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

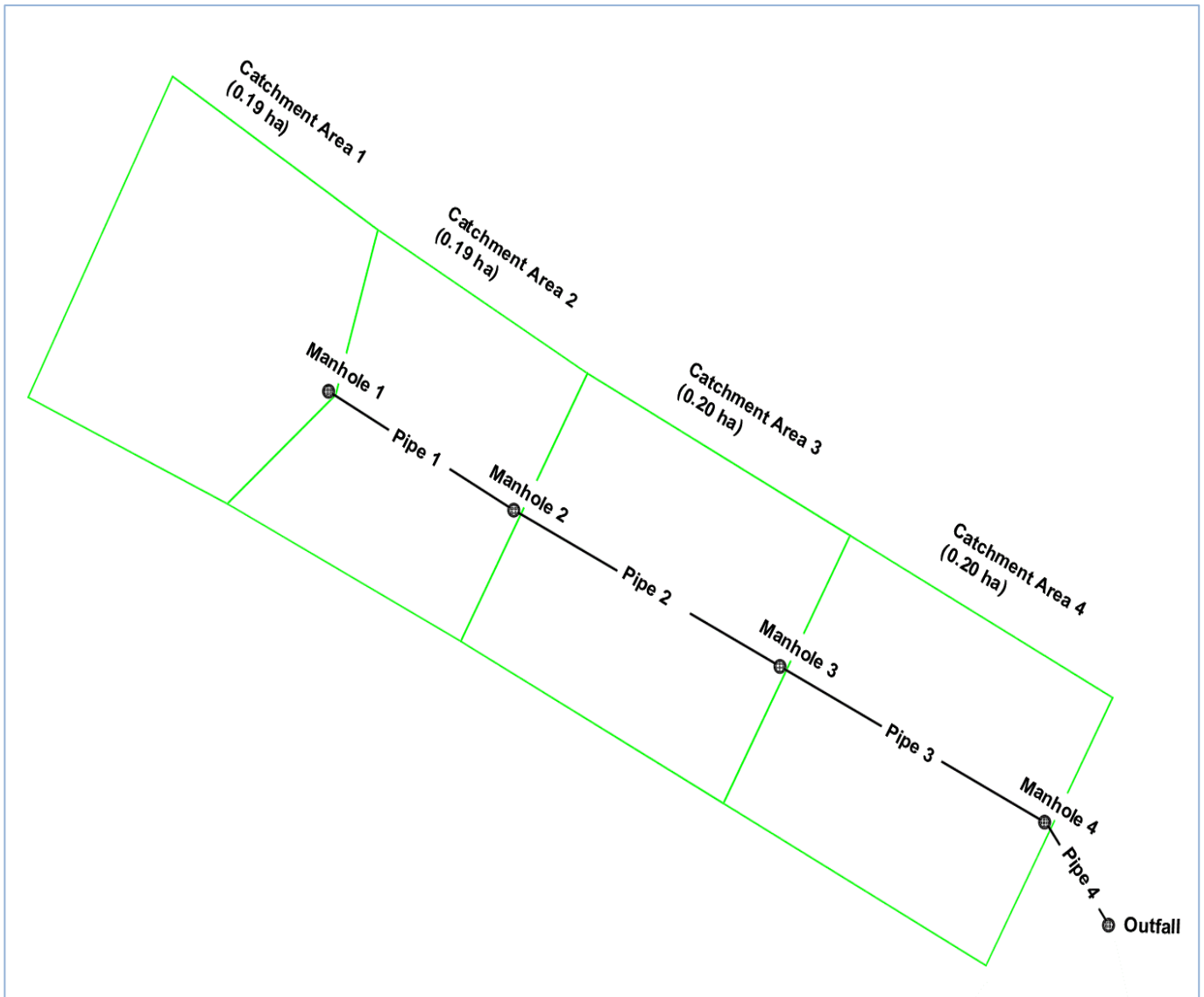Below is an example of a typical surface drainage scenario.

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

2.1.2 Build the Network

- **Set the Design Criteria:**

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

15:21

≡ **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

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
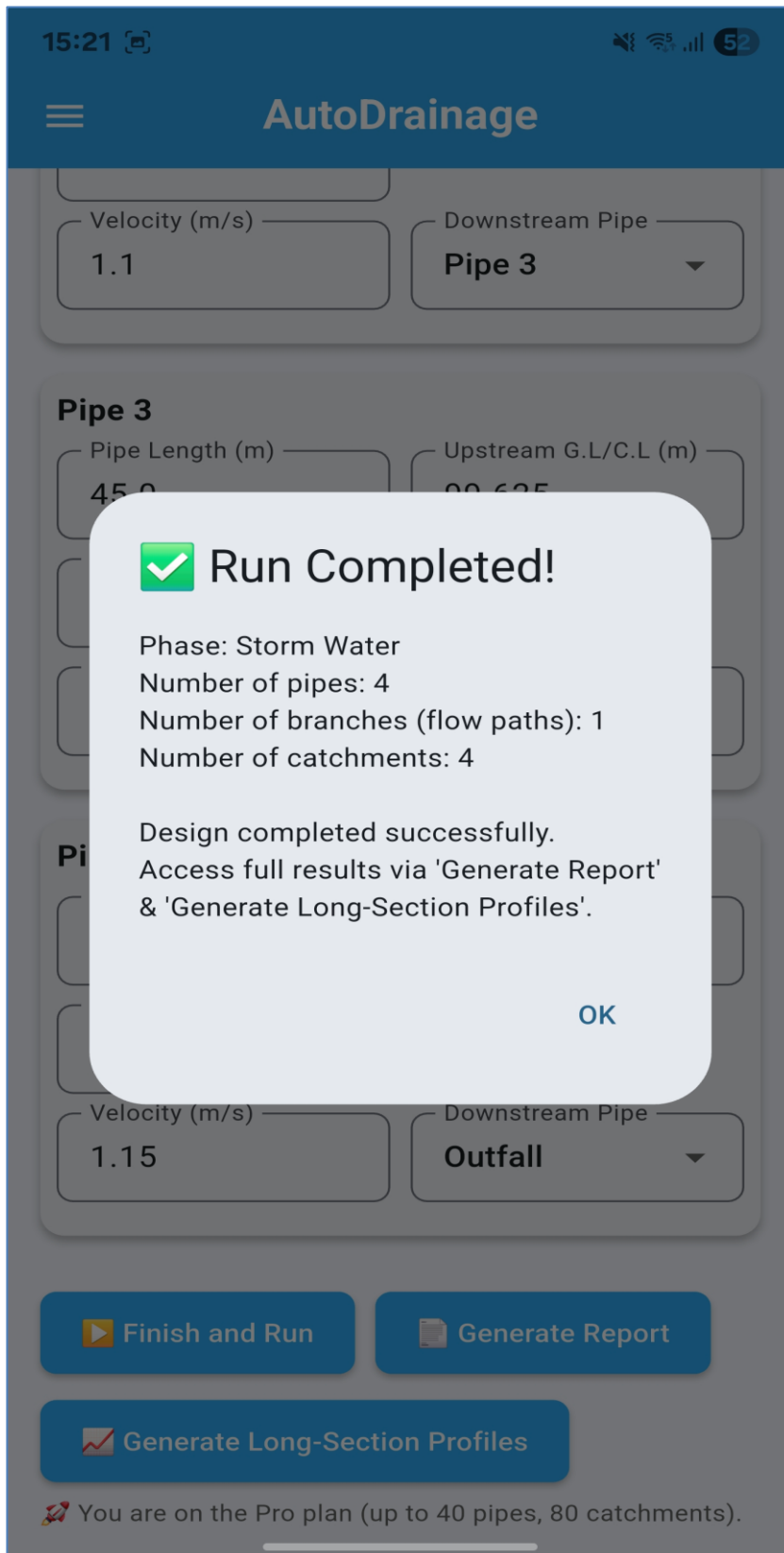
Catchment Area 3

Runoff Coeff. (Cv*CR)
0.95

Area (ha)
0.20

2.1.3 View the Results:

- **Hit Finish and Run Button:**

15:22

AutoDrainage Results R...

AutoDrainage - Network Design Repo

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 yea
Climate Change Factor = 40.0%

Results Summary Table: (Partially Full Pipes & Aut

Pipe No.	Diameter (mm)	Flow (l/s)	Velocity (m/s)	Flo
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 (Fl

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

The Outfall is the downstream end of the network.

Catchment Connectivity Table: For Storm Water

Catchment No.	Connected to	Area (ha)	Descriptio
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

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:x	Length (m)	U/S G.L (m)	Cover (m)	U/S IL (m)	D/S IL (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	98.750	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	99.875	0.90	98.425	98.227	Pipe 3	1.15	OK	1.200	72.52	1.03
Pipe 3	375	75.06	1.15	214.38	271.4	45.00	99.625	0.90	98.200	98.034	Pipe 4	1.05	OK	1.350	120.75	1.09
Pipe 4	375	100.94	1.15	277.94	309.9	16.00	99.475	0.90	98.034	97.983	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.

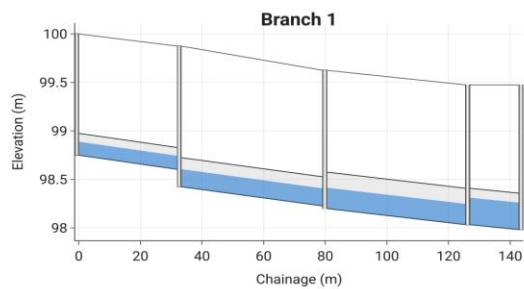- **Hit Generate Long-Section Profiles Button:**
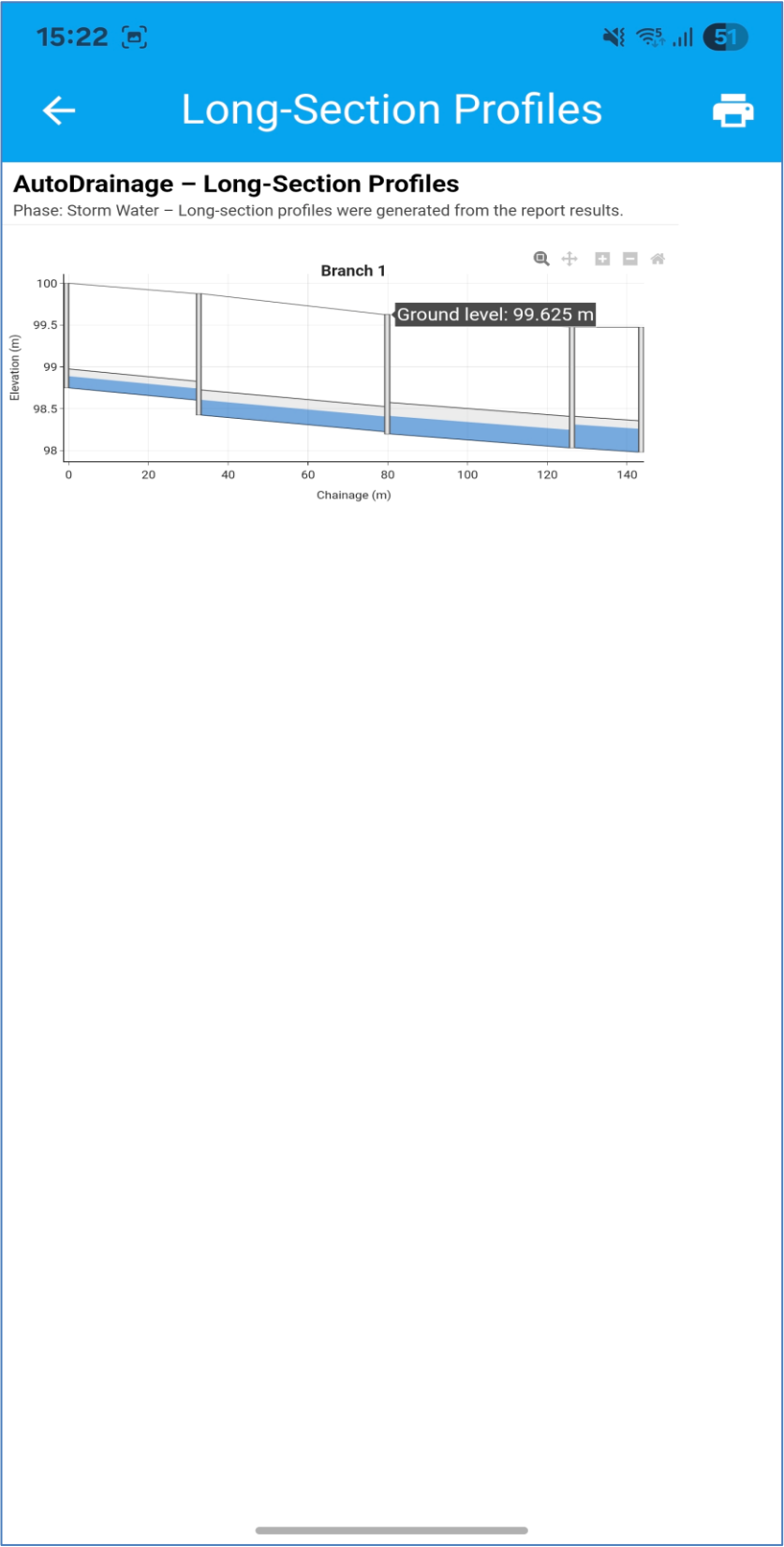
Long-Section Profiles

AutoDrainage – Long-Section Profiles

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

Branch 1

Ground level: 99.625 m

AutoDrainage – Long-Section Profiles

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

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2.2 Foul Network – Example

2.2.1 Plan View - Example
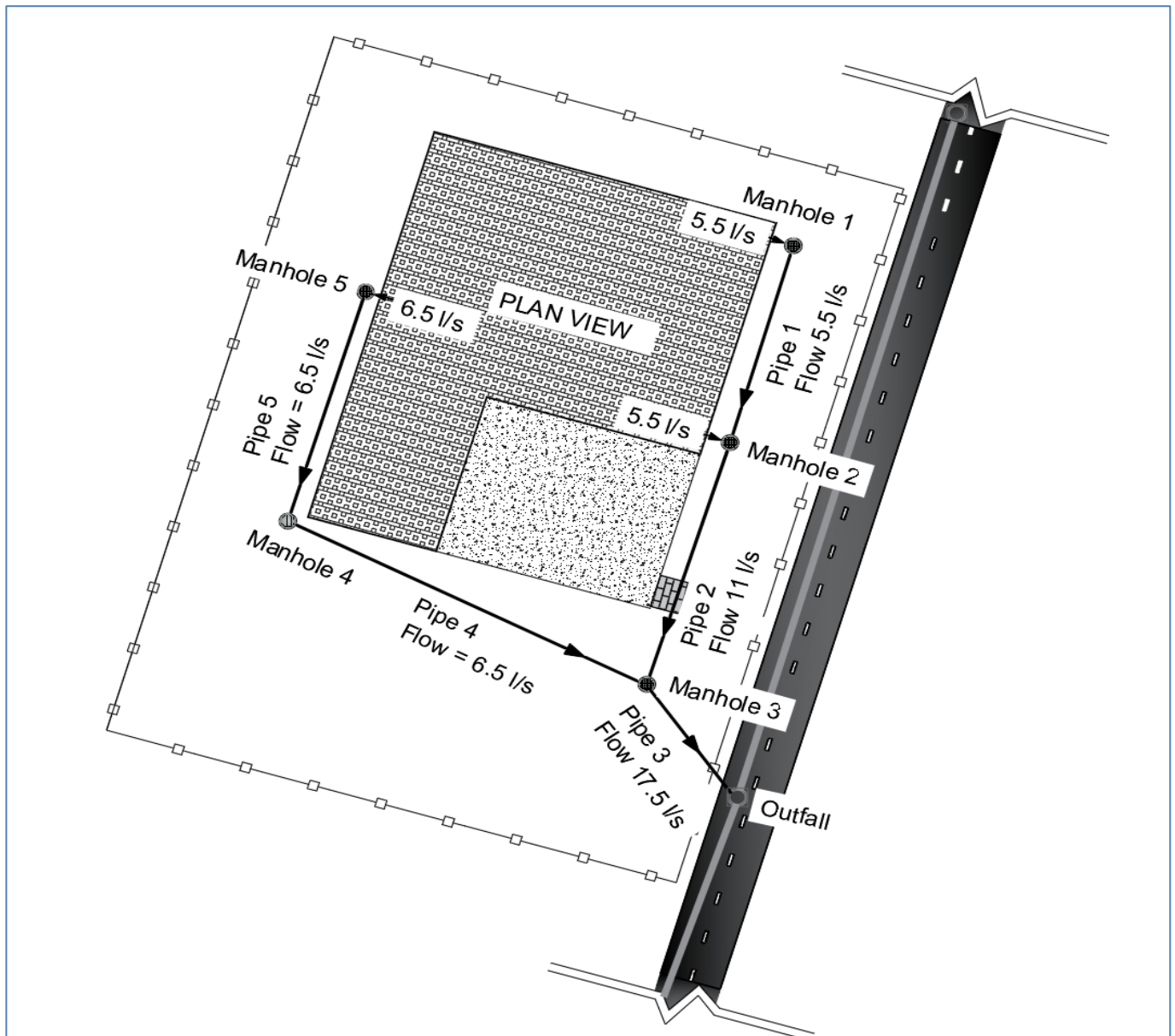
Below is an example of a typical foul drainage scenario.

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

2.2.2 Build the Network

- **Set the Design Criteria:**

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

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)
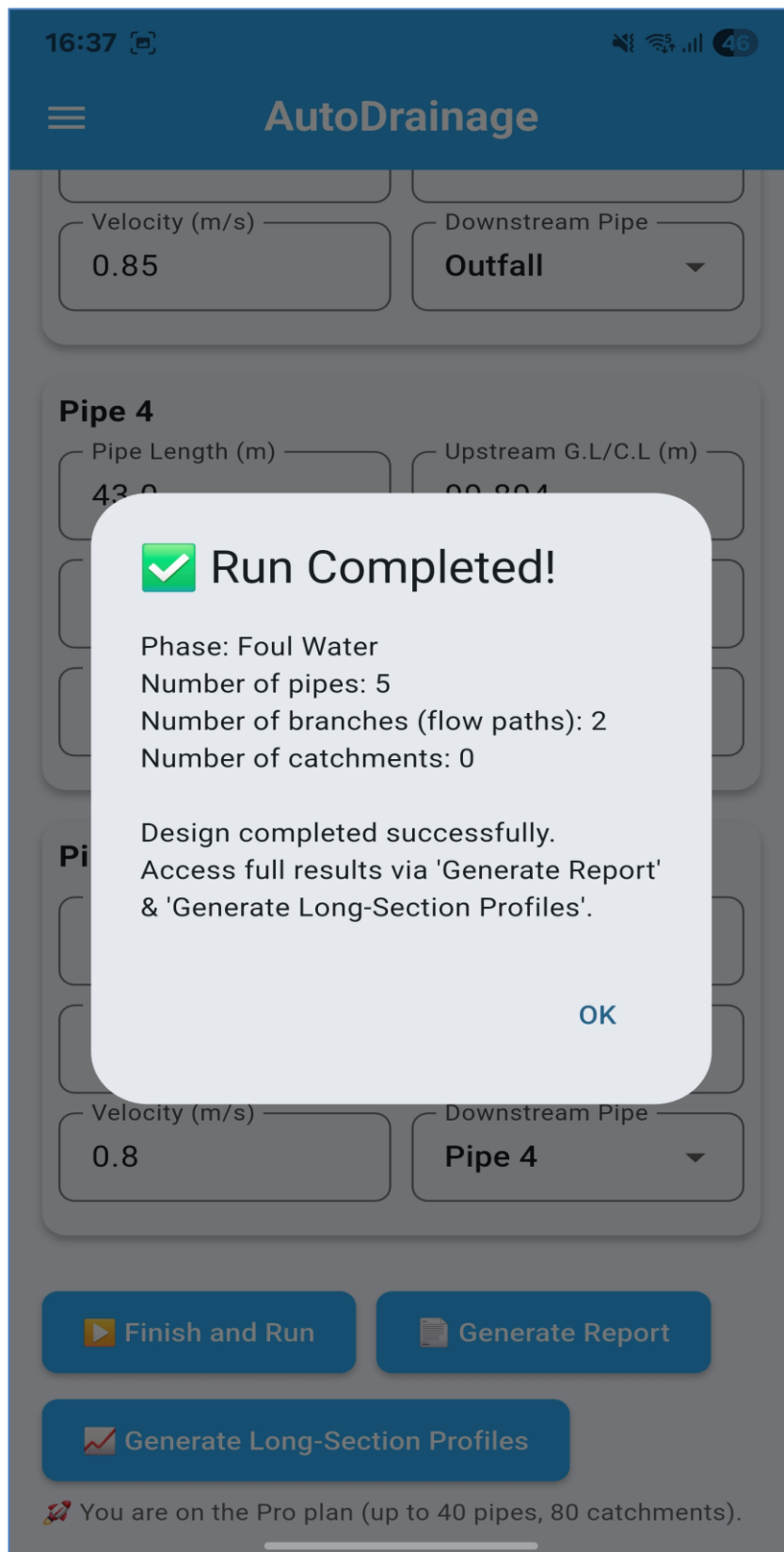99.950

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:**

16:37

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 (
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.

Save as PDF

Copies: 01   Paper size: Letter

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)	U/S G.L (m)	Cover (m)	U/S IL (m)	D/S IL (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	131.8	29.00	99.858	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	99.669	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	99.950	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)

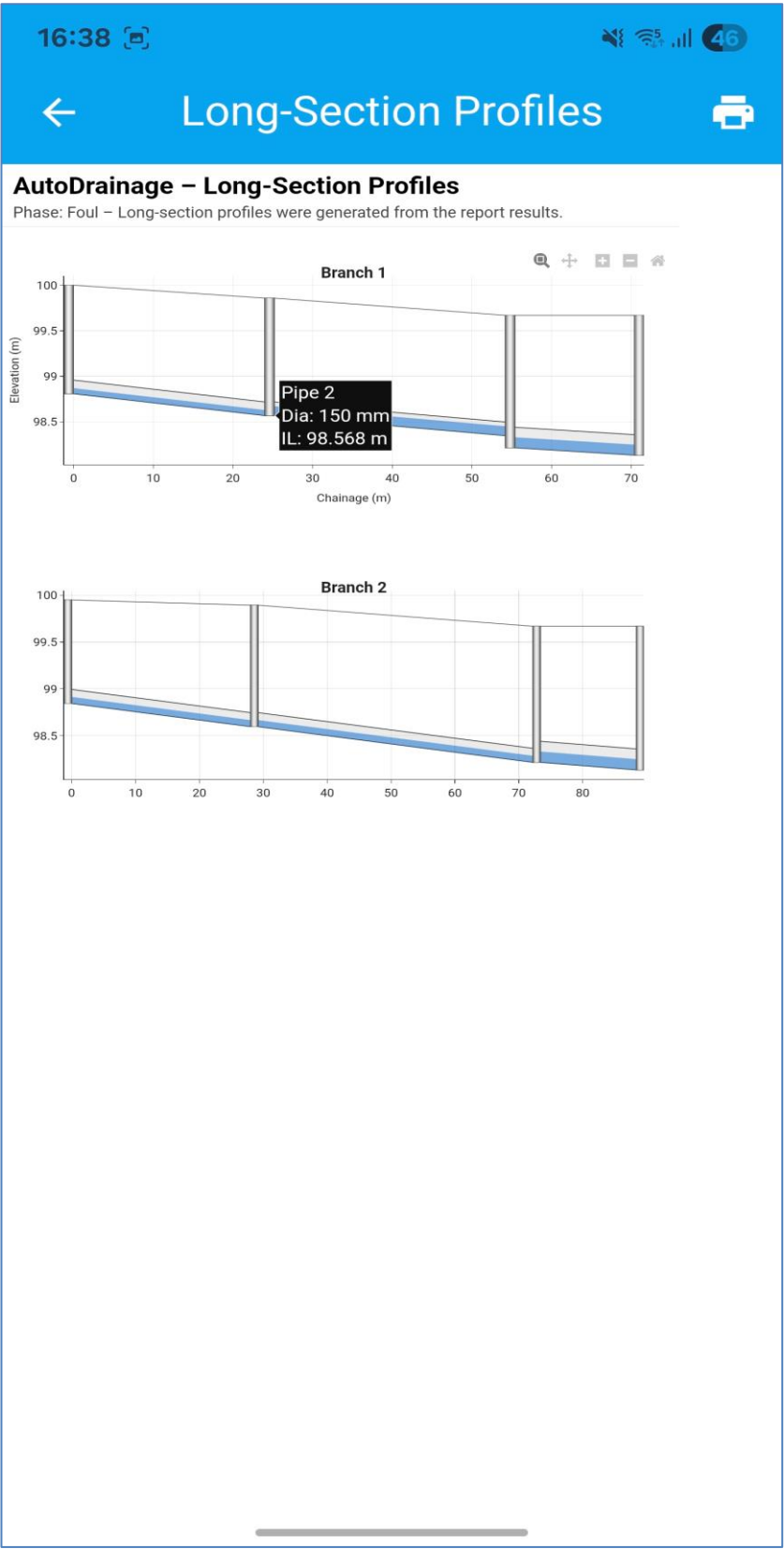| Branch No.	Connectivity: (Upstream → Downstream)
1	(MH01) Pipe 1 → (MH02) Pipe 2 → (MH03) Pipe 3 → Outfall*
2	(MH05) Pipe 5 → (MH04) Pipe 4 → (MH03) Pipe 3 → Outfall*

*The Outfall is the downstream end of the network.

Catchment Connectivity Table: For Storm Water

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

Results should be reviewed and approved by a qualified engineer.
For optimal readability, print on A4 landscape.
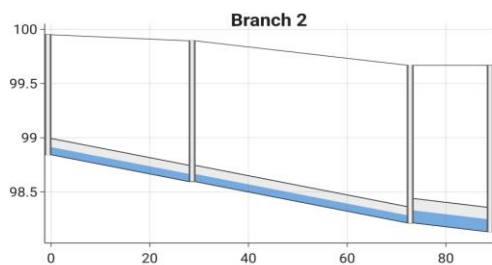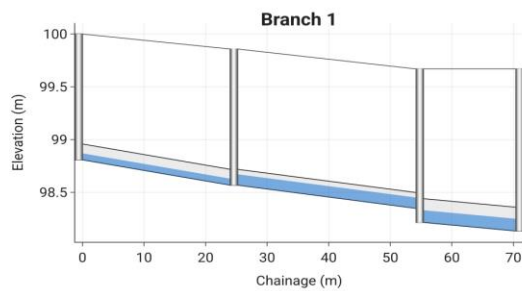
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- **Hit Generate Long-Section Profiles Button:**

AutoDrainage – Long-Section Profiles

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

Branch 1

Branch 2

1/1