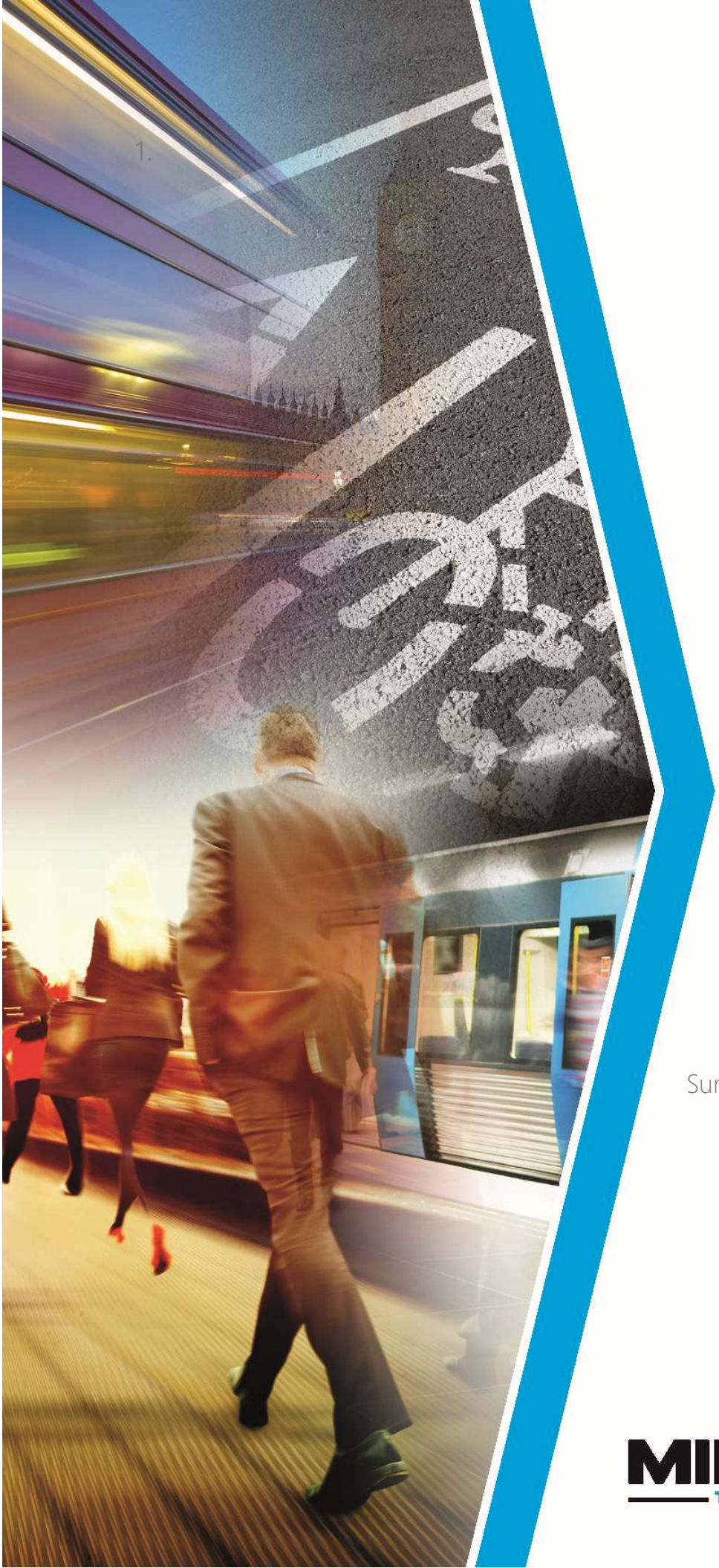


Proposed Residential Development

Land at West Sompting
West Sussex BN15 0DZ

Phase 1
Surface Water Maintenance and Management Plan

Prepared on behalf of
Persimmon Homes Thames Valley Limited

August 2023

MILESTONE
TRANSPORT PLANNING

Land at West Sompting, West Sussex, BN15 0DZ – Phase 1 Residential Development

Project No: MTP Ref: 22-065

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Document Title: Phase 1 – Surface Water Maintenance and Management Plan

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Document history and status

Revision	Date	Description	Prepared By	Checked By	Authorised By
P01	22/02/2023	First Issue - DRAFT	SRT	SRT	SRT
P02	14/08/2023	Drainage Maintenance Responsibilities Plan added	SRT	SRT	SRT
P03	03/06/2024	Design Life added to Suds Components	BM	BM	BM

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2. Introduction

2.1. This document sets out the principles for the long-term maintenance and management of the proposed surface water systems installed for Phase 1 of the residential development at Land South of West Street and West of Loose Lane Sompting West Sussex, Planning application no. AWDM/0323/19.

2.2. The principal surface water drainage systems are all based on infiltration into the ground with no discharge to watercourses or surface water sewers. They comprise the following:

- Section 38 Adoptable roads will be provided with several highway drainage pipe networks that discharge into their own attenuation crate soakaways. The primary attenuation will be accommodated within the crate soakaways.
- House and garage roofs will drain to individual house crate soakaways.
- Private parking and drives along with shared (non-adopted) drives will be drained using permeable paving surfaces with attenuation provided within the 30% voids sub-base.

2.3. In addition to the above infiltration systems for each Section 38 adoptable road a Hydro International Downstream Defender will be provided before surface water enters the crate soakaways.

2.4. The purpose of this document is to set out the basis of the maintenance and management of the Sustainable Drainage Systems (SuDS) for the development and to ensure that the adopting management company in relation to privately owned systems undertake a robust inspection and maintenance programme. It ensures that the optimum operation of the surface water drainage network is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).

2.5. With regards to the S38 roads these will ultimately become publicly owned systems. Recommendations will be given on the inspection and maintenance program which will be apply until the roads are adopted by the highway authority, West Sussex County Council (WSCC). After the roads are adopted the inspection and maintenance program may change to be in alignment with the highway authority own practices.

2.6. The activities listed in this document are generic to the relative surface water systems and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required.

2.7. The specific maintenance needs of the surface water systems should be monitored, and maintenance schedules adjusted to suit requirements.

2.8. The installed SuDS system at West Sompting will initially be the responsibility of Persimmon Homes.

2.9. Following installation and after an initial period of operation, all privately owned SuDS are to be transferred to the Homeowner and /or an appointed Management Company.

2.10. In the case of the S38 roads the installed SuDS systems will initially be the responsibility of Persimmon Homes. After the roads are adopted as public highway responsibility will then transfer to the highway authority.

2.11. The Drainage Maintenance Responsibilities Plan in Appendix A shows the long-term responsibilities after the initial period of operation and adoption of the S38 assets by West Sussex County Council.

2.12. An agreement shall be set up by Persimmon Homes, who shall confirm in writing to the Principal Planning Officer at Adur and Worthing Councils when the maintenance agreement is completed and in operation.

2.13. The Management Company will then be responsible for maintaining the surface water systems including all SuDS.

2.14. All property owners should be advised that an annual management fee will need to be paid to the management company for this service.

2.15. Inspection checks shall be carried out by qualified and competent persons, at the minimum intervals listed within the schedules and the appropriate work carried out.

2.16. This report is to read in conjunction with Milestone Transport Planning 'Drainage Layout' drawings nos. 601-130-101 to 105 inclusive for the location of all surface water drainage elements present within Phase 1 of the development.

3. SuDS Layout & Design

3.1. The storm water drainage strategy for the proposed development is to utilise a range of SuDS features to attenuate all surface water runoff from impermeable areas.

3.2. The proposed storm water systems consist of the following SuDS components:

- Permeable Block Paving
- House Crate Soakaways
- Attenuation crate soakaways for Section 38 Roads

3.3. There are three categories of maintenance activities referred to in this report:

- Regular maintenance (including inspections and monitoring).

  Consists of basic predictable tasks carried out at defined intervals.
- Occasional maintenance

  Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks.
- Remedial maintenance

  Comprises intermittent tasks that may be required to rectify faults associated with a system, although the likelihood of faults can be minimised by good design and construction practices.

  Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

4. SUDS Management & Maintenance

Permeable Block Paving

4.1. To ensure the continual and optimal performance of the permeable block paving, the following maintenance schedule is proposed as an initial regime but may either be increased or decreased by the management company depending on the local environment and any external contributing factors.

Permeable Paving Operation and Maintenance Requirements

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brush regularly and remove sweepings from all hard surfaces	Three times a year; at end of winter, mid-summer and after autumn leaf fall, or as required based on local observations. Pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	After autumn leaf fall brush and vacuum surface to prevent silt blockage and enhance design life. Based on site-specific observations of clogging or manufacturer's recommendations	Annually or reduced frequency as required
	Removal of weeds or management using glyphospate applied directly into the weeds by an application rather than spraying.	Annually or reduced frequency as required.
Remedial Work	Monitor effectiveness of permeable pavement and when water does not infiltrate immediately consider possible need for reinstatement of top layers or specialist cleaning.	As required
	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required

Maintenance Schedule	Required Action	Frequency
	Remediate work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three monthly, 48h after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually

4.2. During inspections the management company will identify any areas that require remedial maintenance such as topping up of jointing grit or removal of vegetation, weeds, silts and sediments that may be clogging the joints between the blocks. Small areas such as driveways can be swept with a hand bristle broom, for larger areas such as shared drives a lorry mounted rotary brush and vacuum sweeper device can be used.

4.3. Weeds can be removed from the surface through the controlled application of proprietary non-persistent contact herbicides. Those containing Glyphosate are the most suitable.

4.4. Care should be taken to ensure that only the detritus is removed from the joints and avoid removal of the jointing material.

4.5. If required, joints should be replenished with aggregate material using a 6-2mm single size grit suitable for jointing.

4.6. Jointing grit should not be replaced with sand as this will stop the permeable system from working.

4.7. Contamination of the permeable block paving from routine landscape maintenance such as grass clippings from mowing, hedge trimming, mulching plant beds etc. should be removed immediately by the homeowner or landscape operative.

4.8. If the infiltration rate of water into the paving becomes prolonged, allowing ponding to develop. then it may be necessary to refurbish the paving by the uplifting and cleaning or replacing of the laying course. The laying course material, jointing and blocks can be reused once cleaned, thus minimising costs.

4.9. Should the permeable paving need to be refurbished then the underlying sub-base infiltration should be reviewed and if found inadequate then the subbase material including geotextile membranes may require either replacement or cleaning.

4.10. Replacement sub-base material to be used should be a clean 4/20mm coarse graded aggregate to BS EN13242:2002. Jointing material between the blocks must be 6-2mm single size grit to the joints.

4.11. Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

4.12. Loose materials such as sand, cement, soil, or other loose substances should not be stored directly on top of the permeable blocks without the use of an impenetrable ground sheet.

4.13. Design Life of the permeable block paving is 20-25 years based on guidance contained within Suds manual C753 and Interpave Design and construction document.

Soakaways

4.14. Key Maintenance Requirements:

- Regular inspection of silt traps, manholes, crate attenuation, pipework and pre-treatment devices, with removal of sediment and debris as required.

4.15. Regular inspection and maintenance is required to ensure the effective long-term operation of below ground attenuation crate storage systems.

4.16. Maintenance responsibilities for the S38 road soakaways will initially be the responsibility of the management company until the roads are adopted after which it will be the Highway Authority.

4.17. In the case of the individual house crate soakaways the maintenance responsibility will lie with the individual property householders overseen by the management company.

4.18. Design life of below ground attenuation crates is in excess of 50 years see Appendix B for BBA certificate.

Soakaway Operation and Maintenance Requirements for S38 Roads

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months and then six monthly
	Debris removal from catchment surface (where it may cause risks to performance)	Three times a year at end of winter, mid-summer and after autumn leaf fall, or as required based on local observations.
	Remove sediment from pre-treatment structures	Monthly for 3 months and then six monthly and after large storms
Remedial Actions	Repair of inlets and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents to ensure that they are in good condition and operating as designed	Annually and after large storms
	Monitor catchpits for silt accumulation	Monthly for 3 months and then six monthly
	Monitor Downstream Defender for silt accumulation	Monthly for 3 months and then six monthly

Soakaway Operation and Maintenance Requirements for House Soakaways

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect for sediment and debris in silt pits	Monthly for 3 months and then six monthly and after large storms
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Remove sediment from pre-treatment structures	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of attenuation crates	As Required based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually and after large storms

Storm water pipe work and road gullies

4.19. A key maintenance requirement for the surface water drainage system upstream of the attenuation crate soakaways includes the removal of sediments and debris from the system as required.

4.20. As road gullies are the first intervention on the treatment train and susceptible to higher silt loadings, these will need to be inspected a minimum of monthly for the first three months after installation and then a minimum of every four months.

4.21. During this inspection, until the roads adopted, the Management Company will identify any gully pots or pipes that require remedial maintenance such as removal of sediment, debris, leaves and litter as required.

4.22. During the inspections the general operation and structural integrity of all components will be recorded and repaired as required.

4.23. It should also be noted that more regular inspections may be required should catchpits fill more frequently and/or if the initial inspections reveal that maintenance / cleaning will be required more regularly than at six-month intervals.

4.24. Flushing of the system can be achieved using a jetting system. The jet nozzle should be introduced to the system via the inspection chambers and manholes.

4.25. Any silt and debris should be flushed to an inspection or catchpit manhole and removed in accordance with the Management Company policy for waste management.

Downstream Defender Vortex Separator

4.26. Operation and maintenance of the Downstream Defender Vortex Separator shall be strictly in accordance with the Operation and Maintenance Manual provided by the manufacturer, Hydro International.

4.27. The frequency of cleanout is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. Refer to manufacturer O & M manual. This information should be recorded in the maintenance log to establish a routine maintenance schedule.

4.28. Design life of Downstream Defender select is the lifetime of the system see appendix B for email from Hydro International confirming design life.

APPENDIX A

Drainage Maintenance Responsibilities Plan

INDICATIVE

Maximum size U9 - U10
Mini Soccer Pitch
(54.9m x 36.6m)
Run Off (60.9m x 42.6m)

Maximum size U13 - U14
Community Soccer Pitch
(82m x 50m)
Run Off (88m x 56m)

Notes

1. Do not scale from this drawing. All dimensions shown are in metres unless noted otherwise.
2. This drawing has been based upon topographical survey information produced by both Brunel Surveys Ltd and Milton Keynes Surveys Ltd and Milestone Transport Planning cannot be held responsible for any discrepancies which may arise because of it.

Key

- S104 Foul Sewer and Manhole - Leep Utilities
- S38 drainage - West Sussex County Council
- S38 road drainage soakaways - West Sussex County Council
- G** S38 Highway Gully with 150mm Dia Connection Pipe - West Sussex County Council
- Private Foul - Home Owner / Management Company
- Private Storm - Home Owner / Management Company
- B Storm House Soakaway - Home Owner
- Private Road drainage soakaways - Management Company
- G** Private Road Gully with 150mm Dia Connection Pipe - Management Company
- Private Parking Permeable paving - Home Owner
- Shared Drive Permeable paving - Home Owner / Management Company

Ordnance Survey Licence number: 100057360

Drawing Revisions

Rev:	Drn:	Date:	Details	Chk:
P1	ST	14/08/2023	First issue	SRT

Client
Persimmon Homes
Thames Valley

Project
West Sompting, West Sussex

Title
Phase 1
Drainage Maintenance
Responsibilities Plan

MILESTONE TRANSPORT PLANNING
7 Ancells Court, Rye Close, Fleet, Hampshire, GU51 2UY
Tel: 01483 397888
Gateshead IBC, Mulgrave Terrace, Gateshead, NE8 1AN
Tel: 0191 338 7220
web: www.milestonetp.co.uk

Drawing Number:
601-190-105

Scale:
1:700 @ A1

Revision:
P01

APPENDIX B

Supporting documents for Design Life of SUDS components

Brett Morse

From: Harvey Farrington-Thorne <hfarringtonthorne@hydro-int.com>
Sent: 17 May 2024 13:15
To: Brett Morse
Subject: Downstream Defender TT48363
Attachments: design data-en gb-downstream defender select.pdf

Hi Brett,

I have discovered that we do not have a declaration as such, but I can confirm that the Downstream Defender Select will last the lifetime of the designed system.

Kind regards,

Harvey Farrington-Thorne
BEng (Hons)
Applications Engineer
Direct Dial: +44 1275 337935

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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

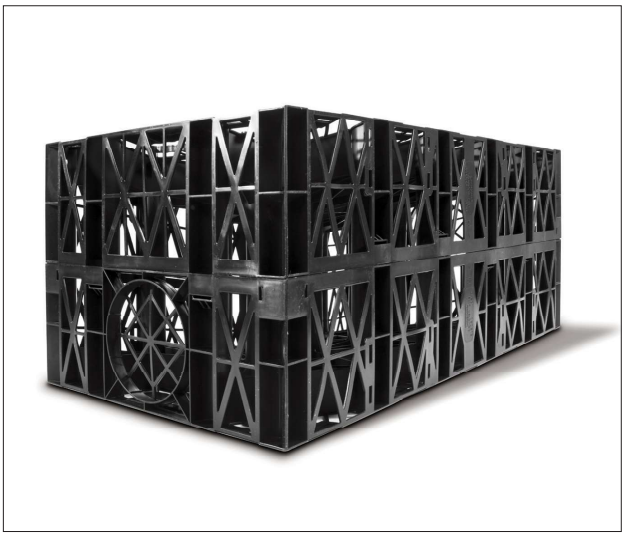
Agrément Certificate
03/4018
Product Sheet 4

WAVIN AQUACELL ATTENUATION AND INFILTRATION SYSTEMS

AQUACELL ECO

This Agrément Certificate Product Sheet(1) relates to AquaCell Eco, comprising black recycled polypropylene modular units for use either as below-ground storage tanks or as a soakaway to manage run-off from impermeable surfaces.

(1) Hereinafter referred to as 'Certificate'.



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 is provided in this Certificate to assist in the design of a below-ground water management system incorporating AquaCell Eco (see section 6).

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

Maintenance — data is provided in this Certificate to assist in planning the maintenance of a completed system (see section 11).

Durability — the system will have a service life in excess 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 Second issue: 2 November 2016

Originally certificated on 15 June 2012

Brian Chamberlain
Head of Technical Excellence

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.

Regulations

In the opinion of the BBA, AquaCell Eco, 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 meet this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system components are 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 meeting 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:		All 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.

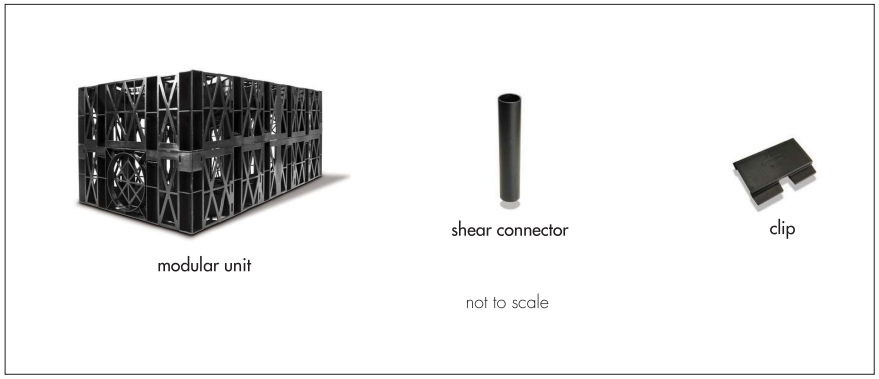
See sections: 1 *Description* (1.2), 3 *Delivery and site handling* (3.1) and 15 *Procedure* (15.1) of this Certificate.

Technical Specification

1 Description

1.1 AquaCell Eco consists of individual recycled black polypropylene modular units, polypropylene shear connectors to hold units together vertically, and polypropylene clips to hold units together horizontally (see Figure 1).

Figure 1 System components



1.2 The overall unit dimensions and characteristics of AquaCell Eco are shown in Table 1.

Table 1 Characteristics of modular units

Characteristic (unit)	Value
Unit dimensions per storage cell (nominal) (mm) (L x W x H)	1000 x 500 x 400
Unit volume per storage cell (nominal) (m^3)	0.20
Storage volume per storage cell (nominal) (m^3)	0.19
Void ratio (%)	95
Weight (nominal) (kg)	7

1.3 The polypropylene modular units have preformed sockets to enable connection to 160 mm diameter pipework. Alternatively, connection to 150 mm or 225 mm pipework is possible using an adaptor. Adaptors and connecting pipework for use with the system are outside the scope of this Certificate.

1.4 Ancillary items necessary for use with the system (according to best practice), but outside the scope of this Certificate, are:

- adaptors and connecting pipework
- air vents
- inspection points
- inspection chamber modules
- silt traps and sediment separators
- permeable geotextile — wrapped around each assembly when used for infiltration
- geomembrane — wrapped around each assembly when used for storage (attenuation)
- protective fleece — wrapped around each assembly when used for storage (attenuation), to give added protection to the geomembrane
- granular material/coarse sand.

2 Manufacture

2.1 The system components are injection-moulded using recycled polypropylene to one specification.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Wavin UK (Holdings) Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by SGS UK Ltd (Certificate GB08/74586).

3 Delivery and site handling

3.1 The system is supplied to site in packs of 12 or 15 units, secured with straps, with plastic feet attached to the underside to enable placing and movement by a fork-lift. Each pack of units carries a label bearing the system type, part number, operator's initials, individual pallet sequential number and date of manufacture.

3.2 Each unit is supplied with two shear connectors and three clips.

3.3 The packs should be carefully placed on level ground and should not be stacked on site. Loose individual units should not be stored more than two units high.

3.4 The units contain an inhibitor to resist the effects of ultraviolet light for up to six months. However, prolonged exposure to direct sunlight should be avoided.

3.5 The units should not be stored near fuel bowsers, fuel tanks or other solvents, to avoid potential chemical damage.

3.6 The units are resistant to damage that could occur with normal handling. They should be stored way from the possibility of impacts by vehicles and other construction plant.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on AquaCell Eco.

Design Considerations

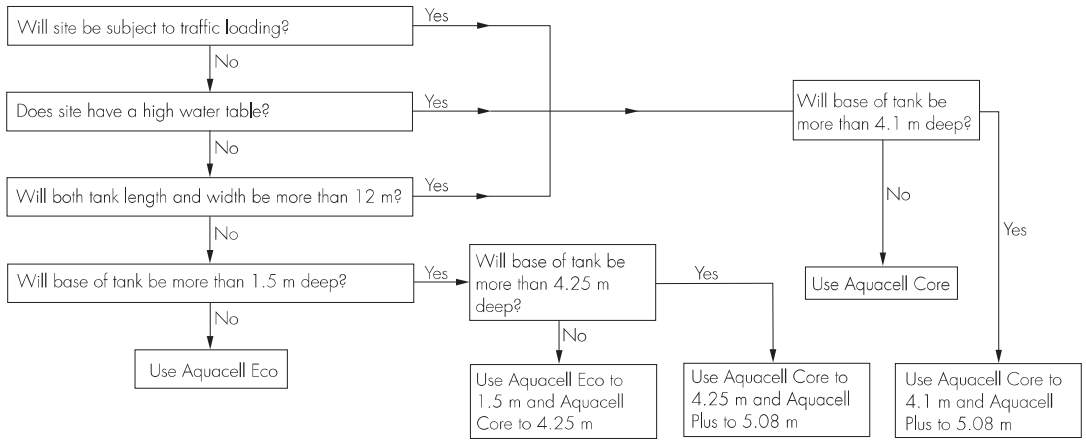
4 General

4.1 The design of AquaCell Eco must be in accordance with the Certificate holder's design guidelines. Guidance on the application of sustainable drainage systems (SUDS) for new developments can be found in The National Planning Policy Framework and The SUDS Manual (C697) published by the Construction Industry Research and Information Association (CIRIA).

4.2 The system is satisfactory for the management of stormwater run-off from impermeable surfaces and can be used in three main ways (see Figure 2):

- infiltration — water is stored within the system during rainfall and allowed to drain away by soaking into the surrounding ground over a period of time after the rain has ceased
- attenuation — water is stored within the system during rainfall and released at a reduced flow rate through a flow control device into an appropriate outfall. This reduces peak flows in the watercourse, thereby minimising the risk of flooding
- a combination of infiltration and attenuation.

Figure 2 Sustainable drainage system selection and design



(1) This Certificate covers Aquacell Eco units only — the validity of Certificates covering other Aquacell units can be checked on the BBA website: www.bbacerts.co.uk.

(2) Maximum burial depths assume ideal soil conditions and should be verified by site investigations (see section 6 of this Certificate for information relating to structural design). Maximum burial depths for a variety of soil types are given in Table 7.

4.3 The design of a system for a specific project must always be preceded by a detailed audit of the proposed site to establish:

- existing factors and considerations applicable to the site
- predicted factors relating to the site's use following the planned development, and the parameters within which the installation is required to function
- the type of function of application suggested by this audit.

4.4 Once the project criteria have been established from the site audit, there are two main parts to the design procedure of individual installations: hydraulic design and structural design.

5 Practicability of installation

The system is designed to be installed by a competent general builder or contractor with experience of this type of system.

6 Hydraulic design

Infiltration

Calculation principles



6.1 There are two approaches, either of which can be adopted: CIRIA Report 156 *Infiltration drainage — Manual of good practice* and BRE Digest 365 *Soakaway design*. Further information on the design of SUDS may be obtained from *The SUDS Manual* (C697).

6.2 A simplified approach can be used on a small site (ie a single-house development), where detailed site infiltration rate information may not be required or available (see Table 2). In Approved Document H, a storage volume equal to the area to be drained multiplied by 10 mm, for areas up to 25 m^2 is allowed. Beyond this size, design should be carried out in accordance with BS EN 752 : 2008 or BRE Digest 365. BS EN 752 : 2008 suggests a storage volume equal to 20 mm multiplied by the area to be drained. In Scotland, guidance for the design of single-house soakaways is given in Mandatory Standard 3.6, clause 3.6.5(1).

(1) Technical Handbook (Domestic).

Table 2 Simplified soakaway design for single-house development(1)

Number of units	Storage volume (m^3)	Maximum area to be drained (m^2)
1	0.19	19(2)
2	0.38	25(2)
3	0.57	28.5(3)
4	0.76	38(3)
5	0.95	47.5(3)
6	1.14	57(3)

(1) When doubt exists over suitability of ground for infiltration permeability, figures should be derived by test (see BRE Digest 365).
(2) In accordance with Approved Document H.
(3) In accordance with BS EN 752 : 2008, clause NA 4.4.8.

6.3 When the BRE or CIRIA approach is used, the design volumes and areas for trench or cuboid type installations can be found in Tables 3 and 4 of this Certificate.

Table 3 Data for use in hydraulic design — one unit wide trench configuration

Number of units high	System volume (m^3) per metre length of trench	Vertical surface area (m^2) (both sides) per metre length of the system	Area beneath system (m^2) per metre length of trench
1	0.19	0.8	0.5
2	0.38	1.6	0.5

Table 4 Data for use in hydraulic design — three-dimensional systems, two units high

System length (number of units long) (1.2 m side)	2 units wide (0.5 m side)			4 units wide (0.5 m side)			8 units wide (0.5 m side)		
	Volume (m^3)	Area around sides and ends (m^2)	Area under base (m^2)	Volume (m^3)	Area around sides and ends (m^2)	Area under base (m^2)	Volume (m^3)	Area around sides and ends (m^2)	Area under base (m^2)
1	0.76	3.2	1.0	1.52	4.8	2.0	3.04	8.0	4.0
2	1.52	4.8	2.0	3.04	6.4	4.0	6.08	9.6	8.0
4	3.04	8.0	4.0	6.08	9.6	8.0	12.16	12.8	16.0
8	6.08	14.4	8.0	12.16	16.0	16.0	24.32	19.2	32.0
10	7.6	17.6	10.0	15.2	19.2	20.0	30.4	22.4	40.0
100	76.0	161.6	100.0	152.0	163.2	200.0	304.0	166.4	400.0

6.4 For calculations, the size and volume of the units are given in Table 1. The total areas of the base and sides are required as water is absorbed through the geotextile soil interface. Storage volume is 95% of the total volume. As an example, using Table 4, for a typical linear trench 40 m long and two units deep the volume is 0.38 by 40 = 15.2 m^3 and the side area 1.6 by 40 = 64 m^2.

Attenuation

Calculation principles

6.5 The anticipated total run-off volume from the site is estimated. The most commonly-used method for evaluating storm rainfall events in the UK is the Wallingford Procedure by which the total rainfall level of storms over defined time periods ranging from five minutes up to 48 hours is assessed. The allowable discharge rate from the site to an appropriate outfall is established, but will normally be set by the Environment Agency, Scottish Environmental Protection Agency or Planning Authorities. The volume to be stored underground in the system is then determined and the number of units needed to contain this volume is calculated on the basis that the storage volume is equal to 95% of the total volume of the system.

Connections

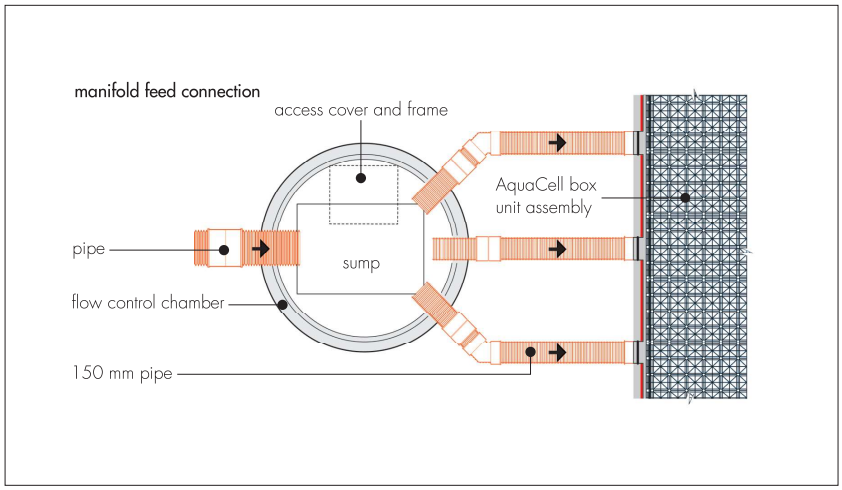
6.6 Connection is made to the units using a preformed socket and adaptor or a flange adaptor.

6.7 It is recommended that all connections into storage applications (using a geomembrane) are made using a flange adaptor. Adhesive or double-sided tape should be used between the geomembrane and flange adaptor to ensure a watertight seal.

Manifold design

6.8 The units are manufactured to allow a connection to be formed by insertion of 160 mm diameter pipes to BS EN 13476-3 : 2007 into the knock-out incorporated in each cell. The capacity of a 160 mm pipe is limited and may be insufficient for the anticipated design flow. The flow may be split amongst a number of 160 mm pipes connected to a manifold to provide increased hydraulic capacity (see Figure 3). The system designer should ensure that the pipework connecting the units to the drainage system has sufficient capacity to cope with the design flow.

Figure 3 Typical inlet connection design



Flow control

6.9 When the system is used for attenuation purposes, the outflow from the system must be controlled to comply with the discharge rate consent of the site. The main methods to achieve outflow control are: orifice plate, vortex valve or small pipe. Comparative features and benefits of these various control flow devices should be considered prior to selection.

Outflow positioning and head calculations

6.10 The invert level of the outflow pipe should be flush with the bottom of the lowest unit to allow the system to drain. As the system fills, a depth of water develops on the upstream side of the outflow control. For a system with two layers of units, this depth is 0.8 m when the units are full, creating a driving head to push the flow through the control device. For design purposes, the head used in calculations is taken as that at the invert line of the outflow device.

7 Structural design

7.1 The structural design of each installation incorporating the system should be carried out by a suitably-qualified and experienced engineer.

7.2 Guidance on the design and installation of systems incorporating the units can be found in CIRIA Report C680 *Structural design of modular geocellular drainage tanks*. Consideration should be given to the effects of cumulative deflection in systems comprising several layers of units.

7.3 The system can be placed under a wide variety of landscaped or pedestrian areas were ground water is not present. Design procedures for trafficked applications are outside the scope of this Certificate.

7.4 The engineer responsible for the design of the installation must confirm that the ground-bearing capacity at the formation level is sufficient for the proposed operational loads. In areas of weak or compressible soils, advice should be sought from a geotechnical engineer.

Performance characteristics

7.5 Characteristic compressive strength at the yield point and elastic deflection values for the system have been determined from independent, short-term tests (see Table 5).

Table 5 Short-term performance values

Performance characteristic (unit)	Value
Characteristic compressive strength at the yield point ($kN \cdot m^{-2}$)	
vertical loading on top face	213
lateral loading on side face	52
Short-term elastic deflection (mm per $kN \cdot m^{-2}$) (applied load)	
vertical loading on top face	1 per 29
lateral loading on side face	1 per 9

7.6 Creep tests indicate that the long-term vertical deflection may be estimated from the equations shown in Table 6. This is valid for loads up to 52 $kN \cdot m^{-2}$ for durations of up to 10 years at 20°C. In locations where settlement is not a concern, designs of up to 50 years can be considered.

Table 6 Equations for estimation of long-term deflection

For loads up to ($kN \cdot m^{-2}$):	Equations for estimation of long-term deflection (mm)
52	Vertical deflection = 0.1069 Ln [time (days)] + 1.2561
13	Lateral deflection = 0.9344 Ln [time (days)] + 1.3841

7.7 The partial load and material factors given in Table 7, as defined in CIRIA Report C680, should be used for design.

Table 7 Partial factors for loads and materials

Description	Ultimate limit state	Serviceability limit state
Partial factors for loads		
vertical dead-load (F_{dl})	1.40	1.00
earth pressure (horizontal) + hydrostatic (horizontal) load (F_{ep})	1.35	1.00
imposed live-load (F_{ll})	1.60	1.00
Partial safety factors for materials (F_m)	2.75	1.50

Note: Where applicable, additional factors should be considered for dynamic factor and material factors for creep/fatigue.

7.8 Example maximum installation depths and minimum depths of cover, calculated as described in this Certificate and in accordance with CIRIA Report C680, are shown in Tables 8, 9 and 10. For soakaways serving an individual house, the system is located below a garden a minimum of 5 m from the building, inaccessible to motor vehicles. Table 8 indicates the maximum installation depth and minimum depths of cover.

Table 8 Design criteria for use of the system as a soakaway for an individual house(1)

Criterion (unit)	Value
Maximum depth to base of units (m)	2.68
Minimum cover depth (m)	0.50

(1) The following assumptions apply:
- soakaway constructed in sandy gravels with a soil weight not exceeding 20 $kg \cdot m^{-3}$ and angle of shearing resistance for surrounding soil not less than 30°
- groundwater at least one metre below the base of the units
- soakaway located beneath small gardens or landscaped areas inaccessible to motor vehicles, in accordance with Table 4.2 of CIRIA Report C680.

7.9 For installations below landscaped or pedestrian areas the information given in Tables 9 and 10 is only applicable in temperate climate conditions such as those in the UK. Site-specific calculations should be carried out for configurations and prevailing ground conditions other than those shown.

Table 9 Maximum installation depths (to base of units)

Soil description	Maximum installation depth (from invert of structure) (m)		
	Soil weight ($kN \cdot m^{-3}$)	Angle of internal friction (degrees)	No groundwater present: landscaped areas[1]
Over consolidated stiff clay	20	24	1.53
Silty sandy clay	19	26	1.68
Loose sand and gravel	18	30	2.08
Medium dense sand and gravel	19	34	2.35
Dense sand and gravel	20	38	2.68

(1) Landscaped area where drive-on mowers are used in accordance with Table 4.2 of CIRIA Report C680.

Notes:

- these values relate to installations where the groundwater is a minimum of one metre below the base of the excavation. AquaCell Eco units should not be used where groundwater is present
- calculations based on systems constructed from two layers of AquaCell Eco units
- no account is taken of accidental loading
- ground surface in vicinity of system assumed to be level
- formation below system assumed to have adequate bearing capacity
- partial load and material factors are defined in Table 7.

Table 10 Minimum cover depth

	Landscaped areas[1]
Minimum cover depth required (m)	0.50

(1) Landscaped areas where drive-on mowers are used in accordance with Table 4.2 of CIRIA Report C680.

Notes:

- calculations based on systems constructed from two layers of AquaCell Eco units
- soil weight and angle of internal friction of the soil above the system taken as 20 $kN \cdot m^{-3}$ and 38° respectively
- calculations based on there being no groundwater present
- angle of spread for wheel loads taken as 27° in car parks with asphaltic surfacing and angle of internal friction of soil in landscaped areas
- no account is taken of accidental loading
- ground surface in vicinity of system assumed to be level
- formation below system assumed to have adequate bearing capacity
- partial load and material factors are defined in Table 7
- values for distributed and concentrated wheel loads/contact as defined in Table 4.1 of CIRIA Report C680.

8 Geotextiles and geomembranes

Infiltration

8.1 The system requires a geotextile wrapping when used as an infiltration system to prevent:

- silt that may be contained in the surface water run-off contaminating the surrounding soil, in addition to reducing its permeability
- surrounding soil from entering the units.

8.2 The selection of an appropriate geotextile requires careful consideration (see section 8.6).

Attenuation

8.3 The system requires a sealed geomembrane wrapping to create an attenuation storage system, to prevent:

- the release of surface water into the surrounding ground
- inflow of groundwater that may overload downstream systems and contain pollutants on contaminated sites.

8.4 Site conditions may also require the use of an additional thick, protective geotextile fleece to prevent puncture or excessive strain in the geomembrane. Further advice should be sought from the geomembrane manufacturer.

8.5 Selection of an appropriate geomembrane requires careful consideration (see section 8.7).

Specification of geotextile

8.6 The selection of an appropriate geotextile for a specific AquaCell Eco Infiltration System should be considered carefully, particularly with reference to the surrounding soil properties and required performance. Points to consider are:

- pore size — this should be designed and specified to assist infiltration and prevent migration of fine soil particles
- permeability and breakthrough head — the geotextile should not limit flow of water in the system, and should have a similar or greater permeability than the surrounding ground
- puncture resistance — the geotextile must be able to resist piercing by potentially sharp objects, eg stones in the soil
- tensile strength — the geotextile should have sufficient strength to resist any imposed forces, eg from traffic
- specialist advice should be sought if surrounding soil characteristics exhibit a high degree of fines/low infiltration capacity and/or there is risk of damage from ground contaminants.

Specification of geomembrane

8.7 The specification and selection of the impermeable geomembrane must be correct for the proposed installation, to ensure that it performs to the level required. It is essential that the specified material:

- withstands the rigours of installation
- resists puncture
- resists multi-axial elongation stress and strains associated with settlement
- resists environmental stress cracking
- resists damage from ground contaminants
- remains intact for the full design life.

8.8 A geomembrane less than 1 mm thick is unlikely to meet these criteria (except in shallow, domestic installations), and is not recommended for use with AquaCell Eco. For further details the Certificate holder's advice should be sought.

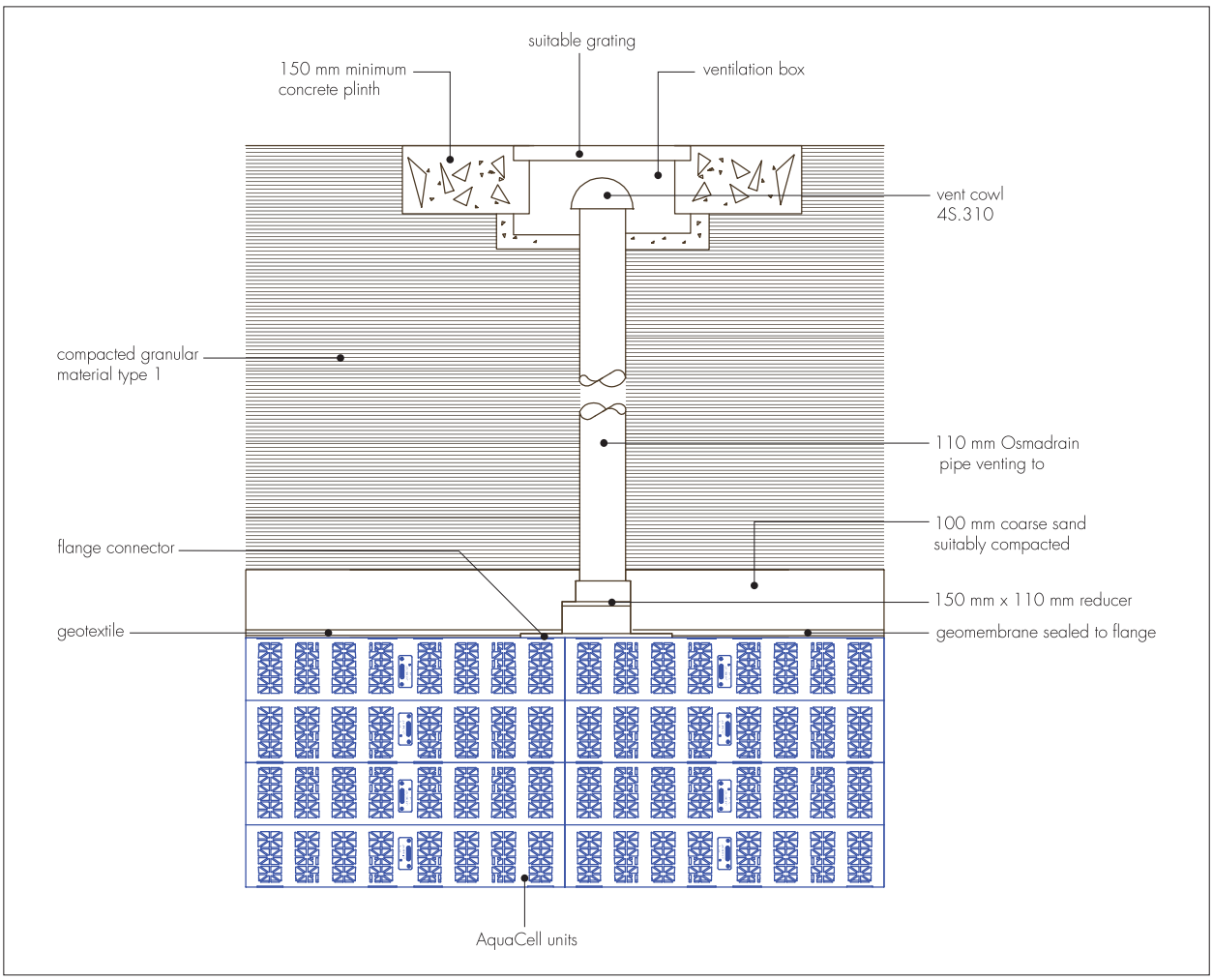
8.9 All joints must be sealed using proprietary techniques recommended by the manufacturer. Advice on seam testing procedures is given in CIRIA Report SP 124 : 1996 *Barriers, liners and cover systems for containment and control of land contamination*.

9 Venting

9.1 Adequate venting must be provided to the system. One 110 mm diameter air vent is required per 7500 m^2 of impermeable catchment area to be drained (see Figure 4).

9.2 Typical air vent connectors and pipework can be seen in the Certificate holder's *AquaCell Systems — Product and Installation Manual*. It is recommended that all air vent installations in attenuation/storage applications (using an impermeable geomembrane) are made using a flange adaptor. Adhesive or double-sided tape should be used between the geomembrane and flange adaptor to ensure a watertight seal.

Figure 4 Typical air vent system



10 Resistance to chemicals

10.1 An assessment carried out by the BBA indicates that the system components are suitable for use in contact with the chemicals likely to be found in rainwater.

10.2 An assessment of the suitability for use of AquaCell Eco units on brownfield sites should be made, only after a suitable site investigation, to determine the possibility for chemical attack. Particular care must be taken where acids and organic solvents are present at high concentrations. Further information can be obtained from the Certificate holder.

11 Maintenance

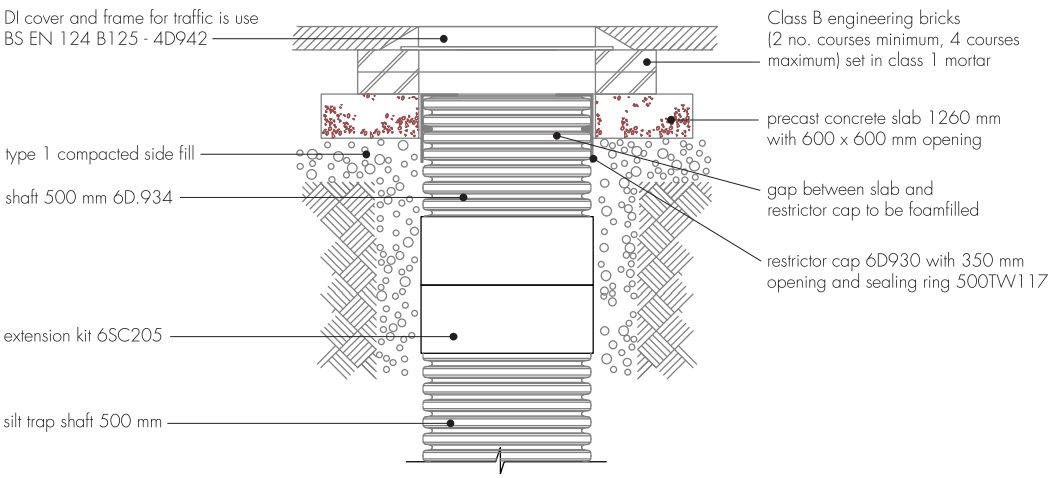
11.1 The owner of the structure is responsible for its maintenance.

11.2 For soakaways to individual houses, the only necessary maintenance of the system is to keep all gullies clear of debris, such as leaves.

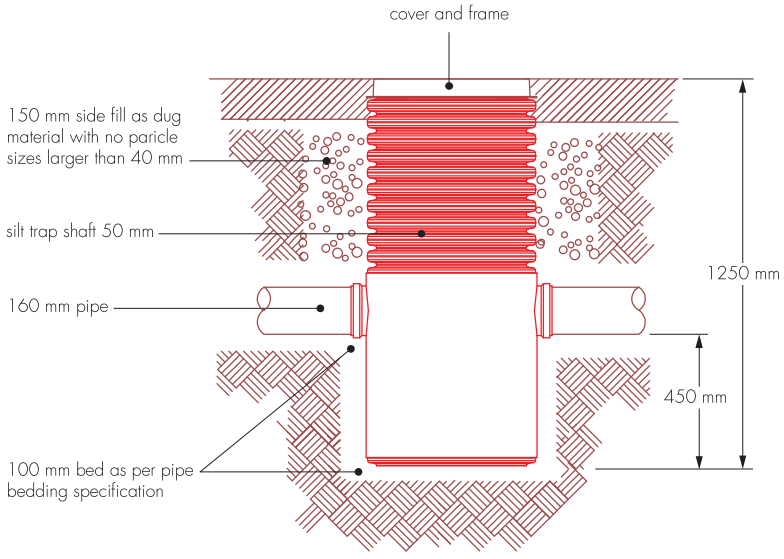
11.3 For large installations, or where the receiving waters are environmentally sensitive, a programme of regular inspections should be established to prevent siltation of the system which, if allowed to develop, would reduce its effectiveness. The system should also be inspected after every major storm event.

11.4 It is recommended that a silt trap or sediment removal separator be installed upstream of the inlet pipework to the system (see Figure 5). A maintenance plan must be in place for regular cleaning of all traps and sumps to ensure correct performance. Silt traps and sediment removal separators for use with the system are outside the scope of this Certificate.

Figure 5 Typical silt trap



cover detail for trafficked areas with extension option



typical detail for silt trap non trafficked areas

11.5 For all flow control devices it is sensible to incorporate access (via a manhole or similar) to the location of the pipe entry, orifice or vortex valve. This will enable easy removal of any blockage. The orifice itself may be protected by a debris screen.

11.6 Paved surface areas above an installation should be inspected at the same time as internal inspections, to ensure that the units continue to provide the required structural support.

12 Durability



The structural properties of polypropylene used in the system components will deteriorate with time, and this should be taken into account at the design stage by the application of suitable safety factors. In the opinion of the BBA, AquaCell Eco , when used in accordance with this Certificate, will have a life in excess of 50 years.

13 Reuse and recyclability

The units are made from polypropylene, which can be recycled.

Installation

14 General

The system should be installed in accordance with the Certificate holder's *AquaCell Systems — Product and Installation Manual*.

15 Procedure

15.1 The hole or trench is excavated to the required depth, dimensions and levels. It must be ensured that the plan area is sufficient to allow plant access around sides to compact backfill material (300 mm minimum). The base must be smooth and level without sharp drops or humps. Slopes must be cut to a safe angle or adequately supported, and safe access must be provided to allow personnel to enter the excavation.

15.2 The base must be inspected for soft spots in the formation; any present must be excavated and replaced with compacted granular fill material.

15.3 A 100 mm thick bedding layer of coarse sand is laid on the base and sides of the excavation. If required in attenuation systems, a layer of geotextile is laid to protect the impermeable geomembrane.

15.4 The impermeable geomembrane (or geotextile, if in an infiltration system) is laid over the sand bedding layer and up the sides of the excavation. The impermeable geomembrane is inspected for damage and all welds are tested as required. Joints between adjacent sheets of impermeable membrane should be sealed correctly using proprietary techniques with a minimum lap of 50 mm. Jointing with tape is not recommended as the system then becomes reliant on the mechanical properties of the tape to maintain its integrity.

15.5 The AquaCell Eco units are installed in accordance with the installation schedule for correct orientation. Wherever possible, continuous vertical joints should be avoided. The units are arranged so that preformed sockets are in the correct alignment for inlet and outlet pipes. For single-layer applications, AquaCell clips are used and, for multilayers, AquaCell clips and shear connectors.

15.6 The geotextile or impermeable geomembrane encapsulation to base, sides and top of installation, including protective geotextile (if required to protect the geomembrane), is completed. Impermeable geomembranes should be welded with double seams. All welds should be tested as required and the membrane inspected for damage.

15.7 Drainage connections are made to the installation using proprietary adaptors. Preformed socket positions for pipe connections must be located at the correct position for receiving pipework. Alternatively, flange adaptors are used attached to AquaCell Eco units with adhesive tape and self-tapping screws (flange adaptors cannot be used at the invert of AquaCell Eco units into the preformed socket). It is recommended that all connections and air vent installations, in attenuation/storage applications, are made with a flange adaptor, using adhesive or double-sided tape to form a seal. Alternatively, drainage connections are sealed into a preformed socket using proprietary seals approved by the geomembrane manufacturer.

15.8 A coarse sand protection layer, 100 mm thick, should be placed over the top of the units that have been wrapped. Backfilling is continued with selected as-dug material, with size of pieces less than 75 mm, compacted to 90% maximum dry density. Compaction plant over the top of the system must not exceed 2300 kg per metre width.

15.9 Pavement construction or landscaping over the system is completed.

Technical Investigations

16 Tests

Tests were carried out on the system and the results assessed to determine:

- long- and short-term resistance to loading
- performance and durability
- volumetric capacity and discharge rate.

17 Investigations

17.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

17.2 An assessment of the system was made in relation to material properties and design procedures.

17.3 A site visit was made to assess the practicability and ease of installation and connection.

Bibliography

BS EN 752 : 2008 *Drain and sewer systems outside buildings*

BS EN 13476-3 : 2007 +A1 : 2009 *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*

Conditions of Certification

18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

18.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

18.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

18.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

18.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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Agrément Certificate
03/4018
Product Sheet 7 Issue 1

WAVIN AQUACELL ATTENUATION AND INFILTRATION SYSTEMS

AQUACELL NG GEOCELLULAR UNIT

This Agrément Certificate Product Sheet(1) relates to Aquacell NG Geocellular Unit, comprising polypropylene geocellular boxes, for use as below ground water storage attenuation tanks or soakaways to manage stormwater run-off from impermeable surfaces.

(1) Hereinafter referred to as 'Certificate'.



The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review

KEY FACTORS ASSESSED

Section 1. Mechanical resistance and stability
Section 2. Safety in case of fire
Section 3. Hygiene, health and the environment
Section 4. Safety and accessibility in use
Section 5. Protection against noise
Section 6. Energy economy and heat retention
Section 7. Sustainable use of natural resources
Section 8. Durability

The BBA has awarded this Certificate to the company named above for the product described herein. This product 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 issue: 4 July 2023

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation.

The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 3537).

Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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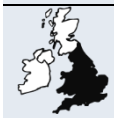
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www.bbacerts.co.uk

SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that Aquacell NG Geocellular Unit, 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 Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**H3(3)**	**Rainwater drainage**
Comment:		The product can contribute to satisfying this Requirement. See section 9 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See sections 8 and 9 and the Annex of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Fitness and durability of materials and workmanship**
Comment:		The product can contribute to satisfying this Regulation. See sections 8 and 9 and the Annex of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.6	Surface water drainage
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.6.1(1)(2) to 3.6.5(1)(2). See section 9 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product 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 made in relation to this product 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(1)(a)(i) (iii)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The product is acceptable. See sections 8 and 9 and the Annex of this Certificate.
Regulation:	**82**	**Rainwater drainage**
Comment:		The product can be used in a construction to satisfy this Regulation. See section 9 of this Certificate.

Additional Information

NHBC Standards 2023

In the opinion of the BBA, Aquacell NG Geocellular Unit, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to NHBC Standards, Chapter 5.3 *Drainage below ground.*

Fulfilment of Requirements

The BBA has judged Aquacell NG Geocellular Unit to be satisfactory for use as described in this Certificate. The product has been assessed as below ground water storage attenuation tanks or soakaways to manage stormwater run-off from impermeable surfaces.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the product under assessment. Aquacell NG Geocellular Unit consists of black polypropylene (PP) injection moulded components:

- base unit — main element with integrated connectors, providing the volume storage
- bottom plate — element forming the base of the tank
- side plates — elements used around the sides of the tank structure prior to enclosing the tank in either a geotextile and/or a geomembrane. The plates include two integrated standard DN160 inlets allowing connection of 160 mm diameter pipes (to BS EN 1401-1 : 2019).

The product has the nominal characteristics given in Table 1.

Table 1 Nominal characteristics of Aquacell NG Geocellular Unit

Characteristic (unit)	Components			
	Base unit (with bottom plate)	Base unit (without bottom plate)	Bottom plate	Side plate
Product code	—	3084334	3084335	3084336
Unit dimensions (nominal) (L x W x H) (mm)	600 x 1200 x 425	600 x 1200 x 400	600 x 1200 x 35	1155 x 60 x 404
Unit volume (nominal) (m^3)	0.306	0.288	0.025	0.028
Storage volume (nominal) (m^3)	0.290	0.275	—	—
Void ratio (%)	95	95	—	—
Nominal mass (kg)	15	11.4	3.6	2.3

Ancillary Items

The following ancillary items are essential to use with the product and have been assessed with the product:

- adaptor — to connect pipework, with diameters other than a standard DN 160 inlet, into the side plates.

The Certificate holder recommends the following ancillary items for use with the product, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- connecting pipework
- access/inspection provision
- outlet flow control device (orifice plate, vortex control or small pipe)
- project specific geotextiles conforming
- project specific geomembrane, and protective fleece
- adhesive or double-sided tape
- air vent connection
- silt trap or sediment removal separator.

The product is intended for use in the following situations:

- for a variety of landscaped and trafficked areas, as defined below
- management of rainwater run-off from impermeable surfaces, is utilised as follows:
  - infiltration system (mostly wrapped in geotextiles) — water is stored within the system during rainfall and allowed to drain away by infiltrating into the surrounding ground over a substantial period after the rain has stopped
  - attenuation system (wrapped in geomembranes and/or geotextiles) — water is stored within the system during rainfall and released at a reduced flow rate through a flow control device into an appropriate outfall. This reduces peak flows in the watercourse and, therefore, minimises the risk of flooding
  - a combination of infiltration and attenuation systems
  - rainwater harvesting (wrapped in geomembranes) — water is stored in the tank until required.

Any other applications are outside of the scope of this Certificate.

Definitions for products and applications inspected

Geocellular unit is a thermoplastic cuboid shaped element, with or without sidewalls, used to create modular system made of repeating boxes.

Landscaped areas (further details to be found in CIRIA C737 : 2016, Table 5.6) are defined as:

- small domestic gardens (isolated from access drives/roads), which must be impractical for vehicle access (behind house etc)
- small domestic gardens/landscaped areas (adjacent do drives or roads), where accidental load case for concentrated load must be considered.

Trafficked areas (further details to be found in CIRIA C737 : 2016, Table 5.6) are defined as:

- car parks (with height/width barriers to limit access) with barriers being robust, and permanent
- car parks without barriers, where warning signs should preclude Heave Goods Vehicles (HGVs) and accidental load case for HGVs being considered
- private roads, or cul-de-sacs, access tracks (<15 mph) with warning signs for maximum speed limit.

Product assessment – key factors

The product was assessed for the following key factors, and the outcome of the assessments are shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Data were assessed for the following characteristics.

1.1 Mechanical properties

1.1.1 Results of impact resistance test are given in Table 2.

Table 2 Characteristics for mechanical properties

Product assessed	Assessment method	Requirement	Result
Unit, bottom plate	Impact resistance (Drop Test) adapted from BS EN ISO 13263 : 2017	If damaged, identified as 'handle with care'	Pass

1.1.2 On the basis of data assessed, the product is deemed to be sufficiently robust to withstand handling, transport, storage and installation.

1.2 Strength and stability

1.2.1 Results of short-term compression and sensitivity to non-rigid loading tests are given in Table 3.

Table 3 Characteristics for strength and stability

Product assessed	Assessment method	Requirement	Result
Unit with bottom plate	Short-term compression strength (as Ultimate strength σ_{max}) to BS EN 17150 : 2019, Method A	Value declared	Vertical: 438.8 $kN \cdot m^{-2}$ Lateral: 111.0 $kN \cdot m^{-2}$
	Short-term elastic deflection to BS EN 17150 : 2019 (applied load)		Vertical: 1 mm per 37.7 $kN \cdot m^{-2}$ Lateral: 1 mm per 14.7 $kN \cdot m^{-2}$
	Sensitivity to non-rigid loading to BS EN 17152-1 : 2019, Method A, Annex B for vertical direction	< 25% of average short-term compression strength	Pass

1.2.2 On the basis of data assessed, the product is deemed to be fit for purpose for resistance to soil load including traffic load, both during and after installation.

1.2.3 The short-term compression results given in Table 2 must not to be used to derive design strength directly. Ultimate strength (equal to compression strength to BS EN 17150 : 2019) is the maximum recorded strength or the resistance recorded at strain amplitude of 6%, whichever occurs first.

1.2.4 The partial load and material factors defined in CIRIA C737 : 2016, Table 5.2, may be used in an ultimate limit state design (see Table 4 of this Certificate).

Table 4 Units strength values[1]

		Value
Ultimate strength[2] ($kN \cdot m^{-2}$)		
Vertical		438.8
Horizontal		111.0
Characteristic strength[3] ($kN \cdot m^{-2}$)		
Vertical	137.5	Design life = 50 years
Horizontal	29.7	
Design strength[4] (50 years) ($kN \cdot m^{-2}$)		
Vertical	76.0	Partial factor $\gamma_m = 1.81$
Horizontal	16.2	Partial factor $\gamma_m = 1.83$
Reference strength[5] (20 years) ($kN \cdot m^{-2}$)		
Vertical	87.8	Partial factor = $\gamma_m = 1.68$
Horizontal	18.2	Partial factor = $\gamma_m = 1.74$

(1) Values given defined against the definitions of CIRIA C737 : 2016, Section 4.2.3, with exception for ultimate strength (see Table 3 above).
(2) Ultimate strength is equal to compression strength as per BS EN 17150 : 2019 and defined as when the unit fails or reaches a limit of 6% strain.
(3) Characteristic strength is derived from creep rupture tests, defined as when the unit fails or reaches a limit of 6% strain.
(4) Design strength is $P_d = P_{ck}/\gamma_m$, where P_{ck} is characteristic strength and γ_m is material factor (CIRIA C737 : 2016, Section 5.3.2).
(5) Reference strength is the characteristic strength at a design life of 20 years, used as a basis to compare different geocellular units' strength.

2 Safety in case of fire

Not applicable.

3 Hygiene, health and the environment

Not applicable.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Not applicable.

7 Sustainable use of natural resources

The product is manufactured from polypropylene, which can be recycled.

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in the product were assessed.

Specific test data were assessed for the following.

8.2 Durability

8.2.1 The product was tested for the characteristics for durability as given in Table 5.

Table 5 Characteristics for durability

Product assessed	Assessment method	Requirement	Result
Unit with bottom plate	Long-term compression σ_r strength to BS EN 17151 : 2019	Vertical ≥ 50 kN·m^{-2} Declared value	Vertical: 154.0 kN·m^{-2} Lateral: 28.7 kN·m^{-2}
	Characteristic strength at design life of 50 years derived from long-term compression σ_r strength to BS EN 17151 : 2019	Declared value	Vertical: 137.5 kN·m^{-2} Lateral: 29.7 kN·m^{-2}
	Effects of heating to BS EN ISO 580 : 2005	No delamination, cracks, blisters, opening of weld line	Pass
Polypropylene material	Resistance to chemicals to BS EN 13476-1 : 2018, A.3. For guidance: PD ISO/TR 10358 : 2021	Product conforming to BS EN 17152-1 : 2019	Pass
	Resistance to internal pressure EN ISO 1167-1 : 2006 and EN ISO 1167-2 : 2006	Declared value	> 96 hours
	Flexural creep modulus (500 h) to BS EN ISO 899-2 : 2003 + A1 : 2015	Declared value	> 389 MPa
	Thermal stability (OIT) to BS EN ISO 11357-6 : 2018	Declared value	> 8 min

8.2.2 On the basis of data assessed, the product is deemed to be suitably resistant to soil load and traffic load, both during and after installation, as well as to the chemicals with which it is likely to come into contact in service.

8.2.3 The product has suitable resistance to the chemicals likely to be encountered in service, subject to the water discharged being rainwater, surface water or ground water, excluding chemically contaminated wastewaters, such as industrial discharges. In situations where the product is to be exposed to the excluded influents, specific chemical and temperature resistance must be taken into account by a suitably experienced and competent individual.

8.4 Service life

Under normal service conditions, the product will have a life of at least 50 years, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The design process was assessed by the BBA, and the following requirements apply in order to meet the performance assessed in this Certificate:

9.1.1.1 A classification score, in accordance with CIRIA 737 : 2016, must be established for each project by a suitably experienced and competent individual, but such scores are outside of the scope of this Certificate.

9.1.1.2 Guidance on the design and application of Sustainable Drainage Systems (SUDS) must be followed as given in:

- the Certificate holder's design recommendations
- CIRIA C737 : 2016 structural and geotechnical design of modular geocellular drainage systems
- BPF Guide to designing geocellular drainage systems to CIRIA C737 : 2016
- flood risk and coastal change guidance
- CIRIA C753 : 2015 SUDS Manual.

9.1.2 The design of each project must be preceded by a detailed audit of the proposed site to establish:

- existing factors and considerations applicable to the site (eg soil type, presence of groundwater)
- predicted factors relating to the site's use following the planned development, and the parameters within which the installation is required to function (eg depth cover, surface finishing, type of loading)
- the type of function of application suggested by the audit.

9.1.3 Once the specific project criteria have been established from the site audit, the following design criteria must be established:

9.1.3.1 Hydraulic design

9.1.3.1.1 The outflow from the tank must be controlled to comply with the discharge rate consent of the site. If the anticipated design flow is greater than the hydraulic capacity of a single connection pipe, the flow may be split between a number of pipes from an adjacent manhole. The system designer must ensure that the number and size of the pipe connections is sufficient to convey the anticipated design flow without restriction.

9.1.3.1.2 For infiltration (soakaways) application, either CIRIA Report 156 or BRE Digest 365 : 2016 calculations must be followed. In addition, the soil underlying the installation must have adequate permeability and the seasonally high-water table must be a minimum of 1 m below the base of the installation.

9.1.3.1.3 For attenuation (storage) application, the anticipated total run-off volume from the site must be estimated in the calculation, using the Wallingford Procedure or other acceptable method. The allowable discharge rate from the site to an appropriate outfall must be established, but will normally be set by the Environment Agency, Scottish Environmental Protection Agency or Planning Authorities. Furthermore, for site with a groundwater or high-water table, susceptibility of the tank to float must be taken into consideration.

9.1.3.2 Structural design

9.1.3.2.1 The structural design of each installation incorporating the product must be carried out by an appropriately competent and experienced individual based on the requirements of CIRIA C737 : 2016.

9.1.3.2.2 Consideration must be given to the effects of cumulative deflection in systems comprising several layers of units and care taken when the product is used below trafficked areas and close to structures. It is important to ensure that the infiltrating water will not soften the soils or cause loss of fines and subsequent settlement.

9.1.3.2.3 The engineer responsible for the design of the installation must confirm that the allowable ground-bearing capacity at the formation level is sufficient for the proposed operational loads. In areas of weak or compressible soils, advice should be sought from a geotechnical engineer, but such advice is outside of the scope of this Certificate.

9.1.3.2.4 When the tank is wrapped in an impermeable geomembrane and placed below the groundwater table, flotation may occur. To prevent this, the weight of the soil over the top of the unit must be greater than the uplift force caused by the unit's buoyancy in the water. This can be achieved with most types of fills if the depth of cover fill is equal to, or greater than, the depth of penetration of the units below groundwater level.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance are provided in Annex A of this Certificate.

9.2.3 To achieve the performance described in this Certificate, the product must be installed and tested in accordance with PD CEN/TR 17179 : 2018 and CIRIA C737 : 2016.

9.2.4 Special attention must be paid to temporary work requirements in excavations. The base must be inspected for soft spots in the formation, any present must be excavated and replaced with compacted granular fill material. The construction of final cover layers, such as concrete, bituminous or blockwork surfacing, and other finishes must be delayed as much as possible.

9.2.5 Adequate venting must be provided to the tank, either through high level pipe connections, direct venting to the atmosphere or via access chambers. One 110 mm diameter air vent is required per 7500 m^2 impermeable catchment area to be drained.

9.3 Workmanship

9.3.1 Practicability of installation was assessed by the BBA, on the basis of the Certificate holder's information. To achieve the performance described in this Certificate, installation of the product must be carried out by a competent general builder, or a contractor, experienced with this type of product.

9.4 Maintenance and repair

9.4.1 Ongoing satisfactory performance of the product in use requires that it is suitably maintained. The guidance provided by the Certificate holder was assessed by the BBA and found to be appropriate and adequate.

9.4.2 The following requirements apply in order to satisfy the performance assessed in this Certificate:

9.4.2.1 The owner of the structure is responsible for its maintenance. For soakaways to individual houses, the only necessary maintenance of the tank is to keep all gullies clear of debris. For large installations or where the receiving waters are environmentally sensitive, a programme of regular inspections and cleaning of all traps and sumps must be established to prevent siltation of the tank and to ensure its correct performance. Paved surface areas above an installation must be inspected at the same time to ensure it continues to provide the required structural support. The tank must also be inspected after every major storm event.

10 Manufacture

10.1 The production processes for the product have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate. An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to review the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

11 Delivery and site handling

11.1 The Certificate holder stated that the product is delivered to site in packaging bearing the product name, part number, Certificate holder name, batch number and date of manufacture. The main units, bottom plates and side plates are supplied to site in pallets of 28, 56 and 48 units respectively, secured with straps on wooden panels to enable placing and movement by a forklift.

11.2 Delivery and site handing must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 Requirements for transportation, handling and storage at depots ands sites in accordance with PD CEN/TR 17179 : 2018.

11.2.2 The pallets must be carefully placed on level ground and not be stacked on site.

11.2.3 The product must be protected from direct sunlight if long-term storage is envisaged.

11.2.4 The product is resistant to damage that could occur with normal handling. However, it must be stored in locations where impact from vehicles and other construction plant activities will be avoided.

11.2.5 Prior to installation, all components of the system must be checked for damage. Damaged or defective components must not be installed.

ANNEX A – SUPPLEMENTARY INFORMATION †

Supporting information in this Annex is relevant to the product but has not formed part of the material assessed for the 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.

Management Systems Certification for production

The management system of the manufacturer has been assessed and registered as meeting the requirements of ISO/IEC 9001 : 2015 by DNV, KIWA and BSI (Certificates C560794, KSC-K20865/09 and FM00217 respectively).

Additional information on installation

A.1 The hole or trench is excavated to the required depth, dimensions and levels. It must be ensured that the plan area is sufficient (minimum 500 mm is recommended) to allow access around the tank to compact backfill material. The base must be smooth and level without sharp drops or humps. Slopes must be cut to a safe angle or adequately supported and safe access must be provided to allow personnel to enter the excavation. Excavation must be carried out in accordance with BS 6031 : 2009, with particular attention paid to safety procedures.

A.2 The impermeable geomembrane (and geotextile and fleece, if additional protection is required) in the attenuation system and geotextile in the infiltration system are laid over the sand bedding layer and up the sides of the excavation. Joints between adjacent sheets of impermeable membrane must be sealed correctly using proprietary techniques recommended by the manufacturer and in line with PD CEN/TR 17179 : 2018. Jointing with tape is not recommended as the seal becomes reliant on the mechanical properties of the tape to maintain its integrity. The geomembrane is inspected for damage and all welds are tested as required.

A.3 The main unit is mounted onto the bottom plate; a proper connection is ensured through a 'click' sound. The next pre-mounted units are installed in the correct orientation (white circles in line) by sliding the integrated connectors into each other. In the next layers, position of the white circles above each other is not possible. Side panels are installed by inserting hinge pins into the hinge pockets.

A.4 Drainage connections are made to the installation using proprietary adaptors. Pre-formed socket positions for pipe connections must be located at the correct position for receiving pipework. Alternatively, flange adaptors are used attached to the units with adhesive tape and self-tapping screws (flange adaptors cannot be used at the invert of the units into the pre-formed socket). It is recommended that all connections into air vent and storage applications (using a geomembrane) are made using a flange adaptor. Adhesive or double-sided tape must be used between the geomembrane and flange adaptor to ensure a watertight seal. Alternatively, drainage connections are sealed into a pre-formed socket using proprietary seals approved by the geomembrane manufacturer.

A.5 The installation is backfilled with Type 1 or 2 sub-base or Class 6P (side fill only) selected granular material in accordance with the *Manual of Contract Documents for Highway Works* (MCHW), Volume 1 *Specification for Highway Works* (SHW). The backfill is compacted in 150 mm thick layers.

A.6 A coarse sand protection layer, 100 mm thick, should be placed over the top of the units that have been wrapped. Backfilling is continued with:

- trafficked areas (eg car parks) — Type 1 or 2 sub-base material compacted in 150 mm layers in accordance with the MCHW, Volume 1. The mass of compaction plant over the top of the units must not exceed 2300 kg per metre width of roll
- landscaped and non-trafficked areas — selected as-dug material, with size of pieces less than 75 mm, compacted to 90% maximum dry density.

A.7 Pavement construction or landscaping over the product can then be completed.

Additional information on maintenance

A.8 It is recommended that a silt trap or sediment removal separator is installed upstream of the inlet pipework to the system and access (via manhole or similar) to the location of flow control devices is incorporated.

A.9 Further guidance on operation and maintenance of the installation may be obtained from CIRIA C753 : 2016.

Bibliography

BRE Digest 365 : 2016 *Soakaway Design*

BPF Guide to Designing Geocellular Drainage Systems to CIRIA Report C737 — September 2018

BS 6031 : 2009 *Code of practice for earthworks*

BS EN 1401-1 : 2019 *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Specifications for pipes, fittings and the system*

BS EN 13252 : 2016 *Geotextiles and geotextile-related products — Characteristics required for use in drainage systems*

BS EN 13476-1 : 2018 *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — General requirements and performance characteristics*

BS EN 17150 : 2020 *Plastics piping systems for non-pressure underground conveyance and storage of non-potable water – Test method for determination of short-term compression strength of boxes*

BS EN 17151 : 2019 *Plastics piping systems for non-pressure underground conveyance and storage of non-potable water — Test method for determination of long-term compression strength of boxes*

BS EN 17152-1 : 2019 *Plastics piping systems for non-pressure underground conveyance and storage of non-potable water — Boxes used for infiltration, attenuation and storage systems — Specifications for storm water boxes made of PP and PVC-U*

BS EN ISO 580 : 2005 *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

BS EN ISO 899-2 : 2003 + A1 : 2015 *Plastics — Determination of creep behaviour — Flexural creep by three-point loading*

BS EN ISO 1133-1 : 2011 *Plastics — Determination of the melt-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

BS EN ISO 1167-1:2006 *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids. Determination of the resistance to internal pressure-General method*
BS EN ISO 1167-2:2006 *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids. Determination of the resistance to internal pressure-Preparation of pipe test pieces*

BS EN ISO 11357-6 : 2018 *Plastics — Differential scanning calorimetry (DSC) — Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

BS EN ISO 13263 : 2017 *Thermoplastics piping systems for non-pressure underground drainage and sewerage — thermoplastics fittings — test method for impact strength*

CIRIA C737 : 2016 *Structural and geotechnical design of modular geocellular drainage systems*

CIRIA C753 : 2015 *The SuDS Manual*

CIRIA Report 156 : 1996 *Infiltration drainage — Manual of good practice*

Flood risk and coastal change guidance — *National Planning Policy Framework — August 2022*

ISO/IEC 9001 : 2015 *Quality management systems — Requirements*

Manual of Contract Documents for Highway Works (MCHW), Volume 1 *Specification for Highway Works,* Series 0500, *Drainage and Service Ducts,* February 2020

PD CEN/TR 17179 : 2018 *Thermoplastics piping and ducting systems — Rainwater infiltration and storage attenuation systems — Practices for underground installation*

PD ISO/TR 10358 : 2021 *Plastics pipes and fittings for industrial applications — Collection of data on combined chemical-resistance*

Conditions of Certificate

Conditions

1 This Certificate:

- relates only to the product that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product
- actual installations of the product, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to UKCA marking and CE marking.

6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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