DYSE
STRUCTURAL ENGINEERS

Cringle Road
SuDS Verification Report

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1 Introduction

A planning application was submitted to Manchester City Council for the construction of a housing development at Cringle Road, Levenshulme. The development comprises 57 residential properties, including a mixture of modern 3 and 4 bedroom, two-storey, semi-detached and detached housing units.

Planning approval, reference 122042/OO/2018, was granted in October 2021. The approval included a planning condition requiring SuDS verification information to be submitted.

This report has been updated at revision P03 to provide a clearer verification narrative and to respond directly to the Local Authority and Lead Local Flood Authority comments following review of the previous submission.

The objective of this report is to set out the approved SuDS design basis, the evidence reviewed by DYSE, the relationship between the approved design and installed construction, the limitations of the available inspection records, the status of known deviations and a clear verification summary for each principal SuDS component.

2 Executive Summary

This report provides the SuDS verification record for the Cringle Road residential development, prepared by DYSE Structural Engineers on behalf of Towerhouse Systems Ltd.

The previous report submission has been revised to make the evidence more accessible to Manchester City Council and the Lead Local Flood Authority. This P03 revision provides a clearer structure linking the Council's specific requests to the relevant report sections, appendices and evidence records.

The available evidence includes DYSE periodic site inspection records, construction-stage photographs, completed-development inspection records, specialist supplier information, product and material certificates, attenuation tank completion certification, drainage survey and inspection records and approved or as-built drainage drawings where available.

DYSE's inspections were periodic visual inspections and did not constitute continuous site supervision. Concealed drainage construction has therefore been assessed using the available contemporaneous inspection records, construction photographs, supplier information and certificates. Completed-site inspections are relied upon only where the relevant component remained visible or accessible at the time of inspection.

The verification status of each SuDS component is summarised in Section 8.

3 Planning condition and response to council comments

The relevant planning approval includes a requirement for SuDS verification information to be submitted for the completed development and adoptable highway SuDS features. The P03 revision of this report has been prepared to respond directly to the outstanding Local Authority and Lead Local Flood Authority comments.

Council / LLFA requirement	DYSE response	Supporting evidence	Report / appendix reference
Photographic evidence of the installed pipe networks	Construction-stage photographs and inspection records are to be used to demonstrate relevant pipe installation where available.	DYSE inspection records, selected construction photographs, drawings / as-built information where available.	• Section 6.1 • Appendix A • Appendix B • Appendix C
Photographic evidence of the flow-control chamber	The main flow-control chamber is addressed as a specific SuDS component. The report identifies the approved detail and the evidence reviewed.	DYSE inspection records, selected photographs, specialist supplier information / Hydro-Brake information where available	• Section 6.4, • Appendix A • Appendix B • Appendix D
Photographic evidence of the attenuation tank	The offline attenuation tank is addressed as a specific SuDS component. The report references construction-stage photographs and the StormForce completion information.	Construction-stage photographs, StormForce completion certificate, warranty / release information	• Section 6.2 • Appendix B • Appendix D
As-built construction drawings where construction differs from the approved design	The report includes a specific as-built and deviations section. Known changes, including the recorded Plot 11 orifice-control chamber diversion, are to be identified and cross-referenced to the relevant drawing or evidence.	Approved design drawings, as-built drainage drawing or marked-up drawing, site inspection record	• Section 7 • Appendix C

4 Approved Design Basis

The verification has been undertaken by comparison with the approved design and project information available to DYSE. The principal SuDS components requiring verification are the:

- surface-water pipe network,
- offline below-ground attenuation tank,
- oversized pipe attenuation,
- main flow-control chamber,
- driveway permeable paving,
- bio-retention and diffusers,
- driveway orifice flow-control chambers,
- private road permeable paving,
- bio-retention and filter drain,
- S38 tree pits / biofiltration features.

5 Verification Methodology and Limitations

DYSE's verification has been based on the records available at the time of preparing this report. The evidence comprises a combination of DYSE inspection observations, photographs, supplier information, certificates, survey records and completed-development inspection information.

DYSE's scope was limited to periodic visual inspection of the works to check general conformity with the design information and good construction practice at the time of inspection. DYSE did not undertake continuous site supervision.

The Jetflow inspection report is included as supporting information. It provides a record of completed-development inspection and maintenance activity, including accessible chambers.

6 Verification of Installed SuDS

6.1 Surface-Water Pipe Network

Approved design requirement: The surface-water drainage was required to be installed in accordance with the approved drainage design package. The evidence reviewed by DYSE demonstrates that the installed surface-water drainage accords with the approved drainage drawings listed below, except where a specific deviation is recorded in Section 7.

- LM20066-DYSE-XX-ZZ-DR-C-1120 P02 — S104 General Arrangement Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1121 P02 — S104 General Arrangement Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1122 P01 — S104 Long Sections Surface Water.
- LM20066-DYSE-XX-ZZ-DR-C-1124 P02 — S104 Manhole Schedule Surface Water.
- LM20066-DYSE-XX-ZZ-DR-C-1126 P02 — S104 Construction Details Sheet 1 of 4.
- LM20066-DYSE-XX-ZZ-DR-C-1127 P02 — S104 Construction Details Sheet 2 of 4.
- LM20066-DYSE-XX-ZZ-DR-C-1130 P05 — Private External Works Plot Drainage Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1131 P05 — Private External Works Plot Drainage Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1132 P01 — Private External Works Drainage Construction Details Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1133 P01 — Private External Works Drainage Construction Details Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1118 P08 — S38 Works Proposed Drainage Falls and Catchments Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1119 P07 — S38 Works Proposed Drainage Falls and Catchments Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1116 P10 — S38 Construction Details Sheet 2 of 2, including typical Hydro Biofilter arrangement and tree pit details.
- LM20066-DYSE-XX-ZZ-DR-C-1136 P01 — Exceedance Flow Paths.
- LM20066-SW Calculations — supporting surface-water hydraulic calculations.

Evidence reviewed:

- Appendix A — DYSE site inspection record.
- Appendix B — construction-stage photographic verification record.
- Appendix C — approved and/or as-built drainage drawings.
- S38 drainage falls and catchment drawings.
- S38 biofilter construction detail.
- Exceedance-flow-path drawing.
- Appendix E — drainage survey, inspection and maintenance records where relevant.

Verification conclusion: Verified with limitations. On the basis of the evidence reviewed, DYSE concludes that the installed surface-water pipe network accords with the approved drainage drawings, except where a specific deviation is recorded in Section 7. The verification

is supported by the approved drawings, DYSE inspection record, construction-stage photographic evidence and completed-development drainage inspection records. The limitation is that DYSE undertook periodic inspections only and did not continuously supervise every element of below-ground drainage installation. Concealed pipework, bedding, gradients and chamber connections have therefore been verified by reference to the available records rather than continuous direct inspection.

6.2 Offline Below-Ground Attenuation Tank

Approved design requirement: The offline below-ground attenuation tank was required to provide surface-water attenuation storage in accordance with the approved drainage strategy. The approved drawings identify a private offline Wavin Q-Bic Plus geocellular attenuation tank, 53m x 3.6m x 0.63m deep, with a stated maximum volume of 112m³ and invert level of 64.30m, connected into the surface-water network upstream of the flow-control chamber.

Evidence reviewed:

- Appendix A — DYSE site inspection record.
- Appendix B — attenuation tank construction-stage photographs.
- Appendix C — approved and/or as-built drainage drawings.
- Appendix D — StormForce completion certificate and warranty / release information.

Verification conclusion: Verified with limitations. The attenuation tank is verified on the basis of the approved drainage drawings, the DYSE inspection record, construction-stage photographs and specialist supplier completion / warranty information. The limitation is that the completed tank is a buried asset and cannot be fully visually inspected after reinstatement; verification therefore relies on the available construction-stage and supplier records.

6.3 Oversized Pipe Attenuation

Approved design requirement: The oversized online pipework was required to provide part of the surface-water attenuation volume in accordance with the approved S104 general arrangement, surface-water long sections, manhole schedule and hydraulic calculations.

Evidence reviewed:

- Appendix A — DYSE site inspection record.
- Appendix B — construction-stage photographic verification record where relevant.
- Appendix C — approved S104 drainage drawings, long sections and manhole schedule.
- Appendix E — drainage survey, inspection and maintenance records where relevant.
- Supporting surface-water hydraulic calculations.

Verification conclusion: Verified with limitations. On the basis of the evidence reviewed, DYSE concludes that the oversized online pipe attenuation has been installed in accordance with the approved S104 general arrangement, surface-water long sections, manhole schedule

and supporting hydraulic calculations. The limitation is that the oversized pipework is concealed following construction; verification is therefore based on the inspection record, construction-stage photographs where available, drainage survey / inspection records and the approved design information.

6.4 Main Flow-Control Chamber

Approved design requirement: The main flow-control chamber was required to control discharge from the SuDS system in accordance with the approved drainage design and hydraulic modelling. The approved design rationale restricts discharge to the pre-development Qbar rate of 10.38 l/s, with the flow-control device identified as approximately 10.4 l/s in the design information.

Evidence reviewed:

- Appendix A — DYSE site inspection record.
- Appendix B — flow-control chamber photographic evidence where available.
- Appendix C — approved drainage drawings and flow-control chamber location.
- Appendix D — flow-control device / Hydro-Brake information where available.
- Supporting surface-water hydraulic calculations.

Verification conclusion: Verified with limitations. On the basis of the evidence reviewed, DYSE concludes that the main flow-control chamber has been installed in accordance with the approved drainage design and hydraulic modelling intent. The limitation is that the flow-control device and chamber arrangement were not subject to continuous DYSE supervision, and the final installed device evidence should be retained within the supporting supplier or contractor records where available.

6.5 Permeable Private Roads and Driveways

Approved design requirement: The permeable private roads and driveways were required to be installed in accordance with the approved plot drainage drawings, construction details and material requirements, including the relevant permeable paving build-up, sub-base storage and associated drainage connections.

Evidence reviewed:

- Appendix A — DYSE site inspection record for private roads, driveways and associated chambers.
- Appendix B — representative construction-stage photographs.
- Appendix C — approved plot drainage drawings and construction details.
- Appendix D — product data, material information and certificates where available.
- Appendix E — completed-development inspection and maintenance records where relevant.

Verification conclusion: Verified with limitations. The permeable private roads and driveways are verified on the basis of the approved plot drainage drawings, construction

details, DYSE inspection record, representative construction-stage photographs, material information and completed-development inspection records. The limitation is that the available photographic record should be treated as representative evidence unless individual plot photographs are clearly identified; it should not be read as a plot-by-plot photographic verification of every driveway build-up.

6.6 Plot Flow-Control Chambers and Diffusers

Approved design requirement: The plot flow-control chambers and diffusers were required to be installed in accordance with the approved plot drainage drawings, construction details and project-specific chamber arrangements, to control and distribute runoff from the relevant plots into the wider surface-water drainage network.

The site inspection record records that the Plot 11 orifice-control chamber was diverted from DYSE plans to account for a directional change. This item is listed in the deviation schedule in Section 7 and should be shown on the as-built drainage information where available.

Evidence reviewed:

- Appendix A — DYSE site inspection record for plot orifice-control chambers, diffusers and inspection chambers.
- Appendix B — representative construction-stage photographs.
- Appendix C — approved plot drainage drawings and construction details.
- Appendix D — specialist supplier / chamber arrangement information where available.
- Section 7 — recorded deviation for the Plot 11 orifice-control chamber.

Verification conclusion: Verified with limitations. On the basis of the evidence reviewed, DYSE concludes that the plot flow-control chambers and diffusers have been installed in accordance with the approved plot drainage drawings and construction details, except where the Plot 11 chamber diversion is recorded in Section 7. The limitation is that several chambers and diffusers are associated with individual plot drainage and are not all independently visible after completion; verification is therefore based on representative records, inspection entries and the approved design information.

6.7 Tree Pits and Biofiltration Features

Approved design requirement: The S38 tree pits and biofiltration features were required to be installed in accordance with the approved highway drainage design, falls and catchment drawings, Hydro Biofilter construction detail and tree pit maintenance plan. The S38 biofilter detail identifies the 1200 x 1200 kerb inlet arrangement, incoming gully connections, perforated distribution pipework, engineered media, stone bedding, inspection point / overflow and wrapped pipework. The tree pit maintenance plan sets out the inspection and maintenance regime, including removal of litter and debris, inspection for blockages, clogging, standing water, damage and silt accumulation, jetting of pipework and connected gullies where required, replacement of silted or contaminated filter media where required, and watering of trees during drought conditions.

Evidence reviewed:

- Appendix A — DYSE site inspection record for tree pits and completed S38 features.
- Appendix B — photographic verification record where relevant.
- Appendix C — approved S38 drainage falls and catchment drawings.
- Appendix C — S38 Hydro Biofilter construction detail.
- Appendix D — Hydro Biofilter supplier information where available.
- Tree pit maintenance plan, including inspection, cleaning, jetting, filter media replacement and drought watering requirements.

Verification conclusion: Verified with limitations. On the basis of the evidence reviewed, DYSE concludes that the tree pits and biofiltration features have been installed in accordance with the approved S38 drainage falls and catchment drawings, S38 Hydro Biofilter construction detail and tree pit maintenance plan. The limitation is that the below-ground biofilter chamber, filter media, underdrain and internal components are partly concealed once installed; verification therefore relies on the available approved drawings, supplier information, inspection records and completed-development evidence rather than continuous direct observation of all concealed elements.

7 As-built arrangement and deviations

The Council has requested as-built construction drawings where the installed construction differs from the approved design. This section records known differences between the approved design and installed arrangement, based on the information available to DYSE at the time of preparing this report. All approved drawings are considered an accurate reflection of the as built assets, unless documented in the table below.

Item	Approved arrangement	Recorded as-built arrangement	Technical significance	Supporting drawing / evidence	Verification outcome
Plot 11 orifice-control chamber	Plot 11 orifice-control chamber to be installed in accordance with the approved plot drainage drawings and associated construction details.	Appendix A records that the Plot 11 orifice-control chamber was diverted from DYSE plans to account for a directional change.	Local alignment deviation only. No evidence has been identified to indicate that the diversion adversely affects the hydraulic function, provided the chamber remains accessible, operational and connected as intended.	Appendix A — Site inspection record, Plot 11 orifice-control chamber observation. Appendix C — approved plot drainage drawings and as-built / marked-up drainage information where available.	Verified with recorded deviation.

8 Verification Summary

SuDS component	Evidence basis	Verification outcome	Report section	Appendix reference	Verification note
Surface-water pipe network	DYSE inspection record, construction-stage photographs, drawing / as-built information	Verified with limitations	6.1	Appendix A, B, C	Installed drainage accords with the approved drawings based on the evidence reviewed, with the Plot 11 recorded deviation addressed in Section 7.
Offline attenuation tank	DYSE inspection record, construction-stage photographs, StormForce completion certificate and warranty information	Verified with limitations	6.2	Appendix A, B, C, D	Installed attenuation tank verified by construction-stage photographs and StormForce completion / warranty information.
Main flow-control chamber	DYSE inspection record, photographic evidence, flow-control device information	Verified with limitations	6.4	Appendix A, B, D	Installed flow-control chamber verified against the approved drainage design intent and supporting hydraulic information.
Oversized pipe attenuation	DYSE inspection record, approved S104 drawings, long sections, manhole schedule, hydraulic calculations and drainage inspection records	Verified with limitations	6.3	Appendix A, B, C, E	Oversized online pipe attenuation verified against the approved S104 drainage design, long sections, manhole schedule and supporting hydraulic calculations.

Permeable private roads and driveways	DYSE inspection record, representative construction photographs, material certificate and completed inspection information	Verified with limitations	6.5	Appendix A, B, D, E	Permeable private roads and driveways verified by inspection records, representative construction photographs, material information and completed-development inspection evidence.
Plot flow-control chambers and diffusers	DYSE inspection record, representative construction photographs, approved plot drainage drawings, chamber approval drawings and diffuser product information	Verified with limitations	6.6	Appendix A, B, C, D	Plot chambers and diffusers verified against approved plot drainage drawings and supplier information, with the Plot 11 recorded deviation addressed in Section 7.
Tree pits and biofiltration features	DYSE inspection record, S38 drainage falls and catchment drawings, S38 Hydro Biofilter detail, Hydro Biofilter supplier information and tree pit maintenance plan	Verified with limitations	6.7	Appendix A, B, C, D	Tree pits and biofiltration features verified against the approved S38 drainage drawings, Hydro Biofilter construction detail and maintenance requirements.

9 Conclusion

This P03 revision has been prepared to provide a clearer SuDS verification record for the completed Cringle Road development. The report identifies the approved design basis, the evidence reviewed, the limitations of DYSE's periodic inspection role and the verification status of each principal SuDS component. Based on the available evidence, DYSE concludes that the installed drainage and SuDS components accord with the approved drainage design drawings, except where specific deviations are recorded in Section 7. The report also provides a direct response to the Council and Lead Local Flood Authority comments and restructures the supporting evidence so that it can be reviewed as a single coherent submission.

Appendix A - Site inspection record

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 1 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 1 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 1 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 2 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 2 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 2 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 3 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 3 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 3 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 4 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 4 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 4 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 5 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 5 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 5 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 6 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 6 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 6 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 7 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 7 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 7 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 8 Driveway	Yes	P	✓	Yes	O		Yes	O	✓
Plot 8 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 8 Inspection chamber	Yes	F	✓ Silt observed in bottom of inspection chamber	Yes	O		Yes	O	✓
Plot 9 Driveway	Yes	P	✓	Yes	O		Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 9 Orifice control chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 9 Inspection chamber	Yes	F	✓	Yes	O		Yes	O	✓
Plot 10 Driveway				Yes	F	✓	Yes	O	✓
Plot 10 Orifice control chamber				Yes	F	✓	Yes	O	✓
Plot 10 Inspection chamber				Yes	F	✓	Yes	O	✓
Plot 11 Driveway				Yes	F	✓	Yes	O	✓
Plot 11 Orifice control chamber				Yes	F	Diverted from DYSE plans to account for directional change	Yes	O	✓
Plot 11 Inspection chamber				Yes	F		Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 12 Driveway				Yes	F	✓	Yes	O	✓
Plot 12 Orifice control chamber				Yes	F	✓	Yes	O	✓
Plot 12 Inspection chamber				Yes	F	✓	Yes	O	✓
Plot 13 Driveway				Yes	F	✓	Yes	O	✓
Plot 13 Orifice control chamber				Yes	F	✓	Yes	O	✓
Plot 13 Inspection chamber				Yes	F	✓	Yes	O	✓
Plot 14 Driveway				Yes	F	✓	Yes	O	✓
Plot 14 Orifice control chamber				Yes	F	✓	Yes	O	✓
Plot 14 Inspection chamber				Yes	F	✓	Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 46 Driveway	Yes	P	✓	Yes	O	✓	Yes	O	✓
Plot 46 Orifice control chamber	Yes	F	✓	Yes	O	✓	Yes	O	✓
Plot 46 Inspection chamber	Yes	F	✓	Yes	O	✓	Yes	O	✓
Plot 47 Driveway				Yes	O	✓	Yes	O	✓
Plot 47 Orifice control chamber				Yes	O	✓	Yes	O	✓
Plot 47 Inspection chamber				Yes	O	✓	Yes	O	✓
Plot 48 Driveway				Yes	O	✓	Yes	O	✓
Plot 48 Orifice control chamber				Yes	O	✓	Yes	O	✓
Plot 48 Inspection chamber				Yes	O	✓	Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 49 Driveway				Yes	O	✓	Yes	O	✓
Plot 49 Orifice control chamber				Yes	O	✓	Yes	O	✓
Plot 49 Inspection chamber				Yes	O	✓	Yes	O	✓
Plot 50 Driveway				Yes	O	✓	Yes	O	✓
Plot 50 Orifice control chamber				Yes	O	✓	Yes	O	✓
Plot 50 Inspection chamber				Yes	O	✓	Yes	O	✓
Plot 51 Driveway				Yes	P	✓	Yes	O	✓
Plot 51 Orifice control chamber				Yes	N		Yes	O	✓
Plot 51 Inspection chamber				Yes	P	✓	Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Plot 52 Driveway				Yes	P	✓	Yes	O	✓
Plot 52 Orifice control chamber				Yes	P	✓	Yes	O	✓
Plot 52 Inspection chamber				Yes	P	✓	Yes	O	✓
Plot 53 Driveway				Yes	P	✓	Yes	O	✓
Plot 53 Orifice control chamber				Yes	P	✓	Yes	O	✓
Plot 53 Inspection chamber				Yes	P	✓	Yes	O	✓
Plot 54 Driveway				Yes	P	✓	Yes	O	✓
Plot 54 Orifice control chamber				Yes	N		Yes	O	✓
Plot 54 Inspection chamber				Yes	P	✓	Yes	O	✓

SuDS aspect	Visit 1 (JB) 08/01/2024			Visit 2 (JB) 15/05/2024			Visit 3 (RL) 09/04/2026		
	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations	Elements inspected	Stage during inspection Not yet started Partially installed Fully installed Operational	General compliance with design information, and pertinent observations
Private road							Yes	O	✓
Tree pits							Yes	O	✓
Offline attenuation	Yes	P	✓				Yes	O	✓
Online attenuation (oversized pipework)	No	F		Yes (14.06.2023 during team site visit)	F	✓	Yes	O	✓
Flow control chamber	Yes	P	✓				Yes	O	✓

Appendix B - Photographic Verification Record

This appendix contains selected photographic evidence used to support the SuDS verification narrative. The photographs are organised as evidence sheets rather than individually catalogued images.

Each evidence sheet has been given a reference:

- B1-01 for pipe network evidence,
- B2-01 for attenuation tank evidence,
- B3-01 for flow-control chamber evidence,
- B4-01 for driveway and permeable paving evidence,
- B5-01 for plot chambers and diffusers,
- B6-01 for tree pits and biofiltration features,
- B7-01 for completed-development inspection photographs.

B1-01 for pipe network evidence



Photo showing pipe network
Photo taken 14.10.2022



Photo showing pipe network
Photo taken 14.10.2022



Photo showing inspection chamber and pipe network
Photo taken 08.01.2024



Photo showing inspection chamber and pipe network
Photo taken 08.01.2024

B2-01 for attenuation tank evidence



Photo showing installation of attenuation tank.
Completion Certificate issued 20.10.2023



Photo showing installation of attenuation tank.
Completion Certificate issued 20.10.2023

B3-01 for flow-control chamber evidence



Flow control chamber under construction
Photo taken 14.10.2022



Flow control chamber under construction
Photo taken 14.10.2022



Flow control chamber
Photo taken 08.01.2024



Flow control chamber
Photo taken 08.01.2024



Photo showing installation of orifice flow control chamber.
Photo taken 24.05.2024



Photo showing installation of orifice flow control chamber.
Photo taken 08.01.2024

B4-01 for driveway and permeable paving evidence



Photo showing installation of permeable driveway.
Photo taken 08.01.2024



Photo showing installation of permeable driveway.
Photo taken 08.01.2024



Photo showing installation of permeable driveway.
Photo taken 24.05.2024



Photo showing installation of permeable driveway.
Photo taken 24.05.2024

B5-01 for plot chambers and diffusers



Plot chamber during construction
Photo taken 08.01.2024



Plot chamber during construction
Photo taken 08.01.2024



Plot chamber during construction
Photo taken 24.05.2024



Plot chamber during construction
Photo taken 24.05.2024



Photo showing installation of diffuser.



Photo showing installation of diffuser.

B6-01 for tree pits and biofiltration features



Photo showing Hydro Biofilter units prior to installation



Photo showing Hydro Biofilter units prior to installation



Photo showing installed S38 tree pit.
Photo taken 09.04.2026



Photo showing installed S38 tree pit.
Photo taken 09.04.2026



Photo showing installed S38 tree pit.
Photo taken 09.04.2026

B7-01 for completed- development inspection photographs



Photo showing installed permeable driveway
Photo taken 09.04.2026



Photo showing installed permeable driveway
Photo taken 09.04.2026

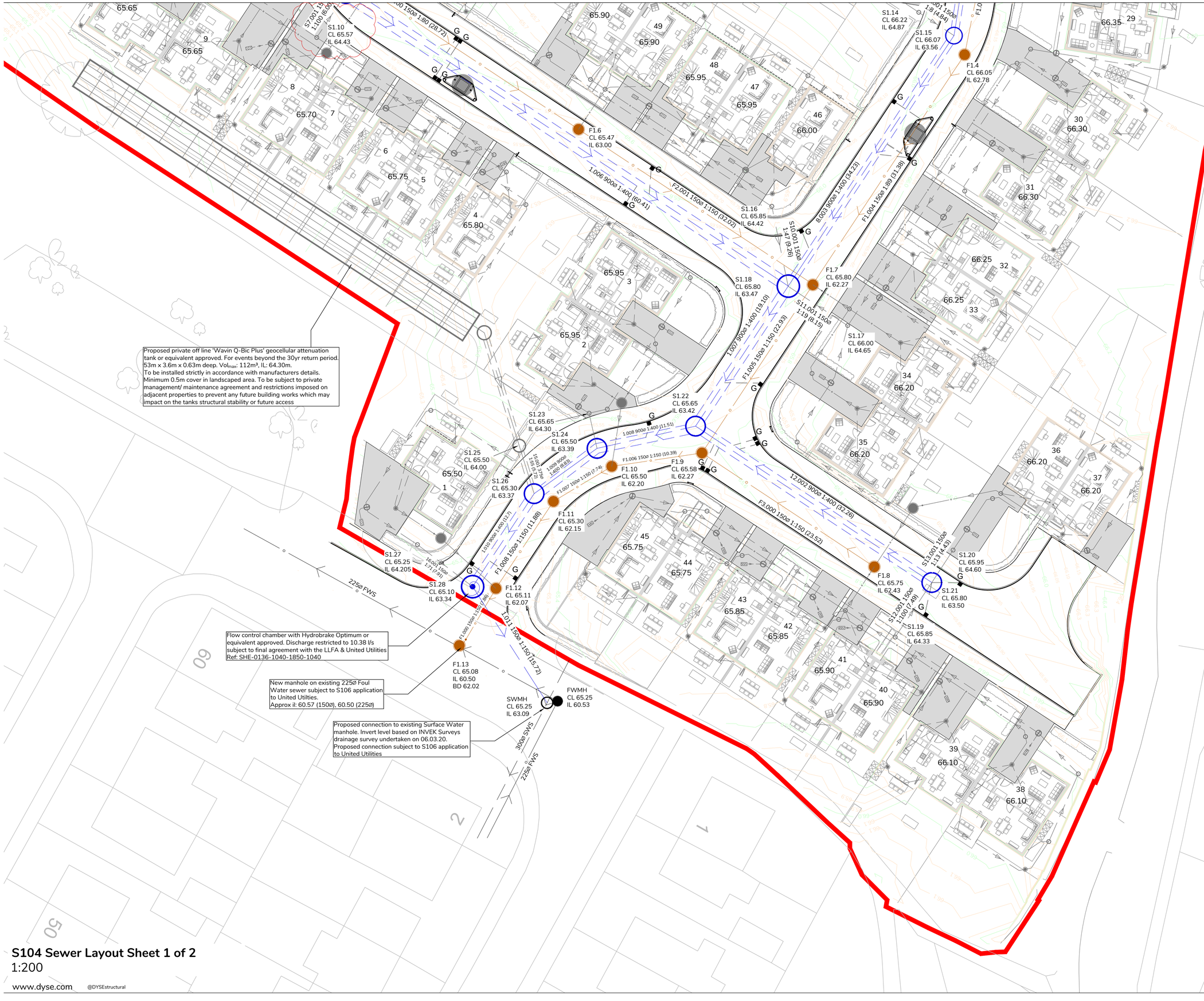


Photo showing installed permeable driveway and flow control chamber.
Photo taken 09.04.2026

Appendix C - Approved Drawings

This appendix contains the approved design drawings and relevant details used for verification and considered as an as built record.

- LM20066-DYSE-XX-ZZ-DR-C-1120 P02 — S104 General Arrangement Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1121 P02 — S104 General Arrangement Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1122 P01 — S104 Long Sections Surface Water.
- LM20066-DYSE-XX-ZZ-DR-C-1124 P02 — S104 Manhole Schedule Surface Water.
- LM20066-DYSE-XX-ZZ-DR-C-1126 P02 — S104 Construction Details Sheet 1 of 4.
- LM20066-DYSE-XX-ZZ-DR-C-1127 P02 — S104 Construction Details Sheet 2 of 4.
- LM20066-DYSE-XX-ZZ-DR-C-1130 P05 — Private External Works Plot Drainage Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1131 P05 — Private External Works Plot Drainage Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1132 P01 — Private External Works Drainage Construction Details Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1133 P01 — Private External Works Drainage Construction Details Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1118 P08 — S38 Works Proposed Drainage Falls and Catchments Sheet 1 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1119 P07 — S38 Works Proposed Drainage Falls and Catchments Sheet 2 of 2.
- LM20066-DYSE-XX-ZZ-DR-C-1116 P10 — S38 Construction Details Sheet 2 of 2, including typical Hydro Biofilter arrangement and tree pit details.
- LM20066-DYSE-XX-ZZ-DR-C-1136 P01 — Exceedance Flow Paths.
- A1_2461/01_Rev_01 – Cringle Rd Levenshulme – Drainage Layout



Residual Risks

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General Notes

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Legend

- Site Boundary
- Proposed Major Contour 250mm intervals
- Proposed Minor Contours 50mm intervals
- S104 Surface Water Sewer
- S104 Surface Water Manhole
- S104 Foul Water Sewer
- S104 Foul Water Manhole
- Existing Surface Water Sewer
- Existing Foul Water sewer
- Private Surface Water Drain
- Private Foul Water Drain
- 300Ø Mini Access Chamber
- 450Ø Inspection Chamber
- 1050Ø Inspection Chamber
- 600Ø RIDGISTORMcheck Orifice Control Chamber. 2l/s MAX.
- re65.85 Rodding Eye
- Surface Water Drainage Channel
- Polypipe Permavoid Rainwater Diffuser Unit
- Permeable Car Park with min 350mm Subbase Storage
- G S38 Road Gully

Rev	Date	Description	Drw	Chk	Revd	App
P11	09/02/24	Re-route of drainage plots 4-11 and 12-16	BKD	JB	JDY	JDY
P10	20/07/23	Technically Approved	BKD	JDY	JDY	JDY
P09	07/06/23	Amendments to suit LHA comments	BKD	JDY	JDY	JDY
P08	26/04/23	Amendments to suit LHA comments	BKD	JDY	JDY	JDY
P07	14/12/22	Gully's and build-outs re-located	ARJ	BKD	JDY	JDY
P06	28/09/22	F1.12 invert correct. F1.8 & F3.000 amended	ARJ	BKD	JDY	JDY
P05	24/06/22	Amendments to suit LHA comments	ARJ	BKD	JDY	JDY
P04	20/03/22	Private foul layout added	ARJ	BKD	JDY	JDY
P03	25/01/22	Pipe No's S1.005 & S.0006 corrected.	ARJ	BKD	JDY	JDY
P02	12/01/22	MH references corrected	ARJ	BKD	JDY	JDY
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status:

Technically Approved

Client:

Towerhouse Systems

Project:

Cringle Road
Manchester

Drawing:

S104 Sewer Layout
Sheet 1 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1120 Revision: P11

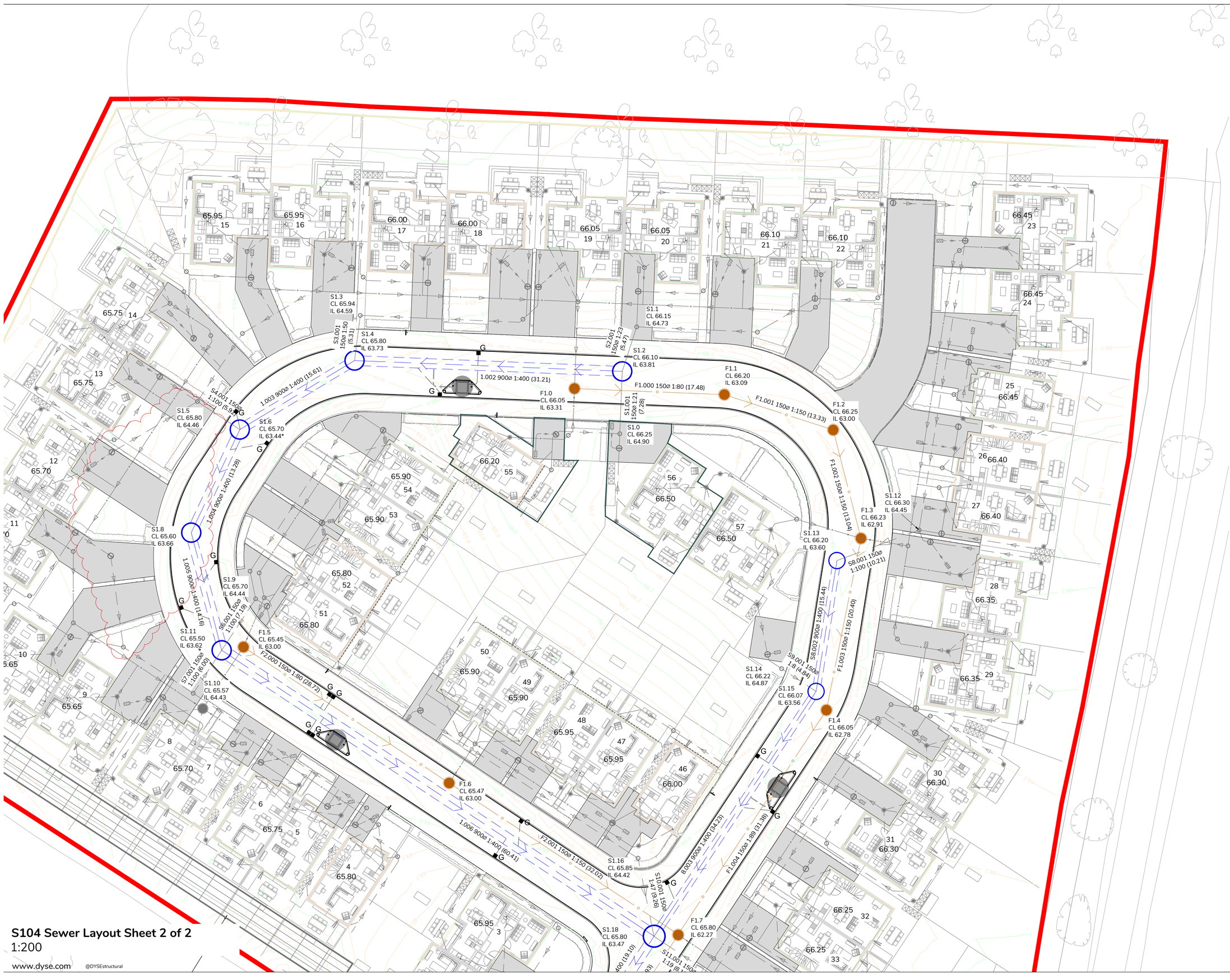
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ISO A1 (594x841mm)

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S104 Sewer Layout Sheet 1 of 2
1:200

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S104 Sewer Layout Sheet 2 of 2
1:200

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P02	12/01/22	MH references corrected	ARJ	BKD	JDY	JDY
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status:
Technically Approved

Client:
Towerhouse Systems

Project:
Cringle Road
Manchester

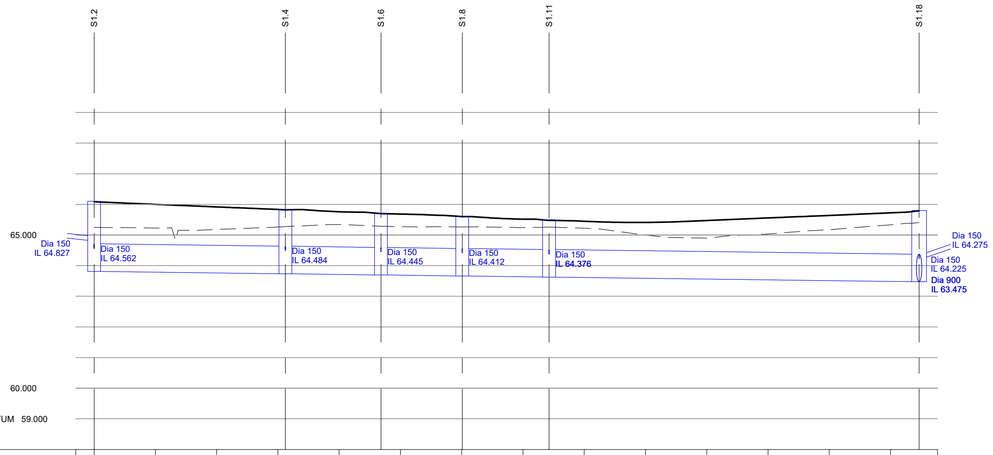
Drawing:
S104 Sewer Layout
Sheet 2 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1121 Revision: P10

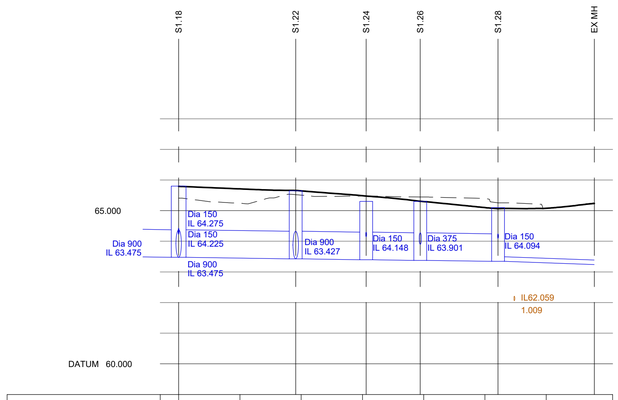
DYSE STRUCTURAL ENGINEERS

ISO A1 (594x841mm)

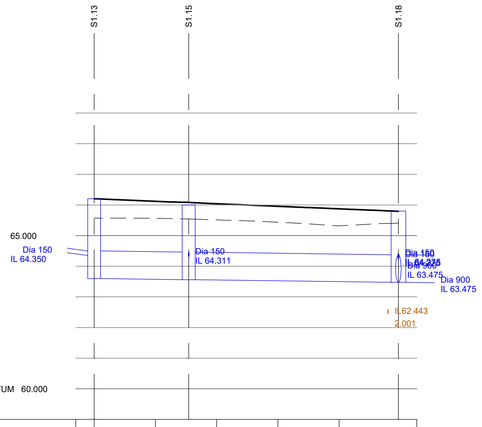
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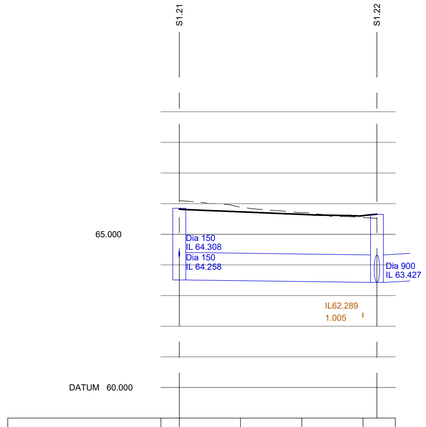
GROUND LEVEL	65.248	65.227	65.180	65.261	65.342	65.274	65.262	65.239	65.220	65.003	64.900	65.032	65.176	65.333
STORMWATER COVER LEVEL	66.100	65.825			65.700		65.600		65.500					65.800
STORMWATER INVERT		63.812			63.734	63.734	63.695	63.695	63.662	63.662	63.626	63.626		63.475
STORMWATER DETAILS		1.002 900Ø Conc 1 in 400 Class S			1.003 900Ø Conc 1 in 400 Class S	1.004 900Ø Conc 1 in 400 Class S		1.005 900Ø Conc 1 in 400 Class S		1.006 900Ø Conc 1 in 400 Class S				
STORMWATER LENGTHS		31.213			15.606	13.276		14.162		60.408				



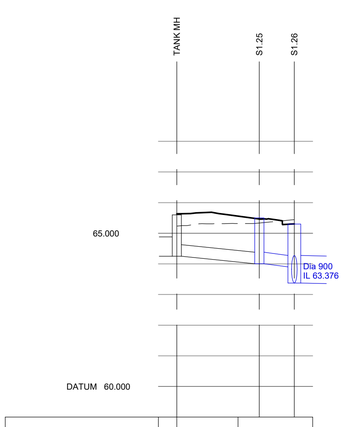
GROUND LEVEL	65.406	65.246	65.507	65.475	65.445	65.397	65.077						
STORMWATER COVER LEVEL	65.800	65.650		65.300	65.300	65.100	65.250						
STORMWATER INVERT		63.475	63.427	63.427	63.398	63.398	63.376	63.376	63.344	63.344	63.238		
STORMWATER DETAILS		1.007 900Ø Conc 1 in 400 Class S		1.008 900Ø Conc 1 in 400 Class S	1.009 900Ø Conc 1 in 400 Class S	1.010 900Ø Conc 1 in 400 Class S	1.010 150Ø Clay 1 in 150 Class S						
STORMWATER LENGTHS		19.104		11.506	8.827	12.695	15.717						



GROUND LEVEL	65.574	65.565	65.512	65.437	65.321	
STORMWATER COVER LEVEL	66.200	66.000				65.800
STORMWATER INVERT		63.600	63.561	63.561		63.475
STORMWATER DETAILS		8.002 900Ø Conc 1 in 400 Class S		8.003 900Ø Conc 1 in 400 Class S		
STORMWATER LENGTHS		15.441		34.229		



GROUND LEVEL	66.091	65.877	65.708	65.545
STORMWATER COVER LEVEL	65.850			65.650
STORMWATER INVERT		63.508		63.427
STORMWATER DETAILS		12.002 900Ø Conc 1 in 400 Class S		
STORMWATER LENGTHS		32.261		



GROUND LEVEL	65.234	65.317	
STORMWATER COVER LEVEL	65.600	65.500	65.300
STORMWATER INVERT	64.250	64.005	63.901
STORMWATER DETAILS	15.000 375Ø Conc 1 in 55 Class S		15.001 375Ø Conc 1 in 55 Class S
STORMWATER LENGTHS	13.464		5.719

Residual Risks

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Legend

S104 Long Sections, Surface Water

1:500(h), 1:100(v)

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Rev	Date	Description	Drw	Chk	Revd	App
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status:
Preliminary

Client:
Towerhouse Systems

Project:
Cringle Road
Manchester

Drawing:
S104 Long Sections
Surface Water

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1122

Revision: P01

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Manhole Number	Cover Level	Connections	Pipe				Manhole Size	Types	
Coordinates	Depth To Soffit		Code	Inverts	Diams			Manhole	Cover
S1.0	66.250		1	1.000	64.950	100	450	D	D400
E. 388410.903	1.200		0	1.001	64.900	150			
N. 393193.270									
S1.1	66.150		1	2.000	64.780	100	450	D	D400
E. 388412.883	1.270		0	2.001	64.730	150			
N. 393205.735									
S1.2	66.100		1	1.001	64.827	150	2100	SHALLOW DETAIL 4	D400
E. 388411.194	1.388		2	2.001	64.562	150			
N. 393200.533			0	1.002	63.812	900			
S1.3	65.940		1	3.000	64.640	150	450	D	D400
E. 388380.668	1.200		0	3.001	64.590	150			
N. 393207.055									
S1.4	65.825		1	1.002	63.734	900	2100	SHALLOW DETAIL 4	D400
E. 388380.006	1.191		2	3.001	64.484	150			
N. 393201.792			0	1.003	63.734	900			
S1.5	65.770		1	4.000	64.554	100	450	D	D400
E. 388361.692	1.116		0	4.001	64.504	150			
N. 393197.018									

Manhole Number	Cover Level	Connections	Pipe				Manhole Size	Types	
Coordinates	Depth To Soffit		Code	Inverts	Diams			Manhole	Cover
S1.6	65.700		1	1.003	63.695	900	2100	SHALLOW DETAIL 4	D400
E. 388366.630	1.105		2	4.001	64.445	150			
N. 393193.754			0	1.004	63.695	900			
S1.7	65.730		1	5.000	64.528	150	450	D	D400
E. 388357.324	1.102		0	5.001	64.478	150			
N. 393187.278									
S1.8	65.600		1	1.004	63.662	900	2100	SHALLOW DETAIL 4	D400
E. 388360.974	1.038		2	5.001	64.412	150			
N. 393181.743			0	1.005	63.662	900			
S1.9	65.700		1	6.000	64.498	150	450	D	D400
E. 388368.483	1.102		0	6.001	64.448	150			
N. 393174.030									
S1.10	65.570		1	7.000	64.486	150	450	D	D400
E. 388361.208	0.984		0	7.001	64.436	150			
N. 393163.024									
S1.11	65.500		1	6.001	64.376	150	2100	SHALLOW DETAIL 4	D400
E. 388364.519	0.974		2	1.005	63.626	900			
N. 393168.032			3	7.001	64.376	150			
			0	1.006	63.626	900			

Manhole Number	Cover Level	Connections	Pipe				Manhole Size	Types	
Coordinates	Depth To Soffit		Code	Inverts	Diams			Manhole	Cover
S1.12	66.300		1	8.000	64.502	100	450	D	D400
E. 388445.789	1.698		0	8.001	64.452	150			
N. 393182.050									
S1.13	66.200		1	8.001	64.350	150	2100	SHALLOW DETAIL 4	D400
E. 388436.217	1.700		0	8.002	63.600	900			
N. 393178.489									
S1.14	66.220		1	9.000	64.920	100	450	D	D400
E. 388429.772	1.200		0	9.001	64.870	150			
N. 393165.893									
S1.15	66.000		1	8.002	63.561	900	2100	SHALLOW DETAIL 4	D400
E. 388433.785	1.539		2	9.001	64.311	150			
N. 393163.241			0	8.003	63.561	900			
S1.16	65.850		1	10.000	64.470	100	450	D	D400
E. 388413.045	1.280		0	10.001	64.420	150			
N. 393143.767									
S1.17	66.000		1	11.000	64.700	150	450	D	D400
E. 388421.685	1.150		0	11.001	64.700	150			
N. 393130.207									

Manhole Number	Cover Level	Connections	Pipe				Manhole Size	Types	
Coordinates	Depth To Soffit		Code	Inverts	Diams			Manhole	Cover
S1.18	65.800		1	11.001	64.275	150	2400	SHALLOW DETAIL 4	D400
E. 388414.896	1.425		2	8.003	63.475	900			
N. 393134.696			3	10.001	64.225	150			
			4	1.006	63.475	900			
			0	1.007	63.475	900			
S1.19	65.850						450	D	D400
E. 388427.091	1.317		0	12.001	64.383	150			
N. 393094.743									
S1.20	65.950		1	13.000	64.650	100	450	D	D400
E. 388433.678	1.200		0	13.001	64.600	150			
N. 393104.655									
S1.21	65.850		1	12.001	64.308	150	2100	SHALLOW DETAIL 4	D400
E. 388431.258	1.442		2	13.001	64.258	150			
N. 393100.961			0	12.002	63.508	900			
S1.22	65.650		1	12.002	63.427	900	2100	SHALLOW DETAIL 4	D400
E. 388404.354	1.323		2	1.007	63.427	900			
N. 393118.764			0	1.008	63.427	900			
S1.23	65.650		1	14.000	64.350	100	450	D	D400
E. 388392.226	1.200		0	14.001	64.300	150			
N. 393120.243									

Manhole Number	Cover Level	Connections	Pipe				Manhole Size	Types	
Coordinates	Depth To Soffit		Code	Inverts	Diams			Manhole	Cover
S1.24	65.300		1	1.008	63.398	900	2100	SHALLOW DETAIL 4	D400
E. 388393.130	1.002		2	14.001	64.148	150			
N. 393116.232			0	1.009	63.398	900			
S1.25	65.500		1	15.000	64.005	375	1500	C	D400
E. 388384.274	1.120		0	15.001	64.005	375			
N. 393116.539									
S1.26	65.300		1	1.009	63.376	900	2100	SHALLOW DETAIL 4	D400
E. 388385.965	1.024		2	15.001	63.901	375			
N. 393111.076			0	1.010	63.376	900			
S1.27	65.250		1	16.000	64.255	100	450	D	D400
E. 388372.678	0.895		0	16.001	64.205	150			
N. 393105.274									
S1.28	65.100		1	1.010	63.344	900	2100	FLOW CONTROL	D400
E. 388378.964	1.606		2	16.001	64.094	150			
N. 393100.486			0	1.011	63.344	150			

⚠ Residual Risks ⚠

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Status:
Preliminary

Client:
Towerhouse Systems

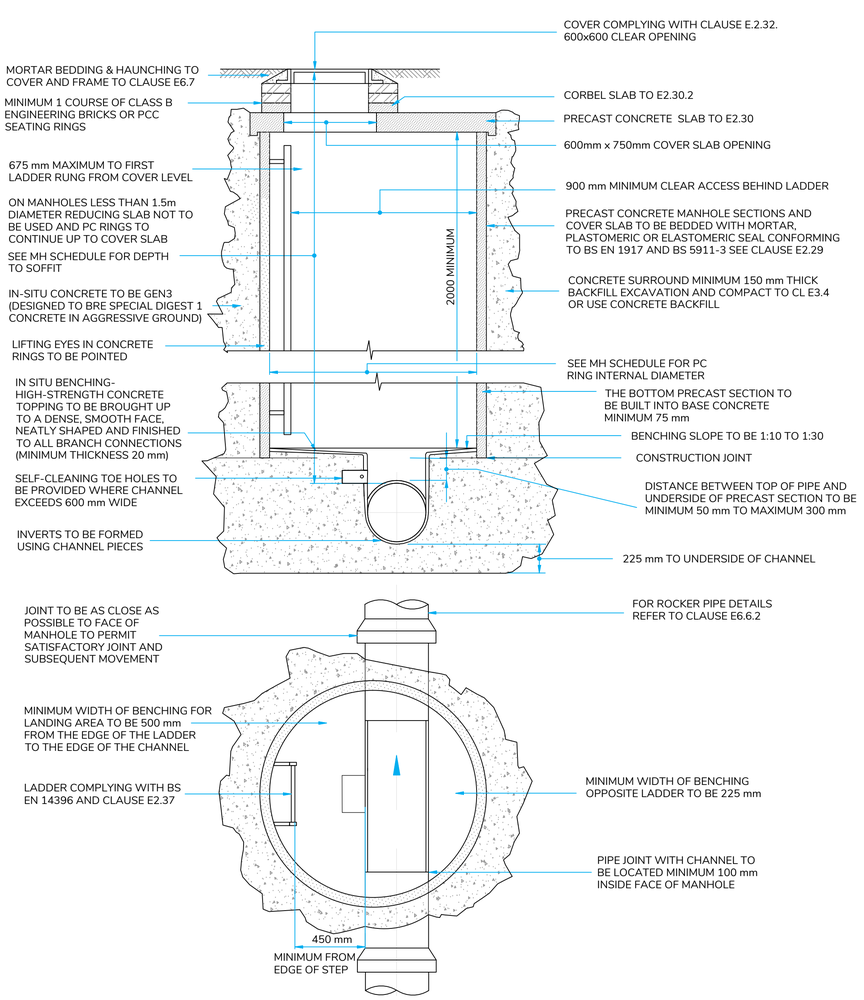
Project:
Cringle Road
Manchester

Drawing:
S104 Manhole Schedules
Surface Water

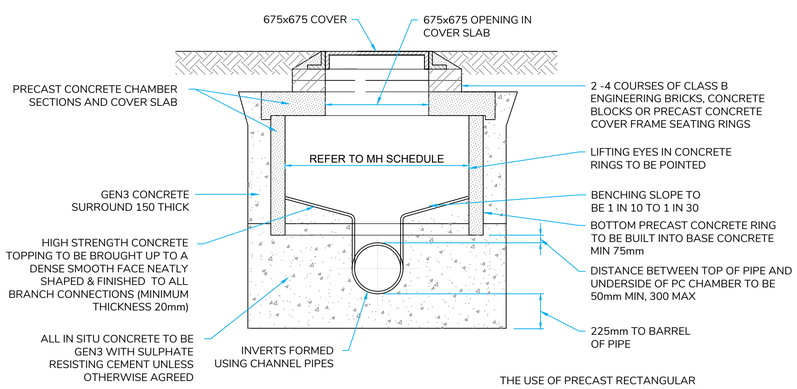
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Revision: P02

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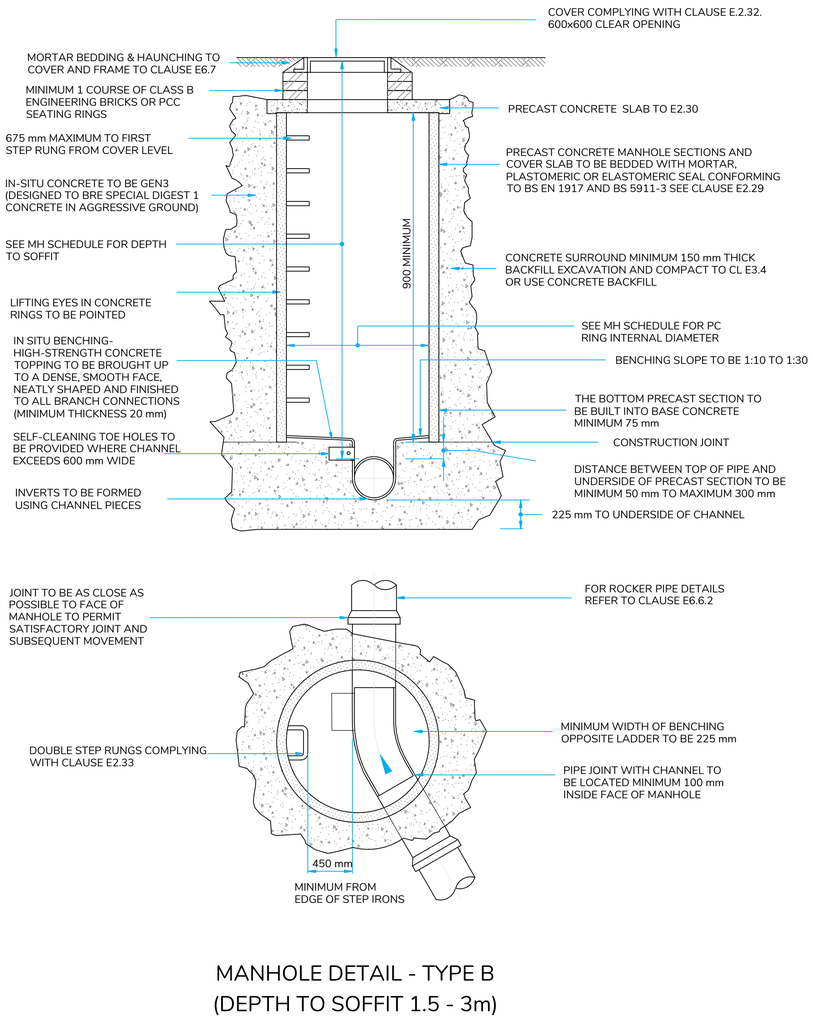


TYPICAL MANHOLE DETAIL - TYPE A
(DEPTH TO SOFFIT 3m - 6m)
SCALE - NTS

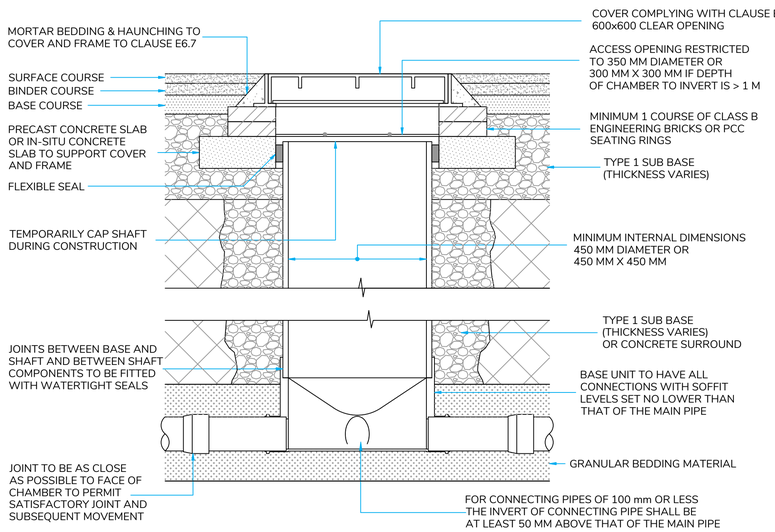


THE USE OF PRECAST RECTANGULAR CONCRETE MANHOLE UNITS WITH 150 GEN3 CONCRETE SURROUND SHALL BE PERMITTED WHERE ACCEPTED BY THE ENGINEER AND THE UNDERTAKER.

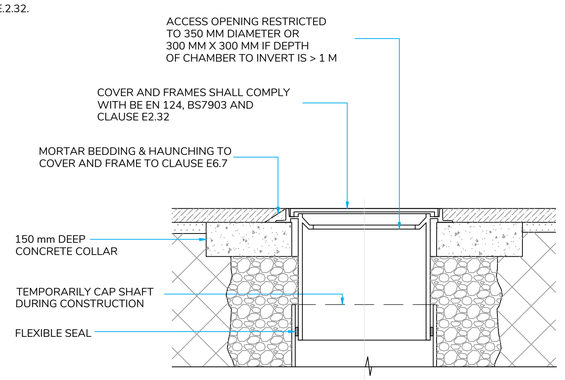
MANHOLE DETAIL - TYPE C
(DEPTH TO SOFFIT 1.0m - 1.5m)
SCALE - NTS



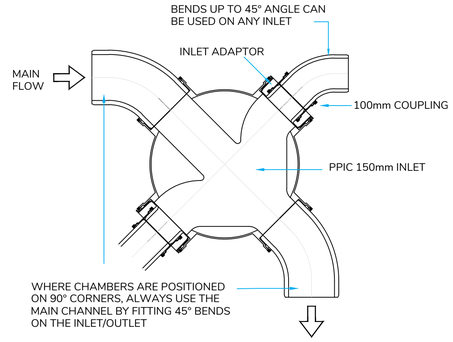
MANHOLE DETAIL - TYPE B
(DEPTH TO SOFFIT 1.5 - 3m)
SCALE - NTS

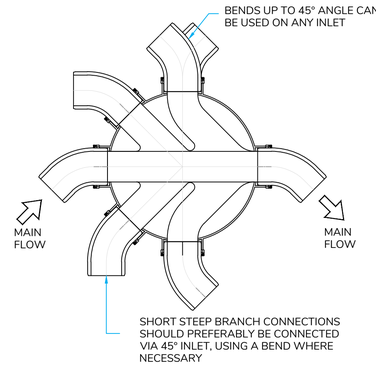


INSPECTION CHAMBER DETAIL - TYPE D
(DEPTH TO SOFFIT 3m) D400 COVER
SCALE - NTS



INSPECTION CHAMBER DETAIL - TYPE D
B125 COVER
SCALE - NTS





TYPE D INSPECTION CHAMBER BASE DETAIL
SCALE - NTS

⚠ Residual Risks ⚠

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Legend

Rev	Date	Description	Drw	Chk	Revd	App
P02	12/01/22	Type A & B manholes and sheet numbering updated.	ARJ	BKD	JDY	JDY
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status: Preliminary

Client: Towerhouse Systems

Project: Cringle Road Manchester

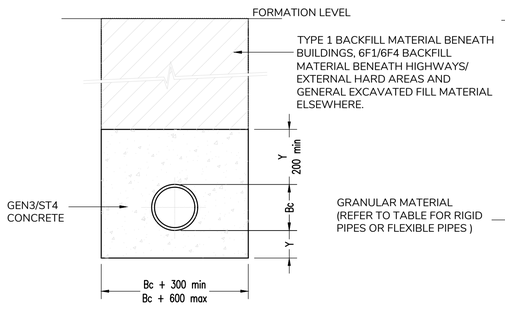
Drawing: S104 Construction Details Sheet 1 of 4

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1126

Revision: P02

DYSE STRUCTURAL ENGINEERS

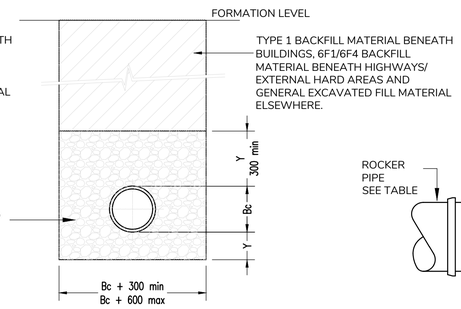
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TO BE USED WHERE COVER TO PIPE IS:
1. LESS THAN 1.2m IN TRAFFICKED AREAS
2. LESS THAN 0.90m IN FIELDS
3. LESS THAN 0.6m IN LANDSCAPED AREAS
4. LESS THAN 0.3m BENEATH BUILDING SLABS

CLASS Z BEDDING DETAIL

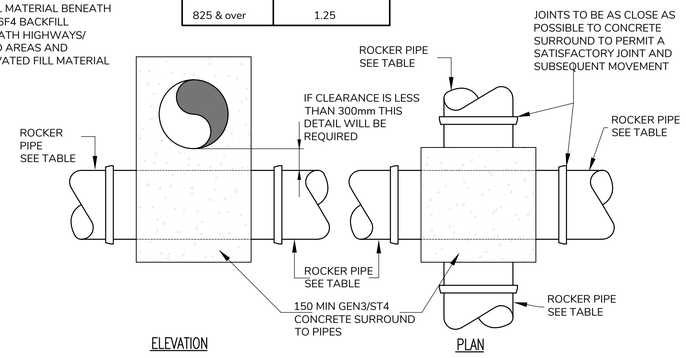
Y VALUE:
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER



CLASS S BEDDING DETAIL

Y VALUE:
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER

NOMINAL DIA. (mm)	EFFECTIVE LENGTH (m)
150 to 600	0.6
675 to 750	1.0
825 & over	1.25



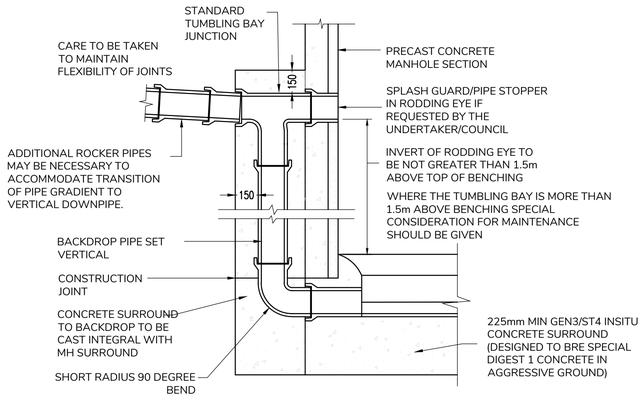
SPECIAL PIPE CROSSOVER DETAIL

REQUIRED IF CLEARANCE BETWEEN PIPES CROSSING EACH OTHER IS LESS THAN 300mm

BS EN 1610:1998 ANNEX B TABLE B.15 COARSE AGGREGATE - PIPE BEDDING							
SIEVE SIZE (mm)	PERCENTAGE BY MASS PASSING BS SIEVES FOR NOMINAL SIZES						
	GRADED AGGREGATE (mm)			SINGLE-SIZED AGGREGATE (mm)			
	40 to 5	20 to 5	14 to 5	40	20	14	10
50.0	100	-----	-----	100	-----	-----	-----
37.5	90 - 100	100	-----	85 - 100	100	-----	-----
20.0	35 - 70	90 - 100	100	0 - 25	85 - 100	100	-----
14.0	-----	-----	90 - 100	-----	-----	85 - 100	100
10.0	10 - 40	30 - 60	50 - 85	0 - 5	0 - 25	0 - 50	85 - 100
5.0	0 - 5	0 - 10	0 - 10	-----	0 - 5	0 - 10	0 - 25
2.36	-----	-----	-----	-----	-----	-----	0 - 5

RIGID PIPES BEDDING GRADING

FOR RIGID PIPES THE BEDDING SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO A MAX SIZE OF 10mm FOR 100mm PIPES; 14mm FOR 150mm PIPES; 20mm FOR 225mm TO 600mm PIPES; 40mm FOR OVER 600mm PIPES



MINIMUM DIMENSIONS REQUIRED TO CONSTRUCT BACKDROP	
PIPE DIA. (mm)	MIN DIMENSION (mm)
100	530
150	630
225	915
300	1170

TYPICAL VERTICAL BACKDROP DETAIL

PIPE ⌀	JOINT THICKNESS
< 450	18mm
450 - 1200	36mm
>1200	54mm

COMPRESSIBLE FILLER TABLE

(BITUMEN IMPREGNATED INSULATING BOARD TO BS EN 622-1 AND BS EN 622-4)

JOINTS FOR CONCRETE SURROUND TO PIPES

(AT EACH PIPE JOINT)

TRENCH WIDTHS

PIPE I.D	OVERALL TRENCH WIDTH
100	550
150	600
225	700
300	850
375	1050
450	1150
525	1200
600	1350
675	1450
750	1500
825	1600
900	1900
1050	2100
1200	2300
1350	2500
1500	2700
1800	3100

BS EN 13242, COARSE AGGREGATE (CLAUSE 4.3.2)		
CATEGORY FOR GENERAL GRADING REQUIREMENTS	Gc80-20	
CATEGORY FOR TOLERANCES AT MID-SIZE SIEVES	GTnr (NO REQUIREMENTS)	
CATEGORY PF MAXIMUM VALUES OF FINES CONTENTS	GRAVEL - F1.5 CRUSHED ROCK, RECYCLED AGGREGATE - F4	
NOMINAL PIPE DIAMETER, mm	AGGREGATE SIZE, mm	
	GRADED	SINGLE SIZED
NOT EXCEEDING 140	-	4/10
EXCEEDING 140 BUT NOT EXCEEDING 400	2/14 or 4/20	4/10, 6/14 or 10/20
EXCEEDING 400	2/14, 4/20 or 4/40	4/10, 6/14, 10/20 or 20/40

FLEXIBLE PIPE BEDDING, HAUNCHING AND SURROUND MATERIAL

Residual Risks

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Legend

Rev	Date	Description	Drw	Chk	Revd	App
P02	12/01/22	Sheet numbering updated.	ARJ	BKD	JDY	JDY
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status:
Preliminary

Client:
Towerhouse Systems

Project:
Cringle Road
Manchester

Drawing:
S104 Construction Details
Sheet 2 of 4

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1127
Revision: P02

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Proposed private off line 'Wavin Q-Bic Plus' geocellular attenuation tank or equivalent approved. For events beyond the 30yr return period. 53m x 3.6m x 0.63m deep. Vol_{max}: 112m³, IL: 64.30m. To be installed strictly in accordance with manufacturers details. Minimum 0.5m cover in landscaped area. To be subject to private management/ maintenance agreement and restrictions imposed on adjacent properties to prevent any future building works which may impact on the tanks structural stability or future access

SWMH CL 65.25 IL 63.09

FWMH CL 65.25 IL 60.53

300ø SWS

225ø FWS

225ø FWS

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6. Subbase depth of 350mm is the minimum required for loading, ground conditions and attenuation. Formation to be laid flat and therefore subbase depth will vary to suit proposed driveway gradients.

Legend

- Site Boundary
- Proposed Major Contour 250mm intervals
- Proposed Minor Contours 50mm intervals
- S104 Surface Water Sewer
- S104 Surface Water Manhole
- S104 Foul Water Sewer
- S104 Foul Water Manhole
- Existing Surface Water Sewer
- Existing Foul Water sewer
- Private Surface Water Drain
- Private Foul Water Drain
- 300ø Mini Access Chamber
- 450ø Inspection Chamber
- 1050ø Inspection Chamber
- 600ø RIDGISTORMcheck Orifice Control Chamber. 2l/s MAX.
- Rodding Eye
- ACO Rain Drain Surface Water Drainage Channel
- Polypipe Permavoid Rainwater Diffuser Unit (1062x708x150mm)
- Permeable Driveway with min 350mm Subbase Storage
- x65.82 Permeable Driveway Subbase Formation Level
- S38 Road Gully

Rev	Date	Description	Drw	Chk	Revd	App
P05	09/02/24	Re-route of drainage plots 4-11 and 12-16	BKD	JB	JDY	JDY
P04	14/12/22	Build-outs re-located	ARJ	BKD	JDY	JDY
P03	24/06/22	Plot 36/37 drainage & FFLs updated	ARJ	BKD	JDY	JDY
P02	22/03/22	Private foul drainage added	ARJ	BKD	JDY	JDY
P01	17/12/21	First issue	ARJ	BKD	JDY	JDY

Status: Preliminary

Client: Towerhouse Systems

Project: Cringle Road Manchester

Drawing: Private External Works Plot Drainage Sheet 1 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1130 Revision: P05

DYSE STRUCTURAL ENGINEERS

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Private External Works Plot Drainage
Sheet 1 of 2
1:200

Residual Risks

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Legend

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- Proposed Major Contour 250mm intervals
- Proposed Minor Contours 50mm intervals
- S104 Surface Water Sewer
- S104 Surface Water Manhole
- S104 Foul Water Sewer
- S104 Foul Water Manhole
- Existing Surface Water Sewer
- Existing Foul Water sewer
- Private Surface Water Drain
- Private Foul Water Drain
- 300Ø Mini Access Chamber
- 450Ø Inspection Chamber
- 1050Ø Inspection Chamber
- 600Ø RIDGISTORMcheck Orifice Control Chamber. 2l/s MAX.
- re65.85 Rodding Eye
- ACO Rain Drain Surface Water Drainage Channel
- Polypipe Permavoid Rainwater Diffuser Unit (1062x708x150mm)
- Permeable Driveway with min 350mm Subbase Storage
- x65.82 Permeable Driveway Subbase Formation Level
- S38 Road Gully

Rev	Date	Description	Drw	Chk	Revd	App
P05	09/02/24	Re-route of drainage plots 4-11 and 12-16	BKD	JB	JDY	JDY
P04	14/12/22	Build-outs re-located	ARJ	BKD	JDY	JDY
P03	24/06/22	Minor private drainage level updated	ARJ	BKD	JDY	JDY
P02	22/03/22	Private foul drainage added	ARJ	BKD	JDY	JDY
P01	17/12/21	First issue	ARJ	BKD	JDY	JDY

Status:

Preliminary

Client:

Towerhouse Systems

Project:

Cringle Road
Manchester

Drawing:

Private External Works
Plot Drainage
Sheet 2 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1131

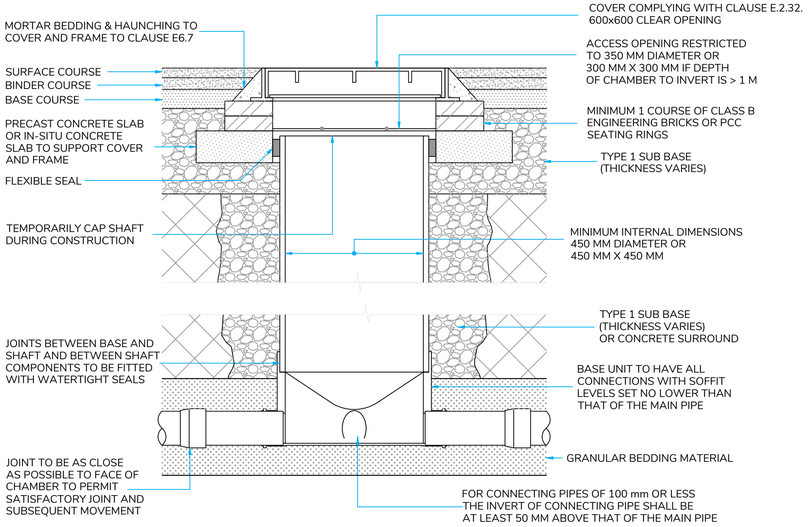
Revision: P05

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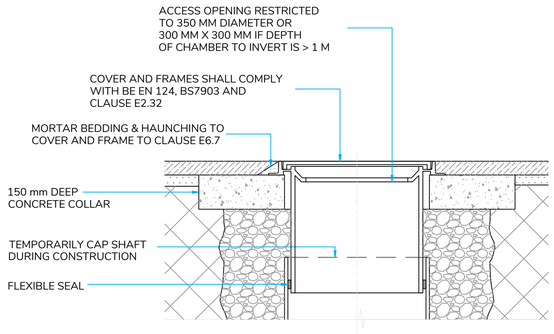
Private External Works Plot Drainage
Sheet 2 of 2
1:200

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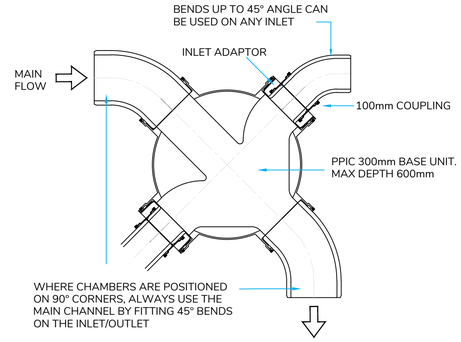
INSPECTION CHAMBER DETAIL - TYPE D (DEPTH TO SOFFIT 3m) D400 COVER

SCALE - NTS



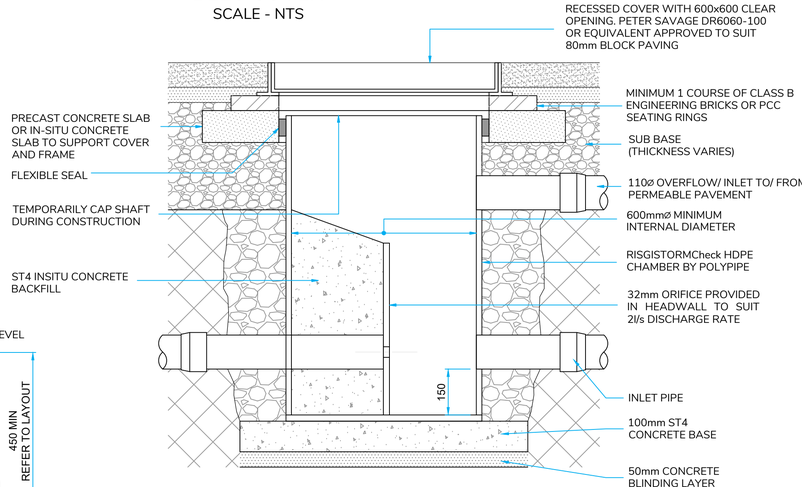
INSPECTION CHAMBER DETAIL - TYPE D B125 COVER

SCALE - NTS



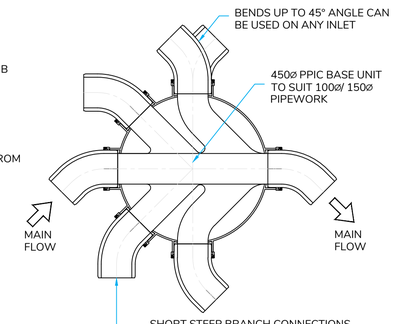
MINI PPIC BASE DETAIL

SCALE - NTS



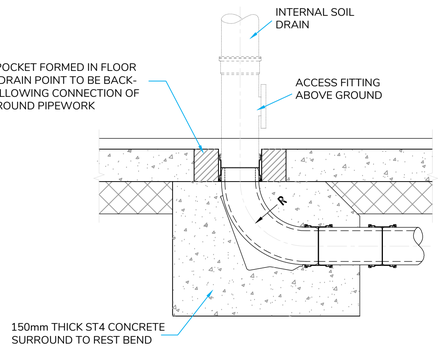
POLYPIPE RISGISTORMCheck ORIFICE CONTROL CHAMBER

SCALE - 1:10



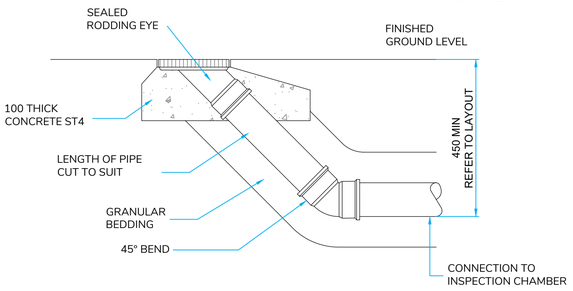
TYPE D INSPECTION CHAMBER BASE DETAIL

SCALE - NTS



TYPICAL SOIL PIPE BASE DETAIL

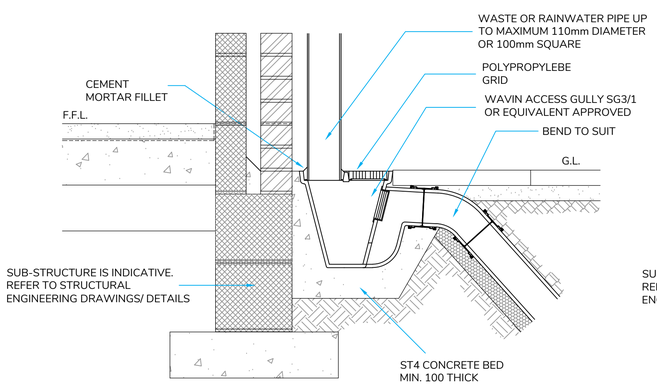
SCALE - 1:10



SEALED RODDING EYE

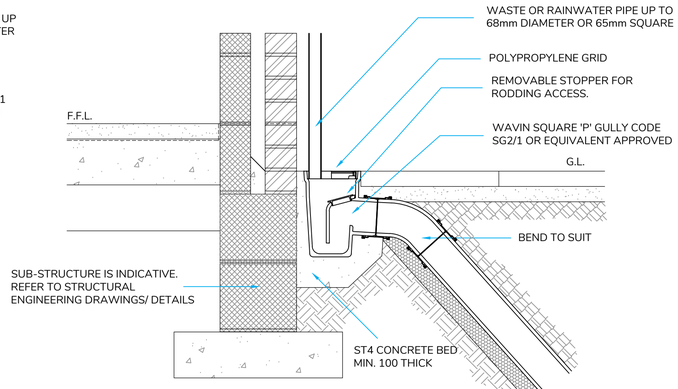
SCALE - 1:10





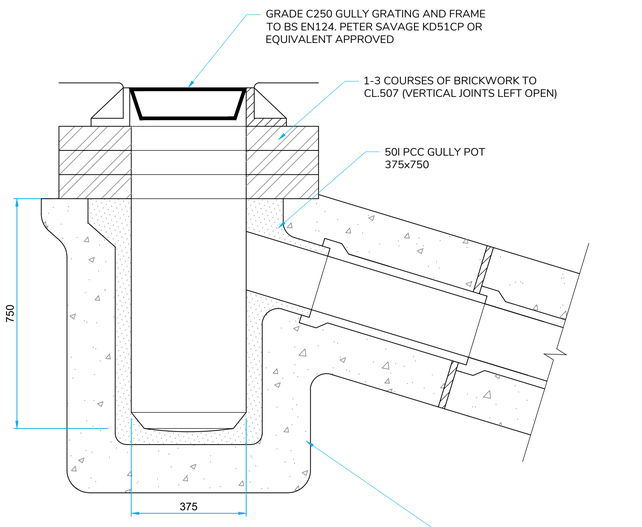
ACCESS GULLY CONNECTION DETAIL TYPE A

SCALE - NTS



ACCESS GULLY CONNECTION DETAIL TYPE B

SCALE - NTS



PRIVATE CONCRETE GULLY WITH SPIGOT OUTLET (375x750)

SCALE - 1:10

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Legend

Rev	Date	Description	Drw	Chk	Revd	App
P01	17/12/21	First issue	ARJ	BKD	JDY	JDY

Status: Preliminary

Client: Towerhouse Systems

Project: Cringle Road Manchester

Drawing: Private External Works Drainage Construction Details Sheet 1 of 2

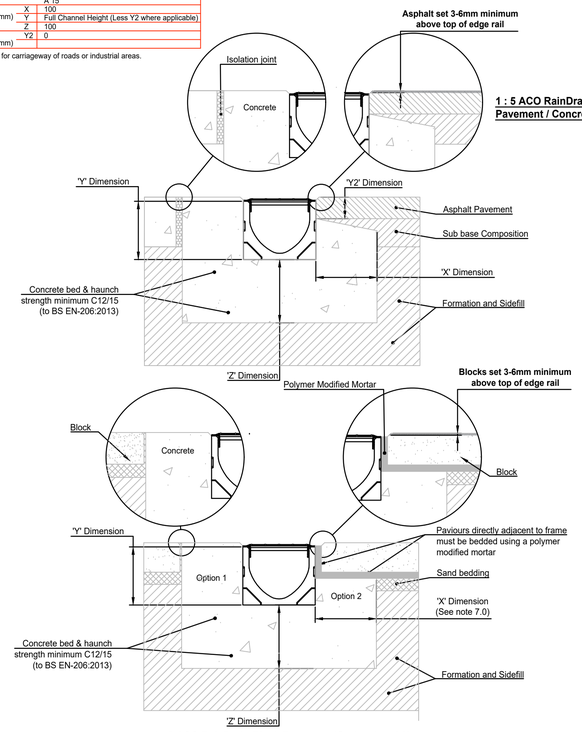
Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1132 Revision: P01

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Load Class		A 15
Minimum Dimensions (mm)	X	100
	Y	Full Channel Height (Less Y2 where applicable)
	Z	100
Maximum Dimensions (mm)	Y2	0

Not suitable for carriageway of roads or industrial areas.



1 : 5 ACO RainDrain Asphalt Pavement / Concrete Pavement

1 : 5 ACO RainDrain Block Pavement (Option 1 and 2)

NBS Specification:
ACO RainDrain® should be specified in section Q10:180. Assistance in completing this clause can be found in ACO Technologies product entries in NBS Plus, or a model specification can be downloaded from www.aco.co.uk. For further assistance, contact the ACO Water Management Design Services Team.

Best Practice and Workmanship:
ACO can give guidance with respect to the most suitable methods of installation for each of the products in the ACO RainDrain® range. ACO RainDrain® should be installed using levels of workmanship that accord with the National Code of Practice (UK: BS8000-0:2014) and in keeping with BS EN 1433:2002 (Drainage channels for vehicular and pedestrian areas).

Detailed installation statements and methodologies will vary for all sites as each will have different aspects deserving particular consideration, consequently the relevant approvals should be sought from the consulting engineer and/or the installer.

1.0 Load Class
Installation recommendations shown are ACO minimum recommendations for BS EN 1433:2002 load class requirements.

2.0 Ground Conditions
The long term performance of a channel installation to sustain vertical and lateral loads depends upon A) ground conditions B) stability of the adjacent pavement and C) a durable concrete bed and surround. The recommended installation detail may require the minimum dimensions to be revised to achieve site specific load class requirements (referred to in 1.0 above).

3.0 Cutting and Jointing
Mitre joints are formed by cutting the channels to the required angle and butting them together with appropriate sealant (e.g. Sikaflex 11FC or similar) or ACO Repair Kit. Where possible 90° joints and T's should be formed so that gratings do not have to be cut. Angles can be formed by connecting them using proprietary PVCu pipework attached to ACO inlet/outlet endcaps. For further details please contact ACO Design Services Team.

4.0 Isolation Joints
The channel must be isolated from the surrounding environment. An isolation joint must be positioned up to 1500mm from the channel wall. Any dowel bars must be located no nearer than 150mm from the channel wall. Other isolation joints in surrounding slab must be continued through the channel. Additional crack control may be required to comply with specifier requirements.

5.0 Installation into in-situ Slab
Where a channel is to be installed into an existing concrete slab it is necessary to cut a suitably sized pocket in the slab. The channel will then need to be bedded in polymer modified mortar of 25mm minimum thickness (this may vary depending on the type of mortar used). Engineering advice may be necessary.

6.0 Temporary Installation
A channel installation is not complete until the final surfacing is laid. In any temporary condition, i.e. with the channel walls projecting above adjacent ground, site traffic should not cross channels. Loose boards, stone fill or cover plates will not protect the channel walls or grating. A temporary channel crossing should be formed by raising the ground level locally, to 3 - 6mm above top of edge rail, either side of a channel for a distance of 750 to 1000mm, to form ramps. Note that the channel load class should be adequate to carry the site traffic.

7.0 Block Pavements
The channel must be supported laterally. Blocks laid directly against a channel must be laid as a soldier course and restrained from movement by bedding securely on the concrete haunch e.g. by using a polymer modified mortar for bed and perpendicular joints (e.g. RONAFIX mortar mix C or similar). Blocks or slabs bedded on sand remote from the channel should be set at a higher level to compensate for possible settlement of the paving in service.

8.0 Grate Locking System
Gratings should be securely fixed to the channel, where required, using an appropriate grate lock system (where available).

9.0 Channel Protection
Avoid contact between compaction equipment and top of ACO channel edge rail. The installer must ensure that the finished surface level lies above the top of the edge rail (by at least 3-6mm). Covering or protecting the grating, before concreting the haunch or laying blocks, removes the time and cost associated with cleaning the channel and grating of cement material and embedded stones. (Please note that ACO channels must be installed with the grating in place to prevent deformation of the channel).

10.0 Watertight Installation to BS EN 1433:2002
Where ACO channel joints/fittings and channel/pavement interfaces are to be sealed, an appropriate sealant should be used (e.g. Sikaflex 11FC or similar). Guidance on the necessary surface preparation and/or priming should be sought from the sealant manufacturer.

For Guidance a typical method of application follows:
- The end faces of the channels are to be sound and free from dust, oil, and grease, with any loose material or dirt removed, e.g. by mechanical wire brush. No water drops should be evident.
- Using a standard cartridge gun, apply the sealant evenly and with no flaws. The detail on the ends of a channel varies from one product to another:
- Products with a basically flat face - apply the sealant in a layer approximately 5mm thick to one face of the joint.
- Products with a sealing groove within the end face - apply the sealant in a bead of approximately 10mm diameter into the sealing groove.
- Products with a sealing groove following the inside shape of the channel - apply the sealant to the end face of the channel and to the sealant groove, such that when the joint is completed, the sealant will both cover the end face and fill the groove.
- The channel unit should be placed on the prepared concrete bedding and pressed against the previously placed channel unit. A sealed joint of approximately 1-2mm width should be formed between adjacent channel units.
- Excess sealant should be wiped from the inside face of the channel to leave a smooth finish.
- The sealant is to be left to cure for 24 hours, during which time the sealant should be kept as dry as possible.

Note: Galvanised steel and iron products have good corrosion resistance to concrete and mortar products but may experience corrosion if high chloride and/or sulphate content is present. Use only good quality concrete and consider using corrosion inhibitors where necessary. The use of protective coatings, such as paint, can minimise the risk of corrosion.

Version	Date	Description	Name

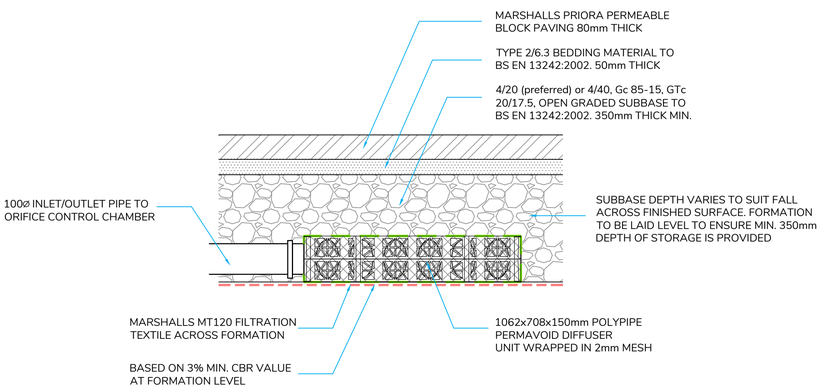
ACO Technologies plc
ACO Business Park
Hitchin Road
Shefford
Bedfordshire
SG17 5TE, UK
Tel: 01462 816666
www.aco.co.uk

Drawing Number: 22269 — Revision: A

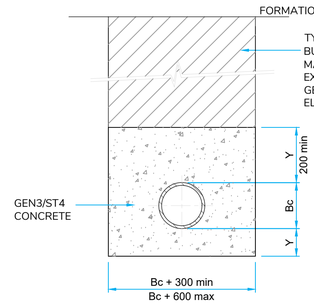
Title: ACO RAINDRAIN CHANNEL INSTALLATION DETAIL DRAWING

Created by: IM	Released by: TS	Projection: ISO-A	Units: mm / Format: A3
Created at: 1.3.2016	Released at: 30.9.2016		Scale: 1 : 5
Replacement for: E1-E01-011-3	Replaced by:		Sheet: 1 of 1

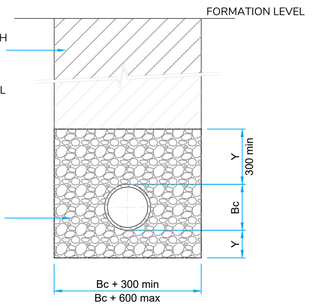
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PERMEABLE DRIVEWAY OUTFALL DETAIL
SCALE - NTS



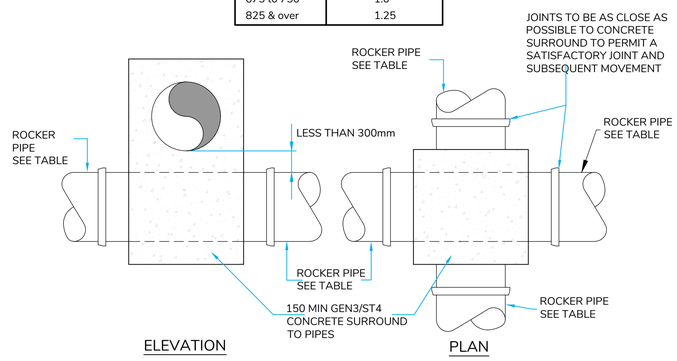
CLASS Z BEDDING DETAIL
Y VALUE:
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER



CLASS S BEDDING DETAIL
Y VALUE:
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER

CLASS Z TO BE USED WHERE COVER TO PIPE IS:
1. LESS THAN 0.9m IN TRAFFICKED AREAS
3. LESS THAN 0.6m IN LANDSCAPED AREAS
4. LESS THAN 0.3m BENEATH BUILDING SLABS

NOMINAL DIA. (mm)	EFFECTIVE LENGTH (m)
150 to 600	0.6
675 to 750	1.0
825 & over	1.25

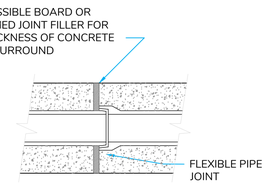


ELEVATION — PLAN

SPECIAL PIPE CROSSOVER DETAIL
REQUIRED IF CLEARANCE BETWEEN PIPES CROSSING EACH OTHER IS LESS THAN 300mm

PIPE ⌀	JOINT THICKNESS
< 450	18mm
450 - 1200	36mm
>1200	54mm

COMPRESSIBLE FILLER TABLE
(BITUMEN IMPREGNATED INSULATING BOARD TO BS EN 622-1 AND BS EN 622-4)



JOINTS FOR CONCRETE SURROUND TO PIPES
(AT EACH PIPE JOINT)

BS EN 13242, COARSE AGGREGATE (CLAUSE 4.3.2)		
CATEGORY FOR GENERAL GRADING REQUIREMENTS	Gc80-20	
CATEGORY FOR TOLERANCES AT MID-SIZE SIEVES	GTnr (NO REQUIREMENTS)	
CATEGORY PF MAXIMUM VALUES OF FINES CONTENTS	GRAVEL - F1.5 CRUSHED ROCK, RECYCLED AGGREGATE - F4	
NOMINAL PIPE DIAMETER, mm	AGGREGATE SIZE, mm	
	GRADED	SINGLE SIZED
NOT EXCEEDING 140	-	4/10
EXCEEDING 140 BUT NOT EXCEEDING 400	2/14 or 4/20	4/10, 6/14 or 10/20
EXCEEDING 400	2/14, 4/20 or 4/40	4/10, 6/14, 10/20 or 20/40

FLEXIBLE PIPE BEDDING, HAUNCHING AND SURROUND MATERIAL

⚠ Residual Risks ⚠

These drawings should be read in conjunction with the designer's risk assessment (DRA) which communicates significant residual design risks that have been identified and suggests mitigating actions.

General Notes

1. All dimensions are in metres unless stated otherwise.
2. This drawing shall be read in conjunction with all other relevant engineering details, drawings and specifications.
3. Any discrepancies should be reported to the engineer immediately so that clarification can be sought prior to the commencement of work.
4. All work is to be carried out in accordance with the specification for highways works and local authority guidance.
5. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

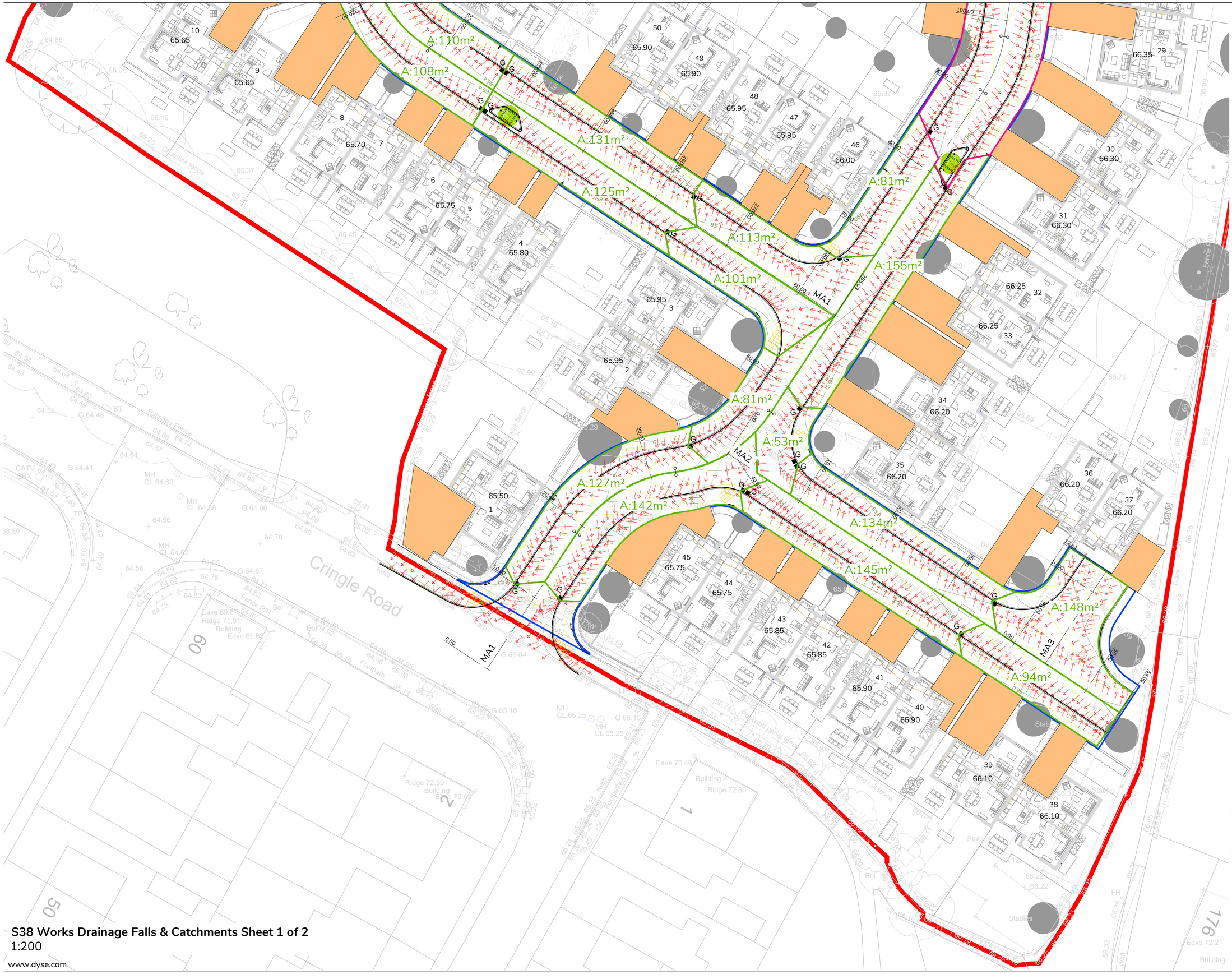
Legend

Rev	Date	Description	Drw	Chk	Revd	App
P01	17/12/21	First issue	ARJ	BKD	JDY	JDY

Status: Preliminary
Client: Towerhouse Systems
Project: Cringle Road Manchester
Drawing: Private External Works Drainage Construction Details Sheet 2 of 2
Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1133 — Revision: P01

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Residual Risks

These drawings should be read in conjunction with the designer's risk assessment (DRA) which communicates significant residual design risks that have been identified and suggests mitigating actions.

General Notes

1. All dimensions are in metres unless stated otherwise.
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3. Any discrepancies should be reported to the engineer immediately so that clarification can be sought prior to the commencement of work.
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5. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

Legend

- Site Boundary
- S38 Adoption Boundary
- Proposed Major Contour 250mm Intervals
- Proposed Minor Contours 50mm Intervals
- Proposed Fall Direction
- Road Gully Catchment Area
- Private Permeable Driveway

P08	20/07/23	Technically Approved	BKD	BKD	JDY	JDY
P07	07.06.23	LHA Comments Incorporated	BKD	BKD	JDY	JDY
P06	26.04.23	LHA Comments Incorporated	BKD	JDY	JDY	JDY
P05	14.12.22	Gully's & uild-outs re-located	ARJ	BKD	JDY	JDY
P04	08.11.22	S38 Boundary updated	ARJ	BKD	JDY	JDY
P03	24.06.22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P02	06.05.22	Catchment areas updated	ARJ	BKD	JDY	JDY
P01	28.03.22	First Issue	ARJ	BKD	JDY	JDY

Status:
Technically Approved

Client:
Towerhouse Systems

Project:
Cringle Road
Levenshulme

Drawing:
S38 Works
Proposed Drainage Falls & Catchments
Sheet 1 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1118 Revision: P08

Engineered:	Drawn:	Checked:	Approved:
ARJ	ARJ	JY	JY

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S38 Works Drainage Falls & Catchments Sheet 1 of 2
1:200

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⚠ Residual Risks ⚠

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General Notes

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4. All work is to be carried out in accordance with the specification for highways works and local authority guidance.
5. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

Legend

- Site Boundary
- S38 Adoption Boundary
- Proposed Major Contour 250mm Intervals
- Proposed Minor Contours 50mm Intervals
- Proposed Fall Direction
- Road Gully Catchment Area
- Private Permeable Driveway

P07	20/07/23	Technically Approved	BKD	JDY	JDY	JDY
P06	07/06/23	LHA Comments Incorporated	BKD	JDY	JDY	JDY
P05	26/04/23	LHA Comments Incorporated	BKD	JDY	JDY	JDY
P04	14.12.22	Gully's & build-outs re-located	ARJ	BKD	JDY	JDY
P03	24.06.22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P02	06.05.22	Catchment areas updated	ARJ	BKD	JDY	JDY
P01	28.03.22	First Issue	ARJ	BKD	JDY	JDY

Status:
Technically Approved

Client:
Towerhouse Systems

Project:
Cringle Road
Levenshulme

Drawing:
S38 Works
Proposed Drainage Falls & Catchments
Sheet 2 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1119 Revision: P07

Engineered:	Drawn:	Checked:	Approved:
ARJ	ARJ	JY	JY

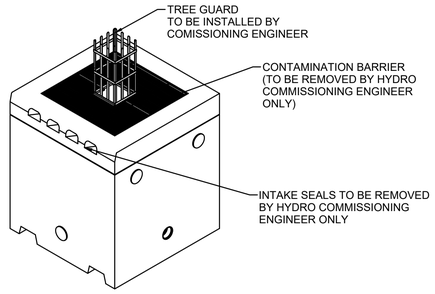
DYSE STRUCTURAL ENGINEERS

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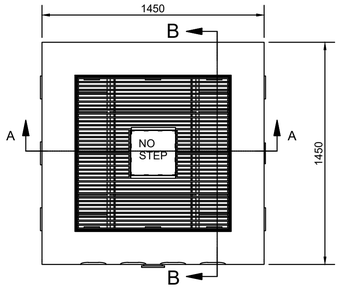
S38 Works Drainage Falls & Catchments 2 of 2
1:200

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1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT GENERAL ARRANGEMENT & DETAIL DRAWINGS.
2. ALL COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE PRODUCTION SPECIFICATION HRD-FM09/15.
3. THE ITEMS SHOWN ON THIS DRAWING SHALL BE MANUFACTURED FROM CONCRETE UNLESS STATED OTHERWISE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS STATED OTHERWISE.
5. ALL UN-USED INLET/OUTLETS TO BE FITTED WITH BLANKING PLUGS.



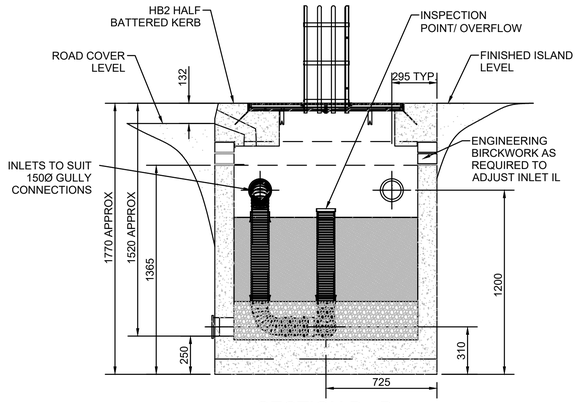
ISOMETRIC VIEW



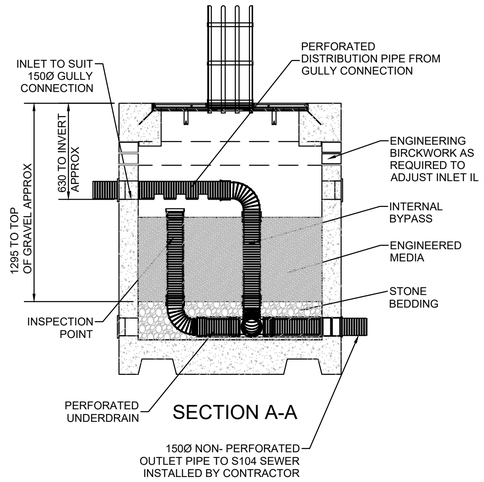
PLAN VIEW



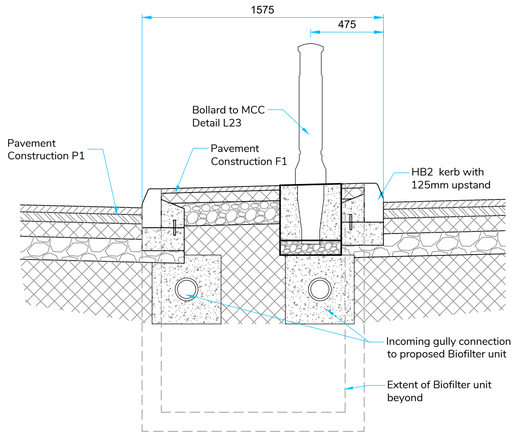
TYPICAL HYDRO BIOFILTER ARRANGEMENT
SCALE (NTS)



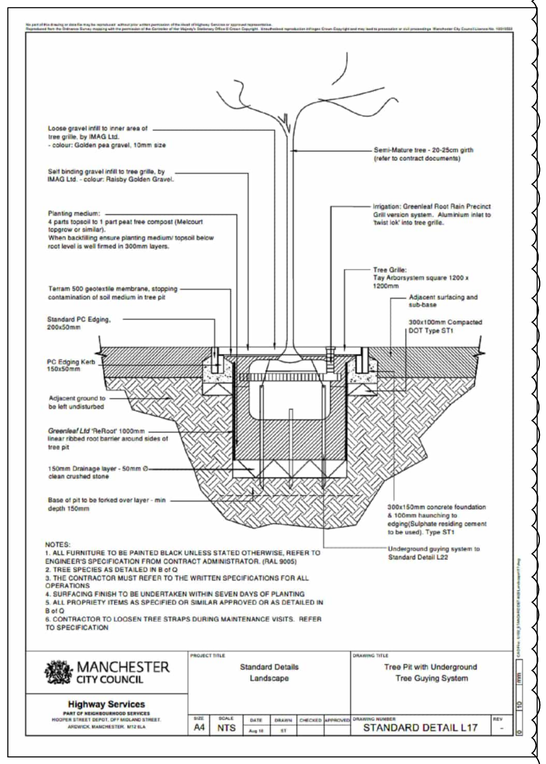
SECTION B - B



SECTION A-A



TYPICAL SECTION THROUGH
BIOFILTER ISLAND
SCALE 1:20

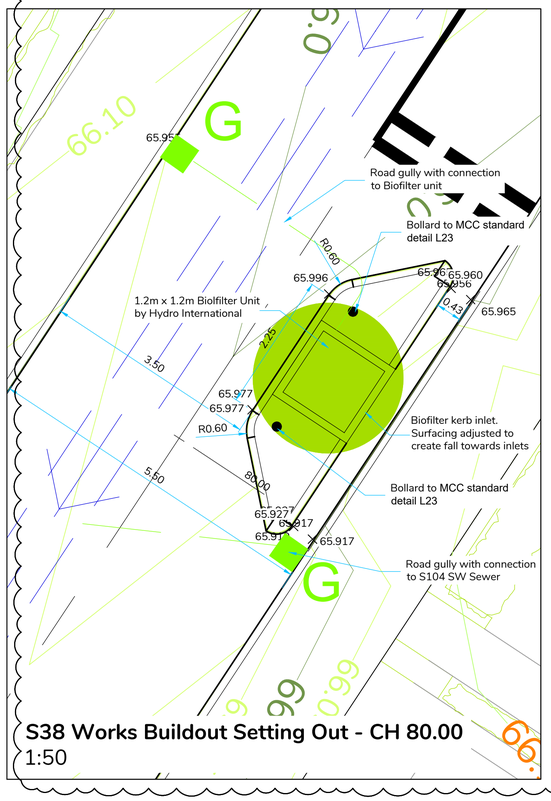


Residual Risks

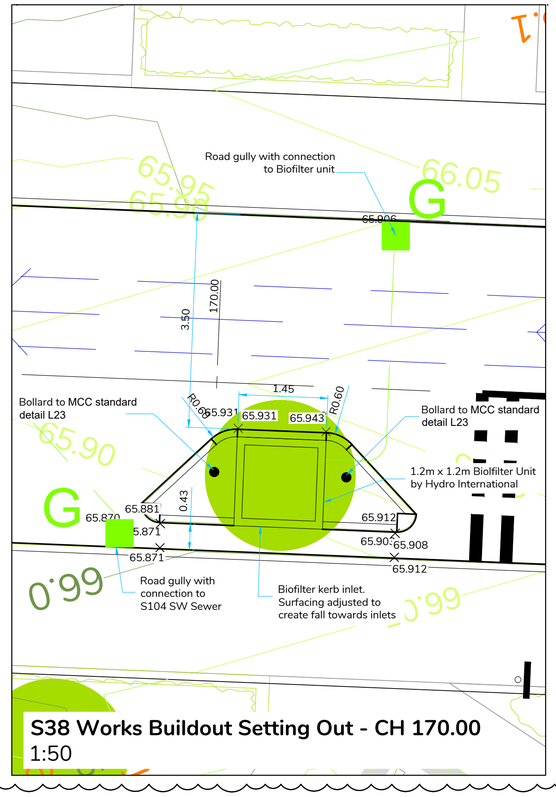
These drawings should be read in conjunction with the designer's risk assessment (DRA) which communicates significant residual design risks that have been identified and suggests mitigating actions.

General Notes

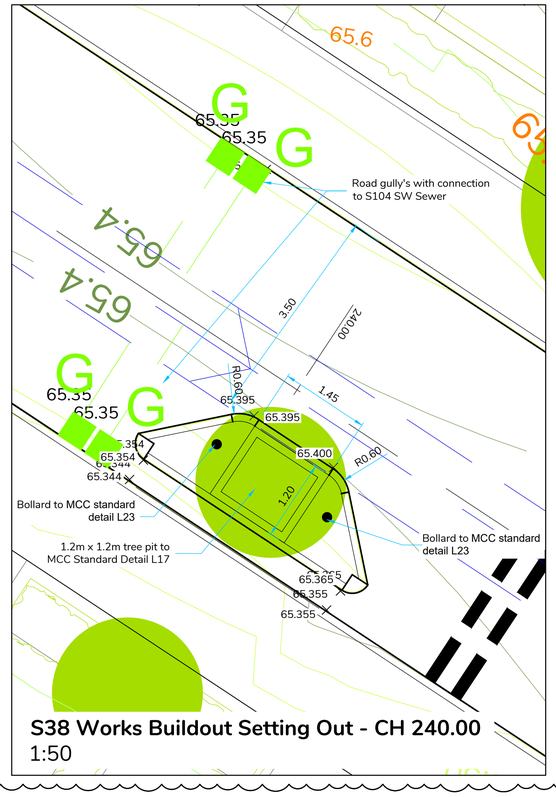
1. All dimensions are in metres unless stated otherwise.
2. This drawing shall be read in conjunction with all other relevant engineering details, drawings and specifications.
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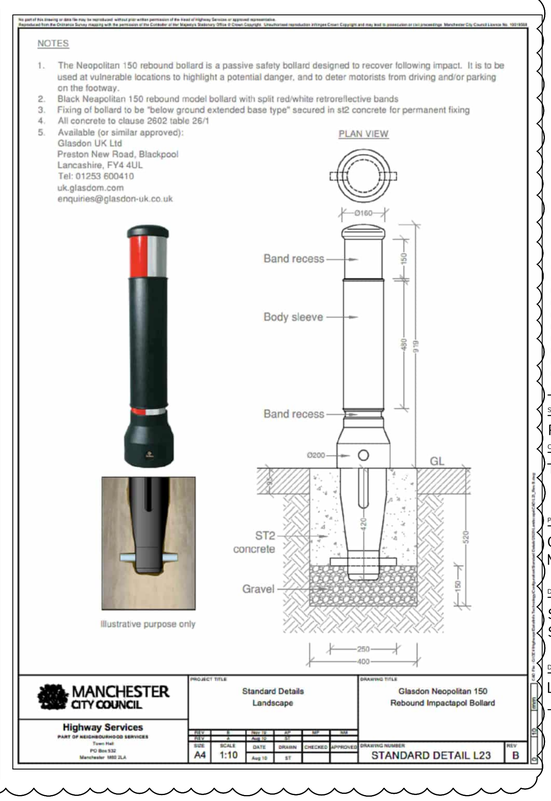
S38 Works Buildout Setting Out - CH 80.00
1:50



S38 Works Buildout Setting Out - CH 170.00
1:50



S38 Works Buildout Setting Out - CH 240.00
1:50



Rev	Date	Description	Drw	Chk	Revd	App
P10	07/06/23	LHA Comments Incorporated	BKD	BKD	JDY	JDY
P09	26/04/23	LHA Comments Incorporated	BKD	BKD	JDY	JDY
P08	14/12/22	Build-outs updated	ARJ	BKD	JDY	JDY
P07	08/11/22	Bollard & roadmarkings added	ARJ	BKD	JDY	JDY
P06	24/06/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P05	06/06/22	MCC L23 Bollard Detail added	ARJ	BKD	JDY	JDY
P04	06/05/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P03	26/04/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P02	28/03/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status:
Preliminary

Client:
Towerhouse Systems

Project:
Cringle Road
Manchester

Drawing:
S38 Construction Details
Sheet 2 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1116

Revision: P10

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STRUCTURAL ENGINEERS

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Exceedance Flow Paths
1:300

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Residual Risks

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5. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

Legend

- Site Boundary
- Proposed Major Contour 250mm intervals
- Proposed Minor Contours 50mm intervals
- S104 Surface Water Sewer
- S104 Surface Water Manhole
- S104 Foul Water Sewer
- S104 Foul Water Manhole
- Existing Surface Water Sewer
- Existing Foul Water sewer
- Private Surface Water Drain
- Private Foul Water Drain
- 300ø Mini Access Chamber
- 450ø Inspection Chamber
- 600ø RIDGISTORMcheck Orifice Control Chamber. 2l/s MAX.
- re65.85 Rodding Eye
- Surface Water Drainage Channel
- Polypipe Permavoid Rainwater Diffuser Unit
- Permeable Car Park with min 350mm Subbase Storage
- G S38 Road Gully
- Flood Flow Route Exceedance Events beyond the 100yr +40% Return Period

Rev	Date	Description	Drw	Chk	Revd	App
P01	12/01/22	First issue	ARJ	BKD	JDY	JDY

Status:
Preliminary

Client:
Towerhouse Systems

Project:
Cringle Road
Manchester

Drawing:
Exceedance Flow Paths

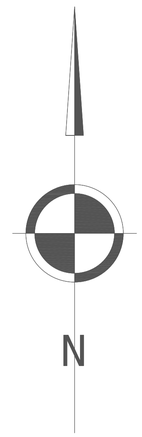
Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1136
Revision: P01

DYSE STRUCTURAL ENGINEERS

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Cringle Rd Drainage Layout - As Built
As approved by United Utilities







Legend/Notes:

Foul Sewer
SW Sewer

INVEK SURVEYS LTD.
Warrington Business Park, Long Lane, Warrington, Cheshire, WA2 8TX
Tel: 01925 244376 Fax: 01925 241517
Email: kevin@invek.com – www.invek.com

Client
Tower House System Ltd

Drawing Title
Cringle Rd Levenshulme
Drainage Layout

Scale(s) N.T.S	Drawn PW
Date 22.06.26	Checked RD
Job Number 2461	Approved KN

Sheet Size, Drawing Number & Revision
A1_2461/01_Rev_01

Appendix D - Specialist Supplier Information, Product Data and Certificates

This appendix contains specialist supplier information, product data, material certificates and completion certificates relevant to the SuDS verification.

- D1 - StormForce Completion Certificate for the offline attenuation tank.
- D2 - STORMFORCE Warranty Release Agreement for the offline attenuation tank.
- D3 - Driveway sub-base stone material certificate / gradation analysis.
- D4 a - SEL Environmental chamber approval drawings for driveway orifice-control chambers. (Units 2-14)
- D4 b – SEL Invoice for Driveway Orifice-Control Chambers (Units 2-14)
- D5 - Permavoid rainwater diffuser product information.
- D6 - Hydro-Brake / main flow-control device drawing and technical information.
- D7 - Hydro Biofilter design data and supplier information.
- D8 a – Hydro Biofilter Commissioning Reports – Unit No. 1 of 2
- D8 b – Hydro Biofilter Commissioning Reports – Unit No. 2 of 2
- D9 – United Utilities S104 Provisional Certificate
- D10 – Confirmation of Delivery of Flow Control

D1 - StormForce Completion Certificate for offline attenuation tank

2
2

STORM FORCE™

5 YEAR INSTALLATION WARRANTY

Completion Certificate

This certificate relates to the following StormForce installation.

Client: Towerhouse Systems Ltd **Date:** 20th October 2023

Project: SFNG23909 – Cringle Road

Site address: Shores Fold, Cringle Road, Levenshulme, Manchester, M19 2RR

Postcode:

Signed on behalf of Wavin

[redacted]

Mike Ward
Territory Director
Wavin UK & Ireland

This certificate is issued in accordance with the collateral warranty issued on the same date.
Please retain this certificate along with the collateral warranty as both documents are required in the event of a claim.

wavin

D2 - StormForce Warranty Release Agreement for the offline attenuation tank

wavin
StormForce

STORMFORCE WARRANTY & RELEASE AGREEMENT

relating to the project at

Cringle Road, Manchester

between

WAVIN LIMITED

and

STARK BM UK LTD T/A JEWSON CIVILS

and

TOWERHOUSE SYSTEMS LTD

StormForce

DATED 13th October 2023

PARTIES

(1) **WAVIN LIMITED** (Company No. 00405836) whose registered office is at Wavin Edlington Lane, Edlington, Doncaster, South Yorkshire, DN12 1BY (**Wavin**);

(2) **STARK BM UK LTD T/A JEWSON CIVILS**, (Company No. 01647362) whose registered office is at Merchant House, Binley Business Park, Harry Weston Road, Coventry, CV3 2TT (**Merchant**); and

(3) **TOWERHOUSE SYSTEMS LTD** (Company No. 07294926) whose registered office is at Bailey Oster, Meller House, 65-81 St Petersgate, Stockport, SK1 1DS (**Customer**).

Background

(A) By the Contract, the Merchant has employed Wavin to carry out and complete the Works.

(B) The Customer has an interest by virtue of being the customer on whose behalf the Merchant has employed Wavin.

(C) In consideration of the payment of £1 (one pound) (receipt of which is hereby acknowledged by Wavin), Wavin has agreed to enter into this Agreement for the benefit of the Customer and the Customer has agreed to waive any rights to pursue the Merchant for any claims arising in respect of the design and installation of the Works.

OPERATIVE PROVISIONS

1. DEFINITIONS AND INTERPRETATION

1.1 In this Agreement, all terms shall have the respective meanings ascribed to them in the Contract unless otherwise stated. The following definitions shall also apply, save where the context otherwise requires:

Contract: The purchase order referencing the Wavin StormForce quote SF(NG)23909 between (1) the Merchant and (2) Wavin incorporating the attached Storm Force Terms and Conditions of Sale (and any further agreement varying, amending or supplementing the Contract) under which Wavin has agreed to carry out and complete the Works

Group Company: in relation to a company, from time to time its subsidiary undertakings of any tier, its parent undertaking of any tier and any other subsidiary undertaking of any such parent undertaking ("subsidiary undertaking" and "parent undertaking" having the meanings ascribed to them by section 1162 of the Companies Act 2006 (as amended)).

1.2 Headings and titles in this Agreement are for ease of reference only and are not to be taken into account in the construction or interpretation of this Agreement. Unless the contrary intention appears, references in this Agreement to numbered clauses are references to the relevant clause in this Agreement.

1.3 Words importing the singular meaning shall include, where the context so admits, the plural meaning and vice versa. Words denoting the masculine gender shall include the feminine and

neuter genders and words denoting natural persons shall include companies, corporations, partnerships, and firms and all such words shall be construed interchangeably in that manner.

1.4 Any reference in this Agreement to any statutes, statutory instruments, or law includes any statute, statutory instruments, or law from time to time in force that amends, consolidates, supplements, or replaces them, and reference to a statute includes statutory instruments, regulations and codes of practice made pursuant to it.

1.5 Any reference to this Agreement or to any other document shall include (where the context so requires) any permitted variation, amendment or supplement to such document.

1.6 Subject always to clause 6, any non-enforcement or delay in enforcement by the Customer of any right shall not be construed as a waiver of such right and shall not affect the ability of the Customer to subsequently exercise that right.

1.7 No variation or amendment to this Agreement shall be effective unless made in writing and signed by the parties.

2. WAVIN'S WARRANTIES

2.1 Wavin warrants and undertakes to the Customer that it has observed and performed and shall continue to observe and perform each and all of its obligations and duties under or arising out of the Contract in accordance with the terms of the Contract, provided always that:

2.1.1 Wavin shall owe no greater obligations to the Customer under this clause 2.1 as it would owe (but excluding set-offs or counterclaims) if the Customer had been named as a joint Merchant with the Merchant under the Contract; and

2.1.2 Wavin shall be entitled in any proceedings under this clause 2.1 to rely on any limitation in the Contract and to raise the equivalent rights in defence of liability as it would have if the Customer had been named as a joint Merchant with the Merchant under the Contract.

2.2 Without limiting clause 2.1, Wavin warrants to the Customer that:

2.2.1 in the performance of Wavin's duties and obligations under or arising from the Contract in respect of design, it has exercised and shall continue to exercise all reasonable skill and care expected of an experienced designer in the relevant area of design;

2.2.2 no materials will be used in or specified for use in, or otherwise incorporated as part of the Works, which are Deleterious; and

2.2.3 the Works have been and shall be performed in accordance with good industry practice in Wavin's industry, profession or trade and in all respects in accordance with the Contract.

2.3 Wavin acknowledges that the Customer has relied and shall continue to rely upon the warranties given by Wavin under this clause 2.

3. COPYRIGHT

3.1 Wavin grants to the Customer, with full title guarantee, an irrevocable, non-exclusive, non-terminable, royalty-free licence to copy and make full use of any Deliverables for any purpose relating to the Project. Such licence carries the right to grant sub-licences. The licence in this

clause 3.1 shall carry the right to grant sub-licences and shall be freely transferable to third parties without Wavin's consent.

3.2 The Customer acknowledges that Wavin shall not be liable for the consequences of any use of any or all of the Deliverables or handover documents for any purpose other than that for which they were prepared by or on behalf of Wavin.

4. INSURANCE

4.1 Wavin warrants and undertakes to the Customer that it shall (where required) take out and maintain the insurances it is required to take out and maintain pursuant to and in accordance with the terms and conditions of the Contract. Wavin warrants to the Customer that he has observed and shall continue to observe all the conditions attached to such insurances.

4.2 Notwithstanding clause 4.1 and without limiting its other obligations under this Agreement or otherwise at law, Wavin shall maintain professional indemnity insurance from the date of commencement of the Works to 6 years from the Date of Practical Completion of the Works with the limit of indemnity of not less than £ 2 million in the annual aggregate, provided that such insurance continues to be available on reasonable terms and at commercially reasonable rates to contractors carrying out works substantially similar to the Works.

4.3 Wavin shall, on reasonable request, produce documentary evidence to show compliance with clauses 4.1 and 4.2.

5. ASSIGNMENT

The Customer may at any time, without the consent of Wavin being required, assign the benefit of this Agreement and any rights arising under it by way of absolute legal assignment to any person on two occasions and in addition may assign or charge the benefit of this Agreement to a Group Company, provided that assignments or charges to a Group Company of the Customer shall not count towards the two permitted assignments.

6. WAIVER OF CLAIMS AGAINST MERCHANT

6.1 In consideration for receiving the benefit of this Agreement, to the extent permissible by law, the Customer:

6.1.1 agrees that its sole course of action for any claim arising from or relating to the Works shall be against Wavin under the terms of this Agreement;

6.1.2 accordingly, irrevocably waives any right to bring any claim or demand against the Merchant (whether in contract, tort or otherwise); and

6.1.3 releases, forever discharges and indemnifies the Merchant from all and any claims and demands under or in connection with the Works.

7. NOTICES

7.1 Any notice given under this Agreement shall be in writing and service shall be effected at the office from which the recipient is carrying on business in relation to the Works (or as otherwise notified in writing to the other party) either:

7.1.1 personally, when service shall be deemed effective on delivery;

7.1.2 by pre-paid first class post, recorded delivery or other next working day delivery service, when service shall be deemed effective on the second day after posting (exclusive);

provided that, if deemed receipt would occur in the place of deemed receipt on a Saturday or Sunday or a public holiday when banks are not open for business, deemed receipt is deemed to take place at 9.00 am on the day when business next starts in the place of receipt.

7.2 The provisions of this clause 7 shall not apply in relation to the service of any process in any legal action or proceedings arising out of or in connection with this Agreement.

8. LIMITATION

The Customer may not commence any legal action against Wavin under this Agreement after six years from the Date of Practical Completion.

9. CONTRACT (RIGHTS OF THIRD PARTIES) ACT 1999

Except as expressly stated in this Agreement, this Agreement shall not and shall not purport to confer on any third party any benefit or right to enforce any term of this Agreement whether by way of the Contract (Rights of Third Parties) Act 1999 or otherwise.

10. GOVERNING LAW AND DISPUTES

The application and interpretation of this Agreement shall in all respects be governed by English law and any dispute or difference arising under or in respect of this Agreement shall be subject to the exclusive jurisdiction of the English courts.

THIS AGREEMENT has been entered into on the date stated at the beginning of it.

wavin
StormForce

Signed by or on behalf of **STARK BM UK LTD T/A JEWSON CIVILS**

[redacted]

Name: DIGER NOCAN

Position: SALES

Date: 13TH OCTOBER 2023

Signed by or on behalf of **WAVIN LIMITED**

[redacted]

Name: Mr S Archer

Position: National Contracts Manager

Date: 13th October 2023

Signed by or on behalf of **TOWERHOUSE SYSTEMS LTD**

[redacted]

Name: N L MASKREY

Position: DIRECTOR

Date: 16-10-23

D3 - Driveway sub-base stone material certificate / gradation analysis.

GRADATION ANALYSIS TEST REPORT

Product: **10/20mm Single Size**

Material Code: **1020**

Supplied by: Dowlow Quarry

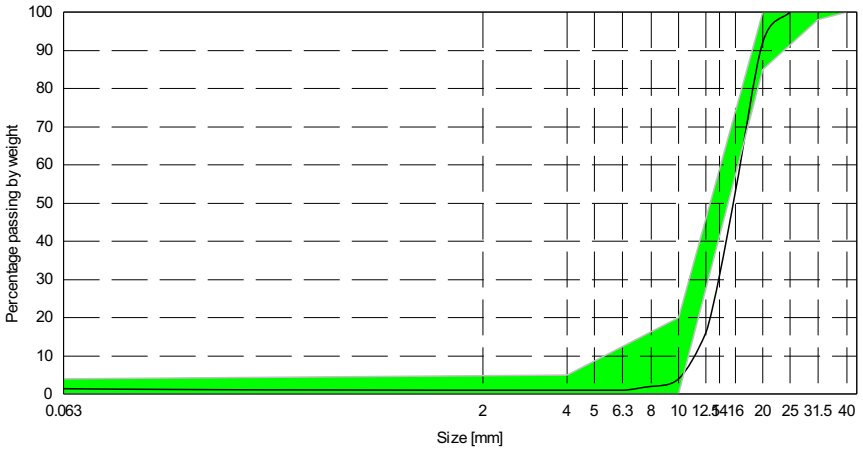
Customer:

Site Address:

Material type: BS EN 12620 / Limestone

Test method: BS EN 933-1:2012

Sample number	34628
Ticket No	
Sampled by	Mellor
Date Sampled	18/12/2023
Sample location	Asphalt Bay
Weather Conditions	Cloudy



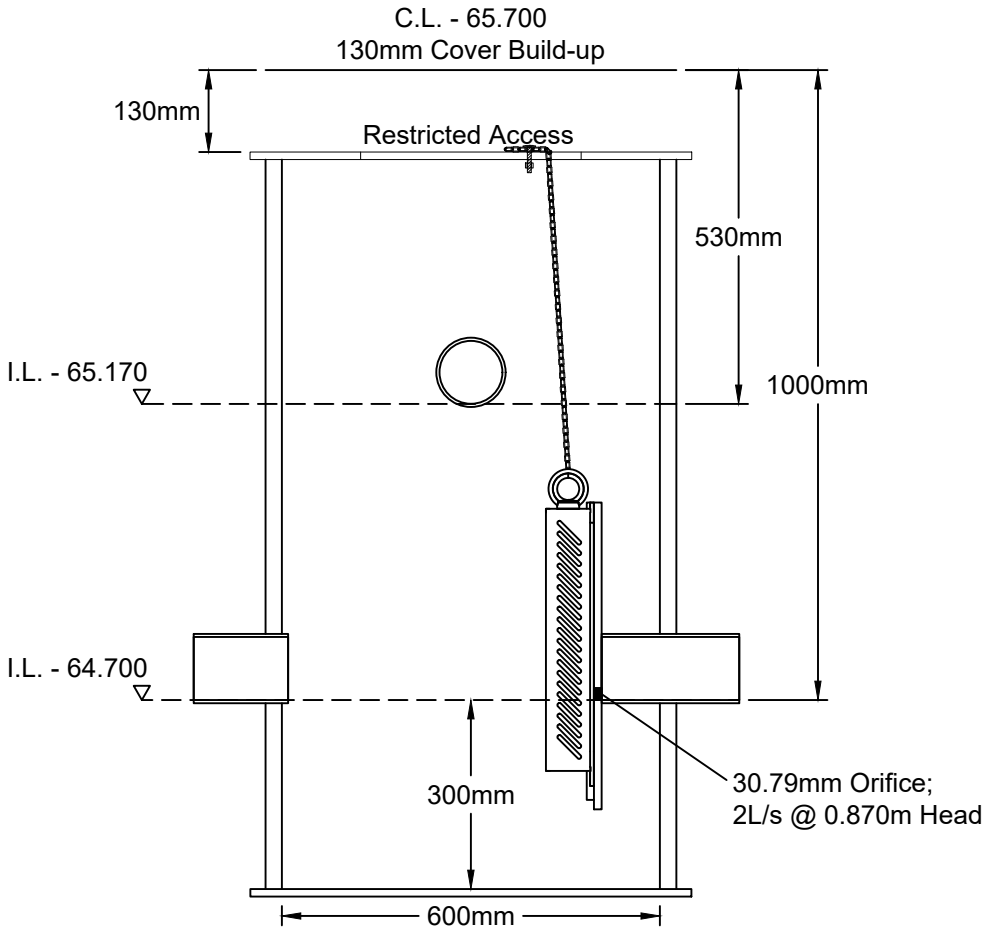
Sieve Size (mm)	Percent passing	Specification	Complies (Spec)
40	100	100	Yes
31.5	100	98 - 100	Yes
25	100	-	-
20	92	85 - 100	Yes
16	53	-	-
14	31	-	-
12.5	16	-	-
10	4	0 - 20	Yes
8	2	-	-
6.3	1	-	-
5	1	-	-
4	1	0 - 5	Yes
2	1	-	-
0.063	1.3	0 - 4.0	Yes
Moisture content (%)	0.5		
Uniformity Coefficient	1		

Sampled By: Mellor Tested By: Mellor Date Tested: 20/12/2023

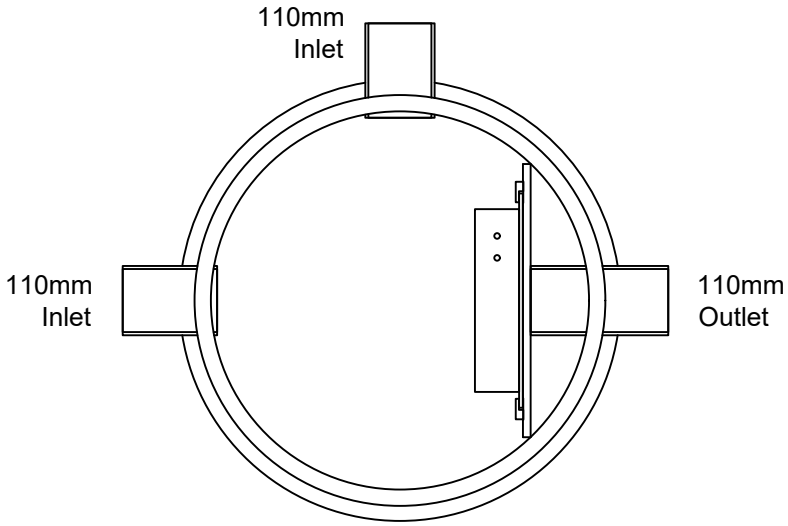
D4 a - SEL Environmental chamber approval drawings for driveway orifice-control chambers

Units 2 - 14 shown as examples (evidence of further units can be provided if required)

SEL Environmental chamber approval drawings for driveway orifice-control chambers
2230629
Units 2 - 14



Plot 2



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD
Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

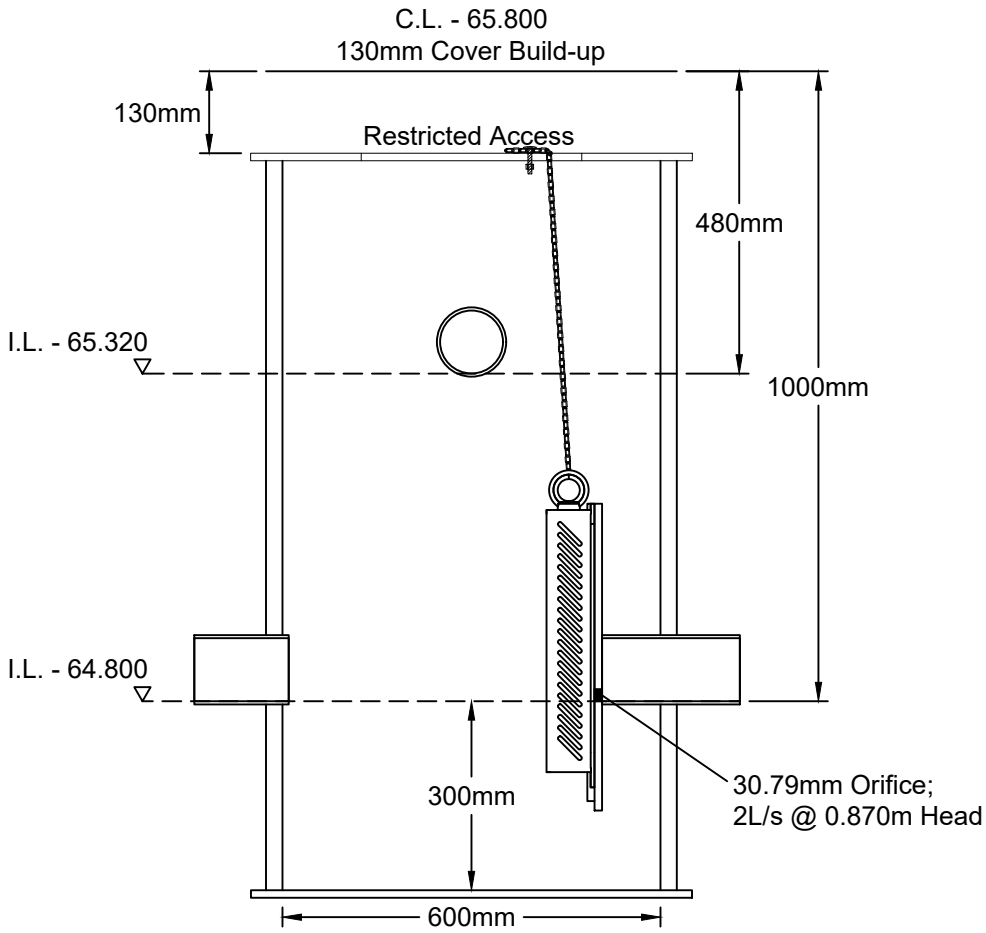
Client: Towerhouse Systems Ltd

Status: For Approval

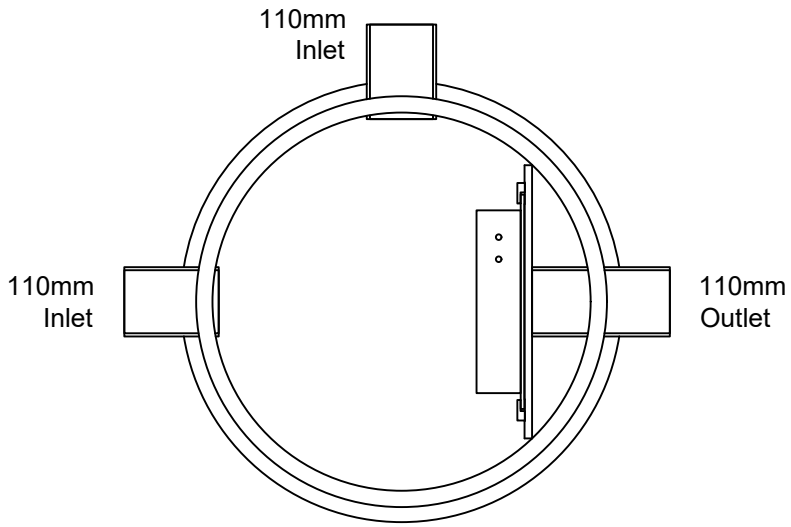
Rev	Date	Description	By	Chk
A	31/08/23	Initial issue	JG	BS

Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 2	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1130 P04
Plot Drainage Sheet 1



Plot 3



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

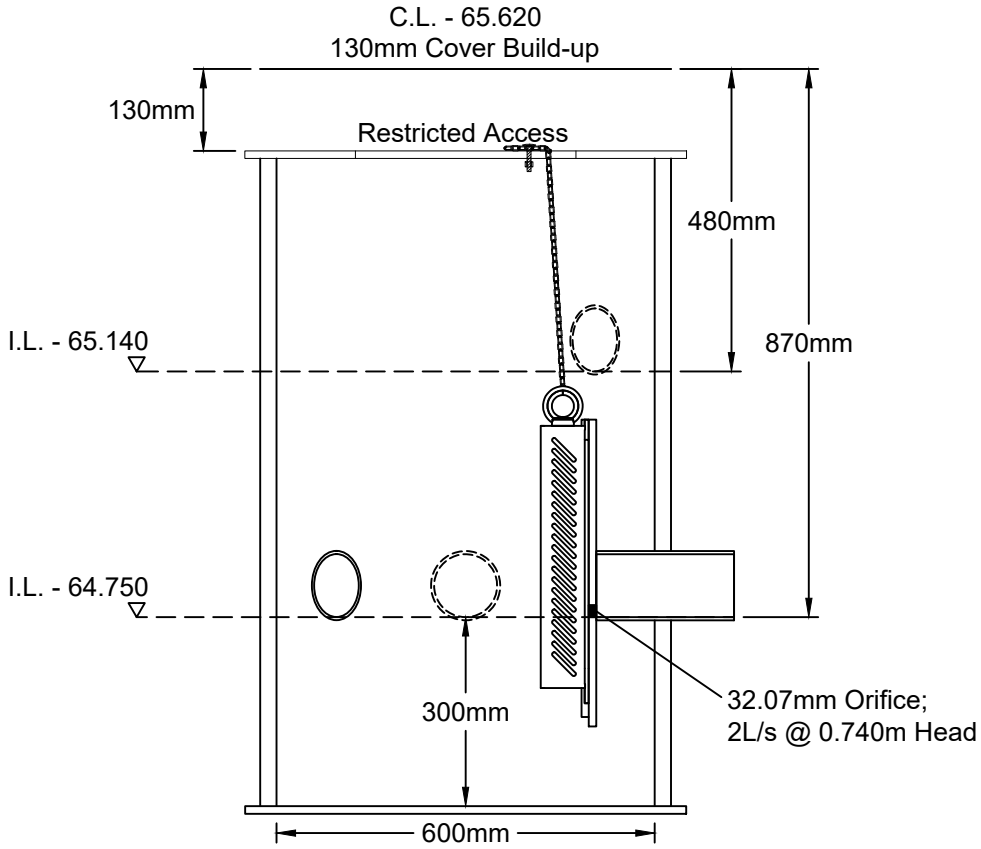
Client: Towerhouse Systems Ltd

Status: For Approval

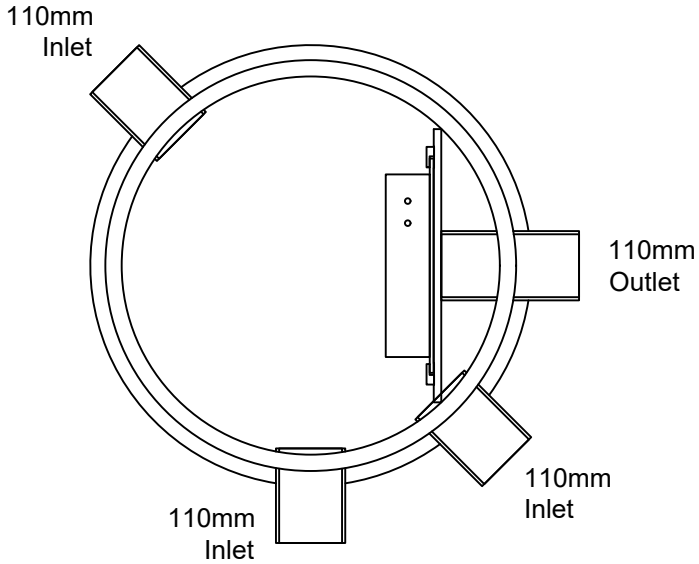
Rev	Date	Description	By	Chk
A	31/08/23	Initial issue	JG	BS

Scale	1:12	Paper Size	A4
Drawing Number		2230644/Plot 3	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1130 P04
Plot Drainage Sheet 1



Plot 4



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

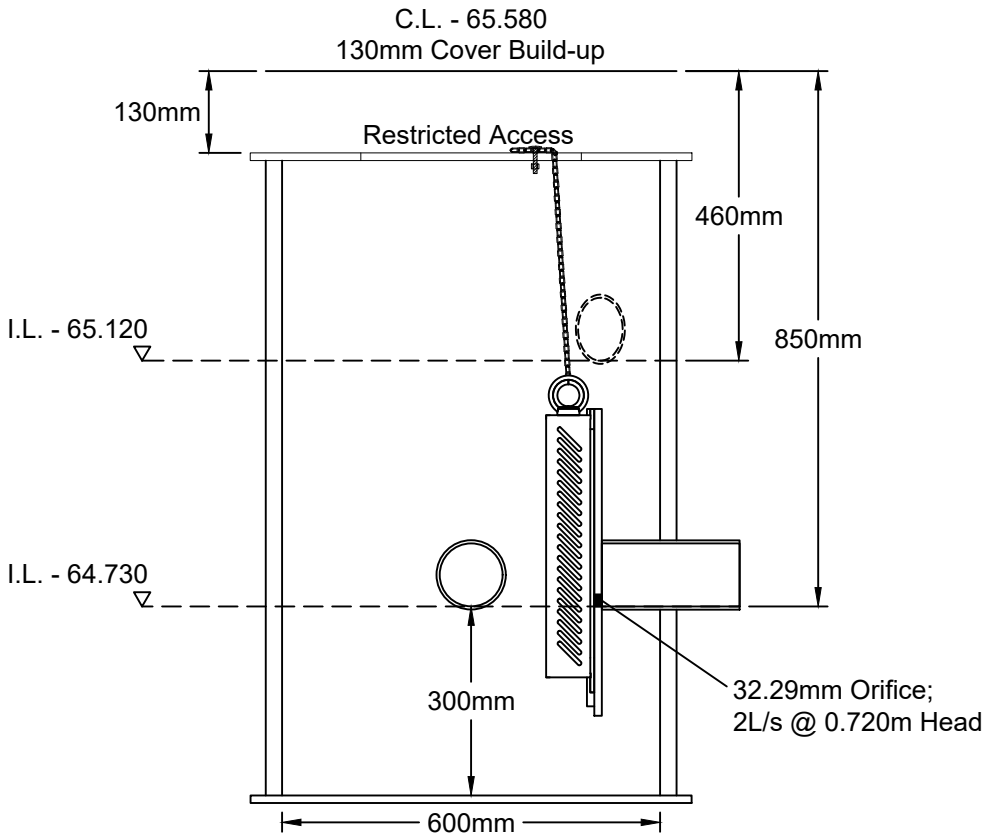
Client: Towerhouse Systems Ltd

Status: For Approval

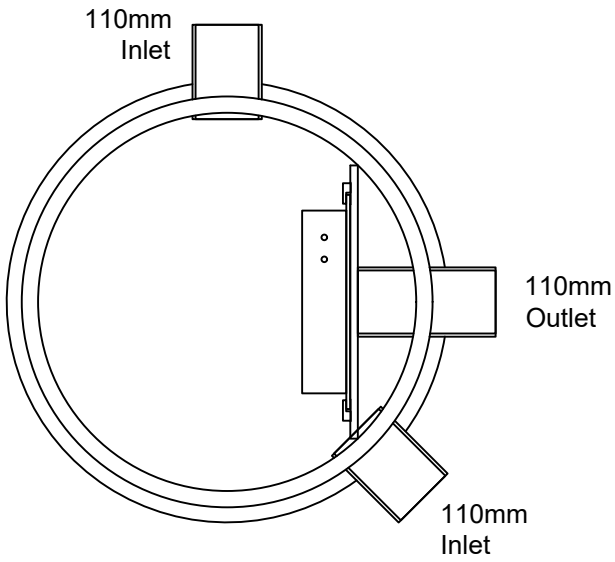
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 4	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 5



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

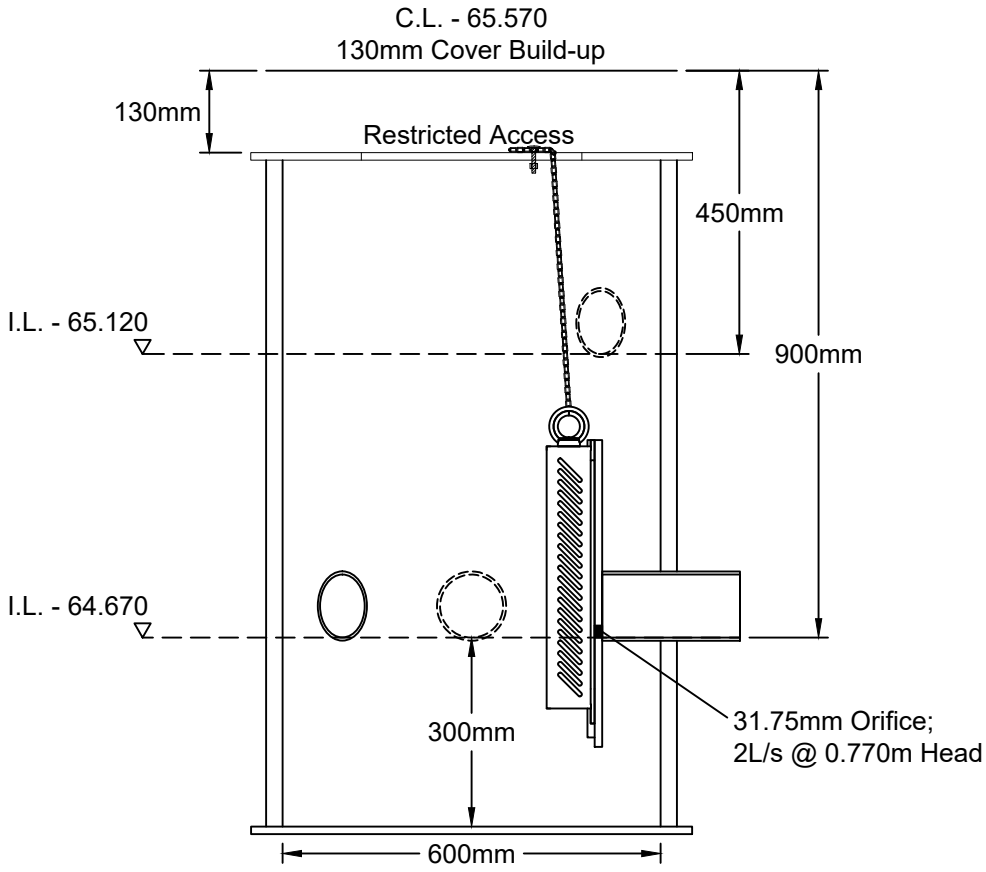
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Status: For Approval

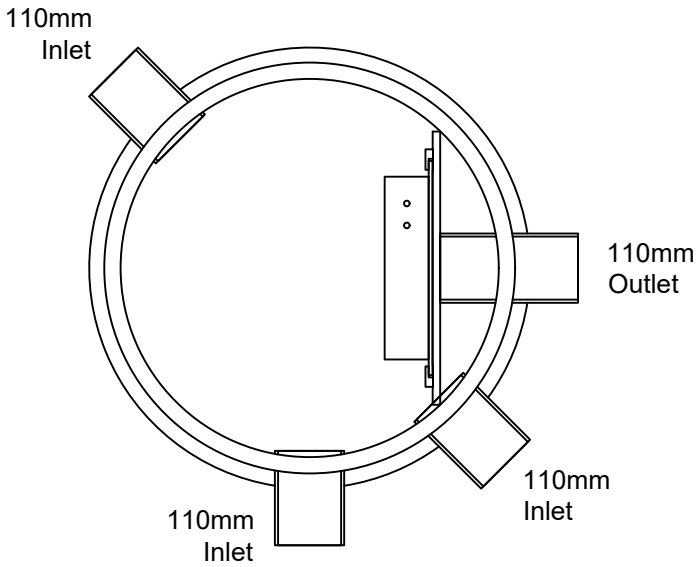
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	Paper Size	A4
Drawing Number		2230644/Plot 5	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 6



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

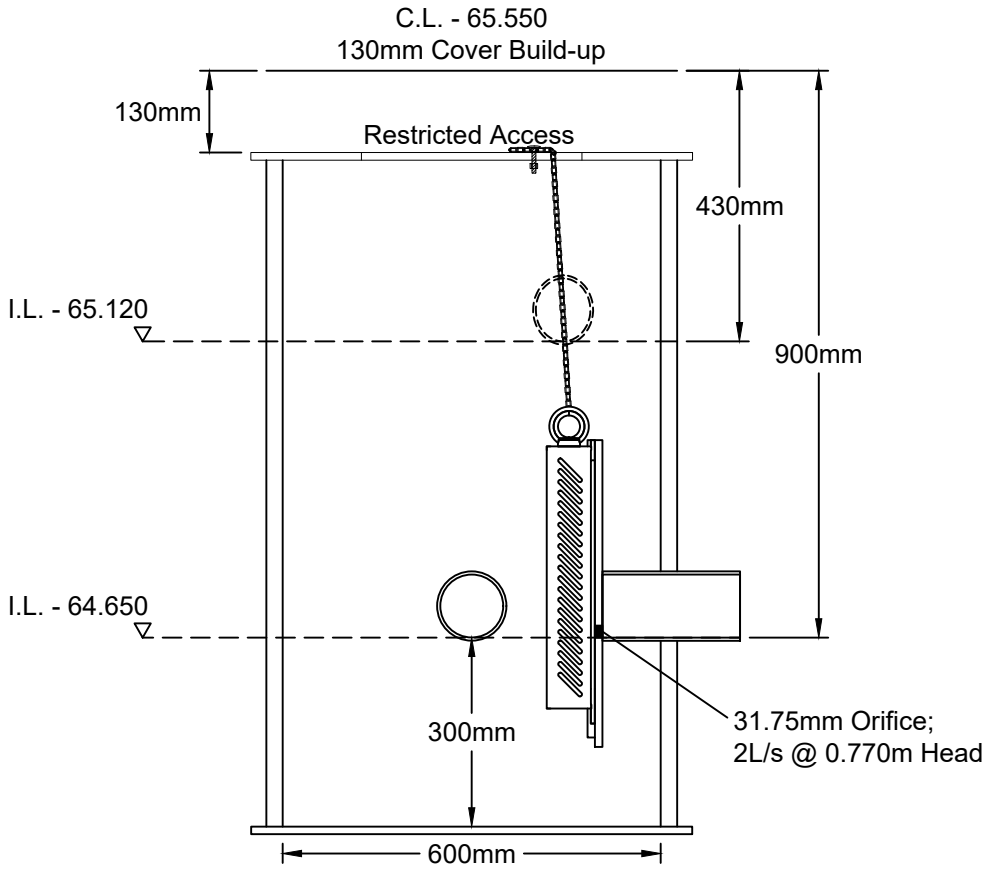
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Status: For Approval

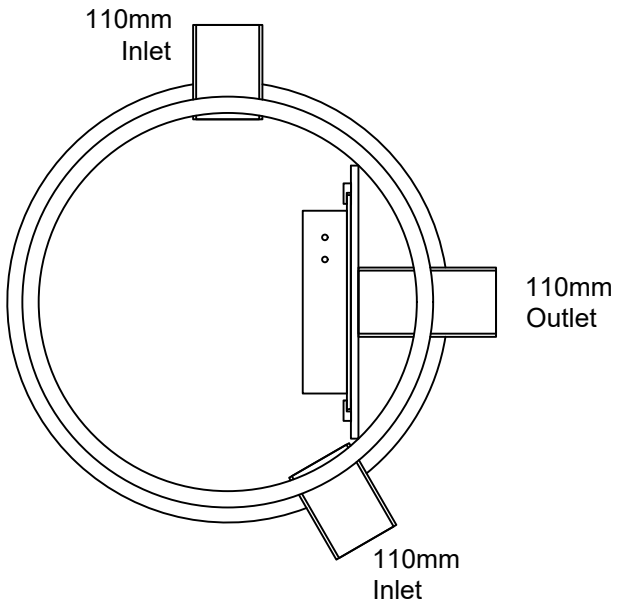
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Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 6	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 7



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

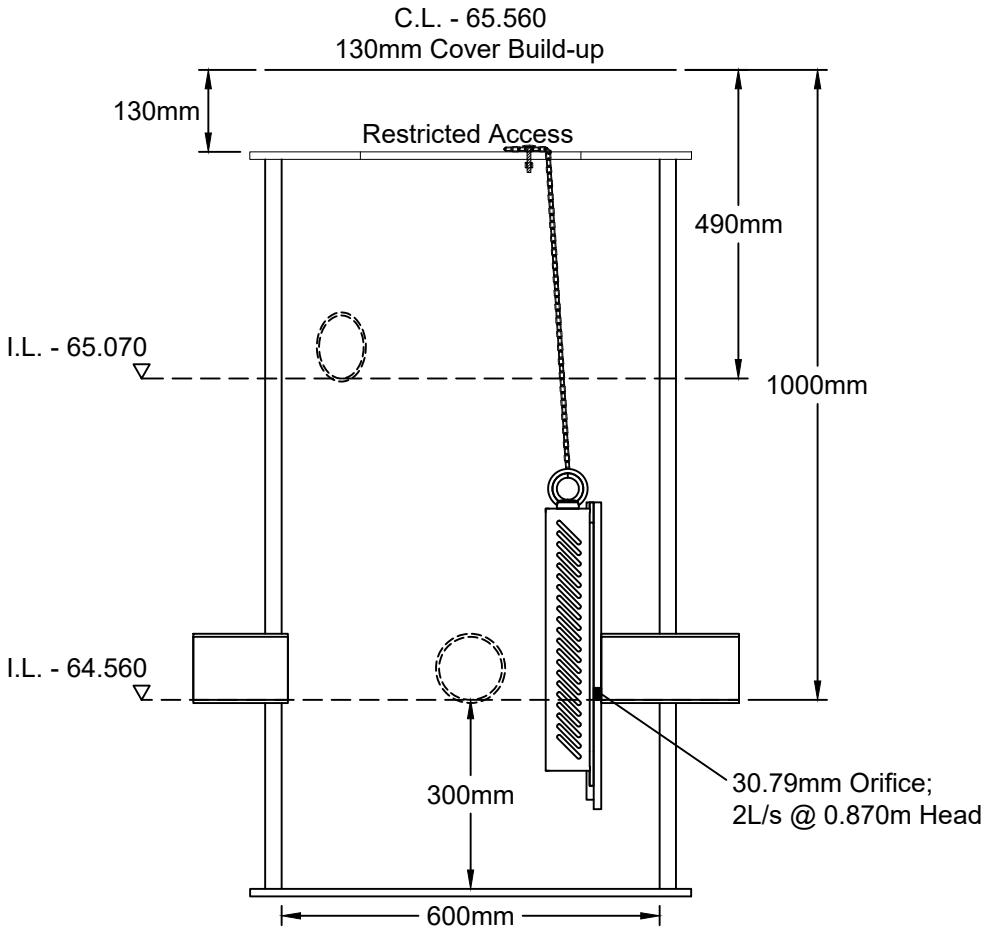
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Status: For Approval

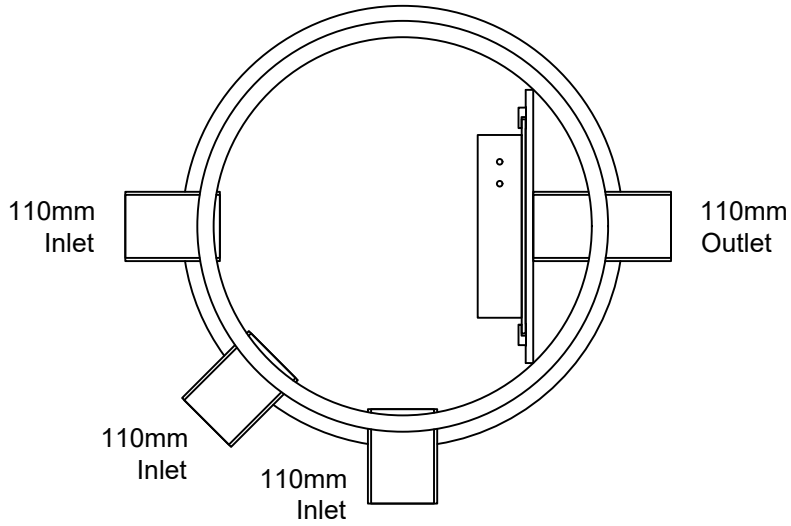
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Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 7	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 8



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

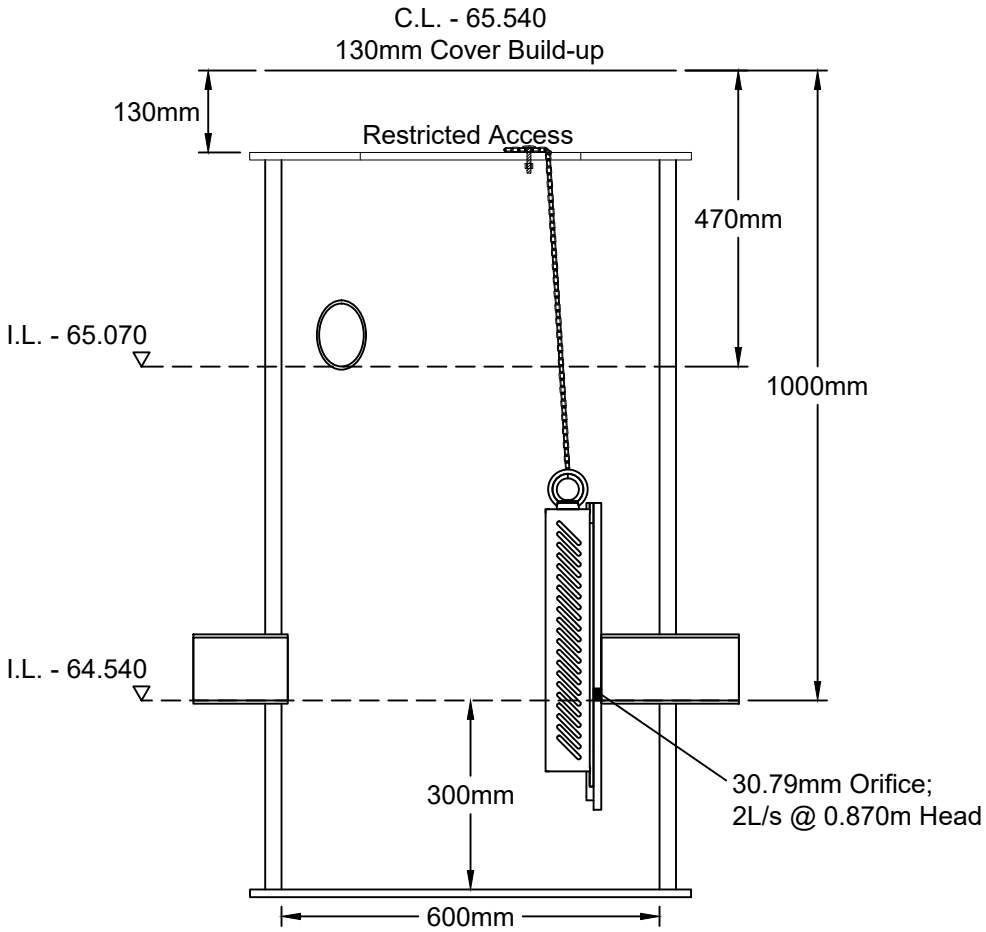
Client: Towerhouse Systems Ltd

Status: For Approval

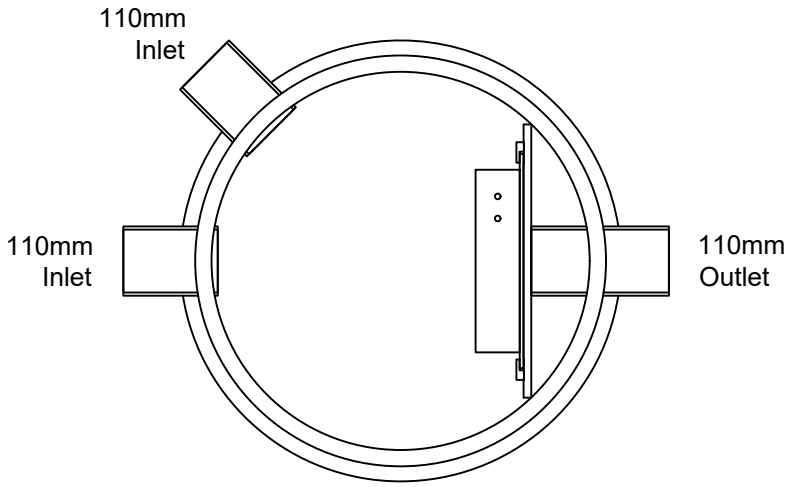
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 8	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 9



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

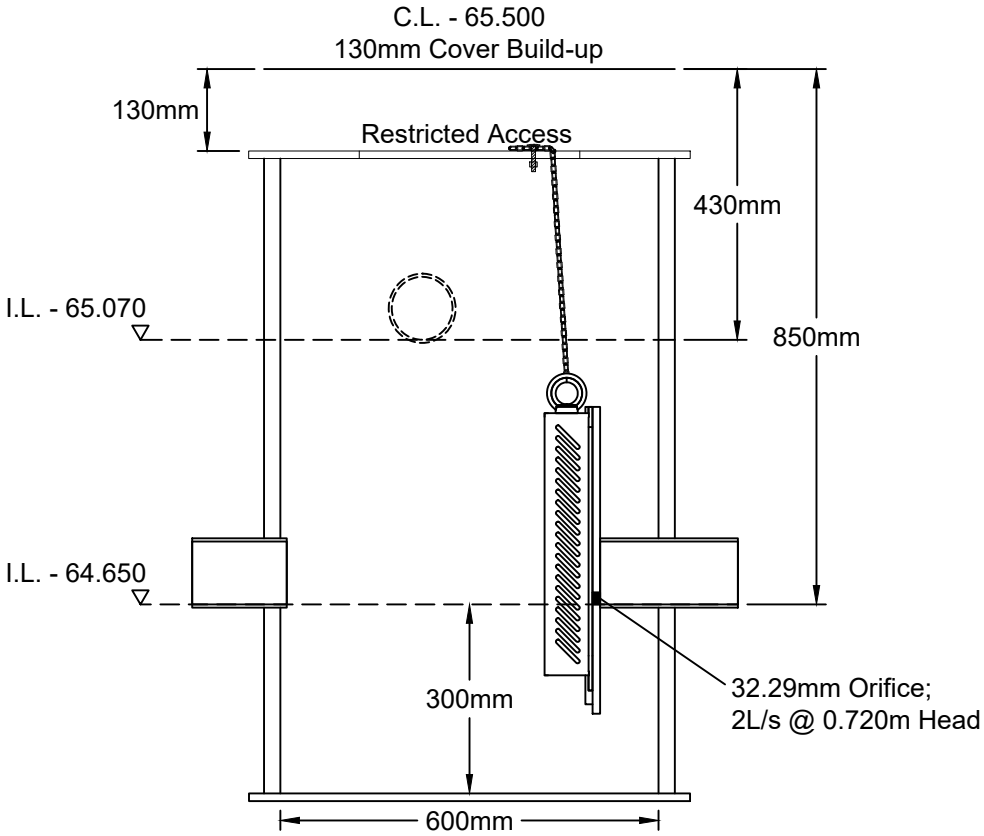
Client: Towerhouse Systems Ltd

Status: For Approval

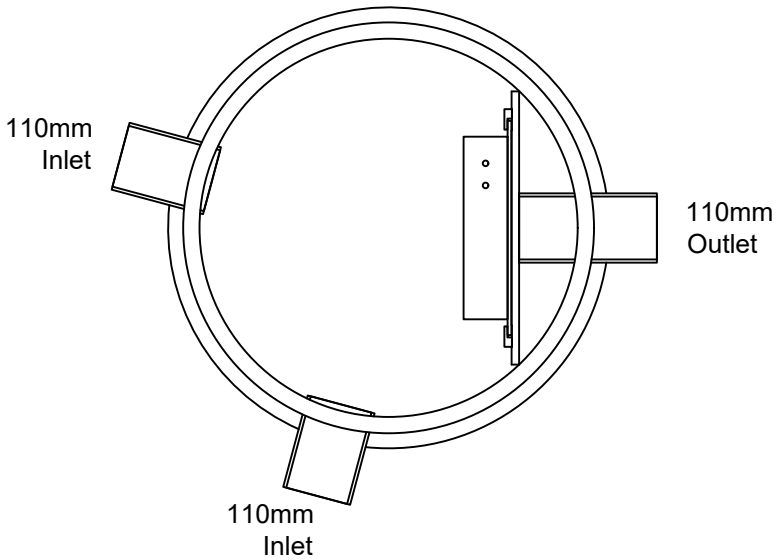
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 9	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 10



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

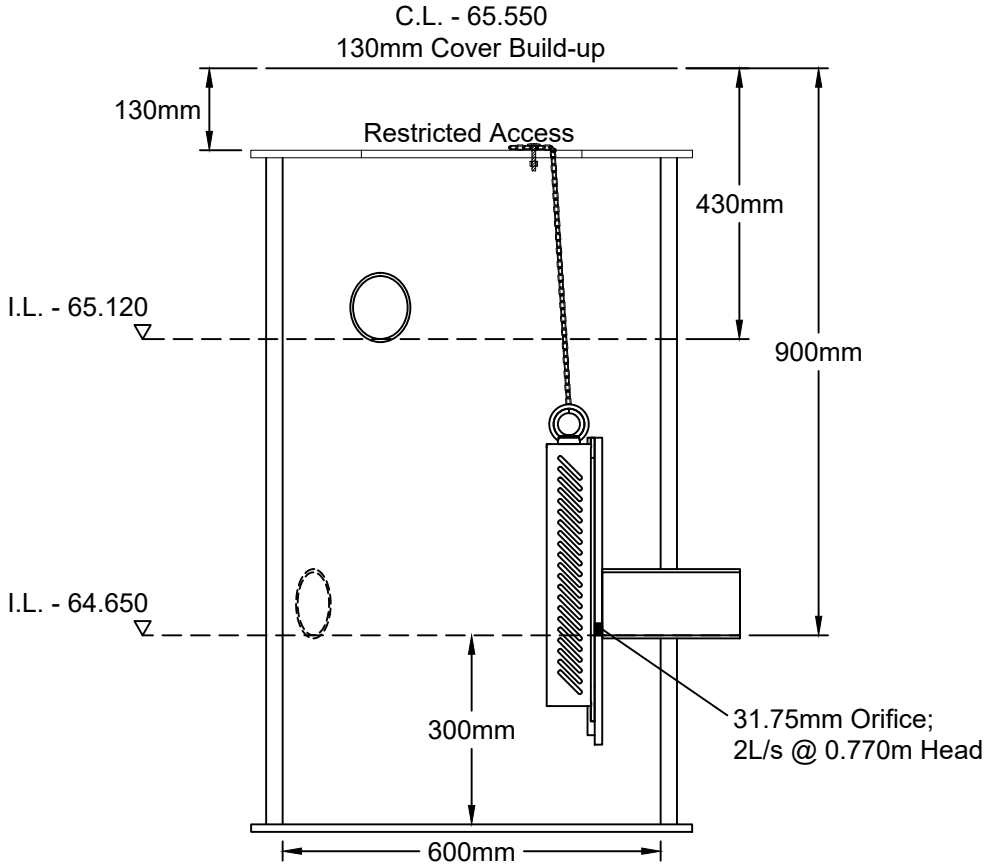
Client: Towerhouse Systems Ltd

Status: For Approval

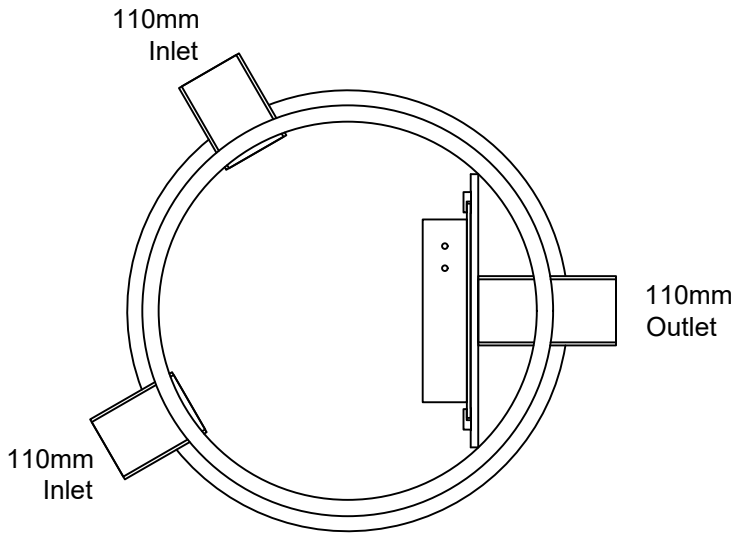
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 10	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 11



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

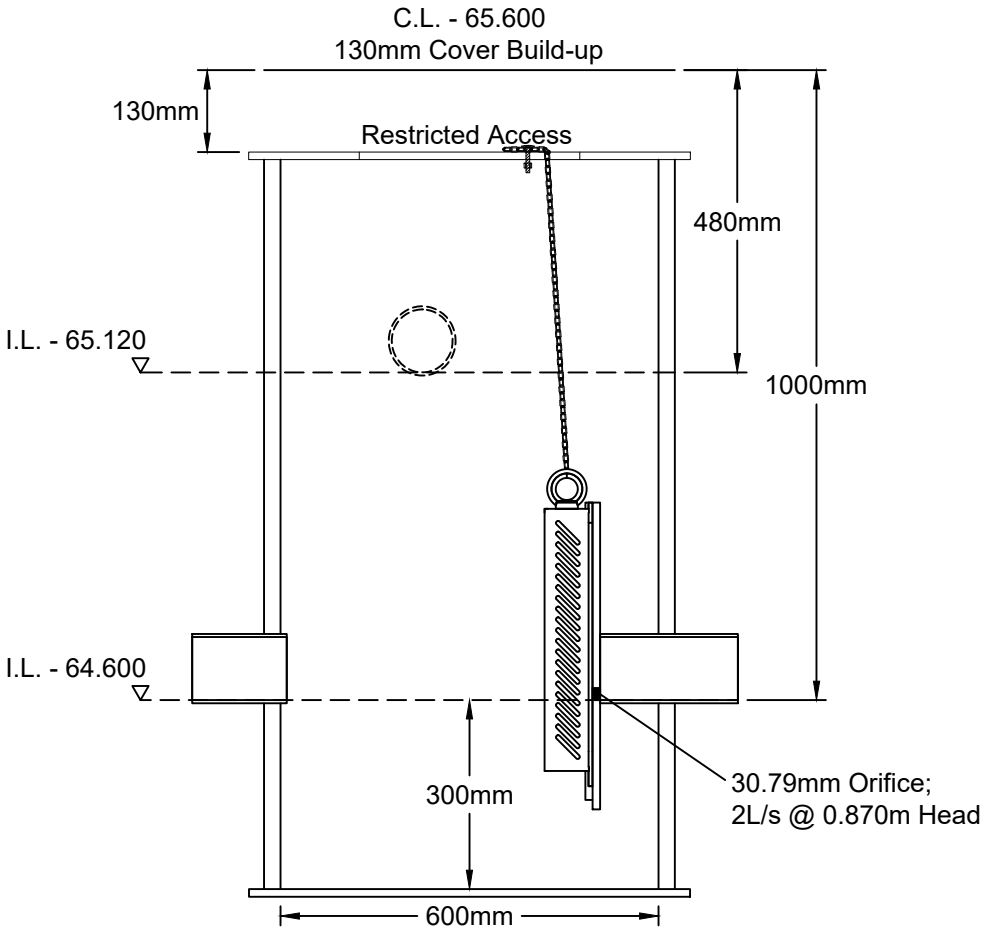
Client: Towerhouse Systems Ltd

Status: For Approval

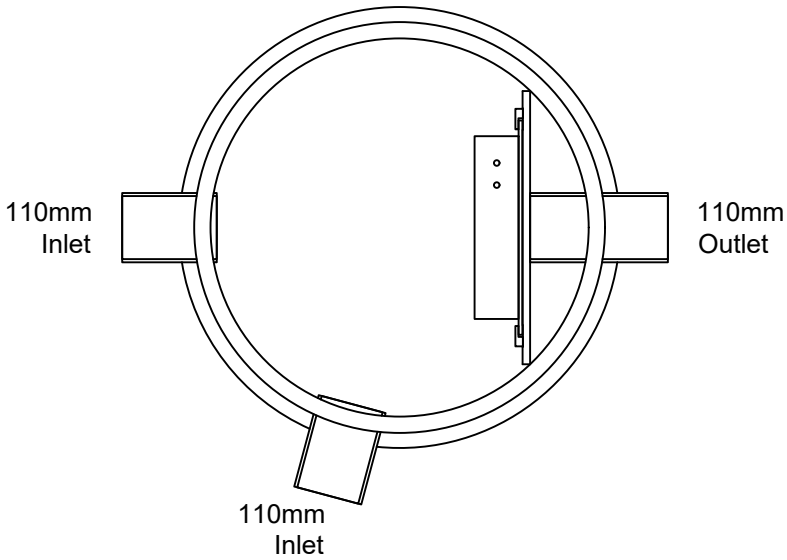
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	Paper Size	A4
Drawing Number		2230644/Plot 11	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 12



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

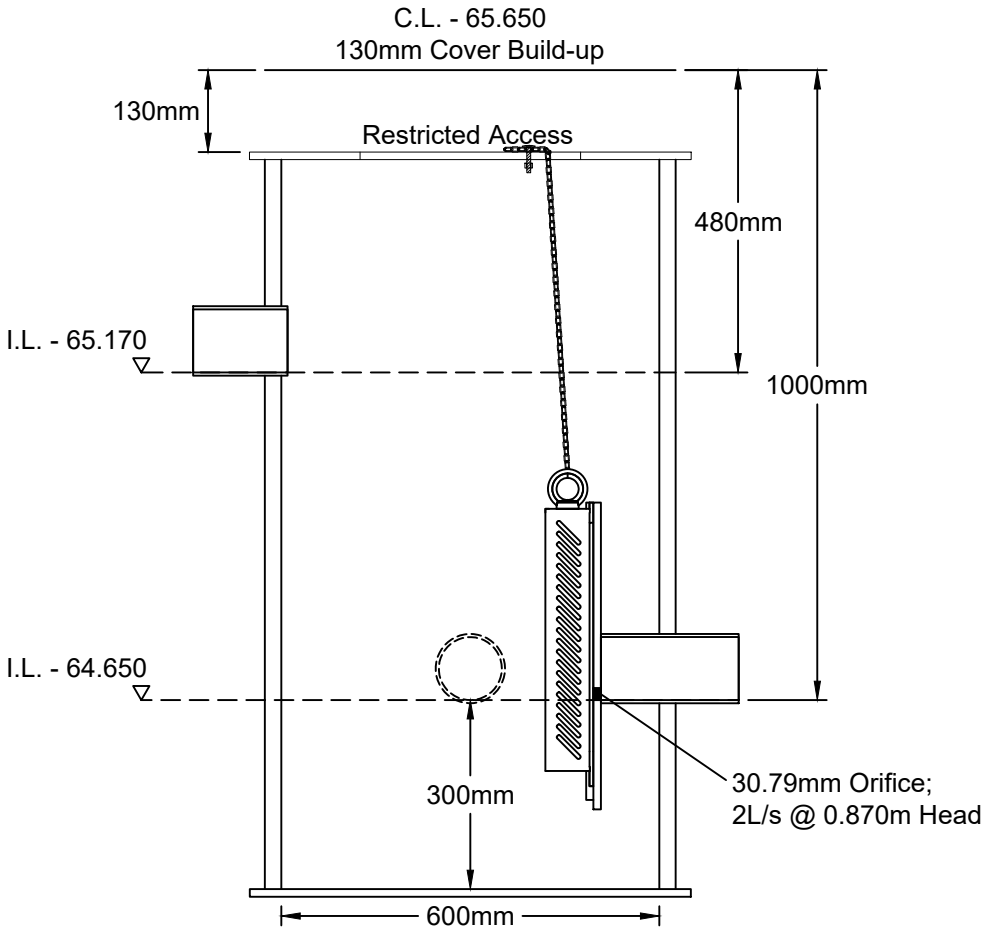
Client: Towerhouse Systems Ltd

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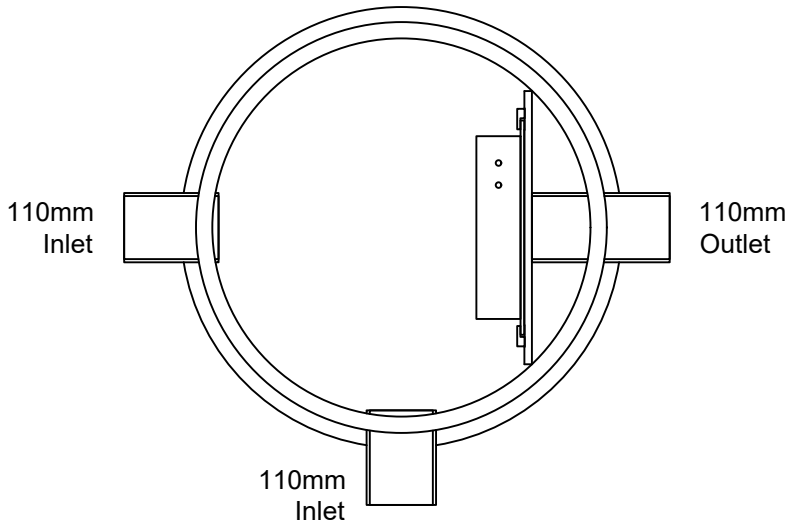
Rev	Date	Description	By	Chk
A	31/08/23	Initial issue	JG	BS

Scale	1:12	**Paper Size**	A4
Drawing Number		2230644/Plot 12	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 13



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

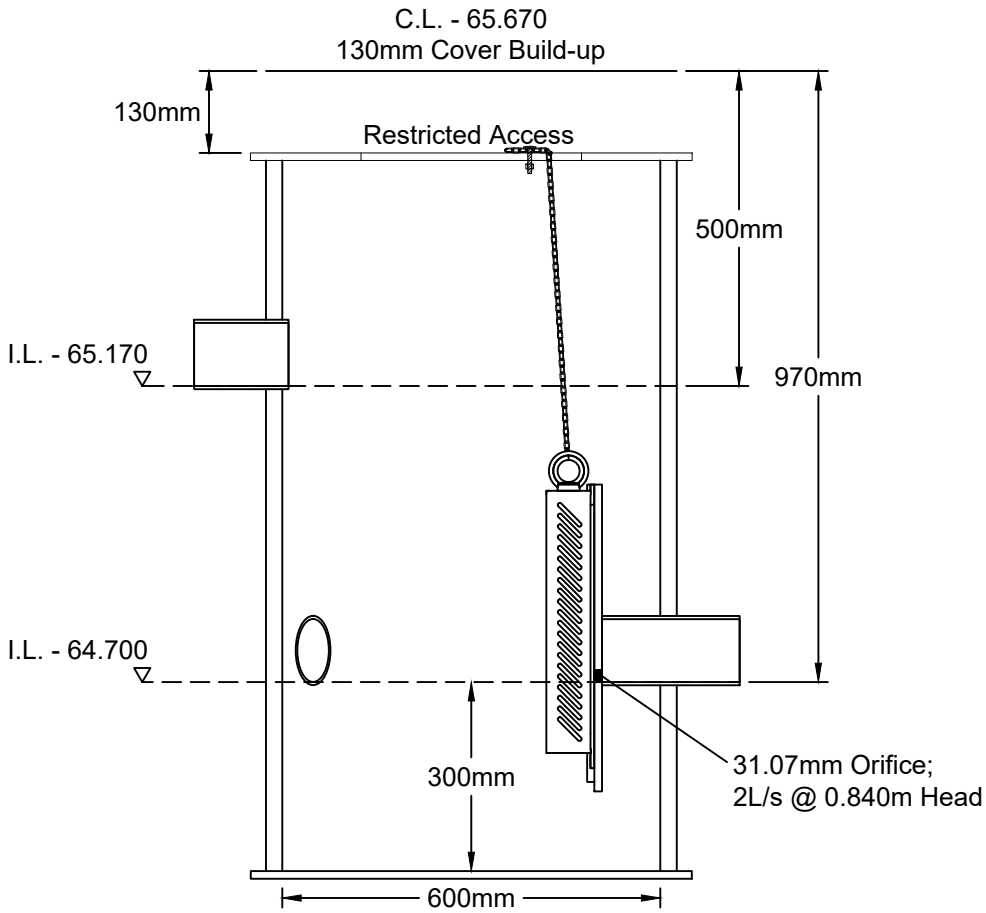
Client: Towerhouse Systems Ltd

Status: For Approval

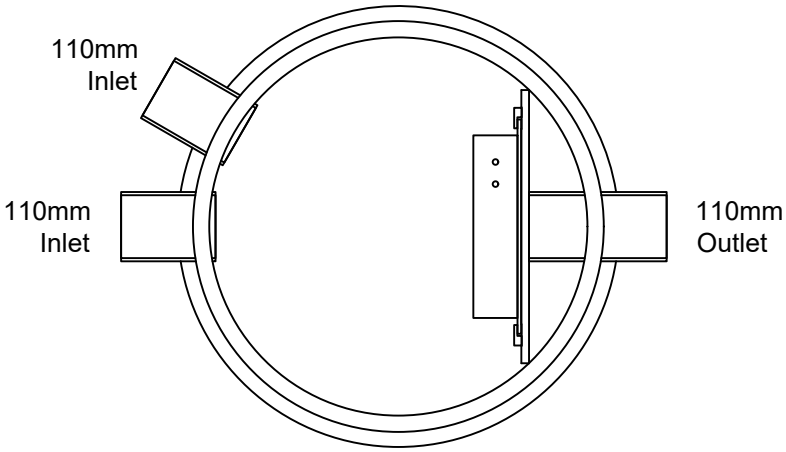
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A	31/08/23	Initial issue	JG	BS

Scale	1:12	Paper Size	A4
Drawing Number		2230644/Plot 13	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2



Plot 14



Sel Environmental
Real Innovation.

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
BB2 4DD

Tel: 01254 589987
www.selel.co.uk

Product Code: SP122
Description: SPECIAL 600mmØ Removable Box Filter Flow Control Chamber

Client: Towerhouse Systems Ltd

Status: For Approval

Rev	Date	Description	By	Chk
A	31/08/23	Initial issue	JG	BS

Scale	1:12	Paper Size	A4
Drawing Number		2230644/Plot 14	

Client Ref: LM20066-DYSE-XX-ZZ-DR-C-1131 P04
Plot Drainage Sheet 2

D4 b - SEL Invoice for driveway orifice-control chambers

Units 2 - 14 shown as examples (evidence of further units can be provided if required)

SEL Invoice for driveway orifice-control chambers

Units 2 - 14 shown as examples (evidence of further units can be provided if required)

Invoice

SEL Environmental Ltd
Canal House
Bonsall Street
Blackburn
Lancashire
BB2 4DD

T 01254 589987
F 01254 695141
www.selel.co.uk

Co. Reg 03740358
VAT Reg No 896 2451 85

Cringle Rd Developments Ltd
Mellor House
65-81 St Petersgate
Stockport
Cheshire
SK1 1DS

VAT Reg No: 338 9929 38

Invoice No	13155
Invoice Date	11/09/2023
Despatch No	24220
Cust. Order No	14062301
Our Ref	2230644
Cust Acc No	C103180

Stock Code	Details	Quantity	Unit Price	Disc Amount	Net £	VAT Rate
SP122	SPECIAL 600mmØ Removable Box Filter Flow Control Chamber Plot 2 - 14 Site Contact - Nick Maskrey - 07798 618345	13	798.00	1,556.10	8,817.90	20%

Delivered To
Cringle
Cringle Road
Levenshulme
Manchester
Greater Manchester
M19 2RN

Total Net Amount	£	8,817.90
Carriage Net	£	0.00
Total VAT Amount	£	1,763.58
Invoice Total	£	10,581.48

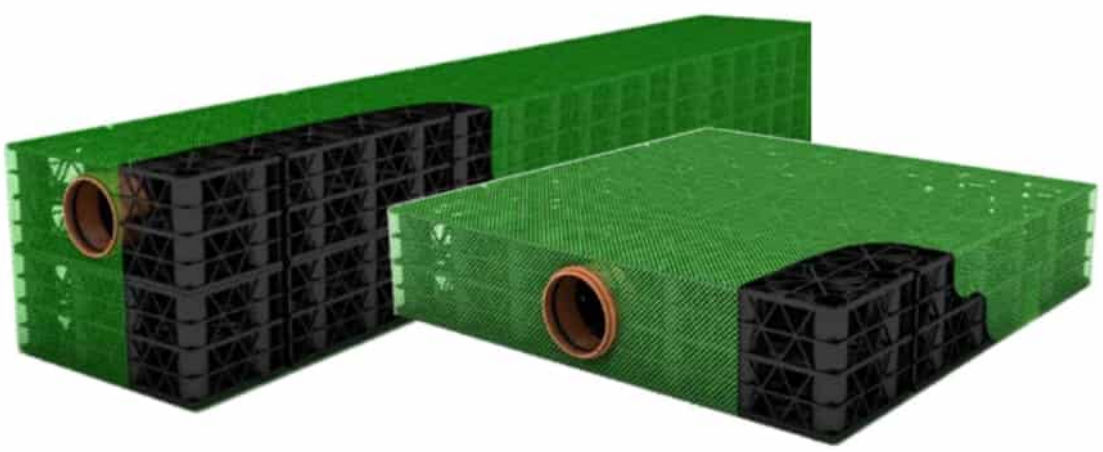
Payments can be made direct to bank to: SEL Environmental Ltd,
Sort Code 01-10-01, Acc No: 65833139
IBAN: GB17NWBK01100165833139, BIC: NWBKGB2L

Unless previously agreed in writing, goods and services are sold as our standard terms and conditions and all invoices are due for payment 30 days after date of invoice. Any shortages/damages must be notified within 7 days. Materials supplied will remain the property of SEL Environmental Ltd until paid for in full.

D5 - Permavoid rainwater diffuser product information

PVOD Diffuser

Specifications and Applications v2



Due to continuous product development, products, materials and specifications may vary from this brochure. Interested parties may visit the Permavoid website for any product enquiries. Copyright Permavoid Limited. All rights reserved.

PVOD Diffuser

Introduction

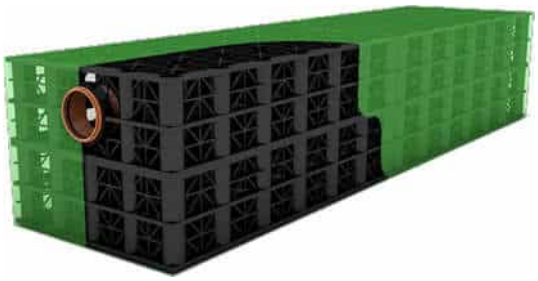
PVOD Diffuser units are a recognised method for efficient diffusion of collected rainwater run-off into and out of the voided sub-base aggregate layers beneath permeable pavements. Diffuser Units are fully compliant with BS7533-13:2009 and arrive to site ready to install with no-site assembly required. They are simply joined to standard underground push-fit pipework.

Run-off from building roofs or hard surfaces would pass through a silt catchpit chamber before discharge into a voided sub-base. The run-off will be efficiently distributed into the voided subbase layer through the highly voided surface structure of the diffuser unit.

Standard Diffuser Units



PVOD05101
for 100m² catchments
or 3 l/s discharge



PVOD05201
for 250m² catchments
or 6.3 l/s discharge

Application

The PVOD Diffuser units are installed within the pavement construction zone as a sub-base replacement system and are fully compliant with BS7533-13:2009, 'Pavements constructed with clay, natural stone or concrete pavers'.

The PVOD Diffuser is particularly useful where there are ground problems, such as high groundwater levels, contamination or shallow rock layers.

Each diffuser module is encapsulated by a 2mm mesh, which provides an excellent open surface area, allowing collected surface water runoff to easily flow into surrounding aggregate.

Coverage

A general principle for application of the diffuser unit is:

Use a 710x710x150 diffuser for up to 100m² of catchment area OR up to 3 l/s discharge*

OR

Use a 2130x355x300 diffuser for up to 250m² of catchment area OR up to 6.3 l/s discharge*

*Performance is based on the diffusers installed within a SudsAgg layer.

Bespoke Units

The above will satisfy most situations but if a larger area for inflow or higher discharge rate is required, the first recommendation is to use a 'manifold' type arrangement from a silt catchpit. If that does not provide a solution then bespoke diffuser units are available, contact the distributor who can calculate your specific requirement.

Diffuser Unit 710x710x150; 110mm ø Socket

PVOD05101

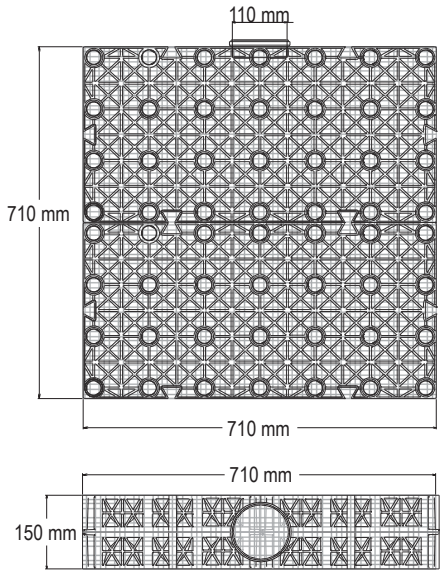
Description

The Permavoid Diffuser Unit 710x710x150; 110mm ø Socket is used for the efficient diffusion of collected surface water runoff in or out of permeable aggregates. This technique can be utilised in conjunction with both pervious and impervious surfaces, in particular where there are high groundwater levels, contamination or shallow rock layers. Each diffuser module is complete with a pre-formed 110mm Ø push fit socket for easy connection to standard PVC-u underground pipework. All diffusers are encapsulated by a 2mm mesh which avoids debris clogging and provides an excellent open surface area for surface water runoff to easily flow into the surrounding aggregate.



Packaging Details

Element	Value	Unit
Packaging unit type	Double wall cardboard	
Packaging unit dimension	726 x 712 x 152 (LxWxD)	mm
Packaging unit weight	7	kg
Number of units per pallet	27	nr
Pallet dimensions	1200 x 1200 x 150 (LxWxD)	mm
Pallet weight	214	kg



Specification

Element	Value	Unit
Unit length	710	mm
Unit width	710	mm
Unit depth	150	mm
Socket OD ⌀	110	mm
No. of sockets	1	nr
Approximate storage volume	70	L
Effective perforated surface area	59	%
Maximum roof catchment area *	100	m2
Unit weight	7	kg
Material	HDPE / PP	

Diffuse up to 100m2 roof catchment

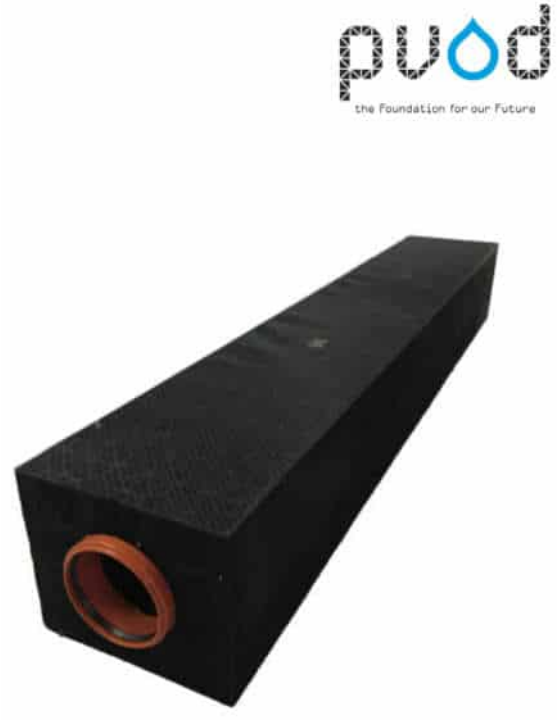
Mesh encapsulation to avoid clogging

Standard PVC-u 110mm ⌀ Socket Connection

*Based on rainwater dispersal into a granular material with permeablitiy greater than or equal to 0.02 m/s, in accordance with UK building regulations. Please check the design and build regulations for your country or region when considering this product.

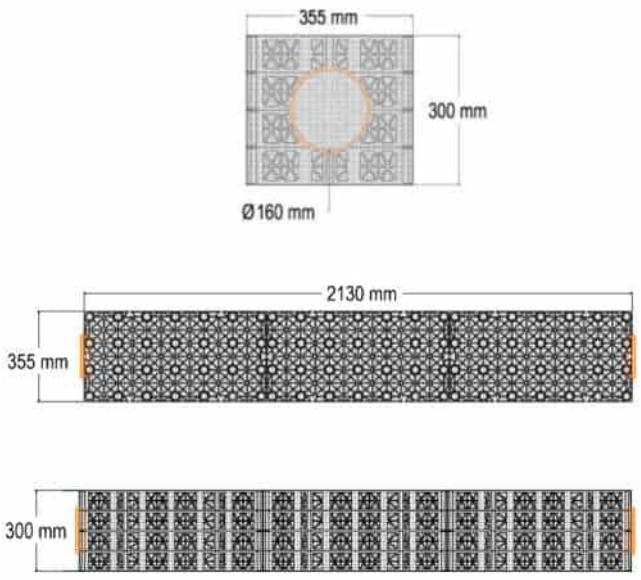
High Performance Diffuser 2130x355x300; Ø160mm Sockets

PVOD05202



Description

The PVOD05202 - High Performance Diffuser 2130x355x300; 160mm Ø Sockets is designed for the efficient diffusion of collectedsurface water runoff into permeable aggregates. This techniquecan be utilised in conjunction with both pervious and impervioussurfacings. The PVOD05202 units can also be used to supplement the storage provided within permeable aggregate layers without increasing construction depths, or to form a propriety soakaway beneath a driveway or other trafficked hardstanding.



Packaging Details

Element	Value	Unit
Packaging unit dimension	2158 x 712 x 302 (LxWxD)	mm
Packaging unit weight	18	kg
Number of units per pallet	18	nr
Pallet dimensions	2400 x 1200 x 150 (LxWxD)	mm
Pallet weight	374	kg

Specification

Element	Value	Unit
Unit length	2130	mm
Unit width	355	mm
Unit depth	300	mm
Socket ID ⌀	160	mm
No. of sockets	2	nr
Approximate storage volume	210	L
Effective perforated surface area	59	%
Maximum roof catchment area	250	m2
Unit weight	18	kg
Material	HDPE / PP	

Effective water dispersal

Standard PVC-u Ø160mm Socket Connection

Lightweight, high strength construction

Standard Diffuser Units

Below are a selection of standard diffuser units which will satisfy most situations for inflow or discharge. The first recommendation is to use a ‘manifold’ type arrangement from a silt catchpit maintaining the correct length to dispersion. If that does not provide a solution then bespoke diffuser units are available. If you cannot see a diffuser to satisfy your requirements, then contact the distributor who can provide advice.

Product Code	Length mm	Width mm	Depth mm	Connection Type	Connection Size	Connection Qty	Catchment Area* m²	Discharge Rate* l/s	Length to Dispersion m
PVOD05201	2130	355	300	Socket	110	2	250	6.3	4.225
PVOD05202	2130	355	300	Socket	160	2	250	6.3	4.225
PVOD05203	2130	355	300	Spigot	225	1	250	6.3	4.225
PVOD05101	710	710	150	Socket	110	1	100	3.0	1.937
PVOD05102	710	710	150	Spigot	160	1	100	3.0	1.937
PVOD05103	710	710	150	Socket	110	2	100	3.0	1.937
PVOD05104	710	710	150	Socket	110	2	100	3.0	1.937
PVOD05105	710	710	150	Socket	110	3	100	3.0	1.937

*Catchment areas and discharge rates based on rainwater dispersal into a granular material with permeability greater than or equal to 0.02 m/s, in accordance with UK building regulations. Ensure minimum length to dispersion is maintained for single diffuser units or double the length to dispersion between adjacent diffuser units within the granular layer. Figures quoted are based on a 130mm surcharge above the diffuser unit. Please check the design and build regulations for you country or region when considering this product.

SIDE

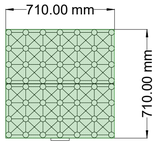
Up to 100sqm inflow
Up to 3l/s outflow



END



PLAN



PVOD
Ø110

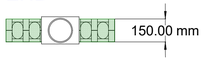
PVOD05101
Diffuser Unit
710mm x 710mm x 150mm
110mm Ø Socket

SIDE

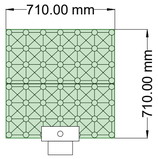
Up to 100sqm inflow
Up to 3l/s outflow



END



PLAN



PVOD
Ø160

PVOD05102
Diffuser Unit
710mm x 710mm x 150mm
160mm Ø Spigot

SIDE

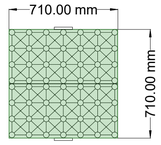
Up to 100sqm inflow
Up to 3l/s outflow



END



PLAN



PVOD
Ø110

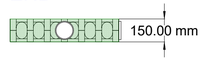
PVOD05103
Diffuser Unit
710mm x 710mm x 150mm
2x110mmØ Socket 180 deg

SIDE

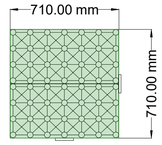
Up to 100sqm inflow
Up to 3l/s outflow



END



PLAN



PVOD
Ø110

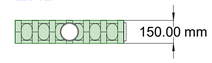
PVOD05104
Diffuser Unit
710mm x 710mm x 150mm
2x110mm Ø Socket 90 deg

SIDE

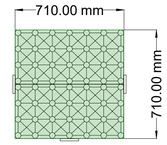
Up to 100sqm inflow
Up to 3l/s outflow



END



PLAN

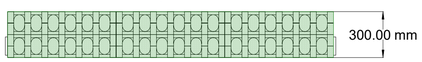


PVOD
Ø110

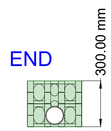
PVOD05105
Diffuser Unit
710mm x 710mm x 150mm
3x110mm Ø Socket 90 deg

SIDE

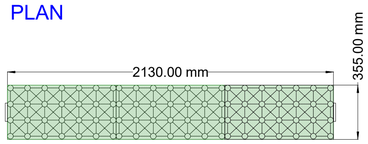
Up to 250sqm inflow
Up to 6.3l/s outflow



END



PLAN

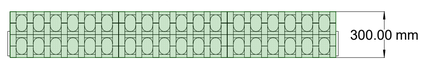


PVODØ110

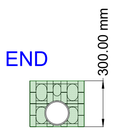
PVOD05201
High Performance Diffuser
2130 x 355 x 300mm
110mmØ Sockets

SIDE

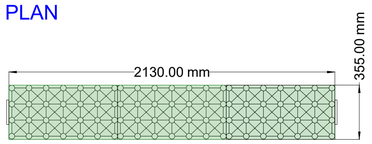
Up to 250sqm inflow
Up to 6.3l/s outflow



END



PLAN

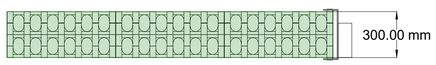


PVODØ160

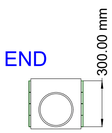
PVOD05202
High Performance Diffuser
2130 x 355 x 300mm
160mmØ Sockets

SIDE

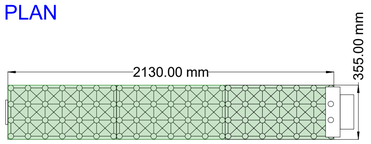
Up to 250sqm inflow
Up to 6.3l/s outflow



END



PLAN



PVODØ225

PVOD05203
High Performance Diffuser
2130 x 355 x 300mm
225mmØ Spigot

Standard Diffuser Units

the Foundation for our Future

Sel Environmental Ltd
Innovation Materialised

Canal House, Bonsall Street, Blackburn, BB2 4DD
T: 01254 589987 Sales@selenvironmental.com

Bespoke Diffuser Units

Below are a selection of bespoke diffuser units to cover situations where the standard stock diffuser units are not suitable, for instance if a larger area for inflow or higher discharge rate is required. The first recommendation is to use a 'manifold' type arrangement from a silt catchpit maintaining the correct length to dispersion. If that does not provide a solution then bespoke diffuser units are available as below. If you cannot see a diffuser to satisfy your requirements, then contact the distributor who can provide advice.

Product Code	Length mm	Width mm	Depth mm	Connection Type	Connection Size	Connection Qty	Catchment Area* m²	Discharge Rate* l/s	Length to Dispersion* m
PVOD05001	710	355	150	Socket	110	1	60	2.5	1.811
PVOD05002	710	355	150	Spigot	160	1	60	2.5	1.811
PVOD05010	710	355	300	Socket	110	1	162	4.8	3.482
PVOD05011	710	355	300	Spigot	160	1	162	4.8	3.482
PVOD05012	710	355	300	Spigot	225	1	162	4.8	3.482
PVOD05120	1065	710	150	Socket	110	1	108	3.2	1.983
PVOD05121	1065	710	150	Spigot	160	1	108	3.2	1.983
PVOD05130	1420	710	150	Socket	110	1	118	3.5	2.109
PVOD05131	1420	710	150	Spigot	160	1	118	3.5	2.109
PVOD05140	1065	710	300	Socket	110	1	189	5.6	3.893
PVOD05141	1065	710	300	Spigot	160	1	189	5.6	3.893
PVOD05150	1065	1065	150	Socket	110	1	125	3.7	2.156
PVOD05151	1065	1065	150	Spigot	160	1	125	3.7	2.156

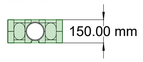
*Catchment areas and discharge rates based on rainwater dispersal into a granular material with permeability greater than or equal to 0.02 m/s, in accordance with UK building regulations. Ensure minimum length to dispersion is maintained for single diffuser units or double the length to dispersion between adjacent diffuser units within the granular layer. Figures quoted are based on a 130mm surcharge above the diffuser unit. Please check the design and build regulations for you country or region when considering this product.

SIDE

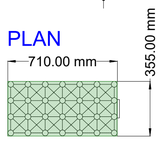
Up to 60sqm inflow
Up to 2.5l/s outflow



END



PLAN



PVOD
Ø110

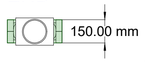
PVOD05001
Diffuser Unit
710mm x 355mm x 150mm
110mm Ø Socket

SIDE

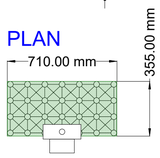
Up to 60sqm inflow
Up to 2.5l/s outflow



END



PLAN



PVOD
Ø160

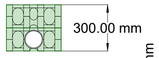
PVOD05002
Diffuser Unit
710mm x 355mm x 150mm
160mm Ø Spigot

SIDE

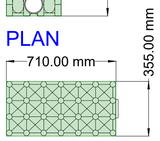
Up to 162sqm inflow
Up to 4.8l/s outflow



END



PLAN

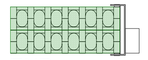


PVOD
Ø110

PVOD05010
Diffuser Unit
710mm x 355mm x 300mm
110mm Ø Socket

SIDE

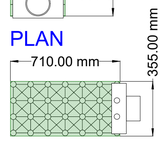
Up to 162sqm inflow
Up to 4.8l/s outflow



END



PLAN

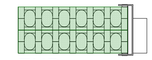


PVOD
Ø160

PVOD05011
Diffuser Unit
710mm x 355mm x 300mm
160mm Ø Spigot

SIDE

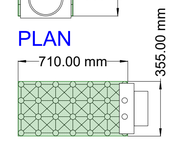
Up to 162sqm inflow
Up to 4.8l/s outflow



END



PLAN



PVOD
Ø225

PVOD05012
Diffuser Unit
710mm x 355mm x 300mm
225mm Ø Spigot

SIDE

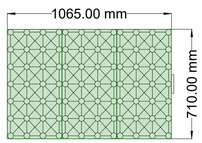
Up to 108sqm inflow
Up to 3.2l/s outflow



END



PLAN



PVOD
Ø110

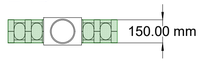
PVOD05120
Diffuser Unit
1065mm x 710mm x 150mm
110mm Ø Socket

SIDE

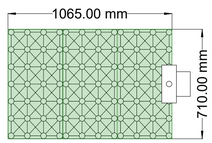
Up to 108sqm inflow
Up to 3.2l/s outflow



END



PLAN



PVOD
Ø160

PVOD05121
Diffuser Unit
1065mm x 710mm x 150mm
160mm Ø Spigot

SIDE

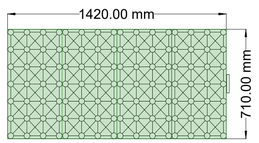
Up to 118sqm inflow
Up to 3.5l/s outflow



END



PLAN



PVOD
Ø110

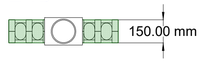
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110mm Ø Socket

SIDE

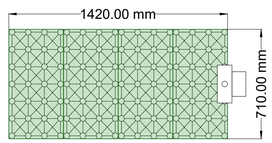
Up to 118sqm inflow
Up to 3.5l/s outflow



END



PLAN

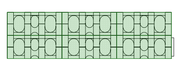


PVOD
Ø160

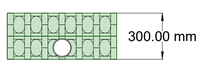
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Diffuser Unit
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160mm Ø Socket

SIDE

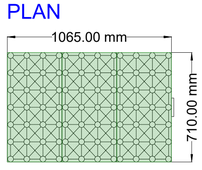
Up to 189sqm inflow
Up to 5.6l/s outflow



END



PLAN

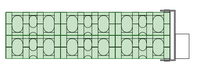


PVOD
Ø110

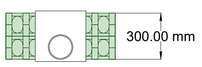
PVOD05140
Diffuser Unit
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110mm Ø Socket

SIDE

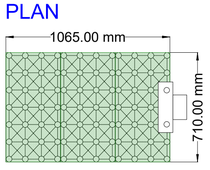
Up to 189sqm inflow
Up to 5.6l/s outflow



END



PLAN



PVOD
Ø160

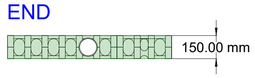
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Diffuser Unit
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160mm Ø Socket

SIDE

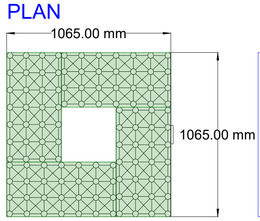
Up to 125sqm inflow
Up to 3.7l/s outflow



END



PLAN



PVOD
Ø110

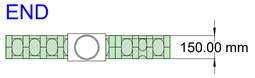
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Diffuser Unit
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110mm Ø Socket

SIDE

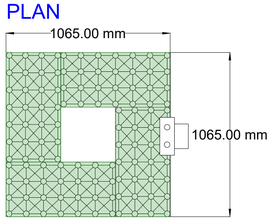
Up to 125sqm inflow
Up to 3.7l/s outflow



END



PLAN



PVOD
Ø110

PVOD05151
Diffuser Unit
1065mm x 1065mm x 150mm
160mm Ø Socket

Bespoke Diffuser Units

pvod

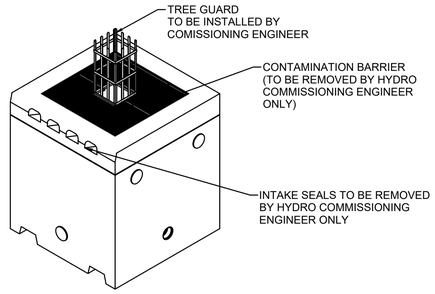
the Foundation for our Future

Sel Environmental Ltd
Innovation Materialised

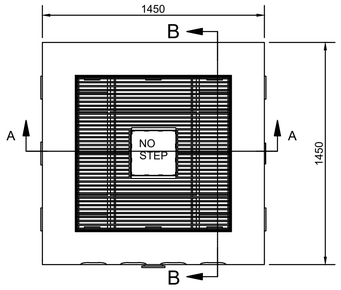
Canal House, Bonsall Street, Blackburn, BB2 4DD
T: 01254 589987 Sales@selenvironmental.com

D6 - Hydro-brake / main flow-control device drawing and technical information

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT GENERAL ARRANGEMENT & DETAIL DRAWINGS.
2. ALL COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE PRODUCTION SPECIFICATION HRD-FM09/15.
3. THE ITEMS SHOWN ON THIS DRAWING SHALL BE MANUFACTURED FROM CONCRETE UNLESS STATED OTHERWISE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS STATED OTHERWISE.
5. ALL UN-USED INLET/OUTLETS TO BE FITTED WITH BLANKING PLUGS.



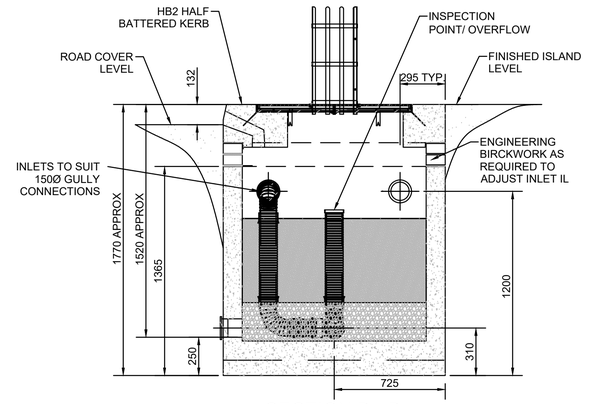
ISOMETRIC VIEW



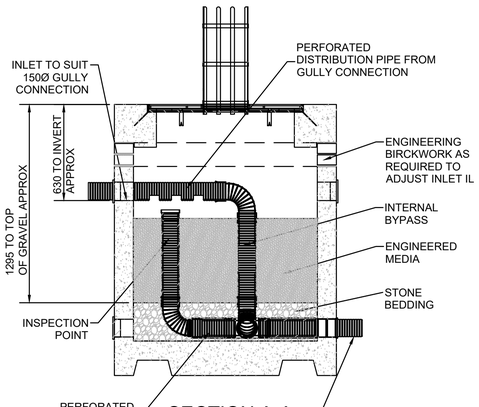
PLAN VIEW



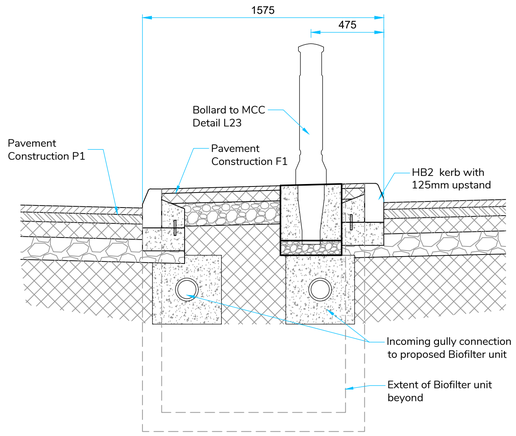
TYPICAL HYDRO BIOFILTER ARRANGEMENT
SCALE (NTS)



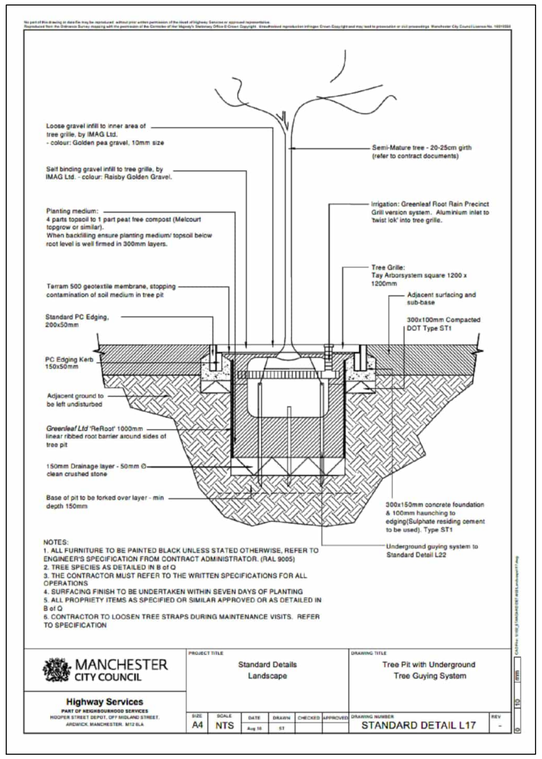
SECTION B - B



SECTION A-A



TYPICAL SECTION THROUGH
BIOFILTER ISLAND
SCALE 1:20

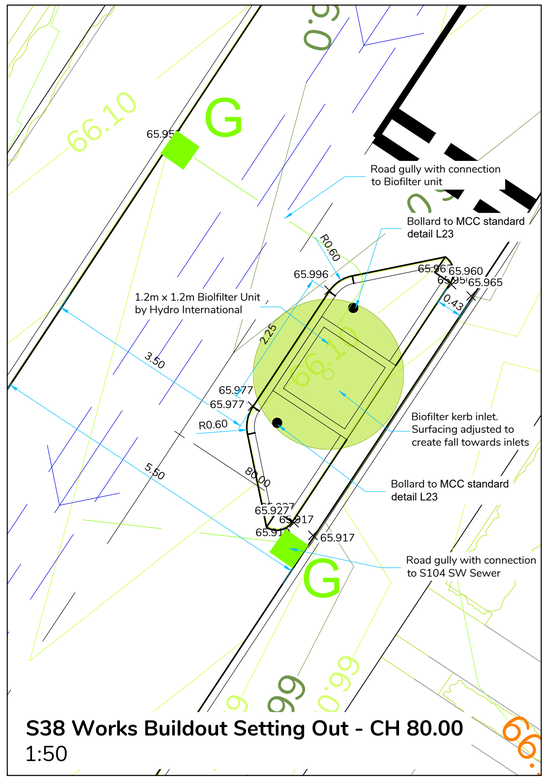


⚠ Residual Risks ⚠

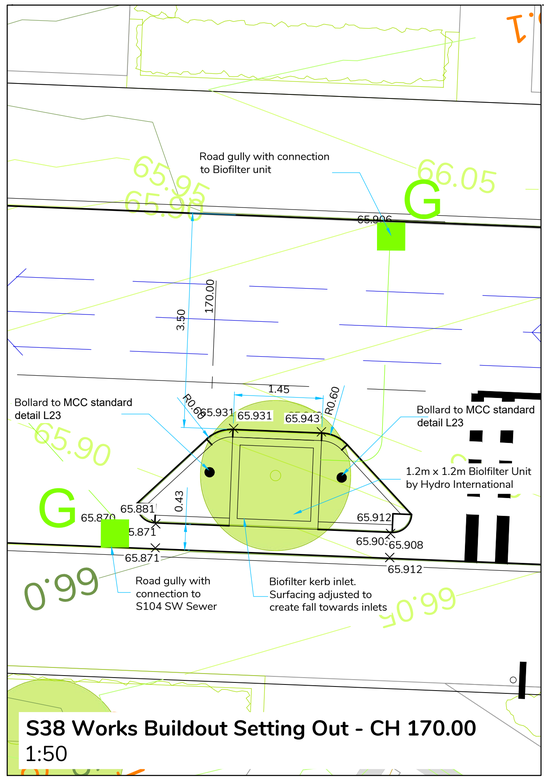
These drawings should be read in conjunction with the designer's risk assessment (DRA) which communicates significant residual design risks that have been identified and suggests mitigating actions.

General Notes

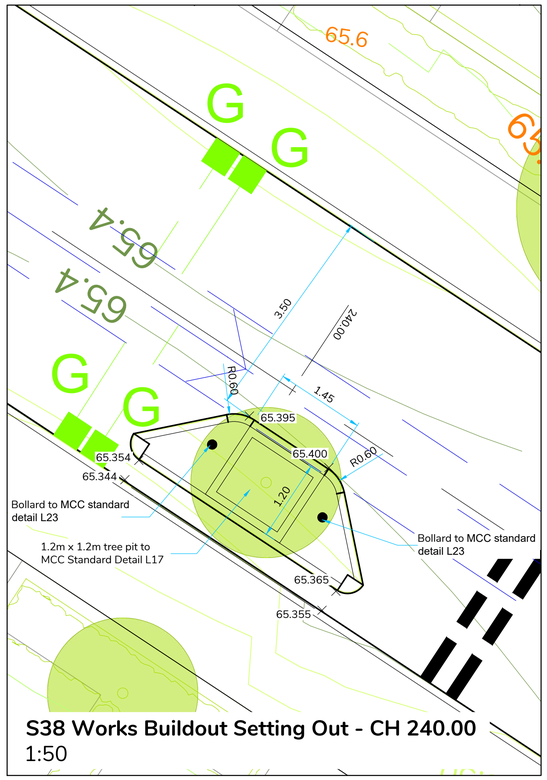
1. All dimensions are in metres unless stated otherwise.
2. This drawing shall be read in conjunction with all other relevant engineering details, drawings and specifications.
3. Any discrepancies should be reported to the engineer immediately so that clarification can be sought prior to the commencement of work.
4. All work is to be carried out in accordance with the specification for highways works and local authority guidance.
5. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works



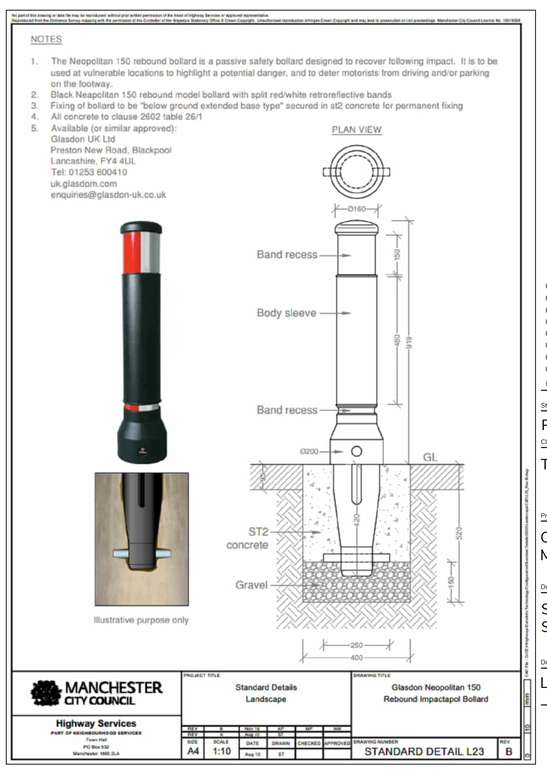
S38 Works Buildout Setting Out - CH 80.00
1:50



S38 Works Buildout Setting Out - CH 170.00
1:50



S38 Works Buildout Setting Out - CH 240.00
1:50



Rev	Date	Description	Drw	Chk	Revd	App
P08	14/12/22	Build-outs updated	ARJ	BKD	JDY	JDY
P07	08/11/22	Bollard & roadmarkings added	ARJ	BKD	JDY	JDY
P06	24/06/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P05	06/06/22	MCC L23 Bollard Detail added	ARJ	BKD	JDY	JDY
P04	06/05/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P03	26/04/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P02	28/03/22	LHA comments incorporated	ARJ	BKD	JDY	JDY
P01	14/12/21	First issue	ARJ	BKD	JDY	JDY

Status:
Preliminary

Client:
Towerhouse Systems

Project:
Cringle Road
Manchester

Drawing:
S38 Construction Details
Sheet 2 of 2

Drawing Number: LM20066-DYSE-XX-ZZ-DR-C-1116
Revision: P08

DYSE
STRUCTURAL ENGINEERS

ISO A1 (594x841mm) Do Not Scale © Copyright DYSE Ltd 2021

D7 - Hydro Biofilter design data and supplier information

Hydro Biofilter™
Design Data

The Hydro Biofilter™ is an innovative bioretention and biofiltration system that harnesses the natural treatment action of vegetation and the filtration power of specially engineered soils.

Hydro Biofilter™ engineers in nature's way to enhance any urban environment even where space is at a premium or where a retrofit surface water treatment solution is required. Suitable for residential or commercial settings, car parks and highways.

1) Robust chamber suitable for installation alongside highways.
2) Cover slab incorporating half-battered kerb and integrated kerb inlet slots (9).
3) Engineered filter media.
4) Enhanced mulch.
5) Tree or shrub.
6) Underdrain system.
7) Protective tree grate.
8) Pipe clean-out port (where required).
9) Half-battered kerb profile, complete with high capacity inlet slots for UK applications.
10) Tree guard

Note: Energy dissipater stones (omitted from drawing for clarity).

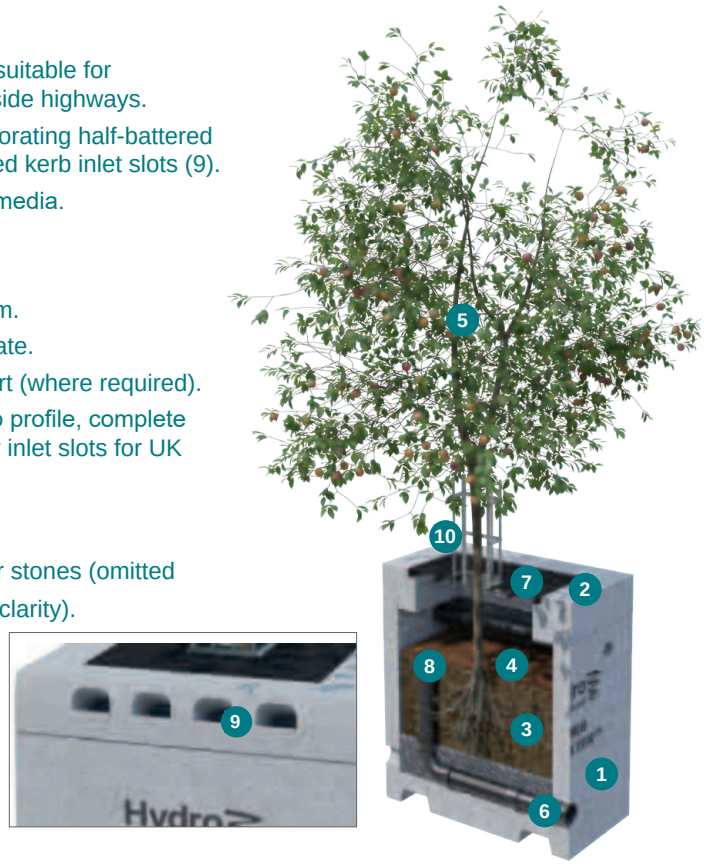


Figure 1 - The Hydro Biofilter™ Bioretention System

Components

From the surface Hydro Biofilter™ looks like a tree box, with a suitable shrub or small tree protruding through a decorative grating in a concrete slab at pavement level. Underneath, the pre-cast concrete chamber contains a layer of enhanced mulch, on top of a unique soil filter medium to deliver high levels of surface water treatment.

Similar in application and concept to a traditional bioretention system, the Hydro Biofilter™ has been optimised for high volume flow whilst retaining high pollutant removal efficiencies.

Repeatable, reliable performance

Surface water is channelled into the unit through a kerbside inlet, through an inlet pipe or directly from the surface and is filtered through the mulch and engineered soil-based media to provide effective removal and remediation of a number of pollutants including:

Very fine particles
Constructed to be functionally similar to an enhanced dry swale, comparable removal rates of 70-96% of total suspended solids can be achieved.

Gross pollutants
The integrated kerb inlet slots prevent larger litter from entering the system and are shaped to inhibit any smaller debris from becoming lodged within the inlet channels.

Liquid and sediment bound hydrocarbons
A substrate for natural bacteria is provided within the mulch layer for degradation of hydrocarbons. Removal efficiencies of 70-90% can be expected.

Sediment bound heavy metals
Plants assimilate metals and other contaminants into their bio-mass. Removal efficiencies are in the order of 50-98%.

Sediment bound nutrients
Nutrients including Nitrogen and Phosphorus are taken up by the plant and used for growth and other biological processes. Removal rates of 40-90% can be achieved.

Dissolved pollutants
Chemical and biological interactions within the soil ecosystem also work to isolate and remove dissolved pollutants.

As several processes are at work, there is an element of redundancy in the pollutant removal, which improves the overall reliability of the system.

The Simple Index Approach (SIA)

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

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

Hydro Biofilter™ SuDS Mitigation Indices [a]		
Total Suspended Solids (TSS)	**Metals**	**Hydrocarbons**
0.9	0.92	0.8

Notes:
(a) All mitigation indices supplied by Hydro International Ltd are independently verified and calculated using the methods laid out in the British Water How To Guide: Applying the CIRIA SuDS Manual Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices.

Table 1 - SuDS mitigation indices for Hydro Biofilter™

Sizing

Section 4.3.2 of CIRIA C609 states that "*To remove the major proportion of pollution it is necessary to capture and treat the runoff from frequent small scale events and a proportion of the runoff (first flush) from larger and rarer events.... The depths of rainfall will be country specific and should be determined using UK rainfall data for the specific site location.*"

Designed as an inlet system, the Hydro Biofilter™ inlet structure has the capacity to accept flows associated with these frequent smaller events and first flush via a kerbside inlet, through an inlet pipe or channel or directly from the surface. A clearance is maintained beneath the cover slab to allow for some surface ponding.

The Hydro Biofilter™ unit will typically be designed to treat in excess of 90% of the average annual rainfall runoff volume. The remaining 10% of runoff can be diverted to appropriate temporary storage areas via an internal or external bypass arrangement.

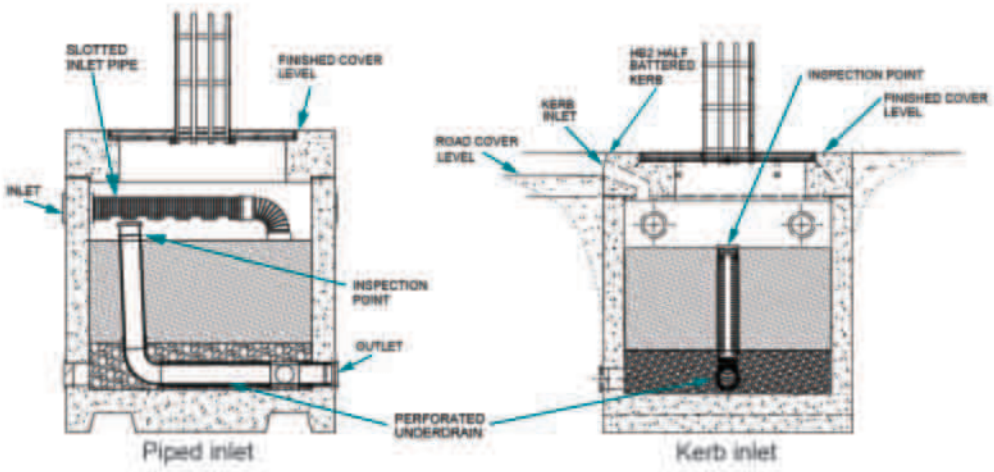
For initial sizing, it can be assumed that the filter surface area to drained area ratio will be between 0.2-0.3% for the UK.

Hydro Biofilter™ Sizes			Drained Area (m^2)		Outlet Flow Rate
Width (m)	**Length (m)**	**Filter Surface Area (m^2)**	**Minimum**	**Maximum**	
1.2	1.2	1.44	480	720	1.0 l/s
1.2	1.8	2.16	720	1080	1.5 l/s
1.2	2.4	2.88	960	1440	2.0 l/s

Table 2 - Hydro Biofilter™ design information.

Configuration options

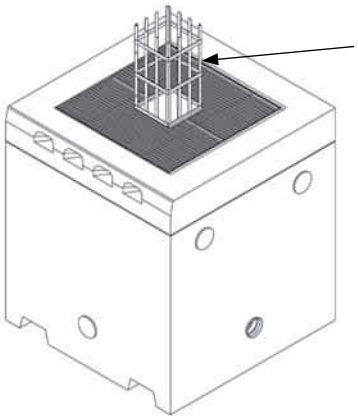
The piped or kerb inlet configurations are our most popular, but grille inlet only or a combined kerb and piped inlet configuration are also available.



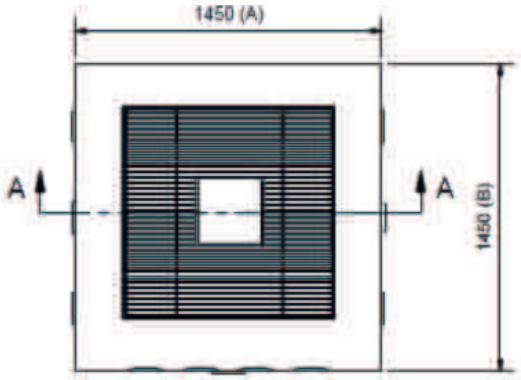
Chamber dimensions and weights

The dimensions in Table 3 are given as a guide.

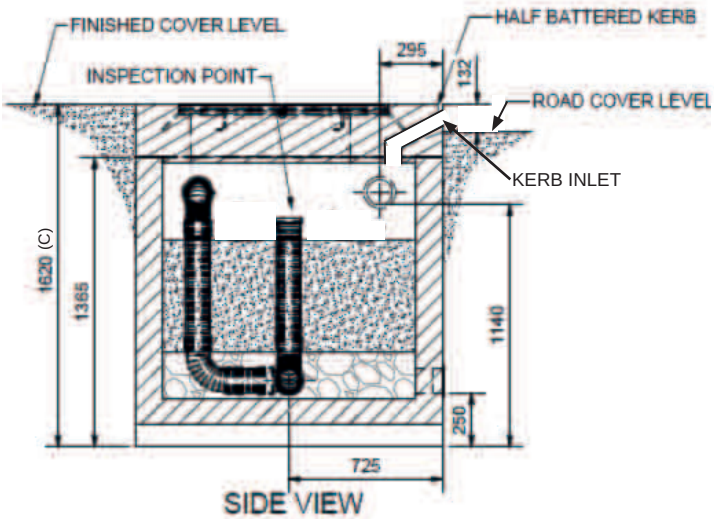
An indicative chamber drawing of the 1.2 m x 1.2 m Hydro Biofilter™ unit, as delivered to site, is shown below. Detailed installation drawings of each chamber size are available from Hydro International.



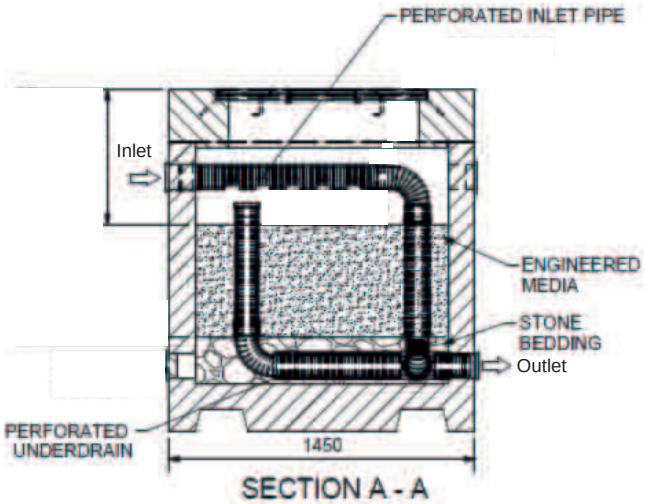
ISOMETRIC VIEW



PLAN VIEW



SIDE VIEW



SECTION A - A

Dimensions and Weights				
Hydro Biofilter™ Unit Size (internal dimensions) (mm)	**A (mm)**	**B (mm)**	**C (mm)**	**Total Chamber Weight (kg),** including all contents, fixtures and fixings.
1200 x 1200	1450	1450	1620	6300
1200 x 1800	2050	1450	1620	8700
1200 x 2400	2650	1450	1620	11200
Note: Chamber wall thickness is 125 mm.				

Table 3 - Hydro Biofilter™ dimensions and weights.

Maintenance

As a living system, the complex physical, chemical and biological processes at work within the Hydro Biofilter™ system act to recharge the filter media between storm events and so maintain the pollutant removal capabilities of the system.

The amount and type of maintenance required may vary from site to site depending on location, pollutant loading, storm conditions and local environmental strategy. However, the need for maintenance will generally be at a level consistent with the routine periodic maintenance of any landscaped area. This will maintain the appearance of the treatment area and its ability to infiltrate surface water and will include litter removal, pruning of plant, weeding and mulch replacement.

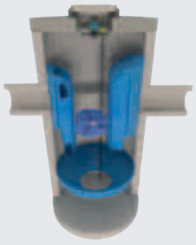
Expert Design Service

Hydro's professional engineers are able to utilise XP Solutions' Pluvius software, which contains over 700 years of UK rainfall data from the Met Office DELUGE® Database, to determine the local rainfall characteristics on a site-by-site basis. We can also provide estimated maintenance intervals, whole life cost estimates and predicted pollutant removal performance.

Call the Stormwater Hotline on: 01275 337937 or email stormwater@hydro-int.com

Our full range of stormwater treatment solutions

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



Downstream Defender® Select



Up-Flo™ Filter



Hydro Biofilter™

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

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

Downstream Defender® Select Up-Flo™ Filter Hydro-Biofilter™

Patent: www.hydro-int.com/patents

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

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

hydro-int.com

D8a - Hydro Biofilter Commissioning Reports - Unit No. 1 of 2

Hydro Biofilter™ Log Book

Hydro International

Hydro Biofilter™



Site Name: Cringle Road

Unit No. 1 of 2 Unit Size (m) 1.2 m

Plant Type (Species): Pyrus Calleryana

Location on Site: doing.diary.artist

Turning Water Around ...®

Inspection and Maintenance

Annual inspection requires 2 site visits, which would generally comprise 1 visit in the spring following winter loading and the second in the autumn to remove excessive leaf litter. Each visit will include a full inspection of the Hydro Biofilter™ unit. The exact amount of subsequent maintenance required may vary from site to site depending on the site location, pollutant loading and storm conditions experienced, but may include some or all of the following actions:

- Removal of foreign debris, rubbish, mulch and silt.
- Filter media evaluation and recharge.
- Evaluation of plant health, pruning and weeding as required.
- Replacement of mulch layer.
- Disposal of refuse materials.
- Cleaning of cover slab, inlet slots and inlet area.

The inlet area and kerb face may be cleaned using standard street sweeping equipment.

No specialist equipment is required to carry out the maintenance of a Hydro Biofilter™ unit, however, care should be taken when handling mulch and filter media as these items may retain traces of contamination. It is recommended that appropriate personal protective equipment is worn at all times, including gloves, safety glasses and high visibility clothing.

Disposal of removed material should be carried out in accordance with local environmental guidelines. It should be noted that after severe contamination, the mulch and media may be considered to be Hazardous Waste (England and Wales) or Special Waste (Scotland) and may therefore be subjected to controlled transportation and disposal procedures.

For further information or advice on any maintenance issues please contact Hydro International on Tel: 01275 337937.

Inspection and Maintenance

Activity		Frequency
Initial Commissioning Aftercare	Watering of plant (this is particularly important for newly established systems where lack of water can jeopardise the health, or in severe circumstances, lead to failure of the plant).	If the system is receiving little or no rainfall then: **24 litres/m² (of planter surface area) every 7-10 days for up to 3 months may be required.** Amount and frequency of watering may need to be adjusted to suit local conditions.
Inspection	Inspect for evidence of poor operation.	At site handover then every six months.
	Inspect surface for ponding. If ponding is evident, record dewatering time to determine if maintenance is required.	At site handover, then every six months.
	Inspect inlets, outlets and pipe system for blockage or silt accumulation.	At site handover, then every six months (or more frequently if required for aesthetic purposes).
Regular Maintenance	Litter, debris and sediment removal.	Every six months (or more frequently if required for aesthetic purposes).
	Mulching - removal and replacement.	Annually.
	Pruning and trimming of plant (trimmings may be recycled back into mulch or removed for composting).	Every 2 years (or as required for aesthetic purposes).
	Spiking, scarifying and thatch removal.	Every 3 years or as required (when replacing mulch).
Occasional Maintenance	Watering of plant.	As required.
	Weeding.	As required (possibly annually or six monthly as determined by site inspections).
Remedial Action	Treat/replace diseased plant.	As required.
	Treatment and restoration of eroded areas.	As required.
	Reinstatement of design levels, restoration of filter media.	As required.

Tools and Equipment

- Mulch.
- Erosion Control Stones.
- Pruning Shears.
- Shovel.
- Broom.
- Short Handled Rake.
- Bungee Cord.
- Empty Buckets (20 l).
- Water.
- Tape Measures.
- Personal Protective Equipment (PPE).
- Hydro Biofilter™ Maintenance Log Book.
- Camera.

Step by Step Instructions

Step 1 - Safety First

Ensure that your work area is safe and secure. If the location of the Hydro Biofilter™ unit is subject to traffic, appropriate traffic management should be in place prior to starting work.

All inspection / maintenance personnel should wear appropriate PPE including (but not limited to) high visibility vests or jackets, impermeable gloves and safety glasses.

Step 2 - Visual Inspection of the Hydro Biofilter™ Unit

Each unit should be inspected to confirm that:

1) The structure number matches the paperwork.
2) There is no standing water in the unit.
3) There is no damage to the tree grate or grates.
4) There is no damage to the top slab, including the kerb and inlet slots.
5) The underdrain pipe is clear.
6) The downstream bypass structure or opening is clear and unobstructed.

Step by Step Instructions

Step 3 - Pruning and Plant Health Evaluation

Examine the plant for any disease or damage, and prune as required.



Before



After

Step 4 - Removal of Tree Grate and Erosion Control Stones

Carefully remove each half of the tree grate and place to one side. Note that the tree grate may be secured on the underside using security clamps which need to be removed prior to lifting the tree grates. The tree grate sections may weigh up to 50 kg.

At the front of each unit are a number of erosion control stones - located just behind the kerb inlet slots. These should be removed through the tree grate opening and placed to one side.

Step 5 - Sediment, Debris, Litter and Mulch Removal

To remove the sediment, debris, litter and mulch, it may be necessary to place a bungee cord around the lower limbs of the plant.



Step by Step Instructions

Step 5 Cont ... - Sediment, Debris, Litter and Mulch Removal

Care should be taken when removing waste as there may be sharp items contained within the unit. The short handled rake should be used to access the corners of the unit to ensure removal of sediment. At this stage, it is important to be careful not to remove excessive amounts of the engineered filter media.

The amount of mulch and waste removed should be measured and recorded in the Inspection & Maintenance Log. This can be recorded in terms of the number of buckets of material removed.

All waste should be disposed of in compliance with local regulations.

Step 6 - Inspecting the Filter Media and Replacing the Mulch

Once all the mulch and debris has been removed, a clean filter media surface should remain at approximately 150 mm below the underside of the cover slab. Measure the distance from the underside of the cover slab to the top of the media surface and record in the Inspection & Maintenance Log.

If more media is required to replenish the system, or if the media appears clogged with sediment, please contact Hydro International for assistance.



Shredded mulch should be spread evenly over the filter media to a depth of 50 - 75 mm. Care should be taken to ensure that mulch is applied across the entire unit, including the corners.

Hydro International can supply additional shredded mulch if required.

Measure and record the distance from the underside of the cover slab to the top of the mulch layer in the Inspection & Maintenance Log. This should be approximately 75 - 100 mm.

Step by Step Instructions

Step 7 - Erosion Stones, Inlet Kerb and Cleaning Up

The top cover of the unit and the kerb inlet slots should be cleaned so that they are free of all debris.



Replace the erosion control stones behind the kerb inlet slots at the front of the unit. These stones should cover the mulch to approximately 150 mm back from the front of the unit. Care should be taken not to block or cause a restriction to the entry of water or litter by placing the stones too close to the inlet slots.

Re-install the tree grates, taking care not to damage the plant. Replace the security clamps if they are present.

If a bungee was used, carefully remove it from the plant.

Add a minimum of 20 litres of water to the plant.

Step 8 - Measure and Record

Measure and record the height of the plant above the grate and the width at the widest part of the stem. Record with any additional notes of interest about the unit or its surrounding environment (eg. evidence of oil / chemical spill, dead landscape vegetation in the vicinity, construction work within the drainage area, etc).



Make a photographic record of the unit following completion of maintenance. Photographic records of any evident damage should also be made.

Ensure that the Inspection & Maintenance Log is completed, signed, dated and kept on record and / or submitted to Hydro International.

Hydro Biofilter™ Installation Log

Hydro International Reference Number	22-21-0788		
Site Name	Shores Fold Development		
Site Location	Manchester		
Owner	Towerhouse Systems	**Contractor**	
Contact Name	Nick Maskrey	**Contact Name**	
Company Name	Towerhouse Systems	**Site Location**	
Address		**Address**	
Telephone		**Telephone**	
Fax		**Fax**	
Installation Date			
Model Size	1.2 m x 1.2 m		
Inlet type	Grate Inlet		

Hydro Biofilter™ Installation Location Record

Site Map	
Site Plan (Include vehicle restrictions and lift heights)	

Call: **01275 337937**
Email: **stormwater@hydro-int.com**

Hydro Biofilter™ Installation Location Record

Photo 1	
Photo 2	

Commissioning Record

Visit Date: 16th March 2026

[redacted] Print Name: P Twiggs

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations			
Standing Water? **If yes, please contact Hydro International immediately.**	No	Is there Damage to Protective Boards or Bungs?	No
Are Inlet Slots Clear?	Yes	Is There Any Damage to the Chamber?	No
Is the Underdrain Clear?	Yes	Is There Any Damage to the Tree Grate?	
Is Site Stabilised?	Yes	Is the Bypass Clear?	Yes
Is Final Surfacing Complete?	No	Is the Flowline Correct?	Yes
Take photographs of any observed damage or restriction.			
Notes: Due to the camber of the road, it is unlikely that water will enter the Bio-Filter via the drain holes, it will only be supplied by one drain gully.			

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	900mm
Media Added	no
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	750mm
Mulch Added	yes
Amount of Mulch Added (m^3)	3 x Bags

Plant	
Plant Type (Species)	Pyrus Calleryana
Height Above Tree Grate (m)	3.45m
Stem Diameter (m)	13mm
Width at Widest Point (m)	1.3m
General Plant Health	good
Plant Needs Support?	Tie wraps fixed to Tree Guard

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Hydro Biofilter™ Service Report Log

Inspection / Initial Observations			
Stanidng Water? If yes, please contact Hyfto International immediately		Is there Damage to Protective Boards or Bungs?	
Are Inlet Slots Clear?		Is there any Damage to the Chamber?	
Is the Underdrain Clear?		Is there any Damage to the Tree Grate?	
Is the Bypass Clear?		Is the Flowline Correct?	
Take photographs of any observed damage or restriction.			
Notes:			

Media		Mulch	
Distance from Top of Media to Underside of Cover Slab (mm)		Distance from Top of Mulch to Underside of Cover Slab (mm)	
Media Added		Mulch Added	
Amount of Media Added (m^3)		Amount of Mulch Added (m^3)	

Plant	
Plant Type (Species)	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Needs Support?	

Date:			
Sign:		**Print Name:**	
Take photographs of any observed damage or restriction.			

Integrated Stormwater Systems

Since the company's formation in 1980, Hydro International has advocated sustainable stormwater management and, through intensive research and product development Hydro has produced a 'Toolkit' for SuDS.

Flow Control

Hydro-Brake® Optimum Vortex Flow Control



Manage low, moderate and high flows to deliver sustainable drainage from single sites to large networks.

Precision-engineered to meet site-specific flow, head and storage requirements, only the Hydro-Brake® Optimum leverages more than 30 years of vortex flow control expertise to deliver exceptional flood protection and sustainable drainage.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 08/4598

wrc approved

Storage and Infiltration

Stormbloc® Optimum

Attenuate surface water and stormwater effectively even in challenging high-traffic urban environments.

Stormbloc® Optimum is a resilient geocellular storage system that provides underground storage and infiltration of urban runoff.

Lightweight materials combined with robust design make it easy to transport, quick to install and extremely durable, even beneath high-traffic areas such as roads, car parks and warehouse yards.



Stormwater Treatment

Downstream Defender® Select



The new generation of hydrodynamic vortex separator with performance that engineers can customise to meet specific stormwater quality objectives through model selection and other additional options.



Up-Flo™ Filter

A high-performance multi-stage treatment train within a single device. The Up-Flo™ Filter combines sedimentation and screening with fluidised bed filtration technology.

Hydro Biofilter™



A bioretention and biofiltration system that harnesses the natural treatment action of vegetation and the filtration power of specially-engineered soils.

Storage

Stormcell® and Stormcell® Lite Stormwater Storage Systems

A low cost underground storage system suitable for installation beneath roads, car parks and amenity areas.

Stormcell® is installed utilising a pipework system which prevents the entry of silts and grits into the storage volume.



Call: **01275 337937**
Email: **stormwater@hydro-int.com**

For Hydro Biofilter™ Maintenance Advice:

Tel: 01275 337937

Email: stormwater@hydro-int.com

Hydro Biofilter™

Unit 2, Rivermead Court
Kenn Business Park
Windmill Road, Kenn
Clevedon
BS21 6FT
Tel: 01275 878371

hydro-int.com

Turning Water Around...®

D8b - Hydro Biofilter Commissioning Reports - Unit No. 2 of 2

Hydro Biofilter™ Log Book

Hydro International

Hydro Biofilter™



Site Name: Cringle Road

Unit No. 1 of 2 Unit Size (m) 1.2 m

Plant Type (Species): Pyrus Calleryana

Location on Site: doing.diary.artist

Turning Water Around ...®

Inspection and Maintenance

Annual inspection requires 2 site visits, which would generally comprise 1 visit in the spring following winter loading and the second in the autumn to remove excessive leaf litter. Each visit will include a full inspection of the Hydro Biofilter™ unit. The exact amount of subsequent maintenance required may vary from site to site depending on the site location, pollutant loading and storm conditions experienced, but may include some or all of the following actions:

- Removal of foreign debris, rubbish, mulch and silt.
- Filter media evaluation and recharge.
- Evaluation of plant health, pruning and weeding as required.
- Replacement of mulch layer.
- Disposal of refuse materials.
- Cleaning of cover slab, inlet slots and inlet area.

The inlet area and kerb face may be cleaned using standard street sweeping equipment.

No specialist equipment is required to carry out the maintenance of a Hydro Biofilter™ unit, however, care should be taken when handling mulch and filter media as these items may retain traces of contamination. It is recommended that appropriate personal protective equipment is worn at all times, including gloves, safety glasses and high visibility clothing.

Disposal of removed material should be carried out in accordance with local environmental guidelines. It should be noted that after severe contamination, the mulch and media may be considered to be Hazardous Waste (England and Wales) or Special Waste (Scotland) and may therefore be subjected to controlled transportation and disposal procedures.

For further information or advice on any maintenance issues please contact Hydro International on Tel: 01275 337937.

Inspection and Maintenance

Activity		Frequency
Initial Commissioning Aftercare	Watering of plant (this is particularly important for newly established systems where lack of water can jeopardise the health, or in severe circumstances, lead to failure of the plant).	If the system is receiving little or no rainfall then: **24 litres/m² (of planter surface area) every 7-10 days for up to 3 months may be required.** Amount and frequency of watering may need to be adjusted to suit local conditions.
Inspection	Inspect for evidence of poor operation.	At site handover then every six months.
	Inspect surface for ponding. If ponding is evident, record dewatering time to determine if maintenance is required.	At site handover, then every six months.
	Inspect inlets, outlets and pipe system for blockage or silt accumulation.	At site handover, then every six months (or more frequently if required for aesthetic purposes).
Regular Maintenance	Litter, debris and sediment removal.	Every six months (or more frequently if required for aesthetic purposes).
	Mulching - removal and replacement.	Annually.
	Pruning and trimming of plant (trimmings may be recycled back into mulch or removed for composting).	Every 2 years (or as required for aesthetic purposes).
	Spiking, scarifying and thatch removal.	Every 3 years or as required (when replacing mulch).
Occasional Maintenance	Watering of plant.	As required.
	Weeding.	As required (possibly annually or six monthly as determined by site inspections).
Remedial Action	Treat/replace diseased plant.	As required.
	Treatment and restoration of eroded areas.	As required.
	Reinstatement of design levels, restoration of filter media.	As required.

Tools and Equipment

- Mulch.
- Erosion Control Stones.
- Pruning Shears.
- Shovel.
- Broom.
- Short Handled Rake.
- Bungee Cord.
- Empty Buckets (20 l).
- Water.
- Tape Measures.
- Personal Protective Equipment (PPE).
- Hydro Biofilter™ Maintenance Log Book.
- Camera.

Step by Step Instructions

Step 1 - Safety First

Ensure that your work area is safe and secure. If the location of the Hydro Biofilter™ unit is subject to traffic, appropriate traffic management should be in place prior to starting work.

All inspection / maintenance personnel should wear appropriate PPE including (but not limited to) high visibility vests or jackets, impermeable gloves and safety glasses.

Step 2 - Visual Inspection of the Hydro Biofilter™ Unit

Each unit should be inspected to confirm that:

1) The structure number matches the paperwork.
2) There is no standing water in the unit.
3) There is no damage to the tree grate or grates.
4) There is no damage to the top slab, including the kerb and inlet slots.
5) The underdrain pipe is clear.
6) The downstream bypass structure or opening is clear and unobstructed.

Step by Step Instructions

Step 3 - Pruning and Plant Health Evaluation

Examine the plant for any disease or damage, and prune as required.



Before



After

Step 4 - Removal of Tree Grate and Erosion Control Stones

Carefully remove each half of the tree grate and place to one side. Note that the tree grate may be secured on the underside using security clamps which need to be removed prior to lifting the tree grates. The tree grate sections may weigh up to 50 kg.

At the front of each unit are a number of erosion control stones - located just behind the kerb inlet slots. These should be removed through the tree grate opening and placed to one side.

Step 5 - Sediment, Debris, Litter and Mulch Removal

To remove the sediment, debris, litter and mulch, it may be necessary to place a bungee cord around the lower limbs of the plant.



Step by Step Instructions

Step 5 Cont ... - Sediment, Debris, Litter and Mulch Removal

Care should be taken when removing waste as there may be sharp items contained within the unit. The short handled rake should be used to access the corners of the unit to ensure removal of sediment. At this stage, it is important to be careful not to remove excessive amounts of the engineered filter media.

The amount of mulch and waste removed should be measured and recorded in the Inspection & Maintenance Log. This can be recorded in terms of the number of buckets of material removed.

All waste should be disposed of in compliance with local regulations.

Step 6 - Inspecting the Filter Media and Replacing the Mulch

Once all the mulch and debris has been removed, a clean filter media surface should remain at approximately 150 mm below the underside of the cover slab. Measure the distance from the underside of the cover slab to the top of the media surface and record in the Inspection & Maintenance Log.

If more media is required to replenish the system, or if the media appears clogged with sediment, please contact Hydro International for assistance.



Shredded mulch should be spread evenly over the filter media to a depth of 50 - 75 mm. Care should be taken to ensure that mulch is applied across the entire unit, including the corners.

Hydro International can supply additional shredded mulch if required.

Measure and record the distance from the underside of the cover slab to the top of the mulch layer in the Inspection & Maintenance Log. This should be approximately 75 - 100 mm.

Step by Step Instructions

Step 7 - Erosion Stones, Inlet Kerb and Cleaning Up

The top cover of the unit and the kerb inlet slots should be cleaned so that they are free of all debris.



Replace the erosion control stones behind the kerb inlet slots at the front of the unit. These stones should cover the mulch to approximately 150 mm back from the front of the unit. Care should be taken not to block or cause a restriction to the entry of water or litter by placing the stones too close to the inlet slots.

Re-install the tree grates, taking care not to damage the plant. Replace the security clamps if they are present.

If a bungee was used, carefully remove it from the plant.

Add a minimum of 20 litres of water to the plant.

Step 8 - Measure and Record

Measure and record the height of the plant above the grate and the width at the widest part of the stem. Record with any additional notes of interest about the unit or its surrounding environment (eg. evidence of oil / chemical spill, dead landscape vegetation in the vicinity, construction work within the drainage area, etc).



Make a photographic record of the unit following completion of maintenance. Photographic records of any evident damage should also be made.

Ensure that the Inspection & Maintenance Log is completed, signed, dated and kept on record and / or submitted to Hydro International.

Hydro Biofilter™ Installation Log

Hydro International Reference Number	22-21-0788		
Site Name	Shores Fold Development		
Site Location	Manchester		
Owner	Towerhouse Systems	**Contractor**	
Contact Name	Nick Maskrey	**Contact Name**	
Company Name	Towerhouse Systems	**Site Location**	
Address		**Address**	
Telephone		**Telephone**	
Fax		**Fax**	
Installation Date			
Model Size	1.2 m x 1.2 m		
Inlet type	Grate Inlet		

Hydro Biofilter™ Installation Location Record

Site Map	
Site Plan (Include vehicle restrictions and lift heights)	

Call: **01275 337937**
Email: **stormwater@hydro-int.com**

Hydro Biofilter™ Installation Location Record

Photo 1	
Photo 2	

Commissioning Record

Visit Date: 16th March 2026

Sign: Pete Twiggs Print Name: P Twiggs

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations			
Standing Water? **If yes, please contact Hydro International immediately.**	No	Is there Damage to Protective Boards or Bungs?	No
Are Inlet Slots Clear?	Yes	Is There Any Damage to the Chamber?	No
Is the Underdrain Clear?	Yes	Is There Any Damage to the Tree Grate?	
Is Site Stabilised?	Yes	Is the Bypass Clear?	Yes
Is Final Surfacing Complete?	No	Is the Flowline Correct?	Yes
Take photographs of any observed damage or restriction.			
Notes: Due to the camber of the road, it is unlikely that water will enter the Bio-Filter via the drain holes, it will only be supplied by one drain gully.			

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	900mm
Media Added	no
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	750mm
Mulch Added	yes
Amount of Mulch Added (m^3)	3 x Bags

Plant	
Plant Type (Species)	Pyrus Calleryana
Height Above Tree Grate (m)	3.45m
Stem Diameter (m)	13mm
Width at Widest Point (m)	1.3m
General Plant Health	good
Plant Needs Support?	Tie wraps fixed to Tree Guard

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Inspection and Maintenance Report No. .....

Date: .....

Sign: ..... Print Name: .....

Please take photographs of any observed damage or restriction.

Inspection / Initial Observations

Service undertaken by: .....

Inspection / Initial Observations		
Standing Water? **If yes, please contact Hydro International immediately.**		**Notes:**
Are Inlet Slots Clear?		
Is the Underdrain Clear?		
Damage to Plant?		
Damage to Chamber?		
Damage to Tree Grate?		
Is the Bypass Clear?		

Maintenance Record

Waste Removed	
Litter	
Leaves	
Sediment	
Other (please specify)	
Total Amount Removed (m^3 or No. of 20 l buckets)	

Plant	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Replaced?	

Media	
Distance from Top of Media to Underside of Cover Slab (mm)	
Media Added	
Amount of Media Added (m^3)	

Mulch	
Distance from Top of Mulch to Underside of Cover Slab (mm)	
Mulch Added	
Amount of Mulch Added (m^3)	

Hydro Biofilter™ Service Report Log

Inspection / Initial Observations			
Stanidng Water? If yes, please contact Hyfto International immediately		Is there Damage to Protective Boards or Bungs?	
Are Inlet Slots Clear?		Is there any Damage to the Chamber?	
Is the Underdrain Clear?		Is there any Damage to the Tree Grate?	
Is the Bypass Clear?		Is the Flowline Correct?	
Take photographs of any observed damage or restriction.			
Notes:			

Media		Mulch	
Distance from Top of Media to Underside of Cover Slab (mm)		Distance from Top of Mulch to Underside of Cover Slab (mm)	
Media Added		Mulch Added	
Amount of Media Added (m^3)		Amount of Mulch Added (m^3)	

Plant	
Plant Type (Species)	
Height Above Tree Grate (m)	
Stem Diameter (m)	
Width at Widest Point (m)	
General Plant Health	
Plant Needs Support?	

Date:			
Sign:		**Print Name:**	
Take photographs of any observed damage or restriction.			

Integrated Stormwater Systems

Since the company's formation in 1980, Hydro International has advocated sustainable stormwater management and, through intensive research and product development Hydro has produced a 'Toolkit' for SuDS.

Flow Control

Hydro-Brake® Optimum Vortex Flow Control



Manage low, moderate and high flows to deliver sustainable drainage from single sites to large networks.

Precision-engineered to meet site-specific flow, head and storage requirements, only the Hydro-Brake® Optimum leverages more than 30 years of vortex flow control expertise to deliver exceptional flood protection and sustainable drainage.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 08/4598

wrc approved

Storage and Infiltration

Stormbloc® Optimum

Attenuate surface water and stormwater effectively even in challenging high-traffic urban environments.

Stormbloc® Optimum is a resilient geocellular storage system that provides underground storage and infiltration of urban runoff.

Lightweight materials combined with robust design make it easy to transport, quick to install and extremely durable, even beneath high-traffic areas such as roads, car parks and warehouse yards.



Stormwater Treatment

Downstream Defender® Select



The new generation of hydrodynamic vortex separator with performance that engineers can customise to meet specific stormwater quality objectives through model selection and other additional options.



Up-Flo™ Filter

A high-performance multi-stage treatment train within a single device. The Up-Flo™ Filter combines sedimentation and screening with fluidised bed filtration technology.

Hydro Biofilter™



A bioretention and biofiltration system that harnesses the natural treatment action of vegetation and the filtration power of specially-engineered soils.

Storage

Stormcell® and Stormcell® Lite Stormwater Storage Systems

A low cost underground storage system suitable for installation beneath roads, car parks and amenity areas.

Stormcell® is installed utilising a pipework system which prevents the entry of silts and grits into the storage volume.



Call: **01275 337937**
Email: **stormwater@hydro-int.com**

For Hydro Biofilter™ Maintenance Advice:

Tel: 01275 337937

Email: [redacted]

Hydro Biofilter™

Unit 2, Rivermead Court
Kenn Business Park
Windmill Road, Kenn
Clevedon
BS21 6FT
Tel: 01275 878371

hydro-int.com

Turning Water Around...®

D9 - United Utilities S104 Provisional Certificate

United Utilities Section 104 Provisional Certificate

United Utilities Reference Number:	**05357230**

Legal Agreement Reference:	**SWW\WHO11.11271**
Value of Works:	**£305,137**
Date of Agreement:	**17/06/2023**

Site Address:	**Cringle Road**		
Adoptions Engineer:	James Darlington	Telephone	[redacted]
		Email	
Developer:	Cringle Road Developments Ltd	Telephone	
Contact name:	Nick Maskrey	Email	

With reference to the above site, I enclose herewith the Provisional Certificate of Completion for the prospectively adoptable sewers duly completed.

It will be necessary for the visual inspections of the sewers, manholes and pumping stations etc. to be undertaken no sooner than two months before the expiry of the maintenance period. Please contact our local Developer Services Inspector to arrange the necessary inspections.

Should you require any further information in the meantime, please do not hesitate to contact me.

WHEREAS the whole of the Works have been completed and the majority of the Properties served by the works are now occupied.

AND WHEREAS the Developer has by notice reference dated ***17/06/2026*** both requested a Provisional Certificate and undertaken to maintain the works and remedy any defects during the period of maintenance.

NOW THEREFORE I hereby CERTIFY that the Works were substantially complete on ***01/04/2026***

This Certificate is issued pursuant to Clause 8 of the Agreement. Pursuant to Clause 9, the Period of Maintenance will expire on ***01/04/2027***

United Utilities Water LTD
Registered in England and Wales: Registered No. 2366678
Registered Office: Haweswater House, Lingley Mere Business Park, Lingley Green Ave, Gt Sankey, Warrington, WA5 3LP

Issued by:	***Chloe McShane***	Date:	***18/06/2026***
	For Developer Services and Metering		

D10 - Confirmation of Delivery of Flow Control (from Supplier)

Cringle Rd Flow Control Supplier Information
Confirmation of Delivery from Supplier

Delivery

Crown Water Ltd
Index House
St Georges Lane
Ascot
SL4 7ET
Tel 01344 886996

Deliver to:-

Shores Fold Development
Site Office
1 Brickyard Close
Levenshulme
Manchester
M19 2ZN
Dave 07985 454784

Date : **26/02/2026**
Order Ref : **Email Order From Nick Maskrey 24/02/26 11:12**
Site Name : **Cringle Rd, Manchester**
Order Date : **26/02/2026**
Project Ref : 16060226

131 mm QR5 Flow Control

Cringle Rd Flow Control Supplier Information
Confirmation of Delivery from Supplier

MY ORDERS

Order Entry

Printing

Manifests

Tracking

Templates

Orders Overview

MY ACCOUNT

MY RULES

MY UPLOADS

:r.com › My Orders › **Tracking**

SIGN OUT

0 BASKET

BACK

Orders

20260303008267700008876

Filter by Order Number

Con Number:
202603030082677 0008876
BS24 9DJ Weston-super-Mare
M19 2ZN MANCHESTER - 03/03/2026
Ref: 131QR5

Scan History

Pickup Request | Pickup | Transit | Delivery

Select Time Zone:

Scan history

Con / Item	DATE / TIME	SCAN TYPE	LATEST STATUS	LOCATION	COMMENTS / SIGNED BY
202603030082677 **0008876 001**	05/03/2026 15:18:53	DELIVERY	DELIVERED	Point of Delivery	david anchor
202603030082677 **0008876 001**	05/03/2026 08:26:24	TRANSIT	OUT FOR DELIVERY	Delivery Depot	
202603030082677 **0008876 001**	05/03/2026 03:47:45	TRANSIT	DEPOT SORT SCAN	Delivery Depot	
202603030082677 **0008876 001**	03/03/2026 19:32:21	SYSTEM	MANIFESTED		
202603030082677 **0008876 001**	03/03/2026 17:51:57	TRANSIT	AT SENDING DEPOT	Sending Depot	
202603030082677 **0008876 001**	03/03/2026 12:44:50	SYSTEM	LABEL PRINTED		
202603030082677 **0008876 001**	03/03/2026 12:44:47	SYSTEM	ORDER CREATED		
202603030082677 **0008876 001**	03/03/2026 12:44:46	SYSTEM	READY TO PRINT		

Message history

Name	Type	Trigger	Recipient	Date/Time	Subject/Body	Success
Sender Delivery (Delivered)	Email	DELIVERED	[redacted]	05/03/2026 15:18:59	Consignment: 0008876 Status: Delivered	
Delivery Window Notification	SMS	DELIVERY - DEPARTED WITHIN THRESHOLD	[redacted]	05/03/2026 08:28:30	APC plan to deliver your {{shipper_company}} order between {{del_timewindow_start}} and {{del_timewindow_end}} Not going to be in? http://apcchoice.com?c={{short_con}}	

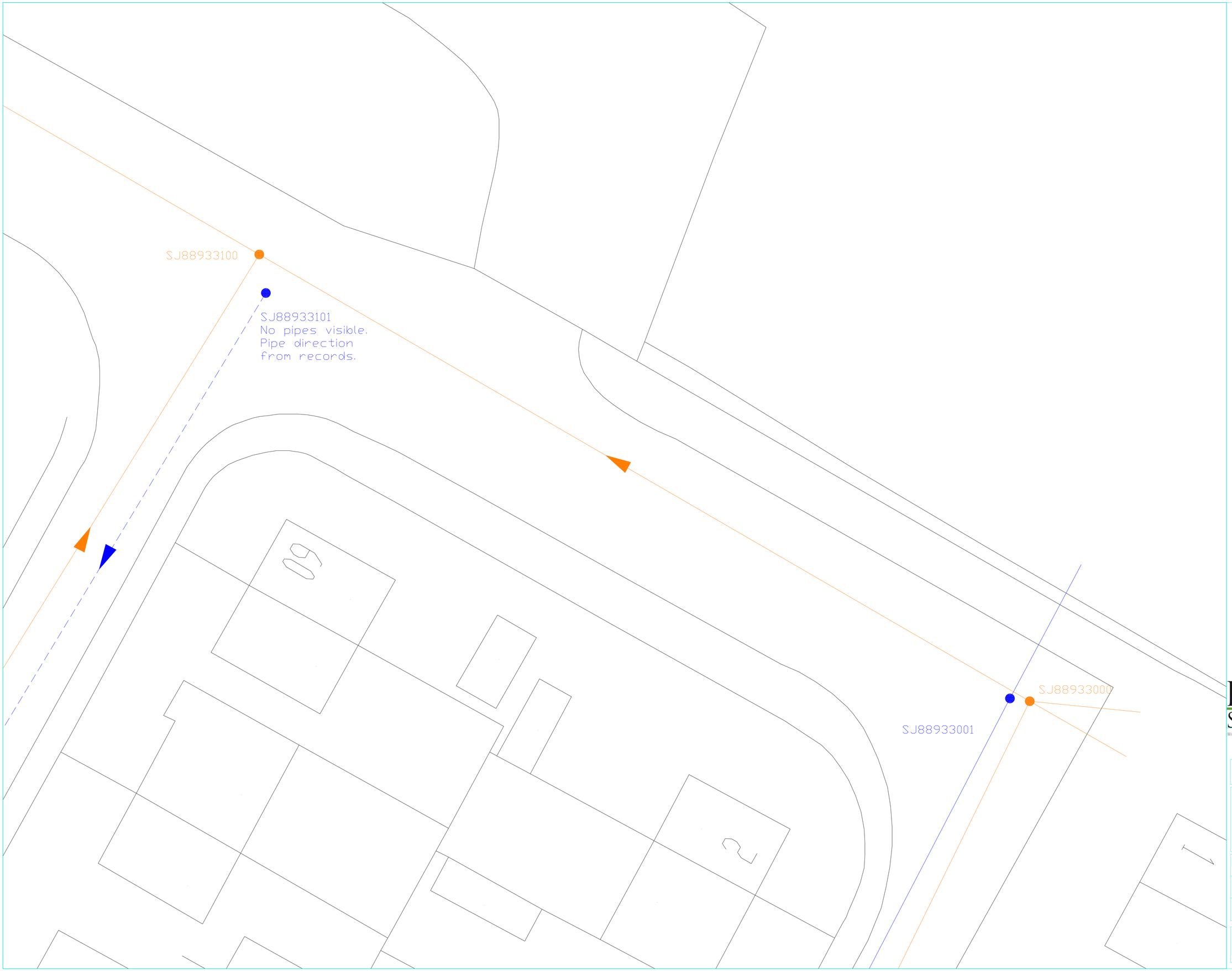
Appendix E - Drainage Survey, Inspection and Maintenance Records

This appendix contains drainage survey, inspection and maintenance records used as supporting information, including the Jetflow inspection report Jan 2026 and the 20.06.03 Invek Drainage Survey. The Jetflow inspection report provides supporting evidence of completed-development inspection and maintenance activity, including accessible chambers and associated site records.

- E1 – Invek Drainage Survey
- E2 – Jetflow inspection report

E1 - Invek Drainage Survey

Showing existing SW manhole (MH SJ88933001) connecting to the newly installed Cringle Road drainage system. Other, unrelated, manholes have been excluded from this appendix as they are not considered relevant to the scheme, however these records may be provided if required.



N

Legend/Notes:

- Combined Sewer
- Foul Sewer
- SW Sewer
- Assumed Sewer (Not Proven)
- Rising Main
- Highway Drainage
- Culvert Sewer
- Open Water Course
- Overflow Line
- Treated Line
- RWD Rain Water Down Pipe
- FDP Foul Down Pipe
- CDP Combined Down Pipe
- GDP Grey Water Down Pipe
- Highway Gully
- Septic Tanks
- Direction of overland flows
- + 49.591 Spot levels
- AV Air Valve
- HB Hatchbox
- CE Capped End
- PS Penstock

smas CHAS BUILDER'S PROFILE

INVEK SURVEYS LTD.
Warrington Business Park, Long Lane, Warrington, Cheshire, WA2 8TX
Tel: 01925 244376 Fax: 01925 241517
Email: kevin@invek.com – www.invek.com

Client
Tower House Systems Ltd

Drawing Title
Cringle Road Levenshulme
Drainage Layout

Scale(s)	N.T.S	Drawn	PW
Date	06.03.20	Checked	RD
Job Number	1622	Approved	KN

Sheet Size, Drawing Number & Revision
A1_1622/01_Rev_

Invek Surveys 6.16 — Manhole Details

09/03/20

OS ref SJ8893387087 — M/H no SJ88933001

Location O/S NO.1 CRINGLE ROAD

Year laid — Status PU — Function S — Type M — Survey date 06/03/20

COVER — Shape S — Hinged Y — Lockable N — Duty H — Size 610 x 610 — Toxic N

SHAFT — Side N — Noreg 1 — Depth 430 — Size 600 x 600 — Vermn Y

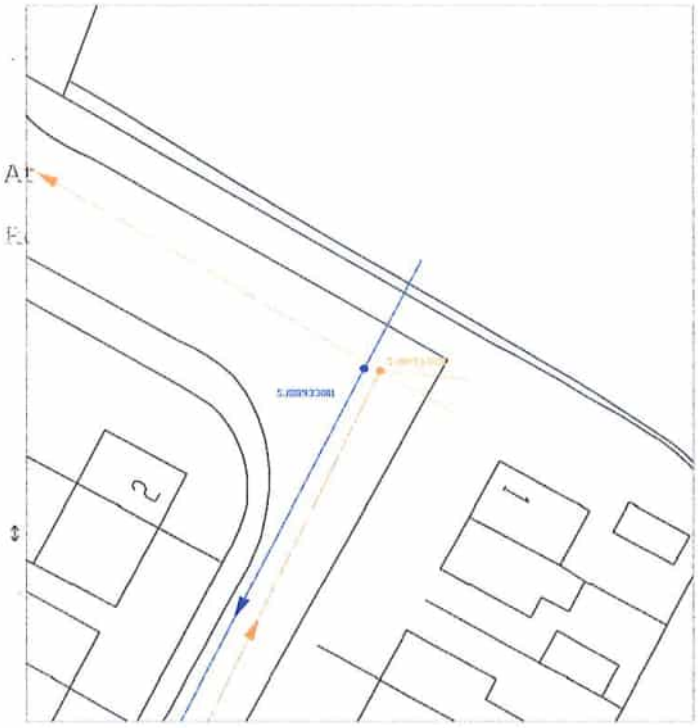
CHAMBER — Soffit S — Steps 4 — Ladders 0 — Lndgs 0 — Size 1200 x — Const P

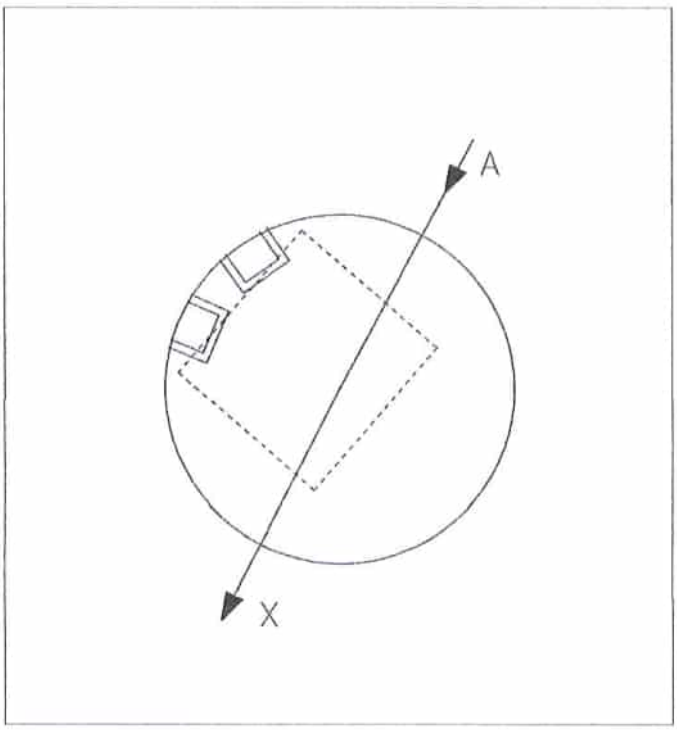
Depth flow — Depth silt 5 — Ht surch 5 — Cover level 65.30

	Up/dn ref	Shp	Size	Bdrop	Mat	Lng	Depth	Invert
In A		C	300 x		CO		2.19	63.11
B			x					
C			x					
D			x					
E			x					
F			x					
				TV Crt				
Ou X	88933003	C	300 x	N C	CO		2.21	63.09
Y			x	N C				

Attention Cover N — Step/Lad N — Shaft N — Chamb N — Bch/ch N — Other N

Remarks DAC





Invek Survey - 29.09.2020
SJ88933001_P_01



Invek Survey - 29.09.2020
SJ88933001_P_02



E2 - Jetflow Inspection Report

Claypit and Brickyard Management LTD 2026

Company:	Jetflow Drain Services
Contact:	Bailey Oster
Created:	Wed, 1/14/2026

(1)



141 Cringle Road

Created: Wed, 1/14/2026

(2)



141 Cringle Road

Created: Wed, 1/14/2026

Filter Box

(3)

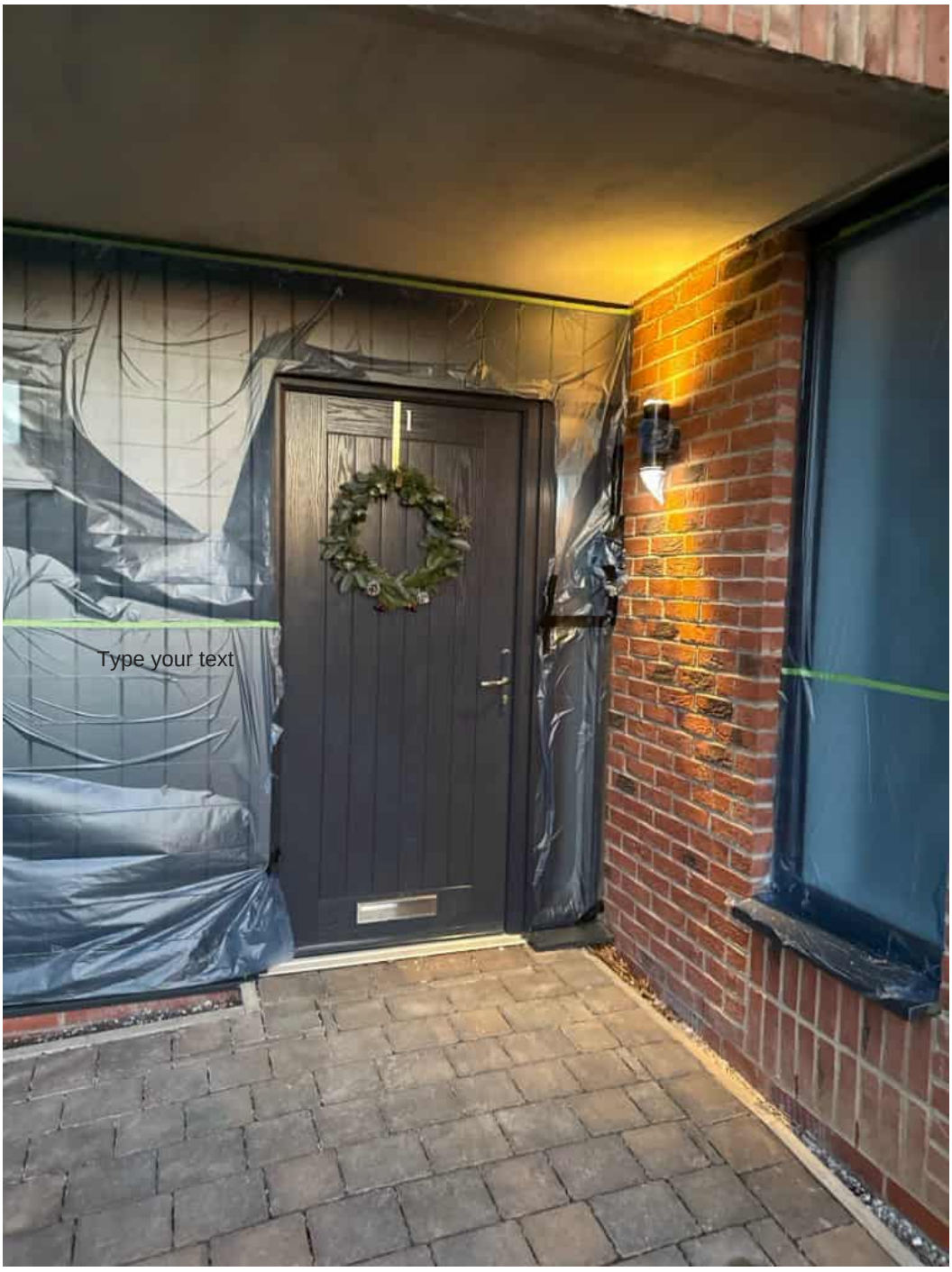


141 Cringle Road

Created: Wed, 1/14/2026

Filter Box Cleaned

(4)



1 Claypit Crescent

Created: Wed, 1/14/2026

(5)



1 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(6)

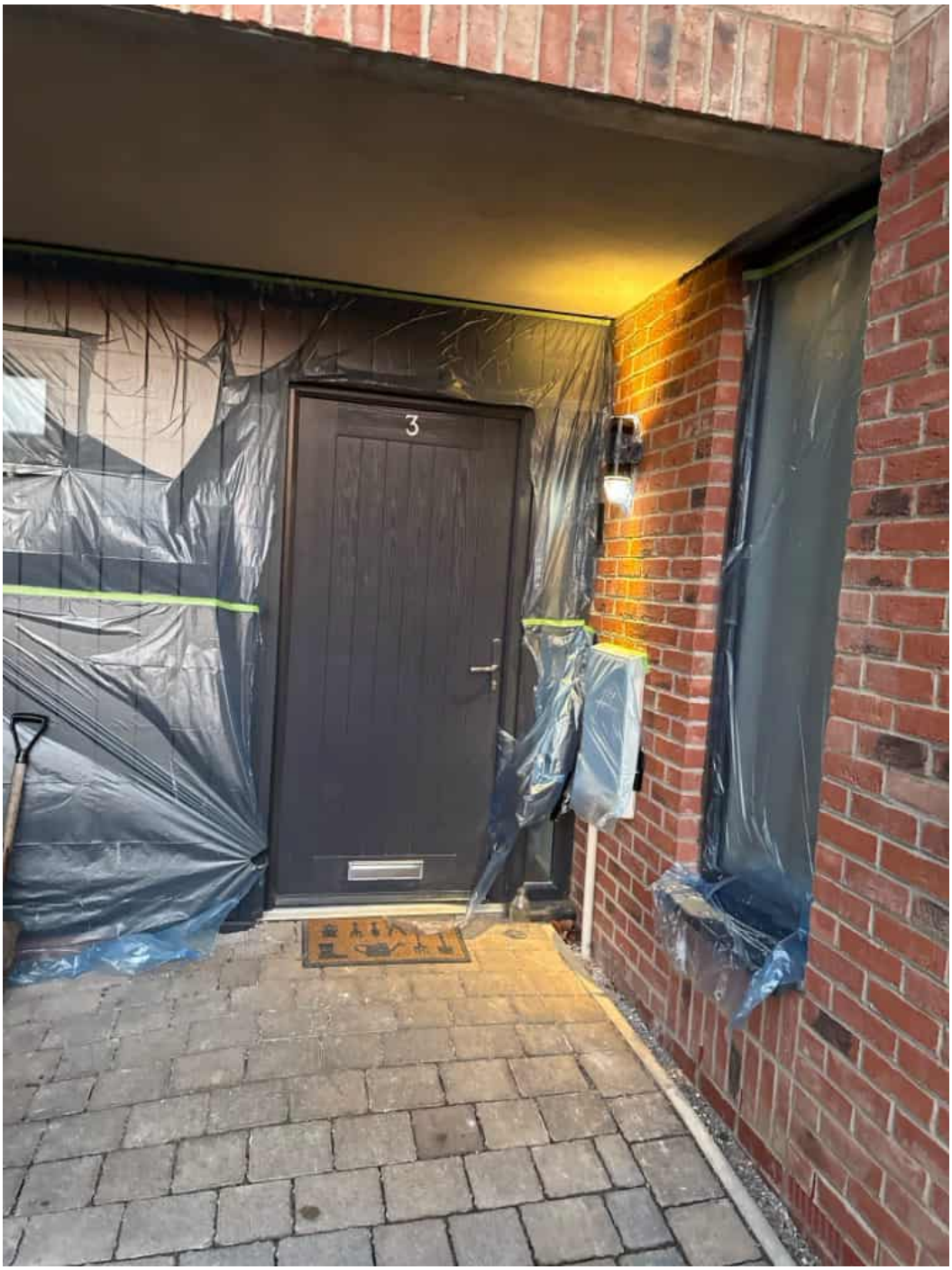


1 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(7)



3 Claypit Crescent

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(8)



3 Claypit Crescent

Created: Wed, 1/14/2026

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3 Claypit Crescent

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5 Claypit Crescent

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(11)



10 Claypit Crescent

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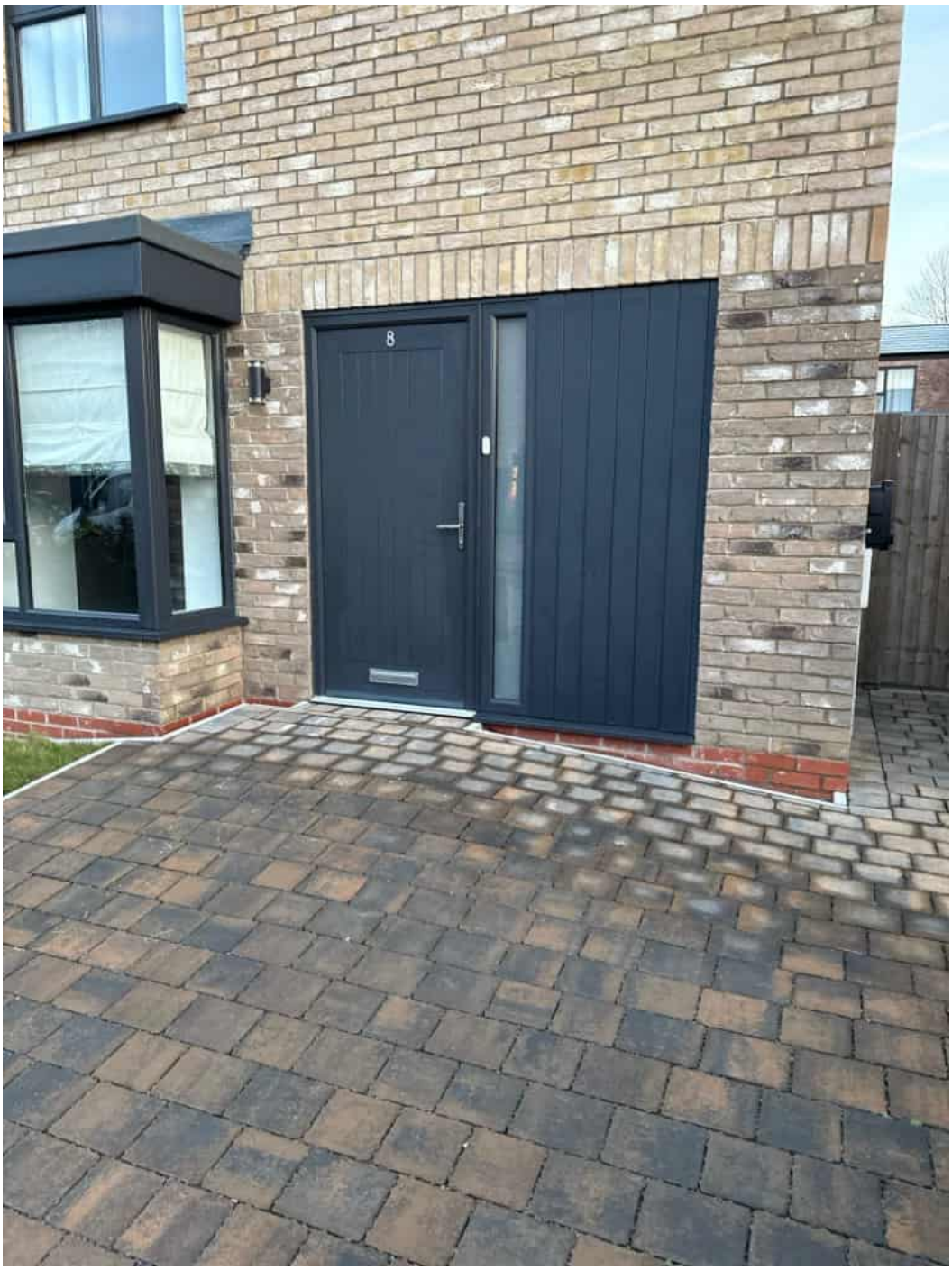


10 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(13)



8 Claypit Crescent

Created: Wed, 1/14/2026

(14)



8 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(15)



6 Claypit

Created: Wed, 1/14/2026

(16)

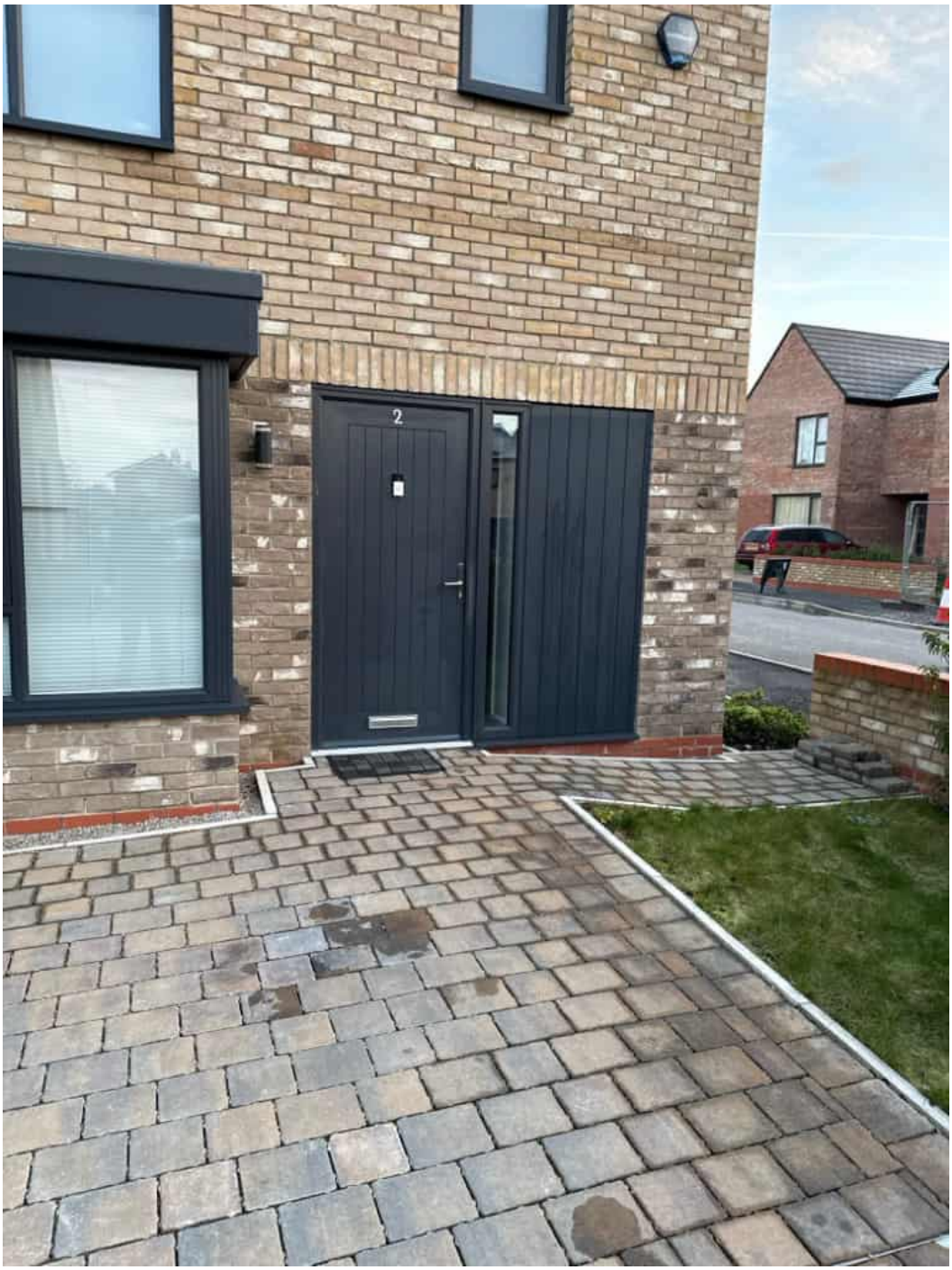


6 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

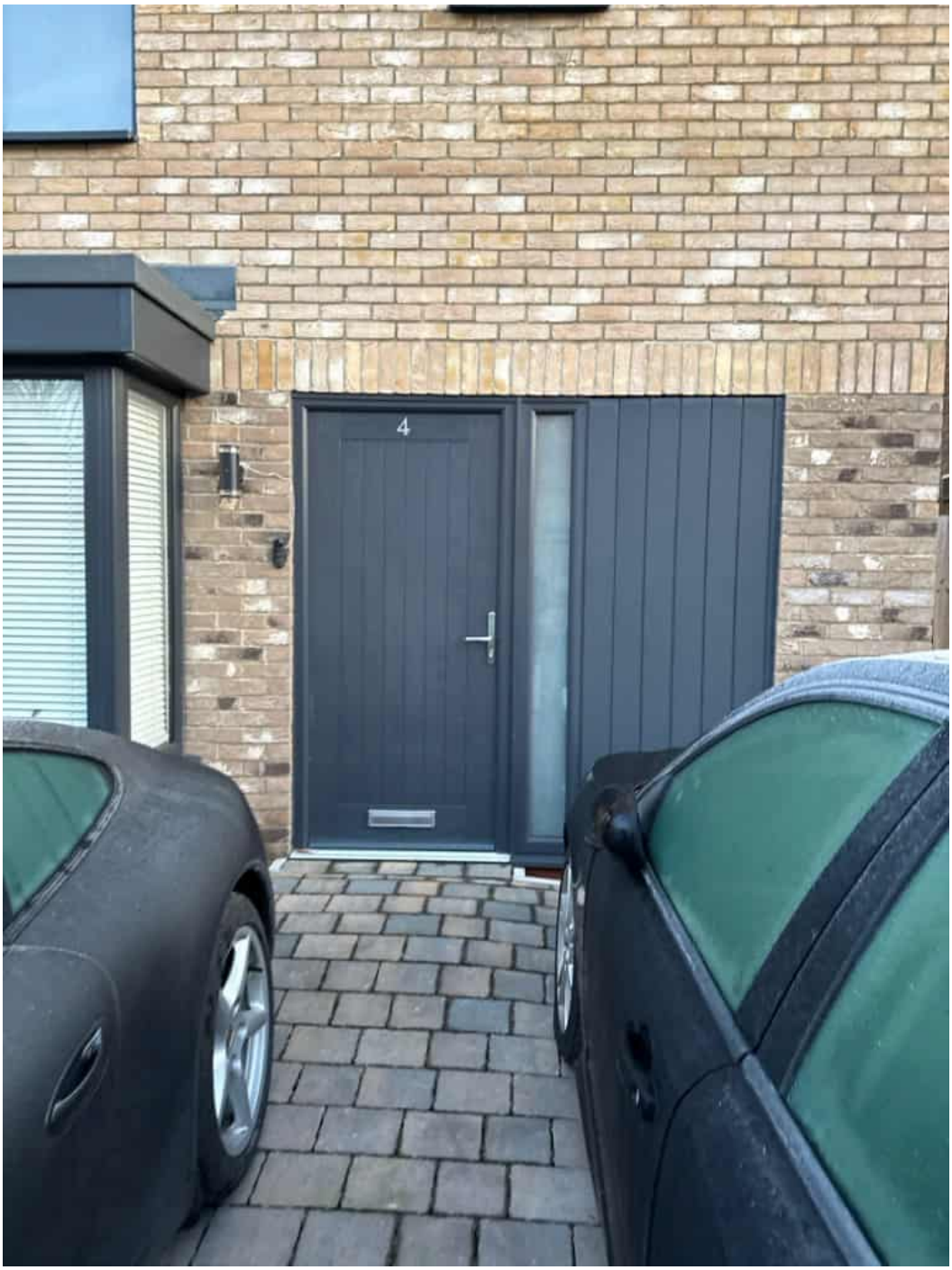
(17)



2 Claypit Crescent

Created: Wed, 1/14/2026

(18)



4 Claypit Crescent

Created: Wed, 1/14/2026

(19)



2 & 4 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(20)



2 & 4 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(21)



9 Claypit Crescent

Created: Wed, 1/14/2026

(22)



11 Claypit Crescent

Created: Wed, 1/14/2026

(23)



9 & 11 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(24)



9 & 11 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(25)



13 Claypit Crescent

Created: Wed, 1/14/2026

(26)



13 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(27)



13 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(28)



15 Claypit Crescent

Created: Wed, 1/14/2026

(29)



5 & 7 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(30)



5 & 7 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(31)



17 Claypit Crescent

Created: Wed, 1/14/2026

(32)



17 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(33)



17 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(34)



Plot 11 19 Claypit Crescent
Created: Wed, 1/14/2026

(35)



21 & 23 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(36)



21 & 23 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

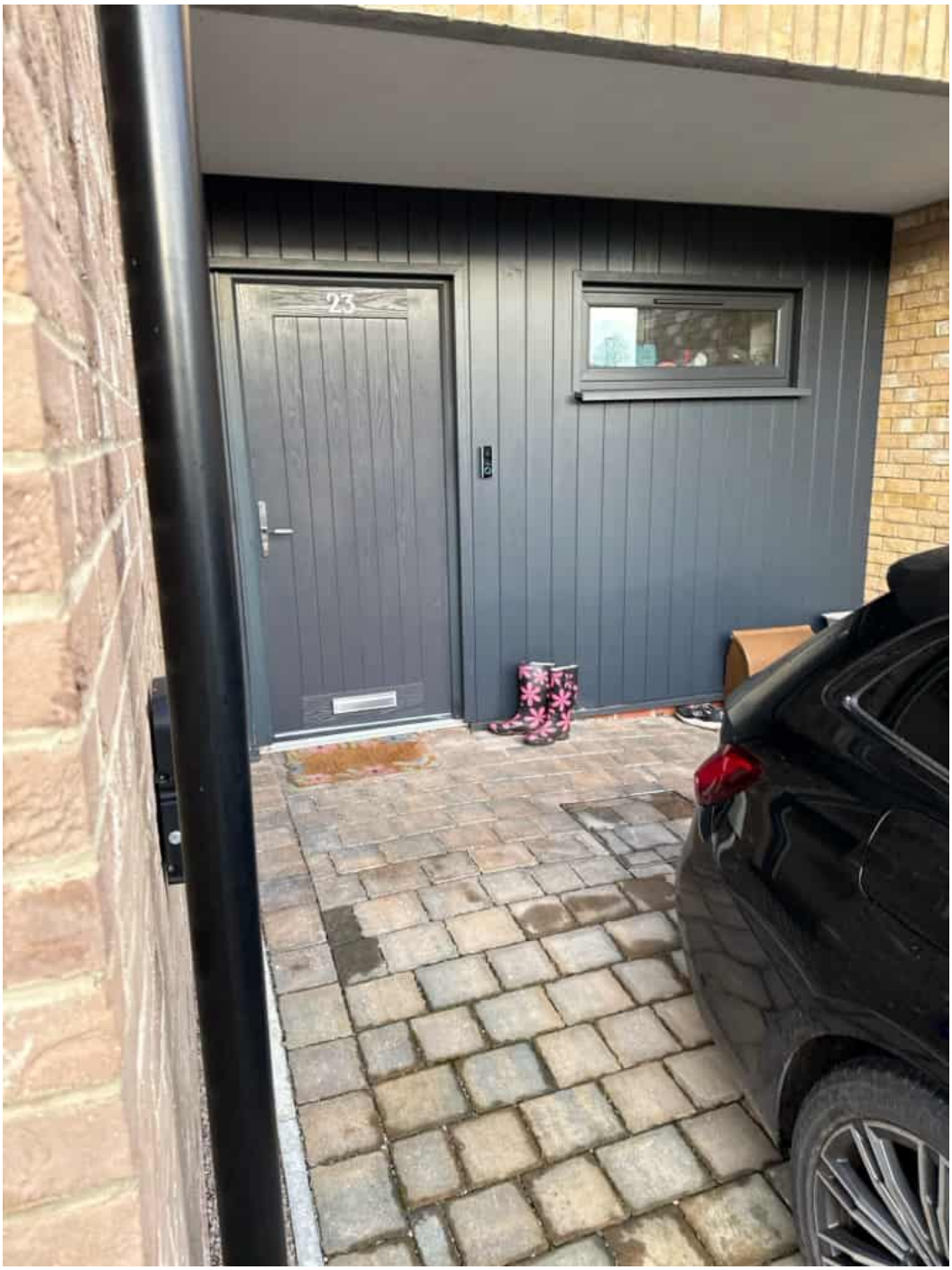
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21 Claypit Crescent

Created: Wed, 1/14/2026

(38)



23 Claypit Crescent

Created: Wed, 1/14/2026

(39)



12 Claypit Crescent

Created: Wed, 1/14/2026

(40)



12 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(41)



12 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(42)



14 Claypit Crescent

Created: Wed, 1/14/2026

(43)



16 Claypit Crescent

Created: Wed, 1/14/2026

(44)



14 & 16 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(45)



14 & 16 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

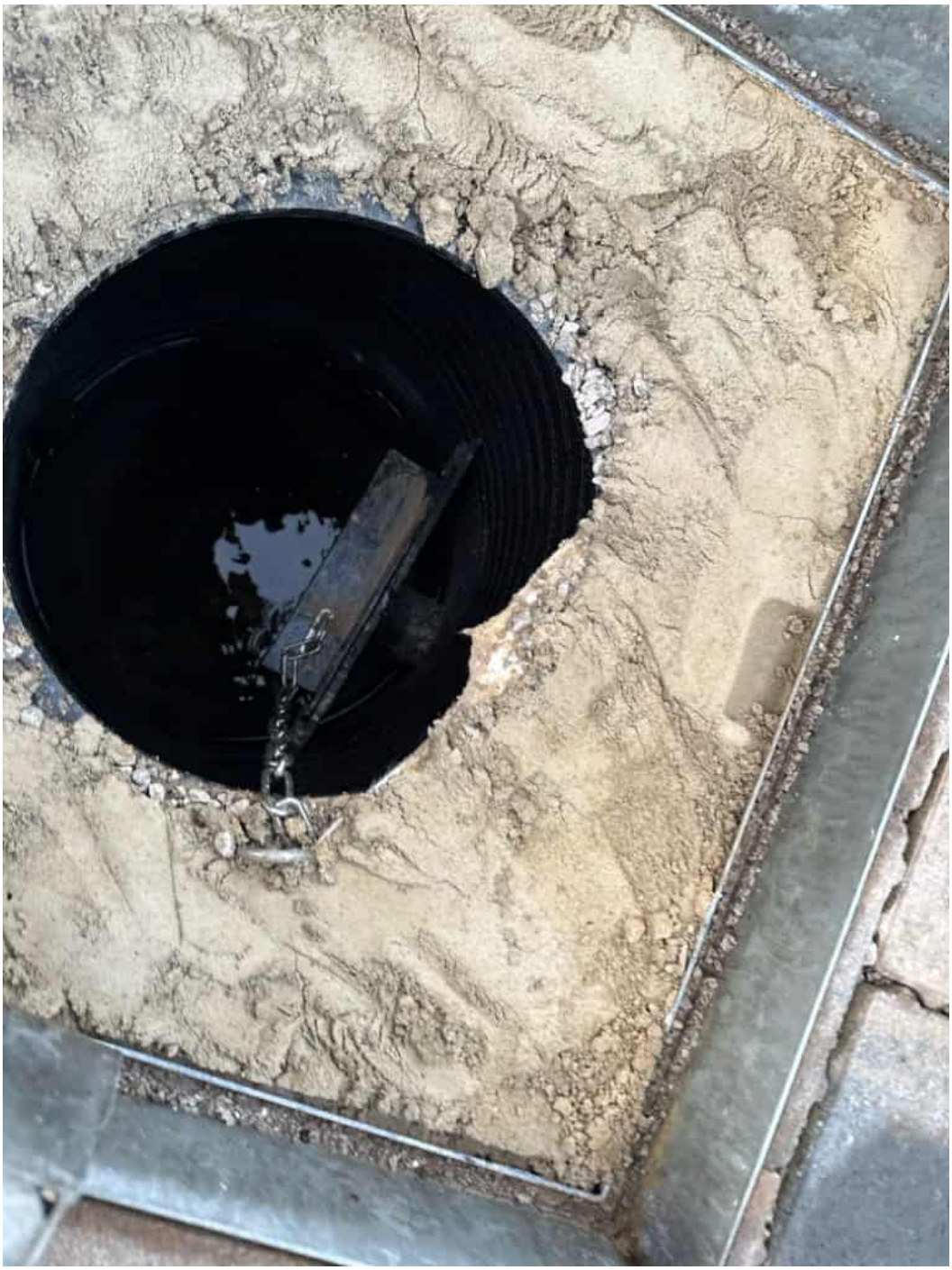
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18 Claypit Crescent

Created: Wed, 1/14/2026

(47)



18 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(48)



18 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(49)



25 Claypit Crescent

Created: Wed, 1/14/2026

(50)



27 Claypit Crescent

Created: Wed, 1/14/2026

(51)



25 & 27 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(52)



25 & 27 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

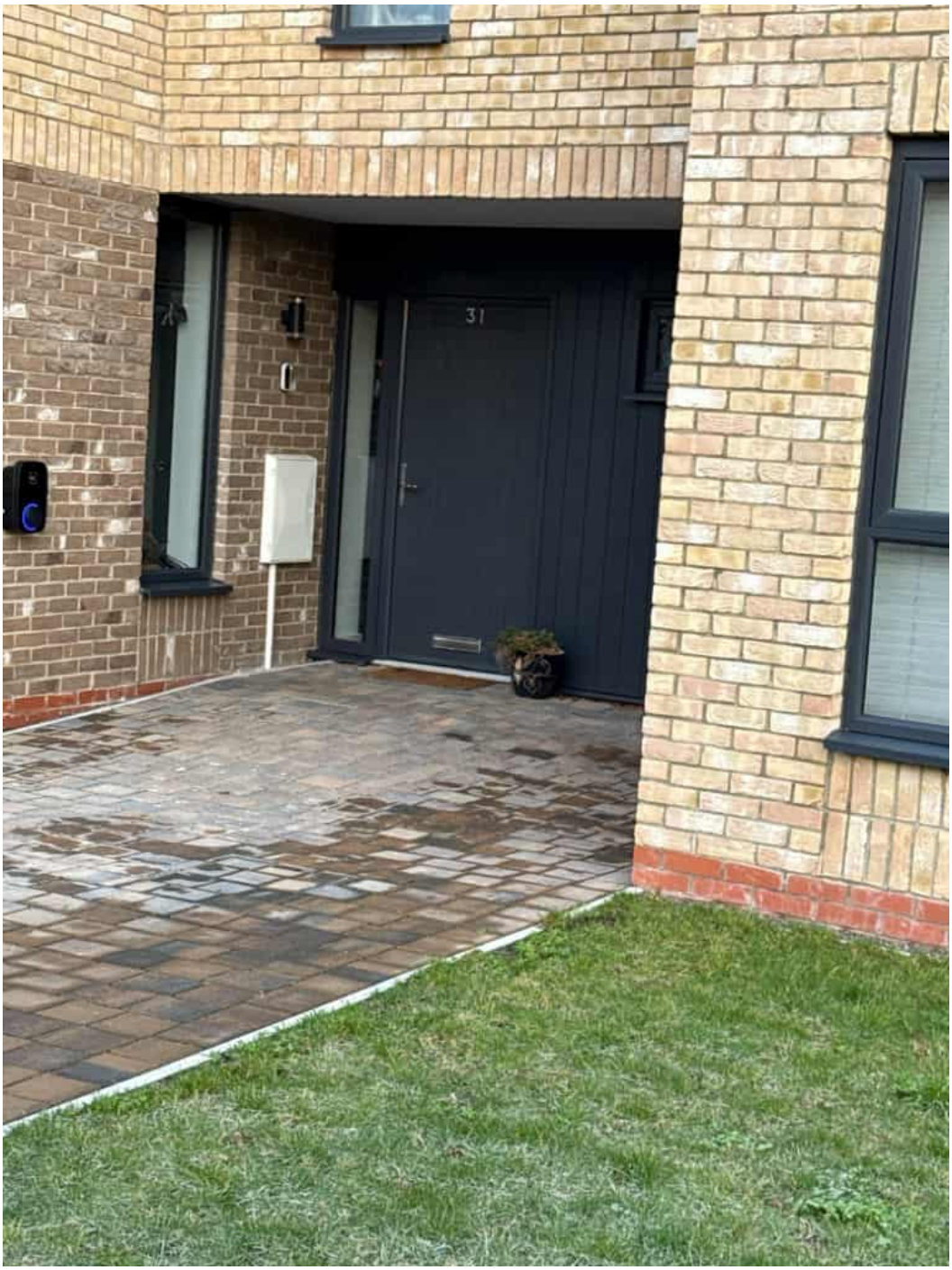
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(54)



31 Claypit Crescent

Created: Wed, 1/14/2026

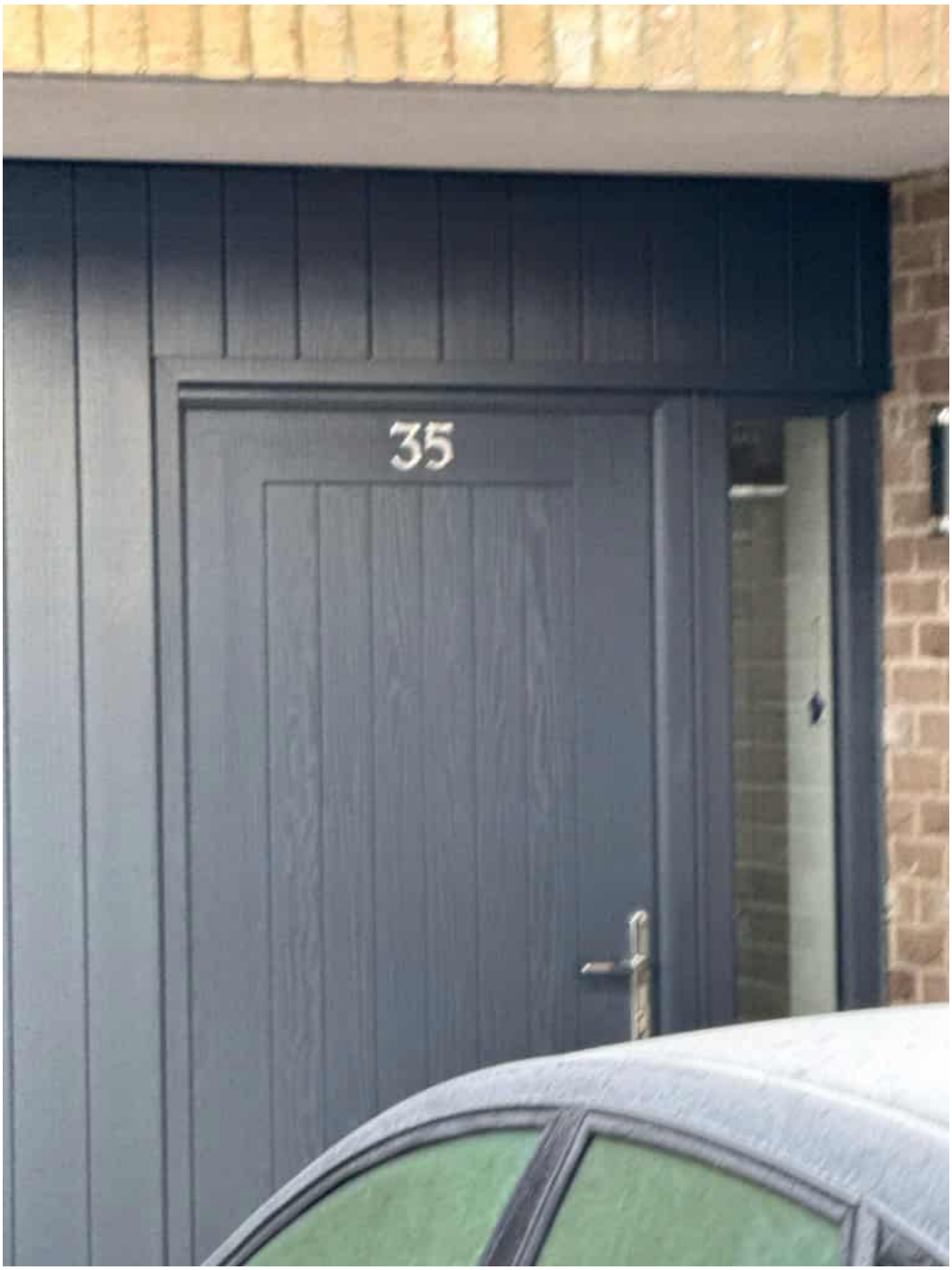
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33 Claypit Crescent

Created: Wed, 1/14/2026

(56)



35 Claypit Crescent

Created: Wed, 1/14/2026

(57)



31 & 33 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(58)



31 & 33 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(59)



27 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(60)



27 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

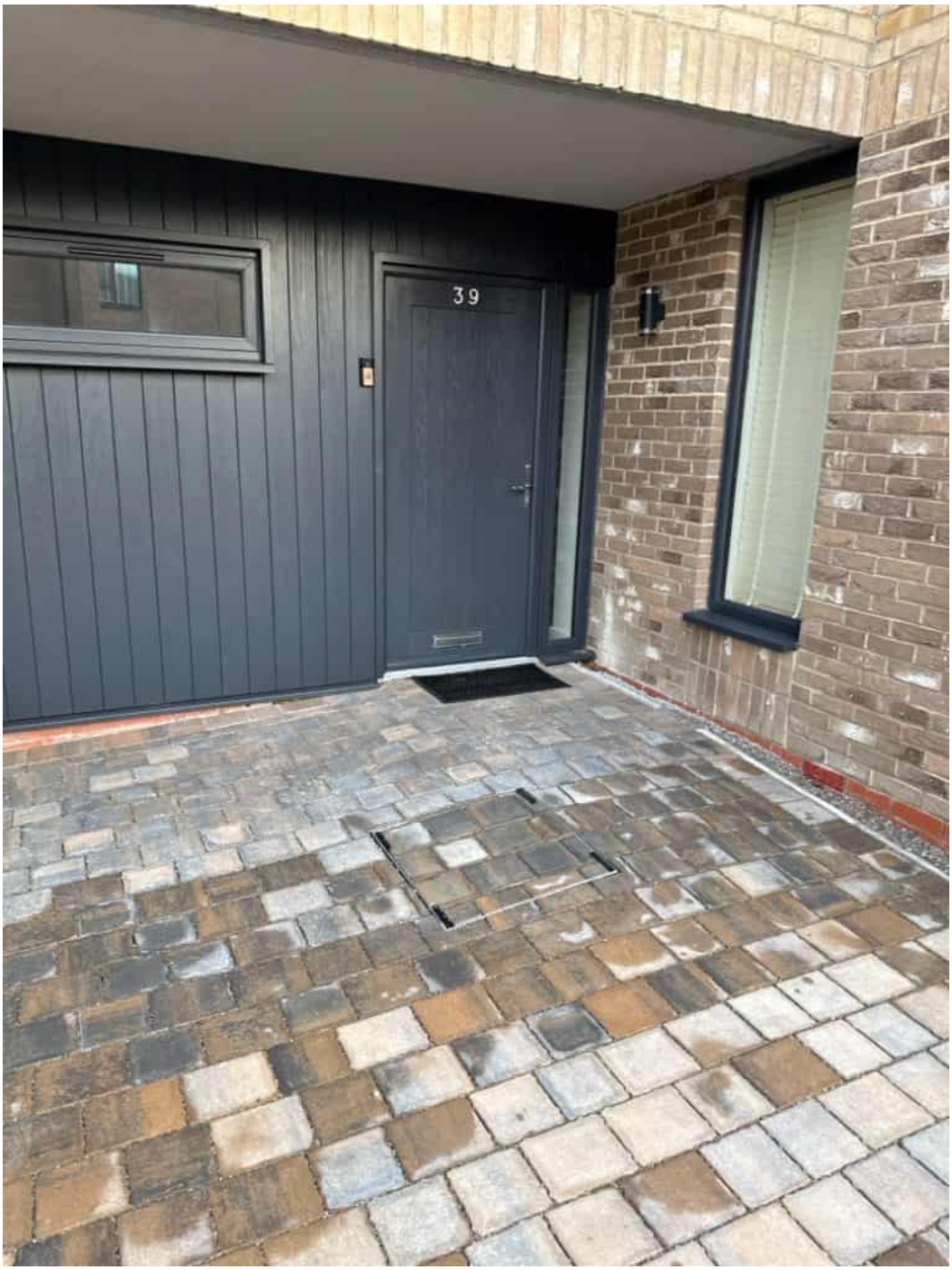
(61)



37 Claypit Crescent

Created: Wed, 1/14/2026

(62)



39 Claypit Crescent

Created: Wed, 1/14/2026

(63)



37 & 39 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(64)



37 & 39 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(65)



43 Claypit Crescent

Created: Wed, 1/14/2026

(66)



45 Claypit Crescent

Created: Wed, 1/14/2026

(67)



43 & 45 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(68)



43 & 45 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(69)



47 Claypit Crescent

Created: Wed, 1/14/2026

(70)



47 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(71)



47 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(72)



41 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(73)



41 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(74)



49 Claypit Crescent

Created: Wed, 1/14/2026

(75)



49 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(76)



49 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

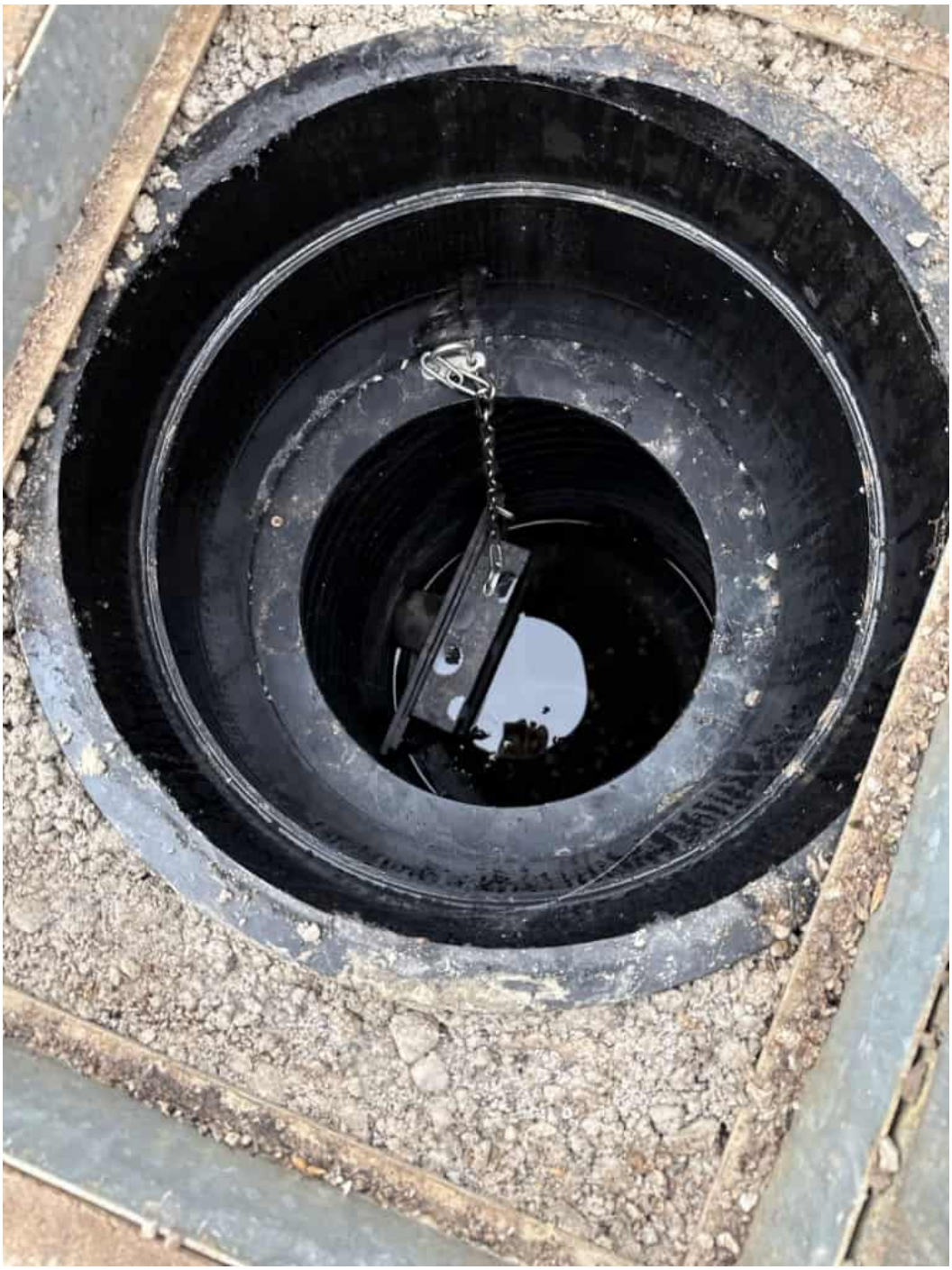
(77)



51 Claypit Crescent

Created: Wed, 1/14/2026

(78)



51 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(79)

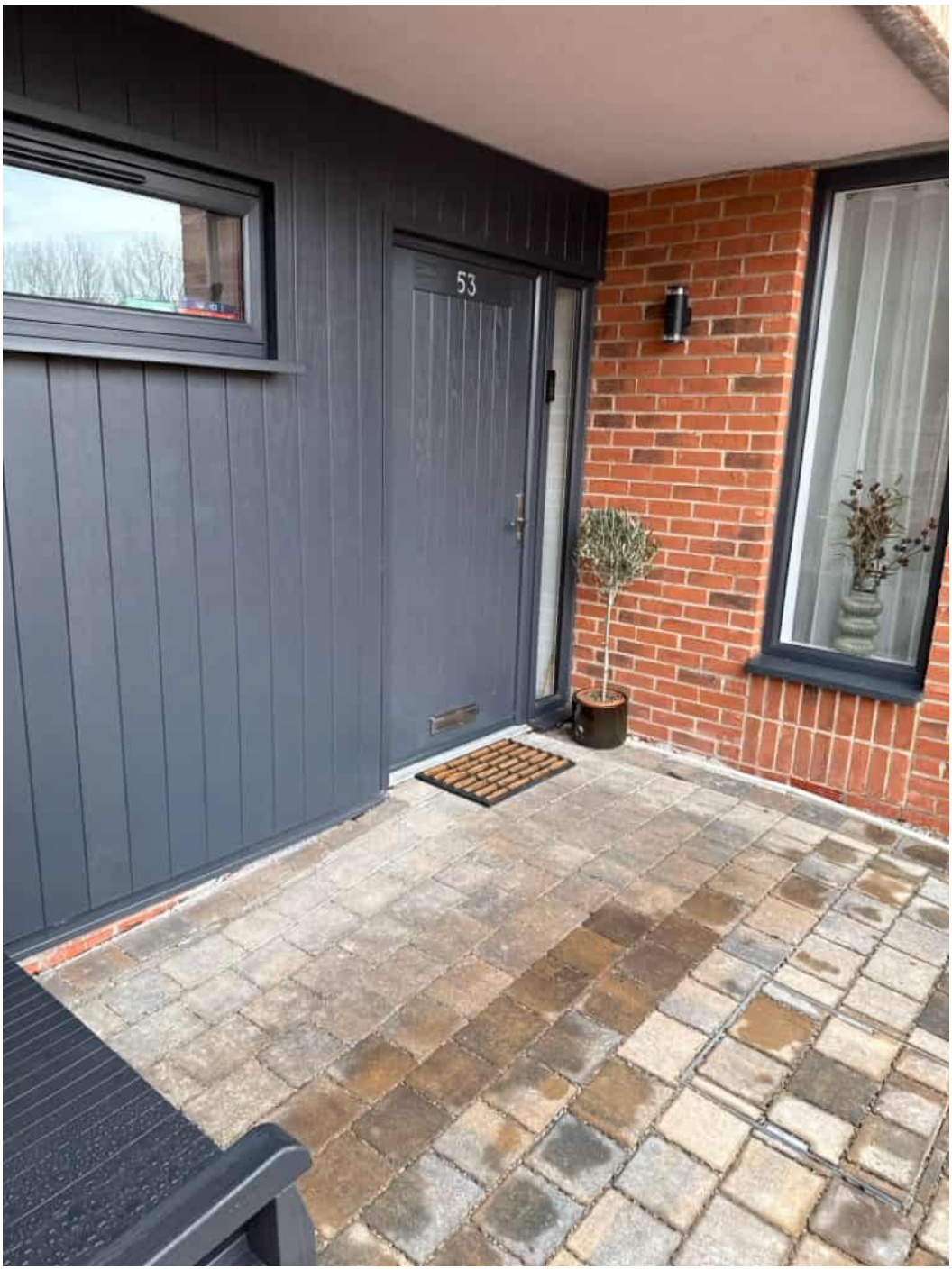


51 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(80)



53 Claypit Crescent

Created: Wed, 1/14/2026

(81)



53 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(82)



53 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(83)



24 Claypit Crescent

Created: Wed, 1/14/2026

(84)



24 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(85)



24 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(86)



22 Claypit Crescent

Created: Wed, 1/14/2026

(87)



22 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(88)



22 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(89)



20 Claypit Crescent

Created: Wed, 1/14/2026

(90)



20 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(91)

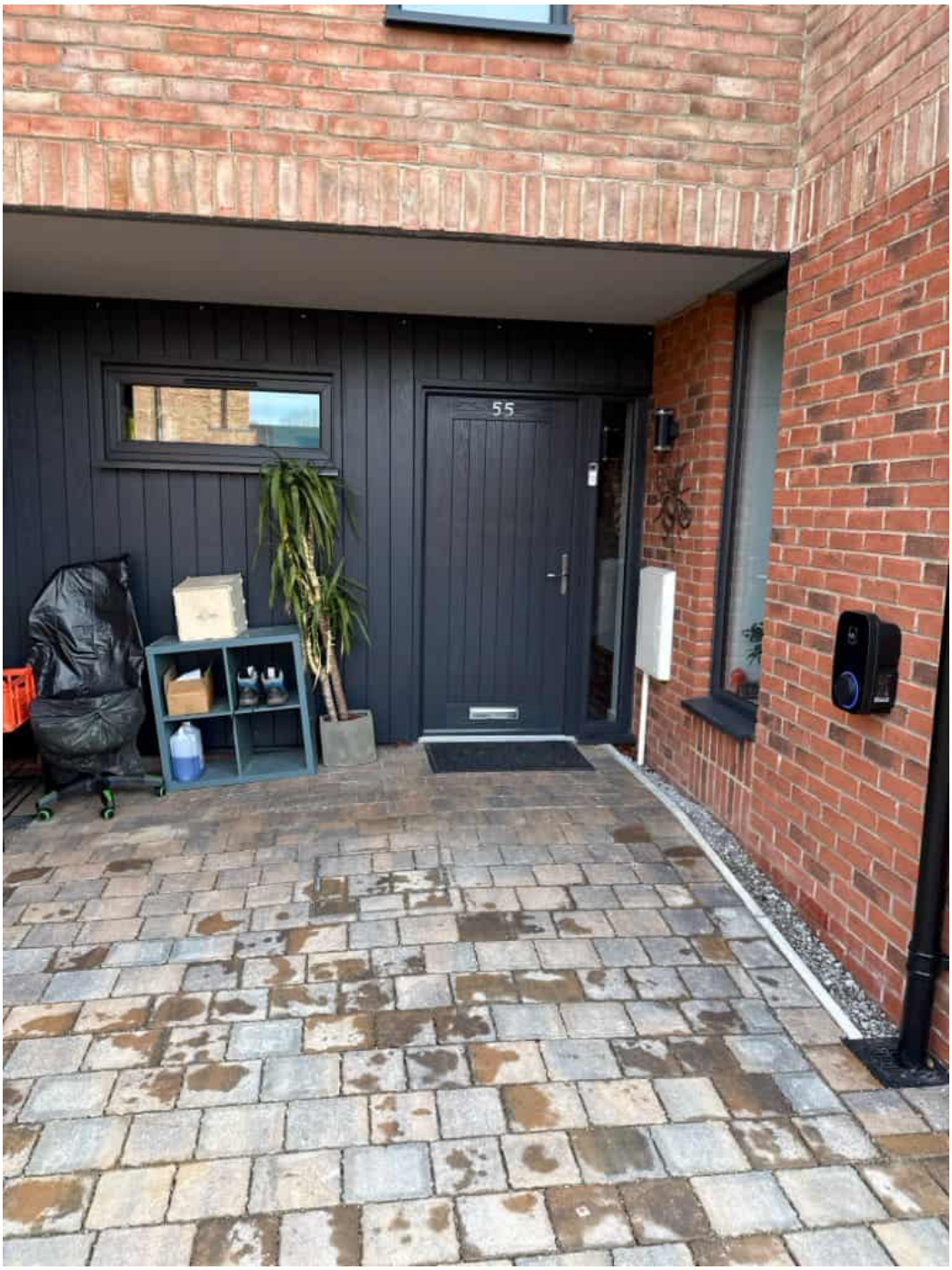


20 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

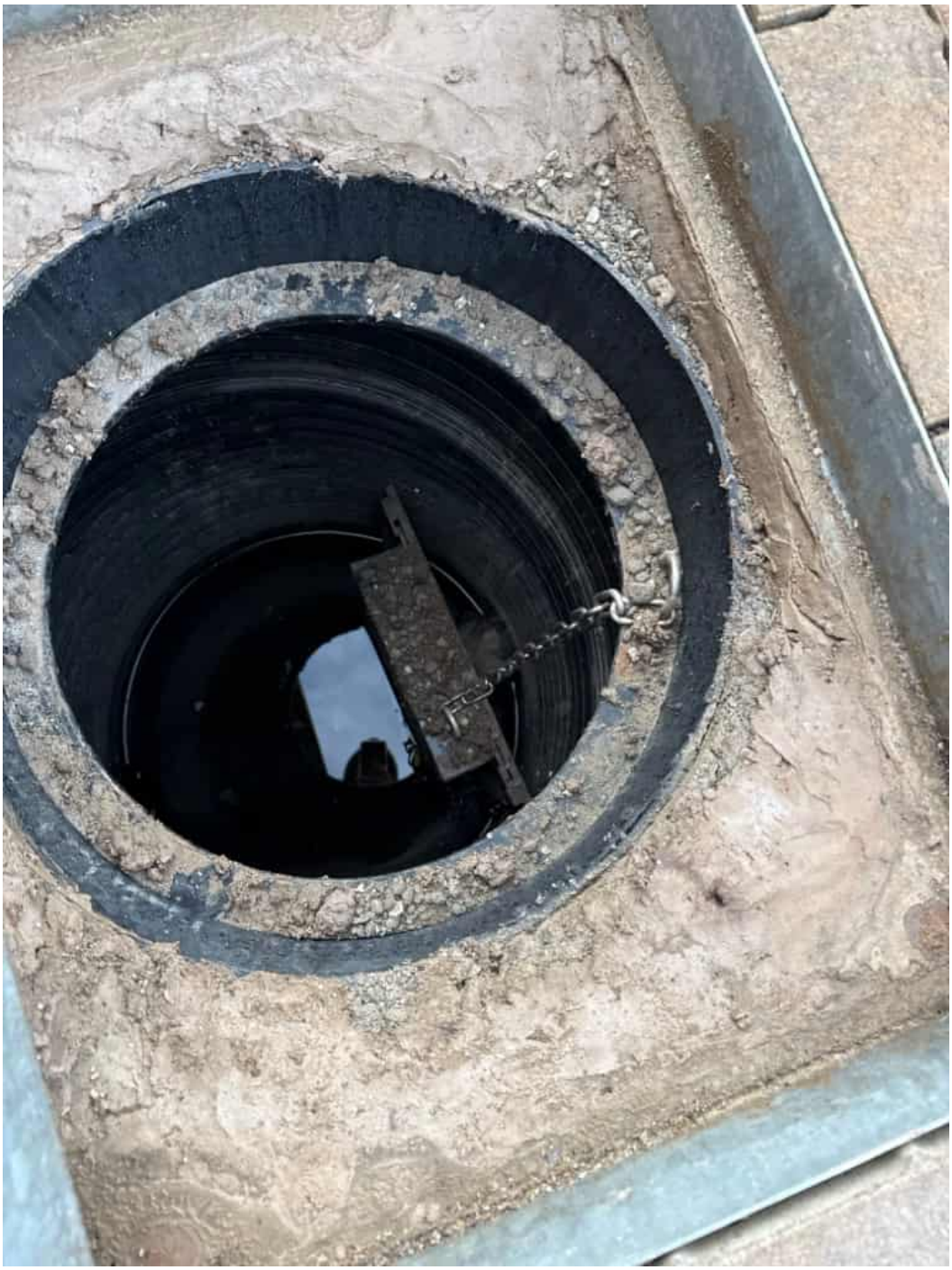
(92)



55 Claypit Crescent

Created: Wed, 1/14/2026

(93)



55 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(94)

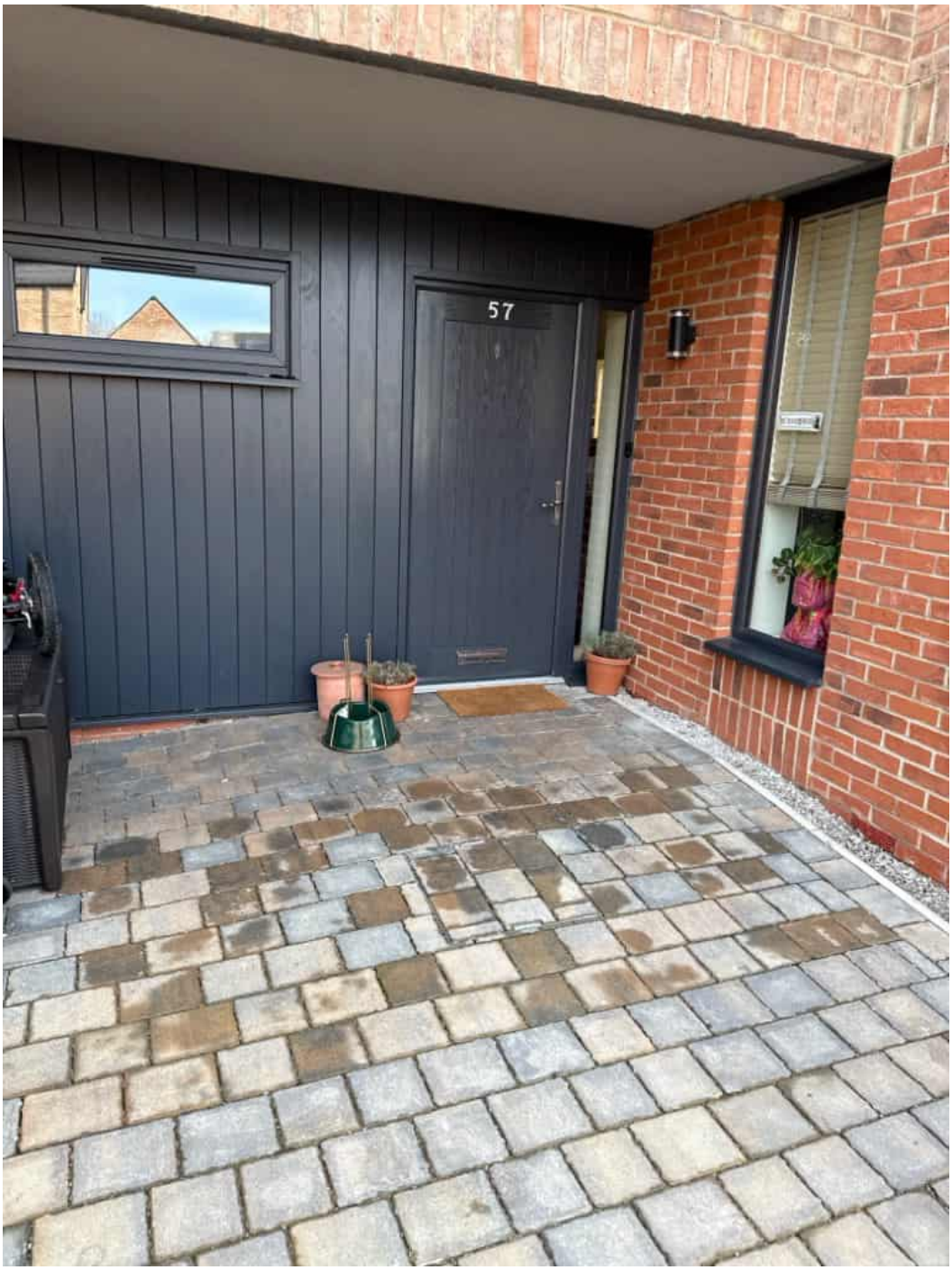


55 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

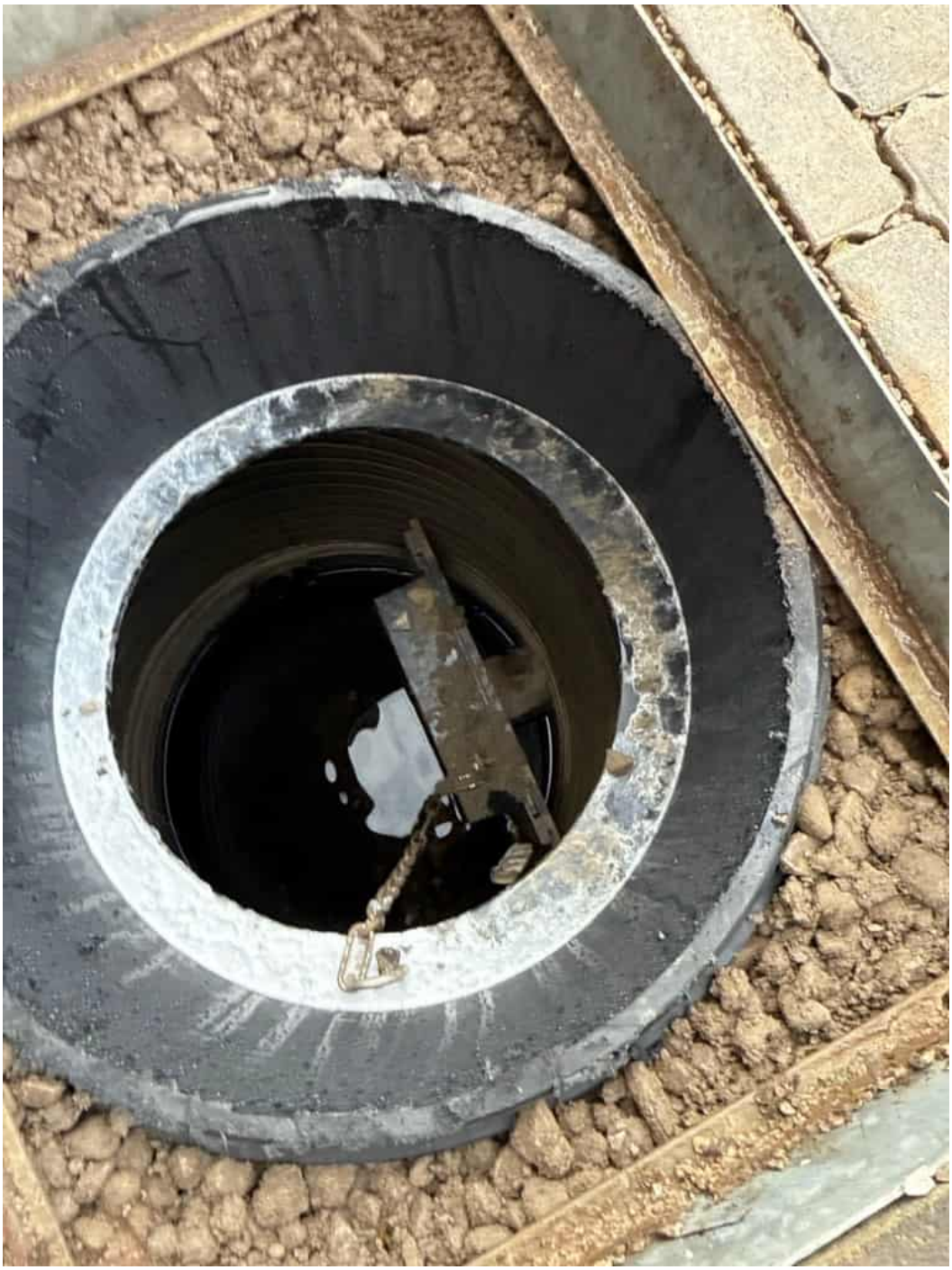
(95)



57 Claypit Crescent

Created: Wed, 1/14/2026

(96)



57 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(97)

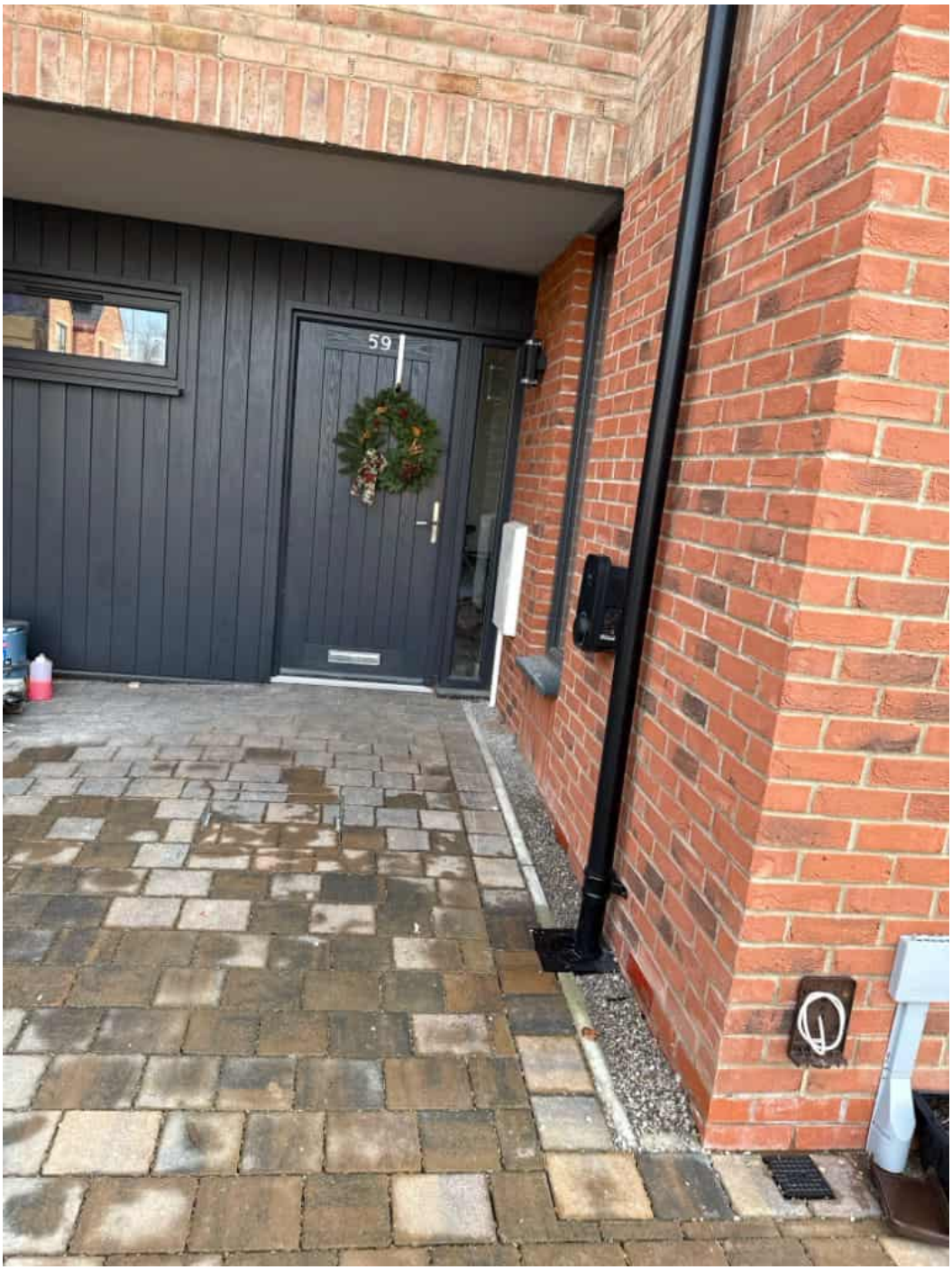


57 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(98)



59 Claypit Crescent

Created: Wed, 1/14/2026

(99)



59 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box

(100)



59 Claypit Crescent

Created: Wed, 1/14/2026

Filter Box Cleaned

(101)



6 Brickyard Close
Created: Wed, 1/14/2026

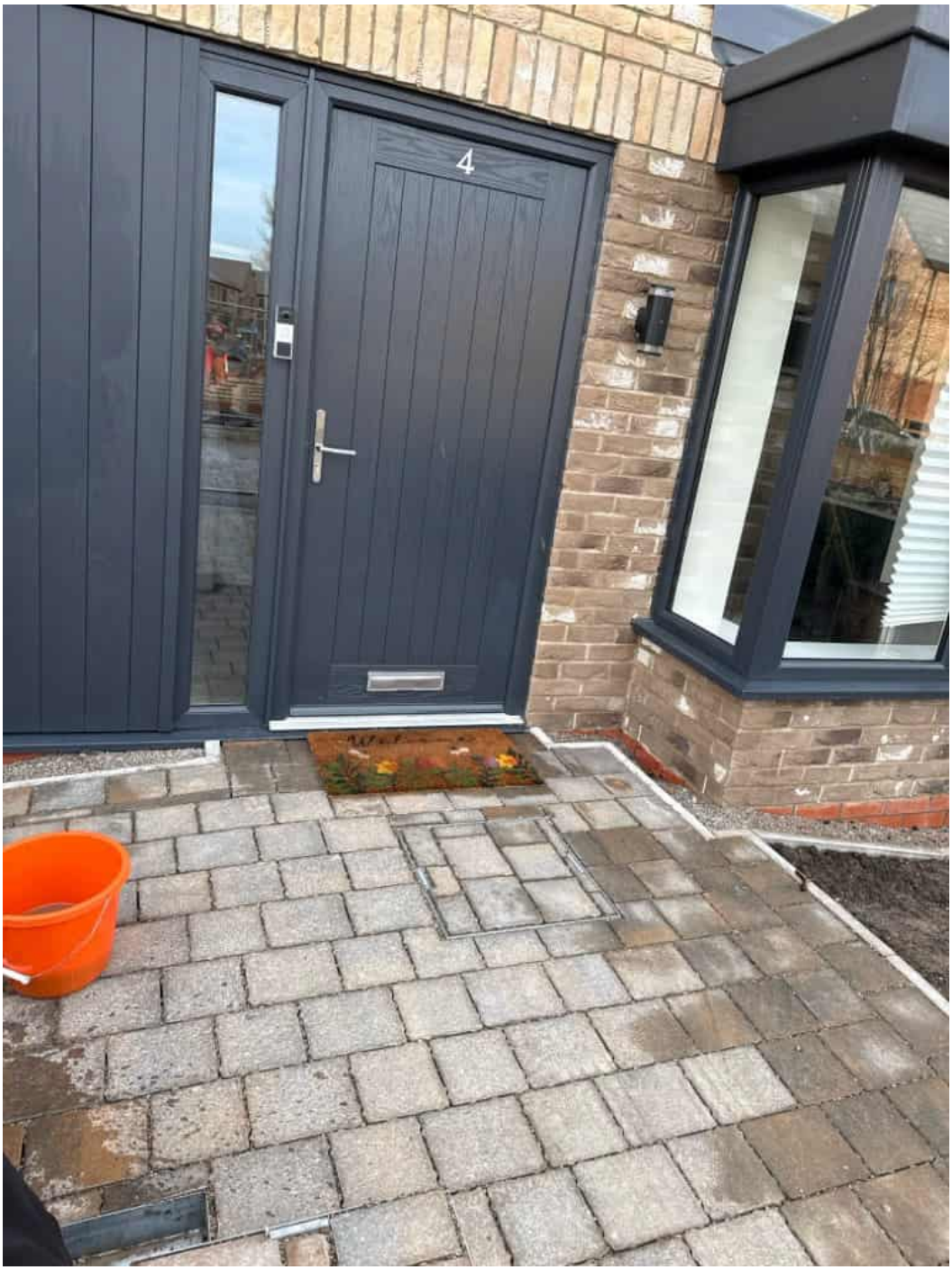
(102)



6 Brickyard Close
Created: Wed, 1/14/2026

Filter Box Cleaned

(103)



4 Brickyard Close
Created: Wed, 1/14/2026

(104)



4 Brickyard Close
Created: Wed, 1/14/2026

Filter Box

(105)



4 Brickyard Close
Created: Wed, 1/14/2026

Filter Box Cleaned

(106)



2 Brickyard Close
Created: Wed, 1/14/2026

(107)



2 Brickyard Close
Created: Wed, 1/14/2026

Filter Box

(108)



2 Brickyard Close
Created: Wed, 1/14/2026

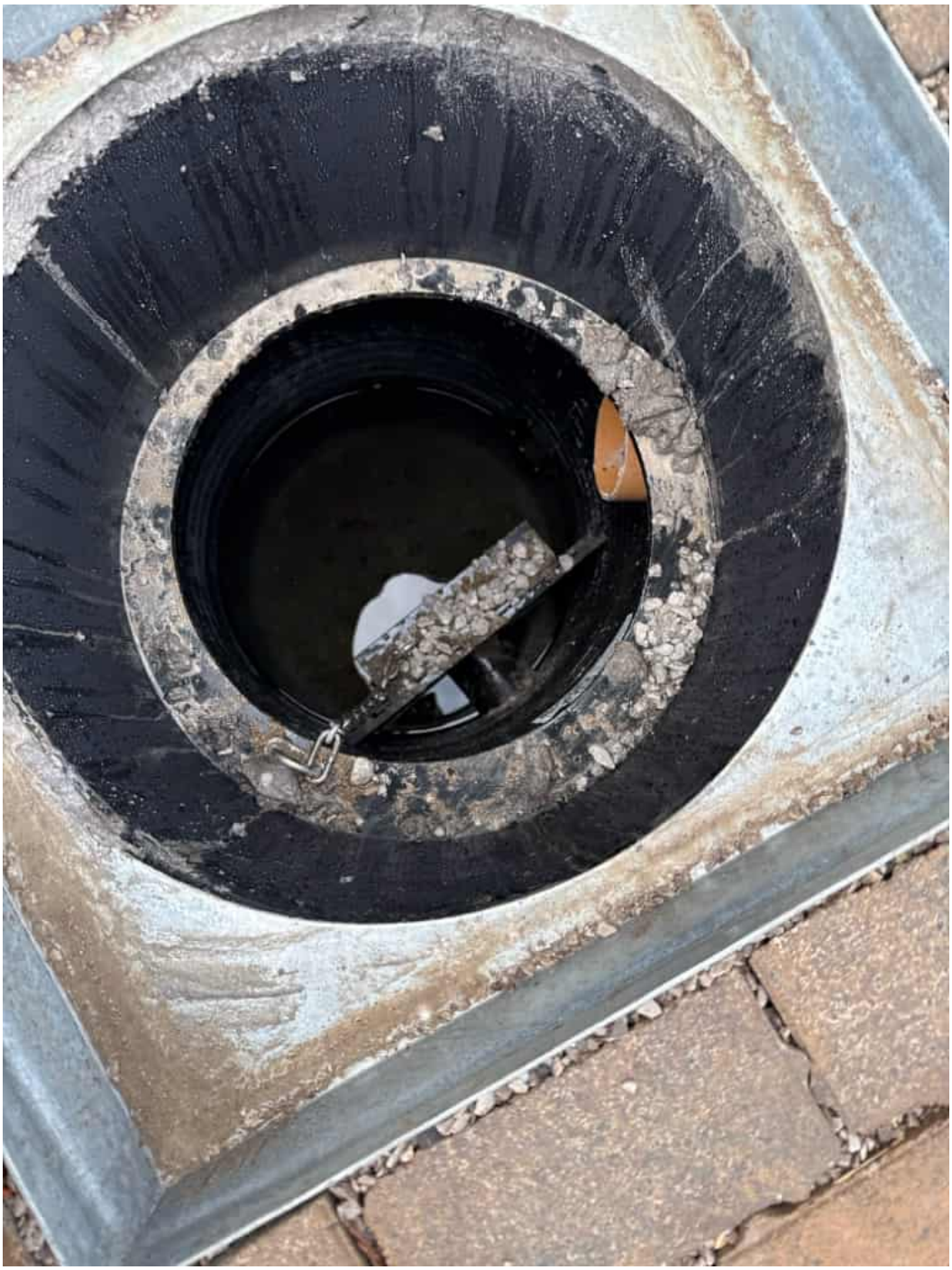
Filter Box Cleaned

(109)



8 Brickyard Close
Created: Wed, 1/14/2026

(110)



8 Brickyard Close
Created: Wed, 1/14/2026

Filter Box

(111)



8 Brickyard Close
Created: Wed, 1/14/2026

Filter Box Cleaned

(112)



10 Brickyard Close
Created: Wed, 1/14/2026

(113)



10 Brickyard Close
Created: Wed, 1/14/2026

Filter Box

(114)



10 Brickyard Close
Created: Wed, 1/14/2026

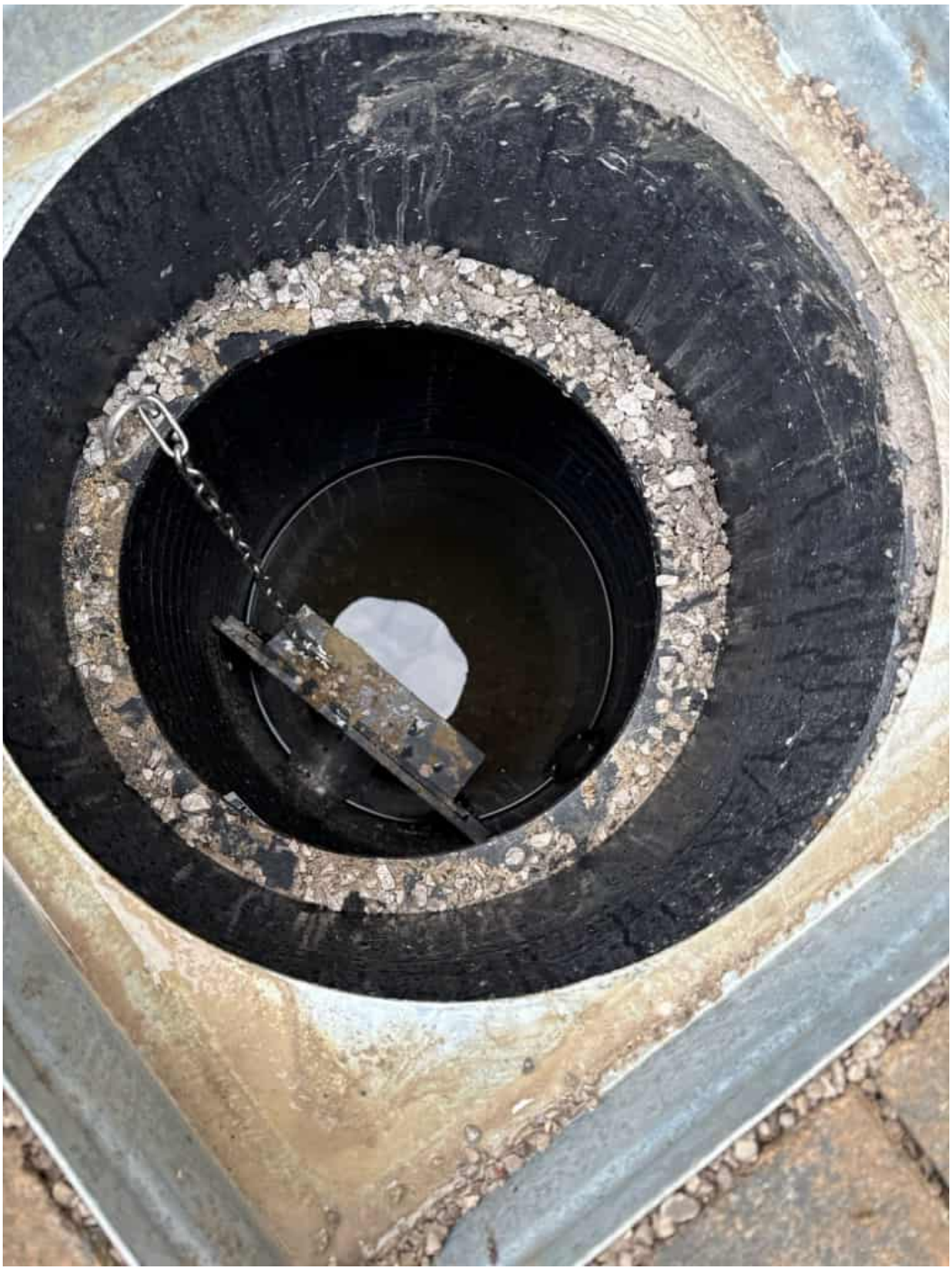
Filter Box Cleaned

(115)



12 Brickyard Close
Created: Wed, 1/14/2026

(116)



12 Brickyard Close
Created: Wed, 1/14/2026

Filter Box

(117)



12 Brickyard Close
Created: Wed, 1/14/2026

Filter Box Cleaned

(118)



1 Claypit Crescent
Created: Wed, 1/14/2026

Main Tank
Correspondence address Mellor House,65-81 St.Petersgate,Stockport,Cheshire,England,SK11 1DS