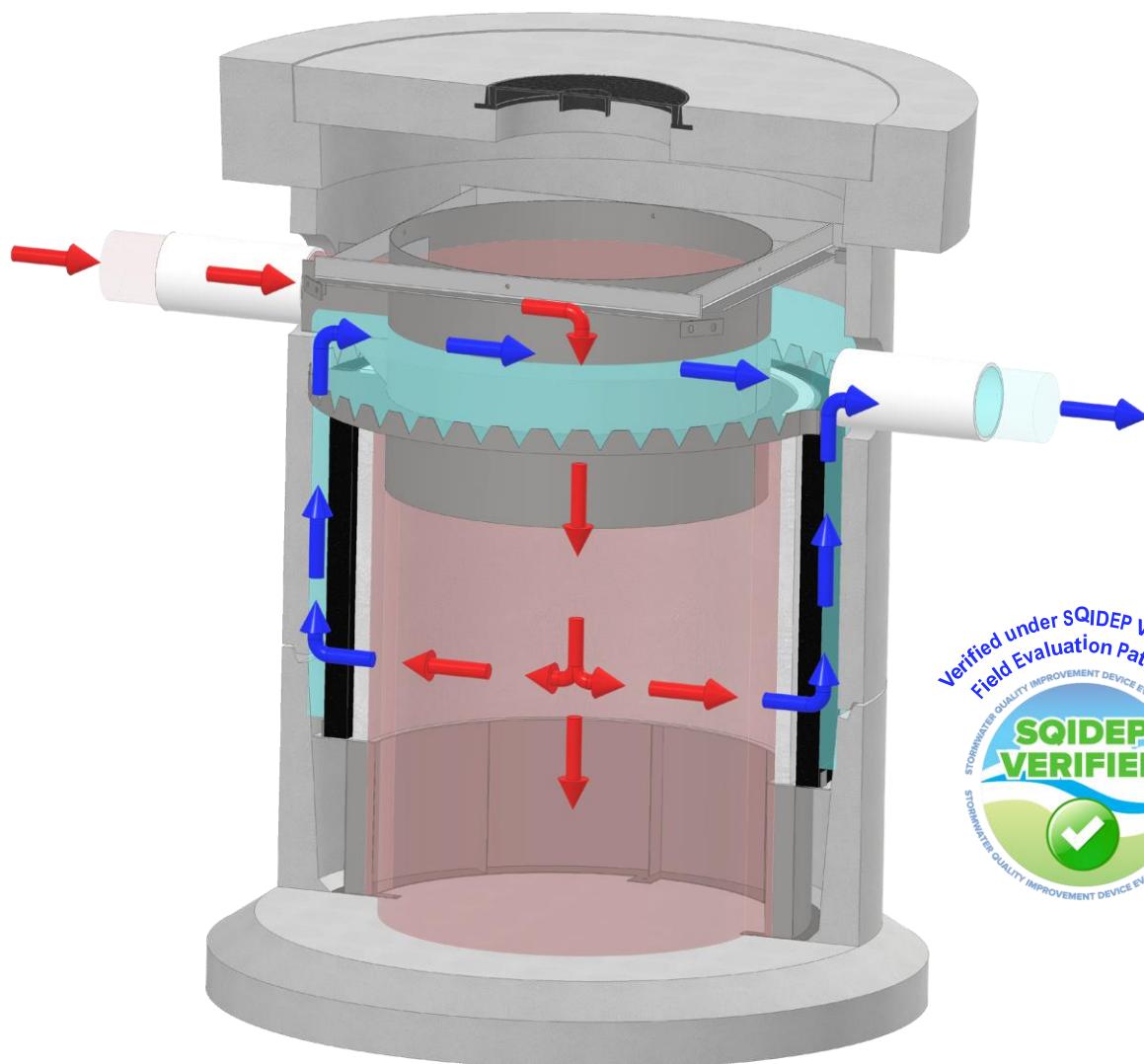


# HumeFilter® UPT Technical manual

Issue 4



# HumeFilter® Universal Pollutant Trap (UPT)

The HumeFilter® is a stormwater treatment device featuring a multistage treatment method, including primary screening, media filtration, and membrane filtration. The multistage treatment approach provides exceptional pollutant removal rates at high treatment flow rates with minimal head loss and relatively low maintenance costs.

The HumeFilter® uses primary screening, hydrodynamic separation and media and membrane filtration to provide complete treatment of stormwater runoff in an underground precast concrete structure.

The combination of the media and membrane filters provides an extremely large contact surface area, resulting in high treatment flow rates.

The HumeFilter® performance capabilities have been validated by Stormwater Australia after completion of field testing under their SQIDEP Field Evaluation Pathway - the first in Australia.

- Total Suspended Solids (TSS), mean removal efficiency of 89%
- Total Nitrogen (TN), mean removal efficiency of 50%
- Total Phosphorous (TP), mean removal efficiency of 75%
- Gross Pollutants (GP), mean removal efficiency of 90%

Designed for constrained sites, the HumeFilter® is available in a range of sizes to cater for both at-source and end-of-pipe solutions. It's also very effective at capturing heavy metals, and the field testing showed HumeFilter removed 57% Copper and 64% Zinc.

- **The system provides tertiary level performance with a small footprint**

The proven performance of the HumeFilter® and high flow rate treatment approach enables water quality objectives to be met with a smaller footprint system than typical bioretention systems.

- **It has been independently tested**

HumeFilter® has been independently tested under Stormwater Australia's Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP) - Field Evaluation Pathway.

The results of the testing were then reviewed and assessed by an independent evaluation panel of industry experts, where the performance claims were accepted



and a Verification Certificate issued by Stormwater Australia and published on their website (<https://www.stormwater.asn.au/sqidep/sqidep-verified-products>).

Earlier laboratory testing also included relevant elements of the stringent New Jersey Corporation for Advanced Technology (NJCAT) protocol.

- **It treats higher flow rates than most filters**

There are 5 models currently available as follows:

- UPT1200 – 12L/s TFR
- UPT1800 – 30L/s TFR
- UPT2400 – 55L/s TFR
- UPT3000 – 100L/s TFR
- UPT3600\* – 160L/s TFR\*\*

\* Internal Diameter of the Concrete Chamber

\*\* TFR – Treatment Flow Rate

- **Above-ground land use is maintained**

The system is assembled within a fully-trafficable, precast concrete structure for underground installations on constrained sites, allowing maximum use for above-ground activities.

- **Maintenance is easy**

The internal components of the HumeFilter® are easily removed, leaving an essentially empty chamber that is cleaned using a typical vacuum truck method. Once the chamber has been cleaned replacement filters are installed and the rest of the internals re-fitted. The media filter and cartridge filter are then returned to the workshop where the media is replaced and the cartridge filter backwashed, ready to be reused for the next maintenance.

- **We provide world class treatment solutions**

Humes has a team of water specialists dedicated to delivering sustainable solutions, creating maximum value for your project, and accommodating your site conditions, as well as meeting design requirements and construction constraints.

# Components and operation

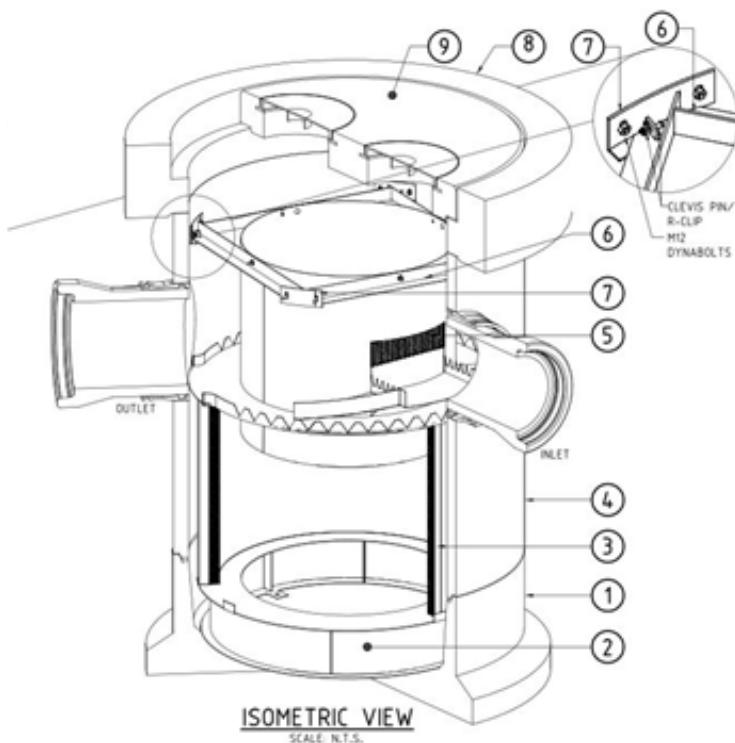
The HumeFilter® is comprised of several structural and functional components:

- A cylindrical precast concrete structure which is available in a range of diameters and depths that serves as a vessel providing structural support for a 50 year design life and provides storage for accumulated filtered pollutants.
- A rigid high-strength stainless steel plinth sits in the lower section of the concrete chamber creating a 500 mm deep sump for the deposition/accumulation of sediments and debris.
- The multistage filter arrangement is seated on top of the plinth, which comprises three basic elements:
  1. An inner stainless steel perforated screen
  2. A stainless steel basket containing a layer of granulated activated carbon
  3. A 50 mm wide pleated cartridge filter
- A rigid high-strength stainless steel insert sits on top of the filters, which performs all of the hydraulic control for the system.
- A heavy duty lid and surround are designed for SM1600 vehicles as per AS5100 (2017), and we can provide custom designs for loads that exceed the AS5100 requirement.

Operation of the HumeFilter® is as follows:

- Water enters the HumeFilter® via an inlet pipe through the concrete chamber and into the centre of the stainless steel insert and into the centre of the chamber. Note it's also possible to have a grated inlet in the centre of the lid to pick up overland flow.
- Sediments and other heavy materials fall into the 500 mm deep sump of the device
- Water passes through the filter arrangement from inside to out under the hydraulic head created by a 150 mm difference between the inlet invert level and outlet invert level
- Water first passes through the screen, then the granular activated carbon layer, and finally through the pleated cartridge for polishing. The filters are designed to only operate at 34% of their capability, therefore having a redundancy of 64% to cater for blocking over time.
- Once through the pleated cartridge, the water then rises up between the outside of the cartridge and the concrete chamber, and through a series of v-notches in a rim weir on the outer edge of the stainless steel insert.
- The water passes through these v-notches and onto the return channel toward the outlet pipe. The v-notches are important to ensure that the flow on the return channel remains laminar so as to minimise losses through the system and into the downstream drainage network.
- While the HumeFilter® is designed as an off-line device, as an added factor of safety, it is also capable of internally bypassing should there ever be a blockage in the filters or the bypass pipe.
- Being a cylindrical chamber, the outlet pipe can be located at almost any angle relative to the inlet pipe.

**Figure 1 – HumeFilter® components**



1. Precast concrete base unit
2. Stainless steel plinth already fitted into the precast base unit
3. Inner and outer filters that will require lowering into position after the precast concrete shaft is fitted
4. Precast concrete shaft – note, there may also be an additional make up shaft to achieve the correct depth to invert level
5. Stainless steel insert that sits inside the precast concrete shaft and on top of the inner and outer filters
6. Stainless steel insert support bracket
7. Support frame mounting brackets (pre-fitted to the shaft in the factory)
8. Precast concrete surround
9. Precast concrete lid

# Design considerations

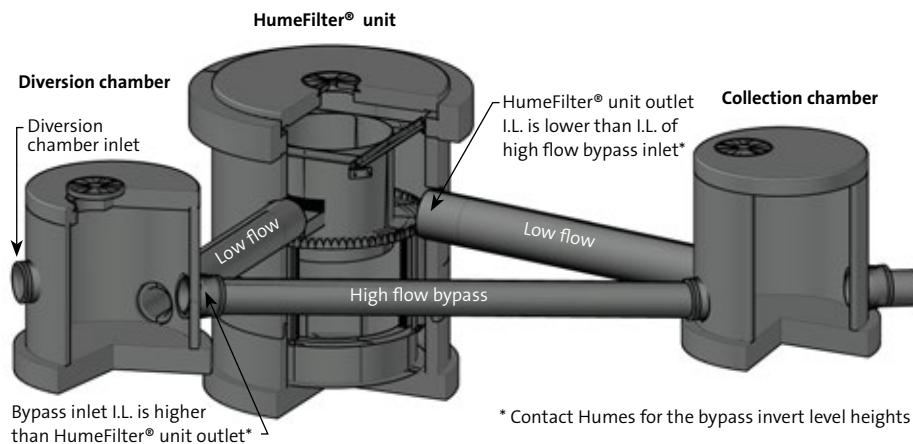
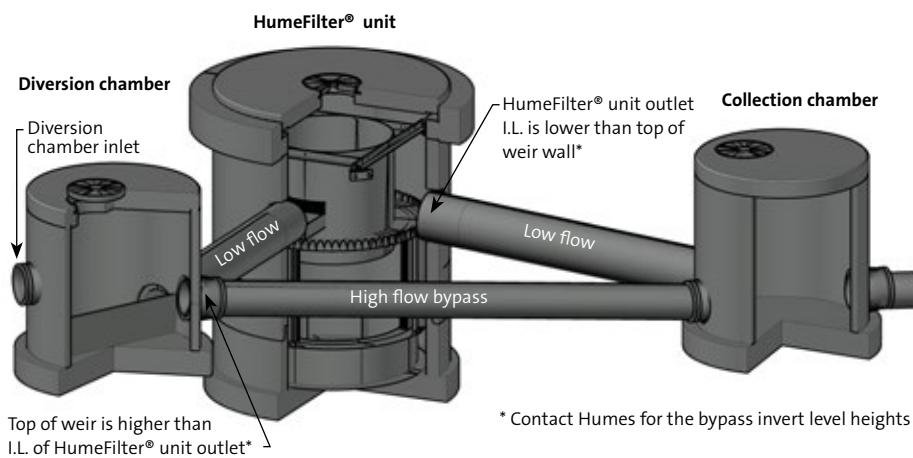
## Bypass arrangement design

The HumeFilter® should be designed in an offline configuration for most catchments. All stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in offline configurations. A standard offline configuration has an external bypass that uses an upstream diversion structure. The invert level difference between the inlet pipe and the outlet pipe of the HumeFilter® is 150 mm.

The location of the upstream diversion structure and downstream collection pit will depend on the specific site constraints, but the bypass pipe between these two structures will have an invert level set higher than the inlet pipe into the HumeFilter®. Alternatively, a weir can be fitted into the upstream diversion structure, where excess flow that overflows the weir bypasses the HumeFilter® via the bypass pipe and directly toward the downstream collection pit. See Figures 2 and 3 below.

**Table 1 – HumeFilter® model range and details**

HumeFilter® Model	Inlet Pipe Diameter	Inlet Pipe Grade	Outlet Pipe Diameter	Outlet Pipe Grade
UPT1200	150mm uPVC	0.5%	150mm uPVC	1.0%
UPT1800	225mm uPVC	0.4%	225mm uPVC	1.0%
UPT2400	225mm uPVC	1.0%	225mm uPVC	1.5%
UPT3000	300mm uPVC	0.8%	300mm uPVC	1.25%
UPT3000	300mm RCP	1.1%	300mm RCP	1.5%
UPT3600	375mm uPVC	0.55%	375mm uPVC	0.9%
UPT3600	375mm RCP	0.8%	375mm RCP	1.25%

**Figure 2 – HumeFilter® UPT offline arrangement without diversion weir****Figure 3 – HumeFilter® UPT offline arrangement with diversion weir**

# System installation

The HumeFilter® can be installed by a civil or plumbing contractor in much the same way as a manhole or other stormwater drainage structures. It is supplied to site in separate, easily identifiable components, and an installation guide will also be provided. If required a Humes representative can also be present.

- The HumeFilter® base is first lowered into place on the pre-prepared bedding, which is specified by the design engineers based on local geotechnical information
- Next a bead of megapoxy is applied to the outer mating face on outer top of the base unit and then the upper shaft is lowered onto the base
- The outer pleated cartridge filter is then lowered inside the shaft to rest onto the stainless steel plinth in the base unit. There are location tabs toward the out edge of the plinth to guide the location of the cartridge
- Next the inner granular activated carbon (GAC) filter is lowered into the shaft and rests inside the pleated cartridge filter, and also sits on the stainless steel plinth. It's important at this point to check that the inner GAC filter is correctly located in the centre of the pleated cartridge filter. There should be an even gap of approximately 40 mm between the two filters all the way around, and the top of the two filters should be at the same height all the way around.

- Once the filters are correctly positioned the stainless steel insert is lowered into position to sit directly on top of the filters. The outer edge of the return channel on the insert has a 25 mm lower rim, which fits around the outer edge of the pleated cartridge filter. If the insert isn't located correctly on top of the filters, the insert will not sit level. It is important to check the levels (in multiple directions) at the top of the insert to ensure that the insert is correctly positioned. The weight of the insert will apply enough pressure on the filter seals to adequately seal the system.
- When the insert is correctly positioned, the four brackets on the wall of the chamber can be tightened into their correct position. To do this the lower loop on the toggle clamps should be hooked into the slot on the underside of the wall bracket, while the toggle clamp is in the open position.

The wall bracket is then moved downward such that the loop is supporting the wall bracket and the bolts are then tightened. This needs to be completed for all four wall brackets. Once the wall brackets have been tightened into position the toggle clamps can be lifted into their vertical locked position, which will apply additional pressure onto the rubber seals on top and beneath the filters.



# Inspection and maintenance

## Annual Interval:

- Arrive onsite with a vacuum truck;
- Remove lid;
- Vacuum out the contents of the sump;
- Rinse the exterior and interior of the Stainless Steel insert with clean water, into the sump;
- Backwash the filters by releasing 2,000L of clean water on the external side of the filters, allowing the water to pass from outside the filters to inside the sump;
- If the water level on the outside of the filters rises to the level of the return channel, this triggers a filter exchange requirement;
- If, however, the water freely backwashes through the filters and doesn't reach the return channel level, then the filters can remain until the next inspection;
- Vacuum out any sludges and water retained in the sump;
- Replace lid.

## 2 Year Interval:

- As above plus;
- Remove the Stainless Steel insert after it has been rinsed;
- Rinse and remove the used GAC and pleated cartridge filters;
- Thoroughly rinse the inside of the concrete chamber and then vacuum out the residual material;
- Exchange the filters with the replacements brought to site;
- Re-insert the SS insert, and replace the lid;
- The used filters are returned to the Humes factory, where the GAC filter is emptied, cleaned and re-filled with new GAC;
- The pleated cartridge filter is backwashed and allowed to dry;
- Both filters are returned to stock as replacement filters for another maintenance.



## STORMWATER AUSTRALIA

### Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

## VERIFICATION CERTIFICATE

#### Applicant Information

Company Name	Holcim Australia
Company Address	18 Little Cribb St Milton QLD 4064
Website	<a href="http://www.humes.com.au">www.humes.com.au</a>
Contact Email	charles.kelly@holcim.com

#### Verified Technology

Product Title	HumeFilter UPT Family
SQIDEP Pathway	Local Field Trial Evaluation Pathway
Reviewed Documents	<p>The following documents form the basis of this independent evaluation:</p> <ul style="list-style-type: none"><li>• SQIDEP Detailed Performance Report 31/01/23 (Issue 1) (superseded)</li><li>• SQIDEP Detailed Performance Report 22/03/23 (Issue 2) (current)</li><li>• Appendix C – iAuditor Sample Collection Reports_Timelapse Videos</li><li>• Appendix D - ALS Lab testing documentation</li><li>• Appendix E – Hydrographs</li><li>• Appendix F - Statutory Declarations</li><li>• Appendix H - Lab Testing Reports</li></ul> <p>The following files and documents were also provided:</p> <ul style="list-style-type: none"><li>• Dirty Water Test.MP4</li><li>• Filter_S04pc_Q0100_view1_hiRes.avi</li><li>• Filter_S04pc_Q0100_view3_hiRes.avi</li><li>• Hume Filter_Animation.MP4</li><li>• Humes UPT.ppt</li><li>• Stormwater Quality Lab Testing- Final Report</li><li>• Manly hydraulic laboratory testing</li></ul> <p>Additional information was requested after a meeting between the Evaluators and applicants, chaired by a senior representative from Stormwater Australia including:</p> <ul style="list-style-type: none"><li>• Additional laboratory Quality Assurance information in the form of Sample Receipt Notices</li><li>• Sizing spreadsheets supplied on a confidential basis for the purpose of this review</li><li>• Additional information on maintenance procedures</li></ul> <p>Further information was provided on 30th May 2023 related to the permeability of the pleated filter. This included:</p> <ul style="list-style-type: none"><li>• Technical Data –Non-woven Filter</li><li>• Cover letter from Matthew King of Filquip Pty Ltd regarding filter permeability</li></ul>

**Technology Information**

<b>Applicant's Verified Performance Claims</b>	Total Suspended Solids (TSS) 89 % Total Phosphorus (TP) 75 % Total Nitrogen (TN) 50 % Gross Pollutants 90 %

<b>Test Stormwater Runoff</b>	The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (Urban Roads, Residential, Industrial, Commercial).
<b>Applicant's performance claims</b>	Total Suspended Solids (TSS) 89 % - Accepted Total Phosphorus (TP) 75 % - Accepted Total Nitrogen (TN) 50 % - Accepted Gross Pollutants 90 % (Accepted by evaluators, but not quantitatively measured – see conditions)
<b>Test Catchment Type</b>	Urban Road

<b>Maintenance Performed during monitoring</b>	The Holcim Humefilter was maintained once during the monitored period. This maintenance involved a filter backwash and removal of captured gross pollutants and sediment. The filter cartridges were not replaced.
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<b>Verified method to model in MUSIC</b>	<p>Modelling a HumeFilter in MUSIC is as follows:</p> <p>Bypass (TFR) parameters should be set as appropriate for each size of device in the family.</p> <table border="1"> <thead> <tr> <th>Device Designation</th> <th>TFR (L/s)</th> <th>Pollutant Removal</th> </tr> </thead> <tbody> <tr> <td>UPT1200</td> <td>12</td> <td>TSS 89%</td> </tr> <tr> <td>UPT1800</td> <td>30</td> <td>TP 75%</td> </tr> <tr> <td>UPT2400</td> <td>55</td> <td>TN 50%</td> </tr> <tr> <td>UPT3000</td> <td>100</td> <td>Gross Pollutants 90%</td> </tr> <tr> <td>UPT3600</td> <td>160</td> <td></td> </tr> </tbody> </table> <p>Input Properties should reflect those shown below;</p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Influent range</th> <th>Effluent Range</th> <th>Reduction</th> </tr> </thead> <tbody> <tr> <td>Total Suspended Solids (TSS)</td> <td>1000</td> <td>110</td> <td>89%</td> </tr> <tr> <td>Total Phosphorous (TP)</td> <td>5</td> <td>1.25</td> <td>75%</td> </tr> <tr> <td>Total Nitrogen (TN)</td> <td>50</td> <td>25</td> <td>50%</td> </tr> <tr> <td>Gross Pollutants</td> <td>1000</td> <td>100</td> <td>90%</td> </tr> </tbody> </table>	Device Designation	TFR (L/s)	Pollutant Removal	UPT1200	12	TSS 89%	UPT1800	30	TP 75%	UPT2400	55	TN 50%	UPT3000	100	Gross Pollutants 90%	UPT3600	160		Pollutant	Influent range	Effluent Range	Reduction	Total Suspended Solids (TSS)	1000	110	89%	Total Phosphorous (TP)	5	1.25	75%	Total Nitrogen (TN)	50	25	50%	Gross Pollutants	1000	100	90%
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Gross Pollutants	1000	100	90%																																				

<b>Conditions</b>	<p>The limitations of the acceptance of these claims include:</p> <p>The results are reliant on the maintenance of the device being consistent with the manufacturer's guidelines.</p> <p>The life expectancy of the media should be regularly monitored and replaced in accordance with the Manufacturer's Technical Guidelines/Maintenance Manual.</p> <p>The tested device was configured "offline" with flows exceeding the TFR externally bypassing the device. Alternative installations may result in different outcomes.</p> <p>While the device should be capable of capturing Gross Pollutants it has not been optimized for this function</p>
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#### Independent Reviewers

Evaluator	Evaluator
Andrew Allan	Rod Wiese
 <b>AFFLUX CONSULTING</b> STORMWATER MANAGEMENT SOLUTIONS	

#### Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	24-Aug-2023
Acceptance by Stormwater Australia Board of Directors	25-Aug-2023
Verification Issued	31-Aug-2023
Stormwater Australia Verification Certificate Number Reference	SA-2023/07a-VC

Verified under SQIDEP Version 1.3

Field Evaluation Pathway





## UNIVERSAL POLLUTANT TRAP (UPT1800) PARTS TABLE

PART	DESCRIPTION	MFR.	SUPPLIED BY	APPROX. MASS (t)	DRAWING No.	COMMENTS
BASE UNIT (1 PIECE)	01828 SHAFT, 1027 DEPTH O/A, 1 PIECE	HUMES	HUMES	3.97	1	INSTALLED BY CONTRACTOR ON SITE
PUNTH	SS PUNTH ASSEMBLY	BY OTHERS	BY OTHERS		EP-BU-1800-NAT-S1	INSTALLED BY HUMES IN FACTORY
BASE UNIT (2 PIECE)	01828 SHAFT, 1077 DEPTH O/A, 2 PIECE	HUMES	HUMES	4.36	1	INSTALLED BY CONTRACTOR ON SITE
PUNTH	SS PUNTH ASSEMBLY	BY OTHERS	BY OTHERS		EP-BU-181027-NAT-P	INSTALLED BY HUMES IN FACTORY
2 PART FILTER	FILTER CARTER GE'S, PART A FLEATED	BY OTHERS	BY OTHERS	0.87	1	BY OTHERS
TREATMENT CHAMBER SHAFT	01828 ID TC MAIN SHAFT (MIN. DEPTH 1.323m)	HUMES	HUMES	2.16	1	INSTALLED BY CONTRACTOR ON SITE
TREATMENT CHAMBER INSERT	01828 ID TC MAKEUP SHAFT	BY OTHERS	BY OTHERS	-	EP-TC-1800-NAT-B2-P	INSTALLED BY HUMES IN FACTORY
TREATMENT CHAMBER SUPPORT FRAME	TREATMENT CHAMBER INSERT ASSEMBLY	BY OTHERS	BY OTHERS	0.17	1	INSTALLED BY HUMES IN FACTORY
TREATMENT CHAMBER SUPPORT FRAME	SUPPORT FRAME, FABRICATION DETAILS	BY OTHERS	BY OTHERS	-	EP-UPT-1800-NAT-S2-16	INSTALLED BY HUMES IN FACTORY
CONCRETE SURROUND RING	02516 FLAT CONCRETE SURROUND RING	HUMES	HUMES	2.10	1	INSTALLED BY CONTRACTOR ON SITE
RUBBER RING	5mm THICK RUBBER RING	BY OTHERS	BY OTHERS	-	EP-UPT-1800-NAT-B2-P	INSTALLED BY CONTRACTOR ON SITE
CONCRETE LID	02006 O/A c/w 1-0800 OPENING	HUMES	HUMES	1.40	1	INSTALLED BY CONTRACTOR ON SITE
'ANCON' CLUTCHES	2.5I UNICON® CLUTCHES	ANCON	CONTRACTOR	-	ANCON CATALOGUE	PROVIDED BY CONTRACTOR FOR LIFTING
MEGAPOXY (EPOXY) / MASTIC SEALANT	-	HUMES	HUMES	-	N/A	INSTALLED BY CONTRACTOR ON SITE

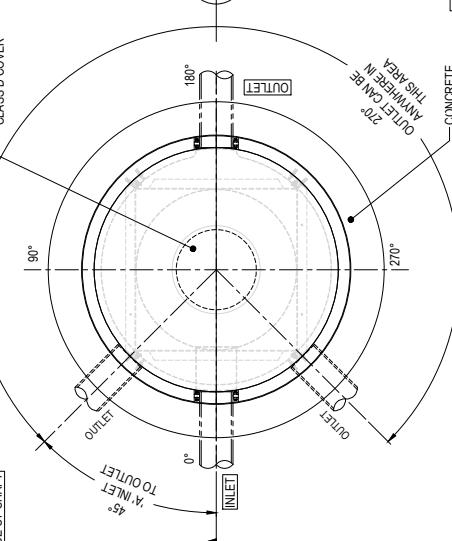
TABLE 3 - PIPES CONNECTION TABLE

REFERENCE	LENGTH (mm)	TYPE	PIPE I/D (mm)	PIPE O/D (mm)	GRADE CONNECTION	GRADE INSTALLED
B	2978	INLET - DN25 UPVC PIPE	225	250	HUME SEAL	0.4%
C	1545	OUTLET - DN25 UPVC PIPE	225	250	HUME SEAL	1.0%

TABLE 4 DIMENSIONS  
FOR TREATMENT CHAMBER DEPTH  
O/A DEPTH WILL VARY AS PER JOB  
SPECIFIC REQ.

ANGLE (degrees)	"A" DIMENSION (mm)
45	787

REFER TO TABLE 2 FOR  
DIMENSIONS MEASURED  
AROUND OUTSIDE  
CIRCUMFERENCE OF SHAFT



PLAN - SITE ARRANGEMENT

SCALE: 1: 20

UNCONTROLLED COPY WHEN PRINTED

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## UNIVERSAL POLLUTANT TRAP (UPT2400) PARTS TABLE

PART	DESCRIPTION	MFR.	SUPPLIED BY	APPROX. MASS (t)	DRAWING No.	COMMENTS
BASE UNIT	Ø2438 SHAFT, 1080 DEPTH O/A, 2 PIECE	HUMES	BY OTHERS	770	1	EP-UPT2400-NAT-B-P
PUNTH	SS PUNTH ASSEMBLY	BY OTHERS	BY OTHERS	1	EP-UPT2400-NAT-B-S-01	INSTALLED BY CONTRACTOR ON SITE
2 PART FILTER	FILTER CARRIERS, PART A & EATED PART B	BY OTHERS	BY OTHERS	0.98	1	BY OTHERS
TREATMENT CHAMBER SHAFT	Ø2438 ID CONCRETE MAIN SHAFT (MIN. DEPTH 1080m)	HUMES	HUMES	5.30	1	EP-TC2400-NAT-B2-P
TREATMENT CHAMBER INSERT	TREATMENT CHAMBER INSERT ASSEMBLY	BY OTHERS	BY OTHERS	-	1	EP-TI2400-NAT-B-S-11
TREATMENT CHAMBER SUPPORT FRAME	SUPPORT FRAME FABRICATION DETAILS	BY OTHERS	BY OTHERS	0.25	1	EP-TI2400-NAT-B-S-16
BRACKEI	TREATMENT CHAMBER SUPPORT FRAME	BY OTHERS	BY OTHERS	-	1	EP-TI2400-NAT-B-S-20
CONCRETE SURROUND RING	Ø3308 FLAT CONCRETE SURROUND RING	HUMES	HUMES	3.50	1	EPSUR2400-NAT-B2-P
COPPER RING	5mm THICK RUBBER RING	BY OTHERS	BY OTHERS	-	1	BY OTHERS
CONCRETE LID	Ø2762 O/A ØW 1- Ø800 OPENING	HUMES	HUMES	3.10	1	EPDL2400-NAT-B2-P
'ANCON' CLUTCHES	5.0t UNICON® CLUTCHES	ANCON	CONTRACTOR	-	4	ANCON CATALOGUE
MEGAPOLY / EPOXY / MASTIC SEALANT	-	-	HUMES	-	AS REQ.	N/A

**TABLE 3 - PIPES CONNECTION TABLE**

TYPE	PIPE ID (mm)	PIPE OD (mm)	CONNECTION	GRADE	INSTALLED
INLET - DN225 UPVC PIPE	225	250	HUMESAL	10%	
OUTLET - DN225 UPVC PIPE	225	250	HUMESAL	1.5%	

**TABLE 2**

ANGLE (degrees)	"A" DIMENSION (mm)
45	1080
180	4319

**TABLE 4 - DIM TABLE**  
REFERENCE LENGTH (mm)  
FOR TC DEPTH & INLET  
SPECIFIC REQ.

REFERENCE	LENGTH (mm)
B	O/A DEPTH
D	TREATMENT CHAMBER DEPTH (MIN)
E	BASE DEPTH
F	INLET I.L. (MIN)
G	INLET I.L. (MIN)
H	OUTLET I.L. (MIN)
C	O/A OPENING Ø

**MAKE-UP (MU) SHAFT MAYBE REQUIRED AS PER PROJECT REQUIREMENTS**

PRECAST CONCRETE  
LID WITH Ø800 CAST  
IRON CLASS D COVER

HUMESAL

TREATMENT CHAMBER SHAFT

2 PART FILTER

MEGAPOLY CONCRETE JOINT

TO ENSURE WATER TIGHT

INSTALLATION BY

CONTRACTOR ON SITE

S/S PLINTH

BASE UNIT

WALL

152

205

250

300

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## UNIVERSAL POLLUTANT TRAP (UPT3000) PARTS TABLE

PART	DESCRIPTION	MFR.	SUPPLIED APPROX. MASS (t)	DRAWING No.	COMMENTS
BASE UNIT	03060 SHAFT, 1251 DEPTH O/A, 2 PIECE	HUMES	116t	EP-BU-301251NAT-P	INSTALLED BY CONTRACTOR ON-SITE
PUNTH	SS PUNTH ASSEMBLY	BY OTHERS	HUMES	1	EP-UPT-3000-NAT-SS-01 INSTALLED BY HUMES IN FACTORY
2 PART FILTER	FILTER CARRIERS, PART A & PART B	BY OTHERS	1.23	1	BY OTHERS
TREATMENT CHAMBER SHAFT	03060 ID TC MAIN SHAFT (MIN. DEPTH 1615m)	HUMES	7.20	1	EP-TC-3000-NAT-B2-P INSTALLED BY CONTRACTOR ON-SITE
TREATMENT CHAMBER INSERT	TREATMENT CHAMBER INSERT ASSEMBLY	BY OTHERS	-	1	EP-TC-3000-NAT-B2-P INSTALLED BY HUMES IN FACTORY
TREATMENT CHAMBER SUPPORT FRAME	SUPPORT FRAME FABRICATION DETAILS	BY OTHERS	0.35	1	EP-UPT-3000-NAT-SS-11 INSTALLED BY HUMES IN FACTORY
BRACKEI	SUPPORT FRAME BRACKETS DETAILS	BY OTHERS	-	1	EP-UPT-3000-NAT-SS-16 INSTALLED BY HUMES IN FACTORY
CONCRETE SURROUND RING	04022 FLAT CONCRETE SURROUND RING	BY OTHERS	5.00	1	EPS-3000-NAT-B2-P INSTALLED BY CONTRACTOR ON-SITE
RUBBER RING	5mm THICK RUBBER SURROUND RING	BY OTHERS	-	1	BY OTHERS
CONCRETE LID	03460 O/A CONC. LID O/W - 600 OPENING	HUMES	5.30	1	EP-AD-3000-NAT-B2-P INSTALLED BY CONTRACTOR FOR LIFTING
'ANCON' CLUTCHES	5.0t UNICON CLUTCHES	ANCON	-	4	ANCON CATALOGUE PROVIDED BY CONTRACTOR FOR LIFTING
'ANCON' CLUTCHES	10.0t 'UNICON' CLUTCHES	ANCON	-	4	ANCON CATALOGUE PROVIDED BY CONTRACTOR FOR LIFTING
MEGAPOXY / EPOXY / MASTIC SEALANT	-	HUMES	-	N/A	INSTALLED BY CONTRACTOR ON-SITE

**TABLE 3 - PIPES CONNECTION TABLE**

TYPE	PIPE ID (mm)	PIPE O/D (mm)	CONNECTION	GRADE INSTALLED
INLET - DN300 UPVC PIPE	300	316	EPOXY MORTAR	0.8%
OUTLET - DN300 RCP CLASS 2 PIPE	300	316	EPOXY MORTAR	1.25%
INLET - DN300 RCP CLASS 2 PIPE	300	362	EPOXY MORTAR	0.8%
OUTLET - DN300 RCP CLASS 2 PIPE	300	362	EPOXY MORTAR	1.25%

**TABLE 4 - DIM TABLE**  
FOR TC DEPTH & INLET  
WILL VARY AS PER JOB  
SPECIFIC REQ.

REFERENCE	LENGTH (mm)
B	O/A DEPTH
D	TREATMENT CHAMBER DEPTH
E	BASE DEPTH
F	OUTLET I.L.
G	INLET I.L.
H	OUTLET t
C	O/A OPENING Ø
Q	CONCRETE LID
Q	CONCRETE SURROUND

MAKE-UP (MU) SHAFT MAYBE  
REQUIRED AS PER PROJECT  
REQUIREMENTS

CONCRETE LID WIDTH  
O/600 CAST IRON  
CLASS D COVER

CONCRETE SURROUND  
O/360 O/D

CONCRETE SURROUND  
O/4022 O/D

CONCRETE SURROUND  
O/360 O/D

**TABLE 2**  
**FIXED DIMENSION CANNOT VARY**

ANGLE (deg)	"A" DIM (mm)
45°	1338
270°	8031

**TABLE 1**

MIN 45°  
TO OUTLET  
MIN 45°  
TO INLET

MAX 270°  
TO OUTLET  
MAX 270°  
TO INLET

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