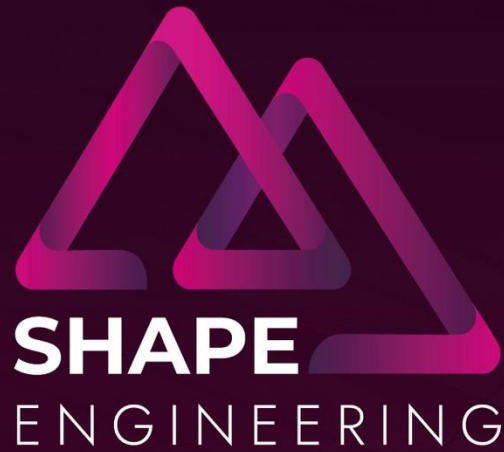




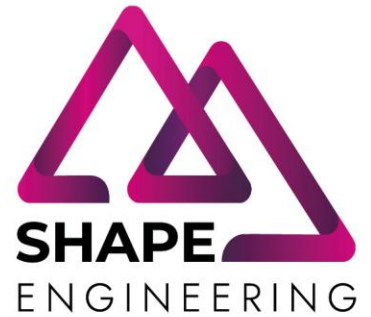
ROYLE ROAD, ROCHDALE

DRAINAGE OPERATION MANAGEMENT AND MAINTENANCE
REVISION C

27th April 2026

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REV	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
A	22.09.2025	First Issue	Louie Regan Civil Engineer	Nick McGorry Director	Nick McGorry Director
B	04.03.2026	Updated to latest layout	Kieran Farrell Civil Engineer	Nick McGorry Director	Nick McGorry Director
C	27.04.2026	Client comments	Paige Blundell Assistant Engineer	Nick McGorry Director	Nick McGorry Director

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COMPANY NO. 10275307. VAT REGISTRATION NO. 0000000000

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1.0 INTRODUCTION

Background

- 1.1 Shape Engineering have been instructed to prepare a Drainage Operation and Maintenance Manual for a proposed development at Royle Road, Rochdale.
- 1.2 This report is based on current best practice guidance as outlined within Ciria 753 The SuDS Manual.

Scope of Report

- 1.3 This manual is intended to give an overview of the operation, maintenance and management for the range of drainage features included with the design and in relation to typical details only.
- 1.4 Where proprietary products are specified the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 1.5 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

2.0 DRAINAGE STRATEGY

- 2.1 A proposed Drainage Strategy drawing has been provided in Appendix A.
- 2.2 The surface water drainage strategy for the development will be to collect and convey the surface water runoff and mitigate flood risk to the site, surrounding areas and downstream, by restricting the discharge rate into the existing culverted watercourse to the Western Boundary of the site on Royle Road. Suitable attenuation within the development boundary is to be provided to accommodate this strategy.
- 2.3 The drainage network is to remain under private ownership and maintained by a management company.
- 2.4 The surface water drainage will discharge at 4.5l/s into a new connection into the existing surface water sewer to the west of the site.
- 2.5 Attenuation will be provided in the form of 3no. cellular storage tanks.
- 2.6 As the flows are generally being attenuated on site, there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as in Section 3.
- 2.7 Foul water from dwellings will be collected via a traditional piped network to convey the flows via gravity to the existing public sewer network located to the north of the site.

3.0 SURFACE WATER DRAINAGE

- 3.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 3.2 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.
- 3.3 The surface water network is to be designed to accommodate from 1 in 100 year storm rainfall event plus an allowance for 45% climate change. As the flows are to be attenuated on site there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted in this section.

Components

- 3.4 The following components have been included within the drainage design for the development:
- Drainage Channels and Gullies
 - Pipes
 - Inspection, Manhole and Catchpit Chambers
 - Cellular Storage Tank
 - Flow Control Units
- 3.5 A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 3.6 The maintenance of the drainage network will be the responsibility of a private maintenance company.
- 3.7 A copy of the final drainage layout is provided in Appendix A.

- 3.8 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.
- 3.9 Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.
- 3.10 Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.
- 3.11 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris, leaves, litter etc.
- 3.12 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

4.0 DRAINAGE CHANNELS AND GULLIES

Location and description

- 4.1 The locations of the gullies are to be indicated on the drainage drawing in Appendix A, upon completion of the detailed design.
- 4.2 It is the responsibility of the management company to maintain private gullies within access road, parking/shared parking areas and hard landscaping areas across the development
- 4.3 The features have been designed in accordance with all relevant standards, plus Statutory Bodies' and manufacturers requirements.
- 4.4 Drainage gullies should be inspected and cleaned in accordance with the manufacturer's details.
- 4.5 Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating.
- 4.6 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

Inspection and Maintenance Regime

- 4.7 Regular inspection and maintenance are important for the effective operation of the features. A regular inspection regime is very important to ensure the correct functionality of the surface water drainage network.
- 4.8 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

Drainage Gullies Schedule

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection	Half yearly and after large storms.
Regular maintenance / inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect gullies and rod through poorly performing gullies as initial remediation.	Monthly or as required

5.0 PIPES

Location and Description

- 5.1 The locations of the pipes are indicated on the drainage drawing provided in Appendix A.
- 5.2 The features have been designed in accordance with all relevant standards, plus Statutory Bodies' and manufacturers requirements.
- 5.3 Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.
- 5.4 It is the responsibility of the management company to maintain the pipes within the shared ownership areas and public open space areas, which covers the entirety of the development

Operation

- 5.5 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events.
- 5.6 These have been designed to be self-cleansing where possible for smaller diameter pipes and for larger diameters the risk is reduced due to the overall pipe size.
- 5.7 Access for maintenance will be provided through access chambers, manholes and rodding eyes.

Inspection and Maintenance Regime

- 5.8 Regular inspection and maintenance are important to identify areas which may have been obstructed/clogged and may not be drain correctly thus exposing the development to a greater level of flood risk.
- 5.9 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

Pipes Schedule

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6 monthly.
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

6.0 INSPECTION, MANHOLE AND CATCHPIT CHAMBERS

Location and Description

- 6.1 The locations of the inspection, manhole and catchpit chambers are as indicated on the drainage drawing within Appendix A.
- 6.2 The features have been designed in accordance with all relevant standards, plus Statutory Bodies' and manufacturers requirements.
- 6.3 Inspection, manhole and catchpit chambers are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.
- 6.4 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole.
- 6.5 It is the responsibility of the management company to maintain the inspection chambers, manholes and catchpits within the shared ownership areas and public open space areas, which covers the entirety of the development

Inspection and Maintenance Regime

- 6.6 Regular inspection and maintenance are important for the effective operation of the features. A regular inspection regime is very important to ensure the correct functionality of the surface water drainage network.
- 6.7 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

Chambers Schedule

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
	Check penstocks and other mechanical devices (if present).	Half yearly.
	Inspect ventilation cowl (if present)	Monthly and after large storms.
Regular maintenance \ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms)
	Remove sediment from pre-treatment structures	Annually (or as required after heavy rainfall events)
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.

7.0 FLOW CONTROL UNITS

Location and Description

- 7.1 The location of the flow control units are as indicated on the drainage drawing within Appendix A.
- 7.2 The manufacturer details and specification of the flow control units are included in Appendix B.
- 7.3 The features will be designed in accordance with all relevant standards, plus Statutory Bodies' and manufacturers requirements.
- 7.4 It is the responsibility of the management company to maintain the flow control units.

Operation

- 7.5 The flow control units are intended for downstream flow control and to restrict the discharge rate of surface water leaving the site.
- 7.6 The flow controls are to be specified as Hydro-Brake and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.

Inspection and Maintenance Regime

- 7.7 Access for maintenance will be provided by locating within a manhole chamber.
- 7.8 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from water authority prior to any access.

Flow Control Schedule

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance / inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

8.0 ATTENUATION TANK

Location and Description

- 8.1 There are 3no. cellular attenuation tanks proposed for the development, the location of cellular attenuation tanks are as indicated on the drainage drawing as provided in Appendix A.
- 8.2 The manufacturers details and specification for the attenuation tank are included in Appendix C.
- 8.3 The feature will be designed in accordance with all relevant standards, plus statutory Bodies' and manufacturers requirements.
- 8.4 Attenuation tanks are proprietary products and therefore manufacturer's recommendations should also be taken into consideration. Additionally, different manufacturers may have different connection types and arrangements which will need to be taken into consideration.
- 8.5 It is the responsibility of the management company to maintain the cellular attenuation tanks.

Operation

- 8.6 The attenuation tank is designed to be the primary surface water storage feature to for the development site to support the restricted discharge.
- 8.7 The tanks are designed to be in use during all storm events up to and including the 1 in 100 year plus climate change event.
- 8.8 A catchpit manhole is also positioned prior to and downstream of the tank inlets to reduce the risk of sedimentation entering the storage units during regular conveyance and during surcharging events.
- 8.9 Access for maintenance will be provided from the manhole chambers upstream and downstream of the tank.

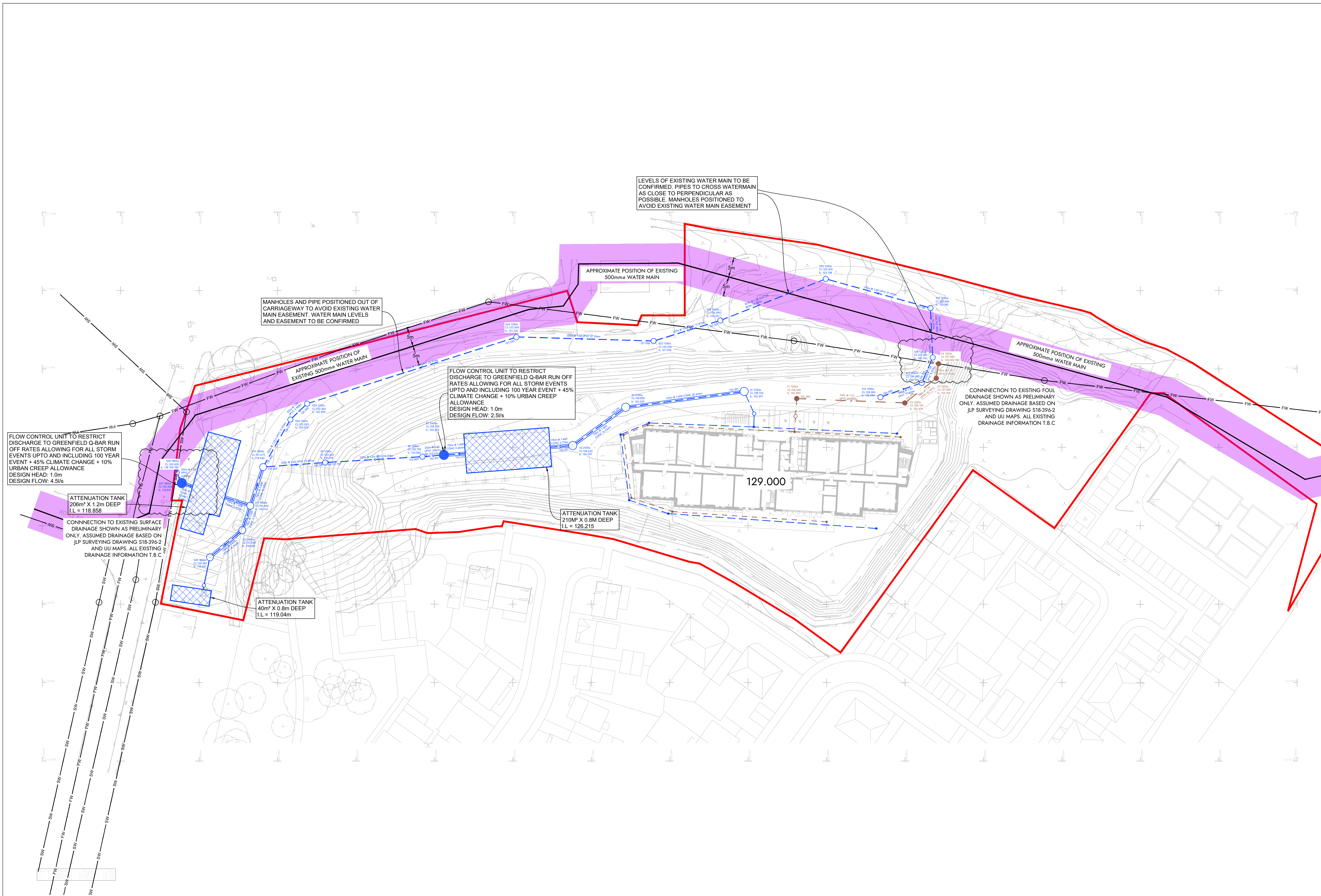
Inspection And Maintenance Regime

- 8.10 Regular inspection and maintenance are important for the effective operation of the features. As the feature is an open accessible feature of the development, a regular inspection regime is very important to ensure the correct functionality of the surface water drainage network.
- 8.11 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.
- 8.12 The Cellular attenuation tank is a proprietary product and manufacturers guidance should be adhered too.

Cellular Attenuation Tank Schedule

Maintenance Schedule	Required Action	Frequency
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required

9.0 APPENDIX A – DRAINAGE LAYOUT



- NOTES**
- SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
 - ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DESIGN AND CONSTRUCTION GUIDANCE AND WHERE APPLICABLE UNITED UTILITIES DETAILS
 - THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150mm
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE RATES SHALL INCLUDE FOR HAND DIG AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CDM REGULATIONS AT ALL TIMES
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 - A CLASS 5 BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1m OF HIGHWAY SHALL, AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL. 4.3.4.
 - DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H. 110mm U.P.V.C. PIPES LAID TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

	FOUL	S.W.
HEAD RUN	1 IN 40	1 IN 60
ELSEWHERE	1 IN 80	1 IN 100
 - ALL GULLY CONNECTIONS TO BE 150mm VITRIFIED UPVC UNLESS NOTED OTHERWISE
 - MINIMUM COVER TO DRAINAGE SOFFIT LEVEL;

LANDSCAPING	TRAFFICKED AREAS	HIGHWAYS
0.600m	0.900m	1.200m
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 - FOUL WATER SEWER
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 - DEVELOPMENT BOUNDARY

DRAWING SUBMITTED FOR
INFORMATION PURPOSES ONLY

PO4	27.04.26	PB	Client comments
PO3	05.03.26	KF	Revised Site Boundary
PO2	03.03.26	KF	Revised to suit latest Architects layout
PO1	15.09.25	KF	Preliminary Issue
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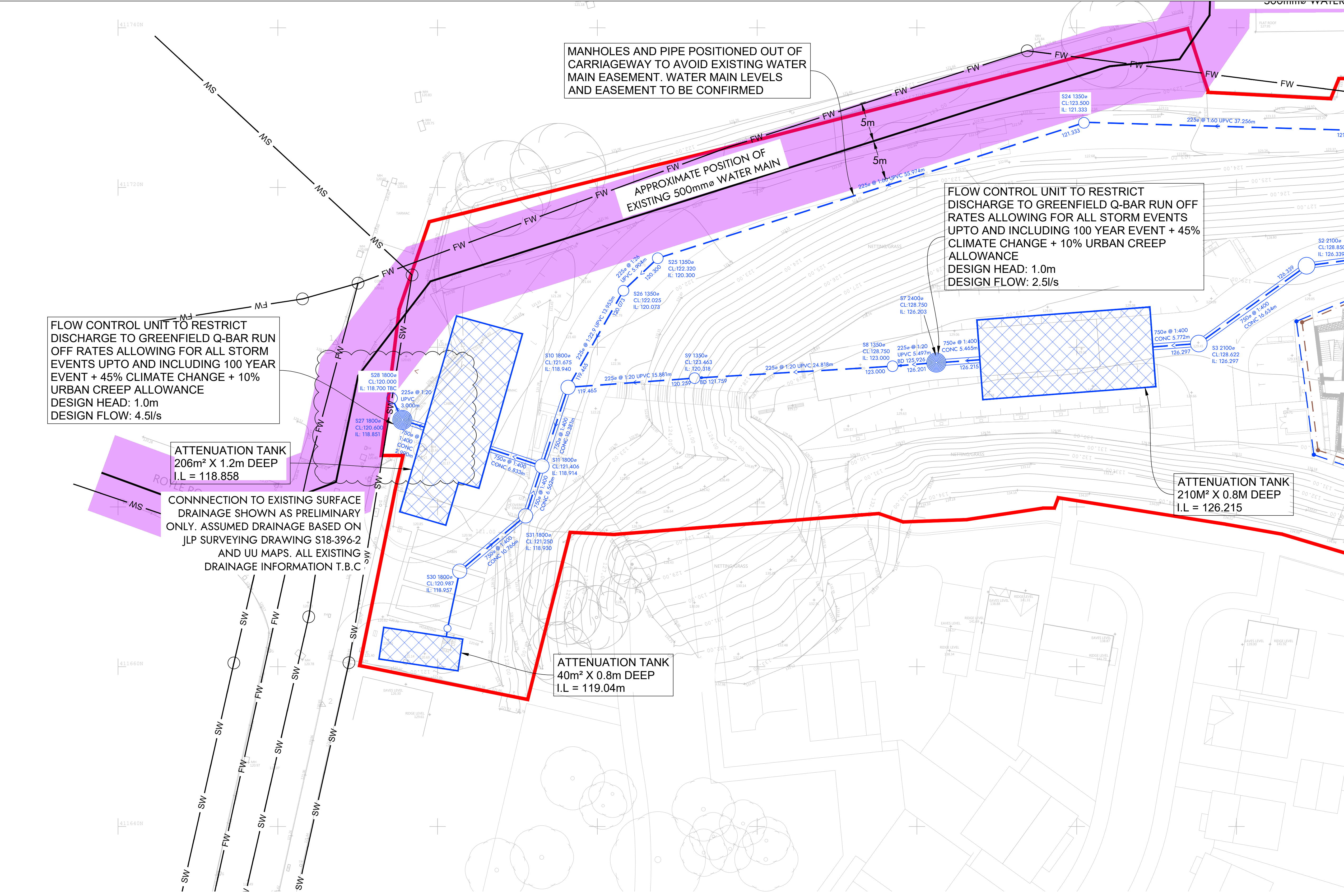
Title
Drainage Strategy - Masterplan

Status	Suitability Description For Information	Structural Stage	Date
			15.09.25

Designed By	Drawn By	Scale @ A1	Project No.
KF	KF	1:500	2885

Sheet No.	Revision
2885-SCE-00-00-DR-C-0003	PO4

DETAILS OF EXISTING WATER MAIN AND ALL EXISTING DRAINAGE TO BE CONFIRMED PRIOR TO WORKS ON SITE. DRAINAGE LAYOUT HAS BEEN SHOWN FOR INFORMATION PURPOSES ONLY AND IS SUBJECT TO CHANGE UPON RECEIVAL OF SUPPORTING INFORMATION



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|-----------|---------|----------|
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- | | LANDSCAPING | TRAFFICKED AREAS | HIGHWAYS |
|--|-------------|------------------|----------|
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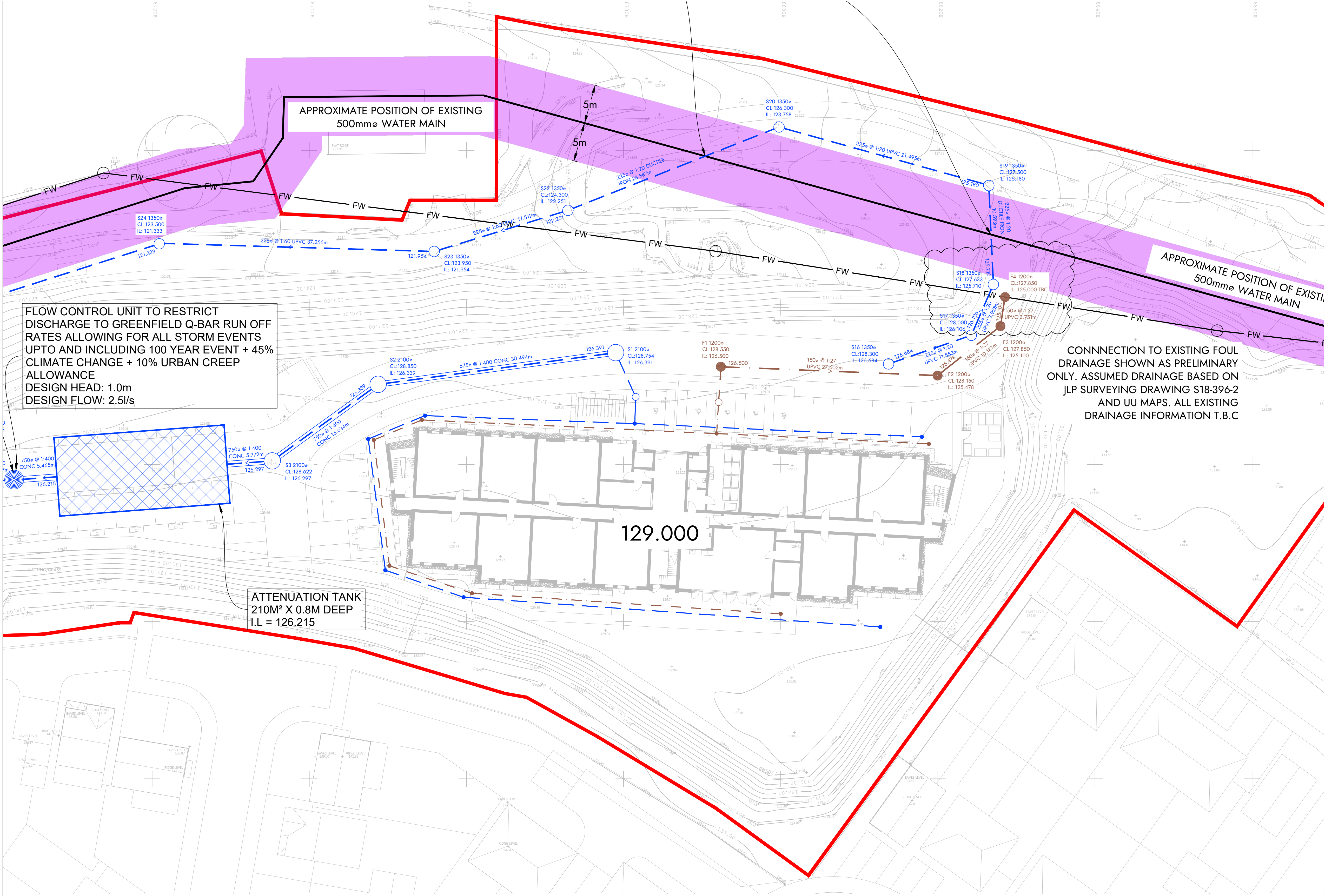
Title
Drainage Strategy - Sheet 1

Status	Suitability Description For Information	Structural Stage	Date
			15.09.25

Designed By	Drawn By	Scale @ A1	Project No.
KF	KF	1:250	2885

Sheet No.	Revision
2885-SCE-00-00-DR-C-0001	PO4

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Rev	Date	By	Description

SHAPE ENGINEERING

Liverpool Innovation Park | Edge Lane | Liverpool | L7 9NJ
T: 0151 305 0700 www.shapeengineering.co.uk

Client
BMC Rochdale Limited

Project
Royle Road, Rochdale

Title
Drainage Strategy - Sheet 2

Status	Suitability Description For Information	Structural Stage	Date
			15.09.25

Designed By	Drawn By	Scale @ A1	Project No.
KF	KF	1:250	2885

Sheet No.	Revision
2885-SCE-00-00-DR-C-0002	PO4

DETAILS OF EXISTING WATER MAIN AND ALL EXISTING DRAINAGE TO BE CONFIRMED PRIOR TO WORKS ON SITE. DRAINAGE LAYOUT HAS BEEN SHOWN FOR INFORMATION PURPOSES ONLY AND IS SUBJECT TO CHANGE UPON RECEIVAL OF SUPPORTING INFORMATION

10.0 APPENDIX B – HYDROBRAKE DETAILS

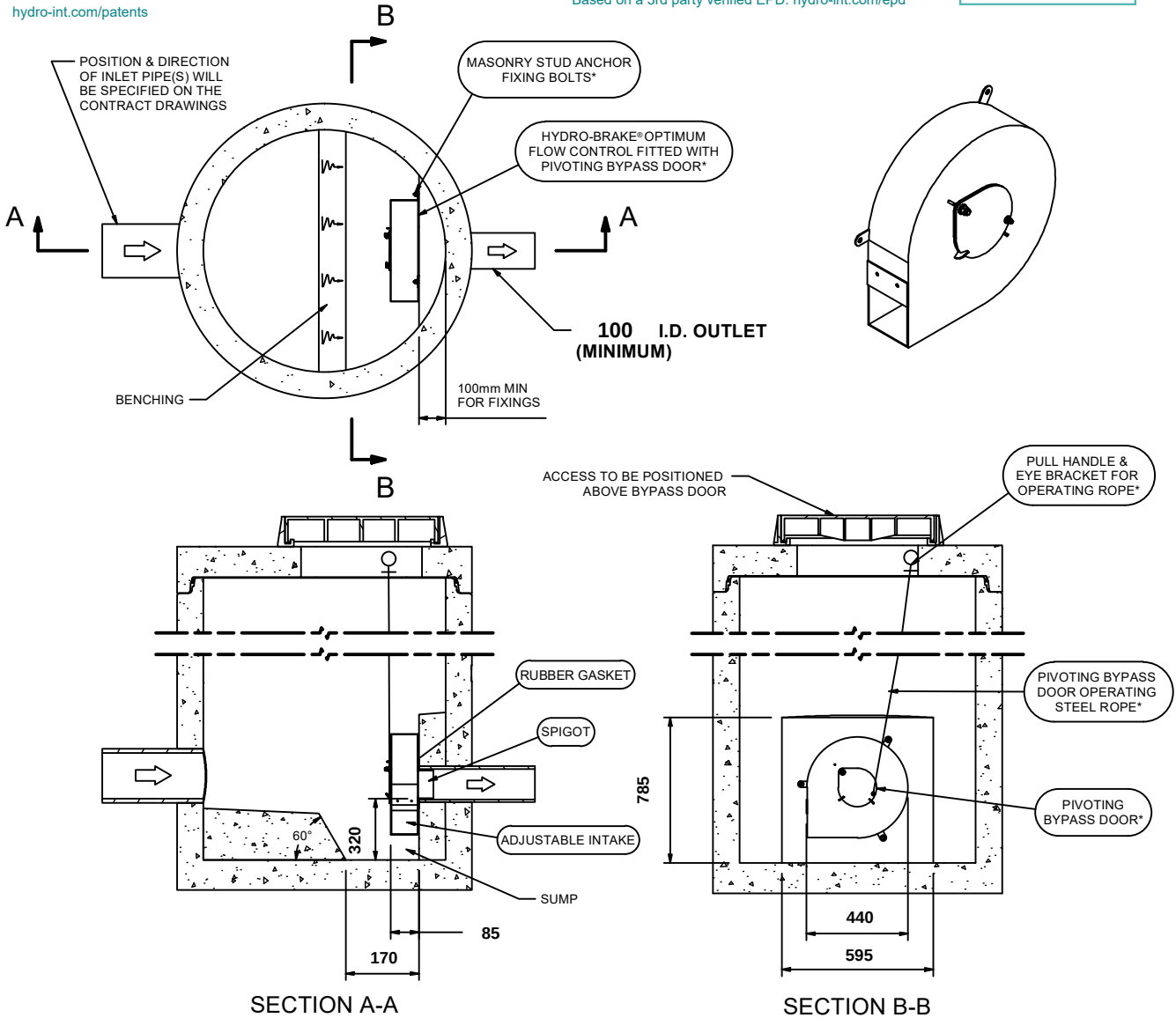
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	2.500
Flush-Flo™	0.307	2.492
Kick-Flo®	0.627	2.020
Mean Flow		2.192

hydro-int.com/patents

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
 - Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
 - Media blasted for corrosion resistance
 - Variable flow rate post installation via adjustable inlet (if necessary)
 - Indicative Weight: 10 kg
 - Product Carbon Footprint: 44.35 kgCO2e
- Based on a 3rd party verified EPD: hydro-int.com/epd



IMPORTANT: ○ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY
HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE ! The head/flow characteristics of this SHE-0075-2500-1000-2500 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.



DATE	22/09/2025 09:39
SITE	Royle Road
DESIGNER	Nick McGorry
REF	2885

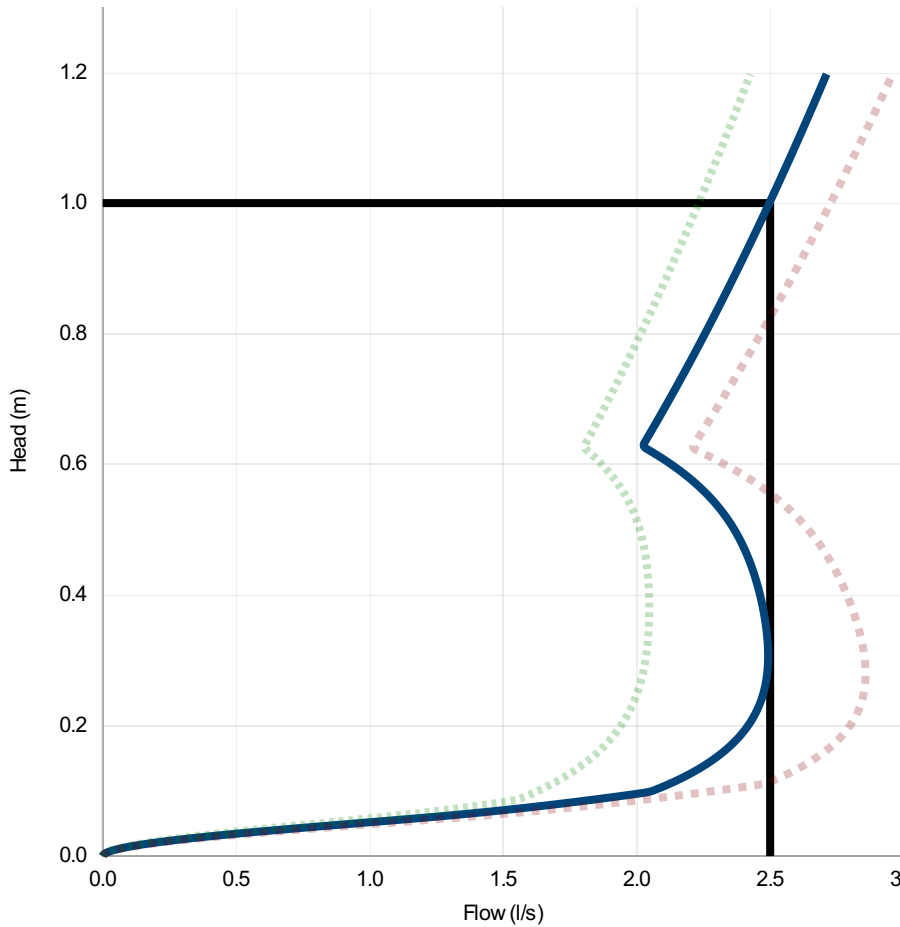
SHE-0075-2500-1000-2500
Hydro-Brake® Optimum

Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
Primary Design	1.000	2.500	1.000	2.232	1.000	2.726
Flush-Flo™	0.307	2.492	0.380	2.047	0.279	2.857
Kick-Flo®	0.627	2.020	0.625	1.800	0.624	2.205
Mean Flow		2.192		1.873		2.449



hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.034	0.504
0.069	1.468
0.103	2.081
0.138	2.250
0.172	2.360
0.207	2.429
0.241	2.469
0.276	2.488
0.310	2.492
0.345	2.487
0.379	2.473
0.414	2.453
0.448	2.426
0.483	2.389
0.517	2.338
0.552	2.269
0.586	2.175
0.621	2.050
0.655	2.061
0.690	2.109
0.724	2.156
0.759	2.202
0.793	2.247
0.828	2.291
0.862	2.334
0.897	2.376
0.931	2.417
0.966	2.457
1.000	2.497

DESIGN ADVICE



The head/flow characteristics of this SHE-0075-2500-1000-2500 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE 22/09/2025 09:39

Site Royle Road

DESIGNER Nick McGorry

Ref 2885

SHE-0075-2500-1000-2500

Hydro-Brake® Optimum

Technical Specification

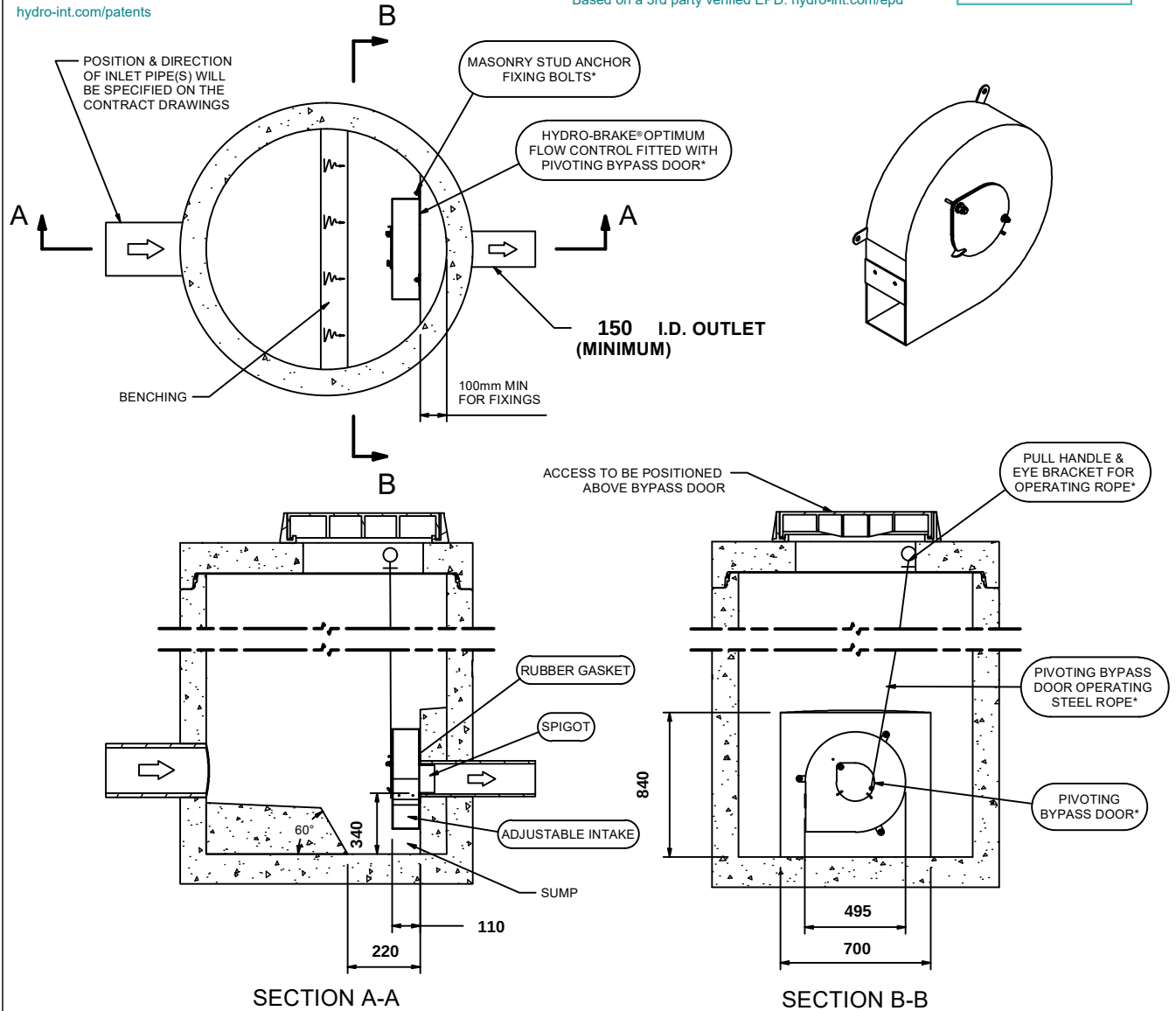
Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	4.500
Flush-Flo™	0.292	4.482
Kick-Flo®	0.630	3.636
Mean Flow		3.906

hydro-int.com/patents

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
- Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- Media blasted for corrosion resistance
- Variable flow rate post installation via adjustable inlet (if necessary)
- Indicative Weight: 15 kg
- Product Carbon Footprint: 58.35 kgCO2e

Based on a 3rd party verified EPD: hydro-int.com/epd



IMPORTANT: ○ LIMIT OF HYDRO INTERNATIONAL SUPPLY
 THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
 FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
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DESIGN ADVICE



The head/flow characteristics of this SHE-0100-4500-1000-4500 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International
 A CRH COMPANY

DATE	27/04/2026 13:42	SHE-0100-4500-1000-4500 Hydro-Brake® Optimum
SITE	Royle Road	
DESIGNER	Paige Blundell	
REF	2885	

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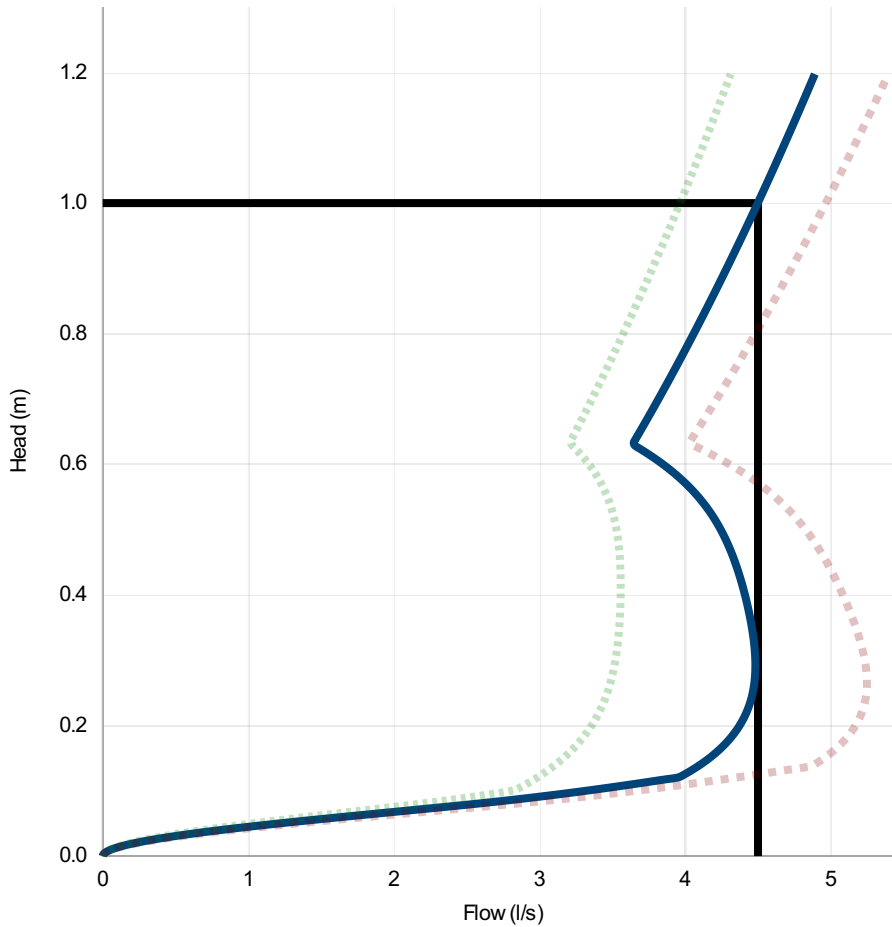
paige.blundell@shape-engineering.co.uk

Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
Primary Design	1.000	4.500	1.000	3.964	1.000	4.965
Flush-Flo™	0.292	4.482	0.412	3.557	0.265	5.248
Kick-Flo®	0.630	3.636	0.632	3.204	0.631	4.023
Mean Flow		3.906		3.264		4.423



hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.034	0.617
0.069	2.057
0.103	3.430
0.138	4.090
0.172	4.277
0.207	4.392
0.241	4.454
0.276	4.479
0.310	4.479
0.345	4.462
0.379	4.432
0.414	4.394
0.448	4.345
0.483	4.282
0.517	4.199
0.552	4.084
0.586	3.926
0.621	3.711
0.655	3.702
0.690	3.791
0.724	3.876
0.759	3.960
0.793	4.042
0.828	4.122
0.862	4.200
0.897	4.277
0.931	4.352
0.966	4.426
1.000	4.498

DESIGN ADVICE



The head/flow characteristics of this SHE-0100-4500-1000-4500 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE 27/04/2026 13:42

Site Royle Road

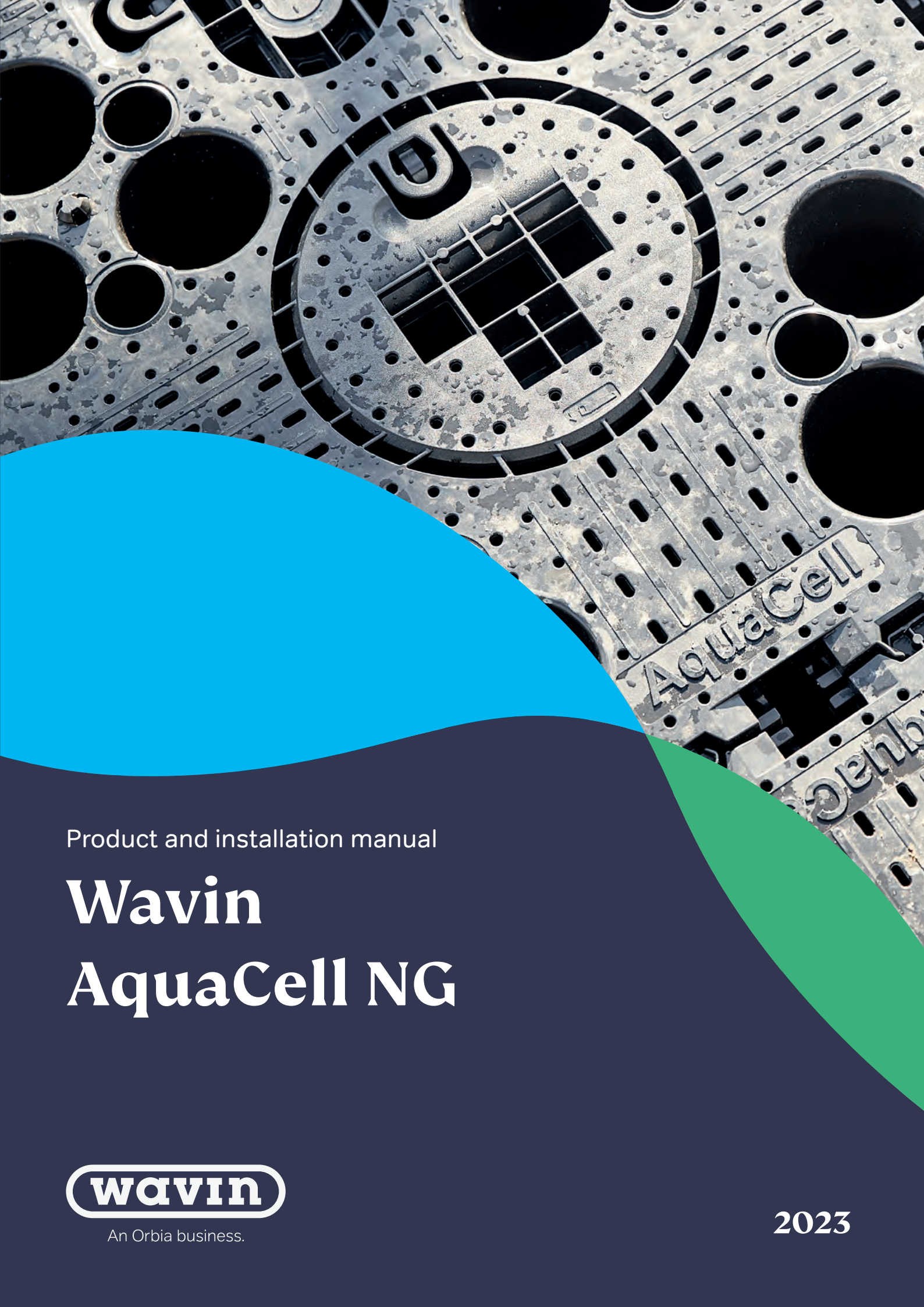
DESIGNER Paige Blundell

Ref 2885

SHE-0100-4500-1000-4500

Hydro-Brake® Optimum

11.0 APPENDIX C – CELLULAR TANK MANUFACTURER PRODUCT DATA



Product and installation manual

Wavin

AquaCell NG



An Orbia business.

2023

AquaCell NG – setting new standards for sustainability

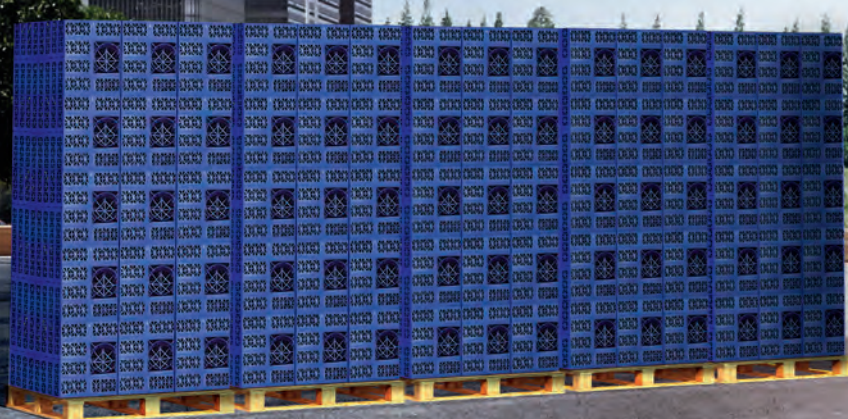
Wavin's AquaCell NG infiltration / attenuation units are made from 100% recycled and 100% recyclable polypropylene (PP).

These new generation units' stackable design means up to four times more product is delivered in every truck; This means...

- a significant reduction of CO2 emissions;
- 75% less deliveries to site

- less space required for storage on site and...
- More units per pallet mean reduced material handling on site.

The push-fit installation with integrated connectors helps to dramatically speed up installation whilst reducing the risk to your teams installing the system.



Stackable design allows up to four times more storage volume per truck when compared to AquaCell Core-R

Wavin AquaCell NG Installation

AquaCell NG		
Dimensions	Length (mm)	1200
	Width (mm)	600
	Height (mm)	400
	Gross volume (m ³)	0.288
	Void ratio %	95%
	Storage volume (m ³)	0.276
Connections	Pipe connections	OsmaDrain 110 – 160mm UltraRib 150, 225, 300mm TwinWall 150, 225, 300mm
Transportation and Handling	Weight per unit (kg)	11.4
	Units per pallet	28
	Units per truck	1,176
	m ³ per truck	338
Installation	Handling	Integrated ergonomic hand grips
	Connectors	Fully integrated
	Pipe connections	Plug and clip system
	Geotextile clips	Integrated
	Installation speed (m ³ per day)	160 – 200
Accessibility	Vertical Access	250mm Ø
	Inspection channel width	200mm
	Open floor area	54%
Material	Material	Recycled PP
	Colour	Black
Certification	BBA	BBA
	European standards	BS EN 17152-1
Loading	Vertical	44 tonnes m ²
	Lateral	11 tonnes m ²
Window of application	Pedestrian	
	Minimum Cover (m)	0.3m
	Max Depth (m)	4.48m
	Car park (9 tonnes)	
	Minimum Cover (m)	0.85m
	Max Depth (m)	3.98m

Wavin AquaCell NG Design guidance

Infiltration or attenuation?

The AquaCell range can be used either as:

- A soakaway whereby the units will be installed in suitable pervious soils so the units can be wrapped in a geotextile to allow infiltration of the stormwater into the surrounding ground, or
- As an attenuation tank in impervious ground (e.g. clay) where infiltration is not possible, here the units are encapsulated in a geomembrane (which is in turn wrapped in a protective geotextile layer) so that the structure can hold the stormwater temporarily until local drainage flows can accept it for normal disposal at a permissible outflow rate.

Site assessment

Ground conditions may be established as part of a geotechnical assessment. This may include tests for infiltration and ground water level.

If there is no confirmation that such assessments have been conducted, or resulting conclusions are unavailable, a trial pit will be required in accordance with BRE 365.

For further information and guidance, please contact Wavin Technical Design Team.

Infiltration (soakaways)

According to the principals of SuDS, wherever possible stormwater should be drained back into the ground via a soakaway as the first priority. A site must meet BOTH of the following criteria for infiltration to be possible:

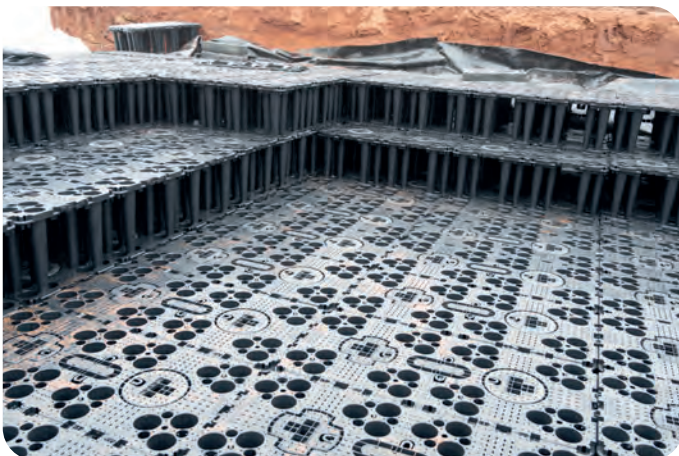
- The underlying soil surrounding the proposed installation is sufficiently permeable
- The seasonally high-water table is a minimum of 1 metre below the base of the proposed installation

If either of these criteria is not met, or cannot be confirmed for any reason, a soakaway system may not be suitable for the application, in which case a storage tank must be used.

Attenuation (storage tanks)

A storage tank may be designed to be online or offline. However, if the site is subject to groundwater or a high water table, it is important to ensure that the tank is not vulnerable to flotation. Sufficient weight from soil, or other covering placed over the AquaCell units, must be sufficient to counter any buoyancy uplift force from the rising groundwater level.

Large scale AquaCell NG storage tank installation



Wavin AquaCell NG

Design guidance

Structural Design

Structural design requires careful consideration of loading factors specific to each location – see CIRIA C680 or CIRIA C737 for further guidance (we recommend using the BPF Guide Designing Geocellular Drainage Systems to CIRIA Report C737 alongside.)

The AquaCell NG unit has been designed to have specific loading capacities that define the maximum depth parameters for which it is suitable.

The minimum depth of cover varies according to whether or not the installation will be subject to trafficking by vehicles.

However, in some situations, installations may have to be located with greater cover depths. Reasons may include:

- Deep-running drainage network
- Other buried services running above tank location
- Installation into banked/ sloping ground
- Upper layer of clay preventing infiltration

The table shows a summary of typical cover depths and installation depths as an indicative guide.

In trafficked applications it is recommended that the height of any tank should not exceed 2.025m (5 units). If you require a tank that exceeds this, please contact Wavin Technical Design for guidance:

T: 0800 038 0088 E: technical.design@wavin.co.uk

Soil Type	Soil Weight kN/m ³	Angle of Internal Friction ϕ (degrees)	Landscaped Areas	Vehicle Mass <9 tonnes	Vehicle Mass <44 tonnes
			Maximum depth (m)		
Consolidated Stiff Clay	20	24	3.49	3.24	2.99
Silty Sandy Clay	19	26	3.94	3.67	3.41
Loose Sand and Gravel	18	30	4.82	4.54	4.26
Medium Dense Sand and Gravel	19	34	5.36	5.10	4.83
Dense Sand and Gravel	20	38	5.21	4.96	4.71
			Minimum cover depth (m)		
			0.3	0.72	1.46

Wavin AquaCell NG

Instructions for installation

1.1. General characteristics

The AquaCell is a below ground (rain)water storage system which can be used in two different applications namely as an:

1. Infiltration system:

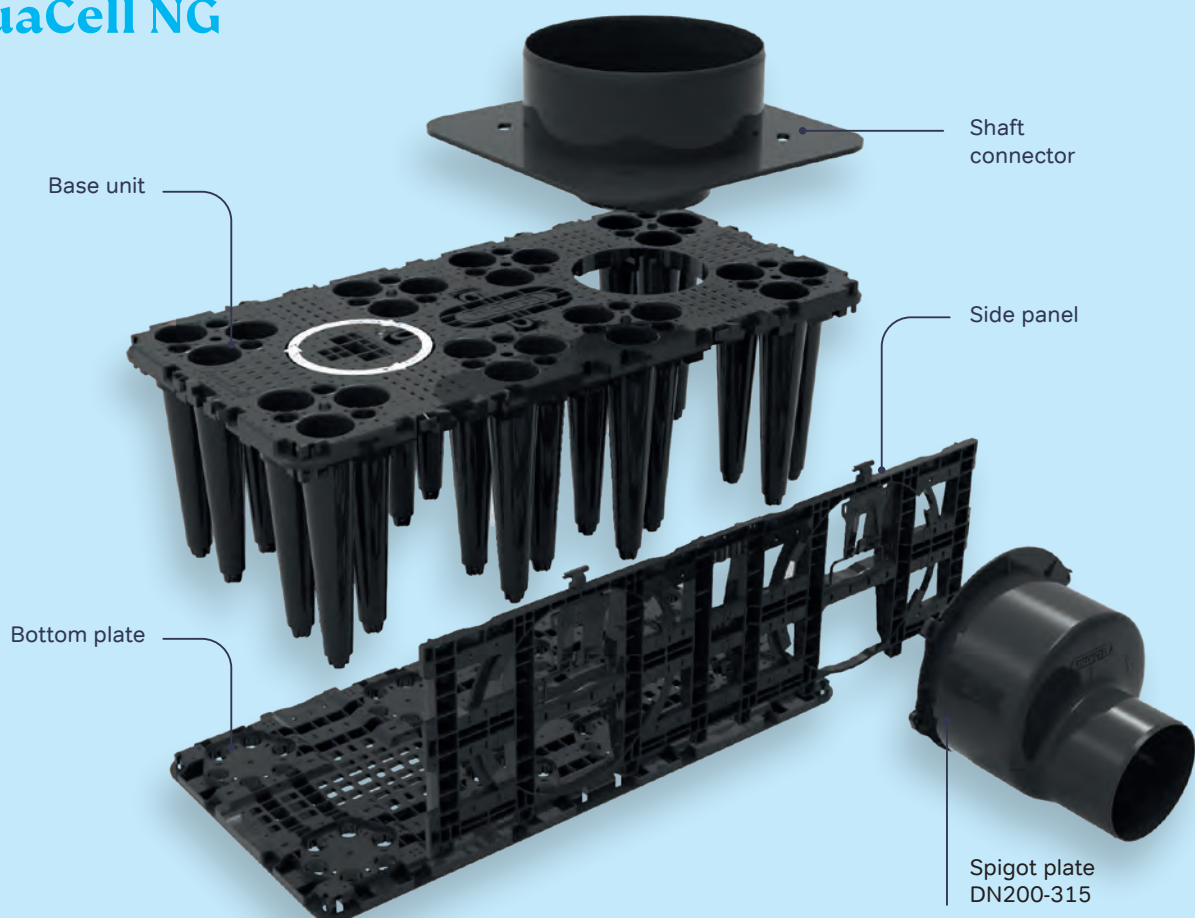
- Objective:
—temporary storage to allow the gradual infiltration of water into the soil.
- Solution:
—Wavin AquaCell system wrapped in a geotextile.

2. Attenuation system:

- Objective:
—temporary water storage and management to return the water to the existing network.
- Solution:
—Wavin AquaCell covered in a geomembrane seal, which is in protected by a geotextile around it.



AquaCell NG



1. Wavin AquaCell NG

Properties:

Base Unit	Material	Recycled PP (Polypropylene)
	Dimensions (mm)	1200x600x425 (LxWxH)
	Volume (Gross)	0.288m ³
	Volume (Net)	0.275m ³
	Void rate	96%
	Weight (kg)	11.4
	Pipe connections	110mm, 160mm, 225mm & 300mm

Bottom plate	Material	PP (Polypropylene)
	Dimensions (mm)	1200x600x35 (LxWxH)
	Weight (kg)	3.6

Side plate	Material	Recycled PP (Polypropylene)
	Dimensions (mm)	1155x373x50 (LxWxH)
	Weight	2.3

DN200-315 Spigot plate	Material	Recycled PP (Polypropylene)
	Dimensions (mm)	360x360x318 (LxWxH)
	Weight (kg)	1.3

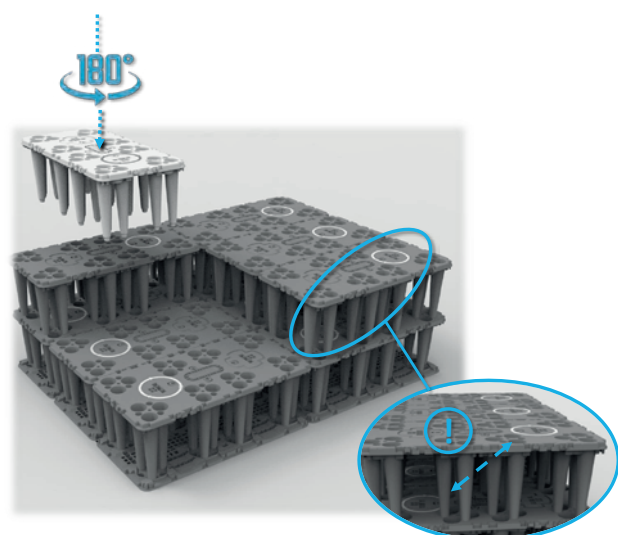
IMPORTANT

Regarding Orientation:

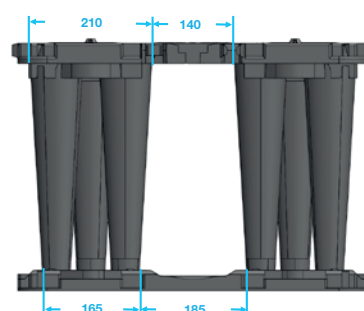
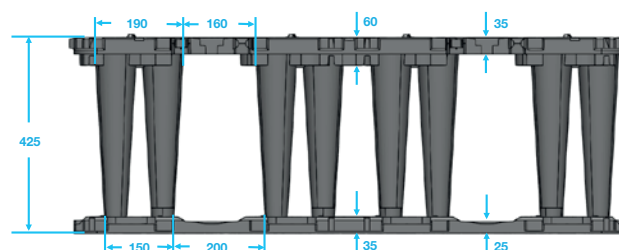
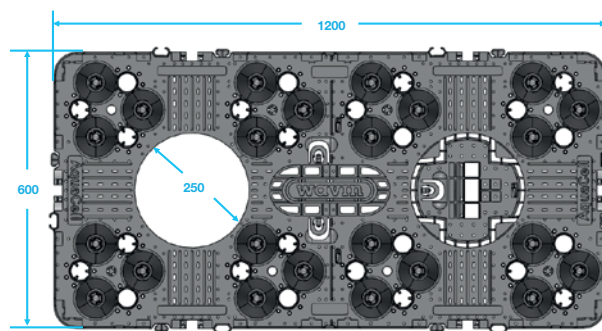
The base unit has a ring on top, which is used for the visual orientation of the product.

It is important to know that when the circle shape on the top of the unit is positioned above the circle of the unit below, the units will fall into each other, in the same way they are stacked on the pallet.

With a multi layer system it is important that all the circles are horizontally in line with each row of units. When installing the layer on top of an existing layer, the circle of the next unit should NOT be oriented directly above the circle of the base unit underneath but in the opposite direction, above the plus.



1.2. Dimensions

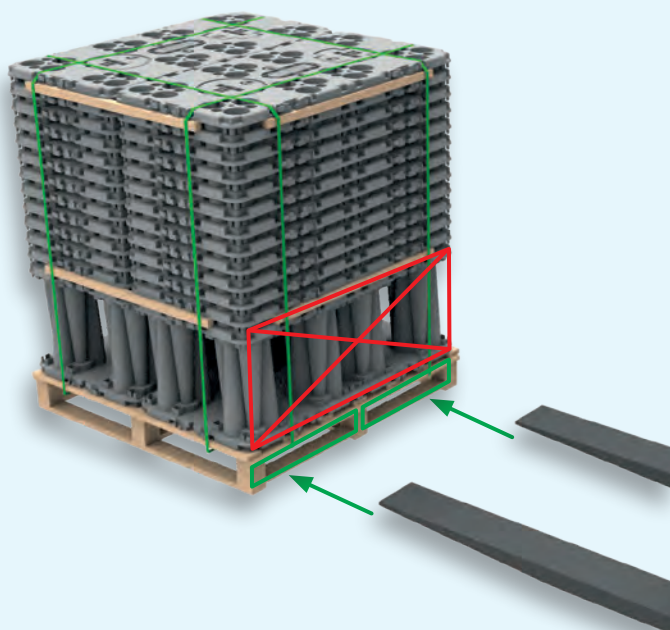


1.3. Destacking package and handling AquaCell NG

Handling by excavator or forklift:

The AquaCell units are stacked 28 pieces per pallet.

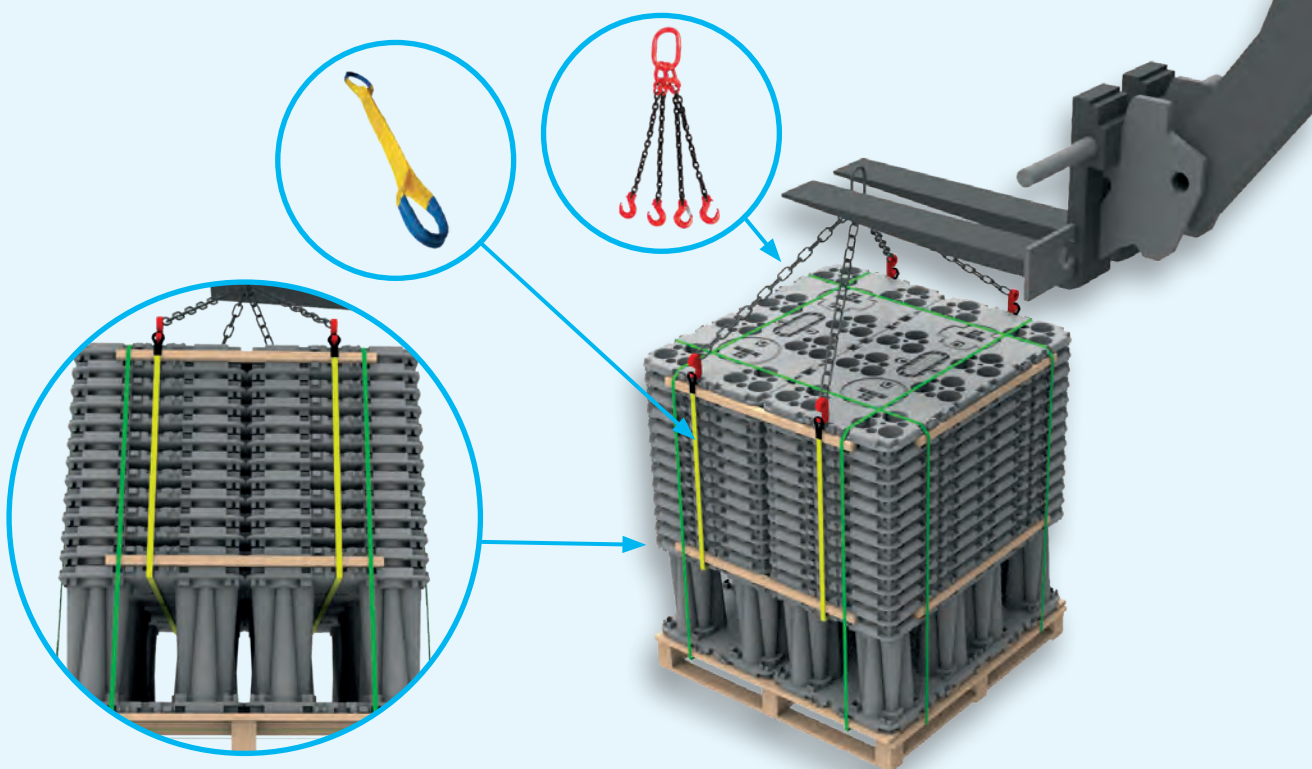
The pallets can be lifted with forks on an excavator or forklift by positioning these forks in the openings of the pallets (see pictures):



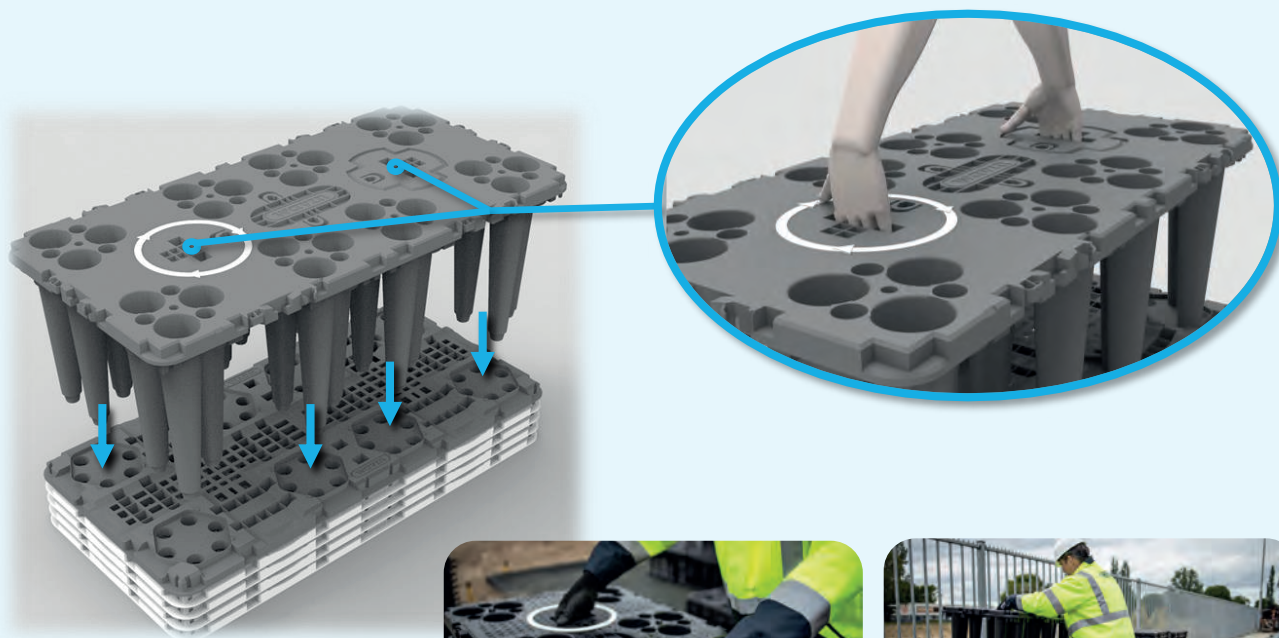
Handling with excavator or crane:

The pallets can also be lifted with slings positioned as indicated in the pictures.

It is important that the sling is long enough that hooks are above the stack, not to damage the products.



The AquaCell NG Base unit has a low weight (11,4 kg) and is equipped with integrated handgrips for ergonomic handling.



For dismounting of the bottom layer of the stack pull firmly on one short side of the unit while keeping a foot on the bottom layer.



2. Installation instructions

For the total installation of the AquaCell NG the following steps have to be performed:

Step 1

Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell NG units.

Lay 100mm of suitable bedding material.

Remove protruding (sharp) objects (e.g. stones) which can damage the geotextile/membrane).



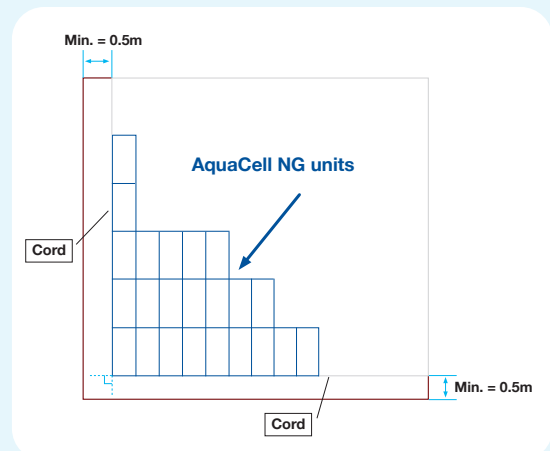
Step 3

Install the geotextile / geomembrane on the bottom of the trench. Lay the geotextile/Geomembrane over the base and the up the sides of the trench.



Step 4

Install and outline (perpendicular) a thin cord to ensure a straight system.



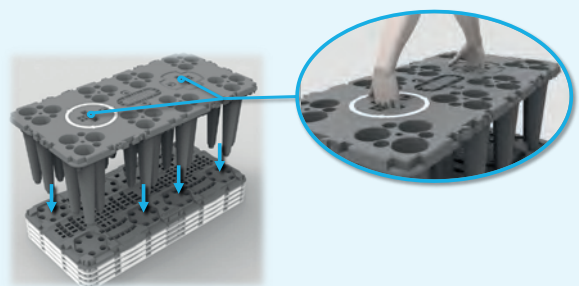
Step 2

Level and Compact.



Step 5

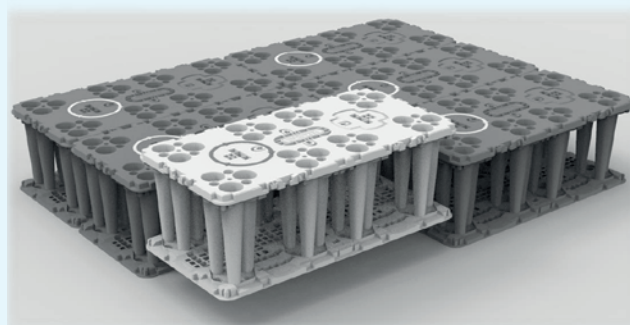
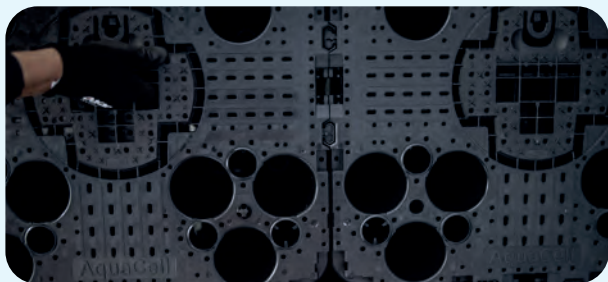
Bottom layer: Mount the bottom plate to the AquaCell unit (make sure an audible “click” is heard to ensure a proper connection) and place this unit in the outlined corner on the bottom of the trench.



Step 6a

Bottom layer: Place the next (outer) units (including a pre-mounted bottom plates) next to the installed units by sliding the integrated connectors into each other.

Note: Check the orientation of AquaCell NG (as above).



Repeat this until the full bottom layer is installed.

Step 6b

Vertical inspection: When vertical access through the unit is required, the round plate / “Circle” or “Cross” on top of the AquaCell NG unit must be cut. The cutting lines are marked by a “hand saw” logo. A saw with a blade length of a least 8cm is required.

Note: Make sure that the round “circle” plate or “cross” of each unit of each layer below the vertical access is cut.



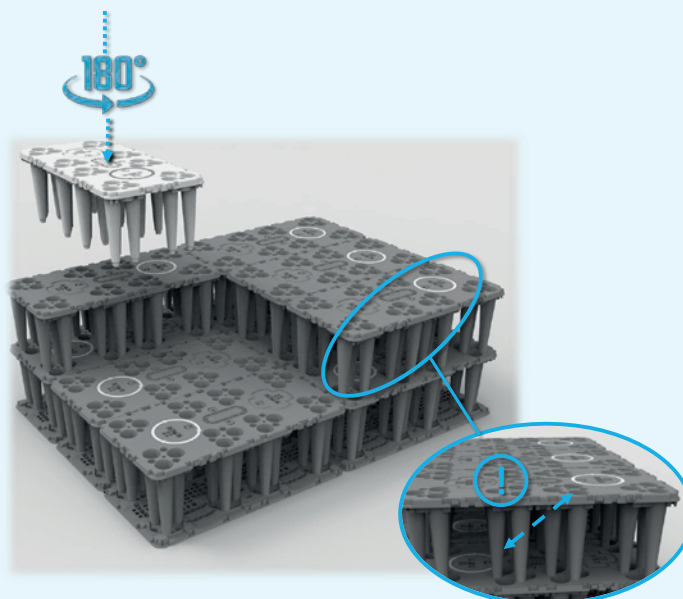
Step 7

Next layer(s): Mount the AquaCell NG (without bottom plate) directly on top of bottom layer unit(s). Each of the pillars will fall into position and click in the top directly on top of the bottom layer of the unit below.

Note 1: Keep in mind the orientation of the white circle (white circle above white circle is NOT possible!).

Note 2: The integrated connectors will slide into each other (vertically).

Note 3: It may be necessary to walk on top of previously laid AquaCell NG units. Care should be taken not to damage the edges of the units.

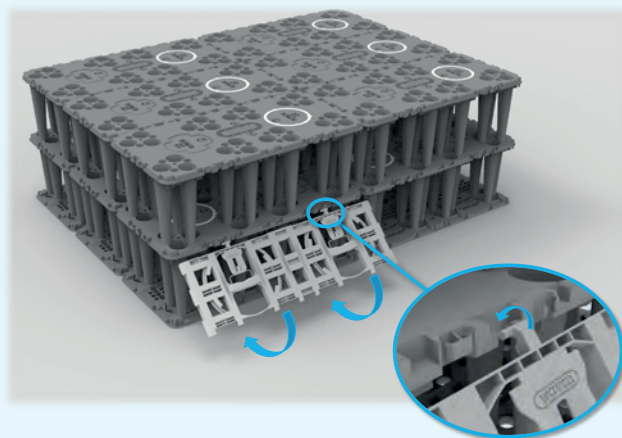


Repeat this for all the layers until all units are installed.

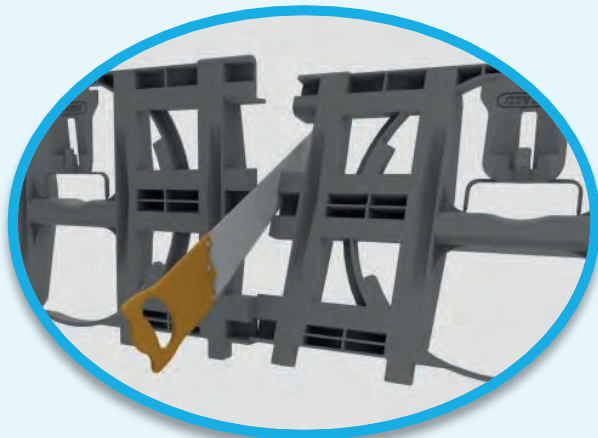
2. Installation instructions

Step 8

Side panels: The following step is to install the side panels by putting the hinge pins of the side panel into the hinge pockets the units under an angle. Next the panels can be hinged against the pillars of the AquaCell NG unit. The panel will snap to the unit.



Repeat this step until all side panels are installed and the system is fully closed except at the location where the inlet and outlet must be placed.

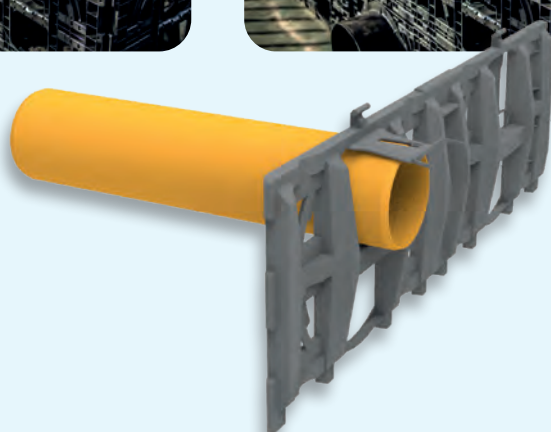
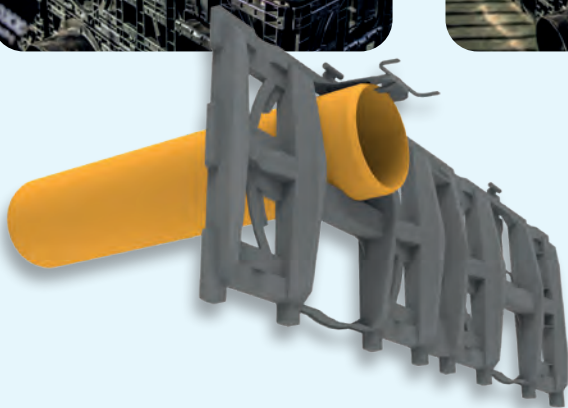


Note 1: In case of the need of a half sidepanel, the sidepanel must be cut.

Note 2: After cutting there is a left and right version. Be sure that the rounded edge of the half panel is positioned towards the corner of the system (not the cut edge!) or depending on the length of the side, put the half panel in between two uncut panels.

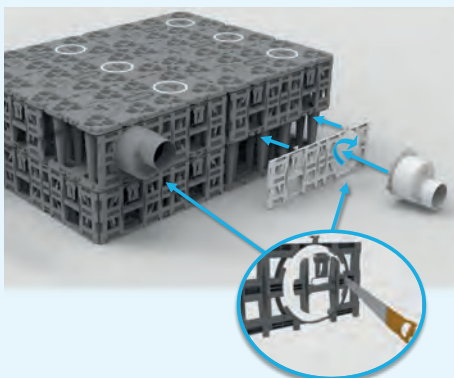
Step 9a

Connection 160mm: Each side panel has two standard DN160 Inlets with integrated pipe stopper. The two sprues of the pipe stopper can be cut/broken to activate this pipe stopper.



Step 9b

Connection 160mm: Each side panel also has two preformed openings that can be cut by a jigsaw. Next, the Inlet connector with spigot DN200 and DN315 can be connected by positioning and rotating until clicked into place. (Bayonet like).



2. Installation instructions

Step 10

Wrap the AquaCell NG Structure:
For soakaways - wrap and overlap the geotextile covering the entire AquaCell NG structure.

For attenuation tanks – wrap the geomembrane around the AquaCell NG structure and seal to manufacturer's recommendations**. Then wrap and overlay the geotextile, to protect the membrane.

**The geomembrane should be designed to survive the rigours of construction, this is typically at least 0.5mm thick. Joints should be sealed using proprietary welding techniques.



Step 11

Lay 100mm of coarse sand or non angular granular material between the trench walls and the AquaCell NG structure and compact.

Step 12

If installing integral vertical inspection shafts, directly onto the top surface of the AquaCell NG Tank structure, then ensure all pre-formed cut out sections are removed (on every level inside the structure).

Install Vertical adaptor within preformed cut out and seal to manufacturers recommendations.

Step 13

Lay 100mm of coarse sand or non angular granular material over the geotextile/geomembrane and compact. Backfill with suitable material.



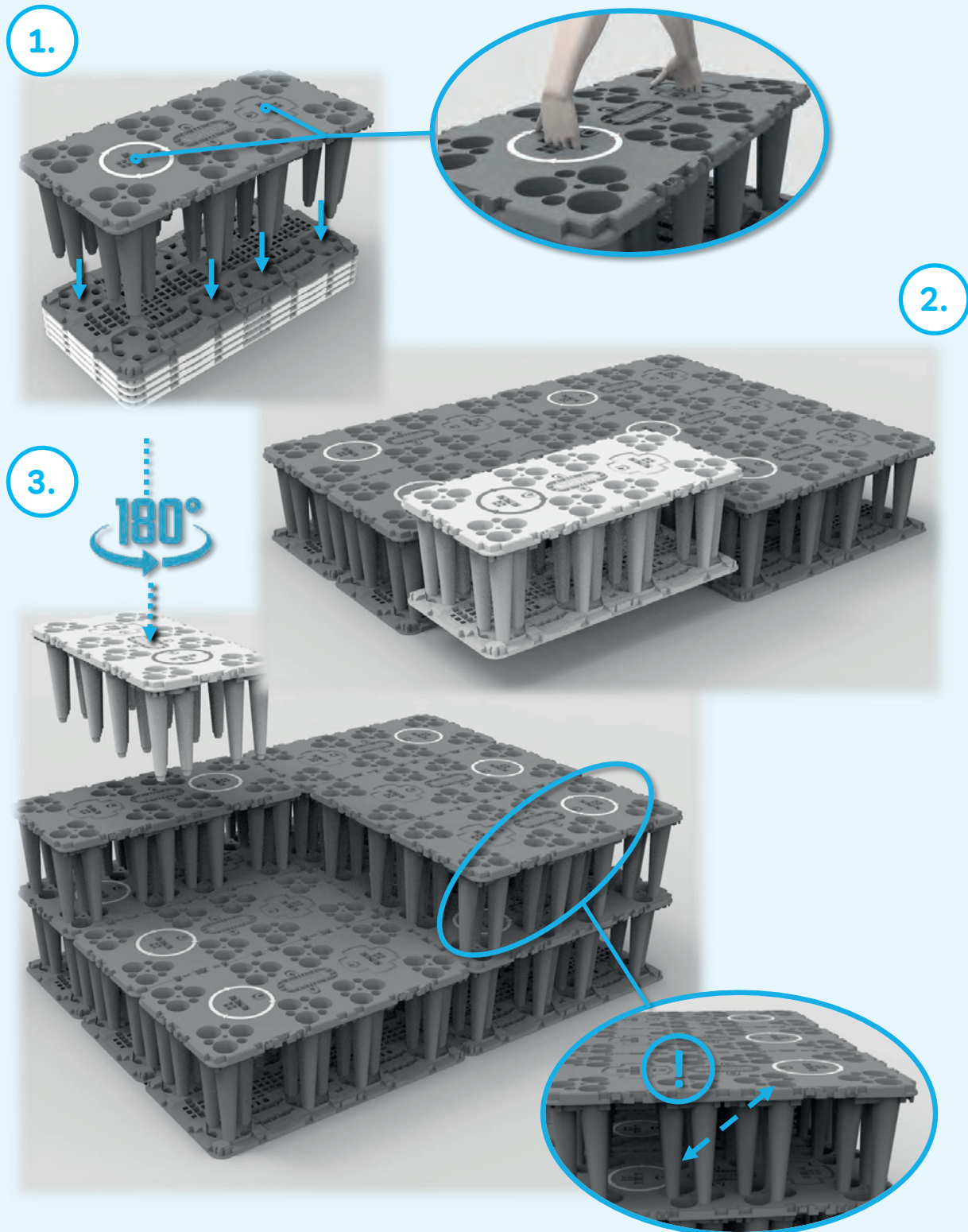
Construction Loads

Construction plant such as excavators can impose significant loads on any AquaCell NG unit. The following guidelines should be observed:

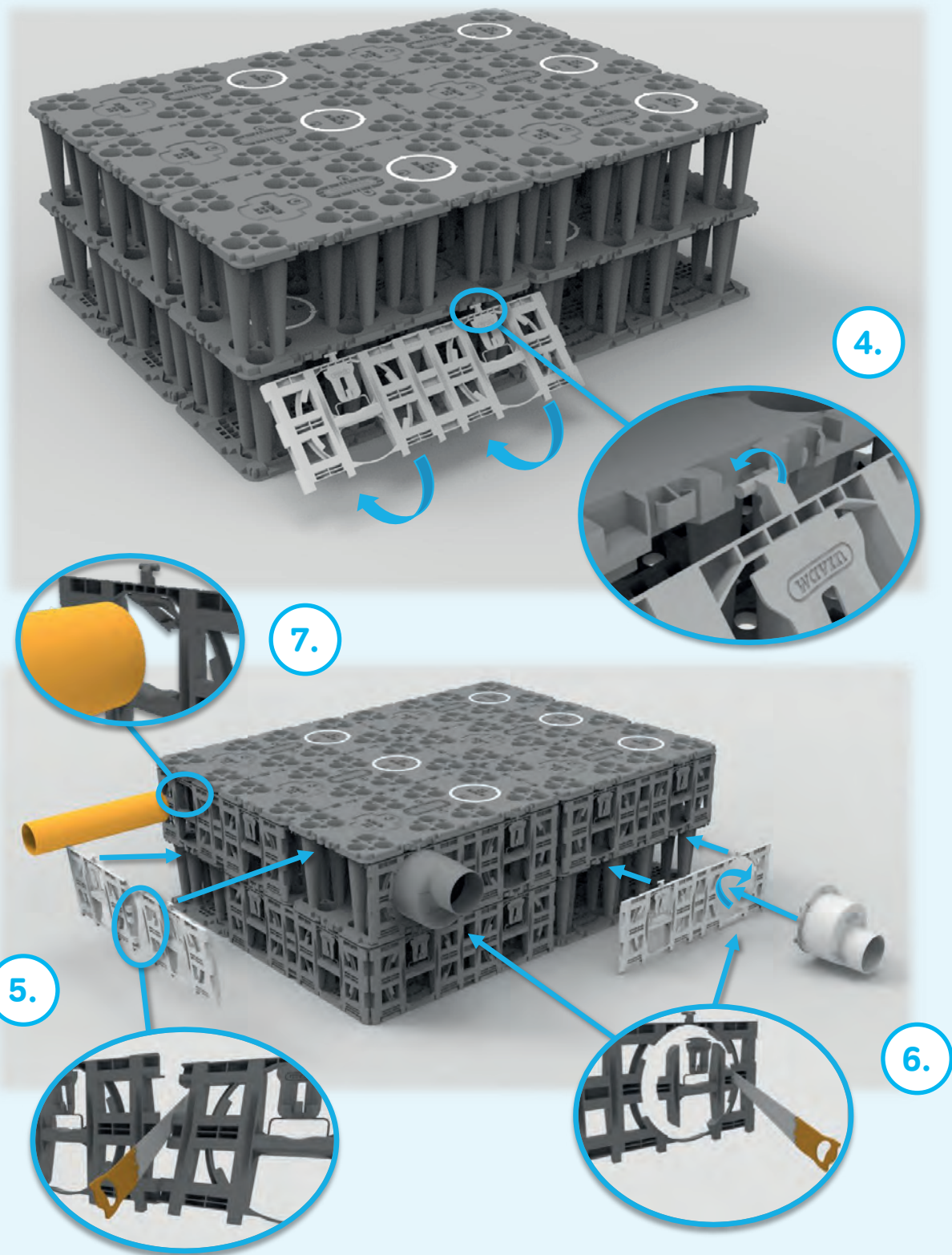
- Tracked excavators (not exceeding 21 tonnes weight) should be used to place fill over the AquaCell units when the geotextile or geomembrane wrapping has been completed
- At least 300mm of fill should be placed before the excavators or trucks delivering the backfill are allowed to traffic over the installed units
- Compaction plant used over the AquaCell NG units should not exceed 2300kg/metre width. This will allow the compaction of Type 1 sub-base in 150mm layers over the units in accordance with the Specification for Highways Works

- All other construction plant should be prevented from trafficking over the system once it is installed and surfacing completed, unless a site-specific assessment demonstrates that is acceptable
- In particular cranes should not be used over, or place their outriggers over the system

3. Schematic installation instructions



3. Schematical installation instructions





Wavin is part of Orbia, a community of companies working together to tackle some of the world's most complex challenges. We are bound by a common purpose: To Advance Life Around the World.



Orbia's Building and Infrastructure business Wavin is an innovative solutions provider for the global building and infrastructure industry. Backed by more than 60 years of product development experience, Wavin is advancing life around the world by building healthy, sustainable environments for global citizens. Whether it's to improve the distribution of clean drinking water, to make sanitation accessible for everyone, to create climate resilient cities, or to design comfortable living spaces, Wavin collaborates with municipal leaders, engineers, contractors, and installers to help future-proof communities, buildings and homes. Wavin has 12,000+ employees around 65 production sites worldwide, serving over 80 countries through a global sales and distribution network.

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