

AutoDrainage

Welcome to AutoDrainage!

1. What's in the App!

The AutoDrainage app is a powerful tool designed to support engineers, consultants, small firms, and developers in designing stormwater and foul drainage systems efficiently and in line with UK water industry standards and best practices.

Automatic Colebrook-White Roughness Values (k_s):

When the design phase is selected, the app automatically assigns internal pipe roughness as:

- 0.6 mm for stormwater
- 1.5 mm for foul water

These values reflect UK industry best practice but can be manually overridden if required.

Design Flexibility:

Users can define their design approach by either:

- Selecting predefined pipe diameters, or
- Allowing the app to automatically calculate pipe diameters based on input flow and velocity.

Flow Condition Options:

Users can choose whether pipes should operate under:

- Partially full (not surcharged) conditions, or
- Fully flowing (surcharged) conditions.

This option is available via the Design Flow Condition dropdown under the Network Design Criteria section.

Network Auto-Generation:

When users enter the total number of pipes, the app:

- Automatically creates all pipes and associated upstream manholes
- Connects each pipe to a downstream one to form a complete network

For example, if 3 pipes are defined:

- Pipe 1 connects to Pipe 2
- Pipe 2 connects to Pipe 3
- Pipe 3 connects to Outfall

The app also supports multiple Outfalls to create branched networks. Users may customise downstream connections to match their preferred numbering or layout.

2. Demo

2.1 Stormwater Network – Example

2.1.1 Plan View

Below is an example of a typical surface drainage scenario.

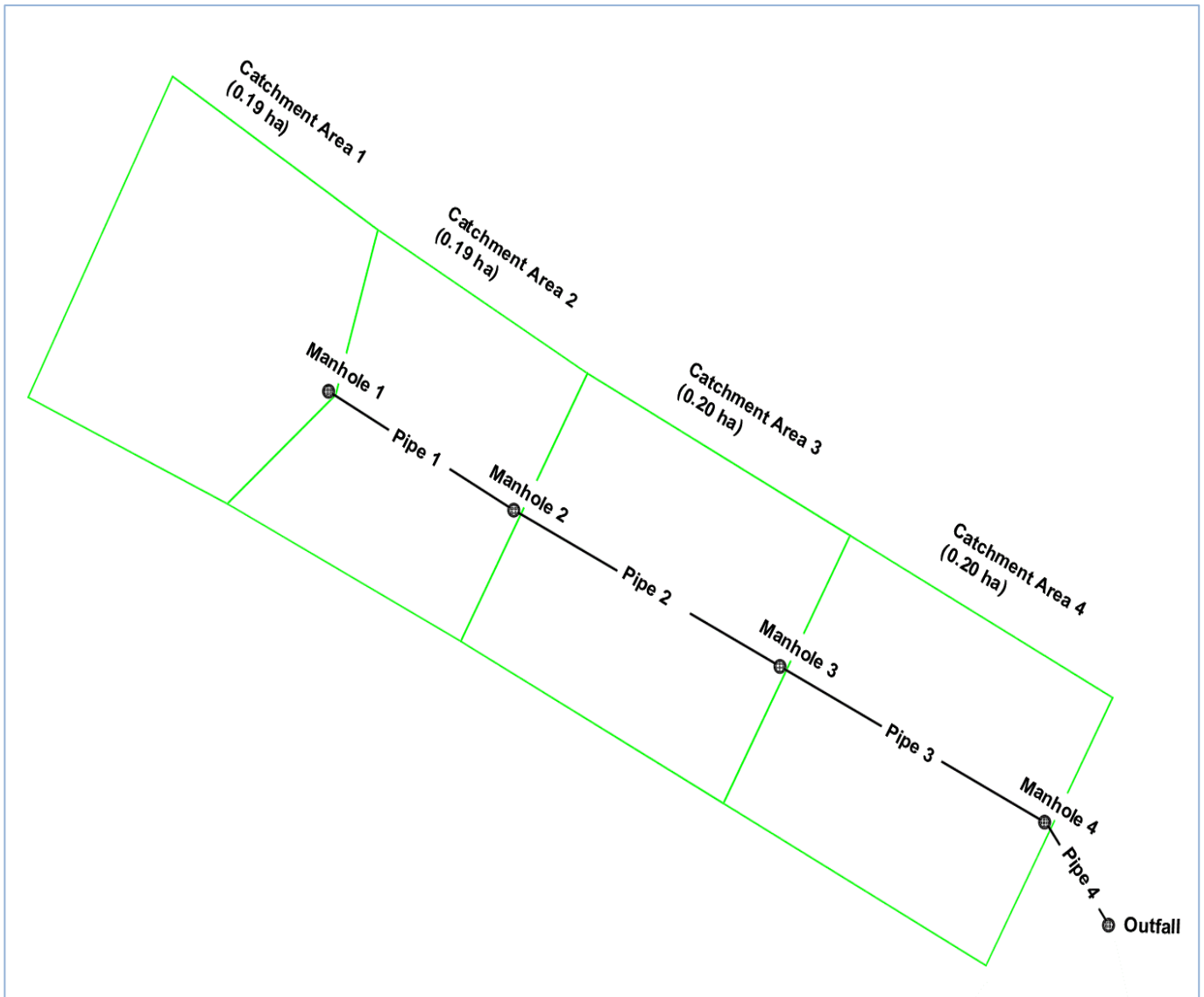


Fig. 2.1: Example of a typical surface drainage scenario.

2.1.2 Build the Network

- Set the Design Criteria:

The screenshot shows the 'AutoDrainage' app interface. At the top, the status bar displays the time '15:21' and battery level '52'. The app header includes a menu icon and the title 'AutoDrainage'. Below the header, a status bar indicates 'Pro plan • Pipes: 40 • Catchments: 80'. The main section is titled 'Build and Design Your Network'. A 'Design Criteria' dialog box is open, displaying the following settings:

- Select Phase: Storm Water
- Pipe Roughness k_s (mm): 0.6
- Kinematic Viscosity ν (m^2/s): 0.000001141
- Design Flow Condition: Partially Full Pipe
- Input Method Selection: Auto-Calculated Diameter

At the bottom of the dialog box are 'Cancel' and 'Save' buttons. The background app interface shows various input fields for pipe design, including 'Cover (m)' set to 0.9, 'Velocity (m/s)' set to 1.1, and 'Downstream Pipe' set to 'Pipe 3'.

- Populate the Pipe Design Parameters & Ground (Cover) levels:

15:21

52

AutoDrainage

Build and Design Your Network

Size Catchments

Network Design Criteria

Total Number of Pipes:

4

Apply

Pipe 1

Pipe Length (m)

32.0

Upstream G.L/C.L (m)

100

Cover (m)

0.9

Velocity (m/s)

0.95

Downstream Pipe

Pipe 2

Pipe 2

Pipe Length (m)

46.0

Upstream G.L/C.L (m)

99.875

Cover (m)

0.9

Velocity (m/s)

1.1

Downstream Pipe

Pipe 3

Pipe 3

Pipe Length (m)

45.0

Upstream G.L/C.L (m)

99.625

▪ Size the Catchments and Connect to Pipes:

15:21

5G

52

←

Size Catchments

Pro plan • up to 80 catchments

Peak Flow Calculations

Modified Rational Method

Number of Catchments:

4

Apply

Design Rainfall Intensity (mm/hr)

35

Climate Change Factor (%)

40

Catchment Area 1

Runoff Coeff. (Cv*CR)

0.95

Area (ha)

0.19

Percentage Paved (%)

100

Connect to

Pipe 1

▼

Catchment Area 2

Runoff Coeff. (Cv*CR)

0.95

Area (ha)

0.19

Percentage Paved (%)

100

Connect to

Pipe 2

▼

Catchment Area 3

Runoff Coeff. (Cv*CR)

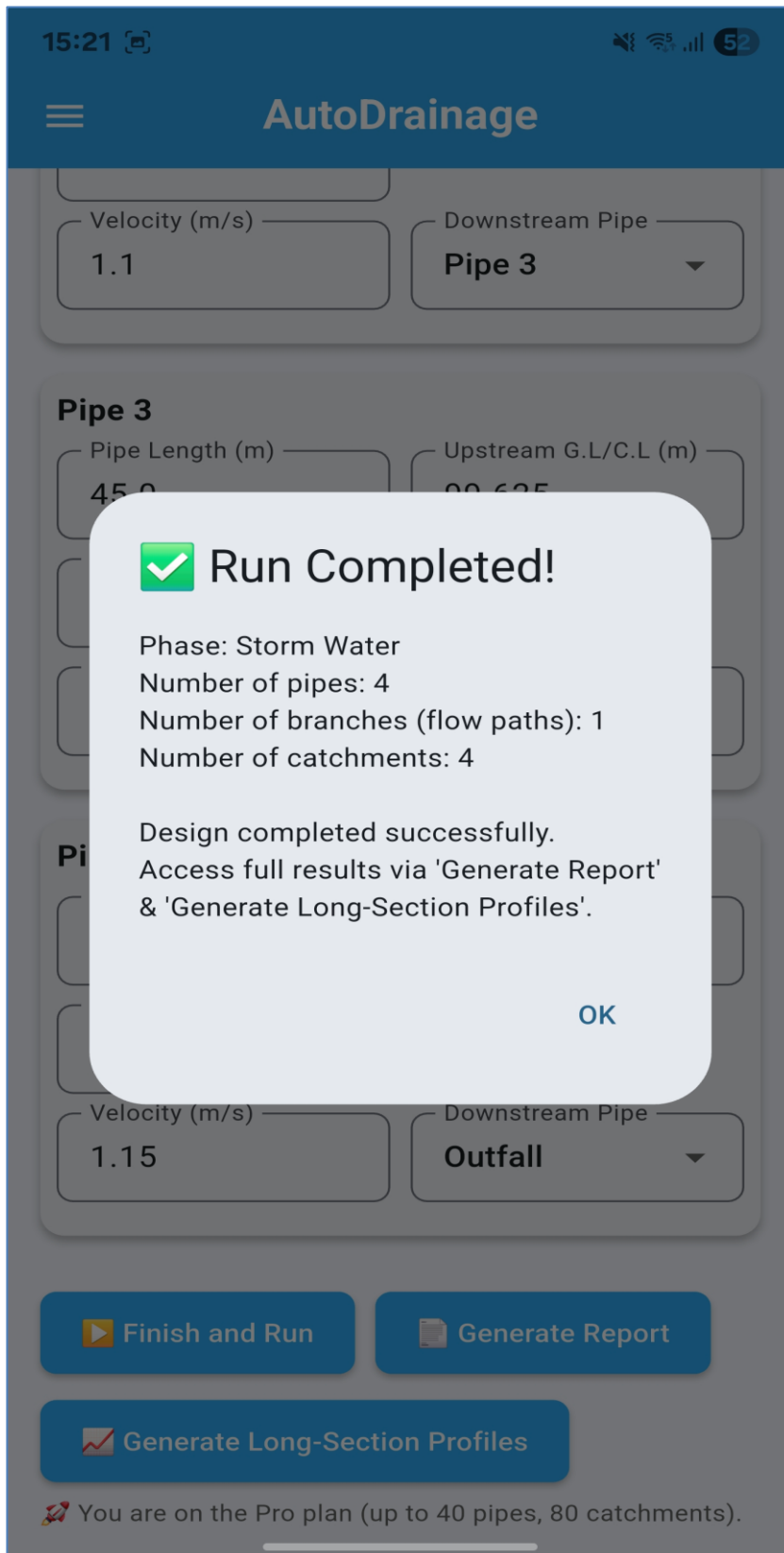
0.95

Area (ha)

0.20

2.1.3 View the Results:

- Hit Finish and Run Button:



- Hit Generate Report Button:

15:22

5G

51

←

AutoDrainage Results R...

AutoDrainage - Network Design Report

Design Criteria

Storm Water

Pipe internal roughness = 0.6 mm

Kinematic Viscosity = 1.141e-06 m²/s

Flow Condition: Partially Full Pipe

Input Method Selection: Auto-Calculated Diameter

Design Rainfall Intensity = 35.0 mm/hr, (typically for a 1:30 year)

Climate Change Factor = 40.0%

Results Summary Table: (Partially Full Pipes & Auto)

Pipe No.	Diameter (mm)	Flow (l/s)	Velocity (m/s)	Flow
Pipe 1	225	24.59	0.95	
Pipe 2	300	49.18	1.10	
Pipe 3	375	75.06	1.15	
Pipe 4	375	100.94	1.15	

*Minimum manhole sizes.

Network Connectivity Table: Network Branches (FI

Branch No.	Connectivity: (Upstream → Downstream)
1	(MH01) Pipe 1 → (MH02) Pipe 2 → (MH03) Pipe

*The Outfall is the downstream end of the network.

Catchment Connectivity Table: For Storm Water

Catchment No.	Connected to	Area (ha)	Description
1	Pipe 1	0.190	Runoff Co
2	Pipe 2	0.190	Runoff Co
3	Pipe 3	0.200	Runoff Co
4	Pipe 4	0.200	Runoff Co



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AutoDrainage - Network Design Report (Storm Water)

Design Criteria
Storm Water
Pipe internal roughness = 0.6 mm
Kinematic Viscosity = 1.141e-06 m²/s
Flow Condition: Partially Full Pipe
Input Method Selection: Auto-Calculated Diameter
Design Rainfall Intensity = 35.0 mm/hr, (typically for a 1.30 year return period storm event)
Climate Change Factor = 40.0%

Results Summary Table: (Partially Full Pipes & Auto-Calculated Diameter)

Pipe No.	Diameter (mm)	Flow (l/s)	Velocity (m/s)	Flow Depth (mm)	Slope 1%	Length (m)	U/S G.L. (m)	Cover (m)	U/S I.L. (m)	D/S I.L. (m)	D/S Pipe	Current Cover (m)	Cover Status	Manhole Size* (m)	Capacity (l/s)	Full-bore Velocity (m/s)
Pipe 1	225	24.59	0.95	139.43	218.6	32.00	100.000	0.90	98.730	98.604	Pipe 2	1.03	OK	1.200	34.94	0.88
Pipe 2	300	49.18	1.10	181.44	232.1	46.00	99.873	0.90	98.425	98.227	Pipe 3	1.15	OK	1.200	72.52	1.03
Pipe 3	375	75.09	1.15	214.98	271.4	45.00	99.625	0.90	98.200	98.034	Pipe 4	1.05	OK	1.850	120.75	1.09
Pipe 4	375	100.94	1.15	277.94	209.9	16.00	99.475	0.90	98.034	97.985	Outfall	1.07	OK	1.350	112.89	1.02

*Minimum manhole sizes.

Network Connectivity Table: Network Branches (Flow Paths)

Branch No.	Connectivity: (Upstream → Downstream)
1	(MH01) Pipe 1 → (MH02) Pipe 2 → (MH03) Pipe 3 → (MH04) Pipe 4 → Outfall*

*The Outfall is the downstream end of the network.

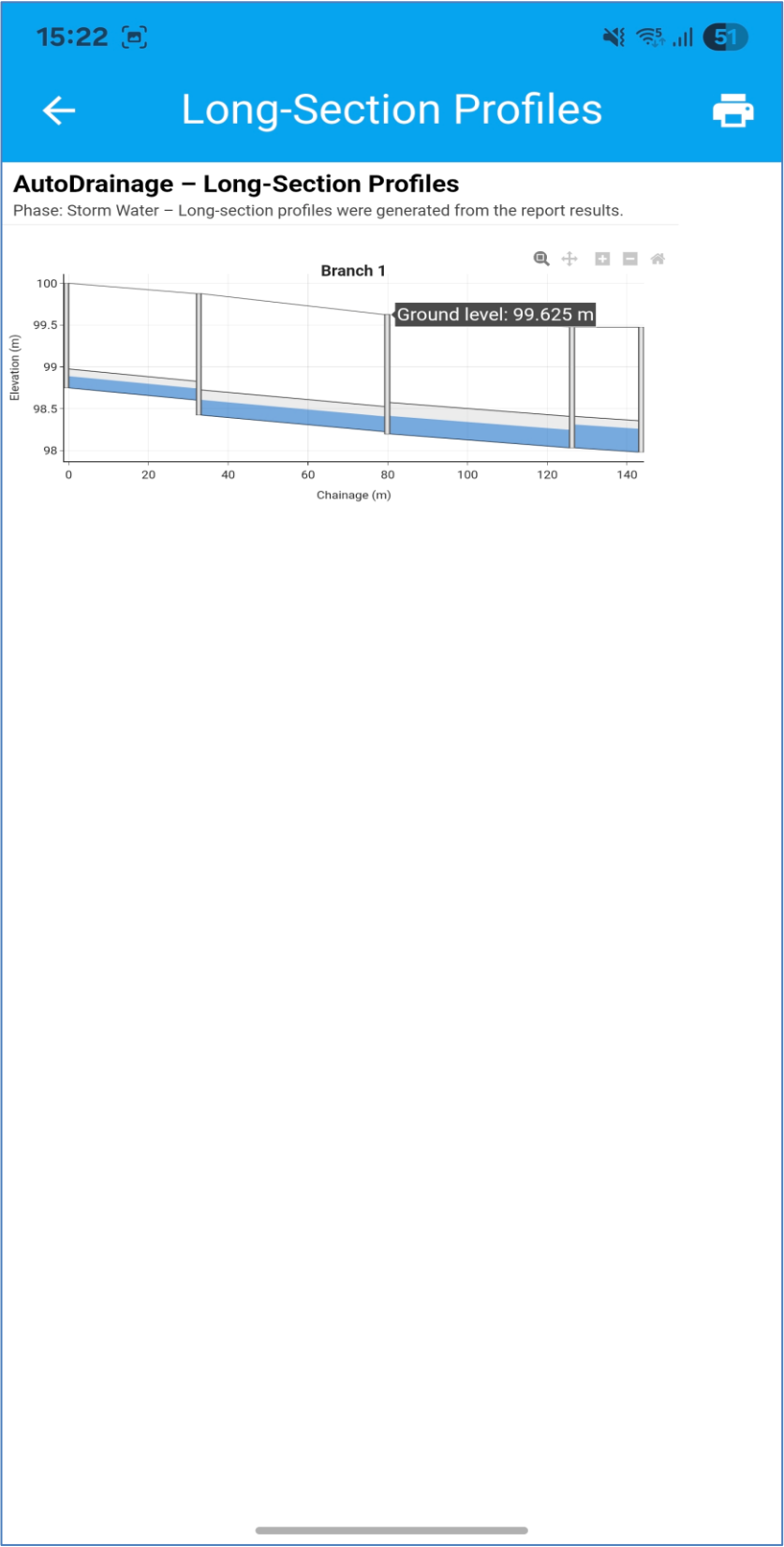
Catchment Connectivity Table: For Storm Water

Catchment No.	Connected to	Area (ha)	Description
1	Pipe 1	0.190	Runoff Coefficient: 0.95 (Paved: 100.0%)
2	Pipe 2	0.190	Runoff Coefficient: 0.95 (Paved: 100.0%)
3	Pipe 3	0.200	Runoff Coefficient: 0.95 (Paved: 100.0%)
4	Pipe 4	0.200	Runoff Coefficient: 0.95 (Paved: 100.0%)

Results should be reviewed and approved by a qualified engineer.
For optimal readability, print on A4 landscape.



- Hit Generate Long-Section Profiles Button:





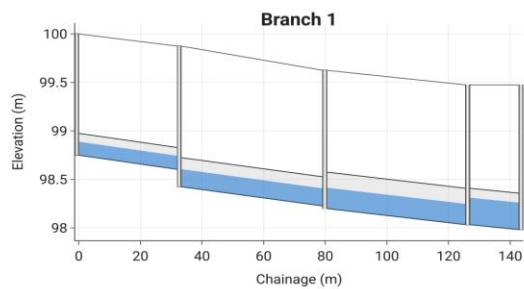
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**AutoDrainage – Long-Section Profiles**

Phase: Storm Water – Long-section profiles were generated from the report results.



2.2 Foul Network – Example

2.2.1 Plan View - Example

Below is an example of a typical foul drainage scenario.

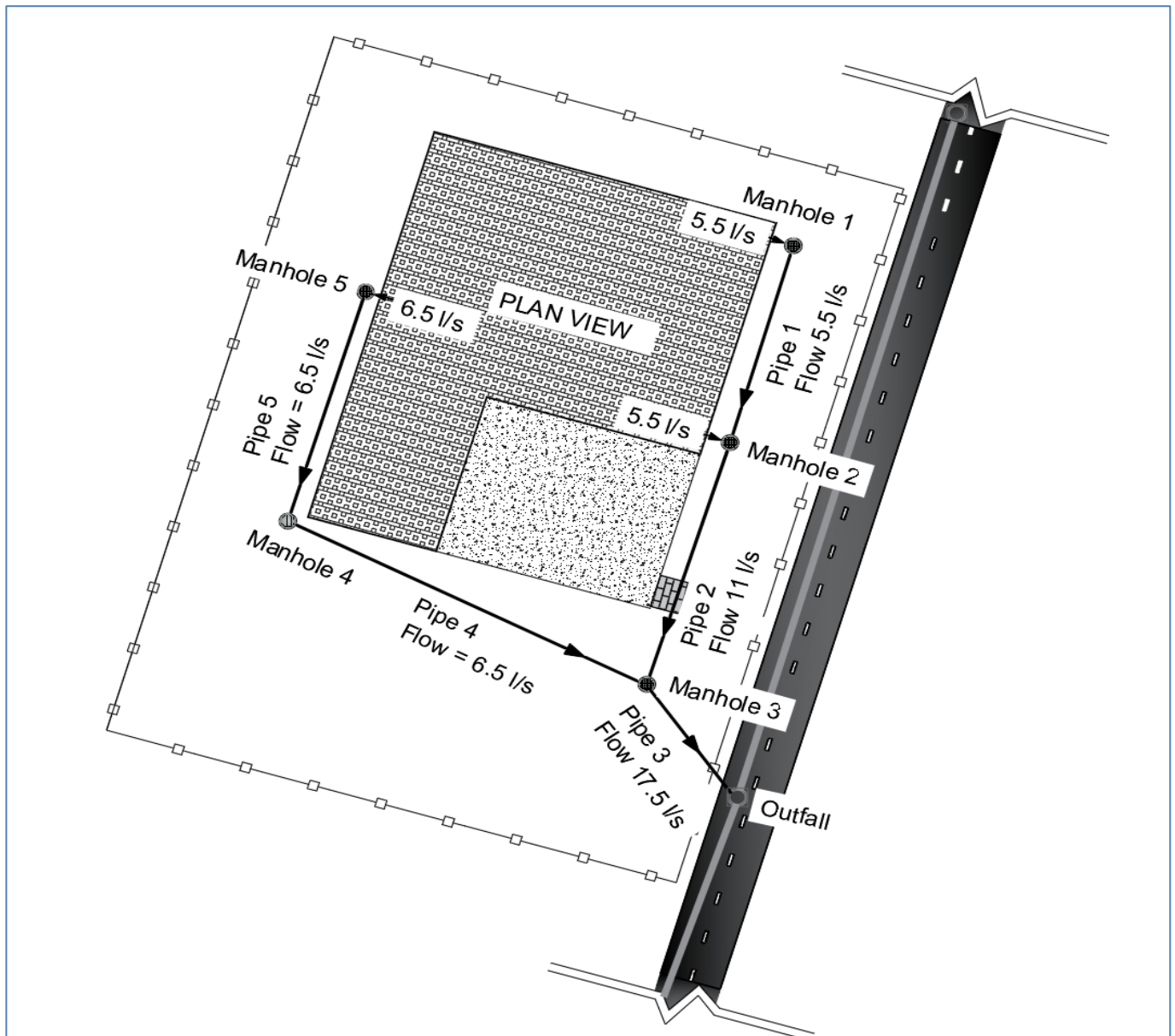


Fig. 2.2: Example of a typical foul drainage scenario.

2.2.2 Build the Network

- Set the Design Criteria:

The screenshot shows the AutoDrainage app interface. At the top, the status bar displays the time 16:36, signal strength, and battery level at 46%. The app's header is dark blue with a hamburger menu icon and the title "AutoDrainage". Below the header, a grey bar indicates the current plan: "Pro plan • Pipes: 40 • Catchments: 80". The main section is titled "Build and Design Your Network". A modal dialog box titled "Design Criteria" is open in the center. It contains five settings: "Select Phase" set to "Foul", "Pipe Roughness k_s (mm)" set to "1.5", "Kinematic Viscosity ν (m^2/s)" set to "0.000001141", "Design Flow Condition" set to "Partially Full Pipe", and "Input Method Selection" set to "Auto-Calculated Diameter". At the bottom of the dialog are "Cancel" and "Save" buttons. The background app interface is dimmed, showing various input fields for pipe parameters like "Cover (m)", "Flow (l/s)", "Velocity (m/s)", and "Downstream Pipe".

16:36 46

AutoDrainage

Pro plan • Pipes: 40 • Catchments: 80

Build and Design Your Network

Design Criteria

Select Phase
Foul

Pipe Roughness k_s (mm)
1.5

Kinematic Viscosity ν (m^2/s)
0.000001141

Design Flow Condition
Partially Full Pipe

Input Method Selection
Auto-Calculated Diameter

Cancel Save

Cover (m)
0.9

Flow (l/s)
11

Velocity (m/s)
0.85

Downstream Pipe
Pipe 3

- Populate the Pipe Design Parameters & Ground (Cover) levels:

16:36

46

AutoDrainage

Pro plan • Pipes: 40 • Catchments: 80

Build and Design Your Network

Size CatchmentsNetwork Design Criteria

Total Number of Pipes:5Apply

Pipe 1

Pipe Length (m)

24.0

Upstream G.L/C.L (m)

100

Cover (m)

0.9

Flow (l/s)

5.5

Velocity (m/s)

0.8

Downstream Pipe

Pipe 2

Pipe 2

Pipe Length (m)

29.0

Upstream G.L/C.L (m)

99.858

Cover (m)

0.9

Flow (l/s)

11

Velocity (m/s)

0.85

Downstream Pipe

Pipe 3



AutoDrainage

Pipe 3

Pipe Length (m)

15.0

Upstream G.L./C.L (m)

99.669

Cover (m)

0.9

Flow (l/s)

17.5

Velocity (m/s)

0.85

Downstream Pipe

Outfall



Pipe 4

Pipe Length (m)

43.0

Upstream G.L./C.L (m)

99.894

Cover (m)

0.9

Flow (l/s)

6.5

Velocity (m/s)

0.8

Downstream Pipe

Pipe 3



Pipe 5

Pipe Length (m)

28.0

Upstream G.L./C.L (m)

99.950

Cover (m)

0.9

Flow (l/s)

6.5

Velocity (m/s)

0.8

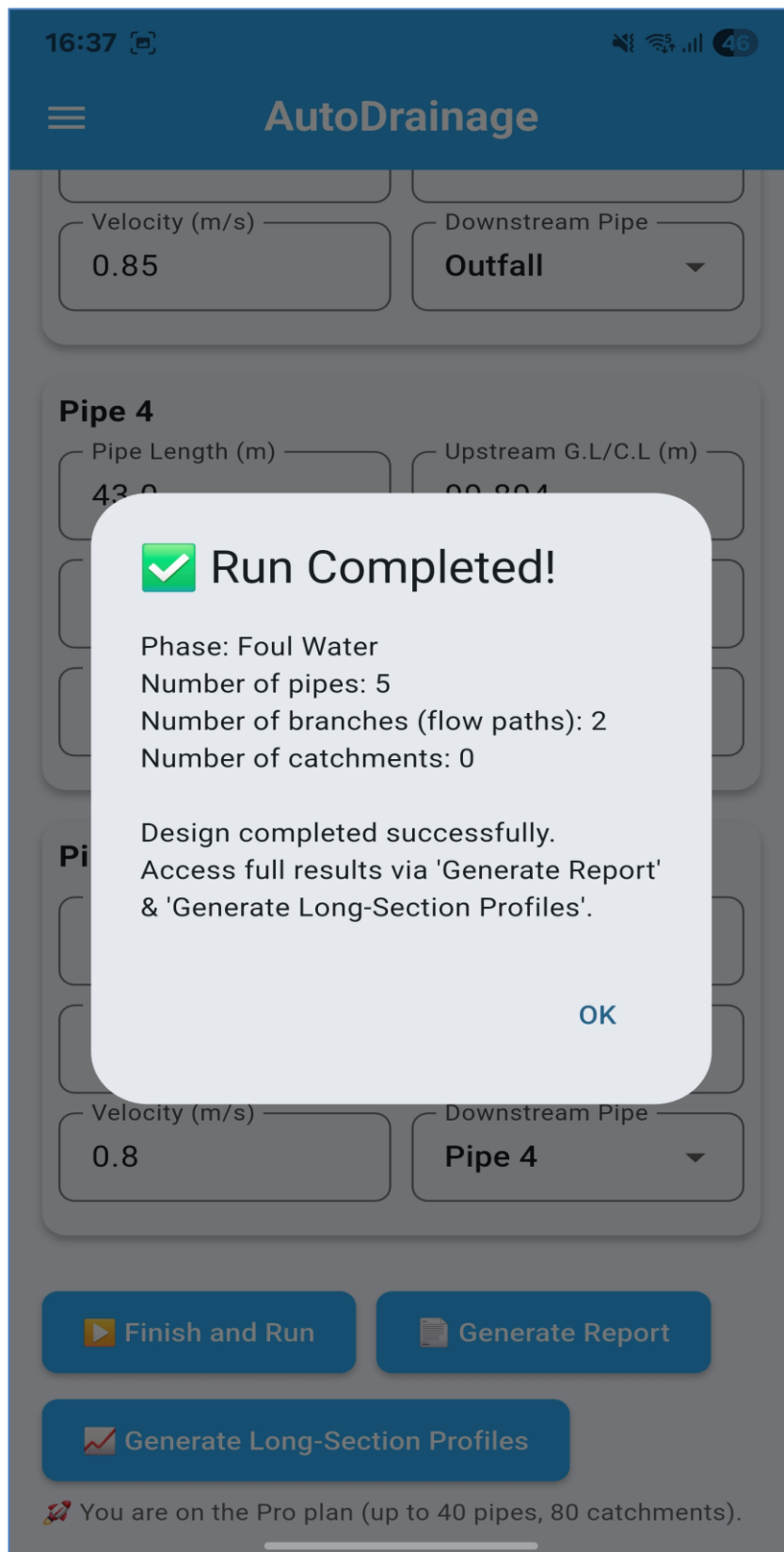
Downstream Pipe

Pipe 4



2.2.2 View the Results:

- Hit Finish and Run Button:



- Hit Generate Report Button:

16:37

5

46

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AutoDrainage Results R...

AutoDrainage - Network Design Report (Foul)

Design Criteria

Foul

Pipe internal roughness = 1.5 mm

Kinematic Viscosity = 1.141e-06 m²/s

Flow Condition: Partially Full Pipe

Input Method Selection: Auto-Calculated Diameter

Results Summary Table: (Partially Full Pipes & Auto-Calculated Diameter)

Pipe No.	Diameter (mm)	Flow (l/s)	Velocity (m/s)	Flow Depth (mm)	Slope 1:x	Length (m)
Pipe 1	150	5.50	0.80	61.86	100.1	24.00
Pipe 2	150	11.00	0.85	103.04	131.8	29.00
Pipe 3	225	17.50	0.85	115.65	185.7	15.00
Pipe 4	150	6.50	0.80	70.26	112.9	43.00
Pipe 5	150	6.50	0.80	70.26	112.9	28.00

*Minimum manhole sizes.

Network Connectivity Table: Network Branches (Flow Paths)

Branch No.	Connectivity: (Upstream → Downstream)
1	(MH01) Pipe 1 → (MH02) Pipe 2 → (MH03) Pipe 3 → Outfall*
2	(MH05) Pipe 5 → (MH04) Pipe 4 → (MH03) Pipe 3 → Outfall*

*The Outfall is the downstream end of the network.

Catchment Connectivity Table: For Storm Water

Catchment No.	Connected to	Area (ha)	Description
—	—	—	No catchments defined

Results should be reviewed and approved by a qualified engineer.

For optimal readability, print on A4 landscape.



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AutoDrainage - Network Design Report (Foul)

Design Criteria

Foul
Pipe internal roughness = 1.5 mm
Kinematic Viscosity = 1.141×10^{-6} m²/s
Flow Condition: Partially Full Pipe
Input Method Selection: Auto-Calculated Diameter

Results Summary Table: (Partially Full Pipes & Auto-Calculated Diameter)

Pipe No.	Diameter (mm)	Flow (l/s)	Velocity (m/s)	Flow Depth (mm)	Slope 1%	Length (m)	U/S G.L. (m)	Cover (m)	U/S I.L. (m)	D/S I.L. (m)	D/S Pipe	Current Cover (m)	Cover Status	Manhole Size (m)	Capacity (l/s)	Full-bore Velocity (m/s)
Pipe 1	150	5.50	0.80	61.86	100.1	24.00	100.000	0.90	98.808	98.568	Pipe 2	1.04	OK	1.200	15.46	0.87
Pipe 2	150	11.00	0.85	103.04	131.6	29.00	99.850	0.90	98.568	98.348	Pipe 3	1.14	OK	1.200	13.46	0.76
Pipe 3	225	17.50	0.85	115.65	185.7	15.00	99.605	0.90	98.215	98.134	Outfall	1.23	OK	1.200	33.41	0.84
Pipe 4	150	6.50	0.80	70.26	112.9	43.00	99.894	0.90	98.596	98.215	Pipe 3	1.15	OK	1.200	14.55	0.82
Pipe 5	150	6.50	0.80	70.26	112.9	28.00	99.990	0.90	98.844	98.596	Pipe 4	0.96	OK	1.200	14.55	0.82

*Minimum manhole sizes:

Network Connectivity Table: Network Branches (Flow Paths)

Branch No.	Connectivity: Upstream → Downstream
1	(MH01) Pipe 1 → (MH02) Pipe 2 → (MH03) Pipe 3 → Outfall*
2	(MH05) Pipe 5 → (MH04) Pipe 4 → (MH03) Pipe 3 → Outfall*

*The Outfall is the downstream end of the network.

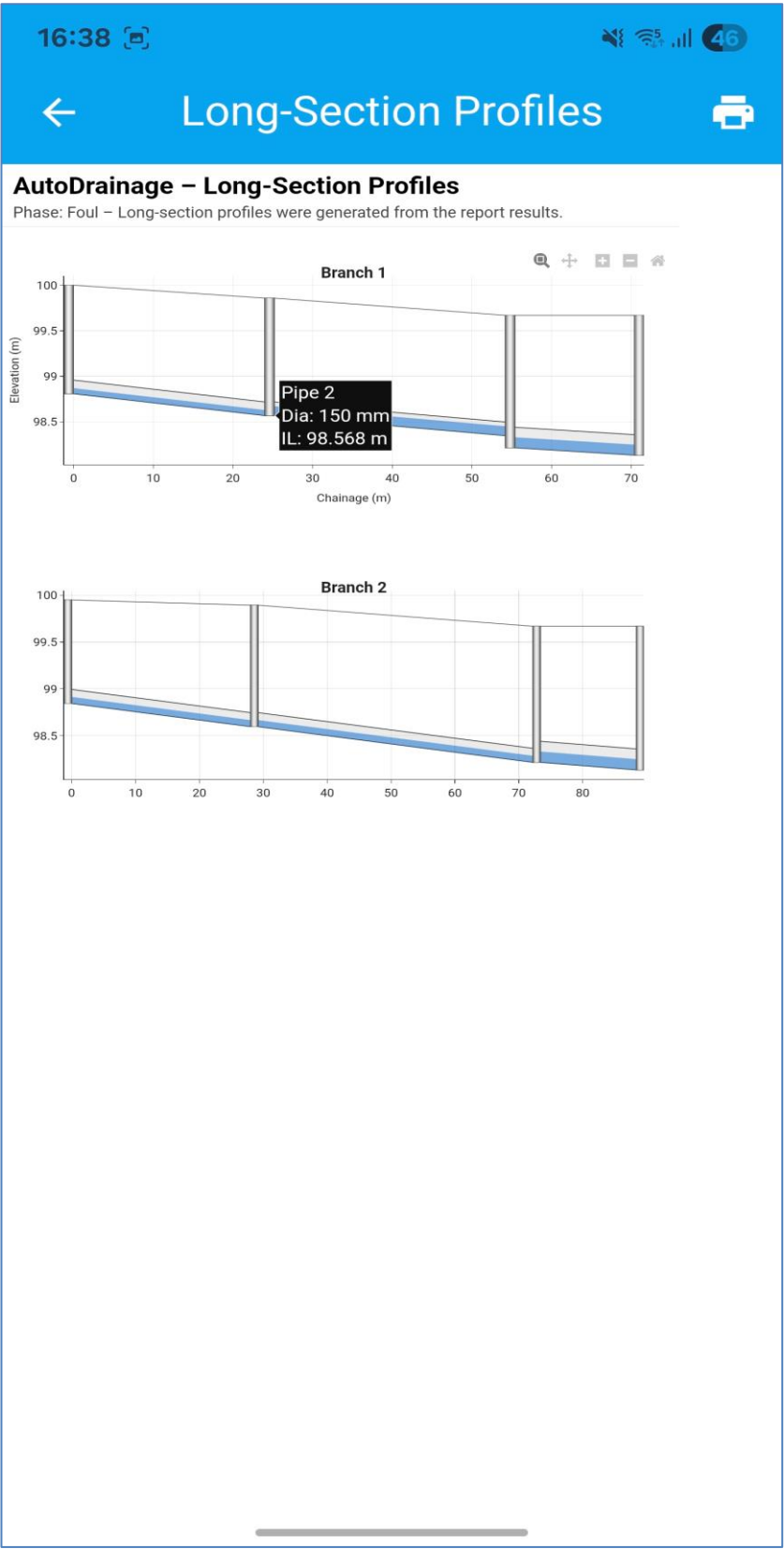
Catchment Connectivity Table: For Storm Water

Catchment No.	Connected to	Area (ha)	Description
1	1	0	No catchments defined

Results should be reviewed and approved by a qualified engineer.
For optimal readability, print on A4 landscape.



▪ Hit Generate Long-Section Profiles Button:



16:38

46



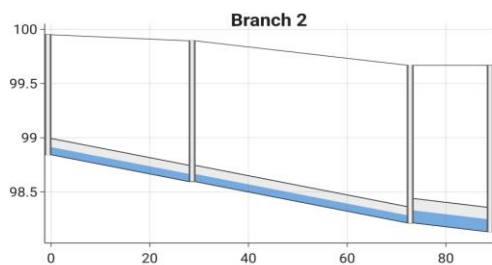
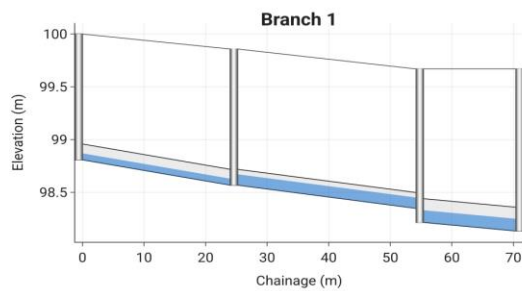
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AutoDrainage – Long-Section Profiles

Phase: Foul – Long-section profiles were generated from the report results.



1/1

