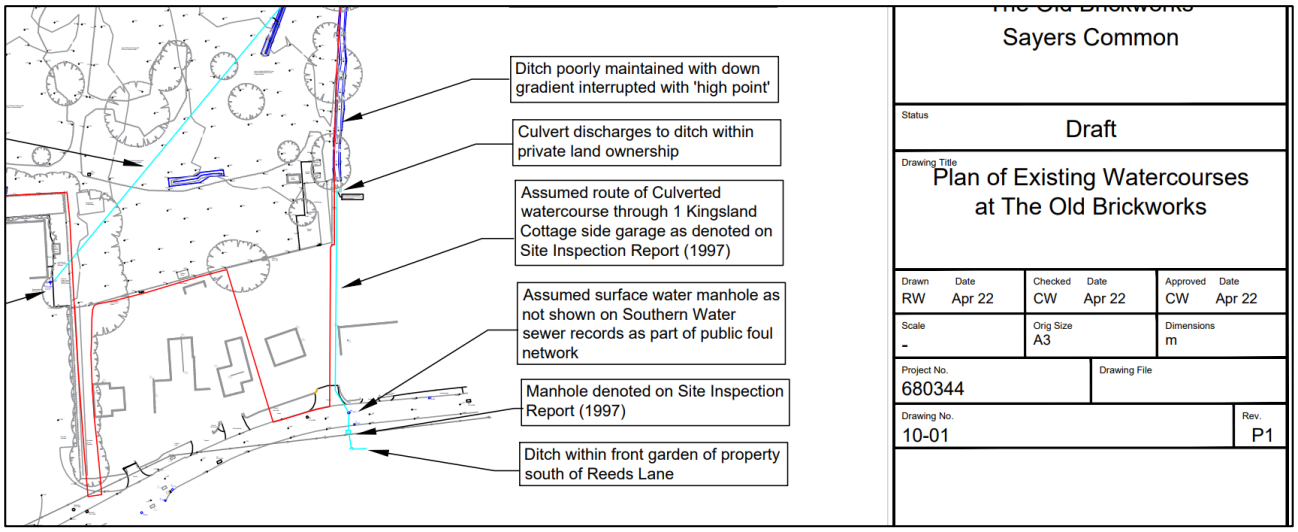


"2. The northern catchment, as defined by the applicant, is proposed to discharge at a restricted rate to a highway drain. We require evidence that the owner of the system accepts in principle connection to their system, and that the receiving system has capacity for additional flows. The applicant is reminded that WSCC highways are unlikely to accept private surface water (from residential areas) into the highway drainage system.

2.1.5 An alternative discharge point has been identified for the site, therefore discharge to the highway drain is no longer proposed. The culverted watercourse in Reed's Lane is presented in the Plan of Existing Watercourses at The Old Brickworks drawing (reference 680344-10-01 P1) in Planning Application DM/22/0640 at Land North of Lyndon, Reed's Lane, Sayers Common. The drawing is located in Appendix A of the 'Agent – Additional drainage information' document. The drawings demonstrate that the culverted watercourse has continuity towards the north.

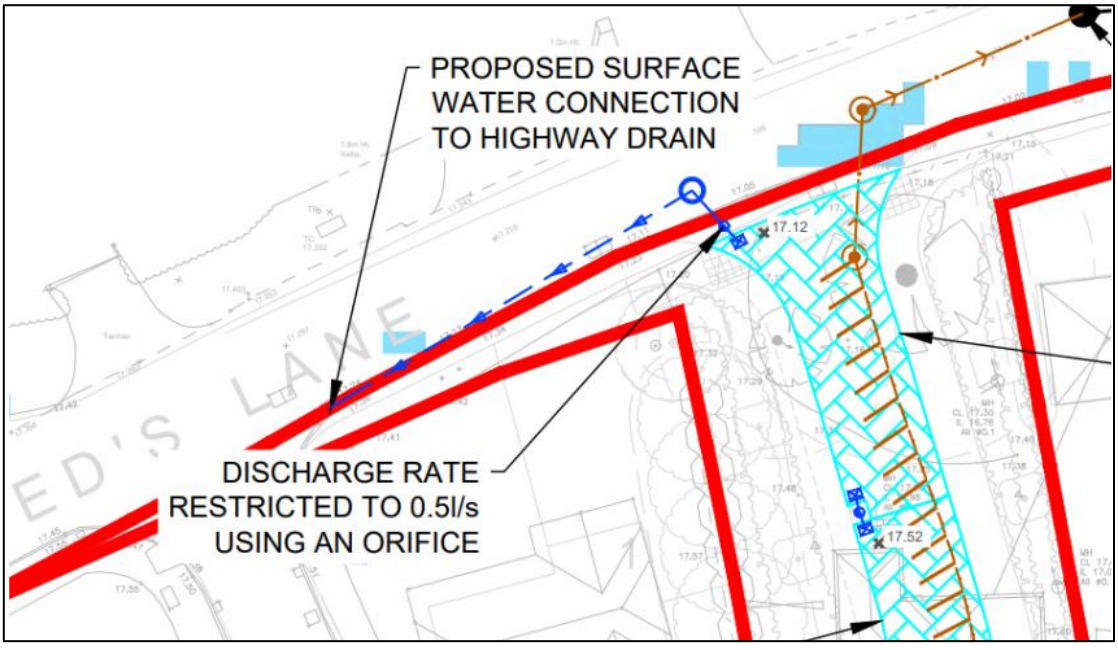
2.1.6 An extract of the drawing is presented in **Figure 2.1** below, the culverted watercourse is indicated in cyan. The access to the proposed site is to west along Reed's Lane and continues to the south.

Figure 2.1 – Extract Showing Culverted Watercourse in Reed's Lane



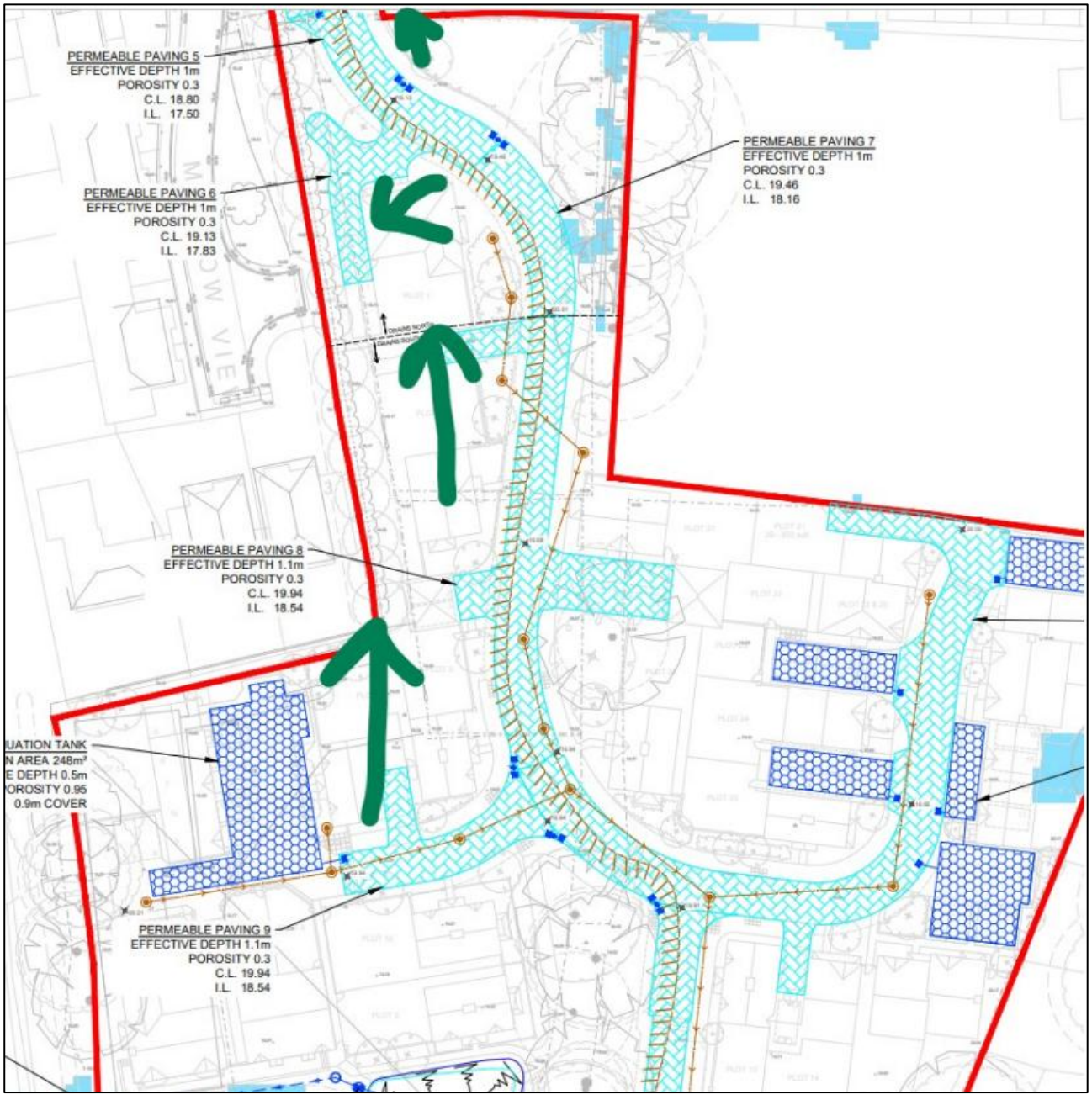
2.1.7 The drainage strategy has been updated to show surface water discharging to this outfall. The details are shown in Drainage Strategy **Drawing 22-258-09B** and the calculations are presented in **Appendix B**.

Also in the northern outfall location, it is unclear what direction the existing system flows. We believe the system it is proposed to discharge into falls from west to east, rather than east to west as suggested in the drainage strategy. If there are proposals to contract additional surface water sewers outside the red line boundary, this will also require third party agreements."



2.1.8 Although it is no longer proposed to connect to the highway drain, the new proposed connection would require works outside the red line boundary. Reed's Lane is a public highway, construction through highway land can be achieved via a s278 agreement. It is acknowledged that agreement to construct on highway land would be required and would be applied for at a later stage in the project once planning permission is achieved.

"3. The surface water drainage system should mimic natural drainage systems. The topographical survey suggests more of the site drains north than where it is proposed that the new surface water drainage system north catchment begins, as seen below.



2.1.9 Previously the site was designed to reduce the amount of water discharging to the highway drain as this option is not ideal however, the drainage strategy has now been updated to discharge to the culverted watercourse under Reed's Lane, with an amended split that better reflects the natural catchments.

2.1.10 The drainage strategy has been updated in **Drawing 22-258-009B** and the updated calculations are presented in **Appendix B**. A catchment plan **Drawing 22-258-014** showing the catchment splits has also been generated.

2.1.11 The principles of the drainage strategy remain the same, however updated greenfield run off rates for each of the catchments (0.618ha) have been provided in **Table 2.1** and **2.2.** Supporting calculations are presented in **Appendix B**.

2.1.12 Note the total catchment area has changed slightly due to changes to the site layout resultant of comments on the planning application from other disciplines. The updated Site Layout is presented in **Appendix C**.

Table 2.1: Greenfield Run off Rates

Return Period	Existing Greenfield Discharge Rates from Site (litres per second (l/s))	Existing Greenfield Discharge Rates per Hectare (l/s/ha)
QBAR	3.2	5.2
Q1	2.7	4.4
Q30	7.3	11.8
Q100	10.3	16.7

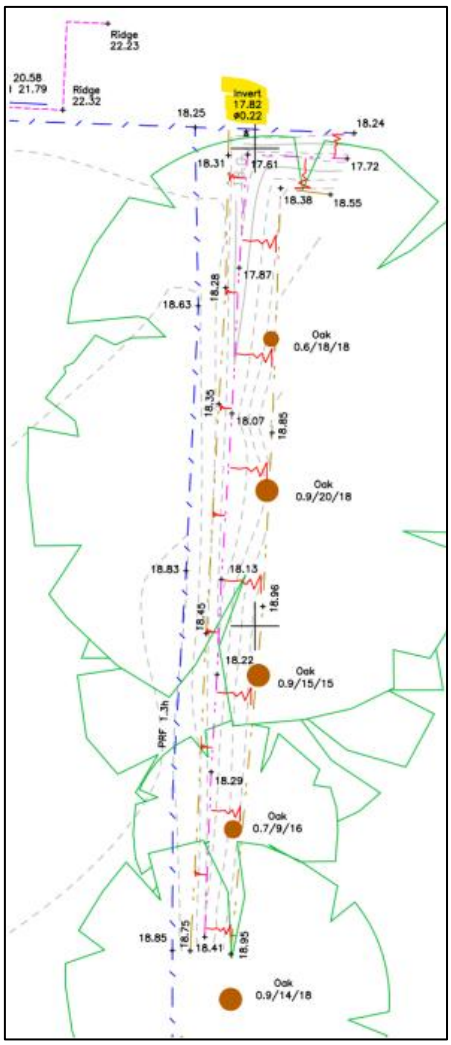
2.1.13 The greenfield runoff rates are prorated for each of the catchment areas, and Qbar for each catchment is provided in **Table 2.2**. The proposed discharge rates have been based on the greenfield run off rates and are also set out in **Table 2.2**.

Table 2.2: Prorated Greenfield Runoff Rates

Catchment	Qbar (l/s)	Proposed Discharge Rate (l/s)
1	1.8	1.8
2	1.4	1.4

"4. It also appears that there might be a shallow ditch on the right-hand side of the site, where the existing line of trees are roughly south of Buff Cottage. There is also an Invert level for what is assumed to be a pipe on the topographical survey, although it is unclear what this relates to. If it is a watercourse that is connected to the wider network, this should be used for the northern part of the site instead of the highway drainage system. This is because

discharge to an above ground surface water body is above discharge to a piped surface water system in the discharge hierarchy."



2.1.14 The culverted watercourse was identified under Reed's Lane which provides a suitable alternative discharge location, it is possible that the culverted watercourse continues from the shallow ditch however it is unclear if it is culverted or if the sewer is in a suitable condition and free flowing which could result in flooding the properties downstream of it. In addition, this shallow ditch would not be able to serve as the discharge point for the section of the site that is topographically lower than the ditch.

2.1.15 The amended strategy is presented in updated drainage strategy **Drawing 22-258-009B** and catchment **Drawing 22-258-014**. The updated calculations are presented in **Appendix B**.

"5. Calculations for a 50% AEP and 3.3% AEP plus climate change are required. In the 3.3% AEP results, there shall be no flooding of the surface water drainage system, apart from areas designed to hold or convey surface water."

2.1.16 The 50% and 3.3% AEP calculations have been provided alongside the calculations for the 1% AEP scenario with climate change in **Appendix B**. The calculations show that there is no flooding in the 3.3% AEP event in the surface water drainage system apart from areas designed to hold or convey surface water.

"6. The levels in the calculations and the drainage layout must match. There is currently instances where there are discrepancies, which means the system being modelling does not reflect plans."

2.1.17 The updated calculations are presented in **Appendix B**.

"7. As several of the orifices have a diameter less than 50mm, we require additional information about how they will be protected from blockage risks. It is also noted that some of the orifices have no design flow."

2.1.18 All of the orifices have been designed out, they have been replaced with vortex control devices which have a minimum opening of 55mm.

2.1.19 Some of the flows are very small due to the downstream attenuation being full or the effect of the surcharged outfall so water is temporarily unable to flow at a rate that would be registered in the calculations, this is required as the discharge rate from the site is low. All of the controls do allow water to pass through so the attenuation will empty in due course.

"8. An exceedance plan is required for 1% AEP plus climate change event."

2.1.20 Exceedance flow route information is presented in **Drawing 22-258-015**.

"9. In the calculations, some of the permeable paving depths are missing."

2.1.21 The permeable paving effective depths are shown by the invert levels of the nodes minus 0.3 allowance for the paving construction, however the depths are now all shown in the calculations.

"10. On the drainage strategy there is no details about the basin included. Cross sections of the basin are also required. The basin should be designed following the SuDS Manual and any relevant sections of the National SuDS Standards.

2.1.22 It is anticipated that the provision of details and cross sections for the basin could be conditioned to be provided at a later design stage. The basin has been slightly amended to be 0.61 meters deep with side slopes between 1 in 4 and 1 in 6. The depth of the basin is determined by levels at the outfall and the ground in the location of the basin.

"11. To ensure there is capacity for consecutive events, attenuation features should half drain a 3.3% AEP event within 24 hours."

2.1.23 The half drain down times have been calculated based on a graphical method, reading of the time for the water to reach half depth in each attenuation storage based on graphs generated by Causeway Flow. The half drain down times for all of the attenuation features for the 1 in 30 year storms have been provided in **Table 2.3**.

Table 2.3: Half Drain Down times

Catchment	Attenuation Feature	Max Depth (time in mins)	Min Depth	Half Depth (time in mins)	Drain Down Time in minutes
Catchment 1	Tank Upstream of Carpark 9	18.626 (947)	18.260	18.443 (2554)	1607
	Carpark 9	18.626 (947)	18.230	18.428 (2680)	1733
	Carpark 8	18.209 (1407)	17.650	17.923 (4831)	3424
	Carpark 7	17.979 (609)	17.580	17.780 (1569)	960
	Carpark 6	17.779 (584)	17.290	17.535 (1835)	1251
	Carpark 5	17.602 (947)	17.140	17.371 (2496)	2402
	Carpark 4	17.428 (2222)	16.900	17.164 (4817)	2595
	Carpark 3	17.339 (2407)	16.840	17.090 (4682)	2275
	Carpark 2	17.079 (1410)	16.500	16.790 (4249)	2839
	Carpark 1	16.636 (152)	16.420	16.528 (325)	173
Catchment 2	Tank upstream of Car Park 10	19.019 (6365)	18.538	18.779 (10952)	4587
	Cark Park 10	19.019 (6365)	18.508	18.764 (11441)	5076
	Tank Upstream of Car Park 11	18.953 (6111)	18.458	18.706 (14489)	8378
	Car Park 11	18.953 (6111)	18.428	18.691 (15859)	9748
	Basin	18.758 (6365)	18.336	18.547 (39122)	32757

2.1.24 Some of the half drain down times are within 24 hours however others do not satisfy that requirement. This is due to the need to sufficiently restrict the discharge rates from the attenuation storage features in order to achieve a total discharge rate of Qbar for the site.

"12. To allow us to check the calculation parameters, send the FEH 2022 point data file for the site to the Flood Risk Management Team. This data will be dealt with in accordance with 5.1.7 of the FEH Web Service terms of use. Please send it to FRM@westsussex.gov.uk not

the case officer, as this information must remain confidential to follow the terms of use. Please title the email: DM/25/1434 FEH Point File.

2.1.25 The FEH Point File has been emailed to the requested contact.

DRAWINGS

N

PROPOSED SURFACE WATER CONNECTION TO EXISTING MANHOLE ON CULVERTED WATERCOURSE

4101
CL: 17.04
IL: 16.08

5101
CL: 17.20
IL: 15.48

5103
CL: TBC
IL: TBC

5102
CL: TBC
IL: TBC

PROPOSED SURFACE WATER CONNECTION TO HIGHWAY DRAIN

PROPOSED FOUL CONNECTION TO MANHOLE 4101

DISCHARGE RATE RESTRICTED TO 1.8l/s USING AN ORIFICE

PERMEABLE PAVING 1
EFFECTIVE DEPTH 0.4m
POROSITY 0.3
Min C.L. 17.120
Min I.L. 16.420

PERMEABLE PAVING 2
EFFECTIVE DEPTH 0.7m
POROSITY 0.3
Min C.L. 17.500
Min I.L. 16.500

PERMEABLE PAVING 3
EFFECTIVE DEPTH 1m
POROSITY 0.3
Min C.L. 17.840
Min I.L. 16.840

PERMEABLE PAVING 4
EFFECTIVE DEPTH 0.7m
POROSITY 0.3
Min C.L. 17.900
Min I.L. 16.900

PERMEABLE PAVING 5
EFFECTIVE DEPTH 0.7m
POROSITY 0.3
Min C.L. 18.140
Min C.L. 17.140

PERMEABLE PAVING 6
EFFECTIVE DEPTH 0.7m
POROSITY 0.3
Min C.L. 18.290
Min I.L. 17.290

PERMEABLE PAVING 7
EFFECTIVE DEPTH 0.7m
POROSITY 0.3
Min C.L. 18.580
Min I.L. 17.580

PERMEABLE PAVING 8
EFFECTIVE DEPTH 0.9m
POROSITY 0.3
Min C.L 18.850
Min I.L.17.650

PERMEABLE PAVING 9
EFFECTIVE DEPTH 0.7m
POROSITY 0.3
Min C.L 19.230
Min I.L 18.230

ATTENUATION TANK
TOTAL PLAN AREA 248m²
EFFECTIVE DEPTH 0.5m
POROSITY 0.95
0.9 COVER

PERMEABLE PAVING 10
EFFECTIVE DEPTH 0.9m
POROSITY 0.3
Min C.L. 19.938
Min I.L. 18.508

ATTENUATION TANKS GOING TO PERMEABLE PAVING 10
TOTAL PLAN AREA 258m²
EFFECTIVE DEPTH 0.5m
POROSITY 0.95
0.9m COVER

PROPOSED OUTFALL
I.L. OF DITCH = 17.81mAOD
I.L. OF OUTFALL PIPE =18.11mAOD

DISCHARGE RATE RESTRICTED TO 1.4l/S USING A VORTEX CONTROL DEVICE

ATTENUATION TANK
TOTAL PLAN AREA 54m²
EFFECTIVE DEPTH 0.5m
POROSITY 0.95
0.9m COVER

PERMEABLE PAVING 11
EFFECTIVE DEPTH 0.9m
POROSITY 0.3
Min C.L. 19.828
Min I.L. 18.428

REED'S LANE
OSBORN CLOSE
COW VIEW
Homelands
Buff Cottage
Hramsa
La Massana
The Hawthorns
The Nook
Meadow View
Moon
OPEN SPACE

NOTES

1. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
2. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES UNLESS OTHERWISE SPECIFIED.
3. THE TOPOGRAPHICAL SURVEY IS BASED ON 3D SERVICES (SOUTH EAST) DRAWING REF. 20/071/01 AND 20/071/02, DATED 06/07/20.
4. THE SITE LAYOUT HAS BEEN PROVIDED BY ANTLER HOMES. DRAWING REF. AH291 - PL.03H, DATED 12.08.25.
5. THE DRAINAGE STRATEGY IS PRELIMINARY AND WOULD BE SUBJECT TO CHANGE AT DETAILED DESIGN STAGE.
6. THE DRAINAGE STRATEGY IS SUBJECT TO A LEVELS STRATEGY TO FACILITATE ATTENUATION STORAGE.
7. PLUVIAL MODELLING UNDERTAKEN BY ODYSSEY. THE PLUVIAL MODELLING REPORT IS APPENDED TO THE FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT (REFERENCE 22-258-05).

LEGEND:

- SITE BOUNDARY
- PROPOSED BASIN
- PROPOSED SURFACE WATER PIPEWORK
- PROPOSED PERMEABLE PAVING
- PROPOSED HEADWALL
- PROPOSED DIFFUSER UNIT
- PROPOSED VORTEX FLOW CONTROL DEVICE
- PROPOSED FOUL SEWER PIPE AND MANHOLE
- PROPOSED FOUL WATER RISING MAIN
- PROPOSED ATTENUATION TANK
- MODELLED 1 IN 100 YEAR PLUS CLIMATE CHANGE PLUVIAL FLOODING EXTENTS
- EXISTING FOUL WATER PIPE AND MANHOLE
- EXISTING SURFACE WATER PIPE AND MANHOLE
- EXISTING SURFACE WATER HEADWALL
- PROPOSED PRIVATE PUMPING STATION WITH 5m BUFFER TO DWELLINGS
- 19.94 PROPOSED SPOT LEVELS

Rev	Amendments	Drn	Chk	App	Date
B	AMENDED FOR LLFA COMMENTS	JW	GG	GG	13.11.25
A	AMENDED FOR NEW SITE LAYOUT	JW	GG	GG	21.03.25

ODYSSEY
Tuscany House
White Hart Lane
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Telephone: 01256 331144
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Job Title
LAND OFF OF REEDS LANE, SAYERS COMMON

Drawing Title
PRELIMINARY DRAINAGE STRATEGY

Client
ANTLER HOMES

Scale	Date	Designed
1:500 @A1	SEPT 23	JW
Drawn	Checked	Approved
JW	GG	GG
Job No	Drawing No	Rev
22-258	22-258-009	B

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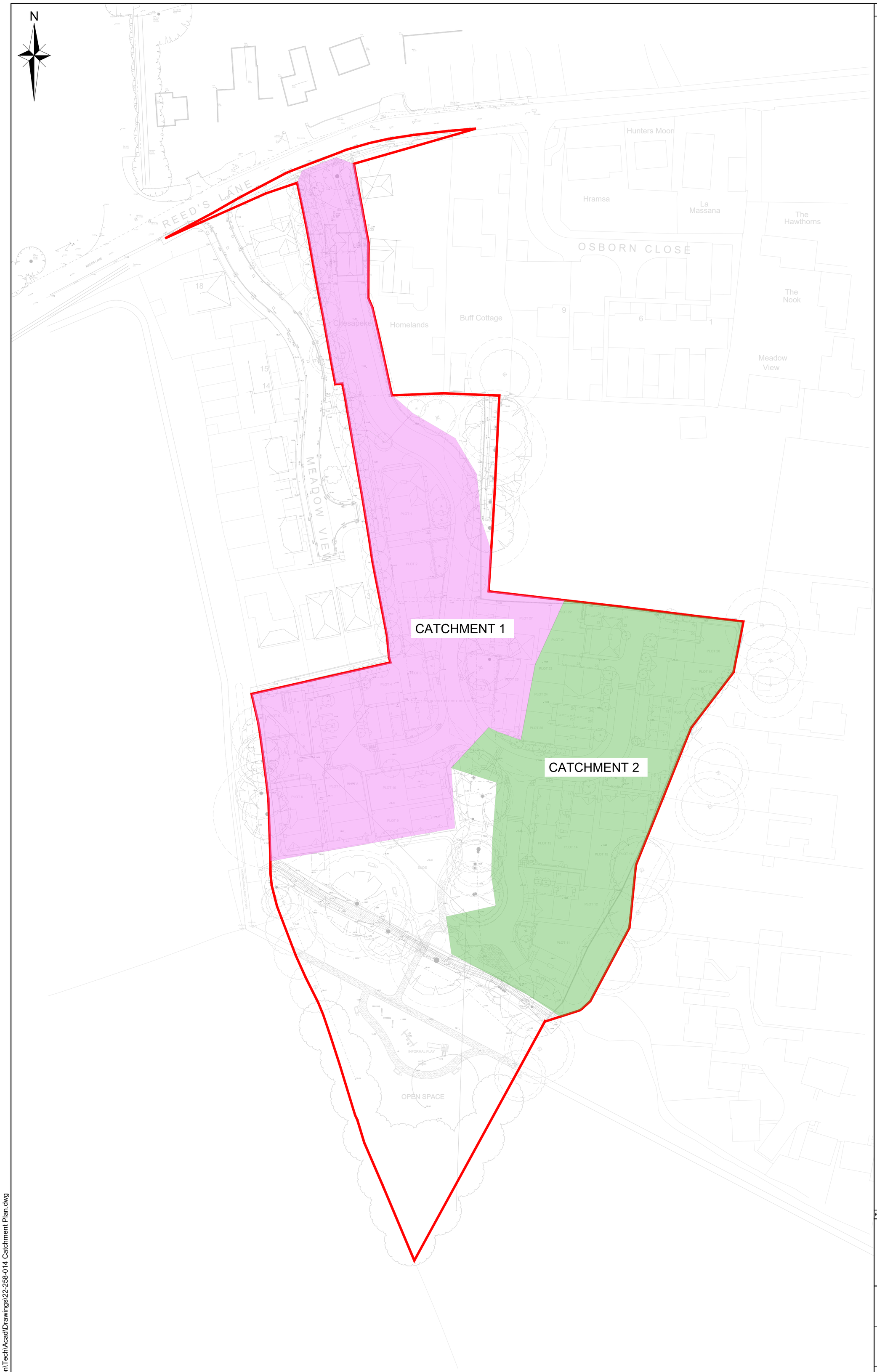

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LEGEND:

- SITE BOUNDARY
- CATCHMENT 1
- CATCHMENT 2

Rev	Amendments	Drn	Chk	App	Date

ODYSSEY

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Job Title
LAND OFF OF REEDS LANE, SAYERS COMMON

Drawing Title
CATCHMENTS

Client
ANTLER HOMES

Scale	Date	Designed
1:500 @A1	NOV 25	JW
Drawn	**Checked**	**Approved**
JW	GG	GG
Job No	**Drawing No**	**Rev**
22-258	22-258-014	

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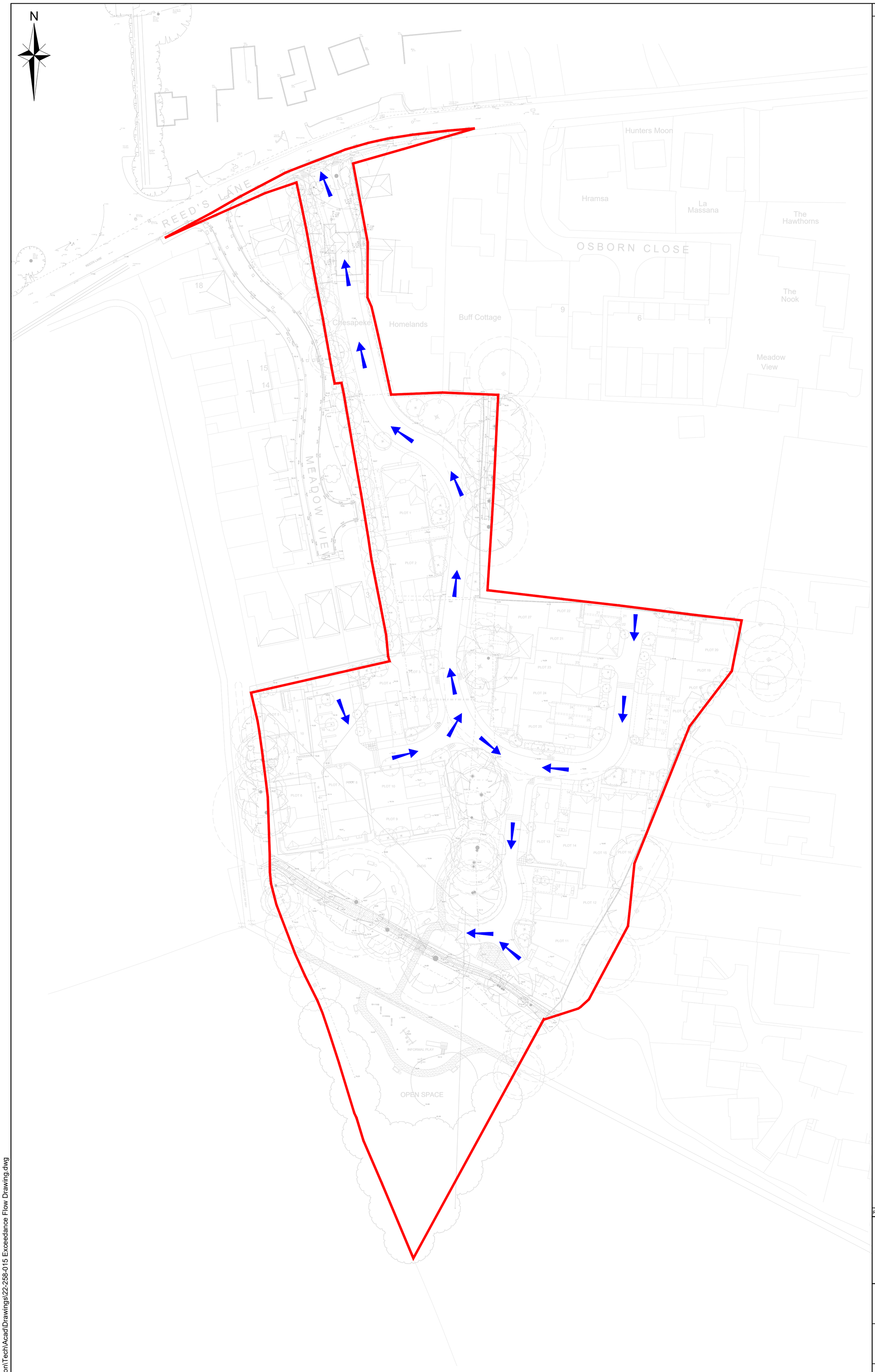

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LEGEND:

SITE BOUNDARY

EXCEEDANCE FLOW ROUTE ARROW

Rev	Amendments	Drn	Chk	App	Date

ODYSSEY

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Telephone: 01256 331144
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Job Title

LAND OFF OF REEDS LANE, SAYERS COMMON

Drawing Title

EXCEEDANCE FLOW DRAWING

Client

ANTLER HOMES

Scale	Date	Designed
1:500 @A1	NOV 25	JW
Drawn	**Checked**	**Approved**
JW	GG	GG
Job No	**Drawing No**	**Rev**
22-258	22-258-015	

P:\22-258 - Sayers Common\Tech\Acad\Drawings\22-258-015 Exceedance Flow Drawing.dwg

APPENDIX A

LLFA Comments

Ground Floor
Northleigh
County Hall
Chichester
West Sussex
PO19 1RH

Stuart Malcom
Development Control
Mid Sussex District Council
Oaklands Road
Haywards Heath
West Sussex
RH16 1SS

Lead Local Flood Authority

Date 18th September 2025

Dear Stuart,

RE: **DM/25/1434 – Land Rear Of Chesapeke, Reeds Lane, Sayers Common, Hassocks, West Sussex BN6 9JG**

Thank you for your consultation on the above site. We have reviewed the application as submitted and wish to make the following comments.

This is a full planning application for the Proposed demolition of an existing dwelling house, stables and barn buildings and the proposed development of 27 dwellings, with a new vehicular access, associated landscaping, parking, open space, and all other associated development works.

This application has been assessed using NPPF, PPG Flood Risk and Coastal Change, MSDC Local Plan and the National standards for sustainable drainage systems (SuDS) (Updated 30th July 2025). The WSCC Policy for the Management of Surface Water was superseded, therefore the National Standards should be followed, not our old policy as this is out of date.

We have concerns that there are several issues with the Flood Risk Assessment and Drainage Strategy which could increase flood risk elsewhere. We **require further information** to address the following:

1. Flood storage for the ordinary watercourse in the south of the site will be lost as a result of the ground raising towards the west of the site. As stated in PPG Flood risk and coastal change, on-site level for level compensatory storage accounting for climate change for the lifetime of the development should be provided. This is to ensure surface water which naturally collects in the lower areas of the site currently (in the watercourse floodplain) is not displaced, as this would increase flood risk within the site or elsewhere.
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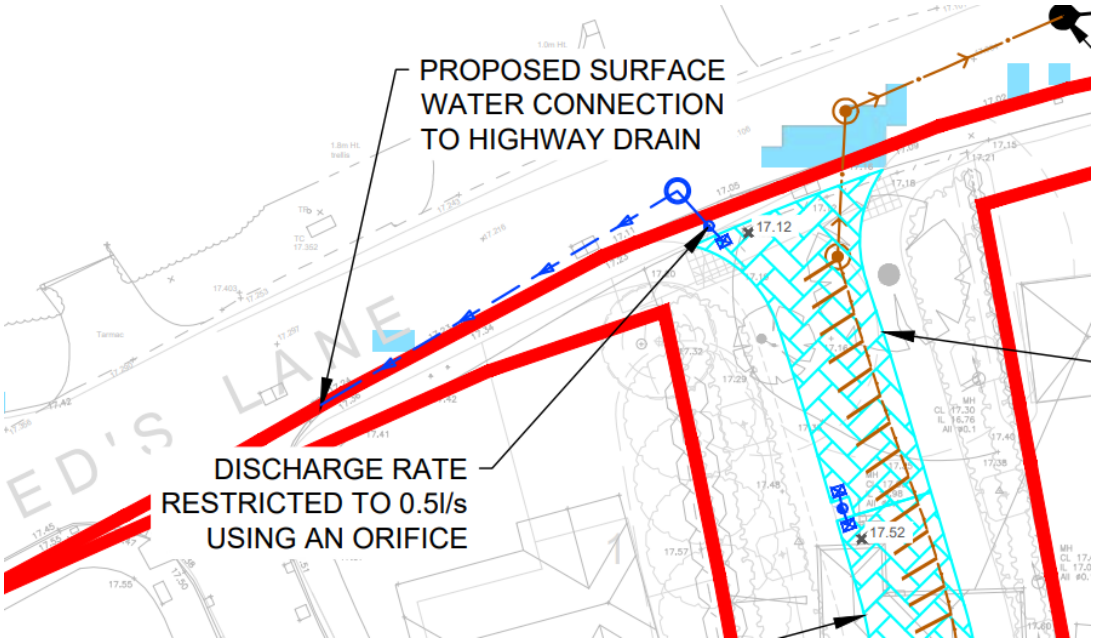

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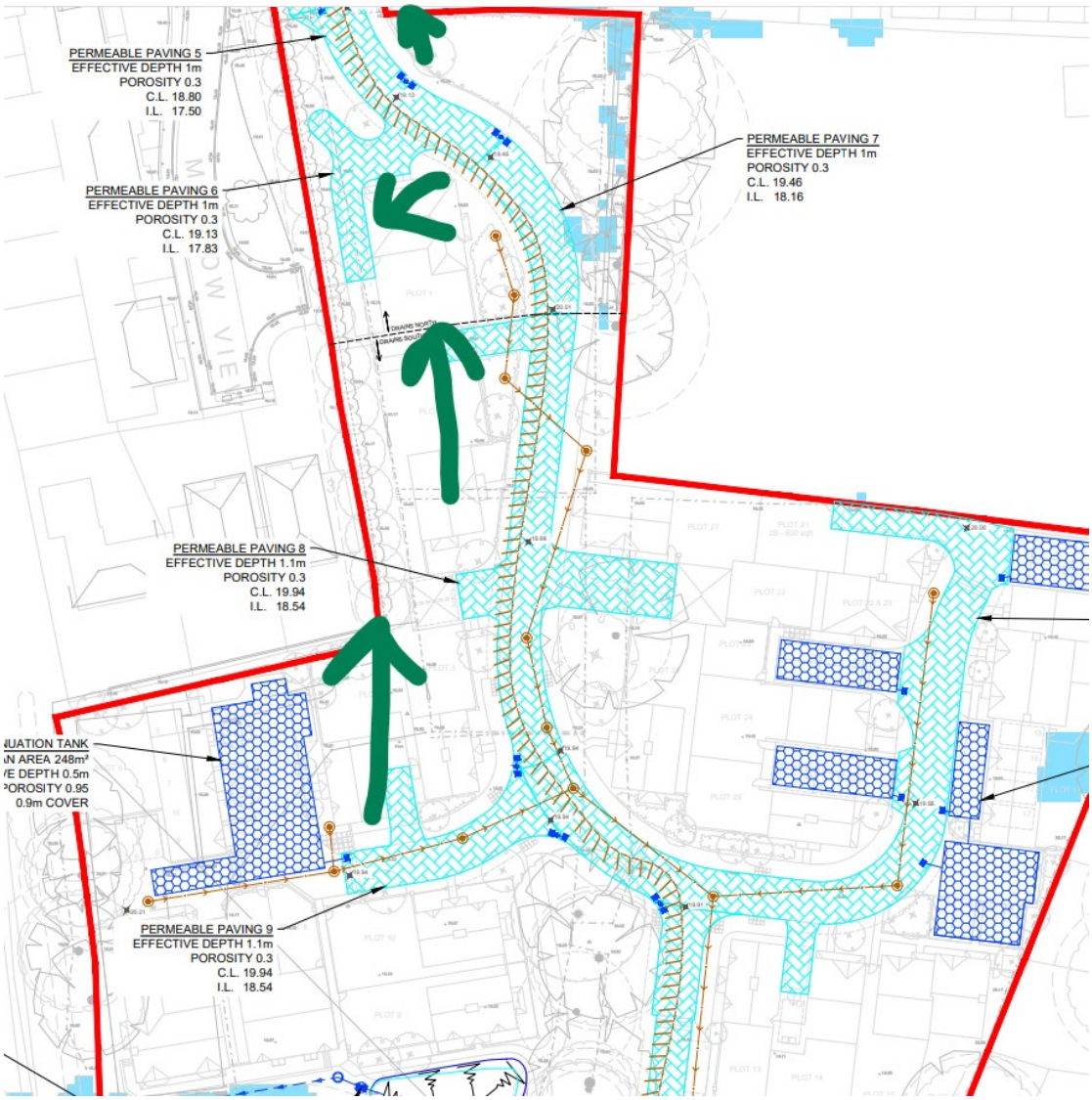
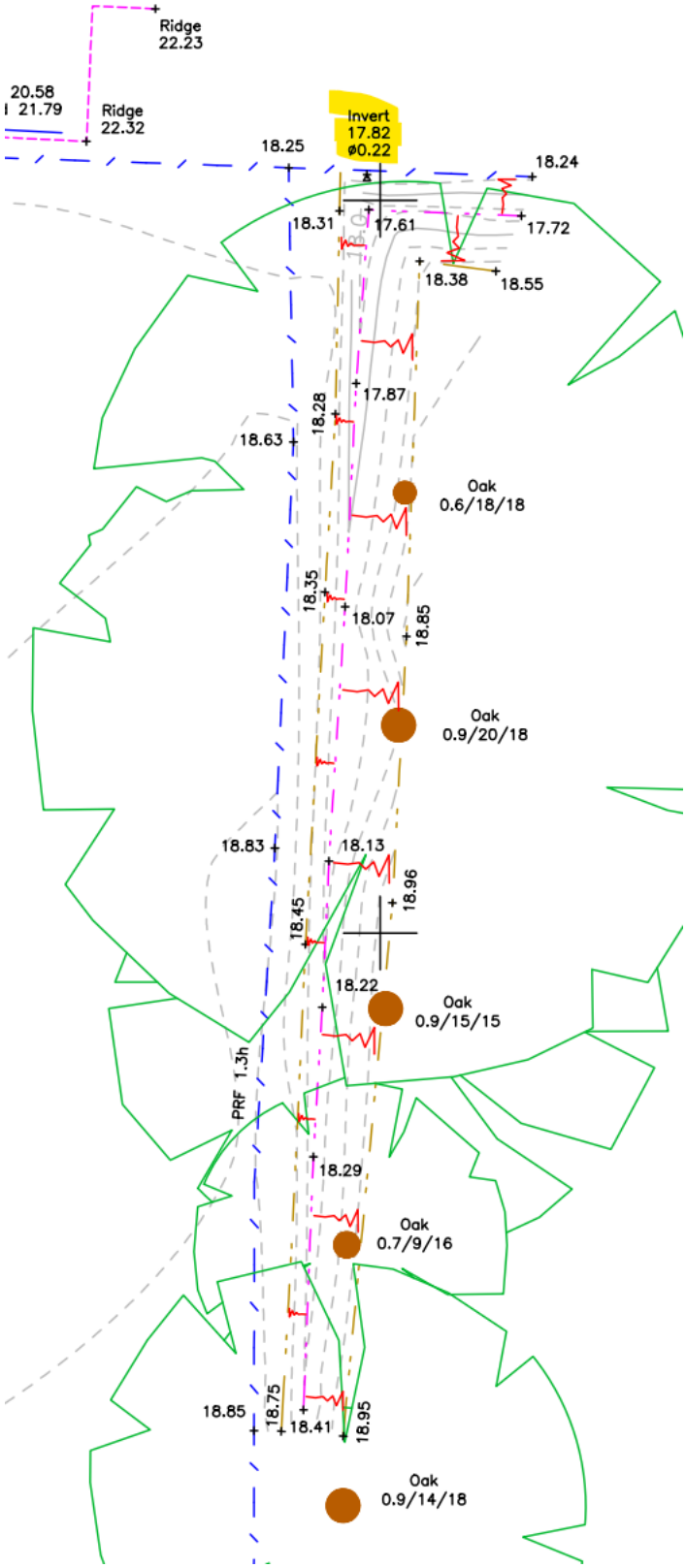


4. It also appears that there might be a shallow ditch on the right-hand side of the site, where the existing line of trees are roughly south of Buff Cottage. There is also an Invert level for what is assumed to be a pipe on the topographical survey, although it is unclear what this relates to.

   If it is a watercourse that is connected to the wider network, this should be used for the northern part of the site instead of the highway drainage system. This is because discharge to an above ground surface water body is above discharge to a piped surface water system in the discharge hierarchy.



5. Calculations for a 50% AEP and 3.3% AEP plus climate change are required. In the 3.3% AEP results, there shall be no flooding of the surface water drainage system, apart from areas designed to hold or convey surface water.
6. The levels in the calculations and the drainage layout must match. There is currently instances where there are discrepancies, which means the system being modelling does not reflect plans.

7. As several of the orifices have a diameter less than 50mm, we require additional information about how they will be protected from blockage risks. It is also noted that some of the orifices have no design flow.
8. An exceedance plan is required for 1% AEP plus climate change event.
9. In the calculations, some of the permeable paving depths are missing.
10. On the drainage strategy there is no details about the basin included. Cross sections of the basin are also required. The basin should be designed following the SuDS Manual and any relevant sections of the National SuDS Standards.
11. To ensure there is capacity for consecutive events, attenuation features should half drain a 3.3% AEP event within 24 hours.
12. To allow us to check the calculation parameters, send the FEH 2022 point data file for the site to the Flood Risk Management Team. This data will be dealt with in accordance with 5.1.7 of the FEH Web Service terms of use. Please send it to FRM@westsussex.gov.uk **not the case officer**, as this information must remain confidential to follow the terms of use. Please title the email: DM/25/1434 FEH Point File.

We'd encourage the applicant to use additional source control SuDS features where possible, to ensure a SuDS Approach is used. This will help ensure the SuDS system has multiple benefits, including amenity and biodiversity.

When preparing any additional documents, the applicant should provide details on how each SuDS standard has been met.

Yours sincerely,

Flood Risk Management Team
FRM@westsussex.gov.uk

Annex

The following documents were accessed from the planning portal and considered at the time in review of this application:

- Flood Risk Assessment and Drainage Strategy Project No. 22-176 Rev 0 - For Submission, prepared by Odysey, March 2025
- Dwg AH291 - PL.03 F Site Layout Plan 11.03.25
- Dwg AH291 - PL.03 F Site Layout Plan 11.03.25
- Dwg AH291 - PL.02 F Site Location Plan 07.11.24

APPENDIX B

Updated Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.618	Urban	0.000
SAAR (mm)	811	Region Number	Region 7

Results l/s

QBAR Rural	3.2
QBAR Urban	3.2
Q100 years	10.3
Q1 year	2.7
Q30 years	7.3
Q100 years	10.3

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank Upstream of Carpark 9		5.00	19.660		-62.089	7.930	1.400
Carpark 9	0.145	5.00	19.230		-44.436	5.899	1.000
Carpark 9 Hydrobrake			19.230	1200	-39.072	10.998	1.030
Carpark 8	0.082	5.00	18.850		-38.436	25.576	1.200
Carpark 8 Hydrobrake			18.850	1200	-37.711	29.973	1.230
Carpark 7	0.019	5.00	18.580		-39.647	85.901	1.000
Carpark 7 Hydrobrake			18.580	1200	-43.067	87.930	1.030
Carpark 6	0.035	5.00	18.290		-48.660	91.114	1.000
Carpark 6 Hydrobrake			18.290	1200	-51.213	93.349	1.030
Carpark 5	0.011	5.00	18.140		-56.374	100.924	1.000
Carpark 5 Hydrobrake			18.140	1200	-58.570	104.803	1.030
Carpark 4	0.018	5.00	17.900		-60.768	116.244	1.000
Carpark 4 Hydrobrake			17.900	1200	-62.499	119.067	1.030
Carpark 3	0.016	5.00	17.840		-64.775	132.754	1.000
Carpark 3 Hydrobrake			17.840	1200	-65.206	138.005	1.030
Carpark 2	0.012	5.00	17.500		-67.678	151.908	1.000
Carpark 2 Hydrobrake			17.500	1200	-68.089	154.225	1.030
Carpark 1	0.013	5.00	17.120		-72.016	164.592	0.700
Carpark 1 Hydrobrake			17.120	1200	-73.498	166.718	0.730
5			17.120	1200	-74.847	169.463	0.760
Outfall to Highway Drain			17.120	1200	-94.183	158.276	1.043

Links (Input)

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	Tank Upstream of Carpark 9	Carpark 9	5.000	0.600	18.260	18.230	0.030	167.0	225	5.08	50.0
1.001	Carpark 9	Carpark 9 Hydrobrake	5.000	0.600	18.230	18.200	0.030	167.0	225	5.17	50.0
1.002	Carpark 9 Hydrobrake	Carpark 8	5.000	0.600	18.200	17.650	0.550	9.1	225	5.18	50.0
1.003	Carpark 8	Carpark 8 Hydrobrake	5.000	0.600	17.650	17.620	0.030	167.0	225	5.27	50.0
1.004	Carpark 8 Hydrobrake	Carpark 7	5.000	0.600	17.620	17.580	0.040	125.0	225	5.34	50.0
1.005	Carpark 7	Carpark 7 Hydrobrake	5.000	0.600	17.580	17.550	0.030	167.0	225	5.42	50.0

Links (Input)

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)
1.006	Carpark 7 Hydrobrake	Carpark 6	5.000	0.600	17.550	17.290	0.260	19.2	225	5.45	50.0
1.007	Carpark 6	Carpark 6 Hydrobrake	5.000	0.600	17.290	17.260	0.030	167.0	225	5.53	50.0
1.008	Carpark 6 Hydrobrake	Carpark 5	5.000	0.600	17.260	17.140	0.120	41.7	225	5.57	50.0
1.009	Carpark 5	Carpark 5 Hydrobrake	5.000	0.600	17.140	17.110	0.030	167.0	225	5.65	50.0
1.010	Carpark 5 Hydrobrake	Carpark 4	5.000	0.600	17.110	16.900	0.210	23.8	225	5.69	50.0
1.011	Carpark 4	Carpark 4 Hydrobrake	5.000	0.600	16.900	16.870	0.030	167.0	225	5.77	50.0
1.012	Carpark 4 Hydrobrake	Carpark 3	5.000	0.600	16.870	16.840	0.030	166.7	225	5.85	50.0
1.013	Carpark 3	Carpark 3 Hydrobrake	5.000	0.600	16.840	16.810	0.030	167.0	225	5.93	50.0
1.014	Carpark 3 Hydrobrake	Carpark 2	5.000	0.600	16.810	16.500	0.310	16.1	225	5.96	50.0
1.015	Carpark 2	Carpark 2 Hydrobrake	5.000	0.600	16.500	16.470	0.030	167.0	225	6.04	50.0
1.016	Carpark 2 Hydrobrake	Carpark 1	5.000	0.600	16.470	16.420	0.050	100.0	225	6.11	50.0
1.017	Carpark 1	Carpark 1 Hydrobrake	5.000	0.600	16.420	16.390	0.030	167.0	225	6.19	50.0
1.018	Carpark 1 Hydrobrake	5	5.000	0.600	16.390	16.360	0.030	167.0	225	6.27	50.0
1.019	5	Outfall to Highway Drain	30.708	0.600	16.360	16.077	0.283	108.5	225	6.68	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Carpark 1 Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.390	Product Number	CTL-SHE-0072-1800-0430-1800
Design Depth (m)	0.430	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node Carpark 2 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.016	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0060-1400-0730-1400
Invert Level (m)	16.470	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.4		

Node Carpark 3 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.810	Product Number	CTL-SHE-0058-1300-0730-1300
Design Depth (m)	0.730	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

Node Carpark 4 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.870	Product Number	CTL-SHE-0058-1300-0730-1300
Design Depth (m)	0.730	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

Node Carpark 5 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.010	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0055-1200-0730-1200
Invert Level (m)	17.110	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.2		

Node Carpark 6 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.008	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0055-1200-0730-1200
Invert Level (m)	17.260	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.2		

Node Carpark 7 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.006	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0050-1000-0730-1000
Invert Level (m)	17.550	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.0		

Node Carpark 8 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	17.620	Product Number	CTL-SHE-0047-1000-0930-1000
Design Depth (m)	0.930	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Carpark 9 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.002	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0042-7000-0730-7000
Invert Level (m)	18.200	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	0.7		

Node Carpark 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.205	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.420	Length (m)	15.370	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	168	Slope (1:X)	500.0		

Node Carpark 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.063	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.500	Length (m)	13.950	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2790	Slope (1:X)	500.0		

Node Carpark 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.728	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.840	Length (m)	17.630	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2100	Slope (1:X)	500.0		

Node Carpark 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	8.327	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.900	Length (m)	17.260	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2340	Slope (1:X)	500.0		

Node Carpark 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.706	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.140	Length (m)	12.950	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1470	Slope (1:X)	500.0		

Node Carpark 6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.606	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.290	Length (m)	26.040	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1230	Slope (1:X)	500.0		

Node Carpark 7 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.470	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.580	Length (m)	21.160	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	975	Slope (1:X)	500.0		

Node Carpark 8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	7.980	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.650	Length (m)	52.458	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	750.0		

Node Carpark 9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.831	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.230	Length (m)	31.128	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1740	Slope (1:X)	750.0		

Node Tank Upstream of Carpark 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.260
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1710

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	248.0	248.0	0.500	248.0	275.9	0.501	0.0	275.9	1.400	0.0	275.9

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +45% CC 15 minute summer	409.775	115.952	30 year +45% CC 720 minute winter	20.004	7.977
30 year +45% CC 15 minute winter	287.561	115.952	30 year +45% CC 960 minute summer	24.138	6.356
30 year +45% CC 30 minute summer	272.386	77.076	30 year +45% CC 960 minute winter	15.989	6.356
30 year +45% CC 30 minute winter	191.148	77.076	30 year +45% CC 1440 minute summer	17.179	4.604
30 year +45% CC 60 minute summer	185.563	49.039	30 year +45% CC 1440 minute winter	11.545	4.604
30 year +45% CC 60 minute winter	123.284	49.039	30 year +45% CC 2160 minute summer	12.125	3.351
30 year +45% CC 120 minute summer	114.970	30.383	30 year +45% CC 2160 minute winter	8.354	3.351
30 year +45% CC 120 minute winter	76.384	30.383	30 year +45% CC 2880 minute summer	10.038	2.690
30 year +45% CC 180 minute summer	88.404	22.749	30 year +45% CC 2880 minute winter	6.746	2.690
30 year +45% CC 180 minute winter	57.465	22.749	30 year +45% CC 4320 minute summer	7.649	2.000
30 year +45% CC 240 minute summer	69.799	18.446	30 year +45% CC 4320 minute winter	5.037	2.000
30 year +45% CC 240 minute winter	46.373	18.446	30 year +45% CC 5760 minute summer	6.399	1.638
30 year +45% CC 360 minute summer	52.969	13.631	30 year +45% CC 5760 minute winter	4.142	1.638
30 year +45% CC 360 minute winter	34.431	13.631	30 year +45% CC 7200 minute summer	5.550	1.416
30 year +45% CC 480 minute summer	41.394	10.939	30 year +45% CC 7200 minute winter	3.582	1.416
30 year +45% CC 480 minute winter	27.501	10.939	30 year +45% CC 8640 minute summer	4.955	1.264
30 year +45% CC 600 minute summer	33.639	9.201	30 year +45% CC 8640 minute winter	3.198	1.264
30 year +45% CC 600 minute winter	22.984	9.201	30 year +45% CC 10080 minute summer	4.524	1.154
30 year +45% CC 720 minute summer	29.765	7.977	30 year +45% CC 10080 minute winter	2.920	1.154

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Tank Upstream of Carpark 9	945	18.643	0.383	4.5	90.1895	0.0000	SURCHARGED
960 minute winter	Carpark 9	945	18.643	0.413	6.4	24.9958	0.0000	SURCHARGED
960 minute winter	Carpark 9 Hydrobrake	945	18.643	0.443	0.6	0.5008	0.0000	SURCHARGED
1440 minute winter	Carpark 8	1410	18.237	0.587	3.2	69.3448	0.0000	SURCHARGED
1440 minute winter	Carpark 8 Hydrobrake	1410	18.237	0.617	0.9	0.6980	0.0000	SURCHARGED
720 minute summer	Carpark 7	690	17.998	0.418	2.4	13.7281	0.0000	SURCHARGED
720 minute summer	Carpark 7 Hydrobrake	690	17.998	0.448	1.0	0.5072	0.0000	SURCHARGED
600 minute summer	Carpark 6	600	17.794	0.504	4.3	24.6559	0.0000	SURCHARGED
600 minute summer	Carpark 6 Hydrobrake	600	17.794	0.534	1.3	0.6041	0.0000	SURCHARGED
1440 minute winter	Carpark 5	1380	17.631	0.491	2.6	10.5926	0.0000	SURCHARGED
1440 minute winter	Carpark 5 Hydrobrake	1380	17.631	0.521	1.5	0.5889	0.0000	SURCHARGED
2160 minute summer	Carpark 4	2220	17.438	0.538	1.8	22.4228	0.0000	SURCHARGED
2160 minute summer	Carpark 4 Hydrobrake	2220	17.437	0.567	1.2	0.6418	0.0000	SURCHARGED
2160 minute summer	Carpark 3	2400	17.347	0.507	1.7	14.7708	0.0000	SURCHARGED
2160 minute summer	Carpark 3 Hydrobrake	2400	17.347	0.537	1.3	0.6077	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)
960 minute winter	Tank Upstream of Carpark 9	1.000	Carpark 9	-4.5	-0.196	-0.113	0.1989	
960 minute winter	Carpark 9	1.001	Carpark 9 Hydrobrake	0.6	0.121	0.016	0.1989	
960 minute winter	Carpark 9 Hydrobrake	1.002	Carpark 8	0.6	0.433	0.004	0.1081	
1440 minute winter	Carpark 8	1.003	Carpark 8 Hydrobrake	0.9	0.152	0.022	0.1989	
1440 minute winter	Carpark 8 Hydrobrake	Hydro-Brake®	Carpark 7	0.9				
720 minute summer	Carpark 7	1.005	Carpark 7 Hydrobrake	1.0	0.120	0.026	0.1989	
720 minute summer	Carpark 7 Hydrobrake	1.006	Carpark 6	1.0	0.415	0.008	0.1989	
600 minute summer	Carpark 6	1.007	Carpark 6 Hydrobrake	1.3	0.119	0.032	0.1989	
600 minute summer	Carpark 6 Hydrobrake	1.008	Carpark 5	1.9	0.446	0.024	0.1989	
1440 minute winter	Carpark 5	1.009	Carpark 5 Hydrobrake	1.5	0.147	0.038	0.1989	
1440 minute winter	Carpark 5 Hydrobrake	1.010	Carpark 4	1.2	0.485	0.011	0.1989	
2160 minute summer	Carpark 4	1.011	Carpark 4 Hydrobrake	1.2	0.177	0.031	0.1989	
2160 minute summer	Carpark 4 Hydrobrake	Hydro-Brake®	Carpark 3	1.2				
2160 minute summer	Carpark 3	1.013	Carpark 3 Hydrobrake	1.3	0.178	0.033	0.1989	
2160 minute summer	Carpark 3 Hydrobrake	Hydro-Brake®	Carpark 2	1.3				

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Carpark 2	1440	17.092	0.592	1.9	12.2419	0.0000	SURCHARGED
1440 minute summer	Carpark 2 Hydrobrake	1440	17.092	0.622	1.4	0.7031	0.0000	SURCHARGED
240 minute summer	Carpark 1	216	16.652	0.232	3.8	5.1898	0.0000	SURCHARGED
240 minute summer	Carpark 1 Hydrobrake	216	16.652	0.262	2.0	0.2958	0.0000	SURCHARGED
240 minute winter	5	392	16.389	0.029	1.8	0.0332	0.0000	OK
240 minute winter	Outfall to Highway Drain	392	16.106	0.029	1.8	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)
1440 minute summer	Carpark 2	1.015	Carpark 2 Hydrobrake	1.4	0.118	0.036	0.1989	
1440 minute summer	Carpark 2 Hydrobrake	1.016	Carpark 1	1.5	0.437	0.030	0.0627	
240 minute summer	Carpark 1	1.017	Carpark 1 Hydrobrake	2.0	0.260	0.050	0.1989	
240 minute summer	Carpark 1 Hydrobrake	Hydro-Brake®	5	1.8				
240 minute winter	5	1.019	Outfall to Highway Drain	1.8	0.596	0.036	0.0924	242.9

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank Upstream of Carpark 9		5.00	19.660		-62.089	7.930	1.400
Carpark 9	0.145	5.00	19.230		-44.436	5.899	1.000
Carpark 9 Hydrobrake			19.230	1200	-39.072	10.998	1.030
Carpark 8	0.082	5.00	18.850		-38.436	25.576	1.200
Carpark 8 Hydrobrake			18.850	1200	-37.711	29.973	1.230
Carpark 7	0.019	5.00	18.580		-39.647	85.901	1.000
Carpark 7 Hydrobrake			18.580	1200	-43.067	87.930	1.030
Carpark 6	0.035	5.00	18.290		-48.660	91.114	1.000
Carpark 6 Hydrobrake			18.290	1200	-51.213	93.349	1.030
Carpark 5	0.011	5.00	18.140		-56.374	100.924	1.000
Carpark 5 Hydrobrake			18.140	1200	-58.570	104.803	1.030
Carpark 4	0.018	5.00	17.900		-60.768	116.244	1.000
Carpark 4 Hydrobrake			17.900	1200	-62.499	119.067	1.030
Carpark 3	0.016	5.00	17.840		-64.775	132.754	1.000
Carpark 3 Hydrobrake			17.840	1200	-65.206	138.005	1.030
Carpark 2	0.012	5.00	17.500		-67.678	151.908	1.000
Carpark 2 Hydrobrake			17.500	1200	-68.089	154.225	1.030
Carpark 1	0.013	5.00	17.120		-72.016	164.592	0.700
Carpark 1 Hydrobrake			17.120	1200	-73.498	166.718	0.730
5			17.120	1200	-74.847	169.463	0.760
Outfall to Highway Drain			17.120	1200	-94.183	158.276	1.043

Links (Input)

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	Tank Upstream of Carpark 9	Carpark 9	5.000	0.600	18.260	18.230	0.030	167.0	225	5.08	50.0
1.001	Carpark 9	Carpark 9 Hydrobrake	5.000	0.600	18.230	18.200	0.030	167.0	225	5.17	50.0
1.002	Carpark 9 Hydrobrake	Carpark 8	5.000	0.600	18.200	17.650	0.550	9.1	225	5.18	50.0
1.003	Carpark 8	Carpark 8 Hydrobrake	5.000	0.600	17.650	17.620	0.030	167.0	225	5.27	50.0
1.004	Carpark 8 Hydrobrake	Carpark 7	5.000	0.600	17.620	17.580	0.040	125.0	225	5.34	50.0
1.005	Carpark 7	Carpark 7 Hydrobrake	5.000	0.600	17.580	17.550	0.030	167.0	225	5.42	50.0

Links (Input)

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)
1.006	Carpark 7 Hydrobrake	Carpark 6	5.000	0.600	17.550	17.290	0.260	19.2	225	5.45	50.0
1.007	Carpark 6	Carpark 6 Hydrobrake	5.000	0.600	17.290	17.260	0.030	167.0	225	5.53	50.0
1.008	Carpark 6 Hydrobrake	Carpark 5	5.000	0.600	17.260	17.140	0.120	41.7	225	5.57	50.0
1.009	Carpark 5	Carpark 5 Hydrobrake	5.000	0.600	17.140	17.110	0.030	167.0	225	5.65	50.0
1.010	Carpark 5 Hydrobrake	Carpark 4	5.000	0.600	17.110	16.900	0.210	23.8	225	5.69	50.0
1.011	Carpark 4	Carpark 4 Hydrobrake	5.000	0.600	16.900	16.870	0.030	167.0	225	5.77	50.0
1.012	Carpark 4 Hydrobrake	Carpark 3	5.000	0.600	16.870	16.840	0.030	166.7	225	5.85	50.0
1.013	Carpark 3	Carpark 3 Hydrobrake	5.000	0.600	16.840	16.810	0.030	167.0	225	5.93	50.0
1.014	Carpark 3 Hydrobrake	Carpark 2	5.000	0.600	16.810	16.500	0.310	16.1	225	5.96	50.0
1.015	Carpark 2	Carpark 2 Hydrobrake	5.000	0.600	16.500	16.470	0.030	167.0	225	6.04	50.0
1.016	Carpark 2 Hydrobrake	Carpark 1	5.000	0.600	16.470	16.420	0.050	100.0	225	6.11	50.0
1.017	Carpark 1	Carpark 1 Hydrobrake	5.000	0.600	16.420	16.390	0.030	167.0	225	6.19	50.0
1.018	Carpark 1 Hydrobrake	5	5.000	0.600	16.390	16.360	0.030	167.0	225	6.27	50.0
1.019	5	Outfall to Highway Drain	30.708	0.600	16.360	16.077	0.283	108.5	225	6.68	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	40	0	0

Node Carpark 1 Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.390	Product Number	CTL-SHE-0072-1800-0430-1800
Design Depth (m)	0.430	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node Carpark 2 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.016	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0060-1400-0730-1400
Invert Level (m)	16.470	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.4		

Node Carpark 3 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.810	Product Number	CTL-SHE-0058-1300-0730-1300
Design Depth (m)	0.730	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

Node Carpark 4 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.870	Product Number	CTL-SHE-0058-1300-0730-1300
Design Depth (m)	0.730	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

Node Carpark 5 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.010	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0055-1200-0730-1200
Invert Level (m)	17.110	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.2		

Node Carpark 6 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.008	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0055-1200-0730-1200
Invert Level (m)	17.260	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.2		

Node Carpark 7 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.006	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0050-1000-0730-1000
Invert Level (m)	17.550	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.0		

Node Carpark 8 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	17.620	Product Number	CTL-SHE-0047-1000-0930-1000
Design Depth (m)	0.930	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Carpark 9 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.002	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0042-7000-0730-7000
Invert Level (m)	18.200	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	0.7		

Node Carpark 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.205	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.420	Length (m)	15.370	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	164	Slope (1:X)	500.0		

Node Carpark 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.063	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.500	Length (m)	13.950	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2850	Slope (1:X)	500.0		

Node Carpark 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.728	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.840	Length (m)	17.630	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2280	Slope (1:X)	500.0		

Node Carpark 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	8.327	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.900	Length (m)	17.260	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2580	Slope (1:X)	500.0		

Node Carpark 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.706	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.140	Length (m)	12.950	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1515	Slope (1:X)	500.0		

Node Carpark 6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.606	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.290	Length (m)	26.040	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1185	Slope (1:X)	500.0		

Node Carpark 7 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.470	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.580	Length (m)	21.160	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	930	Slope (1:X)	500.0		

Node Carpark 8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	7.980	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.650	Length (m)	52.458	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	750.0		

Node Carpark 9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.831	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.230	Length (m)	31.128	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1665	Slope (1:X)	750.0		

Node Tank Upstream of Carpark 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.260
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1620

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	248.0	248.0	0.500	248.0	275.9	0.501	0.0	275.9	1.400	0.0	275.9

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +40% CC 15 minute summer	395.645	111.954	30 year +40% CC 720 minute winter	19.314	7.702
30 year +40% CC 15 minute winter	277.645	111.954	30 year +40% CC 960 minute summer	23.305	6.137
30 year +40% CC 30 minute summer	262.994	74.418	30 year +40% CC 960 minute winter	15.438	6.137
30 year +40% CC 30 minute winter	184.557	74.418	30 year +40% CC 1440 minute summer	16.586	4.445
30 year +40% CC 60 minute summer	179.164	47.348	30 year +40% CC 1440 minute winter	11.147	4.445
30 year +40% CC 60 minute winter	119.032	47.348	30 year +40% CC 2160 minute summer	11.707	3.235
30 year +40% CC 120 minute summer	111.006	29.336	30 year +40% CC 2160 minute winter	8.066	3.235
30 year +40% CC 120 minute winter	73.750	29.336	30 year +40% CC 2880 minute summer	9.692	2.598
30 year +40% CC 180 minute summer	85.356	21.965	30 year +40% CC 2880 minute winter	6.514	2.598
30 year +40% CC 180 minute winter	55.483	21.965	30 year +40% CC 4320 minute summer	7.385	1.931
30 year +40% CC 240 minute summer	67.393	17.810	30 year +40% CC 4320 minute winter	4.864	1.931
30 year +40% CC 240 minute winter	44.774	17.810	30 year +40% CC 5760 minute summer	6.179	1.582
30 year +40% CC 360 minute summer	51.142	13.161	30 year +40% CC 5760 minute winter	3.999	1.582
30 year +40% CC 360 minute winter	33.244	13.161	30 year +40% CC 7200 minute summer	5.358	1.367
30 year +40% CC 480 minute summer	39.966	10.562	30 year +40% CC 7200 minute winter	3.458	1.367
30 year +40% CC 480 minute winter	26.553	10.562	30 year +40% CC 8640 minute summer	4.784	1.221
30 year +40% CC 600 minute summer	32.479	8.884	30 year +40% CC 8640 minute winter	3.088	1.221
30 year +40% CC 600 minute winter	22.192	8.884	30 year +40% CC 10080 minute summer	4.368	1.114
30 year +40% CC 720 minute summer	28.739	7.702	30 year +40% CC 10080 minute winter	2.819	1.114

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Tank Upstream of Carpark 9	945	18.626	0.366	4.4	86.2542	0.0000	SURCHARGED
960 minute winter	Carpark 9	945	18.626	0.396	6.2	23.9303	0.0000	SURCHARGED
960 minute winter	Carpark 9 Hydrobrake	945	18.626	0.426	0.6	0.4819	0.0000	SURCHARGED
1440 minute winter	Carpark 8	1410	18.209	0.559	3.1	65.7721	0.0000	SURCHARGED
1440 minute winter	Carpark 8 Hydrobrake	1410	18.209	0.589	0.9	0.6658	0.0000	SURCHARGED
600 minute summer	Carpark 7	600	17.979	0.399	2.5	13.0536	0.0000	SURCHARGED
600 minute summer	Carpark 7 Hydrobrake	600	17.979	0.429	1.0	0.4851	0.0000	SURCHARGED
600 minute winter	Carpark 6	585	17.779	0.489	3.2	23.8734	0.0000	SURCHARGED
600 minute winter	Carpark 6 Hydrobrake	585	17.779	0.519	1.3	0.5870	0.0000	SURCHARGED
960 minute winter	Carpark 5	945	17.602	0.462	4.7	9.9619	0.0000	SURCHARGED
960 minute winter	Carpark 5 Hydrobrake	945	17.602	0.492	2.1	0.5568	0.0000	SURCHARGED
2160 minute summer	Carpark 4	2220	17.428	0.528	1.8	22.0215	0.0000	SURCHARGED
2160 minute summer	Carpark 4 Hydrobrake	2220	17.428	0.558	1.2	0.6313	0.0000	SURCHARGED
2160 minute summer	Carpark 3	2400	17.339	0.499	1.7	14.5233	0.0000	SURCHARGED
2160 minute summer	Carpark 3 Hydrobrake	2400	17.339	0.529	1.3	0.5985	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)
960 minute winter	Tank Upstream of Carpark 9	1.000	Carpark 9	-4.4	-0.197	-0.109	0.1989	
960 minute winter	Carpark 9	1.001	Carpark 9 Hydrobrake	0.6	0.121	0.016	0.1989	
960 minute winter	Carpark 9 Hydrobrake	1.002	Carpark 8	0.6	0.433	0.004	0.1009	
1440 minute winter	Carpark 8	1.003	Carpark 8 Hydrobrake	0.9	0.154	0.022	0.1989	
1440 minute winter	Carpark 8 Hydrobrake	Hydro-Brake®	Carpark 7	0.9				
600 minute summer	Carpark 7	1.005	Carpark 7 Hydrobrake	1.0	0.108	0.026	0.1989	
600 minute summer	Carpark 7 Hydrobrake	1.006	Carpark 6	1.0	0.418	0.008	0.1969	
600 minute winter	Carpark 6	1.007	Carpark 6 Hydrobrake	1.3	0.130	0.031	0.1989	
600 minute winter	Carpark 6 Hydrobrake	1.008	Carpark 5	3.7	0.411	0.046	0.1989	
960 minute winter	Carpark 5	1.009	Carpark 5 Hydrobrake	2.1	0.141	0.052	0.1989	
960 minute winter	Carpark 5 Hydrobrake	1.010	Carpark 4	1.2	0.489	0.011	0.1953	
2160 minute summer	Carpark 4	1.011	Carpark 4 Hydrobrake	1.2	0.177	0.031	0.1989	
2160 minute summer	Carpark 4 Hydrobrake	Hydro-Brake®	Carpark 3	1.2				
2160 minute summer	Carpark 3	1.013	Carpark 3 Hydrobrake	1.3	0.176	0.033	0.1989	
2160 minute summer	Carpark 3 Hydrobrake	Hydro-Brake®	Carpark 2	1.3				

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Carpark 2	1410	17.079	0.579	1.9	11.9629	0.0000	SURCHARGED
1440 minute summer	Carpark 2 Hydrobrake	1410	17.078	0.608	1.4	0.6882	0.0000	SURCHARGED
180 minute summer	Carpark 1	152	16.636	0.216	4.2	4.8168	0.0000	OK
180 minute summer	Carpark 1 Hydrobrake	152	16.636	0.246	2.0	0.2783	0.0000	SURCHARGED
30 minute winter	5	102	16.389	0.029	1.8	0.0332	0.0000	OK
60 minute summer	Outfall to Highway Drain	173	16.106	0.029	1.8	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)
1440 minute summer	Carpark 2	1.015	Carpark 2 Hydrobrake	1.4	0.109	0.036	0.1989	
1440 minute summer	Carpark 2 Hydrobrake	1.016	Carpark 1	2.6	0.437	0.050	0.0606	
180 minute summer	Carpark 1	1.017	Carpark 1 Hydrobrake	2.0	0.273	0.050	0.1975	
180 minute summer	Carpark 1 Hydrobrake	Hydro-Brake®	5	1.8				
30 minute winter	5	1.019	Outfall to Highway Drain	1.8	0.596	0.036	0.0924	129.9

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank Upstream of Carpark 9		5.00	19.660		-62.089	7.930	1.400
Carpark 9	0.145	5.00	19.230		-44.436	5.899	1.000
Carpark 9 Hydrobrake			19.230	1200	-39.072	10.998	1.030
Carpark 8	0.082	5.00	18.850		-38.436	25.576	1.200
Carpark 8 Hydrobrake			18.850	1200	-37.711	29.973	1.230
Carpark 7	0.019	5.00	18.580		-39.647	85.901	1.000
Carpark 7 Hydrobrake			18.580	1200	-43.067	87.930	1.030
Carpark 6	0.035	5.00	18.290		-48.660	91.114	1.000
Carpark 6 Hydrobrake			18.290	1200	-51.213	93.349	1.030
Carpark 5	0.011	5.00	18.140		-56.374	100.924	1.000
Carpark 5 Hydrobrake			18.140	1200	-58.570	104.803	1.030
Carpark 4	0.018	5.00	17.900		-60.768	116.244	1.000
Carpark 4 Hydrobrake			17.900	1200	-62.499	119.067	1.030
Carpark 3	0.016	5.00	17.840		-64.775	132.754	1.000
Carpark 3 Hydrobrake			17.840	1200	-65.206	138.005	1.030
Carpark 2	0.012	5.00	17.500		-67.678	151.908	1.000
Carpark 2 Hydrobrake			17.500	1200	-68.089	154.225	1.030
Carpark 1	0.013	5.00	17.120		-72.016	164.592	0.700
Carpark 1 Hydrobrake			17.120	1200	-73.498	166.718	0.730
5			17.120	1200	-74.847	169.463	0.760
Outfall to Highway Drain			17.120	1200	-94.183	158.276	1.043

Links (Input)

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	Tank Upstream of Carpark 9	Carpark 9	5.000	0.600	18.260	18.230	0.030	167.0	225	5.08	50.0
1.001	Carpark 9	Carpark 9 Hydrobrake	5.000	0.600	18.230	18.200	0.030	167.0	225	5.17	50.0
1.002	Carpark 9 Hydrobrake	Carpark 8	5.000	0.600	18.200	17.650	0.550	9.1	225	5.18	50.0
1.003	Carpark 8	Carpark 8 Hydrobrake	5.000	0.600	17.650	17.620	0.030	167.0	225	5.27	50.0
1.004	Carpark 8 Hydrobrake	Carpark 7	5.000	0.600	17.620	17.580	0.040	125.0	225	5.34	50.0
1.005	Carpark 7	Carpark 7 Hydrobrake	5.000	0.600	17.580	17.550	0.030	167.0	225	5.42	50.0

Links (Input)

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)
1.006	Carpark 7 Hydrobrake	Carpark 6	5.000	0.600	17.550	17.290	0.260	19.2	225	5.45	50.0
1.007	Carpark 6	Carpark 6 Hydrobrake	5.000	0.600	17.290	17.260	0.030	167.0	225	5.53	50.0
1.008	Carpark 6 Hydrobrake	Carpark 5	5.000	0.600	17.260	17.140	0.120	41.7	225	5.57	50.0
1.009	Carpark 5	Carpark 5 Hydrobrake	5.000	0.600	17.140	17.110	0.030	167.0	225	5.65	50.0
1.010	Carpark 5 Hydrobrake	Carpark 4	5.000	0.600	17.110	16.900	0.210	23.8	225	5.69	50.0
1.011	Carpark 4	Carpark 4 Hydrobrake	5.000	0.600	16.900	16.870	0.030	167.0	225	5.77	50.0
1.012	Carpark 4 Hydrobrake	Carpark 3	5.000	0.600	16.870	16.840	0.030	166.7	225	5.85	50.0
1.013	Carpark 3	Carpark 3 Hydrobrake	5.000	0.600	16.840	16.810	0.030	167.0	225	5.93	50.0
1.014	Carpark 3 Hydrobrake	Carpark 2	5.000	0.600	16.810	16.500	0.310	16.1	225	5.96	50.0
1.015	Carpark 2	Carpark 2 Hydrobrake	5.000	0.600	16.500	16.470	0.030	167.0	225	6.04	50.0
1.016	Carpark 2 Hydrobrake	Carpark 1	5.000	0.600	16.470	16.420	0.050	100.0	225	6.11	50.0
1.017	Carpark 1	Carpark 1 Hydrobrake	5.000	0.600	16.420	16.390	0.030	167.0	225	6.19	50.0
1.018	Carpark 1 Hydrobrake	5	5.000	0.600	16.390	16.360	0.030	167.0	225	6.27	50.0
1.019	5	Outfall to Highway Drain	30.708	0.600	16.360	16.077	0.283	108.5	225	6.68	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Carpark 1 Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.390	Product Number	CTL-SHE-0072-1800-0430-1800
Design Depth (m)	0.430	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node Carpark 2 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.016	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0060-1400-0730-1400
Invert Level (m)	16.470	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.4		

Node Carpark 3 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.810	Product Number	CTL-SHE-0058-1300-0730-1300
Design Depth (m)	0.730	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

Node Carpark 4 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	16.870	Product Number	CTL-SHE-0058-1300-0730-1300
Design Depth (m)	0.730	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

Node Carpark 5 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.010	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0055-1200-0730-1200
Invert Level (m)	17.110	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.2		

Node Carpark 6 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.008	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0055-1200-0730-1200
Invert Level (m)	17.260	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.2		

Node Carpark 7 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.006	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0050-1000-0730-1000
Invert Level (m)	17.550	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	1.0		

Node Carpark 8 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	17.620	Product Number	CTL-SHE-0047-1000-0930-1000
Design Depth (m)	0.930	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Carpark 9 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Downstream Link	1.002	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0042-7000-0730-7000
Invert Level (m)	18.200	Min Outlet Diameter (m)	0.075
Design Depth (m)	0.730	Min Node Diameter (mm)	1200
Design Flow (l/s)	0.7		

Node Carpark 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.205	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.420	Length (m)	15.370	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	336	Slope (1:X)	500.0		

Node Carpark 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.063	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.500	Length (m)	13.950	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	500.0		

Node Carpark 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.728	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.840	Length (m)	17.630	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	3420	Slope (1:X)	500.0		

Node Carpark 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	8.327	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.900	Length (m)	17.260	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	3420	Slope (1:X)	500.0		

Node Carpark 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.706	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.140	Length (m)	12.950	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1710	Slope (1:X)	500.0		

Node Carpark 6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.606	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.290	Length (m)	26.040	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1590	Slope (1:X)	500.0		

Node Carpark 7 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.470	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.580	Length (m)	21.160	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	1170	Slope (1:X)	500.0		

Node Carpark 8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	7.980	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	17.650	Length (m)	52.458	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	750.0		

Node Carpark 9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.831	Depth (m)	0.700
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.230	Length (m)	31.128	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	2220	Slope (1:X)	750.0		

Node Tank Upstream of Carpark 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.260
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	2370

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	248.0	248.0	0.500	248.0	275.9	0.501	0.0	275.9	1.400	0.0	275.9

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 15 minute summer	514.800	145.671	100 year +45% CC 720 minute winter	25.241	10.066
100 year +45% CC 15 minute winter	361.263	145.671	100 year +45% CC 960 minute summer	30.631	8.066
100 year +45% CC 30 minute summer	345.538	97.775	100 year +45% CC 960 minute winter	20.291	8.066
100 year +45% CC 30 minute winter	242.483	97.775	100 year +45% CC 1440 minute summer	21.973	5.889
100 year +45% CC 60 minute summer	237.115	62.663	100 year +45% CC 1440 minute winter	14.767	5.889
100 year +45% CC 60 minute winter	157.534	62.663	100 year +45% CC 2160 minute summer	15.531	4.292
100 year +45% CC 120 minute summer	143.747	37.988	100 year +45% CC 2160 minute winter	10.701	4.292
100 year +45% CC 120 minute winter	95.502	37.988	100 year +45% CC 2880 minute summer	12.815	3.435
100 year +45% CC 180 minute summer	109.820	28.261	100 year +45% CC 2880 minute winter	8.613	3.435
100 year +45% CC 180 minute winter	71.386	28.261	100 year +45% CC 4320 minute summer	9.637	2.520
100 year +45% CC 240 minute summer	86.572	22.878	100 year +45% CC 4320 minute winter	6.346	2.520
100 year +45% CC 240 minute winter	57.517	22.878	100 year +45% CC 5760 minute summer	7.952	2.036
100 year +45% CC 360 minute summer	65.859	16.948	100 year +45% CC 5760 minute winter	5.147	2.036
100 year +45% CC 360 minute winter	42.810	16.948	100 year +45% CC 7200 minute summer	6.812	1.738
100 year +45% CC 480 minute summer	51.747	13.675	100 year +45% CC 7200 minute winter	4.397	1.738
100 year +45% CC 480 minute winter	34.379	13.675	100 year +45% CC 8640 minute summer	6.015	1.535
100 year +45% CC 600 minute summer	42.264	11.560	100 year +45% CC 8640 minute winter	3.882	1.535
100 year +45% CC 600 minute winter	28.878	11.560	100 year +45% CC 10080 minute summer	5.436	1.387
100 year +45% CC 720 minute summer	37.558	10.066	100 year +45% CC 10080 minute winter	3.509	1.387

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Tank Upstream of Carpark 9	1440	18.847	0.587	6.5	117.9178	0.0000	SURCHARGED
1440 minute summer	Carpark 9	1440	18.847	0.617	8.9	38.0337	0.0000	SURCHARGED
1440 minute summer	Carpark 9 Hydrobrake	1440	18.847	0.647	0.6	0.7320	0.0000	SURCHARGED
2880 minute winter	Carpark 8	2820	18.461	0.811	2.6	97.5016	0.0000	SURCHARGED
2880 minute winter	Carpark 8 Hydrobrake	2820	18.461	0.841	0.9	0.9516	0.0000	SURCHARGED
960 minute winter	Carpark 7	930	18.133	0.553	2.0	18.4011	0.0000	SURCHARGED
960 minute winter	Carpark 7 Hydrobrake	930	18.133	0.583	1.0	0.6598	0.0000	SURCHARGED
960 minute winter	Carpark 6	930	17.958	0.668	2.9	33.1231	0.0000	SURCHARGED
960 minute winter	Carpark 6 Hydrobrake	930	17.958	0.698	1.2	0.7898	0.0000	SURCHARGED
1440 minute summer	Carpark 5	1470	17.795	0.655	2.0	14.2254	0.0000	SURCHARGED
1440 minute summer	Carpark 5 Hydrobrake	1470	17.795	0.685	1.3	0.7743	0.0000	SURCHARGED
4320 minute winter	Carpark 4	3720	17.573	0.673	1.5	28.2643	0.0000	SURCHARGED
4320 minute winter	Carpark 4 Hydrobrake	3720	17.573	0.703	1.2	0.7950	0.0000	SURCHARGED
4320 minute winter	Carpark 3	3660	17.473	0.633	1.5	18.5609	0.0000	SURCHARGED
4320 minute winter	Carpark 3 Hydrobrake	3660	17.473	0.663	1.3	0.7494	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)
1440 minute summer	Tank Upstream of Carpark 9	1.000	Carpark 9	-6.5	-0.164	-0.163	0.1989	
1440 minute summer	Carpark 9	1.001	Carpark 9 Hydrobrake	0.6	0.081	0.016	0.1989	
1440 minute summer	Carpark 9 Hydrobrake	1.002	Carpark 8	0.6	0.318	0.004	0.1971	
2880 minute winter	Carpark 8	1.003	Carpark 8 Hydrobrake	0.9	0.149	0.022	0.1989	
2880 minute winter	Carpark 8 Hydrobrake	Hydro-Brake®	Carpark 7	0.9				
960 minute winter	Carpark 7	1.005	Carpark 7 Hydrobrake	1.0	0.150	0.025	0.1989	
960 minute winter	Carpark 7 Hydrobrake	1.006	Carpark 6	1.0	0.395	0.008	0.1989	
960 minute winter	Carpark 6	1.007	Carpark 6 Hydrobrake	1.2	0.120	0.031	0.1989	
960 minute winter	Carpark 6 Hydrobrake	1.008	Carpark 5	3.1	0.426	0.039	0.1989	
1440 minute summer	Carpark 5	1.009	Carpark 5 Hydrobrake	1.3	0.123	0.033	0.1989	
1440 minute summer	Carpark 5 Hydrobrake	1.010	Carpark 4	1.2	0.483	0.011	0.1989	
4320 minute winter	Carpark 4	1.011	Carpark 4 Hydrobrake	1.2	0.176	0.031	0.1989	
4320 minute winter	Carpark 4 Hydrobrake	Hydro-Brake®	Carpark 3	1.2				
4320 minute winter	Carpark 3	1.013	Carpark 3 Hydrobrake	1.3	0.177	0.033	0.1989	
4320 minute winter	Carpark 3 Hydrobrake	Hydro-Brake®	Carpark 2	1.3				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute winter	Carpark 2	2640	17.191	0.691	1.6	14.3370	0.0000	SURCHARGED
2880 minute winter	Carpark 2 Hydrobrake	2640	17.190	0.720	1.4	0.8149	0.0000	SURCHARGED
360 minute summer	Carpark 1	312	16.746	0.326	3.7	7.4569	0.0000	SURCHARGED
360 minute summer	Carpark 1 Hydrobrake	312	16.746	0.356	1.9	0.4027	0.0000	SURCHARGED
60 minute winter	5	304	16.389	0.029	1.8	0.0332	0.0000	OK
60 minute winter	Outfall to Highway Drain	304	16.106	0.029	1.8	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)
2880 minute winter	Carpark 2	1.015	Carpark 2 Hydrobrake	1.4	0.128	0.035	0.1989	
2880 minute winter	Carpark 2 Hydrobrake	1.016	Carpark 1	1.4	0.432	0.027	0.0259	
360 minute summer	Carpark 1	1.017	Carpark 1 Hydrobrake	1.9	0.219	0.048	0.1989	
360 minute summer	Carpark 1 Hydrobrake	Hydro-Brake®	5	1.8				
60 minute winter	5	1.019	Outfall to Highway Drain	1.8	0.596	0.036	0.0924	218.6

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank Upstream of Carpark 10		5.00	19.938		-14.957	13.881	1.400
Carpark 10	0.176	5.00	19.938		-23.846	7.168	1.430
Car Park 10 Hydrobrake			19.938	1200	-19.439	0.993	1.470
Tank upstream of Carpark 11		5.00	19.938		-3.664	-8.590	1.480
Carpark 11	0.093	5.00	19.828		-16.048	-8.851	1.400
Car Park 11 Hydrobrake			19.828	1350	-18.462	-13.192	1.430
3			19.260	1350	-26.351	-21.542	0.892
Basin			18.941	1350	-43.904	-29.674	0.605
Basin Hydrobrake			18.941	2100	-54.956	-20.139	0.635
Outfall to ditch			18.690	1200	-83.815	-25.187	0.580

Links (Input)

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	Tank Upstream of Carpark 10	Carpark 10	5.000	0.600	18.538	18.508	0.030	166.7	225	5.08	50.0
1.001	Carpark 10	Car Park 10 Hydrobrake	5.000	0.600	18.508	18.468	0.040	125.0	225	5.15	50.0
1.002	Car Park 10 Hydrobrake	Carpark 11	5.000	0.600	18.468	18.428	0.040	125.0	225	5.23	50.0
2.000	Tank upstream of Carpark 11	Carpark 11	5.000	0.600	18.458	18.428	0.030	166.7	225	5.08	50.0
1.003	Carpark 11	Car Park 11 Hydrobrake	5.000	0.600	18.428	18.398	0.030	167.0	225	5.31	50.0
1.004	Car Park 11 Hydrobrake	3	5.000	0.600	18.398	18.368	0.030	167.0	225	5.39	50.0
1.005	3	Basin	5.276	0.600	18.368	18.336	0.032	164.9	225	5.48	50.0
1.006	Basin	Basin Hydrobrake	5.000	0.600	18.336	18.306	0.030	167.0	225	5.56	50.0
1.007	Basin Hydrobrake	Outfall to ditch	34.500	0.600	18.306	18.110	0.196	176.0	225	6.15	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Outfall to ditch Surcharged Outfall

Overrides Design Area x
Overrides Design Additional Inflow x
Depression Storage Area (m^2) 0
Depression Storage Depth (mm) 0
Evapo-transpiration (mm/day) 0
Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.580	300	0.580	600	0.580	900	0.580	1200	0.580	1500	0.580	1800	0.580	2100	0.580	2400	0.580
15	0.580	315	0.580	615	0.580	915	0.580	1215	0.580	1515	0.580	1815	0.580	2115	0.580	2415	0.580
30	0.580	330	0.580	630	0.580	930	0.580	1230	0.580	1530	0.580	1830	0.580	2130	0.580	2430	0.580
45	0.580	345	0.580	645	0.580	945	0.580	1245	0.580	1545	0.580	1845	0.580	2145	0.580	2445	0.580
60	0.580	360	0.580	660	0.580	960	0.580	1260	0.580	1560	0.580	1860	0.580	2160	0.580	2460	0.580
75	0.580	375	0.580	675	0.580	975	0.580	1275	0.580	1575	0.580	1875	0.580	2175	0.580	2475	0.580
90	0.580	390	0.580	690	0.580	990	0.580	1290	0.580	1590	0.580	1890	0.580	2190	0.580	2490	0.580
105	0.580	405	0.580	705	0.580	1005	0.580	1305	0.580	1605	0.580	1905	0.580	2205	0.580	2505	0.580
120	0.580	420	0.580	720	0.580	1020	0.580	1320	0.580	1620	0.580	1920	0.580	2220	0.580	2520	0.580
135	0.580	435	0.580	735	0.580	1035	0.580	1335	0.580	1635	0.580	1935	0.580	2235	0.580	2535	0.580
150	0.580	450	0.580	750	0.580	1050	0.580	1350	0.580	1650	0.580	1950	0.580	2250	0.580	2550	0.580
165	0.580	465	0.580	765	0.580	1065	0.580	1365	0.580	1665	0.580	1965	0.580	2265	0.580	2565	0.580
180	0.580	480	0.580	780	0.580	1080	0.580	1380	0.580	1680	0.580	1980	0.580	2280	0.580	2580	0.580
195	0.580	495	0.580	795	0.580	1095	0.580	1395	0.580	1695	0.580	1995	0.580	2295	0.580	2595	0.580
210	0.580	510	0.580	810	0.580	1110	0.580	1410	0.580	1710	0.580	2010	0.580	2310	0.580	2610	0.580
225	0.580	525	0.580	825	0.580	1125	0.580	1425	0.580	1725	0.580	2025	0.580	2325	0.580	2625	0.580
240	0.580	540	0.580	840	0.580	1140	0.580	1440	0.580	1740	0.580	2040	0.580	2340	0.580	2640	0.580
255	0.580	555	0.580	855	0.580	1155	0.580	1455	0.580	1755	0.580	2055	0.580	2355	0.580	2655	0.580
270	0.580	570	0.580	870	0.580	1170	0.580	1470	0.580	1770	0.580	2070	0.580	2370	0.580	2670	0.580
285	0.580	585	0.580	885	0.580	1185	0.580	1485	0.580	1785	0.580	2085	0.580	2385	0.580	2685	0.580

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2700	0.580	3210	0.580	3720	0.580	4230	0.580	4740	0.580	5250	0.580	5760	0.580	6270	0.580	6780	0.580
2715	0.580	3225	0.580	3735	0.580	4245	0.580	4755	0.580	5265	0.580	5775	0.580	6285	0.580	6795	0.580
2730	0.580	3240	0.580	3750	0.580	4260	0.580	4770	0.580	5280	0.580	5790	0.580	6300	0.580	6810	0.580
2745	0.580	3255	0.580	3765	0.580	4275	0.580	4785	0.580	5295	0.580	5805	0.580	6315	0.580	6825	0.580
2760	0.580	3270	0.580	3780	0.580	4290	0.580	4800	0.580	5310	0.580	5820	0.580	6330	0.580	6840	0.580
2775	0.580	3285	0.580	3795	0.580	4305	0.580	4815	0.580	5325	0.580	5835	0.580	6345	0.580	6855	0.580
2790	0.580	3300	0.580	3810	0.580	4320	0.580	4830	0.580	5340	0.580	5850	0.580	6360	0.580	6870	0.580
2805	0.580	3315	0.580	3825	0.580	4335	0.580	4845	0.580	5355	0.580	5865	0.580	6375	0.580	6885	0.580
2820	0.580	3330	0.580	3840	0.580	4350	0.580	4860	0.580	5370	0.580	5880	0.580	6390	0.580	6900	0.580
2835	0.580	3345	0.580	3855	0.580	4365	0.580	4875	0.580	5385	0.580	5895	0.580	6405	0.580	6915	0.580
2850	0.580	3360	0.580	3870	0.580	4380	0.580	4890	0.580	5400	0.580	5910	0.580	6420	0.580	6930	0.580
2865	0.580	3375	0.580	3885	0.580	4395	0.580	4905	0.580	5415	0.580	5925	0.580	6435	0.580	6945	0.580
2880	0.580	3390	0.580	3900	0.580	4410	0.580	4920	0.580	5430	0.580	5940	0.580	6450	0.580	6960	0.580
2895	0.580	3405	0.580	3915	0.580	4425	0.580	4935	0.580	5445	0.580	5955	0.580	6465	0.580	6975	0.580
2910	0.580	3420	0.580	3930	0.580	4440	0.580	4950	0.580	5460	0.580	5970	0.580	6480	0.580	6990	0.580
2925	0.580	3435	0.580	3945	0.580	4455	0.580	4965	0.580	5475	0.580	5985	0.580	6495	0.580	7005	0.580
2940	0.580	3450	0.580	3960	0.580	4470	0.580	4980	0.580	5490	0.580	6000	0.580	6510	0.580	7020	0.580
2955	0.580	3465	0.580	3975	0.580	4485	0.580	4995	0.580	5505	0.580	6015	0.580	6525	0.580	7035	0.580
2970	0.580	3480	0.580	3990	0.580	4500	0.580	5010	0.580	5520	0.580	6030	0.580	6540	0.580	7050	0.580
2985	0.580	3495	0.580	4005	0.580	4515	0.580	5025	0.580	5535	0.580	6045	0.580	6555	0.580	7065	0.580
3000	0.580	3510	0.580	4020	0.580	4530	0.580	5040	0.580	5550	0.580	6060	0.580	6570	0.580	7080	0.580
3015	0.580	3525	0.580	4035	0.580	4545	0.580	5055	0.580	5565	0.580	6075	0.580	6585	0.580	7095	0.580
3030	0.580	3540	0.580	4050	0.580	4560	0.580	5070	0.580	5580	0.580	6090	0.580	6600	0.580	7110	0.580
3045	0.580	3555	0.580	4065	0.580	4575	0.580	5085	0.580	5595	0.580	6105	0.580	6615	0.580	7125	0.580
3060	0.580	3570	0.580	4080	0.580	4590	0.580	5100	0.580	5610	0.580	6120	0.580	6630	0.580	7140	0.580
3075	0.580	3585	0.580	4095	0.580	4605	0.580	5115	0.580	5625	0.580	6135	0.580	6645	0.580	7155	0.580
3090	0.580	3600	0.580	4110	0.580	4620	0.580	5130	0.580	5640	0.580	6150	0.580	6660	0.580	7170	0.580
3105	0.580	3615	0.580	4125	0.580	4635	0.580	5145	0.580	5655	0.580	6165	0.580	6675	0.580	7185	0.580
3120	0.580	3630	0.580	4140	0.580	4650	0.580	5160	0.580	5670	0.580	6180	0.580	6690	0.580	7200	0.580
3135	0.580	3645	0.580	4155	0.580	4665	0.580	5175	0.580	5685	0.580	6195	0.580	6705	0.580	7215	0.580
3150	0.580	3660	0.580	4170	0.580	4680	0.580	5190	0.580	5700	0.580	6210	0.580	6720	0.580	7230	0.580
3165	0.580	3675	0.580	4185	0.580	4695	0.580	5205	0.580	5715	0.580	6225	0.580	6735	0.580	7245	0.580
3180	0.580	3690	0.580	4200	0.580	4710	0.580	5220	0.580	5730	0.580	6240	0.580	6750	0.580	7260	0.580
3195	0.580	3705	0.580	4215	0.580	4725	0.580	5235	0.580	5745	0.580	6255	0.580	6765	0.580	7275	0.580

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
7290	0.580	7605	0.580	7920	0.580	8235	0.580	8550	0.580	8865	0.580	9180	0.580	9495	0.580	9810	0.580
7305	0.580	7620	0.580	7935	0.580	8250	0.580	8565	0.580	8880	0.580	9195	0.580	9510	0.580	9825	0.580
7320	0.580	7635	0.580	7950	0.580	8265	0.580	8580	0.580	8895	0.580	9210	0.580	9525	0.580	9840	0.580
7335	0.580	7650	0.580	7965	0.580	8280	0.580	8595	0.580	8910	0.580	9225	0.580	9540	0.580	9855	0.580
7350	0.580	7665	0.580	7980	0.580	8295	0.580	8610	0.580	8925	0.580	9240	0.580	9555	0.580	9870	0.580
7365	0.580	7680	0.580	7995	0.580	8310	0.580	8625	0.580	8940	0.580	9255	0.580	9570	0.580	9885	0.580
7380	0.580	7695	0.580	8010	0.580	8325	0.580	8640	0.580	8955	0.580	9270	0.580	9585	0.580	9900	0.580
7395	0.580	7710	0.580	8025	0.580	8340	0.580	8655	0.580	8970	0.580	9285	0.580	9600	0.580	9915	0.580
7410	0.580	7725	0.580	8040	0.580	8355	0.580	8670	0.580	8985	0.580	9300	0.580	9615	0.580	9930	0.580
7425	0.580	7740	0.580	8055	0.580	8370	0.580	8685	0.580	9000	0.580	9315	0.580	9630	0.580	9945	0.580
7440	0.580	7755	0.580	8070	0.580	8385	0.580	8700	0.580	9015	0.580	9330	0.580	9645	0.580	9960	0.580
7455	0.580	7770	0.580	8085	0.580	8400	0.580	8715	0.580	9030	0.580	9345	0.580	9660	0.580	9975	0.580
7470	0.580	7785	0.580	8100	0.580	8415	0.580	8730	0.580	9045	0.580	9360	0.580	9675	0.580	9990	0.580
7485	0.580	7800	0.580	8115	0.580	8430	0.580	8745	0.580	9060	0.580	9375	0.580	9690	0.580	10005	0.580
7500	0.580	7815	0.580	8130	0.580	8445	0.580	8760	0.580	9075	0.580	9390	0.580	9705	0.580	10020	0.580
7515	0.580	7830	0.580	8145	0.580	8460	0.580	8775	0.580	9090	0.580	9405	0.580	9720	0.580	10035	0.580
7530	0.580	7845	0.580	8160	0.580	8475	0.580	8790	0.580	9105	0.580	9420	0.580	9735	0.580	10050	0.580
7545	0.580	7860	0.580	8175	0.580	8490	0.580	8805	0.580	9120	0.580	9435	0.580	9750	0.580	10065	0.580
7560	0.580	7875	0.580	8190	0.580	8505	0.580	8820	0.580	9135	0.580	9450	0.580	9765	0.580	10080	0.580
7575	0.580	7890	0.580	8205	0.580	8520	0.580	8835	0.580	9150	0.580	9465	0.580	9780	0.580		
7590	0.580	7905	0.580	8220	0.580	8535	0.580	8850	0.580	9165	0.580	9480	0.580	9795	0.580		

Node Car Park 10 Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.468	Product Number	CTL-SHE-0047-1000-0940-1000
Design Depth (m)	0.940	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Basin Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.306	Product Number	CTL-SHE-0061-1400-0613-1400
Design Depth (m)	0.613	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node Car Park 11 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	18.398	Product Number	CTL-SHE-0052-1200-0930-1200
Design Depth (m)	0.930	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.2	Min Node Diameter (mm)	1200

Node Tank Upstream of Carpark 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.538
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	258.0	258.0	0.500	258.0	286.5	0.501	0.0	286.5	1.300	0.0	286.5

Node Carpark 10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	7.088	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.508	Length (m)	79.913	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	750.0		

Node Tank upstream of Carpark 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.458
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	54.0	54.0	0.500	54.0	67.0	0.501	0.0	67.0	1.300	0.0	67.0

Node Carpark 11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.360	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.428	Length (m)	47.438	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	750.0		

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.336
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	36.9	36.9	0.605	171.0	172.6

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	112.611	31.865	2 year 360 minute winter	12.045	4.769	2 year 2880 minute summer	3.950	1.059
2 year 15 minute winter	79.025	31.865	2 year 480 minute summer	14.753	3.899	2 year 2880 minute winter	2.655	1.059
2 year 30 minute summer	73.727	20.862	2 year 480 minute winter	9.801	3.899	2 year 4320 minute summer	3.130	0.818
2 year 30 minute winter	51.738	20.862	2 year 600 minute summer	12.136	3.319	2 year 4320 minute winter	2.061	0.818
2 year 60 minute summer	49.688	13.131	2 year 600 minute winter	8.292	3.319	2 year 5760 minute summer	2.706	0.693
2 year 60 minute winter	33.012	13.131	2 year 720 minute summer	10.833	2.903	2 year 5760 minute winter	1.752	0.693
2 year 120 minute summer	35.373	9.348	2 year 720 minute winter	7.281	2.903	2 year 7200 minute summer	2.411	0.615
2 year 120 minute winter	23.501	9.348	2 year 960 minute summer	8.897	2.343	2 year 7200 minute winter	1.556	0.615
2 year 180 minute summer	28.862	7.427	2 year 960 minute winter	5.893	2.343	2 year 8640 minute summer	2.203	0.562
2 year 180 minute winter	18.761	7.427	2 year 1440 minute summer	6.460	1.731	2 year 8640 minute winter	1.422	0.562
2 year 240 minute summer	23.566	6.228	2 year 1440 minute winter	4.342	1.731	2 year 10080 minute summer	2.053	0.524
2 year 240 minute winter	15.657	6.228	2 year 2160 minute summer	4.672	1.291	2 year 10080 minute winter	1.325	0.524
2 year 360 minute summer	18.531	4.769	2 year 2160 minute winter	3.219	1.291			

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute winter	Tank Upstream of Carpark 10	6960	18.788	0.250	0.3	61.3338	0.0000	SURCHARGED
10080 minute winter	Carpark 10	6960	18.788	0.280	0.6	38.5346	0.0000	SURCHARGED
10080 minute winter	Car Park 10 Hydrobrake	6960	18.788	0.320	0.3	0.0000	0.0000	SURCHARGED
10080 minute winter	Tank upstream of Carpark 11	6840	18.761	0.302	0.1	15.5180	0.0000	SURCHARGED
10080 minute winter	Carpark 11	6840	18.761	0.332	0.4	27.1544	0.0000	SURCHARGED
10080 minute winter	Car Park 11 Hydrobrake	6840	18.761	0.363	0.4	0.0000	0.0000	SURCHARGED
10080 minute summer	3	6420	18.724	0.356	0.4	0.0000	0.0000	SURCHARGED
10080 minute winter	Basin	6900	18.723	0.387	0.6	30.8978	0.0000	FLOOD RISK
10080 minute winter	Basin Hydrobrake	6900	18.723	0.417	0.4	0.0000	0.0000	FLOOD RISK
15 minute summer	Outfall to ditch	1	18.690	0.580	0.0	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)
10080 minute winter	Tank Upstream of Carpark 10	1.000	Carpark 10	-0.3	-0.074	-0.009	0.1989	
10080 minute winter	Carpark 10	1.001	Car Park 10 Hydrobrake	0.3	0.122	0.006	0.1989	
10080 minute winter	Car Park 10 Hydrobrake	Hydro-Brake®	Carpark 11	0.3				
10080 minute winter	Tank upstream of Carpark 11	2.000	Carpark 11	-0.1	-0.035	-0.002	0.1989	
10080 minute winter	Carpark 11	1.003	Car Park 11 Hydrobrake	0.4	0.092	0.010	0.1989	
10080 minute winter	Car Park 11 Hydrobrake	1.004	3	0.8	0.245	0.019	0.1989	
10080 minute summer	3	1.005	Basin	0.6	0.295	0.016	0.2098	
10080 minute winter	Basin	1.006	Basin Hydrobrake	0.4	0.010	0.010	0.1989	
10080 minute winter	Basin Hydrobrake	Hydro-Brake®	Outfall to ditch	0.4				100.3

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank Upstream of Carpark 10		5.00	19.938		-14.957	13.881	1.400
Carpark 10	0.176	5.00	19.938		-23.846	7.168	1.430
Car Park 10 Hydrobrake			19.938	1200	-19.439	0.993	1.470
Tank upstream of Carpark 11		5.00	19.938		-3.664	-8.590	1.480
Carpark 11	0.093	5.00	19.828		-16.048	-8.851	1.400
Car Park 11 Hydrobrake			19.828	1350	-18.462	-13.192	1.430
3			19.260	1350	-26.351	-21.542	0.892
Basin			18.941	1350	-43.904	-29.674	0.605
Basin Hydrobrake			18.941	2100	-54.956	-20.139	0.635
Outfall to ditch			18.690	1200	-83.815	-25.187	0.580

Links (Input)

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	Tank Upstream of Carpark 10	Carpark 10	5.000	0.600	18.538	18.508	0.030	166.7	225	5.08	50.0
1.001	Carpark 10	Car Park 10 Hydrobrake	5.000	0.600	18.508	18.468	0.040	125.0	225	5.15	50.0
1.002	Car Park 10 Hydrobrake	Carpark 11	5.000	0.600	18.468	18.428	0.040	125.0	225	5.23	50.0
2.000	Tank upstream of Carpark 11	Carpark 11	5.000	0.600	18.458	18.428	0.030	166.7	225	5.08	50.0
1.003	Carpark 11	Car Park 11 Hydrobrake	5.000	0.600	18.428	18.398	0.030	167.0	225	5.31	50.0
1.004	Car Park 11 Hydrobrake	3	5.000	0.600	18.398	18.368	0.030	167.0	225	5.39	50.0
1.005	3	Basin	5.276	0.600	18.368	18.336	0.032	164.9	225	5.48	50.0
1.006	Basin	Basin Hydrobrake	5.000	0.600	18.336	18.306	0.030	167.0	225	5.56	50.0
1.007	Basin Hydrobrake	Outfall to ditch	34.500	0.600	18.306	18.110	0.196	176.0	225	6.15	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	40	0	0

Node Outfall to ditch Surcharged Outfall

Overrides Design Area x | Depression Storage Area (m^2) 0 | Evapo-transpiration (mm/day) 0

Overrides Design Additional Inflow x | Depression Storage Depth (mm) 0

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.580	300	0.580	600	0.580	900	0.580	1200	0.580	1500	0.580	1800	0.580	2100	0.580	2400	0.580
15	0.580	315	0.580	615	0.580	915	0.580	1215	0.580	1515	0.580	1815	0.580	2115	0.580	2415	0.580
30	0.580	330	0.580	630	0.580	930	0.580	1230	0.580	1530	0.580	1830	0.580	2130	0.580	2430	0.580
45	0.580	345	0.580	645	0.580	945	0.580	1245	0.580	1545	0.580	1845	0.580	2145	0.580	2445	0.580
60	0.580	360	0.580	660	0.580	960	0.580	1260	0.580	1560	0.580	1860	0.580	2160	0.580	2460	0.580
75	0.580	375	0.580	675	0.580	975	0.580	1275	0.580	1575	0.580	1875	0.580	2175	0.580	2475	0.580
90	0.580	390	0.580	690	0.580	990	0.580	1290	0.580	1590	0.580	1890	0.580	2190	0.580	2490	0.580
105	0.580	405	0.580	705	0.580	1005	0.580	1305	0.580	1605	0.580	1905	0.580	2205	0.580	2505	0.580
120	0.580	420	0.580	720	0.580	1020	0.580	1320	0.580	1620	0.580	1920	0.580	2220	0.580	2520	0.580
135	0.580	435	0.580	735	0.580	1035	0.580	1335	0.580	1635	0.580	1935	0.580	2235	0.580	2535	0.580
150	0.580	450	0.580	750	0.580	1050	0.580	1350	0.580	1650	0.580	1950	0.580	2250	0.580	2550	0.580
165	0.580	465	0.580	765	0.580	1065	0.580	1365	0.580	1665	0.580	1965	0.580	2265	0.580	2565	0.580
180	0.580	480	0.580	780	0.580	1080	0.580	1380	0.580	1680	0.580	1980	0.580	2280	0.580	2580	0.580
195	0.580	495	0.580	795	0.580	1095	0.580	1395	0.580	1695	0.580	1995	0.580	2295	0.580	2595	0.580
210	0.580	510	0.580	810	0.580	1110	0.580	1410	0.580	1710	0.580	2010	0.580	2310	0.580	2610	0.580
225	0.580	525	0.580	825	0.580	1125	0.580	1425	0.580	1725	0.580	2025	0.580	2325	0.580	2625	0.580
240	0.580	540	0.580	840	0.580	1140	0.580	1440	0.580	1740	0.580	2040	0.580	2340	0.580	2640	0.580
255	0.580	555	0.580	855	0.580	1155	0.580	1455	0.580	1755	0.580	2055	0.580	2355	0.580	2655	0.580
270	0.580	570	0.580	870	0.580	1170	0.580	1470	0.580	1770	0.580	2070	0.580	2370	0.580	2670	0.580
285	0.580	585	0.580	885	0.580	1185	0.580	1485	0.580	1785	0.580	2085	0.580	2385	0.580	2685	0.580

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2700	0.580	3210	0.580	3720	0.580	4230	0.580	4740	0.580	5250	0.580	5760	0.580	6270	0.580	6780	0.580
2715	0.580	3225	0.580	3735	0.580	4245	0.580	4755	0.580	5265	0.580	5775	0.580	6285	0.580	6795	0.580
2730	0.580	3240	0.580	3750	0.580	4260	0.580	4770	0.580	5280	0.580	5790	0.580	6300	0.580	6810	0.580
2745	0.580	3255	0.580	3765	0.580	4275	0.580	4785	0.580	5295	0.580	5805	0.580	6315	0.580	6825	0.580
2760	0.580	3270	0.580	3780	0.580	4290	0.580	4800	0.580	5310	0.580	5820	0.580	6330	0.580	6840	0.580
2775	0.580	3285	0.580	3795	0.580	4305	0.580	4815	0.580	5325	0.580	5835	0.580	6345	0.580	6855	0.580
2790	0.580	3300	0.580	3810	0.580	4320	0.580	4830	0.580	5340	0.580	5850	0.580	6360	0.580	6870	0.580
2805	0.580	3315	0.580	3825	0.580	4335	0.580	4845	0.580	5355	0.580	5865	0.580	6375	0.580	6885	0.580
2820	0.580	3330	0.580	3840	0.580	4350	0.580	4860	0.580	5370	0.580	5880	0.580	6390	0.580	6900	0.580
2835	0.580	3345	0.580	3855	0.580	4365	0.580	4875	0.580	5385	0.580	5895	0.580	6405	0.580	6915	0.580
2850	0.580	3360	0.580	3870	0.580	4380	0.580	4890	0.580	5400	0.580	5910	0.580	6420	0.580	6930	0.580
2865	0.580	3375	0.580	3885	0.580	4395	0.580	4905	0.580	5415	0.580	5925	0.580	6435	0.580	6945	0.580
2880	0.580	3390	0.580	3900	0.580	4410	0.580	4920	0.580	5430	0.580	5940	0.580	6450	0.580	6960	0.580
2895	0.580	3405	0.580	3915	0.580	4425	0.580	4935	0.580	5445	0.580	5955	0.580	6465	0.580	6975	0.580
2910	0.580	3420	0.580	3930	0.580	4440	0.580	4950	0.580	5460	0.580	5970	0.580	6480	0.580	6990	0.580
2925	0.580	3435	0.580	3945	0.580	4455	0.580	4965	0.580	5475	0.580	5985	0.580	6495	0.580	7005	0.580
2940	0.580	3450	0.580	3960	0.580	4470	0.580	4980	0.580	5490	0.580	6000	0.580	6510	0.580	7020	0.580
2955	0.580	3465	0.580	3975	0.580	4485	0.580	4995	0.580	5505	0.580	6015	0.580	6525	0.580	7035	0.580
2970	0.580	3480	0.580	3990	0.580	4500	0.580	5010	0.580	5520	0.580	6030	0.580	6540	0.580	7050	0.580
2985	0.580	3495	0.580	4005	0.580	4515	0.580	5025	0.580	5535	0.580	6045	0.580	6555	0.580	7065	0.580
3000	0.580	3510	0.580	4020	0.580	4530	0.580	5040	0.580	5550	0.580	6060	0.580	6570	0.580	7080	0.580
3015	0.580	3525	0.580	4035	0.580	4545	0.580	5055	0.580	5565	0.580	6075	0.580	6585	0.580	7095	0.580
3030	0.580	3540	0.580	4050	0.580	4560	0.580	5070	0.580	5580	0.580	6090	0.580	6600	0.580	7110	0.580
3045	0.580	3555	0.580	4065	0.580	4575	0.580	5085	0.580	5595	0.580	6105	0.580	6615	0.580	7125	0.580
3060	0.580	3570	0.580	4080	0.580	4590	0.580	5100	0.580	5610	0.580	6120	0.580	6630	0.580	7140	0.580
3075	0.580	3585	0.580	4095	0.580	4605	0.580	5115	0.580	5625	0.580	6135	0.580	6645	0.580	7155	0.580
3090	0.580	3600	0.580	4110	0.580	4620	0.580	5130	0.580	5640	0.580	6150	0.580	6660	0.580	7170	0.580
3105	0.580	3615	0.580	4125	0.580	4635	0.580	5145	0.580	5655	0.580	6165	0.580	6675	0.580	7185	0.580
3120	0.580	3630	0.580	4140	0.580	4650	0.580	5160	0.580	5670	0.580	6180	0.580	6690	0.580	7200	0.580
3135	0.580	3645	0.580	4155	0.580	4665	0.580	5175	0.580	5685	0.580	6195	0.580	6705	0.580	7215	0.580
3150	0.580	3660	0.580	4170	0.580	4680	0.580	5190	0.580	5700	0.580	6210	0.580	6720	0.580	7230	0.580
3165	0.580	3675	0.580	4185	0.580	4695	0.580	5205	0.580	5715	0.580	6225	0.580	6735	0.580	7245	0.580
3180	0.580	3690	0.580	4200	0.580	4710	0.580	5220	0.580	5730	0.580	6240	0.580	6750	0.580	7260	0.580
3195	0.580	3705	0.580	4215	0.580	4725	0.580	5235	0.580	5745	0.580	6255	0.580	6765	0.580	7275	0.580

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
7290	0.580	7605	0.580	7920	0.580	8235	0.580	8550	0.580	8865	0.580	9180	0.580	9495	0.580	9810	0.580
7305	0.580	7620	0.580	7935	0.580	8250	0.580	8565	0.580	8880	0.580	9195	0.580	9510	0.580	9825	0.580
7320	0.580	7635	0.580	7950	0.580	8265	0.580	8580	0.580	8895	0.580	9210	0.580	9525	0.580	9840	0.580
7335	0.580	7650	0.580	7965	0.580	8280	0.580	8595	0.580	8910	0.580	9225	0.580	9540	0.580	9855	0.580
7350	0.580	7665	0.580	7980	0.580	8295	0.580	8610	0.580	8925	0.580	9240	0.580	9555	0.580	9870	0.580
7365	0.580	7680	0.580	7995	0.580	8310	0.580	8625	0.580	8940	0.580	9255	0.580	9570	0.580	9885	0.580
7380	0.580	7695	0.580	8010	0.580	8325	0.580	8640	0.580	8955	0.580	9270	0.580	9585	0.580	9900	0.580
7395	0.580	7710	0.580	8025	0.580	8340	0.580	8655	0.580	8970	0.580	9285	0.580	9600	0.580	9915	0.580
7410	0.580	7725	0.580	8040	0.580	8355	0.580	8670	0.580	8985	0.580	9300	0.580	9615	0.580	9930	0.580
7425	0.580	7740	0.580	8055	0.580	8370	0.580	8685	0.580	9000	0.580	9315	0.580	9630	0.580	9945	0.580
7440	0.580	7755	0.580	8070	0.580	8385	0.580	8700	0.580	9015	0.580	9330	0.580	9645	0.580	9960	0.580
7455	0.580	7770	0.580	8085	0.580	8400	0.580	8715	0.580	9030	0.580	9345	0.580	9660	0.580	9975	0.580
7470	0.580	7785	0.580	8100	0.580	8415	0.580	8730	0.580	9045	0.580	9360	0.580	9675	0.580	9990	0.580
7485	0.580	7800	0.580	8115	0.580	8430	0.580	8745	0.580	9060	0.580	9375	0.580	9690	0.580	10005	0.580
7500	0.580	7815	0.580	8130	0.580	8445	0.580	8760	0.580	9075	0.580	9390	0.580	9705	0.580	10020	0.580
7515	0.580	7830	0.580	8145	0.580	8460	0.580	8775	0.580	9090	0.580	9405	0.580	9720	0.580	10035	0.580
7530	0.580	7845	0.580	8160	0.580	8475	0.580	8790	0.580	9105	0.580	9420	0.580	9735	0.580	10050	0.580
7545	0.580	7860	0.580	8175	0.580	8490	0.580	8805	0.580	9120	0.580	9435	0.580	9750	0.580	10065	0.580
7560	0.580	7875	0.580	8190	0.580	8505	0.580	8820	0.580	9135	0.580	9450	0.580	9765	0.580	10080	0.580
7575	0.580	7890	0.580	8205	0.580	8520	0.580	8835	0.580	9150	0.580	9465	0.580	9780	0.580		
7590	0.580	7905	0.580	8220	0.580	8535	0.580	8850	0.580	9165	0.580	9480	0.580	9795	0.580		

Node Car Park 10 Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.468	Product Number	CTL-SHE-0047-1000-0940-1000
Design Depth (m)	0.940	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Basin Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.306	Product Number	CTL-SHE-0061-1400-0613-1400
Design Depth (m)	0.613	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node Car Park 11 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	18.398	Product Number	CTL-SHE-0052-1200-0930-1200
Design Depth (m)	0.930	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.2	Min Node Diameter (mm)	1200

Node Tank Upstream of Carpark 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.538
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	4620

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	258.0	258.0	0.500	258.0	286.5	0.501	0.0	286.5	1.300	0.0	286.5

Node Carpark 10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	7.088	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.508	Length (m)	79.913	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	4320	Slope (1:X)	750.0		

Node Tank upstream of Carpark 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.458
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	54.0	54.0	0.500	54.0	67.0	0.501	0.0	67.0	1.300	0.0	67.0

Node Carpark 11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.360	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.428	Length (m)	47.438	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	750.0		

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.336
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	36.9	36.9	0.605	171.0	172.6

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +40% CC 15 minute summer	395.645	111.954	30 year +40% CC 360 minute winter	33.244	13.161
30 year +40% CC 15 minute winter	277.645	111.954	30 year +40% CC 480 minute summer	39.966	10.562
30 year +40% CC 30 minute summer	262.994	74.418	30 year +40% CC 480 minute winter	26.553	10.562
30 year +40% CC 30 minute winter	184.557	74.418	30 year +40% CC 600 minute summer	32.479	8.884
30 year +40% CC 60 minute summer	179.164	47.348	30 year +40% CC 600 minute winter	22.192	8.884
30 year +40% CC 60 minute winter	119.032	47.348	30 year +40% CC 720 minute summer	28.739	7.702
30 year +40% CC 120 minute summer	111.006	29.336	30 year +40% CC 720 minute winter	19.314	7.702
30 year +40% CC 120 minute winter	73.750	29.336	30 year +40% CC 960 minute summer	23.305	6.137
30 year +40% CC 180 minute summer	85.356	21.965	30 year +40% CC 960 minute winter	15.438	6.137
30 year +40% CC 180 minute winter	55.483	21.965	30 year +40% CC 1440 minute summer	16.586	4.445
30 year +40% CC 240 minute summer	67.393	17.810	30 year +40% CC 1440 minute winter	11.147	4.445
30 year +40% CC 240 minute winter	44.774	17.810	30 year +40% CC 2160 minute summer	11.707	3.235
30 year +40% CC 360 minute summer	51.142	13.161	30 year +40% CC 2160 minute winter	8.066	3.235

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +40% CC 2880 minute summer	9.692	2.598	30 year +40% CC 7200 minute summer	5.358	1.367
30 year +40% CC 2880 minute winter	6.514	2.598	30 year +40% CC 7200 minute winter	3.458	1.367
30 year +40% CC 4320 minute summer	7.385	1.931	30 year +40% CC 8640 minute summer	4.784	1.221
30 year +40% CC 4320 minute winter	4.864	1.931	30 year +40% CC 8640 minute winter	3.088	1.221
30 year +40% CC 5760 minute summer	6.179	1.582	30 year +40% CC 10080 minute summer	4.368	1.114
30 year +40% CC 5760 minute winter	3.999	1.582	30 year +40% CC 10080 minute winter	2.819	1.114

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	Tank Upstream of Carpark 10	6360	19.019	0.481	1.0	117.9616	0.0000	SURCHARGED
10080 minute summer	Carpark 10	6360	19.019	0.511	2.1	77.7944	0.0000	SURCHARGED
10080 minute summer	Car Park 10 Hydrobrake	6360	19.019	0.551	0.7	0.0000	0.0000	SURCHARGED
10080 minute summer	Tank upstream of Carpark 11	6120	18.953	0.495	0.2	25.4171	0.0000	SURCHARGED
10080 minute summer	Carpark 11	6120	18.953	0.525	1.5	44.5810	0.0000	SURCHARGED
10080 minute summer	Car Park 11 Hydrobrake	6120	18.953	0.555	1.1	0.0000	0.0000	SURCHARGED
10080 minute summer	3	6300	18.760	0.392	1.4	0.0000	0.0000	SURCHARGED
10080 minute summer	Basin	6360	18.758	0.422	1.7	35.3725	0.0000	FLOOD RISK
10080 minute summer	Basin Hydrobrake	6360	18.758	0.452	1.1	0.0000	0.0000	FLOOD RISK
15 minute summer	Outfall to ditch	1	18.690	0.580	0.0	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)
10080 minute summer	Tank Upstream of Carpark 10	1.000	Carpark 10	-1.0	-0.060	-0.026	0.1989	
10080 minute summer	Carpark 10	1.001	Car Park 10 Hydrobrake	0.7	0.139	0.016	0.1989	
10080 minute summer	Car Park 10 Hydrobrake	Hydro-Brake®	Carpark 11	0.7				
10080 minute summer	Tank upstream of Carpark 11	2.000	Carpark 11	-0.2	-0.050	-0.005	0.1989	
10080 minute summer	Carpark 11	1.003	Car Park 11 Hydrobrake	1.1	0.101	0.027	0.1989	
10080 minute summer	Car Park 11 Hydrobrake	1.004	3	1.4	0.299	0.035	0.1989	
10080 minute summer	3	1.005	Basin	1.7	0.248	0.041	0.2098	
10080 minute summer	Basin	1.006	Basin Hydrobrake	1.1	0.027	0.027	0.1989	
10080 minute summer	Basin Hydrobrake	Hydro-Brake®	Outfall to ditch	1.1				351.4

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank Upstream of Carpark 10		5.00	19.938		-14.957	13.881	1.400
Carpark 10	0.176	5.00	19.938		-23.846	7.168	1.430
Car Park 10 Hydrobrake			19.938	1200	-19.439	0.993	1.470
Tank upstream of Carpark 11		5.00	19.938		-3.664	-8.590	1.480
Carpark 11	0.093	5.00	19.828		-16.048	-8.851	1.400
Car Park 11 Hydrobrake			19.828	1350	-18.462	-13.192	1.430
3			19.260	1350	-26.351	-21.542	0.892
Basin			18.941	1350	-43.904	-29.674	0.605
Basin Hydrobrake			18.941	2100	-54.956	-20.139	0.635
Outfall to ditch			18.690	1200	-83.815	-25.187	0.580

Links (Input)

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	Tank Upstream of Carpark 10	Carpark 10	5.000	0.600	18.538	18.508	0.030	166.7	225	5.08	50.0
1.001	Carpark 10	Car Park 10 Hydrobrake	5.000	0.600	18.508	18.468	0.040	125.0	225	5.15	50.0
1.002	Car Park 10 Hydrobrake	Carpark 11	5.000	0.600	18.468	18.428	0.040	125.0	225	5.23	50.0
2.000	Tank upstream of Carpark 11	Carpark 11	5.000	0.600	18.458	18.428	0.030	166.7	225	5.08	50.0
1.003	Carpark 11	Car Park 11 Hydrobrake	5.000	0.600	18.428	18.398	0.030	167.0	225	5.31	50.0
1.004	Car Park 11 Hydrobrake	3	5.000	0.600	18.398	18.368	0.030	167.0	225	5.39	50.0
1.005	3	Basin	5.276	0.600	18.368	18.336	0.032	164.9	225	5.48	50.0
1.006	Basin	Basin Hydrobrake	5.000	0.600	18.336	18.306	0.030	167.0	225	5.56	50.0
1.007	Basin Hydrobrake	Outfall to ditch	34.500	0.600	18.306	18.110	0.196	176.0	225	6.15	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Outfall to ditch Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m^2)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.580	300	0.580	600	0.580	900	0.580	1200	0.580	1500	0.580	1800	0.580	2100	0.580	2400	0.580
15	0.580	315	0.580	615	0.580	915	0.580	1215	0.580	1515	0.580	1815	0.580	2115	0.580	2415	0.580
30	0.580	330	0.580	630	0.580	930	0.580	1230	0.580	1530	0.580	1830	0.580	2130	0.580	2430	0.580
45	0.580	345	0.580	645	0.580	945	0.580	1245	0.580	1545	0.580	1845	0.580	2145	0.580	2445	0.580
60	0.580	360	0.580	660	0.580	960	0.580	1260	0.580	1560	0.580	1860	0.580	2160	0.580	2460	0.580
75	0.580	375	0.580	675	0.580	975	0.580	1275	0.580	1575	0.580	1875	0.580	2175	0.580	2475	0.580
90	0.580	390	0.580	690	0.580	990	0.580	1290	0.580	1590	0.580	1890	0.580	2190	0.580	2490	0.580
105	0.580	405	0.580	705	0.580	1005	0.580	1305	0.580	1605	0.580	1905	0.580	2205	0.580	2505	0.580
120	0.580	420	0.580	720	0.580	1020	0.580	1320	0.580	1620	0.580	1920	0.580	2220	0.580	2520	0.580
135	0.580	435	0.580	735	0.580	1035	0.580	1335	0.580	1635	0.580	1935	0.580	2235	0.580	2535	0.580
150	0.580	450	0.580	750	0.580	1050	0.580	1350	0.580	1650	0.580	1950	0.580	2250	0.580	2550	0.580
165	0.580	465	0.580	765	0.580	1065	0.580	1365	0.580	1665	0.580	1965	0.580	2265	0.580	2565	0.580
180	0.580	480	0.580	780	0.580	1080	0.580	1380	0.580	1680	0.580	1980	0.580	2280	0.580	2580	0.580
195	0.580	495	0.580	795	0.580	1095	0.580	1395	0.580	1695	0.580	1995	0.580	2295	0.580	2595	0.580
210	0.580	510	0.580	810	0.580	1110	0.580	1410	0.580	1710	0.580	2010	0.580	2310	0.580	2610	0.580
225	0.580	525	0.580	825	0.580	1125	0.580	1425	0.580	1725	0.580	2025	0.580	2325	0.580	2625	0.580
240	0.580	540	0.580	840	0.580	1140	0.580	1440	0.580	1740	0.580	2040	0.580	2340	0.580	2640	0.580
255	0.580	555	0.580	855	0.580	1155	0.580	1455	0.580	1755	0.580	2055	0.580	2355	0.580	2655	0.580
270	0.580	570	0.580	870	0.580	1170	0.580	1470	0.580	1770	0.580	2070	0.580	2370	0.580	2670	0.580
285	0.580	585	0.580	885	0.580	1185	0.580	1485	0.580	1785	0.580	2085	0.580	2385	0.580	2685	0.580

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2700	0.580	3210	0.580	3720	0.580	4230	0.580	4740	0.580	5250	0.580	5760	0.580	6270	0.580	6780	0.580
2715	0.580	3225	0.580	3735	0.580	4245	0.580	4755	0.580	5265	0.580	5775	0.580	6285	0.580	6795	0.580
2730	0.580	3240	0.580	3750	0.580	4260	0.580	4770	0.580	5280	0.580	5790	0.580	6300	0.580	6810	0.580
2745	0.580	3255	0.580	3765	0.580	4275	0.580	4785	0.580	5295	0.580	5805	0.580	6315	0.580	6825	0.580
2760	0.580	3270	0.580	3780	0.580	4290	0.580	4800	0.580	5310	0.580	5820	0.580	6330	0.580	6840	0.580
2775	0.580	3285	0.580	3795	0.580	4305	0.580	4815	0.580	5325	0.580	5835	0.580	6345	0.580	6855	0.580
2790	0.580	3300	0.580	3810	0.580	4320	0.580	4830	0.580	5340	0.580	5850	0.580	6360	0.580	6870	0.580
2805	0.580	3315	0.580	3825	0.580	4335	0.580	4845	0.580	5355	0.580	5865	0.580	6375	0.580	6885	0.580
2820	0.580	3330	0.580	3840	0.580	4350	0.580	4860	0.580	5370	0.580	5880	0.580	6390	0.580	6900	0.580
2835	0.580	3345	0.580	3855	0.580	4365	0.580	4875	0.580	5385	0.580	5895	0.580	6405	0.580	6915	0.580
2850	0.580	3360	0.580	3870	0.580	4380	0.580	4890	0.580	5400	0.580	5910	0.580	6420	0.580	6930	0.580
2865	0.580	3375	0.580	3885	0.580	4395	0.580	4905	0.580	5415	0.580	5925	0.580	6435	0.580	6945	0.580
2880	0.580	3390	0.580	3900	0.580	4410	0.580	4920	0.580	5430	0.580	5940	0.580	6450	0.580	6960	0.580
2895	0.580	3405	0.580	3915	0.580	4425	0.580	4935	0.580	5445	0.580	5955	0.580	6465	0.580	6975	0.580
2910	0.580	3420	0.580	3930	0.580	4440	0.580	4950	0.580	5460	0.580	5970	0.580	6480	0.580	6990	0.580
2925	0.580	3435	0.580	3945	0.580	4455	0.580	4965	0.580	5475	0.580	5985	0.580	6495	0.580	7005	0.580
2940	0.580	3450	0.580	3960	0.580	4470	0.580	4980	0.580	5490	0.580	6000	0.580	6510	0.580	7020	0.580
2955	0.580	3465	0.580	3975	0.580	4485	0.580	4995	0.580	5505	0.580	6015	0.580	6525	0.580	7035	0.580
2970	0.580	3480	0.580	3990	0.580	4500	0.580	5010	0.580	5520	0.580	6030	0.580	6540	0.580	7050	0.580
2985	0.580	3495	0.580	4005	0.580	4515	0.580	5025	0.580	5535	0.580	6045	0.580	6555	0.580	7065	0.580
3000	0.580	3510	0.580	4020	0.580	4530	0.580	5040	0.580	5550	0.580	6060	0.580	6570	0.580	7080	0.580
3015	0.580	3525	0.580	4035	0.580	4545	0.580	5055	0.580	5565	0.580	6075	0.580	6585	0.580	7095	0.580
3030	0.580	3540	0.580	4050	0.580	4560	0.580	5070	0.580	5580	0.580	6090	0.580	6600	0.580	7110	0.580
3045	0.580	3555	0.580	4065	0.580	4575	0.580	5085	0.580	5595	0.580	6105	0.580	6615	0.580	7125	0.580
3060	0.580	3570	0.580	4080	0.580	4590	0.580	5100	0.580	5610	0.580	6120	0.580	6630	0.580	7140	0.580
3075	0.580	3585	0.580	4095	0.580	4605	0.580	5115	0.580	5625	0.580	6135	0.580	6645	0.580	7155	0.580
3090	0.580	3600	0.580	4110	0.580	4620	0.580	5130	0.580	5640	0.580	6150	0.580	6660	0.580	7170	0.580
3105	0.580	3615	0.580	4125	0.580	4635	0.580	5145	0.580	5655	0.580	6165	0.580	6675	0.580	7185	0.580
3120	0.580	3630	0.580	4140	0.580	4650	0.580	5160	0.580	5670	0.580	6180	0.580	6690	0.580	7200	0.580
3135	0.580	3645	0.580	4155	0.580	4665	0.580	5175	0.580	5685	0.580	6195	0.580	6705	0.580	7215	0.580
3150	0.580	3660	0.580	4170	0.580	4680	0.580	5190	0.580	5700	0.580	6210	0.580	6720	0.580	7230	0.580
3165	0.580	3675	0.580	4185	0.580	4695	0.580	5205	0.580	5715	0.580	6225	0.580	6735	0.580	7245	0.580
3180	0.580	3690	0.580	4200	0.580	4710	0.580	5220	0.580	5730	0.580	6240	0.580	6750	0.580	7260	0.580
3195	0.580	3705	0.580	4215	0.580	4725	0.580	5235	0.580	5745	0.580	6255	0.580	6765	0.580	7275	0.580

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
7290	0.580	7605	0.580	7920	0.580	8235	0.580	8550	0.580	8865	0.580	9180	0.580	9495	0.580	9810	0.580
7305	0.580	7620	0.580	7935	0.580	8250	0.580	8565	0.580	8880	0.580	9195	0.580	9510	0.580	9825	0.580
7320	0.580	7635	0.580	7950	0.580	8265	0.580	8580	0.580	8895	0.580	9210	0.580	9525	0.580	9840	0.580
7335	0.580	7650	0.580	7965	0.580	8280	0.580	8595	0.580	8910	0.580	9225	0.580	9540	0.580	9855	0.580
7350	0.580	7665	0.580	7980	0.580	8295	0.580	8610	0.580	8925	0.580	9240	0.580	9555	0.580	9870	0.580
7365	0.580	7680	0.580	7995	0.580	8310	0.580	8625	0.580	8940	0.580	9255	0.580	9570	0.580	9885	0.580
7380	0.580	7695	0.580	8010	0.580	8325	0.580	8640	0.580	8955	0.580	9270	0.580	9585	0.580	9900	0.580
7395	0.580	7710	0.580	8025	0.580	8340	0.580	8655	0.580	8970	0.580	9285	0.580	9600	0.580	9915	0.580
7410	0.580	7725	0.580	8040	0.580	8355	0.580	8670	0.580	8985	0.580	9300	0.580	9615	0.580	9930	0.580
7425	0.580	7740	0.580	8055	0.580	8370	0.580	8685	0.580	9000	0.580	9315	0.580	9630	0.580	9945	0.580
7440	0.580	7755	0.580	8070	0.580	8385	0.580	8700	0.580	9015	0.580	9330	0.580	9645	0.580	9960	0.580
7455	0.580	7770	0.580	8085	0.580	8400	0.580	8715	0.580	9030	0.580	9345	0.580	9660	0.580	9975	0.580
7470	0.580	7785	0.580	8100	0.580	8415	0.580	8730	0.580	9045	0.580	9360	0.580	9675	0.580	9990	0.580
7485	0.580	7800	0.580	8115	0.580	8430	0.580	8745	0.580	9060	0.580	9375	0.580	9690	0.580	10005	0.580
7500	0.580	7815	0.580	8130	0.580	8445	0.580	8760	0.580	9075	0.580	9390	0.580	9705	0.580	10020	0.580
7515	0.580	7830	0.580	8145	0.580	8460	0.580	8775	0.580	9090	0.580	9405	0.580	9720	0.580	10035	0.580
7530	0.580	7845	0.580	8160	0.580	8475	0.580	8790	0.580	9105	0.580	9420	0.580	9735	0.580	10050	0.580
7545	0.580	7860	0.580	8175	0.580	8490	0.580	8805	0.580	9120	0.580	9435	0.580	9750	0.580	10065	0.580
7560	0.580	7875	0.580	8190	0.580	8505	0.580	8820	0.580	9135	0.580	9450	0.580	9765	0.580	10080	0.580
7575	0.580	7890	0.580	8205	0.580	8520	0.580	8835	0.580	9150	0.580	9465	0.580	9780	0.580		
7590	0.580	7905	0.580	8220	0.580	8535	0.580	8850	0.580	9165	0.580	9480	0.580	9795	0.580		

Node Car Park 10 Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.468	Product Number	CTL-SHE-0047-1000-0940-1000
Design Depth (m)	0.940	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Basin Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.306	Product Number	CTL-SHE-0061-1400-0613-1400
Design Depth (m)	0.613	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node Car Park 11 Hydrobrake Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	18.398	Product Number	CTL-SHE-0052-1200-0930-1200
Design Depth (m)	0.930	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.2	Min Node Diameter (mm)	1200

Node Tank Upstream of Carpark 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.538
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	3000

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	258.0	258.0	0.500	258.0	286.5	0.501	0.0	286.5	1.300	0.0	286.5

Node Carpark 10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	7.088	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.508	Length (m)	79.913	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	3960	Slope (1:X)	750.0		

Node Tank upstream of Carpark 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.458
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	54.0	54.0	0.500	54.0	67.0	0.501	0.0	67.0	1.300	0.0	67.0

Node Carpark 11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.360	Depth (m)	0.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.428	Length (m)	47.438	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	3900	Slope (1:X)	750.0		

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.336
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	36.9	36.9	0.605	171.0	172.6

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 15 minute summer	514.800	145.671	100 year +45% CC 360 minute winter	42.810	16.948
100 year +45% CC 15 minute winter	361.263	145.671	100 year +45% CC 480 minute summer	51.747	13.675
100 year +45% CC 30 minute summer	345.538	97.775	100 year +45% CC 480 minute winter	34.379	13.675
100 year +45% CC 30 minute winter	242.483	97.775	100 year +45% CC 600 minute summer	42.264	11.560
100 year +45% CC 60 minute summer	237.115	62.663	100 year +45% CC 600 minute winter	28.878	11.560
100 year +45% CC 60 minute winter	157.534	62.663	100 year +45% CC 720 minute summer	37.558	10.066
100 year +45% CC 120 minute summer	143.747	37.988	100 year +45% CC 720 minute winter	25.241	10.066
100 year +45% CC 120 minute winter	95.502	37.988	100 year +45% CC 960 minute summer	30.631	8.066
100 year +45% CC 180 minute summer	109.820	28.261	100 year +45% CC 960 minute winter	20.291	8.066
100 year +45% CC 180 minute winter	71.386	28.261	100 year +45% CC 1440 minute summer	21.973	5.889
100 year +45% CC 240 minute summer	86.572	22.878	100 year +45% CC 1440 minute winter	14.767	5.889
100 year +45% CC 240 minute winter	57.517	22.878	100 year +45% CC 2160 minute summer	15.531	4.292
100 year +45% CC 360 minute summer	65.859	16.948	100 year +45% CC 2160 minute winter	10.701	4.292

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 2880 minute summer	12.815	3.435	100 year +45% CC 7200 minute summer	6.812	1.738
100 year +45% CC 2880 minute winter	8.613	3.435	100 year +45% CC 7200 minute winter	4.397	1.738
100 year +45% CC 4320 minute summer	9.637	2.520	100 year +45% CC 8640 minute summer	6.015	1.535
100 year +45% CC 4320 minute winter	6.346	2.520	100 year +45% CC 8640 minute winter	3.882	1.535
100 year +45% CC 5760 minute summer	7.952	2.036	100 year +45% CC 10080 minute summer	5.436	1.387
100 year +45% CC 5760 minute winter	5.147	2.036	100 year +45% CC 10080 minute winter	3.509	1.387

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.54%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	Tank Upstream of Carpark 10	6600	19.336	0.798	1.4	122.6725	0.0000	SURCHARGED
10080 minute summer	Carpark 10	6600	19.336	0.828	2.7	131.5947	0.0000	SURCHARGED
10080 minute summer	Car Park 10 Hydrobrake	6600	19.336	0.868	0.8	0.0000	0.0000	SURCHARGED
10080 minute summer	Tank upstream of Carpark 11	6600	19.278	0.820	0.3	25.6757	0.0000	SURCHARGED
10080 minute summer	Carpark 11	6600	19.278	0.850	1.8	73.9317	0.0000	SURCHARGED
10080 minute summer	Car Park 11 Hydrobrake	6600	19.278	0.880	1.1	0.0000	0.0000	SURCHARGED
5760 minute summer	3	6420	18.761	0.393	1.7	0.0000	0.0000	SURCHARGED
10080 minute winter	Basin	9060	18.759	0.423	2.0	35.4091	0.0000	FLOOD RISK
10080 minute winter	Basin Hydrobrake	9060	18.759	0.453	1.1	0.0000	0.0000	FLOOD RISK
15 minute summer	Outfall to ditch	1	18.690	0.580	0.0	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)
10080 minute summer	Tank Upstream of Carpark 10	1.000	Carpark 10	-1.4	-0.077	-0.034	0.1989	
10080 minute summer	Carpark 10	1.001	Car Park 10 Hydrobrake	0.8	0.139	0.016	0.1989	
10080 minute summer	Car Park 10 Hydrobrake	Hydro-Brake®	Carpark 11	0.8				
10080 minute summer	Tank upstream of Carpark 11	2.000	Carpark 11	-0.3	-0.050	-0.007	0.1989	
10080 minute summer	Carpark 11	1.003	Car Park 11 Hydrobrake	1.1	0.101	0.027	0.1989	
10080 minute summer	Car Park 11 Hydrobrake	1.004	3	1.8	0.299	0.045	0.1989	
5760 minute summer	3	1.005	Basin	1.7	0.227	0.042	0.2098	
10080 minute winter	Basin	1.006	Basin Hydrobrake	1.1	0.027	0.027	0.1989	
10080 minute winter	Basin Hydrobrake	Hydro-Brake®	Outfall to ditch	1.1				470.7

APPENDIX C

Updated Site Layout

key plan (if applicable)

notes

LEGEND

- EXISTING TREE RETAINED
- ROOT PROTECTION AREA
- EXISTING TREES TO BE REMOVED
- INDICATIVE NEW TREE PLANTING
- AFFORDABLE HOUSING

revision	date	prepared	description
H	12.08.25	MJ	PLOTS 21 & 22 REVISED
G	12.08.25	MJ	PLOTS 5, 11, 12, 21-24, 26 & 27 REVISED IN RESPONSE TO LPA COMMENTS AND ALIGNMENT OF EXISTING BOUNDARIES
F	11.03.25	MJ	REVISED FOLLOWING RECEIPT OF TRAFFIC SURVEY DATA
E	10.03.25	MJ	INDICATIVE PLAY EQUIPMENT SHOWN TO OPEN SPACE
D	25.02.25	MJ	ALLOCATION OF CHIMNEYS RATIONALISED
C	21.02.25	MJ	REVISED TO REFELCT COMMENTS RECEIVED FROM HIGHWAYS CONSULTANTS
B	29.01.25	MJ	PLOT 6 RE - LOCATED OUTSIDE OF FLOOD PLAIN
A	24.01.25	MJ	PLOTS 5 TO 10 REVISED

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project

LAND TO THE REAR OF CHESEPEAKE, REEDS LANE, SAYERS COMMON

drawing

SITE LAYOUT PLAN

date	scale	drawn
07.11.24	1:500 @ A1	MJ

drawing number: AH291 - PL.03

revision: H

0 1 5 10 20 50m