Proposed Foul & Surface Drainage Report

FSWDR-001

Land at The Old Vicarage, Meadowcroft Road, Frizington, Cumbria, CA26 3SU

Proposed Five-Bedroom Detached Self-Build Dwelling & Associated Works

27/10/2026

Document Control

Date	Issue	Description	Author & Owner
27/10/2026	First Issue	Project-specific foul and surface water drainage strategy incorporating lined attenuation, a proposed controlled discharge to the existing private combined sewer and permeable paving.	Daniel Sowerby EDS Design Cumbria Ltd

Report Status and Design Scope

This report supports the full planning application for one detached, five-bedroom self-build dwelling within the grounds of The Old Vicarage.

The proposed drainage arrangement comprises separate foul and surface-water networks, impermeably lined roof-water attenuation tank AT1, lined permeable-pavement storage PP1 and flow-control chamber FC1. The proposed surface-water destination is the existing private combined sewer, with a proposed maximum discharge of 5.0 litres per second. Foul drainage bypasses the surface-water storage and control.

The drainage design takes no credit for infiltration following the applicant's report that the trial hole encountered heavy clay and water did not soak away during the trial.

Section 8 records a preliminary roof-water volume check. It does not establish verified design-storm capacity or acceptance of the receiving-sewer connection.

This report shall be read alongside the coordinated application drawings, including TOV-BM-007, and the supporting ground statement CMGCCPS-001.

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1. Introduction

This report accompanies the proposed development of one detached, five-bedroom self-build dwelling within the grounds of The Old Vicarage, Meadowcroft Road, Frizington.

The existing holding extends to approximately 3,110 m². The proposed residential plot occupies approximately 1,340 m², with approximately 1,770 m² retained with The Old Vicarage.

The supplied dwelling footprint is approximately 186 m². Approximately 154 m² is identified for driveway and parking provision.

The drainage strategy provides:

- A dedicated foul drainage network serving the new dwelling.
- A separate roof-water collection network.
- An impermeably lined attenuation tank, identified as AT1.
- An accessible flow-control chamber, identified as FC1.
- A proposed maximum surface-water discharge of 5.0 litres per second to the existing private combined sewer.
- Permeable paving with storage and an underdrained outlet suitable for the reported clay ground.
- Defined inspection, maintenance and ownership responsibilities.

Foul water shall bypass AT1 and FC1. Roof water shall pass through AT1 and FC1 before joining the receiving combined drainage system.

The permeable paving shall have its own calculated sub-base storage. Its outlet shall be included within the overall surface-water discharge arrangement, without creating an additional uncontrolled connection.

The purpose of the report is to describe a coordinated drainage strategy, distinguish established information from design assumptions, and identify the information required to verify its performance.

2. Site Description and Existing Drainage

The proposed dwelling occupies part of the existing domestic grounds of The Old Vicarage.

Drawing TOV-BM-007 illustrates existing drainage and the proposed foul and surface-water networks. The applicants identify an existing private combined sewer as the intended receiving system.

- The drawing information does not, by itself, establish:
- The ownership and legal status of every downstream pipe.
- The complete downstream route and final destination.
- The condition, diameter or hydraulic capacity of the receiving system.
- The availability of connection and maintenance rights.
- Whether any downstream section is a public sewer.
- The frequency or level of downstream surcharge.

A drainage survey shall establish the existing arrangement sufficiently to assess the proposed connection. This shall include inspection of accessible chambers, measurement of pipe diameters and invert levels, and tracing or CCTV inspection where the route or condition is uncertain.

The assessment shall include the existing flows from The Old Vicarage and any other properties using the same downstream system.

Existing drainage serving the retained dwelling shall remain operational during construction and following completion.

No existing pipe shall be removed, diverted or connected into solely on the assumption that its location on a drawing establishes its ownership, function or capacity.

3. Ground Conditions

The applicant confirms that a trial hole within the proposed development area encountered heavy clay and that water did not soak away during the trial.
The proposed surface-water system therefore excludes disposal by soakaway and takes no credit for infiltration into the underlying ground.

Roof-water attenuation tank AT1 will be impermeably lined. Permeable-pavement storage PP1 will also use a lined, underdrained construction with a positive outlet. Water entering either installation will be stored temporarily and discharged through the controlled surface-water arrangement.

The adopted infiltration contribution is zero for hydraulic design purposes. This is a conservative design assumption, rather than a laboratory measurement of soil permeability.

The local trial-hole observation does not establish bearing capacity, seasonal groundwater conditions, contamination status or the absence of mining influence. Those matters are addressed separately within CMGCCPS-001 and the construction design.

4. Trial Hole and Infiltration Assessment

The reported trial-hole outcome is heavy clay with unsuccessful soakage during the observed trial. Infiltration disposal is consequently excluded from the submitted drainage strategy.

The available account does not include the excavation dimensions, timed water-level readings and repeat-test records necessary to calculate a BRE Digest 365 infiltration coefficient. No numerical infiltration rate or completed BRE 365 calculation is therefore claimed.

The trial-hole account shall be identified as applicant-reported evidence unless supported by a dated factual record. No unrecorded test duration, water-level change or infiltration result shall be inferred.

The proposed drainage arrangement relies on lined storage and controlled discharge, rather than infiltration. No soakaway or foul-water drainage field forms part of the proposal.

5. Surface Water Drainage Hierarchy

The proposed destination shall be assessed through the following hierarchy:

1. Collection for non-potable reuse.
2. Infiltration.
3. Discharge to an above-ground surface water body.
4. Discharge to a surface-water sewer or other piped surface-water system.
5. Discharge to a combined sewer.

A combined-sewer connection requires evidence explaining why higher-priority destinations cannot reasonably serve the development.

Rainwater reuse
The design shall examine roof-water collection for garden irrigation.
Water butts may supplement the drainage arrangement, with overflows connected to the roof-water network.

Ordinary water butts shall receive no credit towards required attenuation capacity because they may already be full when a design storm begins.

Any proposed storm-storage credit from a dedicated rainwater harvesting system shall be demonstrated separately, including its demand assumptions, available capacity and overflow arrangement.

Infiltration
Infiltration disposal is excluded from the proposed design following the reported trial-hole observation of heavy clay and unsuccessful soakage. Neither AT1 nor PP1 relies on infiltration, and no infiltration contribution is deducted from the calculated storage requirement.

Surface water body
The information supplied does not establish an available gravity connection to a suitable watercourse or other surface water body.

This option shall be assessed using the site survey, drainage records and available mapping. The assessment shall identify any potential receptor, its level, the route required and any third-party land or consent constraints.

The absence of a watercourse inside the plot does not, alone, demonstrate that a connection outside the plot is unavailable.

Surface-water sewer
The existing private drainage shall be investigated to distinguish a dedicated surface-water system from the identified combined sewer.

If a suitable surface-water sewer or piped surface-water system is available, its use shall be assessed before a combined-sewer connection is adopted.

Proposed combined-sewer destination
The current proposal is controlled discharge to the identified private combined sewer.
Written confirmation shall address the receiving system's ownership, connection location, permissible flow and downstream capacity.

Where the private system discharges into a public sewer, the proposal shall also be referred to United Utilities as appropriate. Private-owner agreement alone does not establish acceptance by the downstream public sewerage undertaker.

United Utilities requires supporting evidence for the rejection of alternative destinations when seeking acceptance of surface water into a combined sewer.

6. Drainage Design Basis

The design shall use the applicable requirements and guidance of:

- Building Regulations Approved Document H.
- The current National Standards for Sustainable Drainage Systems.
- Environment Agency climate-change guidance.
- Relevant Cumberland Council drainage guidance.
- CIRIA C753, The SuDS Manual.
- Current applicable drainage installation and hydraulic design standards.
- The selected tank, flow-control and permeable-paving manufacturers' instructions.

The design shall assess the 1-in-30-year and 1-in-100-year rainfall events, appropriate climate-change allowances, critical storm durations and downstream surcharge.

The project performance objectives are to prevent flooding of buildings and protect access, neighbouring land and the highway. Events exceeding the drainage capacity shall have a defined, safe surface-flow arrangement.

The rainfall dataset, design lifetime, climate allowance and event durations shall be identified explicitly in the calculation report.

The hydraulic assessment shall identify the site-specific rainfall data, critical storm durations and applicable climate-change allowances for the development lifetime. The calculation inputs and results shall be reproduced in the supporting hydraulic assessment.

The applicable allowance shall be selected for this location and development lifetime. Environment Agency guidance treats residential development as having a minimum 100-year lifetime.

7. Catchment Areas and Design Inputs

Area schedule

Element	Supplied area	Drainage treatment
Proposed residential plot	1,340 m²	Overall plot area; not the roof catchment
Retained Old Vicarage plot	1,770 m²	Existing drainage to remain operational
Proposed dwelling footprint	Approximately 186 m²	Preliminary proxy for roof catchment
Driveway and parking	Approximately 154 m²	Permeable pavement with calculated storage and positive outlet
Specifically identified garden	Approximately 95 m²	No infiltration disposal capacity assumed

The 186 m² figure is a supplied building footprint. It has not been verified as the complete roof catchment.
The roof assessment shall measure the horizontal projected area draining to each downpipe, including the attached garage and utility accommodation, overhangs and other contributing roof sections.

The measured roof catchment shall replace the preliminary footprint proxy in the hydraulic calculations.

Preliminary roof calculation inputs

Catchment	Supplied area	Area including preliminary 10% allowance	Proposed storage
Roof, initially represented by the supplied footprint	186.0 m²	204.6 m²	AT1
Driveway and parking	154.0 m²	169.4 m²	PP1
Combined identified catchments	340.0 m²	374.0 m²	Coordinated AT1 and PP1 assessment

These are preliminary contributing areas, not verified roof measurements or calculated storage requirements.

The Section 8 volume check concerns the roof catchment only. Rainfall entering the lined pavement remains part of the overall drainage assessment because PP1 shares the controlled surface-water outlet.

Additional connected paths, channel drains and other contributing surfaces shall be included in the measured catchment schedule. Allowances shall be applied consistently without double counting.

Permeable-paving catchment
The driveway shall remain a separate identified catchment within the drainage model.
Its surface permeability does not remove the rainfall falling on it. On the proposed non-infiltrating construction, water entering the pavement must be stored and subsequently discharged.

No allowance is made in this report for unrestricted discharge from the pavement in addition to the proposed site surface-water limit.

8. Roof Water Attenuation Design and Calculations

Proposed arrangement
Roof water shall be collected through gutters, downpipes and accessible surface-water drainage.
The network shall discharge through an accessible silt interception arrangement into AT1. The tank outlet shall connect to FC1.

AT1 shall comprise a proprietary geocellular storage system enclosed within an impermeable lining and protective layers.

Preliminary volume calculation
For the preliminary roof-only check:

Effective catchment:
186 m^2 × 1.10 = 204.6 m^2

Illustrative runoff volume:
204.6 m^2 × 0.100 m = 20.46 m^3
The check assumes all rainfall on the effective catchment enters storage and gives no credit for discharge during the event.

Indicative tank envelope
An indicative tank envelope is:
6.00 m long × 4.50 m wide × 0.80 m deep

Gross volume:
6.00 × 4.50 × 0.80 = 21.60 m^3
At an assumed 95% void ratio:
21.60 × 0.95 = **20.52 m^3 nominal internal storage**

Item	Preliminary value
Illustrative runoff volume	20.46 m^3
Tank gross envelope	21.60 m^3
Assumed void ratio	95%
Nominal internal storage	20.52 m^3

This provides a preliminary spatial allowance for the proposed layout.

The small difference between the illustrative runoff volume and nominal tank storage is not a demonstrated design margin.

Limits of the preliminary calculation
The calculation does not establish that AT1 accommodates the critical 1-in-100-year event with climate change.

Verification requires:

- Measured contributing roof areas.
- Site-specific rainfall.
- Relevant storm durations and profiles.
- The selected climate-change allowances.
- Actual tank geometry and product void ratio.
- The stage-storage relationship.
- Outlet invert and flow-controller characteristics.
- Upstream and downstream water levels.
- Available live storage.
- Interaction with the permeable-pavement drainage.
- Surcharge and blockage scenarios.

Storage below the effective outlet level shall not count as available live attenuation storage unless the design demonstrates how it is emptied.

Storage above the permitted maximum operating level shall not count towards capacity.
If the verified calculation requires a larger tank, a different depth or an alternative geometry, the drawings and report shall be revised together.

Tank levels and available depth
Drawing TOV-BM-007 identifies an invert level of approximately 8.300 at S1 and 8.100 at F2, against an assumed finished-floor datum of 10.000.

These levels do not establish that the full proposed 800 mm tank depth can function as live gravity-drained storage.

A longitudinal section shall identify:

- The S1 inlet and connecting pipe.
- Tank base and top.
- Tank inlet and outlet.
- FC1 control level.
- Maximum design water level.
- F2 connection invert.
- Ground levels and structural cover.
- Finished-floor and vulnerable threshold levels.
-

The assessment shall demonstrate gravity drainage and acceptable upstream water levels throughout the operating range.

9. Flow Control and Combined Sewer Connection

Proposed flow-control arrangement
FC1 shall contain an accessible proprietary vortex flow controller or equivalent engineered device.
The proposed maximum surface-water discharge is:

5.0 litres per second

This is a proposed limit for assessment and agreement. It is not identified as an established entitlement or an approved discharge.

The selected device shall be supported by its head/discharge curve and shall limit the flow throughout the relevant operating range.

Justification of discharge
The final calculation report shall establish the appropriate runoff benchmark and explain any departure sought.

A 5 l/s minimum shall not be assumed merely because the development comprises one dwelling. The national runoff standards use a comparison with greenfield rates and a rate expressed per hectare.
If a lower rate is required, the storage assessment and controller selection shall be revised accordingly.

Connection route
The proposed roof-water route is:

Roof network → silt interception → AT1 → FC1 → F2 → F1 → receiving private combined sewer.

Foul drainage shall join the combined drainage downstream of the surface-water control.

The outlet route and connection chambers shall be verified against the existing drainage survey.

Blockage and backflow
FC1 shall provide safe access for inspection, debris removal and maintenance.
No unrestricted bypass shall allow surface water to avoid the control.
A non-return valve, if required for backflow protection, shall be treated as a separate device. It does not regulate discharge to 5 l/s.

The hydraulic assessment shall consider periods when downstream surcharge prevents discharge, including any closure of a non-return valve.

10. Driveway and Permeable Paving Drainage

Proposed system
The approximately 154 m² driveway and parking area shall use a proprietary permeable-sett system.
PP1 shall use Marshalls Tegula Priora permeable paving in charcoal, with open-graded jointing aggregate, a compatible laying course and storage sub-base. The pavement shall be impermeably lined and positively underdrained, with its outlet connected upstream of FC1. No infiltration into the underlying clay is assumed. The pavement storage and roof-water attenuation shall be assessed together against the shared surface-water discharge limit.
The proposed construction shall comprise:

- Permeable paving units.
- Open-graded jointing aggregate.
- Compatible permeable laying course.
- An open-graded storage sub-base.
- An impermeable lining suitable for the non-infiltrating design.
- Underdrainage and accessible inspection points.
- A positive outlet.

The manufacturer’s guidance distinguishes systems that infiltrate into the ground from lined systems that collect water for discharge elsewhere.

Relationship with roof attenuation
The driveway storage shall be identified separately as PP1.
The proposed arrangement is for PP1 to discharge into the surface-water system upstream of FC1, so that the combined controlled surface-water discharge remains within the agreed limit.

The approximately 20.52 m³ AT1 allowance is a roof-only screening provision. It does not include a calculated pavement contribution.

A linked hydraulic model shall establish whether the storage distributed between AT1 and PP1 is sufficient. Their interaction shall be considered because both discharge through the same control.

A separate downstream pavement connection shall not be added without reassessing the total discharge and obtaining the relevant acceptance.

Pavement storage and construction
The pavement design shall establish sub-base thickness, effective void ratio, formation strength, loading, maximum water level, outlet level and emptying performance.

Hydraulic storage depth and structural pavement depth shall be assessed together.
The construction shall prevent water entering adjacent foundations or escaping through unsealed service trenches.

Sediment-laden construction runoff shall be kept out of the permeable pavement. The finished paving shall not be used as a mixing area or unprotected storage area for soil, sand or cement.

11. Foul Water Drainage

The proposed foul system shall serve one five-bedroom dwelling.

Wastewater from sanitary appliances, bathrooms, kitchen and utility accommodation shall discharge through appropriately sized branches and ventilated stacks into the foul network.
The foul system shall bypass the surface-water tank and flow controller.

Peak foul flow and pipe capacity shall be assessed using the actual appliance arrangement. A daily water-use estimate alone shall not be used to demonstrate peak hydraulic capacity.

Foul gradients shall be selected to suit pipe diameter, flow and self-cleansing requirements. A blanket minimum gradient of 1:60 shall not be applied to every pipe without assessment.

The receiving combined drainage shall be assessed for existing foul flows, additional foul flows and the proposed controlled surface-water discharge.

No treatment plant, septic tank or foul-water infiltration field forms part of the present proposal.

Drainage Pipes to be 100mm Plastic Pipe Laid in accordance with Approved Document Part H (Assume FFL = 10.000)				
Surface Water Drainage				
Chamber Name	**Invert Level**	**Cover Level**	**Distance**	**Fall**
S1	8.300	9.150	10,000	1-33
S2	8.600	9.850	12,800	1-40
S3	8.900	9.850	9,300	1-31
S4	8.900	9.850	6,600	1-11
Foul Water Drainage				
Chamber Name	**Invert Level**	**Cover Level**	**Distance**	**Fall**
F1	7.800	8.500	-	
F2	8.100	9.000	14,000	1-46
F3	8.500	9.850	14,100	1-47
F4	8.700	9.850	12,000	1-60
F5	8.750	9.850	2,300	1-46
F6	8.700	9.850	21,000	1-35

12. Sewer Protection and Third-Party Infrastructure

The drainage survey shall identify any shared or public sewer affected by the proposal.
The design shall coordinate AT1, FC1, PP1, foundations, landscaping and access with the verified sewer route.
Applicable protection distances and access requirements shall be established with the asset owner. A generic clearance shall not replace the requirements applying to the actual sewer.

Any necessary build-over agreement, sewer diversion approval or connection consent shall be obtained before the relevant works.

Rights to construct, connect, discharge, inspect and maintain drainage outside the new plot shall be established.

The subdivision shall preserve the retained Vicarage's drainage rights and access for maintenance.
No drainage excavation, tank installation or pavement construction shall proceed within retained-tree rooting areas without the measures specified by the arboricultural assessment.

13. Generic Drainage Specifications

Above-ground drainage
Provide proprietary soil and waste systems sized for their connected appliances and discharge conditions.

Size gutters and rainwater pipes for the effective roof areas and applicable rainfall intensity.
Open soil ventilation terminals shall be positioned in accordance with Approved Document H, including the relevant separation from nearby openings. Where a terminal is within 3 m of an opening, it shall terminate at least 900 mm above that opening.

Provide cleaning and rodding access where needed. Traps and ventilation shall protect against loss of water seals and foul-air entry.

The above-ground and below-ground foul arrangements shall follow the applicable Approved Document H guidance.

Below-ground pipework
Provide proprietary 110 mm outside-diameter plastic drainage pipes and compatible fittings, with larger diameters where the hydraulic assessment requires.

Lay pipes to the verified alignment, invert levels and gradients.
Provide suitable granular bedding and surround, correctly compacted in accordance with the selected system's instructions.

Where cover or loading requires additional protection, provide an engineered detail appropriate to the pipe and location.

Concrete encasement shall not be specified as a universal substitute for checking structural protection.

Wall penetrations and foundations
Coordinate pipe penetrations, sleeves, flexible joints and movement allowances with the structural design.

Seal penetrations appropriately while allowing the movement required by the selected detail.
Drainage trenches shall not undermine existing or proposed foundations. Excavations close to foundations shall follow the structural designer's detail and construction sequence.

Chambers and access

Provide chambers at junctions and changes of direction, gradient or pipe diameter, together with intermediate access where required.

Use 450 mm inspection chambers only where suitable for the depth, system and maintenance access. Deeper installations shall use an appropriate restricted-access arrangement or manhole design.

Covers and frames shall suit the actual loading and location.

Chambers, silt traps, FC1 and tank access points shall remain accessible following completion.

Tank construction
AT1 shall include:

- A proprietary storage structure suitable for the loading and design life.
- Impermeable lining with properly sealed joints and penetrations.
- Protective geotextile or manufacturer-specified protection.
- Suitable bedding and backfill.
- Ventilation.
- Silt interception.
- Inspection and cleaning access.
- Structural and flotation checks.

A permeable geotextile wrap alone is not an impermeable tank lining.

Surface levels
External levels shall direct ordinary runoff away from buildings.

Threshold drainage and accessible approaches shall be coordinated so that drainage measures do not compromise access.

The driveway entrance shall prevent uncontrolled runoff onto the highway.

Any entrance channel drain shall connect to an identified and capacity-checked drainage route.

14. Hydraulic Verification and Drawing Coordination

The calculation package shall document:

Design component	Required information
Catchments	Measured roof areas, pavement areas and contributing connections
Rainfall	Site-specific dataset, location and model inputs
Climate change	Selected allowances and development lifetime
Discharge	Proposed rate, runoff benchmark and written acceptance
AT1	Product, dimensions, void ratio and stage-storage relationship
FC1	Product, control level and head/discharge curve
PP1	Sub-base area, depth, void ratio and outlet
Pipe network	Diameters, lengths, gradients and connectivity
Levels	Ground, cover, invert, threshold and finished-floor levels
Downstream conditions	Receiving sewer levels, capacity and surcharge assumptions
Results	Maximum flows, water levels, storage and any flooding
Resilience	Blocked or restricted outlet and exceedance assessment

The drawing shall identify pipe runs using upstream and downstream chamber references.

Each gradient shall be calculated from the corresponding invert difference and pipe length.

The existing assumed finished-floor level of 10.000 shall remain identified as an assumed datum until tied to the topographical survey.

Proposed levels shall not be presented as measured existing levels.

The final calculation report, drainage plan and tank section shall use the same catchments, chamber references, levels, storage volumes and discharge arrangement.

15. Exceedance and Flood Risk

The supplied Environment Agency Flood Map for Planning, dated 9 October 2026, places the selected location in Flood Zone 1.

That classification concerns river and sea flooding. It does not establish the absence of surface-water, groundwater, sewer or local drainage risks.

The site-level design shall assess incoming overland flows and the consequences of:

- Rainfall exceeding the design capacity.
- A blocked gully or downpipe.
- Partial or complete obstruction of FC1.
- Downstream sewer surcharge.
- Temporary loss of the surface-water outlet.
- Reduced pavement permeability.

An exceedance drawing shall show surface-flow directions, vulnerable thresholds and any designated temporary storage areas.

Flows shall be managed without introducing a new flood route towards The Old Vicarage, neighbouring properties or the highway.

A garden shall not be described as an exceedance storage area without checking its levels, available volume and relationship to buildings and boundaries.

No emergency overflow to the combined sewer shall bypass FC1 unless expressly included in the hydraulic assessment and accepted by the relevant asset owner.

16. Drainage Implementation and Construction Management

Before drainage installation, the contractor shall receive coordinated construction drawings incorporating the verified levels, accepted outlet and selected components.

The proposed sequence is:

- Survey and verify the existing drainage.
- Establish and protect drainage serving the retained dwelling.
- Set out the proposed network against the verified datum.
- Confirm foundation, service and retained-tree constraints.
- Install downstream connections and controls in an agreed sequence.
- Install the foul and surface-water networks separately.
- Install AT1, including lining, access and ventilation.
- Install PP1 and its underdrainage.
- Inspect, test and record concealed work.
- Clean and commission the completed system.

Excavation support, lifting, groundwater management and temporary works shall follow the contractor's construction arrangements and competent design.

Silt, concrete washout, fuels and other pollutants shall be kept out of the drainage system.
Construction water shall not be discharged into the sewer without an appropriate assessment and any required permission.

The contractor shall protect the tank lining and record its condition before backfilling.
Before occupation, the installed drainage shall be cleaned, tested and commissioned. The handover information shall record any changes from the design.

17. Drainage Management and Maintenance

Responsibility

The proposed dwelling owner shall be responsible for the private drainage within the new plot unless a different arrangement is formally established.

Shared drainage responsibilities, rights of access and contributions to maintenance shall be recorded as part of the subdivision arrangements.

This report does not assume adoption of AT1, FC1 or PP1 by the sewerage undertaker or highway authority.

Maintenance schedule

The following initial schedule shall be incorporated into the homeowner's maintenance information and adjusted to the selected products' instructions.

Component	Initial inspection frequency	Maintenance action
Gutters and roof outlets	Quarterly and after significant storms	Remove leaves and debris; check fixings and outlets
Gullies and channel drains	Quarterly and after significant storms	Remove sediment; check grates and free flow
Silt interception	Quarterly during the first year, then according to accumulation	Remove sediment before capacity or performance is impaired
FC1	Six-monthly and after significant storms	Check for obstruction, damage and correct operation
AT1 access and ventilation	Annually	Inspect accessible components; investigate abnormal water levels
Permeable paving	Six-monthly	Check ponding, joint condition, settlement and sediment accumulation
Pavement underdrains	Annually	Inspect accessible outlets and chambers
Foul chambers	Annually and following any blockage	Check condition and flow
Shared downstream drainage	Under the recorded shared arrangement	Coordinate inspection, cleaning and repairs

Jetting, suction cleaning and CCTV surveys shall be undertaken where inspection identifies a need and in accordance with the installed products' requirements.

No person shall enter a tank, manhole or other confined space without the necessary specialist competence and arrangements.

Handover information

The owner shall receive:

- As-built drainage drawings.
- Verified chamber and tank levels.
- Tank and flow-control product information.
- Installation and test records.
- Maintenance instructions.
- Connection approvals and relevant agreements.
- Shared-drainage responsibilities.
- A maintenance record sheet.

Persistent ponding, slow drainage, odours or unexpectedly high chamber levels shall trigger investigation.

18. Conclusion

The proposed strategy provides separate foul and roof-water networks within the plot, with foul drainage bypassing the surface-water attenuation system.

Roof water is proposed to discharge through impermeably lined attenuation tank AT1 and flow-control chamber FC1 to the existing private combined sewer.

The proposed maximum surface-water discharge is 5.0 l/s, subject to its hydraulic justification and acceptance by the relevant receiving-system owners and authorities.

The preliminary roof-only volume check identifies approximately 20.46 m^3 of runoff from an assumed effective catchment of 204.6 m^2 under an illustrative 100 mm rainfall depth.

An indicative tank envelope of 6.00 m × 4.50 m × 0.80 m provides approximately 20.52 m^3 nominal internal storage at an assumed 95% void ratio.

These figures establish a preliminary layout allowance. They do not certify the tank's capacity for a particular return-period storm.

The driveway shall use a lined permeable-paving system with calculated sub-base storage and a positive outlet. Its hydraulic interaction with AT1 and FC1 shall be included in the final assessment.

Completion of the drainage submission requires verified catchments and levels, evidence supporting the drainage hierarchy, receiving-system acceptance and a site-specific hydraulic assessment.

The resulting drawings, calculations and specifications shall form one consistent proposal, establishing the available live storage, controlled discharge, exceedance arrangements and long-term maintenance responsibilities.

19. Appendices

The appendix register identifies the supporting material for this report. An item shall only be described as included when the corresponding evidence is actually appended.

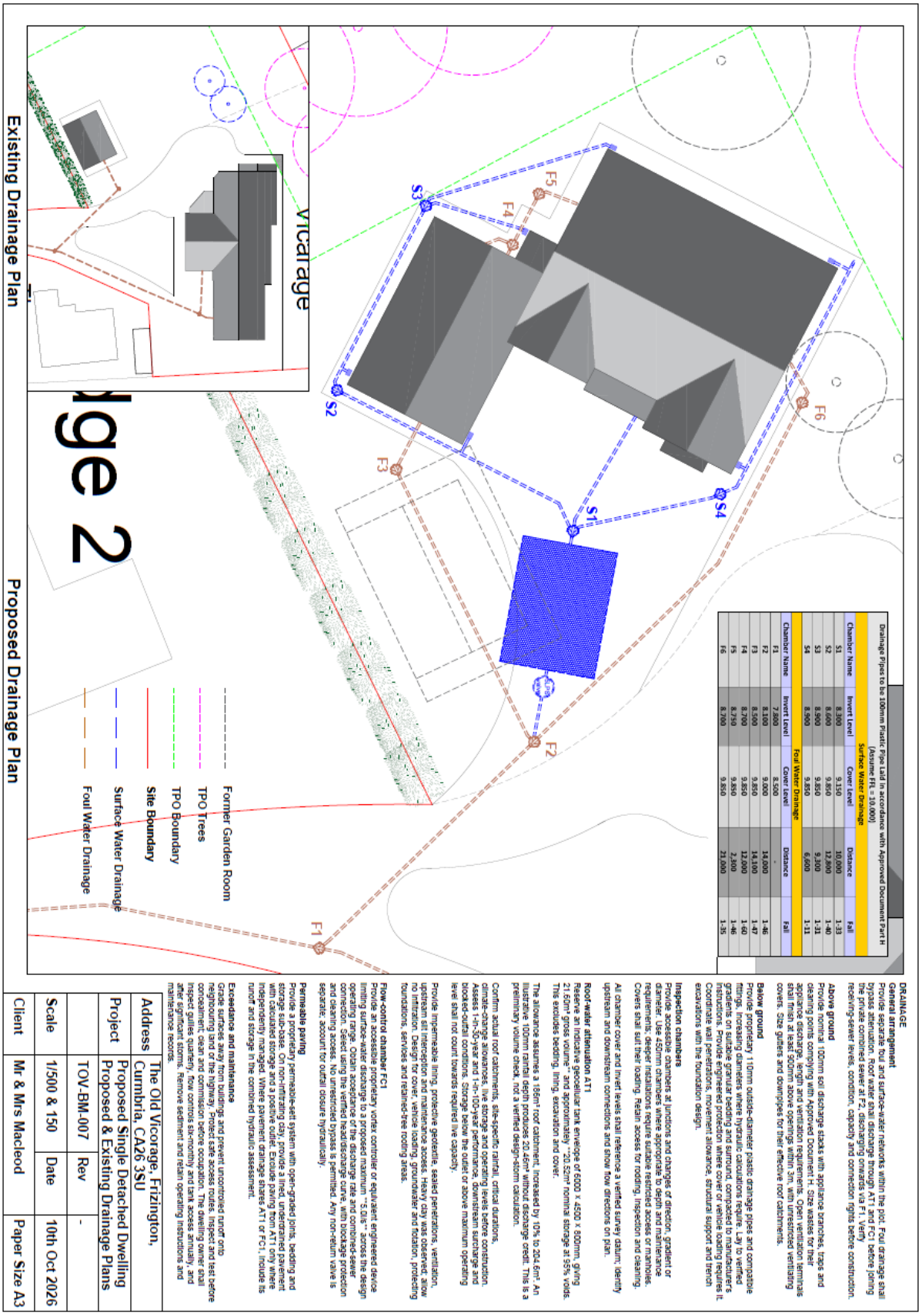
Appendix	Supporting material	Current position
A	Site and block plans	Use the relevant current TOV-BM-001 drawing
B	Drainage layout	TOV-BM-007 supplied; requires coordination with this strategy
C	National rainfall tables	Measured catchment Map
D	Rainbox 3S/core surface water attenuation/Soakaway system	AT1 design
E	Flood and exceedance information	Include the supplied Flood Zone 1 map and proposed exceedance drawing
F	Permeable-paving details	PP1 construction, storage and outlet design required

The industrial-site infiltration photographs, test results, catchment calculations and connection information from the reference report do not form supporting evidence for this development.

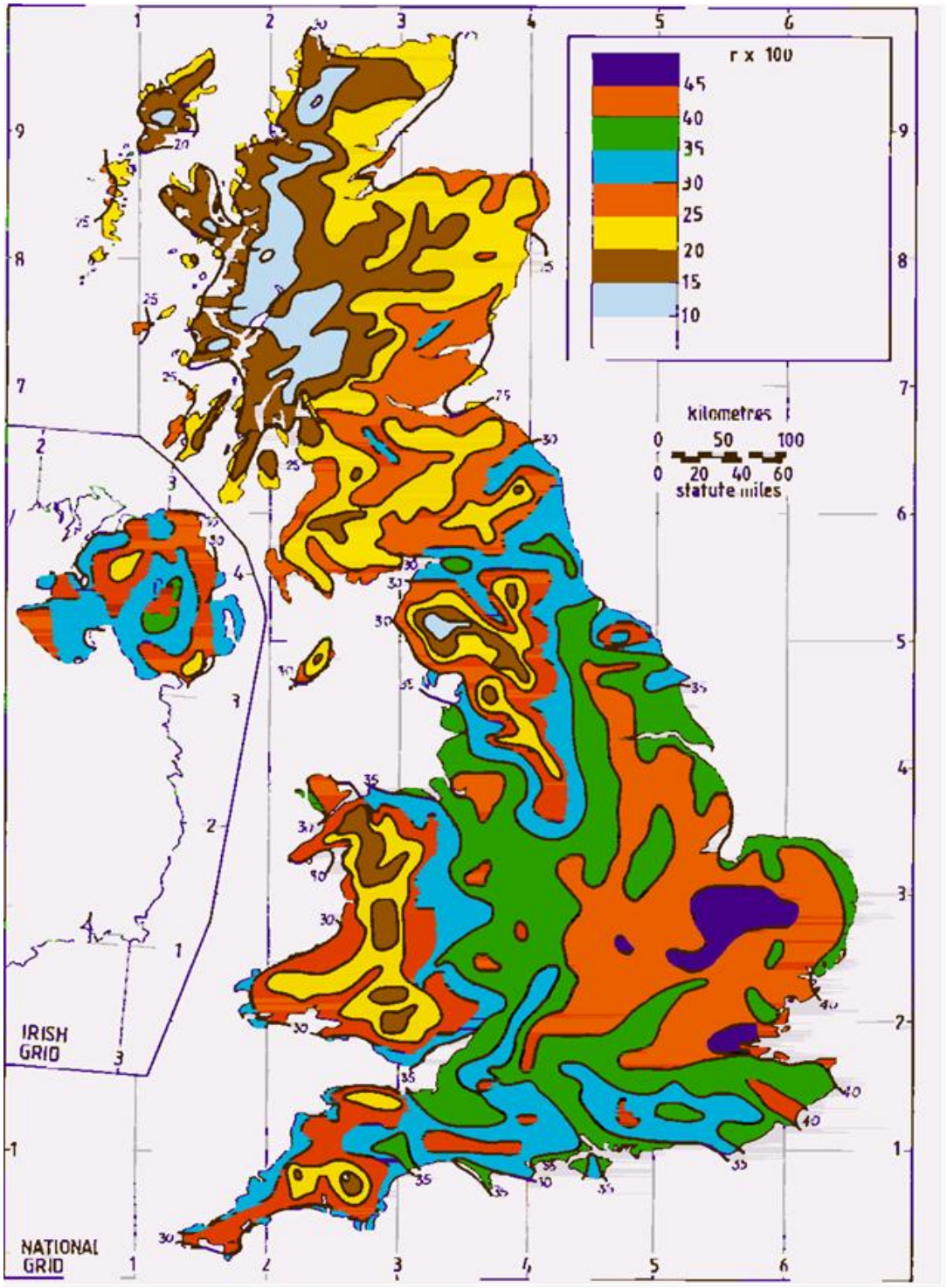
Appendix A – Proposed Site & Block Plan



Appendix B – Existing & Proposed Drainage Plan



Appendix C – National rainfall tables

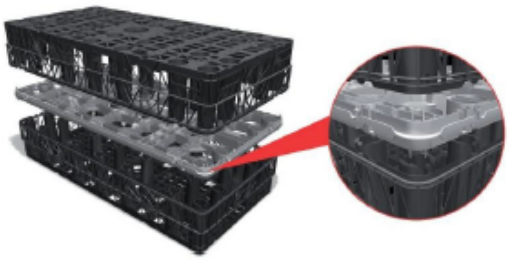


Appendix D – Rainbox 3S/core surface water attenuation/Soakaway system

rainbox® 3S

Technical Data Sheet

The RAINBOX® 3S crate consists of two half-boxes and a centre plate; assemble these prior to their installation within the crate structure.



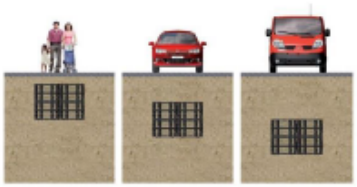
Dimensions:	1200 x 600 x 420mm
Gross Volume:	302 L
Storage Volume:	290 L
Void ratio:	96 %
Materials:	Polypropylene
Recyclable:	100 %
Approximate weight:	11.5 Kg
Inspectable:	Yes

Crates are linked by clips 

Connection Options

The RAINBOX® 3S comes with pre-formed cut-outs for connecting pipework up to 160mm OD. For larger sizes, up to 400mm OD, specially made adaptor plates can be used.

Design & Installation Guidance



Vertical loading to the crate structure is determined by the cumulative loads associated with the backfill and any loads linked to operations (vehicular loads (live loads) or permanent structures (dead loads)). Horizontally loading is determined by the pressure exerted by the earth.

The resulting information determines the minimum and maximum covering height and the maximum excavation depth.
Table 1 shows the parameters for different applications.

Table 1

(For Guidance Only*)

	Load (GVW)		
	Pedestrians	Small Vehicles ≤ 3T	Vehicles ≤ 12T**
Coverage in m (based on backfill φ' 30° and density 20kN/m³)			
Min.	0.30	0.50	1.20
Max.	2.50	2.20	2.00
Max Excavation Depth in m			
with backfill φ' 20°	2.90	2.90	2.90
with backfill φ' 25°	3.80	3.80	3.50
with backfill φ' 30°	4.00	4.00	4.00

* The installer of the Rainbox 3S system should ensure that a structural design check in line with CIRIA C680 has been carried out prior to work commencing.
** Use by heavier vehicles may be permissible depending on site conditions. Please contact JDP Technical Support for more information.

JDP Technical Support – Tel: 01228 794426; E-mail: technical@jdpipes.co.uk

JDP reserve the right to make alterations to this document without prior notice or update. Information correct as of 1st August 2017.

rainbox® 3S

BBA Agrément Certificate 17/5489

DYKA BV
Produktieweg 7
8331 LJ Steenwijk
Holland

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e-mail: info@dyka.nl
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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

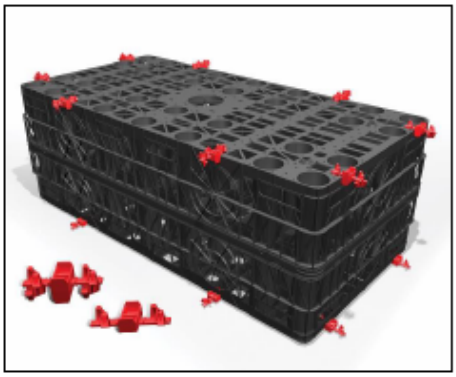
Agrément Certificate
17/5469
Product Sheet 1

DYKA STORMWATER MANAGEMENT SYSTEMS

DYKA RAINBOX 3S STORMWATER MANAGEMENT SYSTEM

This Agrément Certificate Product Sheet[1] relates to the DYKA Rainbox 3S[2] Stormwater Management System, comprising polypropylene modules which can be used to construct below-ground water storage attenuation tanks or soakaways, to manage stormwater run-off from impermeable surfaces.

(1) Hereinafter referred to as 'Certificate'.
(2) Rainbox 3S is a registered trademark.



CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Hydraulic design — data are provided in this Certificate to assist in the design of a below-ground stormwater management system using DYKA Rainbox 3S (see section 6).

Structural performance — the system has adequate strength and stiffness to resist short- and long-term loading when used in accordance with this Certificate (see section 7).

Maintenance — data are provided in this Certificate to assist in planning the maintenance of a completed DYKA Rainbox 3S Stormwater Management System installation (see section 11).

Durability — the system will have a life in excess of 50 years when installed in accordance with this Certificate (see section 12).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 12 January 2018

Paul Valentine
Technical Exellence director

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.
The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Watford
Herts WD25 9BA

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www.bbacerts.co.uk

Regulations

In the opinion of the BBA, the DYKA Rainbox 3S Stormwater Management System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**H3(3)**	**Rainwater drainage**
Comment:		The system can be used in a construction to satisfy this Requirement. See section 6 of this Certificate.
Regulation:	**7**	**Materials and workmanship**
Comment:		The system is acceptable. See section 12 and the *Installation* part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The system can contribute to satisfying this Regulation. See sections 11 and 12 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.6	Surface water drainage
Comment:		The system can contribute to a construction satisfying this Standard, with reference to clauses 3.6.1[(1)(2)] to 3.6.5[(1)(2)]. See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments in relation to the system under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(a)(i)(iii)(b)**	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**82**	**Rainwater drainage**
Comment:		The system can be used in a construction to satisfy this Regulation. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.1), 3 *Delivery and site handling* (3.3, 3.5 and 3.6) and 15 *Procedure* (15.1 and 15.10) of this Certificate.

Technical Specification

1 Description

1.1 The DYKA Rainbox 35 Stormwater Management System comprises modular units manufactured from polypropylene (see Table 1 and Figure 1) that clip together on site to form tanks of the required dimension. The units have pre-formed sockets to enable connection with 110 and 160 mm diameter pipework (to BS EN 1401-1 : 2009).

Table 1 Characteristics of units

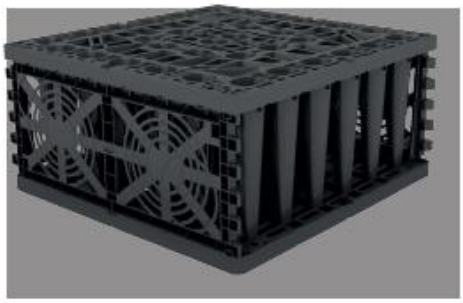
Characteristic (unit)	Value
Dimensions (nominal) (l x w x h) (mm)	1200 x 600 x 420
Volume (nominal) (m^3)	0.3024
Storage volume (nominal) (m^3)	0.2903
Porosity (%)	96
Nominal mass per cell (kg)	11

1.2 Half and Full Click Connectors are manufactured from red polypropylene and used to secure the units together (see Figure 1).

RAINBOX CORE

Stormwater Management Systems

JDP Nature's Network





	Crate	Baseplate
Dimensions (mm)	800 x 800 x 350	800 x 800 x 40
Gross Volume (m3)	0.225m3	0.025m3
Net Volume (m3)	0.217m3	0.020m3
Material	Polypropylene	Polypropylene
Weight	9kg	4kg
Void Ratio	>96% depending on number of layers	
Inspectable	Yes, when combined with RAINBOX CUBE	
*UCS Vertical	340 kN/m2	
*UCS Lateral	110 kN/m2	
*Ultimate Compressive Strength		

Load				
	<3T	12T	30T	40T
Based on backfill φ' 300 density 20kN/m2 and tank of 0.74m (2 crates deep)				
Cover in m *				
Min. Cover	0.26	0.62	0.68	0.82
Max. Cover	3.65	3.40	3.40	3.40
Max. Installation Depth in m *				
With Backfill φ' 260	3.93	3.67	3.67	3.67
With Backfill φ' 300	4.86	4.58	4.58	4.58
With Backfill φ' 340	5.10	4.82	4.82	4.82
With Backfill φ' 380	4.88	4.61	4.61	4.61

*It is advised that structural design calculations are carried out prior to work commencing.
**Installation depths and loadings outside of the information in this table may be permissible depending on site conditions. Contact JDP for more information



Endeavour Drive, Basildon (UK)



Housing Estate, Aberdeenshire (UK)

Tel 0800 195 1212 or Email contact@jdpipes.co.uk or visit www.jdpipes.co.uk

Appendix E – Environment Agency Flood Report

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
Mr Bradley Macleod	**303116/516786**	**9 October 2026 12:52**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2026 AC0000807064. https://flood-map-for-planning.service.gov.uk/os-terms

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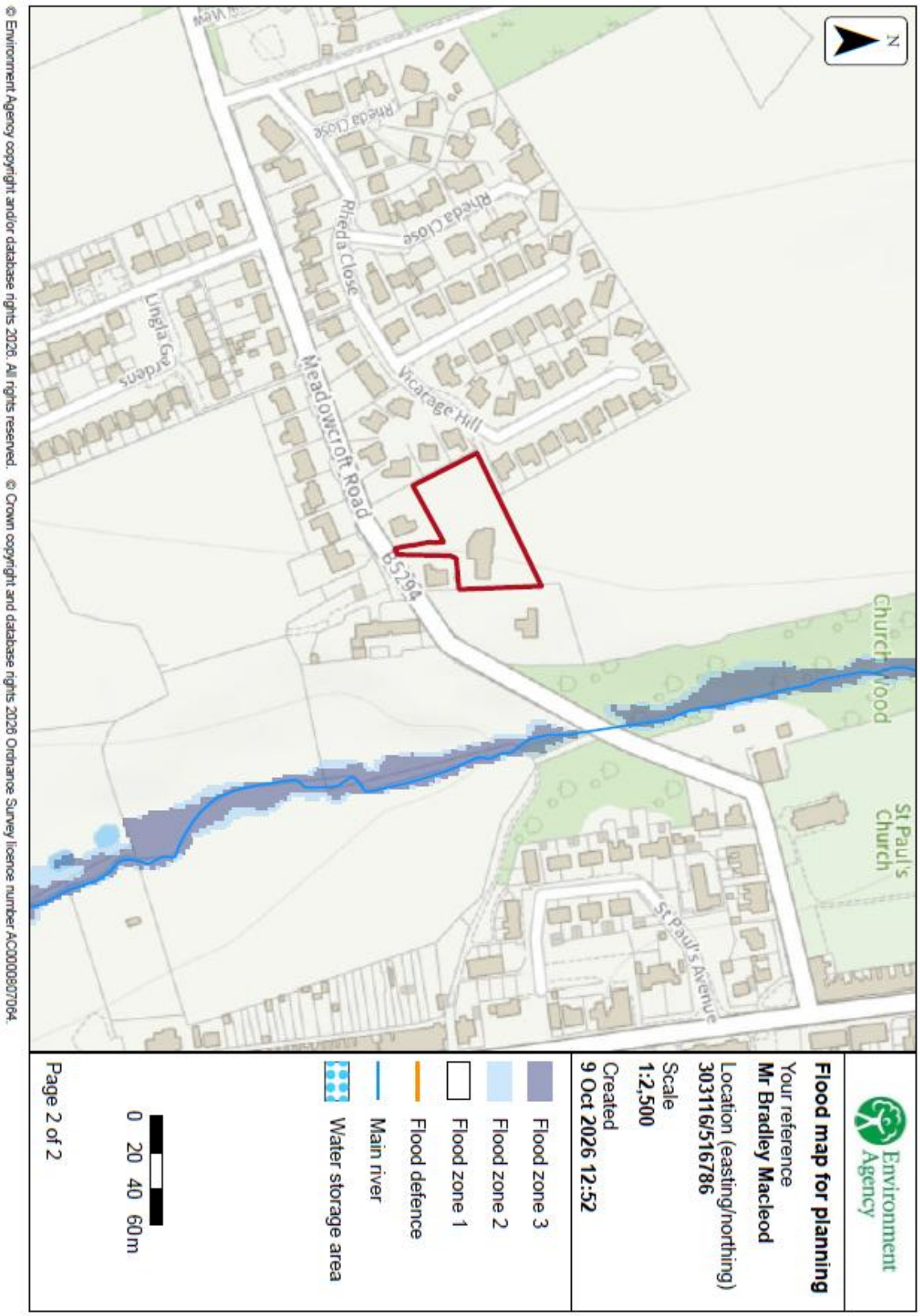

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Appendix F – Marshal Drive Sett Tegula Permeable Paving – Driveways & Shared Private Access

Marshalls

Creating Better Spaces

INSTALLATION DETAILS FOR DRIVESETT TEGULA PRIORA PAVING

General Information

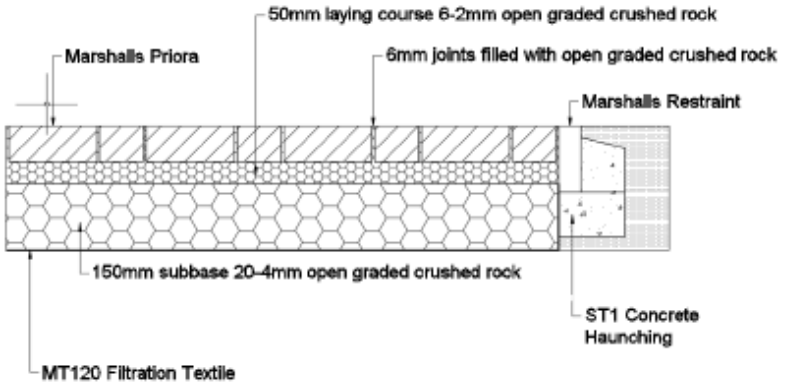
On delivery, the product should be inspected. If there are any issues, please report them immediately and do not commence installation.

Before installation commences a certain amount of sorting of the product may be required to ensure consistency of colour, texture and dimensional tolerance.

Check for services and contact the service provider for advice if gas or electric services run through the intended Priora site. Care must be taken when constructing over sewer, rainwater and water pipes to ensure that the services remain supported for their full length by undisturbed material and are surrounded on the remaining sides by a minimum of 150mm of 4-20mm material.

Health and Safety Information

Safe working practices should be employed at all times during the construction process and all necessary Personal Protective Equipment (PPE) should be worn.



Domestic application only www.marshalls.co.uk Page 1 of 7
10/2018/Issue 4

Landscape House, Premier Way, Lowfields Business Park, Elland, HX5 9HT

Should other construction or maintenance work take place close to the pavement which may affect the infiltration of the pavement, suitable protective measures should be taken.

Laying course

The final target thickness for the laying course should be 50mm.

Tolerances for laying course material are +/-20mm. However, due to the nature of the open-graded material, a reduction in the ability to reduce the thickness of the laying course due to compaction would be experienced when compared to a sand laying course. Therefore, it is important to ensure the initial placing and screeding of the open-graded laying course is as accurate as possible.

It may prove advantageous to trial a small area of open-graded material to ascertain the characteristics of the material under compaction to ensure accurate levels are achieved. Should any disturbance of the screeded laying course material occur prior to the placement of the blocks, the affected area should be re-screeded to ensure consistency between the affected area and the surrounding laying course. When screeding rails are removed on completion of the installation of the laying course, the affected area should be filled and re-screeded with corresponding laying course material and manually compacted. Care should be taken not to disturb adjacent prepared laying course material.

Wearing course

Laying

Paving units should be installed on the laying course material so that the final level is within the permitted surface tolerance. String lines should be utilised as often as required. This is necessary to ensure the bond pattern is maintained and straight lines are achieved in the finished paving.

The manufacturing tolerances of the paving units, profile of the site and frequency of string lines should be taken into consideration during installation.

Paving units should be laid such that the joint profile interlocks with its neighbouring units. Joint widths may be varied slightly in order to achieve straight lines or maintain bond. When laying block paving, the blocks should be mixed simultaneously from a minimum of 3 packs, taking vertically from each slice offered by the pack. This is necessary to ensure an even distribution of both the colours and any manufacturing tolerances offered by the blocks.

Lay whole units first, followed by cut units around obstacles or at edges. No paving unit should be cut down to less than one quarter of its original size to prevent looseness or dislodgement at a later date. Where it appears that only a small section of block will fit, the "inboard cutting" technique should be adopted. The use of a larger or full unit against the edge restraint, allows a small unit to be placed in the resulting space.

Where slopes, gradients or ramps are being constructed, placement of the paving units should commence at the lowest point ie: the bottom of the slope, working upwards. Where there is a risk of lateral movement of the paving units due to the gradient encountered, the provision of additional intermediate restraint should be considered.

Compaction
Compaction should be undertaken with a plate vibrator. Prior to final compaction of the surface, joints should be filled with the same grading of material as that used for the laying course. All joints should remain full of jointing material at all times, with periodic checking and replacing carried out where necessary.

General
The bond pattern should be suited to the application and likely use of the paving. Areas which receive frequent vehicle turning, accelerating or decelerating should be laid in a herringbone pattern. Stretcher bond may be used successfully in very lightly trafficked areas, providing the direction of the traffic is perpendicular to the laying pattern and the paving is not subjected to the above movements. Basket weave patterns should not be used in areas receiving vehicular traffic.

Cutting
Cutting may be carried out using a diamond tipped power saw, a block-splitting guillotine, or hammer and bolster. It must however be noted that the aesthetic finish achieved will depend greatly upon the choice of cutting mechanism and the skill of the installer. Cut blocks should be inserted prior to completion of the working period to prevent any movement of unrestrained blocks. Blocks should be cut such that the resultant joint width remains within the 2-6mm tolerance. When laying to tight curves it may not be always possible to maintain a maximum 6mm joint, in which case, cut or special shaped units may have to be considered.

Maintenance
In brief, Marshalls would recommend:

- Inspect at least twice a year, spring and autumn, and/or after a major storm
- Brush the surface to remove debris and encrusted sediment
- Maintain the area to be free of vegetation
- Replenish the joints when empty
- Ensure that the owner is aware of the pavement construction and the "do's and don'ts" of the system

Further Information
For technical advice on commercial installations, or when confronted by unusual problems or circumstances, please contact Marshalls Technical Advisory Services on 0370 411 2233, or by email on advisory.services@marshalls.co.uk

CONDITIONS AND GUIDELINES

Definition of scope

In some parts of the country there are ground conditions where infiltration could adversely affect foundations to houses, therefore, if in doubt seek advice from a specialist or the local authority building control department.

Domestic Priora is only intended for domestic driveways, paths and patios which are subject to foot traffic or over-run by typical domestic vehicles that do not exceed a gross vehicle weight of 3.5 tonnes, although occasional use by heavier delivery vehicles should not have a detrimental effect.

The domestic Priora system is only intended for driveways or path where infiltration only is required in which the area must drain itself only and no other surrounding paved or roofed areas.

Properties constructed pre-1920's may not have been built on a concrete foundation; therefore, if this is proved to be correct, then the Marshalls' domestic Priora system should not be installed.

Soil strength

Marshalls' domestic Priora system must be either installed on a sub-grade which has previously had an established existing driveway* or on an area which has sub-grade soil strength greater than 5%

Laying onto a sub-grade which has previously taken an established driveway proves that the sub-grade was able to take the driveway construction. The standard designs are based on conditions where the sub-grade is greater than 5%, therefore, this is mirrored in our advice

Rock or Soil Type	Condition	Simple field test	CBR
Rock	Hard	Requires mechanical pick for excavation	Above 5%
Sand Gravel	Compact	50mm square peg hard to drive in 50mm	> 5%
Clay Sandy Sandy Clay	Stiff	Cannot be moulded by fingers Need pick for excavation	5% - 2%
Clay Sandy Clay	Firm	Can be moulded by fingers Need spade for excavation	5% - 2%
Sand Silty Clay Clayey Sand	Loose	Dry lumps easily broken down 50mm square peg driven in easily	2%
Silt Sandy Clay Silty Clay Clay	Soft	Can be easily moulded by fingers	<2%

Silt	Very soft	Exudes between fingers when squeezed seek advice
Sandy Clay Silty Clay Clay		

The CBR of the rock or soil is significantly affected by moisture

Soil permeability

The domestic Priora system is only suitable for soil areas where infiltration applies and the test criteria have been met according to the standard permeability test. For the standard permeability test, a test hole should be dug for every 20m² of driveway. There should be a minimum of two holes. Holes/pits should be spaced evenly in relation to the proposed Priora area. The soil test is the key. If the sub-grade soil is not permeable then domestic Priora cannot be installed.

Surface gradient

- The intended Priora area must fall away from the property. The top surface of the driveway should finish at least 150mm below any adjoining DPC level.
- The area should also fall away from all properties and buildings.
- If the intended Priora system falls to the house, then depending on the gradient, water could discharge and pool in and around areas of the house structure. This could lead to damp areas appearing on the masonry leaf.
- If the driveway exceeds 20m in length and has a gradient greater than 1 in 100, then please contact the Technical Advisory Services Department for assistance.
- Depending on the gradient in relation to the length, additional construction processes will be required by the provision of baffles.

Discharge onto roadway

The domestic Priora area must not discharge onto surrounding public roadways and pathways or towards any buildings

Existing foundations

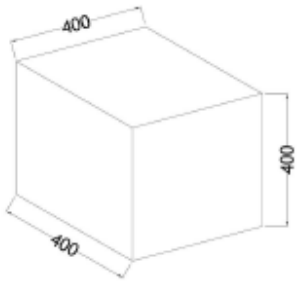
If the property lies adjacent to or is less then 600mm from the proposed domestic Priora driveway area, establish the depth of the house foundation before undertaking any soil test or Priora installation. The house foundation top surface must be a minimum of 600mm below the finished level of the Priora surface. The foundations area must not be disturbed as the integrity of the building may be affected over time. The level of water discharge must be above the level of the foundations to avoid instability at foundation level.

Rainwater catchment area (Driveway area)
No adjoining surfaces areas (rainwater pipes, roof areas etc) must drain onto and into the Priora driveway area. However, small areas, such as door steps and garage areas are acceptable providing that they don't exceed 5% of the driveway area.
If other areas are drained in addition to the driveway area then the hydraulic calculation will dictate the depth, thus increasing the 150mm depth for the 20mm open graded material.

Trees
When installing close to existing trees, tree roots smaller than 25mm diameter may be pruned back, preferably to a side branch, using a suitable pair of secateurs or hand saw. Roots larger than 25mm should only be severed following consultation with an arboriculturist, as they may be essential to the tree's health and stability. Protection of the pavement will also be required, hence the requirement of a permeable root barrier system, such as the Geoweb bio-barrier system (Fiberweb) or similar, which is non-surface protruding, so does not present a trip hazard once installed. Integrity of the pavement installation and intended life may be affected by the ingress of roots.

SOIL PERMEABILITY – based on the BRE Digest 365 test procedure

- Remove topsoil/paving material to exposed sub-grade soil
- Dig hole within sub-grade soil to the size shown below, ensure that all sides and the bottom surface of the hole are trimmed and levelled accordingly



- Fill hole with water and allow to drain away naturally. Repeat this process 3 times. If the water does not drain away at all then the sub-grade soil does not have adequate permeability properties

All pre-test and test work must be carried out for every 20m^2 of driveway. There should be a minimum of two holes, equally spaced throughout the intended area to be paved. Due to the maximum length of time that the test may take, the time of day should be considered.

THE END