

CIVIL ENGINEERING DESIGN CALCULATIONS

MANOR CLOSE, ICKLEFORD, HERTS

FOR TROY HOMES

CALCULATIONS REPORT REF: TH152_C_S_CR001

REVISION 4

13 AUGUST 2025

DOCUMENT RECORD

Document Ref: TH152_C_S_CR001					
Revision	Date	Remarks	Originator	Checked	Approved
1	28/11/24	First Issue	DAM	TL	MDI
2	30/01/25	Updated to address Planning Condition 17	BR	TL	MDI
3	12/06/25	Details of additional soakaway and management company added	BR	TL	MDI
4	13/08/25	Updated to LLFA Comments	BR	TL	MDI

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1. INTRODUCTION

- 1.1. Structa LLP have been commissioned by Troy Homes to undertake the Civil Engineering Design for a proposed development at Manor Close, Ickleford, Herts.
- 1.2. The calculations in this report have been prepared in accordance with British Standards, Eurocodes and relevant Technical Guidance Documents, as applicable to the project and as listed in Tables 1 and 2.

TABLE 1: DESIGN CODES

Design Codes		Used
British Standards	BS 7533 Part 2: Guide for the structural design of lightly trafficked pavements constructed of clay pavers or precast concrete paving blocks	✓
	BS EN 752:2017 Drain and sewer systems outside buildings.	✓

TABLE 2: TECHNICAL DOCUMENTS

Technical Guidance Documents		Used
Technical Guidance	NHBC Standards 2024	✓
	Building Regulations Approved Document H - Drainage and Waste Disposal	✓
	Building Regulations Approved Document M - Access to and Use of Buildings	✓
	Technical Guidance to the National Planning Policy Framework	✓
	CIRIA C753 - The SUDS manual	✓
	Water UK Sewerage Sector Guidance, Appendix C – Design and Construction Guidance	✓
	Manual of Contract Documents for Highway Works, Volume 1 - Specification for Highway Works	✓

- 1.3. As part of the planning application, prior to the first occupation of the development hereby granted by the LPA, planning condition No.17 states that, *“Where a sustainable drainage scheme is to be provided, the submitted details shall:*
- *Provide information about the design storm period and intensity, the method employed to delay and control the surface water discharged from the site and the measures taken to prevent pollution of the receiving groundwater and/or surface waters;*
 - *Include a timetable for its implementation; and,*
 - *Provide, a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime.”*
- 1.4. The above planning condition is addressed at Sections 5 and 6, which details the Proposed drainage strategy and the associated SuDS Maintenance Plan respectively, for the lifetime of the development.

1.5. Comments were received from Hertfordshire County Council as the Lead Local Flood Authority on 18 June 2025. These comments as well as the responses are as follows:

- We note that it appears that FSR rainfall data may have been used in the soakaway calculations which have been provided. This should be clarified, as we no longer accept the use of FSR and would expect FEH13 or 22 to be used instead.

Drainage calculations have been updated to include FEH-22 data and are shown at Appendix C.

- We note that one of the geocellular soakaways is proposed across a number of private gardens (plots 4, 5 and 6) - this provides a potential maintenance risk. Further information should be provided to show that there are no other viable options. If this is the only viable location, then it should be demonstrated how access and arrangements for future maintenance would be achieved.

Due to limited available storage space, a singular combined soakaway has been provided, with an allowance made for a maintenance easement to facilitate future access and upkeep. This is addressed at Section 5.11-5.12.

- The submitted drainage report references a site investigation which took place in July 2024. We ask that the report associated with this site investigation is submitted – this allows us to verify the infiltration rates and groundwater level which has been taken forward into the design.

The geotechnical report dated 9 July 2024 and undertaken by The CDS Group (Report Ref: ES0073rev1) has been submitted to the LLFA.

2. ENGINEERING SCOPE

- 2.1. Structa LLP have been instructed to carry out the civil engineering design of the external drainage, roads and finished levels and provide AutoCAD drawings with specification items included, suitable for construction. Calculations and drainage layout suitable to enable discharge of NHBC conditions pertaining to drainage matters are to be provided.
- 2.2. The design of the external drainage comprises the following:
- Design of private foul and surface water drainage networks
 - Design of adoptable foul sewers (Section 104 works)
 - Design of surface water infiltration devices
 - Design of connections to public sewers (Section 106 works)
- 2.3. The design of the roads comprises the following:
- Design of private road construction
 - Design of adoptable road junction construction (Section 278)
 - Design of permeable paving construction
- 2.4. The design of the finished levels comprises the following:
- Design of finished floor levels and identifying steps in slab levels
 - Design of falls for soft and hard landscaping
 - Identifying retaining structures and retained heights
 - Cut and fill modelling where required
- 2.5. The following elements are excluded from our design remit as these are to be designed, detailed and supplied by the developer's/contractor's preferred supplier.
- Street Lighting
 - Utility Services

3. SITE DETAILS & PROPOSED DEVELOPMENT

- 3.1. The development site is located on wooded, overgrown undeveloped land off Turnpike Lane, Ickleford, Herts approximately 4.0km to the west of Letchworth Garden City centre.
- 3.2. The site is bounded to the north by Turnpike Lane, to the east by residential properties, to the south by industrial premises and to the west by open grassland.
- 3.3. The total area of the development site is 0.465ha
- 3.4. British Geological Survey (BGS) maps indicate this site to be underlain by superficial deposits of Glaciofluvial Deposits (sand and gravel) which is in turn indicated to be overlain by the Gault Formation bedrock (mudstone).
- 3.5. The latest site investigation (Ref: ES0073 Rev1) undertaken by The CDS Group in July 2024 identified topsoil/made ground 0.20-0.60m thick overlying Sands and Gravels with irregular gravelly/sandy clay bands to a minimum depth of 3.00m (bottom of trial pits).
- 3.6. The ground investigation report confirmed moderate groundwater strikes at depths varying between 1.60m-2.07m below existing ground level. Groundwater monitoring was not included as part of The CDS Group site investigation works.
- 3.7. Infiltration testing was carried out by The CDS Group, which indicates the soakage rate varies marginally across the site between 4.69×10^{-5} m/s to 9.45×10^{-6} m/s.
- 3.8. In addition, BRE365 compliant infiltration test results presented in the C J Emm Ltd "Drainage Report" (Ref 091D42-DR/01 April 2023) confirmed similar soakage rates varying marginally across the site between 6.61×10^{-5} m/s to 1.52×10^{-5} m/s.
- 3.9. The proposed development comprises the construction of 8No. residential dwellings with access road, parking areas and areas of soft landscaping. A site layout is provided in Appendix A.

4. EXTERNAL DRAINAGE ARRANGEMENTS

- 4.1. As this is an undeveloped green field site there are currently no positive foul or surface water discharges on or off-site.
- 4.2. The majority of the site is currently permeable (0.445ha) with only a single tarmac access road being impermeable (0.02ha). The site is generally rectangular in nature and slopes gradually down in a northwest to southeast direction at a gradient of approximately 1in50.
- 4.3. Sewerage Authority (Anglian Water) records indicate that there is a public foul sewer in Turnpike running adjacent to the northern site boundary. There are no public surface water sewers in the vicinity of the site.
- 4.4. There are no open features such as ditches, watercourses, streams etc. in the vicinity of the site to accommodate an attenuated surface water discharge.

5. PROPOSED DRAINAGE STRATEGY

GENERAL

- 5.1. The following general principles shall be applied to the drainage design for the re-development.
- The run-off generated by the proposed development should be minimised by the use of Sustainable Drainage Systems (SUDS) techniques.
 - The surface water drainage system should be designed to convey the design storm event of a 1 in 100yr storm plus 45% climate change allowance.
 - The discharge from the development to the local sewer network, if necessary, shall be controlled to avoid exceeding the capacity of the sewer system, without detriment to the site use and not increasing the flood risk to the surrounding area.
- 5.2. By following these principals in preparing the drainage strategy it will mean that:
- The surface water drainage network will be sufficiently robust to withstand the impacts of climate change.
 - The risk of flooding to surrounding areas will not be increased as a result of the development.
 - Surface water run-off will be controlled on-site and the development will not increase flood risk.
- 5.3. The presence of suitable sand and gravel strata at shallow depth and acceptable soakage rates presented in the ground investigation report(s) indicate that conventional infiltration techniques will be suitable for disposing the surface water runoff from the development site.

SURFACE WATER

- 5.4. The following drainage design and layout proposals follow the principles set out in the C J Emm Ltd "Drainage Report" submitted in support of a previous 8No unit iteration of the planning layout.
- 5.5. The proposed drainage layout is provided on drawing **TH152_C_S_051 Drainage General Arrangement** (Refer Appendix B).
- 5.6. The proposals are to dispose surface water run-off from roofs, access road, drives and parking areas via infiltration techniques to accommodate all storm events up to and including 1in100year + 45% allowance for climate change.
- 5.7. Shallow geo-cellular soakaways are provided in rear gardens to infiltrate clean run-off from roofs only. A 10% allowance for urban creep has been added to roof areas.
- 5.8. Porous block paving is provided to serve the private road, drives and parking areas This will incorporate full infiltration where possible and provide storage within the granular sub-base material. Hardstanding areas within 5.0m of properties are to incorporate an impermeable liner to prevent infiltration, in accordance with Building Regulations Approved Document Part H.

- 5.9. As not all the required storage to accommodate run-off from the road/hardstanding areas can be provided in the granular sub-base alone, an adjacent shallow geo-cellular soakaway will provide additional storage and infiltration.
- 5.10. Surface water run-off from areas of impermeable hardstanding such as the access road and junction will be collected in road gullies and directed to a shallow geo-cellular soakaway within the landscaped areas to infiltrate.
- 5.11. Due to the limited storage area available within individual gardens, restricted by a 5m offset from habitable dwellings and root protection zones, a single geocellular soakaway will be installed to manage and infiltrate surface water runoff from Plots 2–7. This soakaway has been designed to accommodate consecutive storms of a 1 in 100 year rainfall event 24 hours after an initial 1 in 100 year + 45% CC storm.
- 5.12. To address potential maintenance requirements over the lifetime of these dwellings, a 3m easement will be provided around the soakaway units to ensure unobstructed access for inspection and maintenance. This easement will be clearly indicated on the plot title plans.
- 5.13. For a critical 1 in 100 + 45% climate change storm event there is slight surface water ponding in the soft landscaped area near the junction. This will flow to the east, following the topography of the land and infiltrate into the soft landscaped area.
- 5.14. The lowest of the recorded infiltration rates of 9.45×10^{-6} m/s has been used in the design of the soakaways and permeable paving with a suitable safety factor applied.
- 5.15. Ground levels have generally been raised across the site to provide a balanced cut and fill profile resulting in all geo-cellular soakaways having their base levels set to provide a minimum 1.0m unsaturated zone above the recorded water strike levels provided in The CDS Group ground investigation report.
- 5.16. The stormwater drainage network on-site expected to be operational by October 2025 as indicated by the Troy Homes Implementation Plan.

WATER QUALITY

- 5.17. In addition to the water quantity control measures set out above, the proposed surface water drainage network will provide treatment to run-off prior to discharge.
- 5.18. CIRIA publication C753 (The SuDS Manual) sets out the simple index approach to the assessment of surface water treatment.
- 5.19. This approach requires suitable pollution hazard indices to be allocated to the development run-off. The pollution hazard indices for the two land use classifications applicable to the proposed development are summarised in the table below.

TABLE 3: POLLUTION HAZARD INDICES

Land Use	Pollution hazard level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads	Low	0.5	0.4	0.4

- 5.20. To deliver adequate treatment, selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).

TABLE 4: POLLUTION MITIGATION INDICES: DISCHARGES TO SURFACE WATERS

SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7

- 5.21. This confirms that the proposed surface water drainage network can provide suitable treatment to run-off prior to discharge.
- 5.22. It is important to note that the mitigation indices set out above apply to SuDS components that follow the design guidance with respect to hydraulics and treatment set out in the corresponding technical chapter of the SuDS Manual (chapter 22). During the detailed design stage the SuDS components shall be designed in accordance with the relevant guidance to ensure adequate treatment of surface water run-off.

TABLE 5: POLLUTION MITIGATION INDICES: DISCHARGES TO GROUNDWATER

Characteristics of the material overlying the proposed infiltration surface, through which the run-off percolates	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e. graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.4	0.4

- 5.23. Soakaways infiltrating runoff from roofs at the rear of dwellings and connected to permeable pavement, are underlain by soil of good attenuation potential and infiltration trench with a minimum depth of 500mm.
- 5.24. This confirms that the proposed surface water drainage network can provide suitable treatment to run-off prior to discharge to the ground.

FOUL WATER

- 5.25. It is proposed to connect the gravity foul drainage network to the existing public sewer network in Turnpike Lane via a newly installed lateral connection.
- 5.26. The lateral connection is subject to Anglian Water S106 Sewer Connection and S104 Adoption consents.

6. MAINTENANCE AND MANAGEMENT

- 6.1. This section provides guidance on the maintenance of specific Sustainable Drainage Systems (SuDS) and other drainage components, the management for which will be the responsibility of either:
- Anglian Water, as the sewer authority;
 - Troy Homes Estate Management Company on behalf of the residents in perpetuity.
- 6.2. These sub-sections outline the maintenance requirements for the SuDS components within the proposed drainage network, however they do not set out all of the drainage that is to be maintained.
- 6.3. It is possible in the future that parts of the drainage network will automatically be transferred to the sewer authority under the Flood and Water Management Act, however this legislation is still under scrutiny and not yet fully implemented.

PERMEABLE BLOCK PAVEMENT

- 6.4. Permeable block paving allows water to infiltrate through the gaps between the blocks into a layer of open-graded aggregate, where the water is attenuated before passing into the piped drainage network.
- 6.5. Permeable pavement increases the time that surface water run-off takes to enter the main drainage system and can provide attenuation storage of run-off in the permeable sub-base.
- 6.6. Surface water run-off passing through the permeable sub-base also receives treatment through the removal/breakdown of pollutants.
- 6.7. The operation and maintenance requirements are given in the table below.

TABLE 6: PERMEABLE PAVEMENT MAINTENANCE

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Sweeping. Note: Any jointing material between the blocks that is lost or displaced as a result of sweeping must be replaced. New jointing material must be the same type as that removed or a suitable replacement.	Three times a year at the end of winter, mid-summer and after autumn leaf fall. Also as required based on site-specific observations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas to prevent excess sediment being washed into the paving.	As required.
	Removal of weeds.	As required.
Remedial actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.

Maintenance Schedule	Required Action	Recommended Frequency
	Rehabilitation of surface and underlying sand and geotextile.	As required (if infiltration performance is significantly reduced as a result of significant clogging).
Monitoring	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action.	Three-monthly, 48h after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.

- 6.8. Maintenance of permeable pavement in public areas (e.g. shared drives and parking areas) will be the responsibility of an appointed management company.
- 6.9. Permeable pavement in areas of land conveyed during the sale of property (i.e. private driveways) will be maintained by the owners of the associated property. Householders must be informed of the maintenance requirements associated with any privately-owned permeable pavement for which they are responsible.
- 6.10. Refer to the Drainage General Arrangement Drawing for the location of the permeable block pavement.

GEOCELLULAR SOAKAWAYS

- 6.11. These soakaways utilise modular geocellular crates to convey run-off into the ground via infiltration.
- 6.12. The high void ratio of the crates allows each soakaway to provide a large volume of attenuation storage.
- 6.13. Each soakaway will be wrapped in a permeable geotextile and will be constructed in permeable strata.
- 6.14. The base of each soakaway should be at least 1.0m above the maximum likely groundwater level.
- 6.15. The operation and maintenance requirements are set out in the table below.

TABLE 7: GEOCELLULAR SOAKAWAY MAINTENANCE

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six-monthly.
	Remove sediment from geo-cellular crates via central inspection point.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlets and vents.	As required.
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required.

Maintenance Schedule	Required Action	Recommended Frequency
Monitoring	Inspect/check all inlets, outlets and vents to ensure that they are in good condition and operating as designed.	Annually and after large storms.
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.
	Check soakaway to ensure emptying is occurring.	Annually.

- 6.16. Refer to the Drainage General Arrangement Drawing for the location of the geocellular soakaways.
- 6.17. Maintenance of the geocellular soakaways will be the responsibility of Troy Homes Estate Management Company.

CATCHPITS

- 6.18. Catchpit chambers and manholes provide a degree of pollution control in preventing silt and debris passing forwards into the drainage network.
- 6.19. The operation and maintenance requirements are given in the table below:

TABLE 8: CATCHPIT MAINTENANCE

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Clean and empty catchpits.	Quarterly.

- 6.20. Refer to the Drainage General Arrangement Drawing for the location of catchpits
- 6.21. Maintenance of the catchpits will be the responsibility of Troy Homes Estate Management Company.

7. ENGINEERING TECHNICAL INFORMATION

- 7.1. A technical review of the information presented has been carried out and the significant engineering elements are listed in the tables below.

TABLE 9: TECHNICAL INFORMATION

Element	Description/Report Reference	Req'd
SI Report	The CDS Group - Phase III Geoenvironmental and Geotechnical Report ES0073 Rev1	✓
Tree Report	Sharon Hosegood Associates – Arbicultural Impact Assessment SHA 1132 Rev A	✓
CCTV Drainage Survey	-	✗
Topo Survey	Terrain Surveys Ltd – Topographical Survey TS18-125 D\1	✓
Ground Conditions	The CDS Group - Phase III Geoenvironmental and Geotechnical Report ES0073 Rev1	✓
Forest Susceptible Soil	The CDS Group - Phase III Geoenvironmental and Geotechnical Report ES0073 Rev	✓
Ground water	The CDS Group - Phase III Geoenvironmental and Geotechnical Report ES0073 Rev1	✓

8. DESIGN CALCULATIONS

- 8.1. The design of the drainage elements has been carried out by hand and where appropriate utilising computer software to assist with the analysis and design elements. Table 7 below lists the software products that have been used.

TABLE 10: DESIGN SOFTWARE

Computational Design Packages	Used
Excel soakaway design software	✓
Causeway Flow drainage design software	✓

- 8.2. Drainage design calculations are presented in Appendix C.

9. SUMMARY

- 9.1. The proposed surface water drainage system for the development shall comprise infiltration techniques in the form of geo-cellular soakaways and permeable paving with storage provided to accommodate all storm events up to and including the 1 in 100 year storm plus a 45% allowance for climate change.
- 9.2. A 10% allowance for urban creep has been applied for roof areas.
- 9.3. The proposed surface water attenuation devices provide a SuDS approach to surface water disposal and protection of ground water quality.
- 9.4. A shared geocellular soakaway will serve Plots 2–7 due to limited garden space for infiltration. A 3m easement will be provided around the soakaway to allow maintenance access.
- 9.5. The proposed surface water drainage design principles set out in this document will ensure that the development does not result in flooding on-site for the duration of the design storms or increase the risk of flooding to surrounding areas to the detriment of others.
- 9.6. During the post planning scheme development process, the site layout has been updated to incorporate minor changes to that shown in the C J Emm “Drainage Report” Ref: 091D42-DR-01 Rev1. The updates are very minor in nature and therefore the principles for surface water disposal remain the same.
- 9.7. The stormwater connection is expected to be operational by October 2025 as indicated by the Troy Homes Implementation Plan.
- 9.8. A private gravity foul network serving the development will discharge to the existing public foul sewer network within Turnpike Lane to the northern site boundary with the connection subject to Anglian Water S106 Sewer Connection and S104 Adoption consent.

FIGURES

FIGURE 1

SITE LOCATION MAP/AERIAL PHOTO

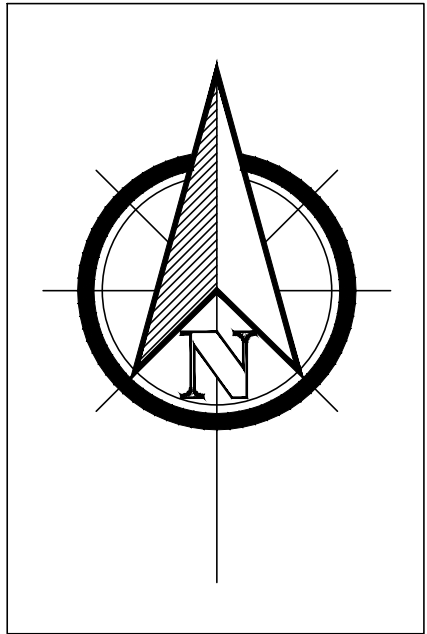


APPENDICES

APPENDIX A

SITE LAYOUT

CHBC ARCHITECTURE SITE PLAN



Rev:	Date:	Amendment:	Initial:
P1	12.06.24	PRELIMINARY ISSUE	JP
P2	14.06.24	Site boundary updated to clients comments	JP
P3	28.06.24	Updated to clients comments, additional information added	DP
P4	27.09.24	Additional information added, hard landscaping key added, plots 2-7 layouts redesigned & site layout adjusted as per S73 application	DP/JP
P5	04.10.24	Plot 8 info doors, roof layout & RWP positions updated, plots 2-7 drainage updated to latest layout	JP
P6	09.10.24	600mm picket fencing added to site layout, bin storage points adjusted, 6ft x 4ft garden sheds added, parking to plots 5 & 6 updated, plot 7 parking moved and carport added, private paving hatch added to key	JP

HARD LANDSCAPING KEY

- ENTRANCE ROAD - BLACK TARMAC
- ENTRANCE PATH - BLACK TARMAC
- SITE COMMUNAL PATH - OMEGA FLOW NATURAL
- SITE ROAD - OMEGA FLOW CHARCOAL (45 deg HERRINGBONE PATTERN)
- PARKING - OMEGA FLOW CHARCOAL (90 deg HERRINGBONE PATTERN). DEMARCATION WITH NATURAL OMEGA FLOW
- PRIVATE PAVING - BRETT CHAUCER JOINTLESS PAVING SLABS

GENERAL KEY

- SITE BOUNDARY
- 1.8M HIGH 215MM WIDE BRICK WALL
- LOW BRICK RETAINING WALL WITH CLOSED BOARDED FENCE OVER
- LOW BRICK RETAINING WALL
- GRAVEL BOARD WITH CLOSED BOARDED FENCE OVER
- CLOSED BOARDED FENCE
- 600mm HIGH PICKET FENCE
- HIGH POST & RAIL FENCE
- HIGH CLOSED BOARDED FENCE WITH 0.3m TRELLIS OVER
- PLOT NUMBER
- TIMBER GARDEN GATE
- PARKING SPACES 5m x 2.5m
- VEHICLE CHARGING POINT
- BIN STORAGE POINT
- BIN COLLECTION POINT
- ELECTRIC METER
- GAS METER
- BOILER LOCATION
- PRIMARY ENTRANCE
- SECONDARY ENTRANCE OR PERSONNEL DOOR TO GARAGE
- 6ft x 4ft APEX ROOF TIMBER GARDEN SHED

KEY CDM RESIDUAL DESIGN RISKS

- Notes:
- Site verify all dimensions prior to construction
 - Report all discrepancies to the Drawing Originator immediately
 - This drawing is to be read in conjunction with all relevant documents and drawings
- IN ACCORDANCE WITH THE CONSTRUCTION DESIGN MANAGEMENT REGULATIONS 2015, THE DOCUMENT ORIGINATOR HAS UNDERTAKEN A DESIGN RISK ASSESSMENT FOR THE ELEMENTS SHOWN ON THIS DOCUMENT. THE ABOVE ARE ONLY THE KEY RISKS THAT WERE IDENTIFIED.



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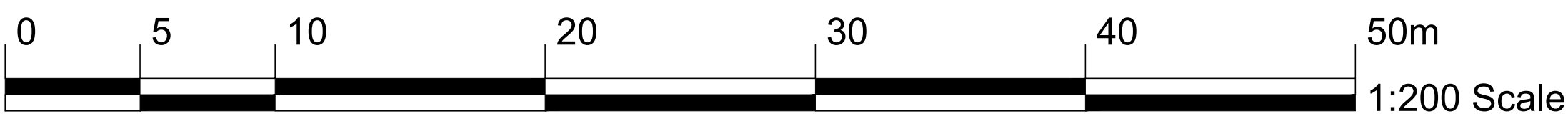
Client: TROY HOMES

Project: LODGE COURT
TURNPIKE LANE, ICKLEFORD
HITCHIN, SG5 3UZ

Drawing: SITE PLAN

Scale: 1:200 @ A1 Date: JUNE 2024
Drawn By: Checked By: Drawing No: JP DP TH152_A_S_XX_001 Rev: P6

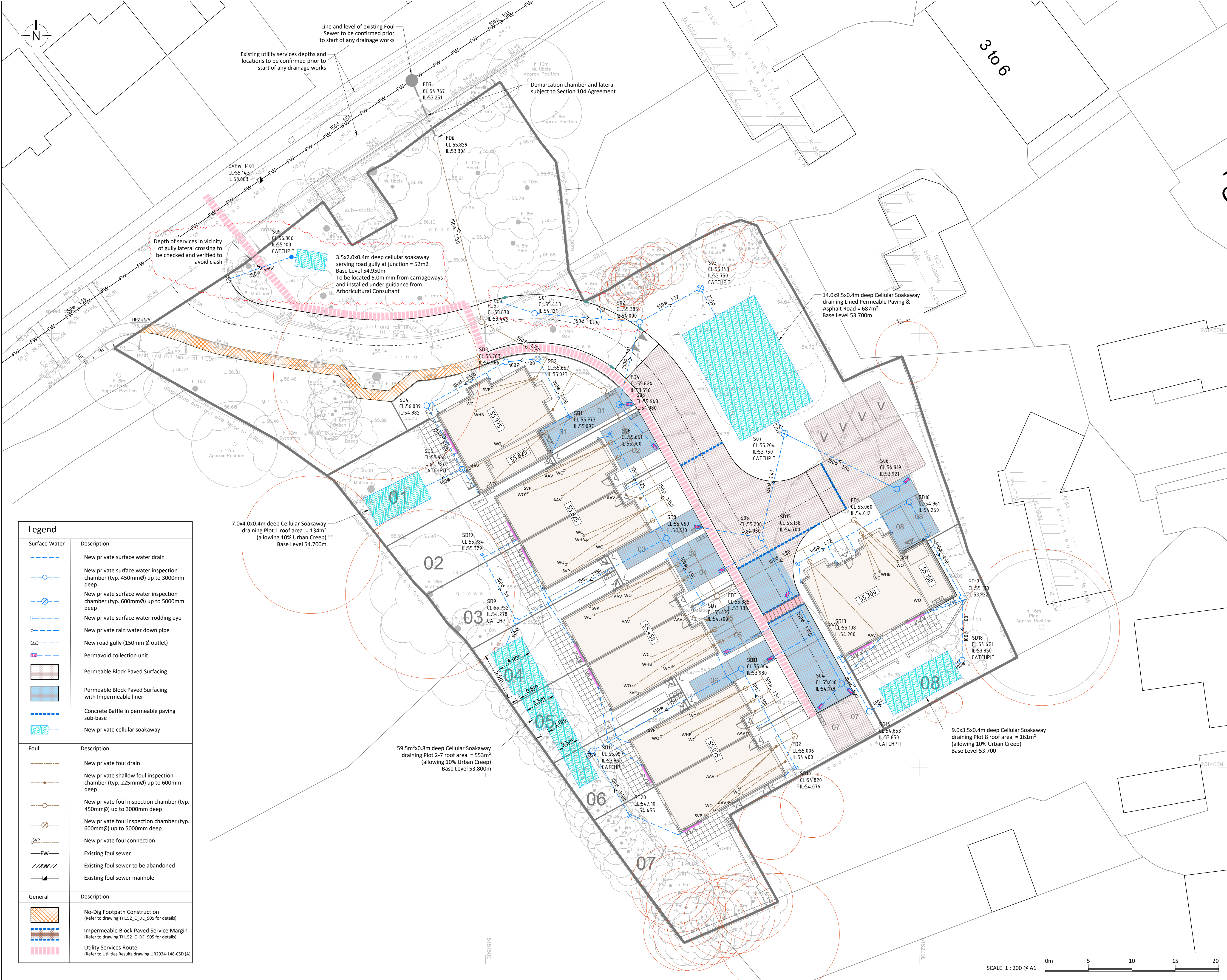
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All dimensions to be checked on site or in the workshop before work commences.
Only figured dimensions to be worked to. Any discrepancies to be reported to the drawing originator.



APPENDIX B

DRAINAGE GENERAL ARRANGEMENT

TH152_C_S_051



HEALTH, SAFETY & ENVIRONMENT

It is the responsibility of the client to ensure that those undertaking the works are competent and experienced in the type of work to be undertaken.

In addition to the hazards usually associated with the types of work detailed on this drawing, the following specific hazards have been identified through design risk assessment. The planning and execution of the works should take into account all usual and specific hazards.

Hazards should also be taken into account in the maintenance, operation, decommissioning and demolition of the works.

None Identified

- NOTES**
- All dimensions are in millimetres (mm) and levels in metres Above Ordnance Datum (mAOD) unless noted otherwise.
 - The copyright in this drawing belongs to Structa LLP; the designs and details may not be used on any project other than that indicated in the titleblock.
 - Where CAD or BIM files of the drawing are issued, they are provided for the convenience of others, and shall not be used for construction purposes or relied upon for accuracy or completeness.
 - Soakaway designs have been based on an Infiltration Rate of 9.45x10⁻⁴m/s as provided in The CDS Group report ref. "ES0073rev1".

Legend

Surface Water

New private surface water drain

New private surface water inspection chamber (typ. 450mmØ) up to 3000mm deep

New private surface water inspection chamber (typ. 600mmØ) up to 5000mm deep

New private surface water rodding eye

New private rain water down pipe

New road gully (150mm Ø outlet)

Permavoid collection unit

Permeable Block Paved Surfacing

Permeable Block Paved Surfacing with Impermeable liner

Concrete Baffle in permeable paving sub-base

New private cellular soakaway

Foul

New private foul drain

New private shallow foul inspection chamber (typ. 225mmØ) up to 600mm deep

New private foul inspection chamber (typ. 450mmØ) up to 3000mm deep

New private foul inspection chamber (typ. 600mmØ) up to 5000mm deep

New private foul connection

Existing foul sewer

Existing foul sewer to be abandoned

Existing foul sewer manhole

General

No-Dig Footpath Construction
(Refer to drawing TH152_C_DE_905 for details)

Impermeable Block Paved Service Margin
(Refer to drawing TH152_C_DE_905 for details)

Utility Services Route
(Refer to Utilities Results drawing UR2024-148-CSD (A))

C3	22.04.25	UPDATED AS CLOUDED	DL	TL	MDI
C2	25.03.25	UPDATED AS CLOUDED	KW	TL	MDI
C1	29.01.25	UPDATED AS CLOUDED. SERVICES ROUTE ADDED. ISSUED FOR CONSTRUCTION	MR	TL	MDI
P3	28.11.24	SOAKAWAY TO REAR OF PLOTS 4&5 UPDATED	MPG	TL	MDI
P2	04.11.24	DRAINAGE UPDATED TO SUIT LATEST LEVELS	JL	TL	MDI
P1	22.10.24	FIRST ISSUE	MPG	TL	MDI
Rev.	Date	Description	Drawn	Checked	Approved

FOR CONSTRUCTION

TROY HOMES

MANOR CLOSE, ICKLEFORD

DRAINAGE GENERAL ARRANGEMENT

Structural

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Drawing No:

TH152_C_S_051

Revision:

C3

APPENDIX C

DRAINAGE CALCULATIONS

SOAKAWAYS AND PERMEABLE PAVING



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SD5	0.013	5.00	55.968	450	518147.274	231434.386	1.181
SOAKAWAY			55.912	1	518143.045	231432.406	1.212

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SD5	SOAKAWAY	4.670	0.600	54.787	54.700	0.087	53.7	100	5.07	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.054	8.3	3.5	1.081	1.112	0.013	0.0	46	1.013

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	4.670	53.7	100	Circular	55.968	54.787	1.081	55.912	54.700	1.112

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SD5	450	Manhole	Adoptable	SOAKAWAY	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SD5	518147.274	231434.386	55.968	1.181	450		0	1.000	54.787	100
SOAKAWAY	518143.045	231432.406	55.912	1.212	1		1	1.000	54.700	100

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 54.700

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.03402 | Safety Factor 3.0 | Invert Level (m) 54.700
Side Inf Coefficient (m/hr) 0.03402 | Porosity 0.95 | Time to half empty (mins) 825

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	28.0	28.0	0.400	28.0	36.8	0.401	0.0	36.8

Results for 1 year 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
15 minute summer	SD5	9	54.820	0.033	1.3	0.0125	0.0000	OK
240 minute summer	SOAKAWAY	220	54.754	0.054	0.5	1.4482	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SD5	1.000	SOAKAWAY	1.3	1.114	0.158	0.0060	
240 minute summer	SOAKAWAY	Head/Flow		0.0				0.0
240 minute summer	SOAKAWAY	Infiltration		0.1				

Results for 30 year 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
240 minute summer	SD5	228	54.885	0.098	1.6	0.0373	0.0000	OK
240 minute summer	SOAKAWAY	228	54.885	0.185	1.6	4.9291	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)
240 minute summer	SD5	1.000	SOAKAWAY	1.6	0.684	0.193	0.0365	
240 minute summer	SOAKAWAY	Head/Flow		0.0				0.0
240 minute summer	SOAKAWAY	Infiltration		0.1				

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

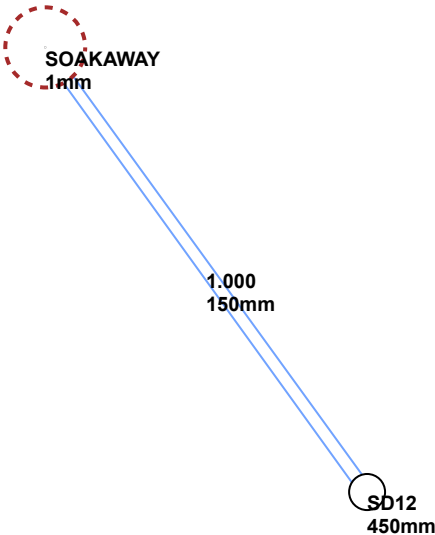
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	SD5	344	54.938	0.151	0.9	0.0572	0.0000	SURCHARGED
360 minute winter	SOAKAWAY	344	54.938	0.238	0.9	6.3282	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	SD5	1.000	SOAKAWAY	0.9	0.661	0.108	0.0365	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.1				

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
600 minute winter	SD5	570	55.064	0.277	0.9	0.1048	0.0000	SURCHARGED
600 minute winter	SOAKAWAY	570	55.064	0.364	0.9	9.6725	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)
600 minute winter	SD5	1.000	SOAKAWAY	0.9	0.587	0.105	0.0365	
600 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
600 minute winter	SOAKAWAY	Infiltration		0.1				



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SD12	0.055	5.00	55.057	450	518162.304	231401.962	1.207
SOAKAWAY			55.379	1	518158.275	231407.507	1.579

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SD12	SOAKAWAY	6.854	0.600	53.850	53.800	0.050	137.1	150	5.13	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.856	15.1	14.9	1.057	1.429	0.055	0.0	122	0.974

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	6.854	137.1	150	Circular	55.057	53.850	1.057	55.379	53.800	1.429

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SD12	450	Manhole	Adoptable	SOAKAWAY	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SD12	518162.304	231401.962	55.057	1.207	450		0	1.000	53.850	150
SOAKAWAY	518158.275	231407.507	55.379	1.579	1		1	1.000	53.800	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	2880	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 53.800

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.03402 | Safety Factor 3.0 | Invert Level (m) 53.800
Side Inf Coefficient (m/hr) 0.03402 | Porosity 0.95 | Time to half empty (mins) 1440

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	59.5	59.5	0.800	59.5	95.5	0.801	0.0	95.5

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SD12	9	53.923	0.073	5.4	0.0784	0.0000	OK
480 minute winter	SOAKAWAY	360	53.922	0.122	0.9	6.8852	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SD12	1.000	SOAKAWAY	5.5	1.246	0.361	0.0322	
480 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
480 minute winter	SOAKAWAY	Infiltration		0.2				

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	SD12	352	54.214	0.364	3.2	0.3896	0.0000	SURCHARGED
360 minute winter	SOAKAWAY	352	54.214	0.414	3.1	23.4056	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)
360 minute winter	SD12	1.000	SOAKAWAY	3.1	0.657	0.208	0.1207	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.2				

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SD12	472	54.331	0.481	3.1	0.5144	0.0000	SURCHARGED
480 minute winter	SOAKAWAY	472	54.331	0.531	3.0	29.9978	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)
480 minute winter	SD12	1.000	SOAKAWAY	3.0	0.613	0.201	0.1207	
480 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
480 minute winter	SOAKAWAY	Infiltration		0.3				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	SD12	705	54.598	0.748	3.2	0.8007	0.0000	SURCHARGED
720 minute winter	SOAKAWAY	705	54.598	0.798	3.1	45.1255	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)
720 minute winter	SD12	1.000	SOAKAWAY	3.1	0.577	0.208	0.1207	
720 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
720 minute winter	SOAKAWAY	Infiltration		0.3				

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SD12	0.055	5.00	55.057	450	518162.304	231401.962	1.207
SOAKAWAY			55.379	1	518158.275	231407.507	1.579

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SD12	SOAKAWAY	6.854	0.600	53.850	53.800	0.050	137.1	150	5.13	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.856	15.1	14.9	1.057	1.429	0.055	0.0	122	0.974

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	6.854	137.1	150	Circular	55.057	53.850	1.057	55.379	53.800	1.429

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SD12	450	Manhole	Adoptable	SOAKAWAY	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SD12	518162.304	231401.962	55.057	1.207	450		0	1.000	53.850	150
SOAKAWAY	518158.275	231407.507	55.379	1.579	1		1	1.000	53.800	150

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	✓
Rainfall Events	Consecutive	Drain Down Time (mins)	2880
Summer CV	1.000	Additional Storage (m³/ha)	20.0
Additional Area (A %)	0	Starting Level (m)	
Additional Flow (Q %)	0	Check Discharge Rate(s)	x
Analysis Speed	Detailed	Check Discharge Volume	x

Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)	Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)
0	1440	100	45	1440	1440	100	0

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 53.800

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Depth/Area Storage Structure

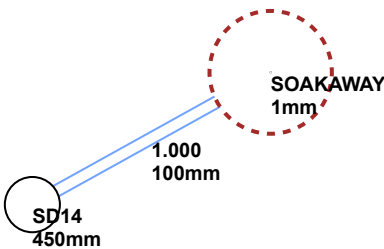
Base Inf Coefficient (m/hr) 0.03402 | Safety Factor 3.0 | Invert Level (m) 53.800
Side Inf Coefficient (m/hr) 0.03402 | Porosity 0.95 | Time to half empty (mins) 1440

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	59.5	59.5	0.800	59.5	95.5	0.801	0.0	95.5

Results for Consecutive Rainfall Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440-1440	SD12	1140	54.526	0.676	2.6	0.7229	0.0000	SURCHARGED
1440-1440	SOAKAWAY	1140	54.526	0.726	2.6	41.0159	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)
1440-1440	SD12	1.000	SOAKAWAY	2.6	0.431	0.169	0.1207	
1440-1440	SOAKAWAY	Head/Flow		0.0				0.0
1440-1440	SOAKAWAY	Infiltration		0.3				



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SD14	0.016	5.00	54.853	450	518194.186	231406.492	1.003
SOAKAWAY			54.720	1	518196.134	231407.569	1.020

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SD14	SOAKAWAY	2.226	0.600	53.850	53.700	0.150	14.8	100	5.02	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.015	15.8	4.3	0.903	0.920	0.016	0.0	36	1.714

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	2.226	14.8	100	Circular	54.853	53.850	0.903	54.720	53.700	0.920

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SD14	450	Manhole	Adoptable	SOAKAWAY	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SD14	518194.186	231406.492	54.853	1.003	450		0	1.000	53.850	100
SOAKAWAY	518196.134	231407.569	54.720	1.020	1		1	1.000	53.700	100

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 53.700

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.03402 | Safety Factor 3.0 | Invert Level (m) 53.700
Side Inf Coefficient (m/hr) 0.03402 | Porosity 0.95 | Time to half empty (mins) 856

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	31.5	31.5	0.400	31.5	41.5	0.401	0.0	41.5

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SD14	9	53.877	0.027	1.6	0.0130	0.0000	OK
360 minute winter	SOAKAWAY	336	53.760	0.060	0.3	1.8037	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SD14	1.000	SOAKAWAY	1.6	1.639	0.102	0.0024	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.1				

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	SD14	344	53.911	0.061	0.9	0.0290	0.0000	OK
360 minute winter	SOAKAWAY	344	53.911	0.211	0.9	6.3025	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)
360 minute winter	SD14	1.000	SOAKAWAY	0.9	1.018	0.057	0.0142	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.1				

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SD14	448	53.972	0.122	1.0	0.0583	0.0000	SURCHARGED
480 minute winter	SOAKAWAY	448	53.972	0.272	1.9	8.1368	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)
480 minute winter	SD14	1.000	SOAKAWAY	1.9	1.018	0.122	0.0174	
480 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
480 minute winter	SOAKAWAY	Infiltration		0.1				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SD14	472	54.134	0.284	1.3	0.1356	0.0000	SURCHARGED
480 minute winter	SOAKAWAY	472	54.134	0.434	2.9	11.9850	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)
480 minute winter	SD14	1.000	SOAKAWAY	2.9	1.018	0.183	0.0174	
480 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
480 minute winter	SOAKAWAY	Infiltration		0.1				



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S07	0.068	5.00	55.204	450	518184.432	231438.478	1.454
SOAKAWAY			56.000	1	518183.381	231447.561	2.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S07	SOAKAWAY	9.144	0.600	53.750	53.700	0.050	182.9	225	5.16	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.963	38.3	18.4	1.229	2.075	0.068	0.0	110	0.956

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	9.144	182.9	225	Circular	55.204	53.750	1.229	56.000	53.700	2.075

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S07	450	Manhole	Adoptable	SOAKAWAY	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S07	518184.432	231438.478	55.204	1.454	450				
						0	1.000	53.750	225
SOAKAWAY	518183.381	231447.561	56.000	2.300	1		1	1.000	53.700
									225

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 53.700

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03402	Safety Factor	3.0	Invert Level (m)	53.700
Side Inf Coefficient (m/hr)	0.03402	Porosity	0.95	Time to half empty (mins)	936

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	133.0	133.0	0.400	133.0	151.8	0.401	0.0	151.8

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S07	8	53.903	0.153	6.3	0.1669	0.0000	OK
480 minute summer	SOAKAWAY	320	53.761	0.061	1.7	7.7192	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S07	1.000	SOAKAWAY	8.3	1.199	0.216	0.1316	
480 minute summer	SOAKAWAY	Head/Flow		0.0				0.0
480 minute summer	SOAKAWAY	Infiltration		0.4				

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S07	6	53.972	0.222	28.6	0.2427	0.0000	OK
360 minute summer	SOAKAWAY	360	53.912	0.212	6.1	26.7560	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S07	1.000	SOAKAWAY	28.6	1.731	0.747	0.1832	
360 minute summer	SOAKAWAY	Head/Flow		0.0				0.0
360 minute summer	SOAKAWAY	Infiltration		0.4				

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.84%

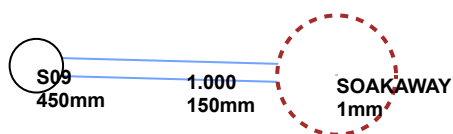
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S07	5	53.997	0.247	36.1	0.2701	0.0000	SURCHARGED
360 minute winter	SOAKAWAY	352	53.972	0.272	4.9	34.3400	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S07	1.000	SOAKAWAY	36.0	1.808	0.941	0.1940	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.5				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	S07	472	55.131	1.381	5.6	1.5111	0.0000	FLOOD RISK
480 minute winter	SOAKAWAY	472	55.131	1.431	5.5	50.6032	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)
480 minute winter	S07	1.000	SOAKAWAY	5.5	0.654	0.144	0.3637	
480 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
480 minute winter	SOAKAWAY	Infiltration		0.5				



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S09	0.005	5.00	56.306	450	518127.645	231458.849	1.206
SOAKAWAY			56.300	1	518130.173	231458.771	1.350

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S09	SOAKAWAY	2.529	0.600	55.100	54.950	0.150	16.9	150	5.02	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.465	43.6	1.4	1.056	1.200	0.005	0.0	18	1.104

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	2.529	16.9	150	Circular	56.306	55.100	1.056	56.300	54.950	1.200

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S09	450	Manhole	Adoptable	SOAKAWAY	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S09	518127.645	231458.849	56.306	1.206	450				
						0	1.000	55.100	150
SOAKAWAY	518130.173	231458.771	56.300	1.350	1		1	1.000	54.950
						1			

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 54.950

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.03402 | Safety Factor 2.0 | Invert Level (m) 54.950
Side Inf Coefficient (m/hr) 0.03402 | Porosity 0.95 | Time to half empty (mins) 552

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	7.0	7.0	0.400	7.0	11.4	0.401	0.0	11.4

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S09	9	55.112	0.012	0.5	0.0029	0.0000	OK
480 minute winter	SOAKAWAY	312	55.033	0.083	0.1	0.5538	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S09	1.000	SOAKAWAY	0.5	0.946	0.012	0.0032	
480 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
480 minute winter	SOAKAWAY	Infiltration		0.0				

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S09	336	55.247	0.147	0.3	0.0356	0.0000	OK
360 minute winter	SOAKAWAY	336	55.247	0.297	0.3	1.9761	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)
360 minute winter	S09	1.000	SOAKAWAY	0.3	0.694	0.007	0.0444	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.0				

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

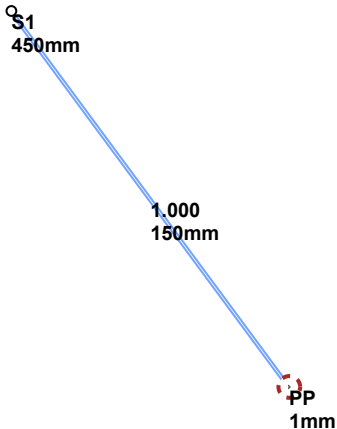
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	S09	344	55.313	0.213	0.6	0.0516	0.0000	SURCHARGED
360 minute summer	SOAKAWAY	344	55.313	0.363	0.5	2.4167	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	S09	1.000	SOAKAWAY	0.5	0.694	0.012	0.0445	
360 minute summer	SOAKAWAY	Head/Flow		0.0				0.0
360 minute summer	SOAKAWAY	Infiltration		0.1				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	S09	480	55.786	0.686	0.6	0.1661	0.0000	SURCHARGED
480 minute summer	SOAKAWAY	480	55.786	0.836	0.5	2.6633	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)
480 minute summer	S09	1.000	SOAKAWAY	0.5	0.463	0.012	0.0445	
480 minute summer	SOAKAWAY	Head/Flow		0.0				0.0
480 minute summer	SOAKAWAY	Infiltration		0.1				



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.033	5.00	55.524	450	518168.067	231446.804	0.674
PP			55.000	1	518180.879	231429.539	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	PP	21.499	0.600	54.850	54.500	0.350	61.4	150	5.28	75.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.285	22.7	8.9	0.524	0.350	0.033	0.0	65	1.209

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	21.499	61.4	150	Circular	55.524	54.850	0.524	55.000	54.500	0.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	450	Manhole	Adoptable	PP	1	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	518168.067	231446.804	55.524	0.674	450		0	1.000	54.850	150
PP	518180.879	231429.539	55.000	0.500	1		1	1.000	54.500	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m ³ /ha)	20.0		

Storm Durations

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

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

Node PP Online Depth/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 54.500

Depth (m) 0.001
Flow (l/s) 0.000

Node PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.03402	Invert Level (m)	54.500	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	176	Depth (m)	0.300
Safety Factor	3.0	Width (m)	18.000	Inf Depth (m)	
Porosity	0.30	Length (m)	18.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	54.888	0.038	3.3	0.0438	0.0000	OK
240 minute summer	PP	152	54.586	0.086	1.3	1.9997	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	PP	3.3	0.886	0.144	0.0979	
240 minute summer	PP	Depth/Flow		0.0				0.0
240 minute summer	PP	Infiltration		0.5				

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	54.941	0.091	14.8	0.1035	0.0000	OK
120 minute summer	PP	92	54.675	0.175	6.4	8.3000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	PP	14.7	1.306	0.649	0.2686	
120 minute summer	PP	Depth/Flow		0.0				0.0
120 minute summer	PP	Infiltration		1.0				

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	54.959	0.109	18.7	0.1238	0.0000	OK
180 minute summer	PP	132	54.703	0.203	6.0	10.9910	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	PP	18.6	1.386	0.818	0.3134	
180 minute summer	PP	Depth/Flow		0.0				0.0
180 minute summer	PP	Infiltration		1.0				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	11	55.171	0.321	27.1	0.3648	0.0000	SURCHARGED
180 minute summer	PP	152	54.770	0.270	8.6	17.5514	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	PP	25.5	1.466	1.125	0.3785	
180 minute summer	PP	Depth/Flow		0.0				0.0
180 minute summer	PP	Infiltration		1.0				