



# Corporate Profile

I N T E G R A T E D   W A T E R   S O L U T I O N S





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## Our Products

### Primary Treatment

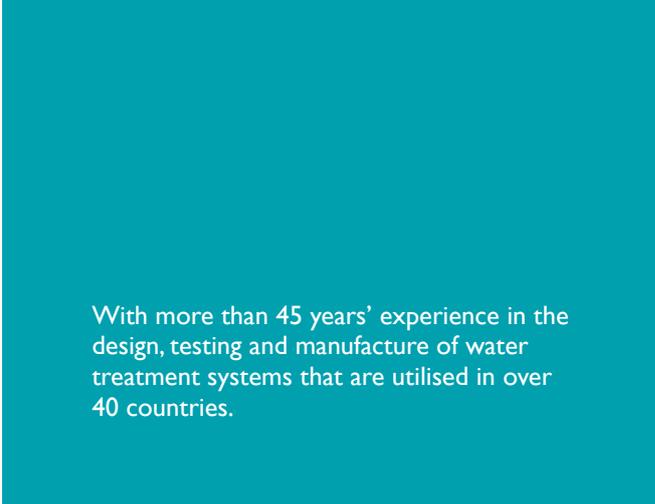
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With more than 45 years' experience in the design, testing and manufacture of water treatment systems that are utilised in over 40 countries.

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# Introduction & Overview

Removing pollutants from water is an ongoing challenge for communities worldwide. As environmental regulations increase, cost-effective and high-performing solutions to remove contaminants become integral.

At SPEL Environmental, we draw on more than 45 years' experience in the design, testing and manufacture of water treatment systems that are utilised in over 45 countries.

## International Experience

SPEL manufactures solutions in Australia, New Zealand, the United Kingdom and USA, and licenses several international technologies. All products are designed and manufactured to comply with relevant industry standards. SPEL Environmental and its international partners are involved in ongoing field and laboratory testing of the products to independently verify performance.

The products have been designed for and installed in the following applications:

- Mining
- Petroleum industry
- Energy
- Defence
- Air, sea and land transport infrastructure
- Commercial and residential developments.



## Efficient products, Tailored service

Our focus is on providing highly efficient treatment products for stormwater and wastewater applications. Our unique combination of technical experience and product design provides to our customers an organisation that includes:

- Engineering Design
- Manufacturing
- Installation
- Onsite Supervision
- Commissioning
- Operational monitoring and
- Maintenance

SPEL Environmental treatment solutions vary from systems based on proven engineering principles through to flexible biological processes. Our diverse range of products provides our customers with various options to achieve their water quality objectives to suit their budget and site constraints.





# Accreditation

At SPEL Environmental, we do not just speak about our commitment to the environment, we take action to ensure a better future for our families, friends and everyone.

We are constantly looking to improve our products and services to bring more value to our clients and their projects. We also engage with reputable industry partners to ensure better industry standards and organise frequent conferences.

Remember at SPEL Environmental, we are the water specialists.

## Quality Products & Systems

Our commitment is unmatched in the industry and is constantly improving our products and services as demonstrated by our ongoing accreditation for Quality and Environmental Management.



**ISO9001:2008**  
CERTIFIED COMPANY

**Qual-**



**ISO14001:2004**  
CERTIFIED COMPANY

**Environmental**

## Industry Partners

Our industry experience and expertise in providing high-quality water solutions has enabled us to obtain preferred-supplier status with many councils and government authorities around Australia, New Zealand, UK and other countries.





# Commitment To Environmental Protection

SPEL Environmental specialises in the design and manufacture of quality improvement solutions for stormwater and wastewater. Solutions are tailored to effectively remove gross pollutants, suspended solids, nutrients and petroleum hydrocarbons.

SPEL Environmental's range of products provide treatment for:

- High risk sites (fuel storage/refuelling)
- High load industrial sites, wash bays, stockpile hardstands
- Shopping precincts and commercial premises
- Residential developments (WSUD)

As a part of a treatment train, SPEL Environmental products will assist designers to comply with Water Sensitive Urban Design (WSUD) objectives and achieve optimum yields from the site.

SPEL Environmental selection guide will help determine the risk applicable to your site and assist in choosing the appropriate class of SPEL™ treatment device.

## Manufacturing Quality Assurance

SPEL fibreglass tanks are filament wound by an advanced, patented, chop hoop filament winding process. This process produces not only circumferential strength as found in helical wound tanks, but also high longitudinal strength. The interlaminar shear strength permits manholes and pipe work to be fabricated to suit the site conditions without any undue loss in strength. Tanks shell design conform to A.S.2634-1983.



“The protection and care of the environment is the responsibility of every one.”

# Field Testing

## SPEL Hydrosystem Field Testing in Brisbane



Field testing carpark runoff through a SPEL Hydrosystem for TSS, Nutrients, Hydrocarbons and Heavy Metals.

## Floating Wetlands Field Testing at Bribie Island QLD



Field testing 100m<sup>2</sup> of SPEL Floating Wetlands receiving runoff from a 7.46ha residential catchment for the reduction of Suspended Solids, Nitrogen and Phosphorous.

## Stormsack & SPELFilter Treatment Train Field Testing at Redlands QLD



Field testing of the StormSack and SPELFilter on a 2,028m<sup>2</sup> medium density townhouse catchment for reduction of Suspended Solids, Nitrogen and Phosphorous.

## Puraceptor Class I Field Testing at a Service Station on the Gold Coast QLD



Capturing the under canopy area and fill box and flow weight field testing for hydrocarbon removal in operational service station.

## SPELBasin Modular Bioretention System



Field testing the SPELBasin treating road runoff on the Sunshine Coast for reduction of TSS, Nutrients and Heavy Metals.

## Stormceptor Class I Field Testing on Commercial development at Nambour QLD



# Design & testing

## Testing

SPEL Environmental and our International technology partners test our products in a range of environments and conditions to meet local regulatory requirements. Testing includes laboratory and field research.

SPEL Environmental conducts regular grab sample testing for our customers, and have engaged with independent research bodies across Australia to monitor systems under both laboratory and field conditions.

### Independent Testing in Australia

Demonstrating our commitment to continuous improvement, we have invested in many flow weighted, automated water sample lab and field testing with respected partners such as Manly Hydraulic Labs, the Universities of Sunshine Coast and South Australia, Griffith University and the Queensland University of Technology.

Our SPEL stormwater treatment devices have undergone rigorous and comprehensive tests in full scale flow conditions, both in the field and at independant hydraulics research facilities — in particular for suspended solids (TSS), nutrients and hydrocarbons.



## Field-testing for improved water quality

We aim to achieve high pollutant removal performance whilst maintaining hydraulic efficiency of all the stormwater quality improvement devices. While some of the research work is done in the laboratory, our main emphasis is on field-testing products to ensure they will deliver in real world applications.

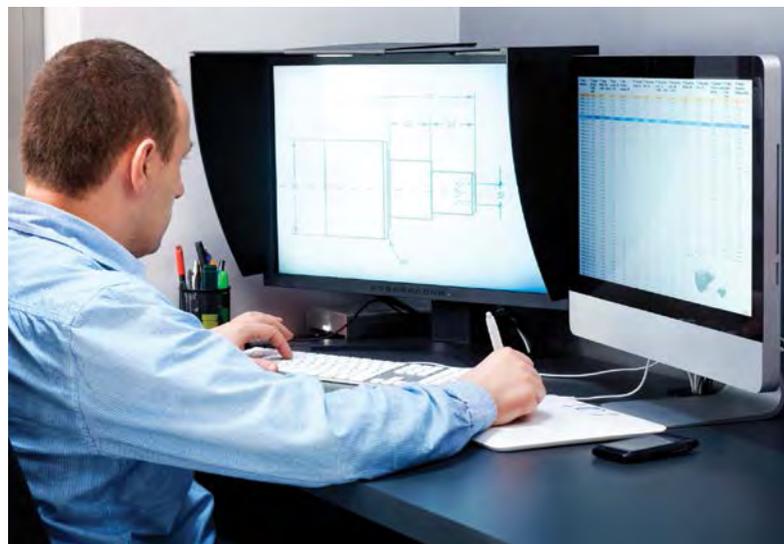
Universities are conducting field testing on SPEL water quality improvement devices for a wide range of problems, including:

- Nutrients in both soluble and particulate form
- Suspended solids
- Hydrocarbon runoff

## Design

The SPEL Environmental design team is committed to continual improvements of both structure and water quality across the diverse range of products used in the storm water and wastewater industries.

We are continuing the standard of excellence with the latest and most up-to-date equipment to ensure the development of high quality, efficient, environmentally sensitive products. The use of AutoCAD, Solid Works, 3D Modelling, FEA Analysis are only a part of the detail used to enhance our products.





# Our company philosophy

## Our mission

Engender and maintain a culture of ingenuity that continuously contributes to the improvement of the world's water and waste water quality and compliance standards.



## Our vision

To be the leader in the water and waste water industry that provides the gateway to best practice, competitive solutions.

## Our corporate values

At SPEL Environmental, our clients are served by professional, knowledgeable and efficient people. We build relationships based on:

### Objectivity

We critically examine our solutions to ensure they align with our clients' objectives and desired outcomes.

### Integrity

We always act with the utmost integrity, and choose what is ethical and right for our clients and the environment.

### Respect

We treat our work colleagues, our clients, our suppliers and the community with respect.

### Innovation

We encourage innovation, continuous improvement and learning.



# SPEL STORMSACK

## At Source Gross Pollutant Trap

The SPEL StormSack is specifically designed for the capture of gross pollutants: sediment, litter, and oil and grease. Ideally suited for municipal storm drain retrofits, the SPEL StormSack's unique design allows maintenance to be performed using conventional vacuum suction equipment.

### Benefits

- Can be modelled in MUSIC in conjunction with bio-retention
- Low cost gross pollutant capture
- Quick & easy installation
- Simple maintenance
- At source capture
- Adjusts to custom pit sizes

### APPLICATIONS

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Council Storm Drain Retrofits

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Commercial/Retail/Residential

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Litter Prone Urban Areas

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Scrap Metal/Solid Waste/Oil Storage/Etc

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Part of Treatment Train

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Construction Sediment/Erosion

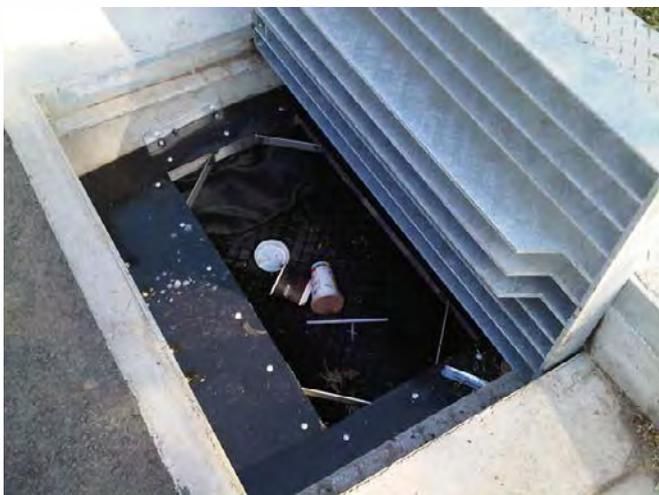
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<200 micron capture

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Photo depicts light duty frame



# SPEL STORMSACK

## At Source Gross Pollutant Trap

An all too common issue with today's highly impervious landscape is how to meet stormwater regulations with limited budgets and tight space constraints.

SPEL StormSack filtration solutions are highly engineered water quality devices that are deployed directly in the stormwater system to capture contaminants close the surface for ease of maintenance. Easily retrofitted into new or existing structures, SPEL StormSack filtration technology is a decentralized approach to stormwater treatment that essentially repurposes traditional site infrastructure and customizes it to meet specific site water quality goals. In this way, it satisfies important objectives of today's LID (Low Impact Development) criteria.

From an operations perspective, catch basins with SPEL Stormsack filters are also easier and quicker to clean out because pollutants are trapped just under the grate.

The SPEL StormSack is specifically designed for the capture of gross pollutants: sediment, litter, and oil and grease. Ideally suited for municipal storm drain retrofits, the SPEL StormSack's unique design allows maintenance to be performed using conventional vacuum suction equipment.



Application	Regulatory Issue	Target Pollutants
Council Storm Drain Retrofits	At-source litter capture	Sediment, Litter, O&G
Commercial/Retail/Residential	Stormwater Compliance	Sediment, Litter, O&G
Litter Prone Urban Areas	Cost effective litter control	Litter ≥ 5 mm
Scrap Metal/Solid Waste/Oil Storage/Etc	Industrial Multi-Sector General Permit	Gross Pollutants, O&G
Part of Treatment Train	Council Stormwater Quality Improvement Targets	Sediment, Litter, O&G
Construction Sediment/Erosion	Sediment Control Plan	Sediment/Erosion Control

Features of the heavy duty model	
1.	Durable, aluminum frame construction
2.	Integral oil boom effectively captures oil and grease from spills
3.	Patented dovetailed flange – allows 12cm of length/width field adjustment
4.	Polypropylene netting protects sack from suction hose during maintenance
5.	Steel clip with locking tab holds replaceable filter sack in place
6.	Baffled bypass traps floatables



Standard SPEL Stormsack to suit Pit Sizes
450x450mm
600x600mm
900x600mm
900x900mm

Custom sizes (i.e. 1200x900mm) can be manufactured on short lead times

# SPEL STORMSACK

## At Source Gross Pollutant Trap

### Specifications & Details

#### General Description

This technology is a post developed stormwater treatment system. The SPEL StormSack provides effective filtration of solid pollutants and debris typical of urban runoff, while utilising the existing or new storm drain infrastructure. The StormSack is designed to rest on the flanges of conventional catch basin frames and is engineered for most hydraulic and cold climate conditions.

#### Installation And Maintenance

Installation procedures shall include removing the storm grate, cleaning the ledge of debris and solids, measuring catch basin clear opening and adjusting flanges to rest on grate support ledge. Install SPEL StormSack with splash guard under curb opening so the adjustable flanges are resting on the grate support ledge. Install corner filler pieces. Reinstall storm grate directly on support flanges [rise shall be no more than 1/8 inch (3 mm)].

Maintenance: Typically the SPEL StormSack is serviceable from the street level, and therefore maintenance does not require confined space entry into the catch basin structure. Mostly the StormSack is emptied by simply lifting the device out of the pit and emptying the contents into a bin to go to landfill. The unit is designed to be maintained in place with a vacuum hose attached to a sweeper or a vactor truck. The oil boom is also designed to easily be replaced from the street level. Use only SPEL replaceable parts.

#### Field Performance

The SPEL Stormsack was introduced to the Australian market in 2012 and field testing is underway at locations in South-east Queensland. The site is a townhouse development located at Ormiston, southeast Queensland. The research was undertaken to evaluate the effectiveness of a 200 micron mesh pit basket in a 900 square format for removing total suspended solids and nutrients from stormwater runoff. The monitoring protocol was developed with Queensland University of Technology (QUT), reflecting the Auckland Regional Council Proprietary Device Evaluation Protocol (PDEP) and United States Urban Stormwater BMP Performance Monitoring Manual with some minor improvements reflecting local conditions. During an 18 month period, more than 30 rain events have occurred, of which nine comply with the protocol. The Efficiency Ratio (ER) observed for the the StormSack treatment devices are 32% total suspended solids (TSS), 37% for total phosphorus (TP) and 38% total nitrogen (TN) for the pit basket. Laboratory testing has shown capture of 99.99% of gross pollutants up to the bypass flow rate.\* Further results will be provided as they become available.



Photo depicts operation without the grate

#### Products

##### Material and Design

- Adjustable Flange and Deflector: Aluminum Alloy 6063-T6
- Splash Guard: neoprene rubber
- Stormsack: woven polypropylene geotextile with US Mesh 20
- Corner Filler: Aluminum Allow 5052-H32
- Lifting Tabs: Aluminum Allow 5052-H32
- Replaceable Oil Boom: polypropylene 76mm diameter
- Mesh Liner: HDPE, diamond configuration
- Support Hardware: CRES 300 Series

##### Typical Performance Characteristics

- Debris capacity: 0.24 m<sup>3</sup>
- Filtered flow rate: 207 lps
- Primary baffled bypass flow rate: 119 lps
- Secondary bypass flow rate: 10 lps
- Total bypass flow rate: 30 lps
- Oil boom sorption capacity: 11 L

Recommended minimum clearance from bottom of SPEL StormSack to inside bottom of vault is 50 mm

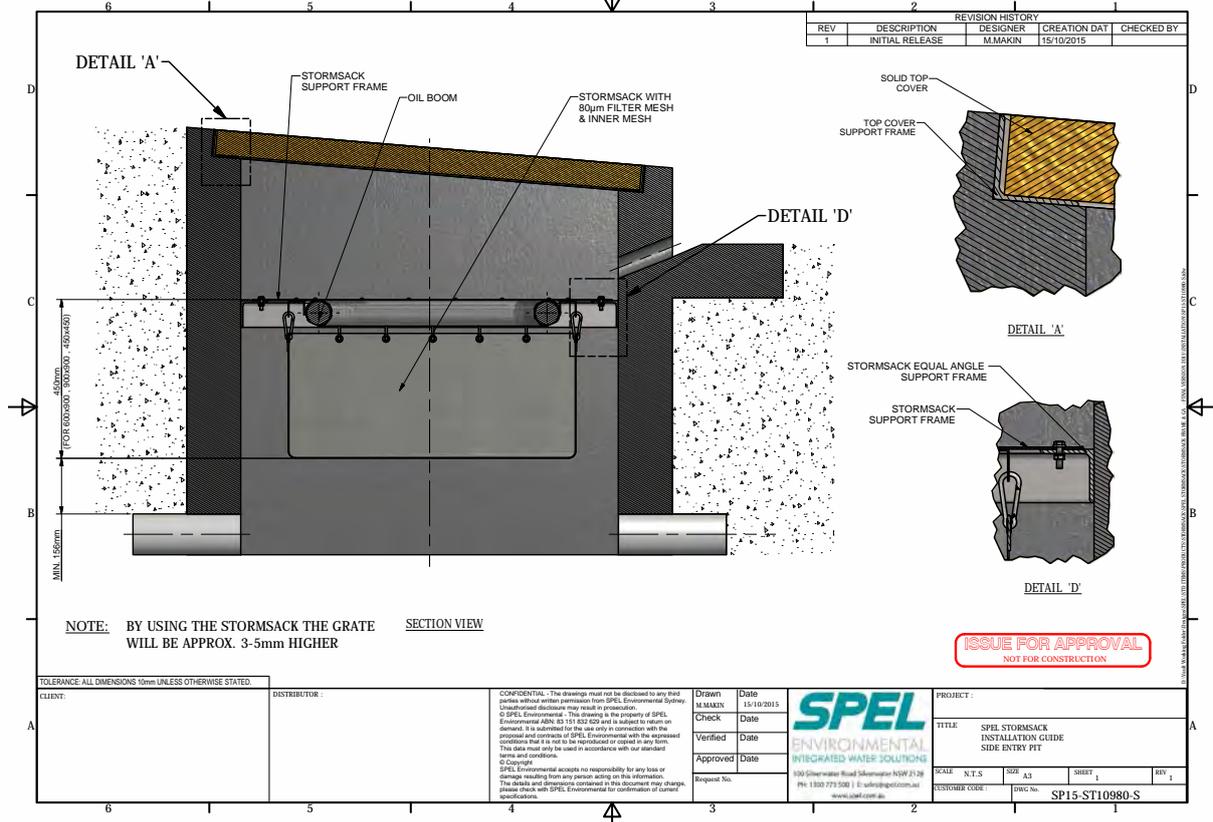
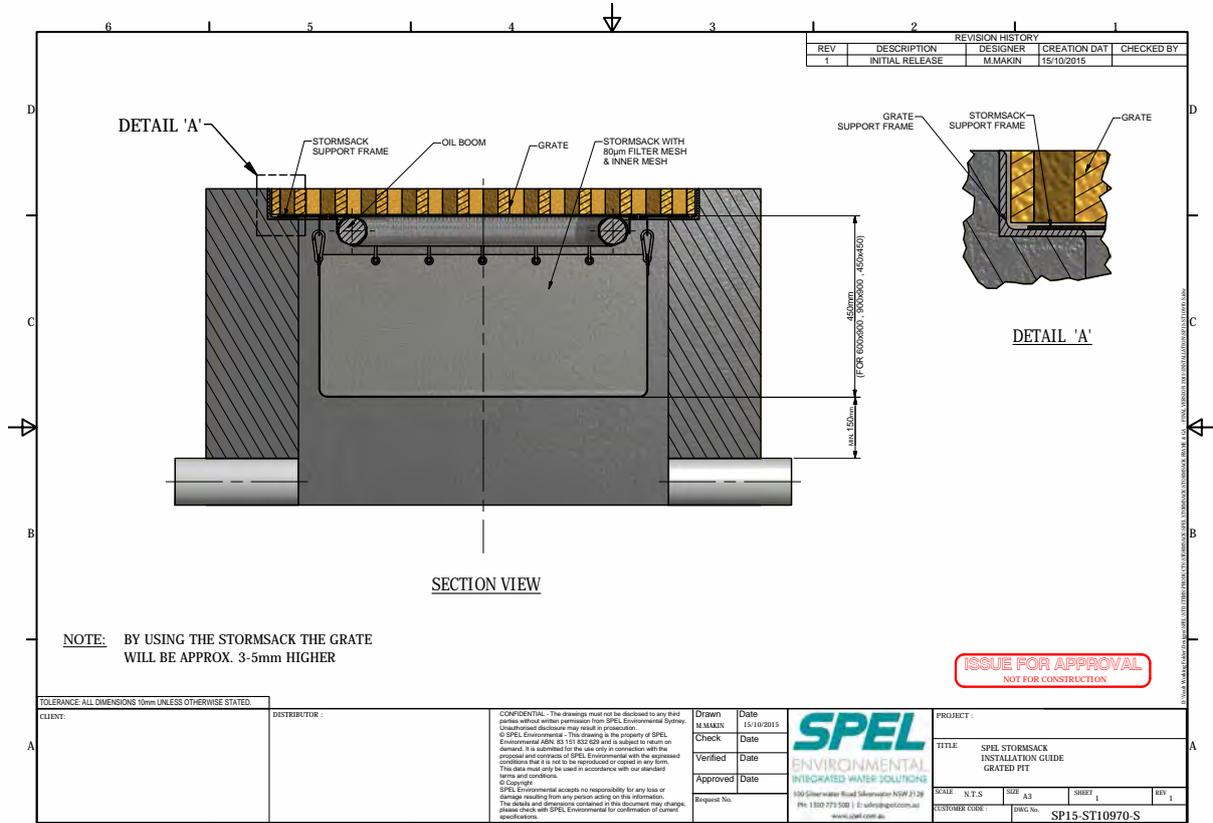
Typical frame adjustability range of 127 mm in each direction.



# SPEL STORMSACK

## At Source Gross Pollutant Trap

### Technical Drawings



# SPEL ECOCEPTOR

## In-line Gross Pollutant Trap (GPT)

SPEL Ecoceptor is a vertically configured gross pollutant trap, sediment and light liquids separator suitable for low risk applications. Manufactured from fibreglass or polyethylene to enable lightweight construction, "the Ecoceptor is designed for use in stormwater drains.

Flow rates on standard units of up to 1400 LPS and can fit pipe sizes from 225mm to 1350mm (other sizes available on request.)

### APPLICATIONS

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Shopping Precincts

---

Commercial Zones

---

Recreational Grounds

---

Light Industrial Areas

---

Beaches & Parks

---



Independently tested for reducing

- ✓ Total suspended solids (TSS)
- ✓ Gross pollutant solids (GP)
- ✓ Light liquids (low risk only, incidental & occasional oil leaks)
- ✓ Total phosphorous



# SPEL ECOCEPTOR

## In-line Gross Pollutant Trap (GPT)

### Overview

The SPEL Ecoceptor is a hydrodynamic in-line Gross Pollutant Trap (GPT) that has a unique treatment action producing low velocity conditions resulting in discharge water quality outcomes complying to statutory guidelines across Australia.

It separates and captures sediments, silt, total suspended solids, and oil and grease. Oil & grease rise to the "oil-capture" zone of the treatment chamber and are contained in all flow events.

Areas with a high fraction of impervious surfaces, including car parks, ports, streetscapes, roads, subdivisions and industrial estates that require stormwater treatment are ideal for the SPEL Ecoceptor. MUSIC node is available on request.

The one-piece, self-contained fibreglass construction, is lightweight and yet robust in strength making it simple and cost-effective when performing installations.

The SPEL Ecoceptor is delivered to site fully assembled saving on installation time and crane costs. The SPEL Ecoceptor fibreglass GPT can be installed in all types of trafficable zones, including vehicular truck (Class D).

The cylindrical shape of the SPEL Ecoceptor with its sloped cone-configured base ensures sediment accretes at the centre of the Ecoceptor's base facilitating easy and simple cleaning.

The poly/fibreglass construction ensures that oil and grease are removed without sticking to the sides of the internal walls.

Flow rates on standard units of up to 1400 LPS and can fit pipe sizes from 225mm to 1350mm (other sizes available on request).



# SPEL ECOCEPTOR

## In-line Gross Pollutant Trap (GPT)

### Maintenance

#### Inspection and Cleaning

The regularity of inspections of the SPEL Ecoceptor is contingent on the features and properties of the catchment area.

SPEL recommends inspection of the Ecoceptor one month after installation to determine the volume of trapped silt and pollutants.

Information sourced can be useful in factoring the frequency of on-going inspections or cleaning operations.

In the event of excessive rain or an oil spill, an inspection is recommended immediately.

Ascertain silt depth and if build-up is evident, then a vacuum-loader truck should be engaged for the cleaning of the tank.

SPEL Ecoceptor cleaning procedure is simple, by lifting the external lid (two persons may be required), resting it securely in a safe manner and then inserting suction hose into the chamber.

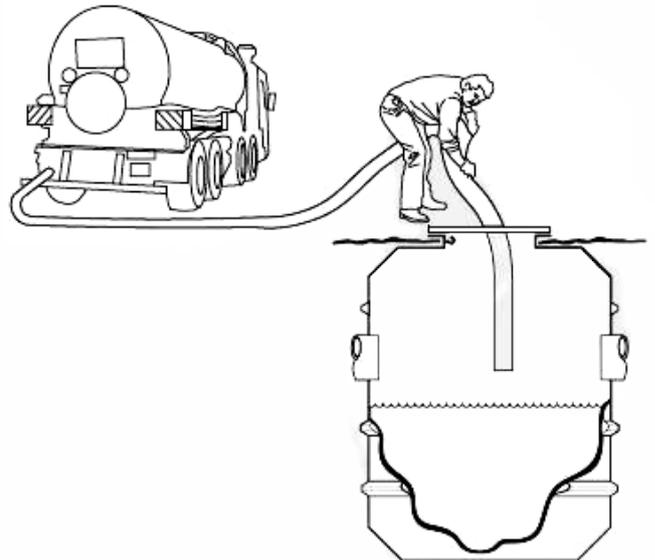
Ensure that the chamber is thoroughly cleaned of all refuse and debris before accessing the chamber - if required.

The chamber is cleaned by inserting the suction hose through the manhole at ground level.

Always commence cleaning from the inlet side of the chamber and ensure on completion of the cleaning operation that the lid is secured to its normal position (and locked if necessary) before departing the site.

### Important

SPEL Environmental takes safety seriously and recommends that prior to the entry of any of its devices, that maintenance personnel undertake relevant safety checks and use appropriate safety equipment. SPEL devices are considered confined spaces and should only be entered by appropriately trained and certified personnel with the necessary safety equipment.



# SPEL ECOCEPTOR

## In-line Gross Pollutant Trap (GPT)

### Class 3 Ecoceptor

“Class 3 Ecoceptor” act as gross pollutant traps and at the same time improves stormwater quality.

They separate and capture gross pollutants, sediments and silt. Light liquids (petroleum hydrocarbons) rise to the top of the lower chamber while sludge settles on the bottom.

### Features

- Unique “V-screen” collects gross pollutants
- Easy access to all parts for desludging and oil removal
- Can handle high flows
- By-pass operation when very heavy rain persists, preventing “back up”
- Units are factory-made to suit any application
- Fibreglass construction
- Minimum on-site labour costs
- Flow rates up to 1400 LPS

### Options:

- Trafficable lid types
- Different pipe configurations and sizes
- Manhole risers
- Larger tanks



DIFFERENT SIZES & TYPES AVAILABLE ON REQUEST

CLASS 3 ECOCEPTOR

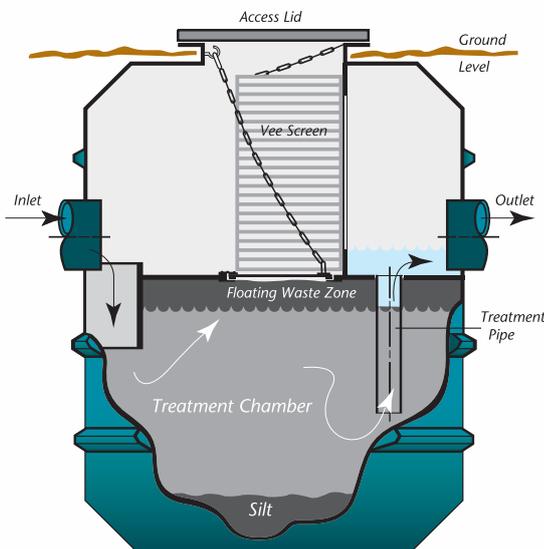
## APPLICATIONS

Car Parks

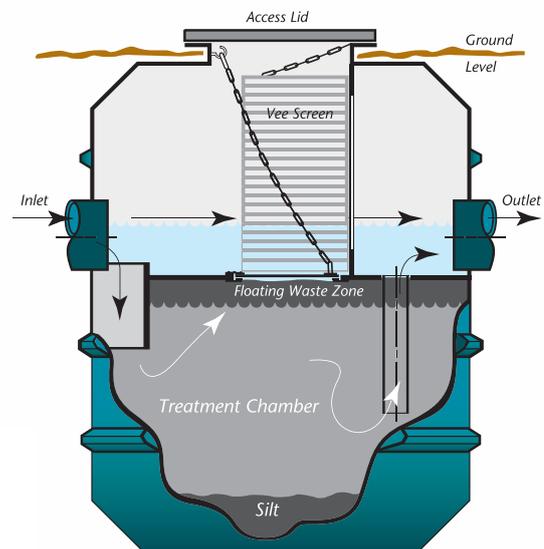
Industrial Estates

Town Houses

VIEW OF V-SCREEN THROUGH MANHOLE



FIRST FLUSH FLOW

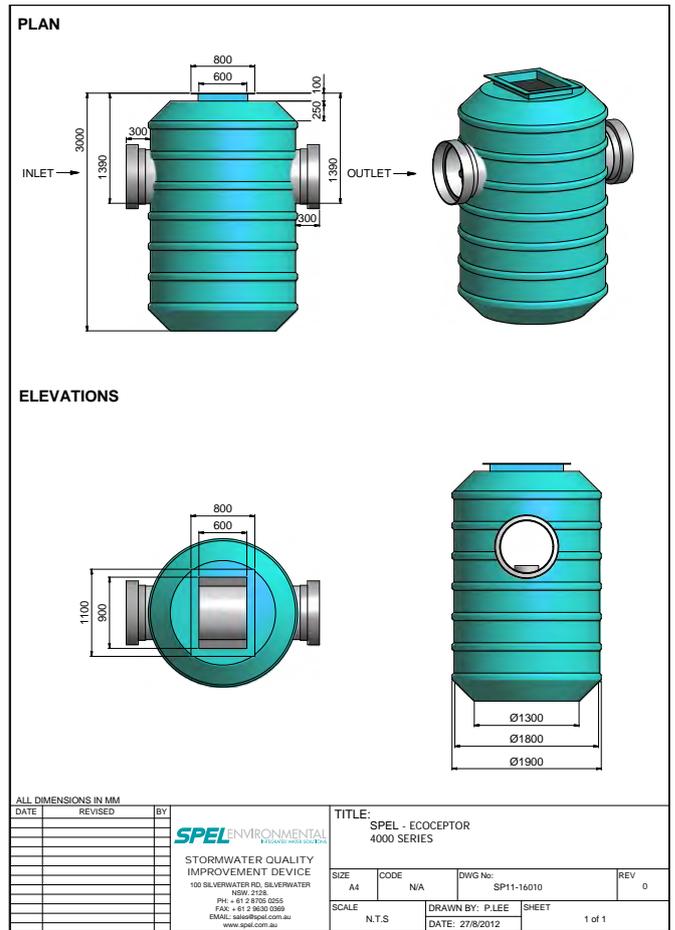
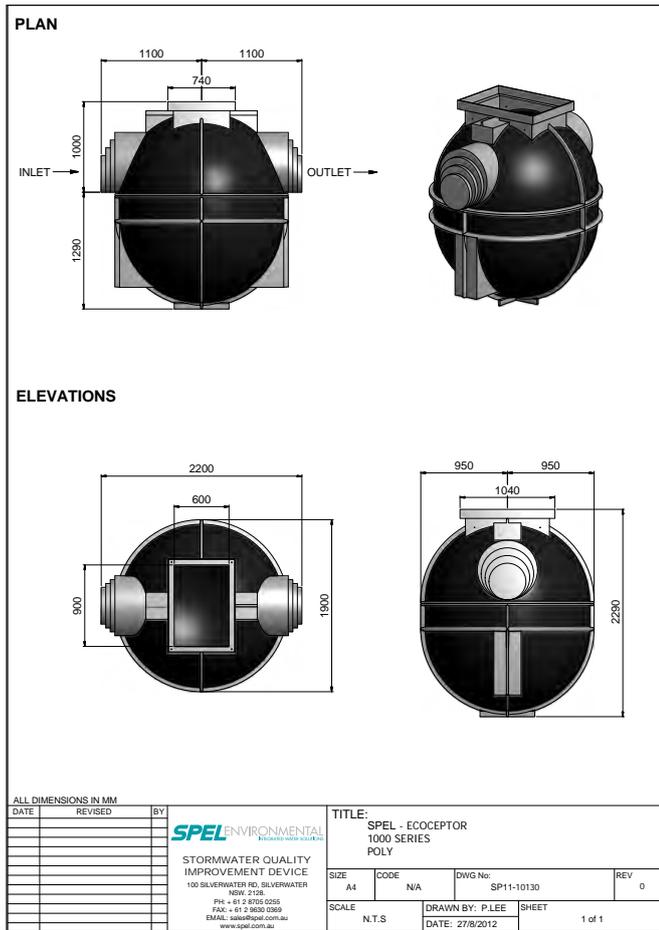


FULL TREATMENT FLOW

# SPEL ECOCEPTOR

## In-line Gross Pollutant Trap (GPT)

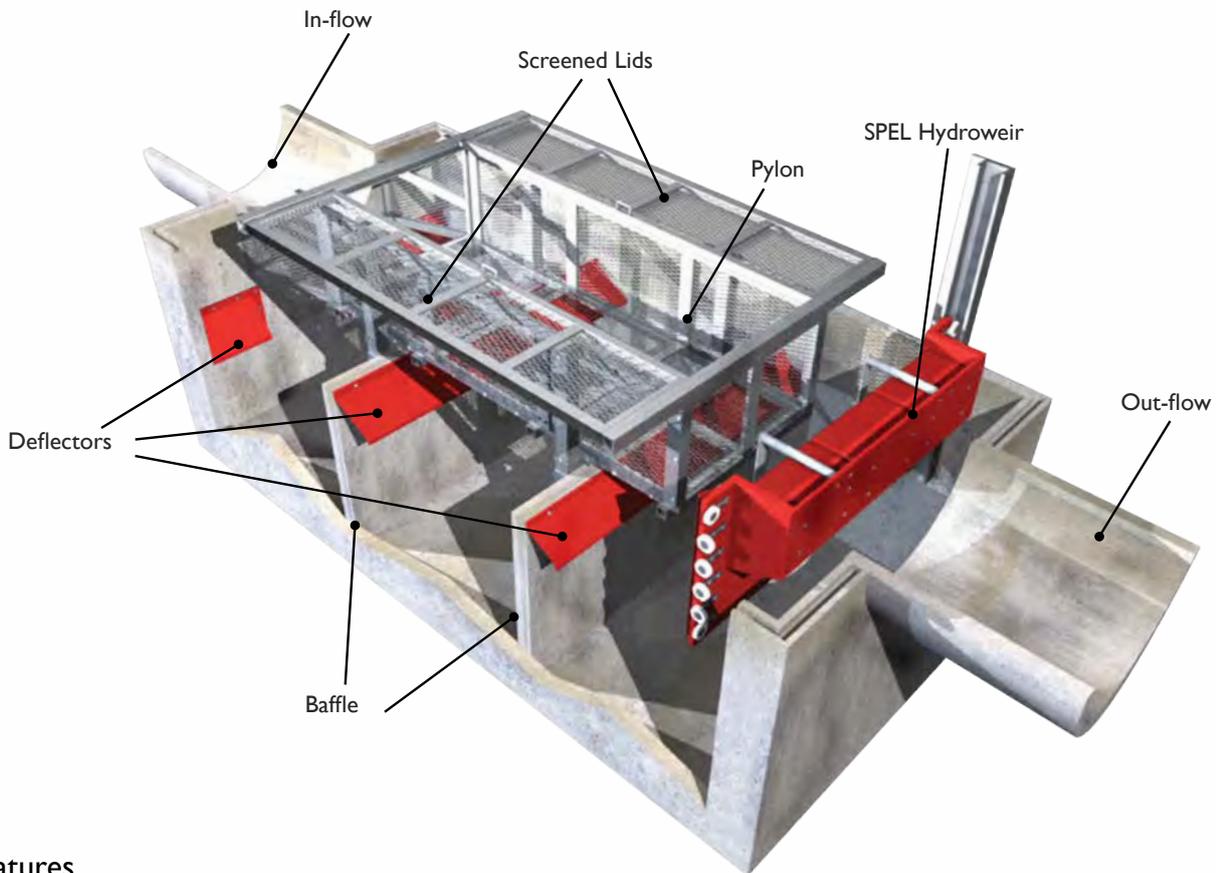
### Technical Drawings





# SPEL BAFFLE BOX

## Hydrocarbon Management

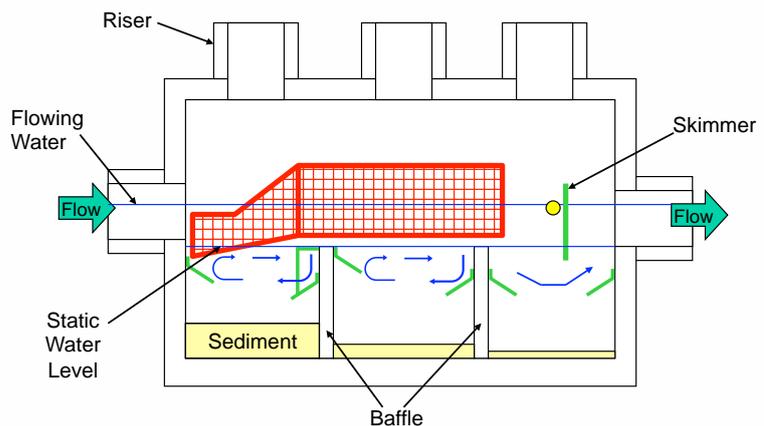


### Features

- Pollutant separating baffle box
- Treats the entire flow
- Minimal head loss with floating weir
- Separates foliage - maintaining a dry storage
- Ideal retrofit capability
- Quick & easy to install
- Fits within existing easements
- Multiple inflows

### APPLICATIONS

- Council Storm Drain Retrofits
- Commercial/Retail/Residential
- Litter Prone Urban Areas
- Scrap Metal/Solid Waste/Oil Storage/Etc
- Part Of Treatment Train
- Construction Sediment/Erosion



# SPEL BAFFLE BOX

## Hydrocarbon Management



Glenmore Park New South Wales - Gross Pollutants captured after first rain event

### SPEL View Observation Cover

The SPELView Observation Cover is the perfect addition for your Outreach or Educational projects. Constructed of aluminum reinforced fiberglass panels, the SPELView Observation Cover is built to last.

Available in custom colors it is sure to blend into the surrounding landscape yet draw the attention it deserves. When compared to other viewing products on the market, the SPELView Observation Cover is the “clear choice”. Educational signage is included with every SPELView Observation Cover illustrating to the public how the treatment system works and the benefits the Pollutant Separating Baffle Box provides.



# **SPEL** PURACEPTOR CLASS I

## Hydrocarbon Management - Service Stations



### Standards & Guidelines for Petrol Station Stormwater Pollution Control

There is no Australian Standard for oil/water separators. There are only guidelines for hydrocarbon discharge limits for stormwater discharge.

All State and territory regulating environmental authorities (or EPA) have guidelines with varying terminology stating that hydrocarbons are not to be visual (10ppm) in stormwater and receiving waters.

#### European Standard

(oil and petrol separators)

In the absence of an Australian Standard, the European British Standard BSEN 858-1:2002 applies when compliance is the regulating issue.

It is the world's most stringent standard for hydrocarbons separation for the use of oil/petrol separators in surface water drainage systems. Prevents the emission of petrol odours.

#### Australian Runoff Quality

The Australian Runoff Quality A Guide to Water Sensitive Urban Design (Engineers Australia) 8 Chapter 9 'Hydrocarbon Management' refers to The Standard and the European Agency UK Oil Separator Selection and Design for petrol stations.

#### Non-Compliant Sites

Petrol stations with the following defects.

- Canopy drip line that does not allow for the 10 degree inset
- Fuel hose line that reaches outside the drip line
- Fuel bowsers that have no canopy
- Defective Oil/Water plate separator (Sewer connected)



PICTURE SHOWS AN UNDERSIZED CANOPY WITH FUEL PUMPS OUTSIDE THE CANOPY DRIPLINE

# SPEL PURACEPTOR CLASS I

## Hydrocarbon Management - Service Stations



PICTURE SHOWS A COMMON SITE AT PETROL STATIONS - UNCOVERED FUEL PUMPS.



PICTURE SHOWS A DEFECTIVE FORECOURT DESIGN WITH OILS AND FUELS DISCHARGING DIRECTLY TO THE STREET DRAIN.



UNSEEMLY & HIGHLY VISIBLE HYDROCARBONS POLLUTING THE STORMWATER. THE CONCENTRATION IN THE PICTURE IS IN EXCESS OF 10PPM

### Solution for Non-Compliant Petrol Stations

**SPEL Puraceptor Class I** stormwater treatment system is a solution for the treatment, capture and retention of hydrocarbons off petrol stations.

Existing operations can be retro-fitted with the SPEL Puraceptor Class I to ensure compliance with relevant environmental guidelines, and capture any potential spills.

**SPEL's Puraceptor Class I** oil/water separator is connected to the stormwater providing the site with the highest degree of environmental protection; - a protection that complies with council and EPA guidelines.



PETROL FORECOURT AND SURROUNDS AT A BUSY METROPOLITAN PETROL STATION RENDERED COMPLIANT. THE CATCHMENT CONSISTS OF A GRATED DRAIN ENCOMPASSING THE COMPLETE PERIMETER OF THE UNDER-SIZED CANOPY. SURFACE WATER AND FORECOURT RUNOFF DRAINS TO THE PURACEPTOR LOCATED UNDER THE TWO TRAFFICABLE COVERS IN THE FOREGROUND.

### Puraceptor Certification

#### Australian Independent Tests

The Puraceptor has been independently tested at the internationally-respected University of South Australia (UNISA) and at the UK's leading hydraulics research faculty HR Wallingford.

- Water quality analyses at NATA-certified laboratories demonstrated no overall detection (0.032mg/L) of hydrocarbons from inflow concentrations of >5,000ppm

### Council Approvals

The compliance of the SPEL Puraceptor with the stringent Class I requirements of BSEN 858-1:2002 has been welcomed by many regulators and approvals have been granted for more than 900 installations to date.

### In-Situ Testing

NATA analysis of Puraceptors operating at similar applications in Australia reveal 'no detection' of hydrocarbons from a captured concentration of >8,000ppm.



# SPEL PURACEPTOR CLASS I

## Hydrocarbon Management - Stormwater



### Stormwater Treatment

SPEL PURACEPTOR Class I stormwater treatment separators cater for potential hazards to the environment including sites where there is a risk of oil and fuel spills.

Oils and all petroleum hydrocarbons are treated to the highest discharge quality exceeding EPA standards ensuring it safe for stormwater discharge.

Major Oil spills from a petrol tanker or a transformer rupture are captured and contained preventing any stormwater discharge.

- Independently tested (laboratory) and certified to discharge < 1.86ppm petroleum hydrocarbons (TPH), from 5,000ppm ingress
- Independently field tested to discharge 'no detection' from >33,000.0ppm

The results obtained at HR Wallingford, U.K. are certified to European Standard EN BS858.1 (2006) and are in line with the designed performance criteria for high performance and long service life between maintenance periods, achieving results averaging between 0.1 - 1.86mg/L



**SERVICE STATION FIELD TEST**

Service station forecourt after 3 months operation.  
Includes capture and treatment of unleaded fuel, diesel and engine oil.

Total Petroleum Hydrocarbons				
Results expressed in mg/l				
	EQL*	Test 1		No Detection
		Inflow	Outflow	
C6-C9	0.05	2.4	<0.05	
C10-C14	0.05	302	<0.05	
C15-C28	0.4	1820	<0.4	
C29-C36	0.1	8.3	<0.1	

\*Sensitivity: Estimated Quantitation Limit

• Analysis was conducted at a NATA certified laboratory

# SPEL PURACEPTOR CLASS I

## Hydrocarbon Management - Stormwater

### How it works

SPEL Puraceptor is a FULL RETENTION separator that treats all flows and is sized to contain more than the anticipated maximum oil spillage enabling it to be fully operational at all times.

It has two chambers, a coalescer and is fitted with an automatic closure device specifically designed to contain major oil spills thereby making it suitable for high risk applications.

It achieves a water discharge quality of less than 5mg/L light liquids per litre complying to European Standard BS EN 858.1. 2006. Treatable flow rates range from 2LPS to 200LPS. Pipe sizes range from 100mm to 450mm (larger sizes and flows on request).

### 1. AUTOMATIC CLOSURE DEVICE

The AUTOMATIC CLOSURE DEVICE (A.C.D.) is a precisely engineered device comprising a water-bouyant ball that is sensitive to any change in the water density as a consequence of light liquids build up, thereby automatically activating a process of depressing the A.C.D. to SHUT OFF the separator, preventing pollutants from discharging to drains and waterways.

### 2. FULL RETENTION

All liquid is treated. There is no by-pass operation.

### 3. COALESCER EQUIPPED

Provides a coalescing process for the separation of smaller globular of light liquid pollutants to reduce the light liquid content in the outlet to 5mg/litre or less.

### 4. INLET DIP PIPE - FLAME TRAP

For minimum turbulence and to prevent fire and inflammable vapours passing through to the drainage system.

### 5. TWO CHAMBER

A non-turbulent flow through two horizontal treatment chambers, utilising the underflow principle to retain light liquids in all flow conditions.

**A. CONTAINMENT CHAMBER:** Where Total Suspended Solids (TSS) silt, sediments, sludge and gross pollutants are trapped and settle on the chamber floor and where light liquids are contained.

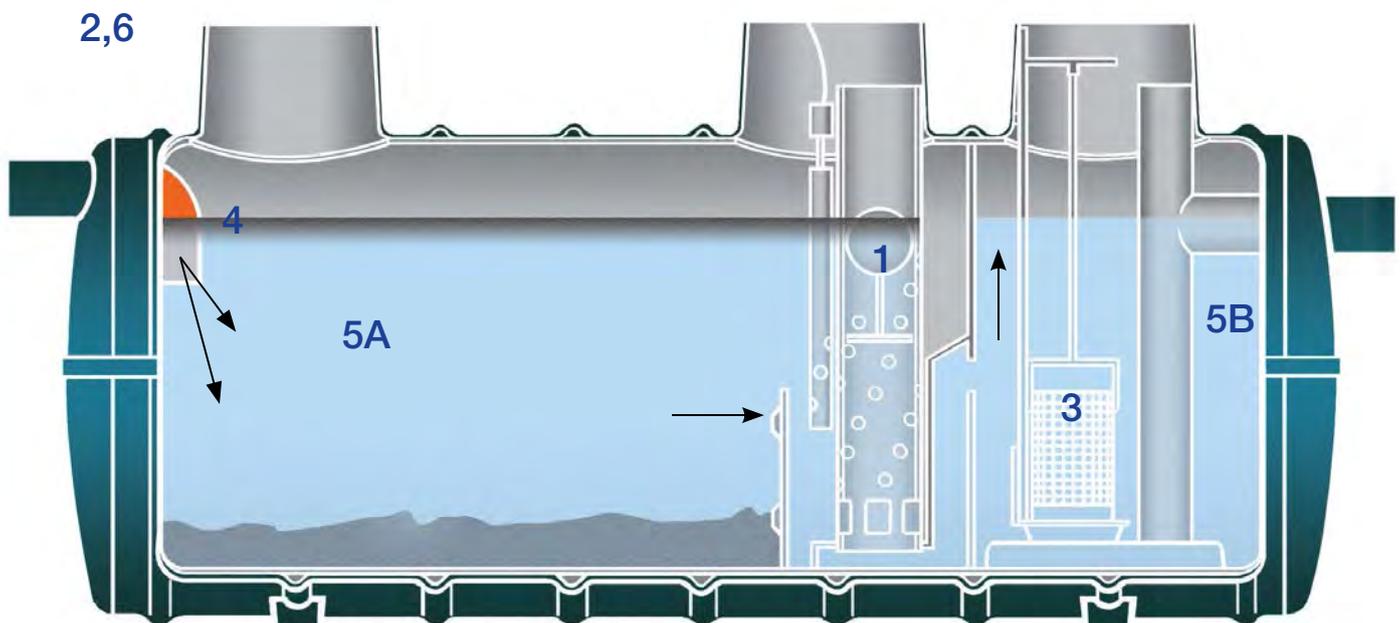
**B. COALESCER CHAMBER:** Where light liquids separation is enhanced reducing it to 5mg/litre or less prior to discharge.

### 6. GRAVITY OPERATED

Will function in the event of power failure and fits into existing pipe drainage systems or new sites.

### 7. MAINTENANCE

Easy and safe with no entering of the tank required.



# SPEL PURACEPTOR CLASS I

## Hydrocarbon Management - Mining



### Features

The SPEL Purceptor Class I has many unique benefits and covers a broad duty range, making it the obvious choice to avert run off contamination, and treat hydrocarbon runoff. Some of the excellent benefits include:

- Approved to the stringent European Standard BS EN 858.1 2006
- Lightweight fibreglass horizontal construction
- Duty range 2L/sec - 200L/sec
- Coalescer pack to improve output quality to less than 5mg/L
- Oil Level probe for continuous monitor
- Auto closure valve for bulk spill protection
- Gravity driven
- One piece unit for easy on-site installation
- No power requirement for auto closure device - failsafe protection from light liquid spills (Purceptor model)
- Cost effective
- Compliments other components in the treatment train
- Discharge to stormwater/leech drain or as site requires

### Mining Applications

- Refueling Zones and Fuel Farms
- Medium to large vehicle parking areas
- Truck bays
- Process Plants
- Transformer switch yards and generators
- Vehicle Wash Bays
- Rail Depots
- Airports

### Compliance

Independent certification and testing has validated test results that exceed the requirements of:

- Local government bodies
- Councils
- Environmental minesite regulations
- Airports Aviations Act

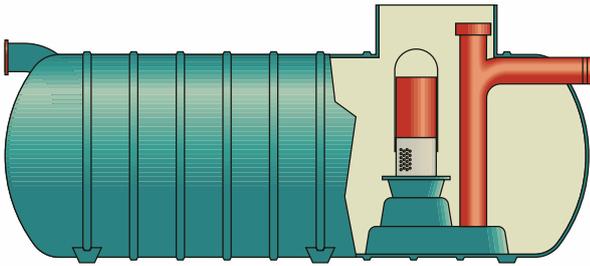


# SPEL PURACEPTOR CLASS I

## Hydrocarbon Management - Mining

### Features - Single Chamber

- Medium risk oil/fuel storage and handling areas.
- Service stations with full canopy protection.
- Commercial vehicle/plant maintenance yards and contaminated industrial areas.



### APPLICATIONS

Power Stations

Substations & Switchyards

Mining & Heavy Vehicle

Windfarms

Waste Transfer Depots

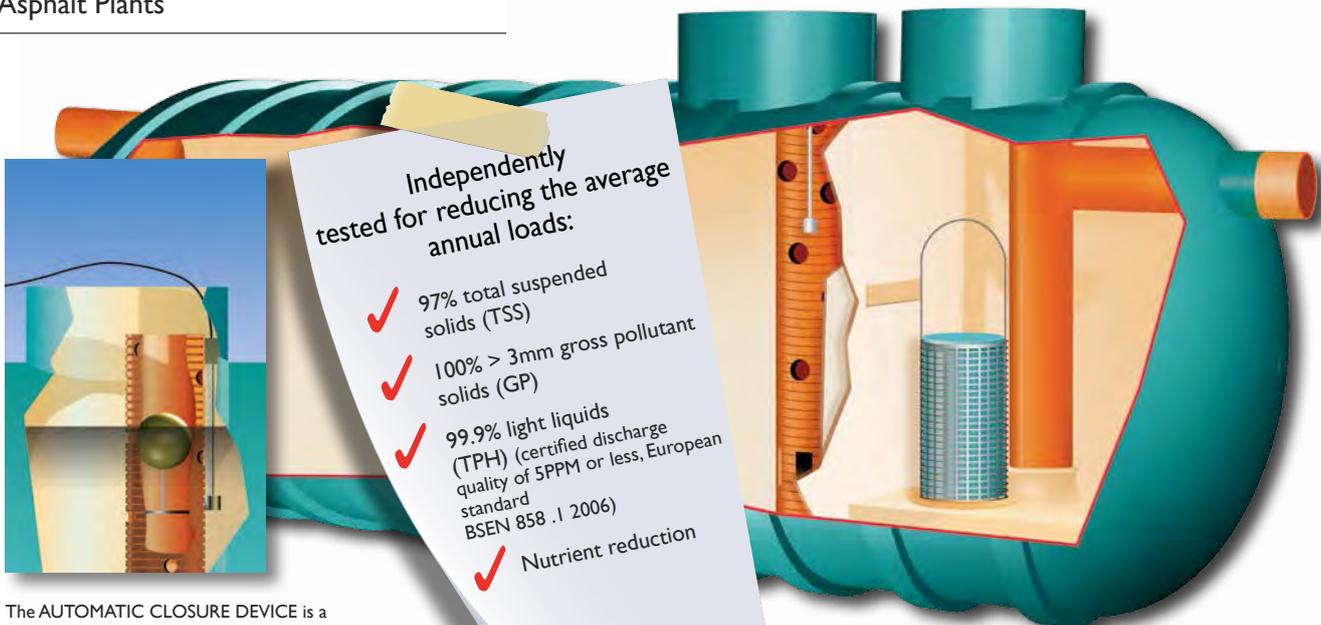
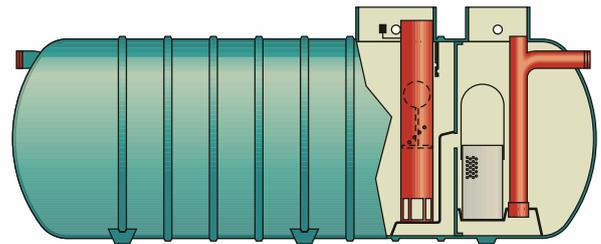
Re-Fuelling Areas

Service Stations

Asphalt Plants

### Features - Two Chamber

- High risk oil/fuel storage and handling areas where maximum protection is required.
- Suitable for service stations exposed to rainfall runoff.
- Continues to treat stormwater even after the maximum designed spill has occurred.
- Heavily contaminated industrial areas, power/sub stations, fire training grounds, railway maintenance and fuelling depots.
- The second chamber provides protection to the coalescer foam inserts from silt and fuel/oil contamination, resulting in less frequent maintenance and easier cleaning of the coalescer foam inserts.
- A large silt capacity is incorporated in the first chamber greatly reduces the frequency of tank cleaning on highly polluted sites.



Independently tested for reducing the average annual loads:

- ✓ 97% total suspended solids (TSS)
- ✓ 100% > 3mm gross pollutant solids (GP)
- ✓ 99.9% light liquids (TPH) (certified discharge quality of 5PPM or less, European standard BSEN 858 .1 2006)
- ✓ Nutrient reduction

The AUTOMATIC CLOSURE DEVICE is a unique feature of the Puraceptor that will completely SHUT OFF the separator in the event of a major oil spill. Not dependent on electricity to operate.

# SPEL STORMCEPTOR CLASS I

## Stormwater Treatment & Hydrocarbon Capture

SPEL Stormceptor Class I\* is a horizontally configured two chamber stormwater quality improvement device (SQID) equipped with a gravity enhancing coalescer unit.

The advanced design facilitates a retention period that provides quiescent conditions within the secondary chamber, efficiently promoting the separation of total suspended solids (TSS), light liquids and pollutants. SPEL treatment devices can accommodate a complete range of flow rates with corresponding pipe size and types.

Field testing of a SPEL Class I Stormceptor stormwater treatment device was undertaken over 14 months at a site located in Nambour, South East Queensland. Testing was undertaken to evaluate the pollution removal performance of a Stormceptor treatment train for removing total suspended solids (TSS), total nitrogen (TN) and total phosphorous (TP) from stormwater runoff. Water quality sampling was undertaken using natural rainfall events complying with an a priori sampling protocol.

More than 59 rain events were monitored, of which 18 were found to comply with the accepted sampling protocol. The efficiency ratios (ER) observed for the treatment device were found to be 83% for TSS, 11% for TP and 23% for TN.

\*Stormceptor Class 2 model with no coalescer is available for medium to low-risk applications.

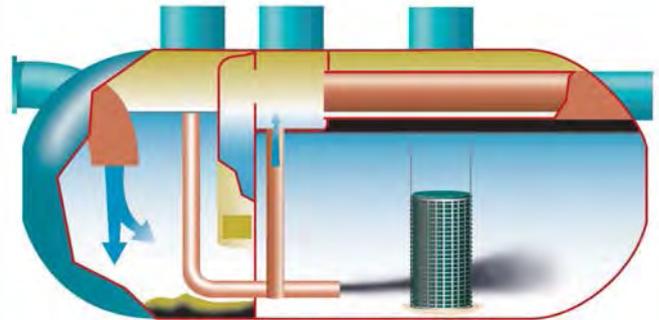


DIAGRAM A - LOW FLOW

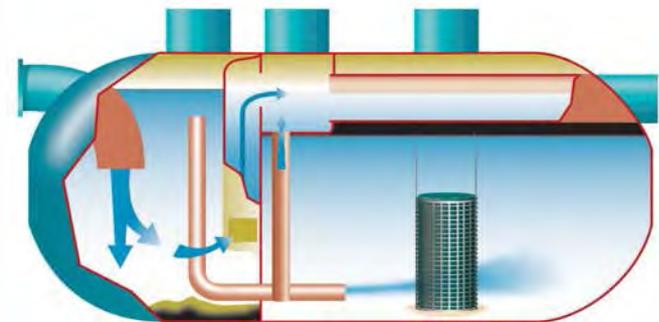


DIAGRAM B - HIGH FLOW



Flinders Port, SA



Brimbank Council, VIC

Independently tested for reducing the average annual loads:

- ✓ 83% total suspended solids (TSS)
- ✓ 100% > 3mm gross pollutant solids (GP)
- ✓ 99.9% light liquids (TPH) (certified discharge quality of 5PPM or less, European standard BSEN 858 .1 2006)
- ✓ Nutrient reduction

# **SPEL** STORMCEPTOR OL CLASS I

## Offline Stormwater Treatment & Hydrocarbon Capture

The design, facilitated by a retention period of approximately 4-6 minutes generates quiescent conditions within the secondary chamber, efficiently promoting the separation of total suspended solids (TSS), light liquids and pollutants.

Treatable flow rates range from 0.1LPS to 400+LPS (max. flow rate more than 4,000 LPS) and can fit pipe sizes from 100mm to greater than 1500mm.

\*Stormceptor Class 2 model with no coalescer is available for medium to low-risk applications.

### APPLICATIONS

---

Car Parks & Shopping Centres

---

Council Depots

---

Industrial Estates

---

Heavy Vehicle Maintenance & Storage Areas

---

Transport Depots & Loading Bays

---

Tunnels

---

Highways & Transport Corridors

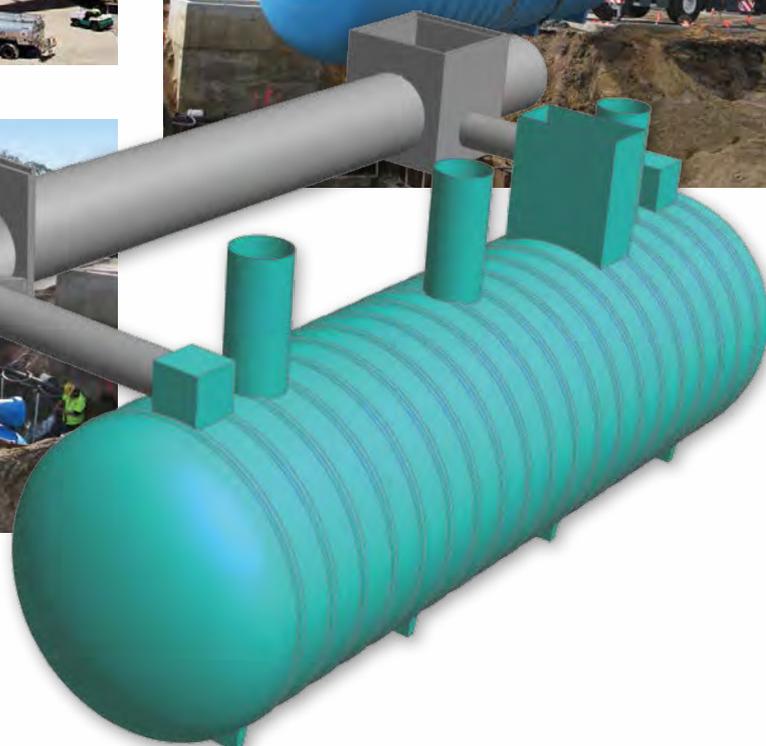
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Recycling Yards

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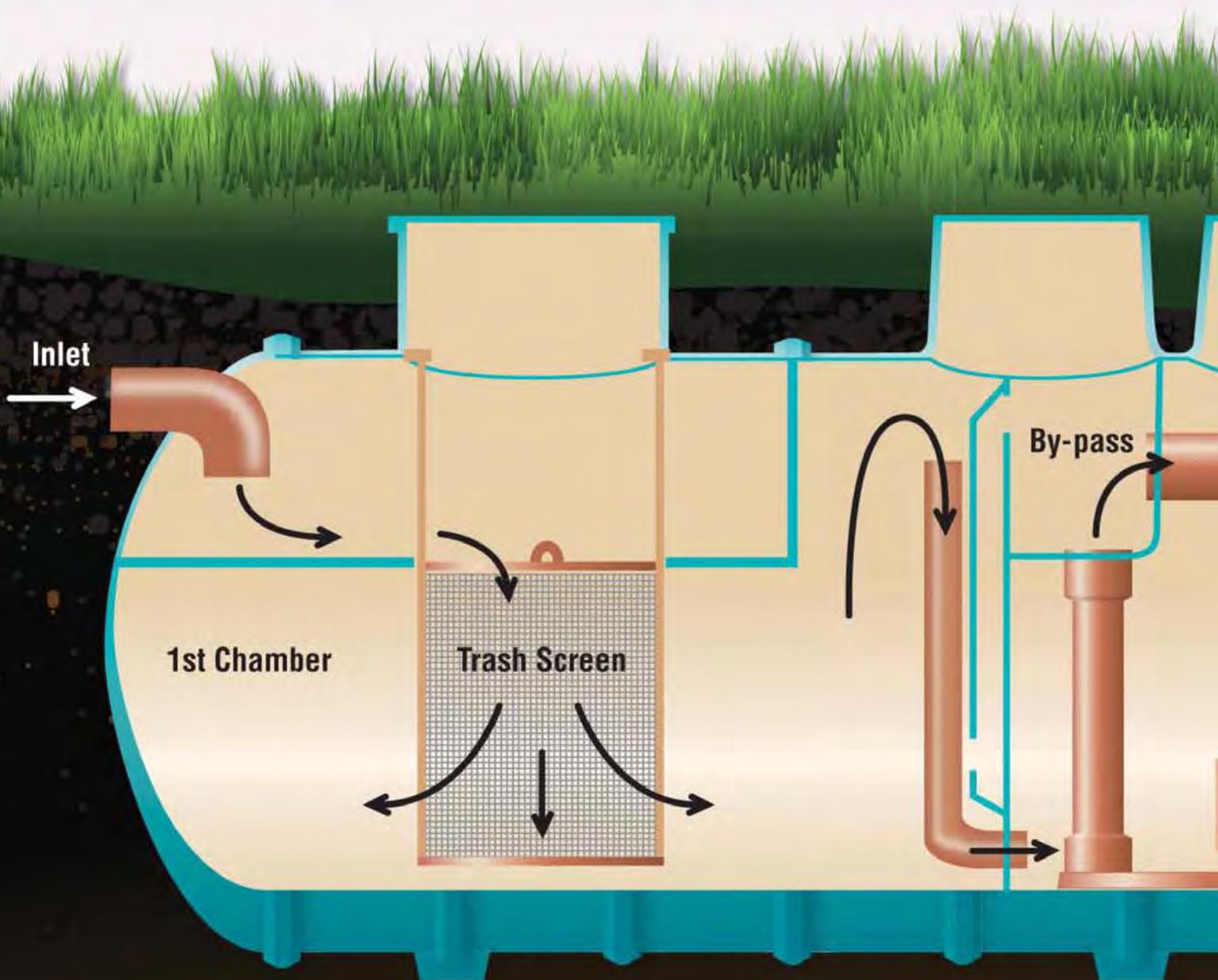
Airport Aprons & Tarmacs

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# **SPEL** STORMCEPTOR CLASS I

Harvesting and re-use



## **TRASH BASKET**

A Trash Basket can be installed in the first chamber (excluding Class 3) as an extra reassurance in the areas of high litter entering the water ways.

The basket is made from a stainless steel wedge wire with a hinged base (for easy emptying) and is fitted in a guide rail type installation.

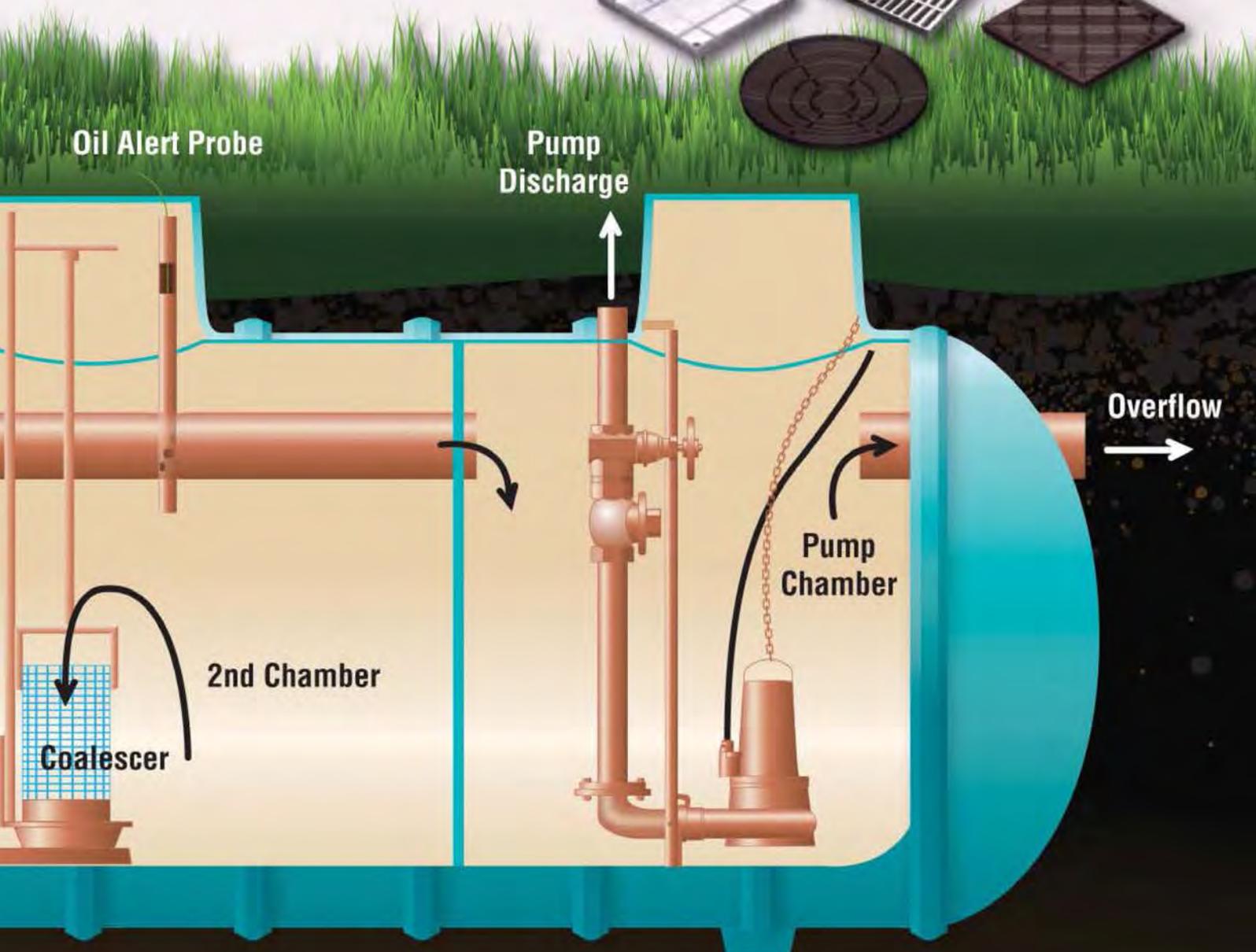
## **PUMP STATIONS**

A third chamber can be added to the separator (excluding Class 3) to incorporate a pump station making it suitable for integration with water harvesting schemes that include irrigation and field watering.

# Options

## SELECTION OF COVERS

All classes of covers are available from heavy trafficable to light duty.



### OIL ALERT PROBE

The probe is freely suspended in the primary chamber. When the oil layer or depth of light liquids reaches the predetermined level, the top of the probe will be immersed in the oil, breaking the circuit and activating the alarm.



### COALESCER UNITS

Available complete with stainless steel holders and handles or slide rails depending on separator size. Coalescers are standard in PURACEPTOR™ & STORMCEPTOR™ CLASS 1.

**SPEL The Distinct Advantage in Water Treatment**

# SPEL TRICEPTOR

## Stormwater Treatment & Hydrocarbon Capture High & Medium Risk

The SPEL Triceptor is a combination of the Stormceptor and Puraceptor functions and features in the one treatment device. The benefit of the Triceptor is that with one treatment device you can treat both the high and low risk areas of a catchment.

The Triceptor has the hydrocarbon spill containment function of the Puraceptor whilst also incorporating the treatment quality and high flow bypass functions of the Stormceptor.

### APPLICATIONS

---

Car Parks & Shopping Centres

---

Tunnels

---

Highways & Transport Corridors

---

Recycling Yards

---

Airport Aprons & Tarmacs

---

Service Stations

---

Re-Fuelling Areas

---

Substations & Switchyards

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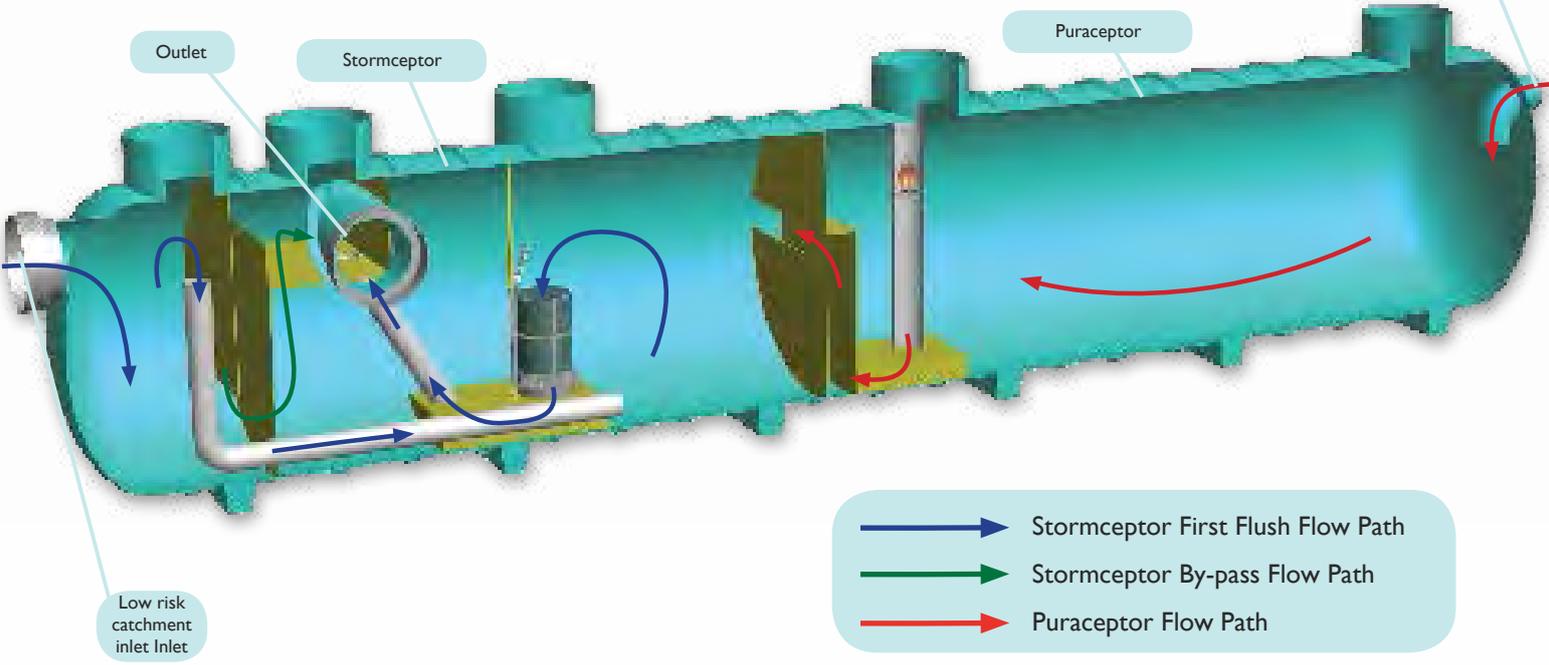
Asphalt Plants

---



# SPEL TRICEPTOR

Stormwater Treatment & Hydrocarbon Capture High & Medium Risk



# SPEL FILTER

## Cartridge Filter For Tertiary Stormwater Treatment

### Overview

The SPELFilter® has an up-flow, wrapped spiral design that facilitates influent flow over its entire surface area, providing consistent pollutant removal with in a smaller footprint.

Hydraulic pressure forces water through the filter media, discharges through the center tube and out through the outlet collection manifold pipe work.

Upon completion of a treatment cycle, each cartridge backwashes and effectively dislodges particulates from the filtration layers. This reestablishes filter porosity. The dislodged particles accumulate on the vault floor for easy removal during maintenance.

SPELFilter's patented design has no moving parts and generates a true siphon effect.

Published results of field monitoring of a StormSack



SPELFilter stormwater treatment train has been underway between November 2013 and May 2015 at a townhouse development located at Ormiston, southeast Queensland.

The research was undertaken to evaluate the effectiveness of a 200 micron mesh pit basket in a 900 square format and an 850 mm high media filtration cartridge system for removing total suspended solids and nutrients from stormwater runoff. The monitoring protocol was developed with Queensland University of Technology (QUT), reflecting the Auckland Regional Council Proprietary Device Evaluation Protocol (PDEP) and United States Urban Stormwater BMP Performance Monitoring Manual with some minor improvements reflecting local conditions.

During the 18 month period, more than 30 rain events have occurred, of which nine comply with the protocol. The Efficiency Ratio (ER) observed was 87% TSS, 55% TP and 42% TN for the SPELFilter cartridge filter. The performance results on nine events have been observed to be significantly different statistically ( $p < 0.05$ ) for the filters.



### Features

- Greater than 87% TSS Removal
- Greater than 55% reduction in Total Phosphorus; including Dissolved Phosphorus
- Greater than 42% reduction in Total Nitrogen; including Dissolved Nitrogen

# SPEL FIL-

## Cartridge Filter For Tertiary Stormwater Treatment

### Value & Benefits

#### Proven Sand Filter Performance:

The uniform size silica-sand filter media provides for higher removal efficiencies than coarser types of media. SPELFilter media is inorganic – it doesn't leach nitrogen and other nutrients.

#### Greater flexibility:

Due to the significant surface area, designated flow path and high flow capacity, combined with the modular cartridge design, the SPELFilter system can be deployed in a variety of structures including manholes, precast vaults, or cast-in-place structures.

Each system is optimised to suit your specific site and local authority requirements by qualified and experienced professionals.



### Filter Configurations



SPIRAL CROSS-SECTION



SPIRAL DESIGN

Visit [www.spel.com.au](http://www.spel.com.au) for detailed data sheets on our products

# SPEL HYDROSYSTEM

## Cartridge Filter For Tertiary Stormwater Treatment

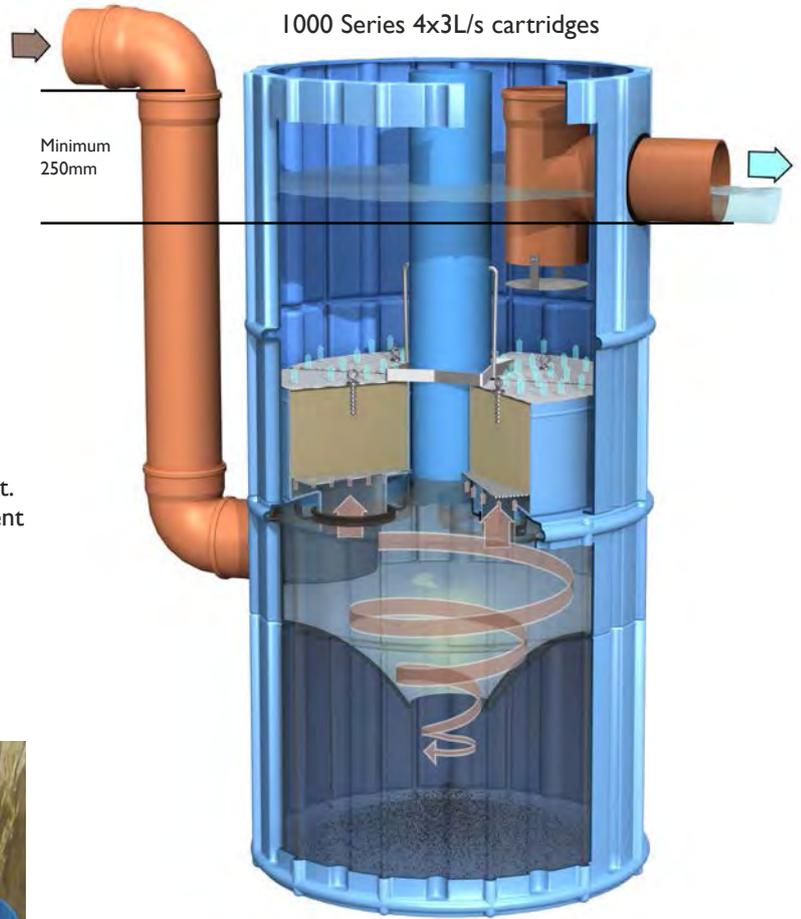
The SPEL Hydrosystem Filter uses an up-flow process. This means there is a minimal head drop between the inlet and the outlet. The cleaned water is of an outstanding water quality. The rainwater is treated within the unit by the following processes: sedimentation, filtration, adsorption and precipitation.

The initial treatment steps take place in the Dynamic Separator, where sedimentation of solid particles occurs within a radial flow regime, characterised by secondary flows.

A settling funnel to the silt trap chamber entrance ensures sediments are not remobilised. Above the separator are the filter inserts, covering the entire diameter of the unit's housing, where the second treatment step takes place.

Water flows upwards through the removable filter element. As a result of both the upward flow within the filter element and the fact that the filter remains saturated, the rate of filter clogging by solids is both very limited and slow.

The filter inserts are easy to exchange.



### Removal Rates

- TSS >90%
- Heavy Metals (Cu, Pb, Zn, Cd, Ni & Cr) >80%
- Nitrogen (NH<sub>4</sub> – Ammonia & NO<sub>3</sub> – Nitrates) >60%
- Phosphorus >75%
- Hydrocarbons (TPH & PAH) >70%
- Integral hydrodynamic separator
- Only 250mm invert drop

### APPLICATIONS

- Car Parks & Shopping Centers
- Council Depots
- Industrial Estates
- Heavy Vehicle Maintenance
- Transport Depots & Loading Bays
- Tunnels
- Highways & Transport Corridors
- Recycling Yards
- Airport Aprons & Tarmacs

# SPEL HYDROSYSTEM

## Cartridge Filter For Tertiary Stormwater Treatment

### The Technology

A specialist stormwater filter, designed for installation within concrete or plastic manholes and access chambers. The device can be delivered fully assembled to easily and quickly install onsite.

The SPEL Hydrosystem 1000 Filter uses an up-flow process. This requires a 250mm invert level change between the inlet and outlet to operate at full capacity. The Runoff is treated within the unit by the following processes: sedimentation, filtration, adsorption and precipitation.

The initial treatment steps take place in the hydrodynamic Separator, where settling of coarse particles occurs within a circular flow regime, encouraging sediment to the centre.

A settling funnel to the silt trap chamber entrance ensures sediments

### How it works

1. The stormwater from the drained area is fed into the inlet, at the base of the shaft. A deflector plate sets up a circular flow.
2. Here, settling of coarse particle, takes place in the hydrodynamic separator.
3. The sediment is collected via an opening in the sediment chamber. This chamber is educted periodically, via the central bypass pipe at intervals.

### Technical Data

Stormwater filter complying with DIN 1989-2. Connections: DN 200; the various types of filter elements have different material structures.

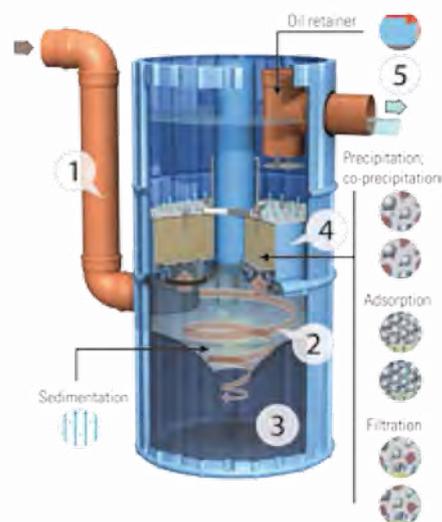
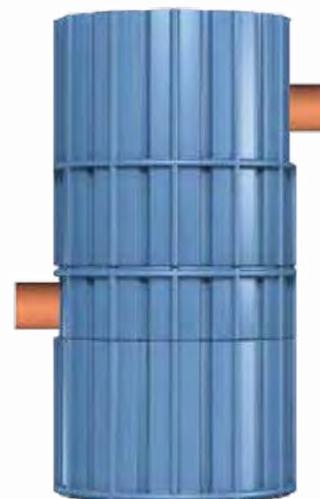
Housing material: Polyethylene  
 Housing weight: 68 kg  
 Total weight: 220 to 350 kg depending on filter type  
 Packing unit SPEL  
 Hydrosystem 1000: Pallet: 1 piece

are not remobilised. Above the separator are the filter inserts, covering the entire diameter of the unit's housing, where the second treatment step takes place.

Water flows upwards through the removable filter element. As a result of both the upward flow within the filter element and the fact that the filter remains saturated, the rate of filter clogging by solids is both very limited and slow.

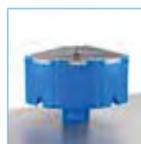
The filter inserts are easy to exchange.

4. Four filter elements are located within the filter shaft. As water flows upwards the finer particles are filtered out, whilst the dissolved pollutants are precipitated and adsorbed. The filter is easily backwashed, and if exhausted, is easily replaced.
5. Treated water above the filter elements discharges via an Oil baffle. In the event of major spill, free floating oils etc are retained here. Typical concentrations of oils are retained within the filter elements.



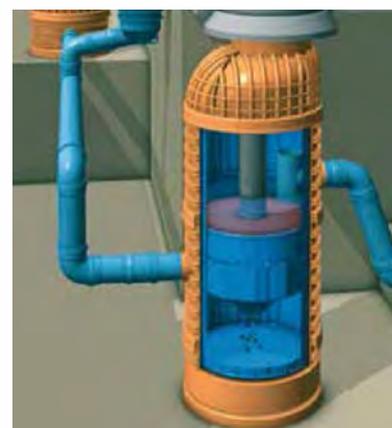
### Accessories 1

SPEL Filter element  
 Weight per filter element:  
 34 kg (roof / traffic)



### Accessories 2

SPEL Filter element  
 Weight per filter element:  
 54 kg (heavy traffic)  
 66 kg (metal)



EXAMPLE: INSTALLATION IN A SHAFT MADE OF PLASTIC

# SPEL HYDROSYSTEM

## Cartridge Filter For Tertiary Stormwater Treatment

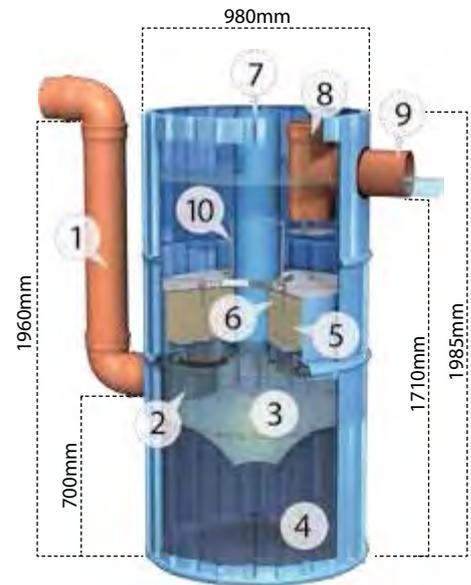
### Example:

The SPEL Hydrosystem 1000 traffic installed in a concrete shaft DNI000.



### Product structure:

1. Stormwater inlet (DN 200)
2. Deflector plate
3. Hydrodynamic separator
4. Sediment chamber
5. Filter element
6. Lifting point for filter element
7. Bypass pipe
8. Oil baffle
9. Outlet pipe
10. Filter locks



Type	Nature of the surface to be drained	Weight of filter element / piece	Total Weight
Heavy traffic with technical approval (Z-84.2-4)	Highly polluted traffic areas (car parks in front of supermarkets, main roads, HGV access roads)	54kg	300kg
Traffic	Slightly polluted traffic areas (side streets, staff car parks, yards)	34kg	220kg
Roof	Roofs without a significant proportion of uncoated metals (< 50m <sup>2</sup> )	34kg	220kg
Metal	Roofs made of uncoated metals (copper, zinc, lead)	66kg	350kg

Parameter	Unit	Non Metal Roof		Copper Roof		Zinc Roof		Parking lot, residential street		Main road Distributer		1 Aims of LAWA	2 Drinking Water	3 Seepage	4 Hydrosystem
		from	to	from	to	from	to	from	to	from	to	permissible limit	permissible limit	control value	aim
<b>Phsico-chemical parameters</b>												<b>90 Percentile</b>			
electrical conductivity	[uS/cm]	25	270	25	270	25	270	50	2400	110	2400	-	2500	-	< 1500
pH value	[-]	4.7	6.8	4.7	6.8	4.7	6.8	6.4	7.9	6.4	7.9	-	6.5 – 9.5	-	7.0 – 9.5
<b>Nutrients</b>															
phosphorous (P ges)	[mg/l]	0,06	0,50	0,06	0,50	0,06	0,50	0,09	0,30	0,23	0,34	-	-	-	0,20
ammonium (NH <sub>4</sub> )	[mg/l]	0,1	6,2	0,1	6,2	0,1	6,2	0,0	0,9	0,5	2,3	-	0,5	-	0,3
nitrate (NO <sub>3</sub> )	[mg/l]	0,1	4,7	0,1	4,7	0,1	4,7	0,0	16,0	0,0	16,0	-	50,0	-	-
<b>Heavy Metals</b>															
cadmium (Cd)	[µg/l]	0,2	2,5	0,2	1,0	0,5	2,0	0,2	1,7	0,3	13,0	1,0	5,0	5,0	< 1,0
zinc (Zn)	[µg/l]	24	4.880	24	877	1.731	43.674	15	1.420	120	2.000	500	-	500	< 500
copper (Cu)	[µg/l]	6	3.416	2.200	8.500	11	950	21	140	97	104	20	2000	50	< 50
lead (Pb)	[µg/l]	2	493	2	493	4	302	98	170	11	525	50	10	25	< 25
nickel (Ni)	[µg/l]	2	7	2	7	2	7	4	70	4	70	50	20	50	< 20
chromium (Cr)	[µg/l]	2	6	2	6	2	6	6	50	6	50	50	50	50	< 50
<b>Organic Substances</b>															
polynuclear aromatic hydrocarbons (PAK)	[ug/l]	0.4	0.6	0.4	0.6	0.4	0.6	0.2	17,1	0.2	17,1	-	0,1 6 compounds	0,2	< 0,2
petroleum-derived hydrocarbons (MKW)	[mg/l]	0,1	3,1	0,1	3,1	0,1	3,1	0,1	6,5	0,1	6,5	-	-	0,2	< 0,2

1 Aims of the German working group on water issues of the Federal States and the Federal Government (LAWA) for surface water, usage as potable water (1998).

2 Permissible of the German Drinking Water Ordinance (2001). 3 Control value for seepage of the German Federal Soil Protection Act an Ordinance (1999) according to § 8 I,2. 4 The aims of the system refer to average annual loads.

# SPEL HYDROSYSTEM

## Cartridge Filter For Tertiary Stormwater Treatment

The SPEL Hydrosystem is available with various filter types, depending on the usage of the connected area. The Roof type is used for roof areas that do not have a significant proportion of uncoated metals; the Metal type is employed for metal roof areas, and the Traffic type is used for small carparks and hardstand areas

The Heavy Traffic type is employed for roads, pavement and large hardstand areas and has been granted general technical approval (Z-84.2-4) by the German Institute for Structural Engineering (DIBt). The maximum areas that may be drained depend on the nature of the surfaces.

### Technical Drawing

**REVISION HISTORY**

REV	DESCRIPTION	DESIGNER	DATE	CHECKED BY
1	INITIAL RELEASE	M.M.	21/03/2016	

**Site Level Confirmation**

Finished Surface Level (FSL) RL:	
Access Cover Thickness:	mm
Inlet Invert Level RL:	
Outlet Invert Level RL:	
Company:	
Name:	
Date:	

**APPROVED**

NAME: \_\_\_\_\_

SIGNED: \_\_\_\_\_

DATE: \_\_\_\_\_

**ISSUED FOR CONSTRUCTION**

**NOTICE:**  
SYSTEM PIPEWORK MUST HAVE AT LEAST 250 MM OF FALL TO OPERATE CORRECTLY.

**TOLERANCE:** ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

**CLIENT:** \_\_\_\_\_ **DISTRIBUTOR:** \_\_\_\_\_

**CONFIDENTIAL:** The drawings must not be disclosed to any third party without written permission from SPEL Environmental Sydney. Unauthorised disclosure may result in prosecution.  
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**Drawn** M.M. **Date** 21/03/2016  
**Check** M.M. **Date** 7/05/2015  
**Verified** \_\_\_\_\_ **Date** \_\_\_\_\_  
**Approved** \_\_\_\_\_ **Date** \_\_\_\_\_

**Request No.** RN1428

**SPEL ENVIRONMENTAL INTEGRATED WATER SOLUTIONS**

180 Silverwater Road Silverwater NSW 2128  
PH: 1300 773 500 | E: sales@spel.com.au  
www.spel.com.au

**PROJECT:** \_\_\_\_\_  
**TITLE:** SPEL HYDROSYSTEM 1500  
SHS 1500/6.A.225.PVC  
FRP TANK 1500 DIA. - 6 FILTER CARTRIDGES  
GENERAL ARRANGEMENT

**SCALE:** N.T.S. **SIZE:** A3 **SHEET:** 1 **REV:** 1

**CUSTOMER CODE:** \_\_\_\_\_ **DWG No.:** SP16-HY2880-P

### Installation

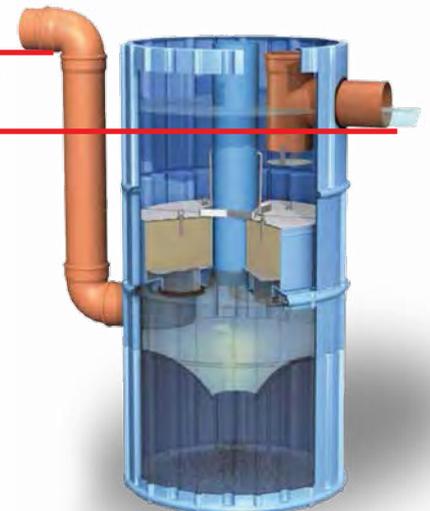
Important information, please note.

The following is to be checked before installation:

The filter must be installed with an invert level difference between inlet and outlet. This means that the incoming pipe (stormwater inlet) is led downwards just ahead of the shaft and can be connected to the chamber base as described.

The difference in invert between the incoming pipe and the outlet to discharge must be at least 250mm. If you only have 125mm of driving head the treatment flow rate will become 6L/sec.

The head pressure required to achieve 12L/sec TFR is 250mm



# SPEL HYDROCHANNEL

## Stormwater treatment - A new path for stormwater

The SPEL HydroChannel offers a decentralized and absolutely new path for stormwater treatment.

SPEL Environmental offers a large product-range to collect, treat and harvest both rain and storm water.

Decentralized stormwater treatment is becoming more and more interesting for authorities and planners. It is seen as an important measure within the implementation of the WSUD as it can be deployed very precisely, and therefore cost effectively.

It is able to filter and bind pollutants like Hydrocarbons, heavy metals as well as Total Phosphorus (TP) and Total Nitrogen (TN). The pollutants then can be disposed of safely and easily.

This allows stormwater from high traffic areas (car parks and roads), industrial areas and metal roofs to be cleaned at site level, and then discharged safely to ground or surface water bodies locally.

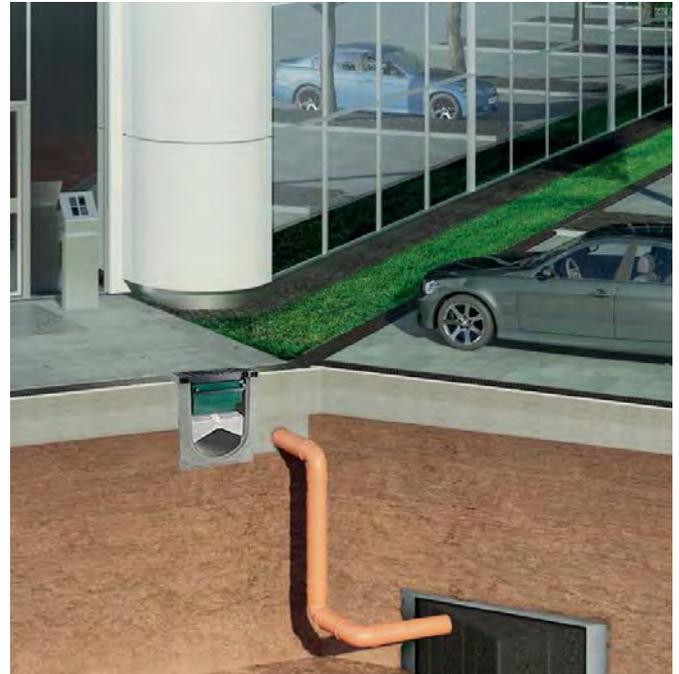
The SPEL HydroChannel's modular design means that the stormwater is treated in two steps:

1. Solids and particulates are settled in the first step
2. Dissolved contaminants are then absorbed in the filter matrix

Water weirs over from the sedimentation chamber and passes down to the filter bag with the filter matrix inside it. Both organic and inorganic contaminants are removed by Adsorption and precipitation. The filtered water then flows within the Channel to the collection point where it can either be re-used or discharged to infiltration.

The initial sedimentation step ensures the long working life of the filter bag, and the granular filter material within it.

The filter is designed to promote an even and homogenous flow distribution within it. Separation of the material is near impossible, by proven and certified design. The pad will need be replaced at about 10 years, depending on site conditions.



### Technical data

Length:  
1000mm  
Nominal diameter:  
300mm  
Catchment Area:  
Contact SPEL



# SPEL HYDROCHANNEL

## Stormwater treatment - A new path for stormwater

### Modular design for ecological line drainage

The innovative modular design is based on a standard 300mm channel & trench grate width. There is no need to make site specific or bespoke design amendments to the channel drainage runs.



#### The modular interior of the SPEL HydroChannel:

- The baffle is placed on the foundation the granular filter bag's where the dissolved pollutants are removed
- The sedimentation box is fixed with four locking pins so no water can pass by the box



#### The modular interior of the HydroChannel:

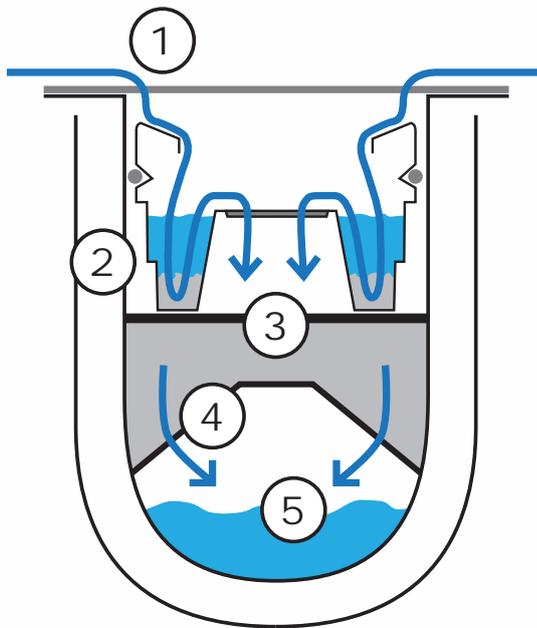
The Sedimentation Chamber removes coarse constituents, such as gravel, leaves and other solids. The rubber seal to the outside ensures no waters can by-pass this chamber within the channel.

# SPEL HYDROCHANNEL

## Stormwater treatment - A new path for stormwater

### Section of the SPEL HydroChannel:

- 1) Water comes from the surface to the SPEL HydroChannel
- 2) The sedimentation chamber removes coarse solids, such as gravels, chippings, leaves and other solids. The rubber seal ensures a water tight seal is maintained.
- 3-4) The pre-treated water pass through the granular filter bag, and the organic and inorganic pollutants are removed.
- 5) The filtered water flows over the baffle into the free flow area of the channel. It can then be re-used, or discharged to surface or ground water via infiltration.

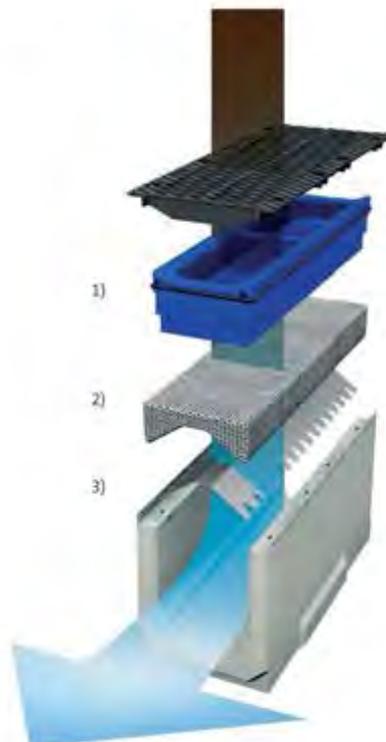


### Modular Design

Based on the innovative filtration solution is the concrete nominal width of 300mm. Planners are not required to make any alternations in the drainage plan if they want to treat the water with the HydroChannel.

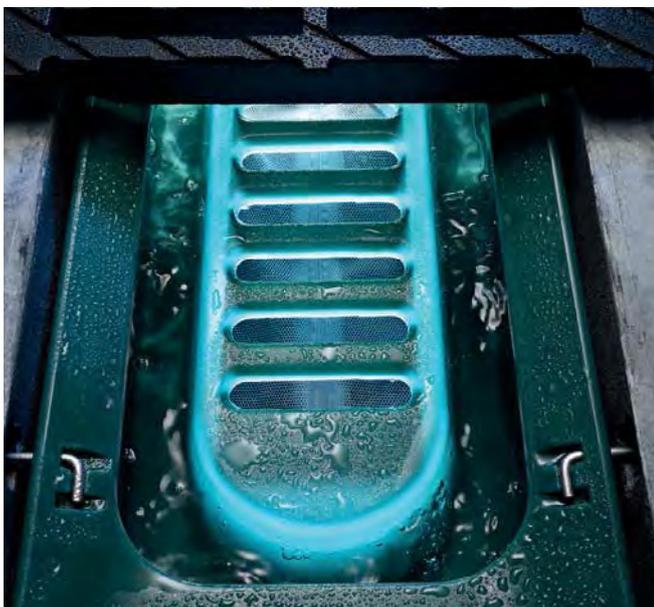
The modular interior of the HydroChannel:

- 1) The sedimentation box is primary treatment capturing solids such as stones, leaves, and suspended particles on. The rubber lip ensures sealing around the edges – for the reliable differentiation for subsequent filtration.
- 2) The pretreated rainwater passes through the granular-filter-pad and the organic and inorganic pollutants will be filtered from the water.
- 3) The filtered water flows over the baffle into the free flow area of the channel and is discharged per normal site requirements.



# **SPEL** HYDROCHANNEL

Stormwater treatment - A new path for stormwater



# SPEL THUNDAFLO

## Heavy Duty Channel Drainage System

THUNDAFLO is easy to install

### Dig Trench and Set Out Reinforcing Cage and Channel Sections

IMAGE NO. 1

- Trench is dug and reinforcing steel cage set in position
- Channel is laid on top of the reinforcing steel cage
- The fibreglass rods are inserted through the brackets and hammered into the ground on an angle - bottom splayed out
- The torsion springs are also attached to the fibreglass rods
- Note the top torsion spring is positioned at the top of the fibreglass pole to prevent the fibreglass being splintered while being hammered into the ground

### Channel Is Raised Into Approximate Position

IMAGE NO. 2

- Each three metre section is raised into approximate position
- Sections are then connected
- Note that as each section is raised the fibreglass poles are placed under tension forming a very rigid structure for the concrete pour

### In Position Ready to Pour

IMAGE NO. 3

- The vertical position of the channel can be adjusted very accurately along the fibreglass rods and securely locked into place with the torsion springs
- The lower torsion spring holds the channel in place while the upper torsion spring prevents float during the concrete pour
- Positioning poles can be easily trimmed with a battery powered grinder if they extend above the height of the channel
- Polystyrene is inserted into the top of the channel to prevent the ingress of wet concrete into the channel during the pour
- Note that the polystyrene insert can be reused

### One Concrete Pour - No Cold Joints

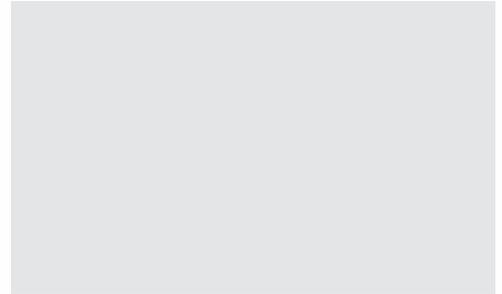
IMAGE NO. 4

- One concrete pour in two passes/stages
- Initial stage up to 50mm above bottom of channel to "haunch" channel and reinforcing steel
- Second stage to top of channel. Note that wet concrete can be dumped on top of the polystyrene insert to "mitigate any risk of float" during this process. This is important where ground conditions are soft and/or large section channel is being installed

### Finished

IMAGE NO. 5

- Chip seal was used in this project where the concrete reinforcing was leveled to 30mm below the top of the frame. This enables the wheel load to be transferred directly into the concrete surround
- Grates are inserted and secured in place with bolt and brace
- The tested load rating of this ThundaFlo channel drain is E400 (AS3996), extra heavy duty



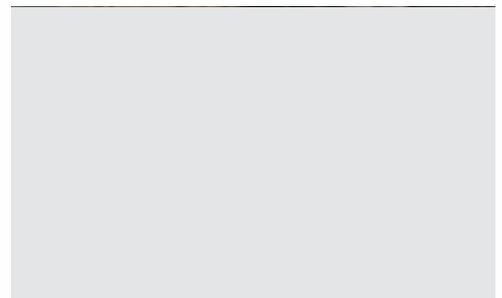
IMAGE



IMAGE



IMAGE



IMAGE

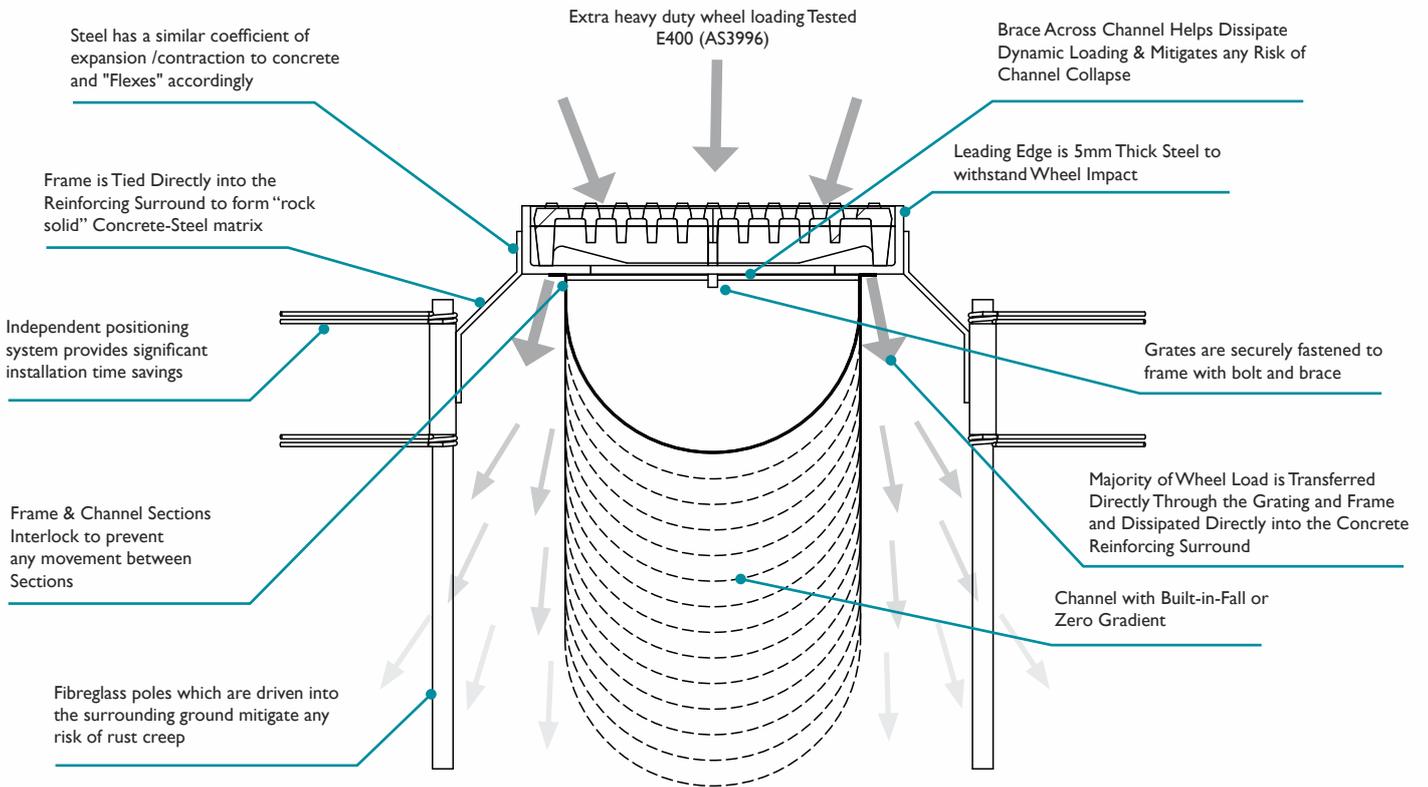


IMAGE NO.5

# SPEL THUNDAFLO

## Heavy Duty Channel Drainage System

### Unique Robust Design



CHANNEL AND GRATING FLOW RATE CURVES AVAILABLE UPON  
DIAGRAM NOT TO

### PROVEN - SINCE 1996



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands - PET

A proven and efficient Floating Treatment Wetlands (FTW) Stormwater & Wastewater Treatment System

Water treatment system made out of recycled PET bottles.



New zealand project commissioned



Plant growth after 12 months

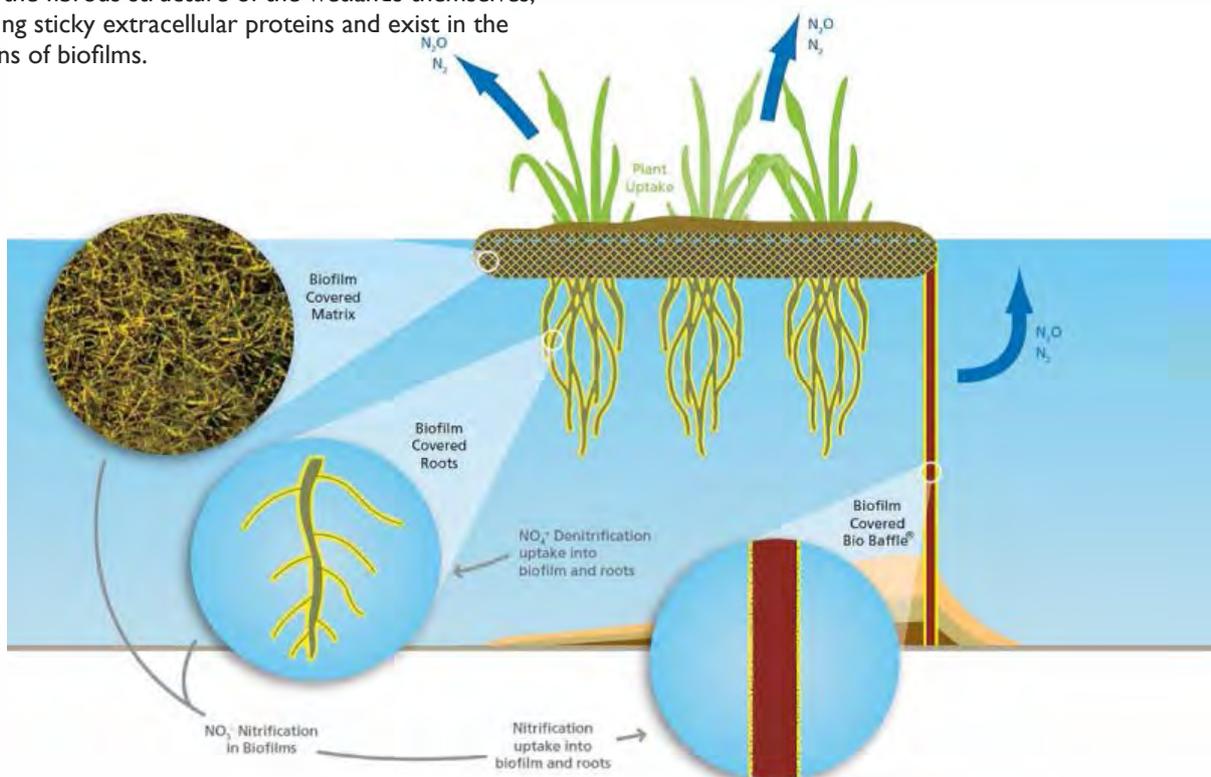
### How it works?

The floating wetlands, which can be used in any water environment requiring treatment, provide a lush and fertile base for plants and vegetation to grow. As the roots spread down through the fibrous structure of the wetlands, an extraordinarily vast activated surface area is created for microbes and bacteria to take on their role of bio-remediation - the use of micro-organisms to remove pollutants.

The microbes and bacteria, are UV sensitive and adhere to the roots and microscopic root hairs of the plants, and within the fibrous structure of the wetlands themselves, secreting sticky extracellular proteins and exist in the environs of biofilms.

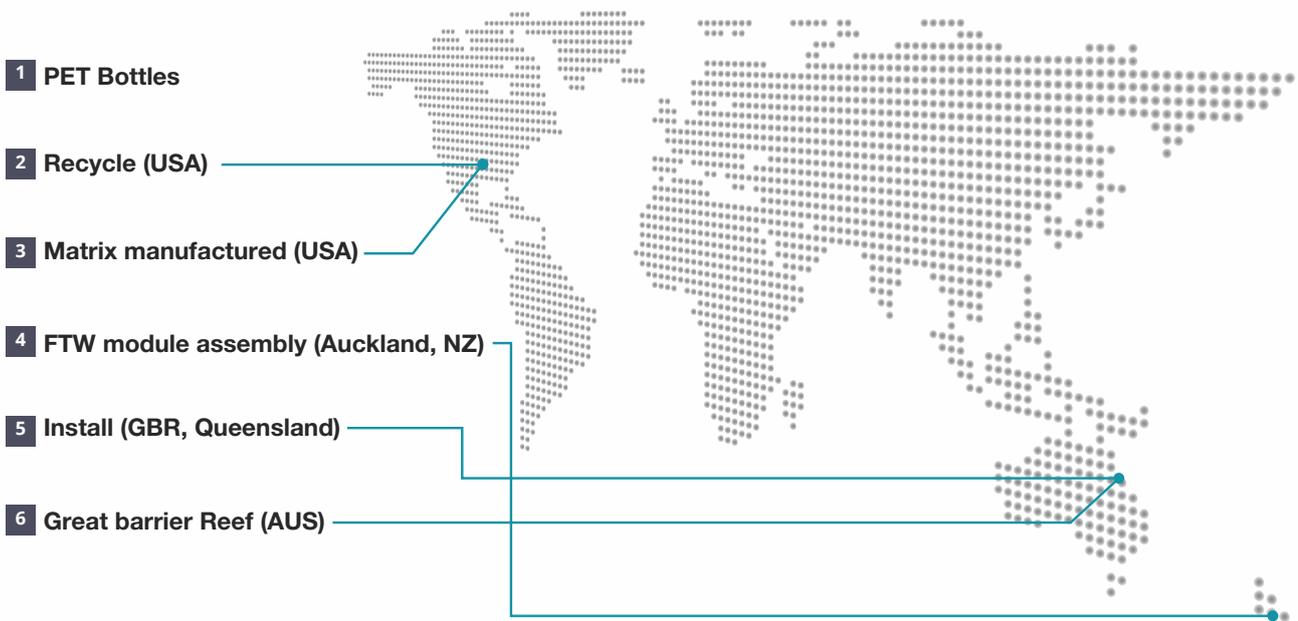
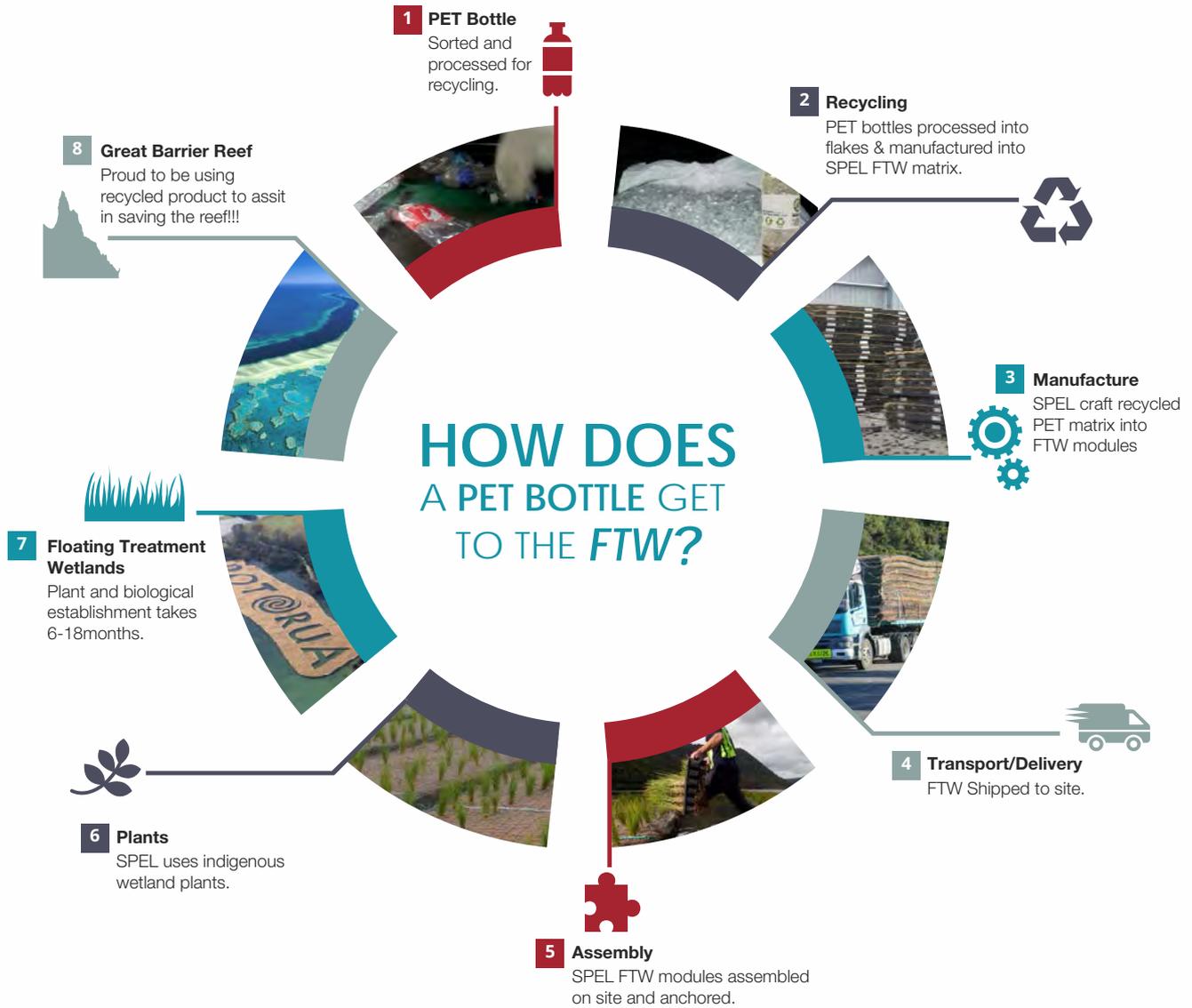
It is within these biofilms which microbes and bacteria trap and digest organic matter and nutrients in stormwater, including total suspended solids, biochemical oxygen demand, nitrogen and phosphorus.

What makes SPEL Environmental's floating treatment wetlands a unique scientific innovation, that has created a revolution within the water treatment industry, is the massive activated surface area they provide for microbes and bacteria to survive.



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands - PET

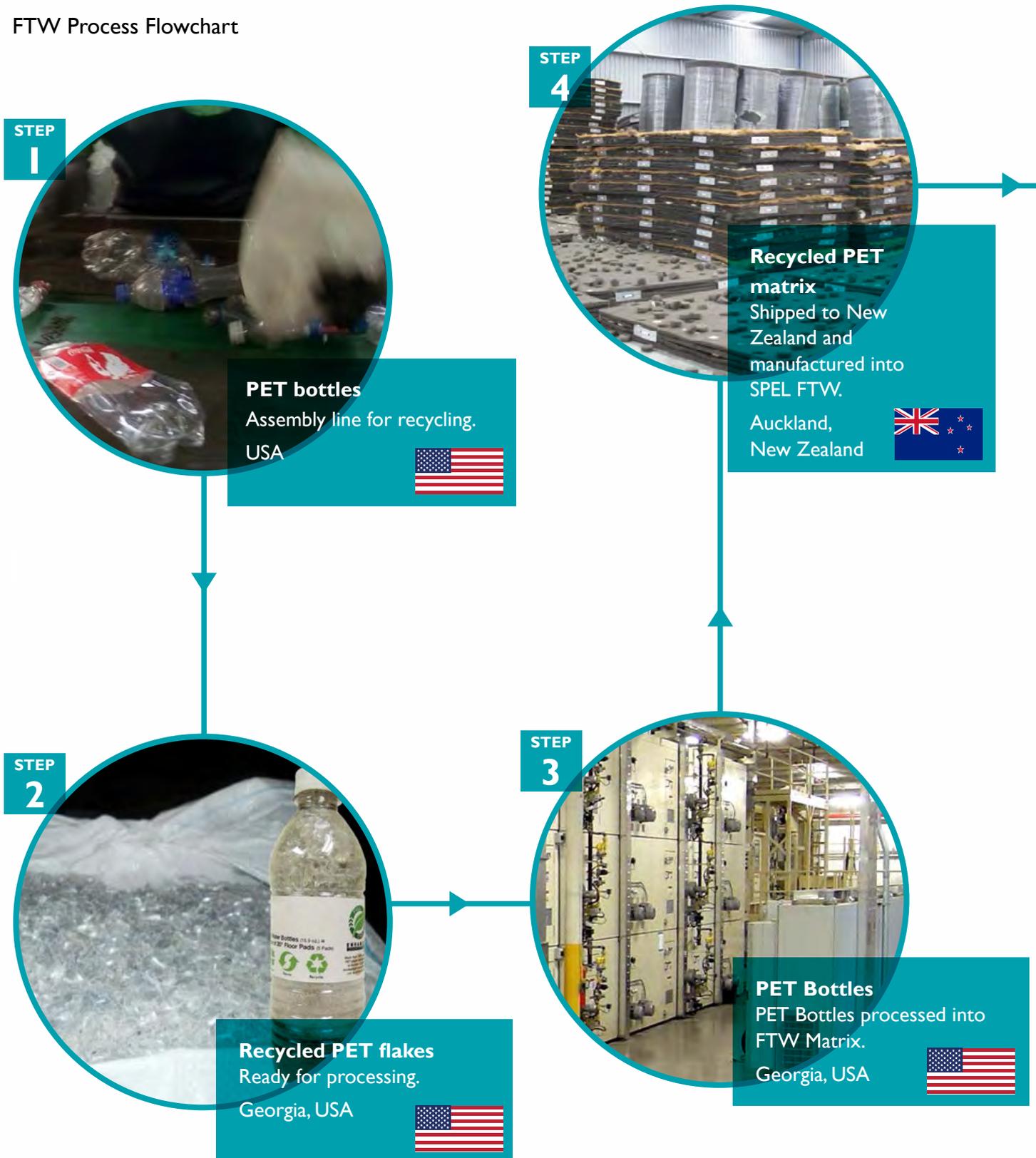


Visit [www.spel.com.au](http://www.spel.com.au) for detailed data sheets on our products

# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands - PET

### FTW Process Flowchart



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands - PET

STEP 5



Can be used for treating cane farm runoff in canals & streams.



STEP 6



Can be used for treating sugar mills & abattoir wastewater.




Using recycled PET Drink Bottles to save the Great Barrier Reef  
 SPEL FTW Sengkang Wetlands Sungei Punggol Singapore.

STEP 7



Protects GBR from fine suspended Solids & Nitrogen



STEP 8



FTW protects the Great Barrier Reef from Sediment & Nutrients



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands

### Overview

In wastewater applications, floating wetlands have proven efficient and low-cost enhancements to municipal wastewater treatment plants — either retrofitted to existing facilities or encompassed into the design of new constructions. Truly environmentally sound and sustainable, the SPEL Waterclean floating wetlands have a dramatic effect on:

- Anaerobic digestion
- Odour mitigation
- Nitrification processes
- De-nitrification and polishing
- Bio-chemical oxygen demand
- Removal of TSS
- Reduction in faecal coliforms
- Reduction in phosphorus



SPEL Floating Wetlands treating sewage ponds

### APPLICATIONS

Stormwater Treatment

Beautification and Landscaping

Lake and Pond Restoration

Waste Water Treatment

Lagoon Augmentation

Fine Colloidal and Particulate Heavy Metal Removal

Algal Bloom Prevention



Rotorua Lakes wetland established in 2015



Lake Tikitapu shoreline erosion mitigation from ski boats

In stormwater applications, the installation of floating wetlands into inlet zones or detention lagoons greatly enhances the stormwater cleaning process by removing:

- Total suspended solids
- Nutrients
- Gross pollutants
- Heavy metals
- Fine colloidal and particulates

Independently tested and validated, these systems provide high-rate performance in both average flow and storm events.



Riverstone Rise residential development Gladstone QLD



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands

### Benefits

SPEL Environmental's floating treatment wetlands offer clear benefits to any organisation or individual requiring wastewater treatment including local authorities, private companies, and landowners. These benefits include:

#### Minimal environmental impact

- Using a waste product to bio-remediate waste, our floating treatment wetlands have strong environmental credentials including:
- Satisfying stringent water quality consent requirements
- Eliminating the need for chemical dosing
- Eliminating the need for further high-impact 'concrete and steel' construction
- No energy used in the operation process; low energy in the manufacture process
- Zero-land use requirement
- Manufacture from recycled PET
- Using plants from eco-sourced seeds to harmonise with the natural vegetation



Lake Tikitapu shoreline erosion mitigation from ski boats

#### Flexible

Floating treatment wetlands are completely flexible and can:

- Fit any existing space or water body shape
- Operate effectively in all climate and environmental conditions
- Operate in fluctuating water levels
- Maximise retention times for treatment optimisation
- Concentrate on removal of particular pollutants through design adjustments

What this flexibility will mean for you is that, whatever your water treatment issue, the wetlands can be adapted to provide a benefit-loaded solution.

#### Beautification

Although the floating treatment wetlands are primarily a water treatment tool, they have the added bonus of being visually appealing as a floating wetland.

As a water-based feature in community facilities, they can enhance the natural environment and provide a habitat for land-based and marine wildlife. They also can be used as a landscaping feature on private residential projects.



Rotorua Lakes floating wetland installed 2014

#### Planting

The plant species suitable for floating wetlands are selected according to the reserve buoyancy required for the application. Generally, terrestrial species such as wetland sedges, rushes and grasses are the best option as they develop superior root structures within the water to provide for an increased surface area. However, many other planting types are also used. Recommended planting density is three to five plants per square metre.



8 weeks young Park Lakes II project  
Sunshine Coast QLD during a storm event

# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands

### Effective

The process is simple, completely natural - and highly effective. You have the assurance of an installation that has been developed to exploit the unsurpassed water cleaning properties of naturally-occurring microbes.

### Zero land use

In situations where water treatment demands have outgrown existing assets, the wetlands can be retrofitted as a low-cost, zero land use alternative to building additional ponds or constructed wetlands.

This eliminates the need for costly land purchase and contributes to the minimal environmental impact of the wetlands – saving you money and time-consuming confrontations over land use.

For example, local authority saved \$500,000.00 when we retro-fitted floating treatment wetlands on an existing pond instead of purchasing land and constructing an alternative constructed wetland system.

In areas where irrigation schemes are used to dispose of treated water, the efficiency of our wetlands in reducing the nutrients in treated water means less land is required for the disposal fields. Again, money is saved and environmental needs met.



### Modular biological system

The Floating treatment wetlands is a modular system therefore can be installed in stages. This proves beneficial where monetary budget constraints restrict the ability to install full systems in one financial year.

Staging also proves beneficial where discharge consents may change in the future while a smaller system meets current demands. A simple additional modular upgrade can be retrofitted at a later stage to future proof the wastewater plant.



### Anchoring and tethering

The floating treatment wetlands can be secured into position by anchoring or tethering, depending on local climate and water conditions.

The technique we use is to secure to the embankment above the maximum water level.

The floating treatment covers are partially submerged which provides a “suction” effect to occur that creates a powerful anchoring mechanism, imparting the greater part of the forces needed for anchoring these systems in place.

### Cost savings

Floating treatment wetlands require low capital investment with minimal operating and maintenance costs, and, there are no operational energy costs. (1) NH<sub>4</sub>N requires an input of O<sub>2</sub> to nitrify. This is often via mechanical aeration

# **SPEL** WATER CLEAN (FTW)

## Floating Treatment Wetlands - Stormwater

### Stormwater

#### SPEL Environmental's floating treatment media - complete pond cover

The floating wetlands, which can be used in any water environment requiring treatment, provide a lush and fertile base for plants and vegetation to grow. As the roots spread down through the fibrous structure of the media, an extraordinarily vast activated surface area is created for microbes and bacteria to take on their role of bio-remediation - the use of micro-organisms to remove pollutants.

The microbes and bacteria, which do not swim, and are UV sensitive, adhere to the roots and microscopic root hairs of the plants, and within the fibrous structure of the media themselves, secreting sticky extracellular proteins and exist in the environs of biofilms. It is within these biofilms which microbes and bacteria trap and digest odours and nutrients in wastewater.

What makes SPEL Environmental's floating treatment media a unique scientific innovation, with the potential to create a revolution within the water treatment industry, is the massive activated surface area they provide for microbes and bacteria to survive.



#### Construction

SPEL Environmental floating treatment wetlands are made from 100 per cent recycled polyethylene terephthalate, commonly known as PET and used in plastic drink bottles. The recycled plastic is made into a non-woven, non-toxic durable matrix of fibres.

Dense and porous, it is extremely inert and has been coated in a UV resistant resin to US Environmental Protection Agency irradiation accelerated degradation standards.

Sheets of fibre matrix are bonded together with foam which provides the buoyancy needed for each specific application. Plants are inserted into the material and grow down into the water hydroponically.

Cleaning water of pollutants is an on-going challenge for communities across the globe as the demand for environmental improvements grows in line with the need to find cost-effective and sustainable methods to remove ever-increasing amounts of contaminants from diverse bodies of water.

SPEL Environmental's revolutionary low cost, highly flexible system of floating treatment media is meeting this need. This innovative system has strong scientific credentials based on the outcomes of independent trials, is an environmentally-sound process, and meets business requirements for sustainable solutions.



Developed alongside leading international scientists, Waterclean Technologies™ floating treatment media represent a highly technical development that uses, and improves on, a naturally occurring phenomenon.

In short, SPEL Environmental's, modular biological technology, being active suspended media provide a colossal environment of active surface area for pollutant-digesting microbes and bacteria to bioremediate water laden with nutrients, heavy metals or suspended solids. They represent an industry breakthrough with scores of benefits that include:

- Cost savings
- Proven effective performance
- Self-cleaning
- Minimal environmental impact
- Flexibility
- Zero land use
- Fluctuating water levels

# **SPEL** WATER CLEAN (FTW)

## Floating Treatment Wetlands - Wastewater

### Wastewater biological treatment

#### Wastewater

Floating treatment wetlands have proven efficient and low-cost enhancements to municipal wastewater treatment plants – retro-fitted to existing facilities or encompassed into the design of new constructions – with extremely low operation costs. Truly environmentally-sound and sustainable, our floating treatment media have a dramatic effect on:

- Anaerobic digestion
- Odour mitigation
- Nitrification processes
- De-nitrification and polishing
- Bio-chemical oxygen demand
- Removal of TSS
- Reduction in faecal coliforms
- Reduction in phosphorus

Independently tested and validated, these systems prove high rate performance in municipal Wastewater treatment plants as retrofitted systems on existing ponds. Many of the Waterclean Technologies floating treatment wetlands are achieving results as per below:



# **SPEL** WATER CLEAN (FTW)

## Floating Treatment Wetlands - Wastewater

### Industrial Wastewater

Floating treatment media provide a low environmental impact, low cost option for industry waste treatment and can be used to deal with many different types of industry waste. The media have a remarkable ability to reduce a vast amount of industrial associated loadings and continue to operate in high levels of salinity, addressing a common problem for many industries.

Typical industrial applications include:

- Food processing
- Meat works
- Geothermal waste
- Timber processing
- Aquaculture
- Mining
- Landfill leachate



### Algae control

Green and blue/green algae cannot reproduce during sustained periods of low/no light levels. Any period beyond 18 hours of no light causes algae to expire.



### Algae and pH

Floating treatment wetlands FTW significantly helps with moderating pH if there is a reasonable level of cover. Design guidelines state to have sufficient cover to control algal biomass (via FTW shading and enhanced settling). It is the algal photosynthesis that causes elevation of pH. When their biomass is high they take up CO<sub>2</sub> for photosynthesis during the day faster than it can be replenished from the atmosphere. This modifies the carbonate equilibrium in the water making it become more alkaline.

During the night the CO<sub>2</sub> becomes replenished from the atmosphere plus algal and bacterial respiration bringing the pH back to near neutral. Controlling algal biomass with the FTW will then enable biologically moderating pH fluctuations. Also the dissolved organic matter released by the FTW (especially as they mature) also assists in moderating pH.



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands - Project Profiles

### Shannon WWTP

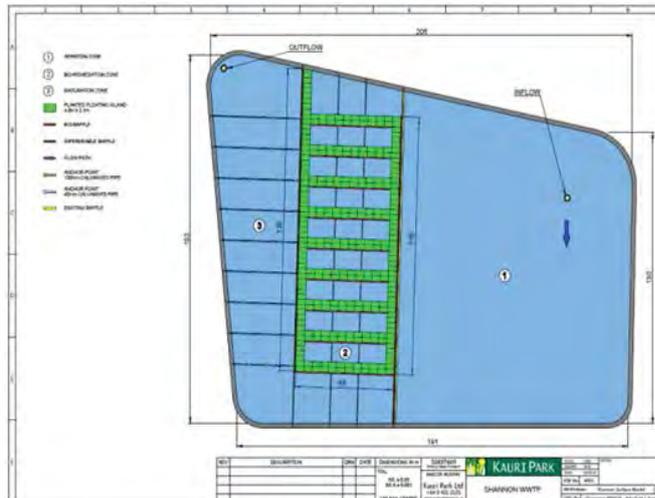
Horowhenua District Council, New Zealand  
Size: 2,600m<sup>2</sup>

The Shannon WWTP was due for an upgrade for the discharge that ultimately impacted on the Manawatu River (flows through Palmerston North). The Manawatu has been dubbed the most polluted river in the Southern Hemisphere...rightly or wrongly this is the spin some media are portraying.

Waterclean approached the consultant who was overseeing the upgrade to the plant. The designer was proposing a Constructed Wetland to the north of the pond. This was designed to polish the wastewater to a standard suitable for discharge.

The Pond treatment is typical of most of these systems that were installed 20-30 years ago. The ponds were designed to perform oxidation and facultative treatment. The levels of biological treatment in the ponds was sufficient at the time of design but ever tightening discharge parameters have now deemed the systems as non-compliant in treatment capabilities.

As an alternative to the Constructed Wetland, Waterclean proposed a Floating Treatment system. This was to operate on quarter of the footprint and on the existing asset (the pond). The addition of a large amount of surface area was the limiting biological process that Floating Treatment Media provide.



### Wastewater Influent to FTW and Effluent Quality

NOTE: Little to no Ammonia reduction occurs in this system as it is designed for Denitrification treatment. If a Nitrification system was implemented (stage 2) then the total nitrogen and NH<sub>4</sub>N concentration would be <10mg/l.

Parameter	Pond 2 Influent Concentrations Median	Effluent Concentrations Median	Removal Rates %
BOD <sub>5</sub> (gm/m <sup>3</sup> )	81	17	80
TSS (gm/m <sup>3</sup> )	44	7	84
NH <sub>4</sub> N (gm/m <sup>3</sup> )	–	–	n/a
Total Nitrogen (gm/m <sup>3</sup> )	44.5	19	57
Total Phosphorus (gm/m <sup>3</sup> )	6	3	50
F. Coliforms (cfu/100ml)	9,455	437	95



# SPEL WATER CLEAN (FTW)

## Floating Treatment Wetlands - Project Profiles

### Hunterville WWTP

Rangitikei District Council, New Zealand  
Size: 1,400m<sup>2</sup>

The Hunterville WWTP was undergoing an upgrade for the discharge of their wastewater. The Regional Council was supporting 2 options that were expensive for such a small population and rating base to support. The options were piping the sewerage 14km back to Marton with pumping stations or a discharge to land during summer which also is a very costly long term option.

Waterclean Technologies approached the Rangitikei District Council and they were intelligent in regards the fixed film removal concept and proposed a total wastewater treatment system within the 2 ponds to treat it to a standard that would comply with the stringent discharge limits.

The discharge from the Hunterville WwTP is to the Porewa Stream. During low river flows, (summer), the WWTP discharge contributes to more than 90% of the stream flow.



### Wastewater Influent to FTW and Effluent Quality

Parameter	Influent Concentrations Summer Median	Effluent Concentrations Summer Median	Removal Rates %
BOD <sub>5</sub> (gm/m <sup>3</sup> )	265	2	99
TSS (gm/m <sup>3</sup> )	265	8	97
NH <sub>4</sub> -N (gm/m <sup>3</sup> )	45	1.75	96
Total Nitrogen (gm/m <sup>3</sup> )	55	2	96
Total Phosphorus (gm/m <sup>3</sup> )	10	2.08	79
F. Coliforms (cfu/100ml)	6-7 log	1,020	99.99



# SPEL BASIN

## Modular Bio-retention Basin

### Overview

The need for a new stormwater treatment system is evident. Federal and state requirements on cities and industry to reduce stormwater runoff increase every year as our population explodes. The EPA is now reporting that stormwater runoff represents the nation's number one water quality problem, and is the reason why nearly half of our rivers and lakes are not even clean enough to support fishing or swimming. Nearly half.

To combat this catastrophe, we turned to the expert in this field: Nature. By developing technology that imitates the processes found in nature, we've created the most advanced stormwater filtration system available. Years ahead of current EPA requirements, our clients understand that when they invest in our new technology, they are investing in the future. For all of us.



### Removal Rates

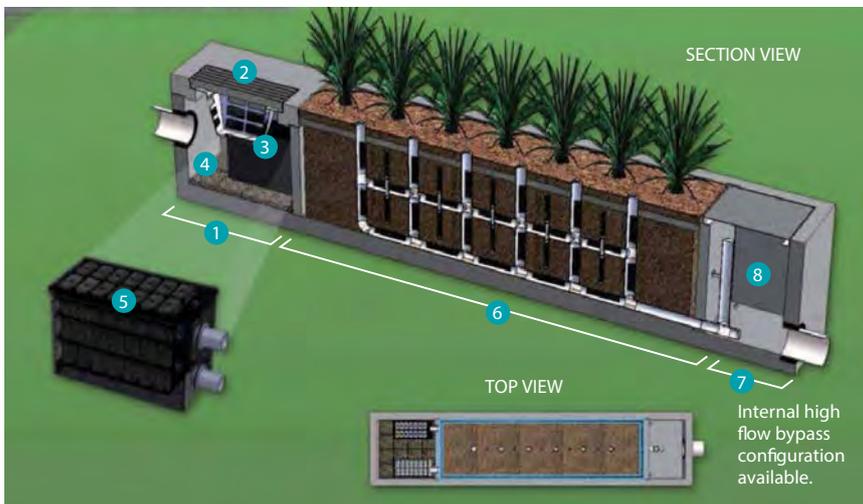
- TSS 82% - PSD 8microns
- TP 68%
- TN 55%
- Copper 33%
- Zinc 79%
- TPH 99%



Sunshine coast field test site installation

### Features

- |  |  |
|--|--|
| <p><b>1</b> Pre-treatment chamber<br/>Captures incoming runoff and contains the first three stages of treatment.</p>                             | <p><b>5</b> Pre-filter cartridge<br/>Provides the third stage of treatment by physically and chemically capturing fine TSS, metals, nutrients, and bacteria.</p> |
| <p><b>2</b> Grate type catch basin inlet<br/>A standard grate type traffic rated catch basin opening directs stormwater into the system.</p>     | <p><b>6</b> Wetland chamber<br/>Provides the final stage of treatment through a combination of physical, chemical and biological processes.</p>                  |
| <p><b>3</b> Catch basin insert filter<br/>Provides the first stage of treatment by capturing trash &amp; litter, gross solids, and sediment.</p> | <p><b>7</b> Discharge chamber<br/>Contains flow control, high flow bypass and optional drain down filter.</p>  |
| <p><b>4</b> Settling chamber<br/>Provides the second stage of treatment by separating out larger suspended solids.</p>                           | <p><b>8</b> Multi-level flow control<br/>Orifice plates and/or valves are used to control the flow through the treatment stages.</p>                             |



### APPLICATIONS

Car Parks & Shopping Centers

Council Depots

Industrial Estates

Heavy Vehicle Maintenance

Transport Depots & Loading Bays

Tunnels

Highways & Transport Corridors

Recycling Yards

Airport Aprons & Tarmacs

# SPEL BASIN

## Modular Bio-retention Basin

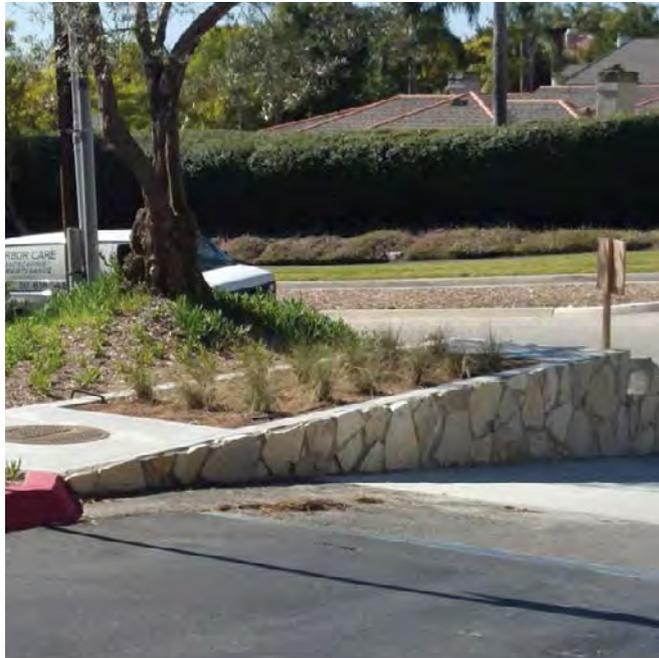


### Sizing

The SPELBasin Modular Bioretention System is modeled [typically in MUSIC] for each project based on the site specific requirements.

### Volume Sizing

The SPEL Basin Modular Wetlands system can be designed to treat flows from detention systems or directly off hardstand surfaces. Contact SPEL for more information



### Tested Removal Efficiencies

Pollutant	Efficiency
TSS (mean particle size 8 microns)	81%
Total Phosphorus (TP)	71%
Total Nitrogen (TN)	45%
Copper	50%
Zinc	68%
TPH	>99%
E.Coli	55%
Faecal Coliform	54%

# SPEL BASIN

## Modular Bio-retention Basin

### Available Configuration

The SPELBasin is an advanced stormwater treatment system that works with natural forces to provide superior pollutant removal. Delivered as a pre-fabricated, compact and self-contained treatment system, the SPELBasin utilizes HORIZONTAL FLOW bioretention technology and multistage pre-treatment. Easy to size, install and maintain, the SPELBasin is ideally suited for the urban environment – treating runoff from parking lots, roadways, residential and commercial developments and/or retrofit applications. Available in numerous sizes and various inlet configurations, including internal high flow bypass, the SPELBasin is clearly the most versatile and innovative stormwater treatment system.



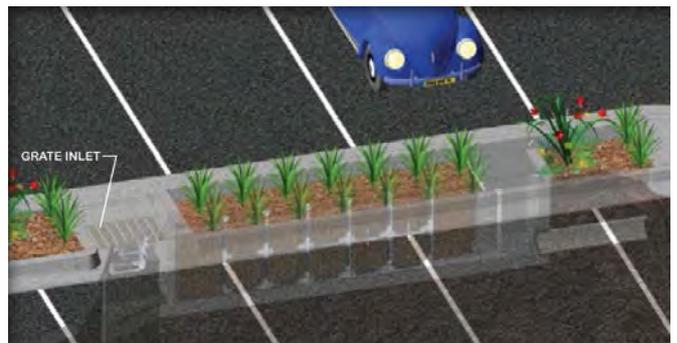
### Benefits

- Built-In Bypass Available with All Configurations
- All Configurations Utilise a Pre-Treatment Chamber Which Contains:
- Litter Capture, Sediment Chamber & Pre-Filter Cartridges



### Curb Type

The curb Inlet configuration accepts sheet flow through a typical curb opening. This configuration is typically installed along road ways or parking lots. This configuration can be placed in a sump condition or connected to an existing curb inlet drain using the DVERT trough.



### Grate/Drop Inlet Type

The Grate Inlet configuration accepts runoff on-grade or in a sump condition through a grated or drop inlet making it ideal for landscaped parking islands, strips or set aside areas. This configuration also accepts inflow pipes from upstream gully pits.

### Optional TSS pre-filter



# SPEL BASIN

## Modular Bio-retention Basin



### Vault Type

The Vault configuration accepts piped flow from upstream drainage basins, wet ponds or underground detention systems. This configuration is a cost-effective solution to the unique challenges faced by systems that require sheet flow - including most proprietary biofilters, tree box filters, rain gardens and/or other WSUD features. This unique feature allows the SPEL Basin Modular Bioretention to treat attenuated flow downstream of underground detention systems without the filter surface dropping metres below the finished surface level.



### Downpipe Type

The Downpipe configuration is a highly anticipated and welcomed addition to our configuration types. Roof top pollutants, such as Zinc, Copper, and Lead are effectively treated and immobilised by our subsurface flow wetland technology. Installed above or below the ground, this configuration offers a compact, yet aesthetically pleasing system that seamlessly integrates into the residential, commercial or industrial settings.



# SPEL STORMCHAMBER

## Modular stormwater storage

### Benefits over other storage methods

- Helps counter drought conditions by maintaining groundwater base flow to streams.
- Superior load ratings for trafficable areas. Complies with AS5100, W8 wheel loads.
- Maximised volume for efficient storage void ratio.
- The least cost underground alternative.
- The lowest installed cost of any modular storage technology.
- Burial depths up to over 9m.
- Multi-layered installations possible for restricted surface area sites.
- Superior design eliminates costly and complicated header manifold systems.
- Can be utilised for conveyance in remote locations.
- Recycled HDPE construction allows smaller excavation and decreased footprint.

### Adapting proven detention technology for conveyance



Significantly less cost, quicker and easier than pipe for conveyance.



# SPEL STORMCHAMBER

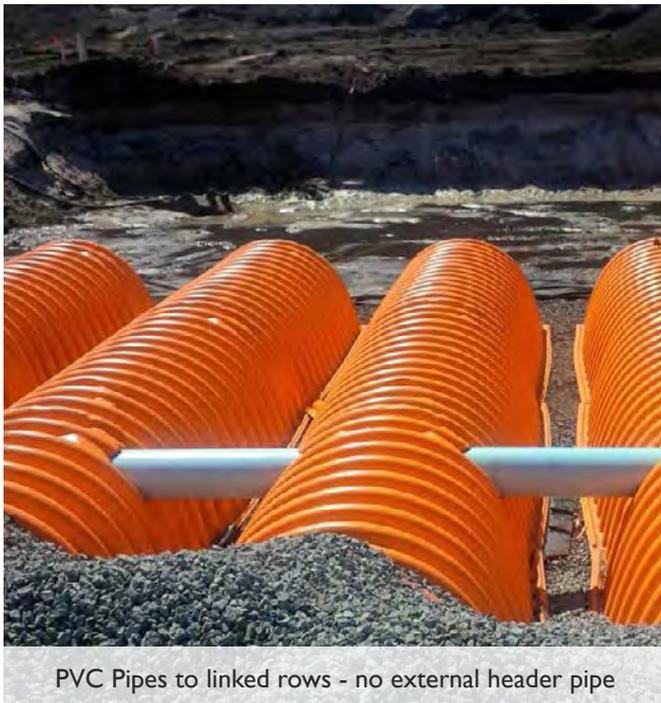
## Modular stormwater storage

### APPLICATIONS

Car Parks & Shopping Centres

Council Depots

Industrial Estates



PVC Pipes to linked rows - no external header pipe



5370kg/m<sup>2</sup> track pressure when backfilled

### Average % Removal Rates

Pollutant Parameter	Infiltration	Wetland	Water Quality Pond	Filtering System	Water Quality Swale
Total Phosphorus	65	51	45.5	45	14.5
Total Nitrogen	82.5	20.9	30	32	10.5
Lead	98	63	66.5	71	50
Zinc	99	53.5	50.5	69	49
Suspended Solids	88.5	78	70	81	66
Organic Carbon	82	28	35	57	23

\* Source: Brown, Whitney, Schueler, Thomas. National Pollutant Removal Performance Database for Stormwater BMPs, August 1997, Center for Watershed Protection, Ellicott City, Maryland.

### Domestic example



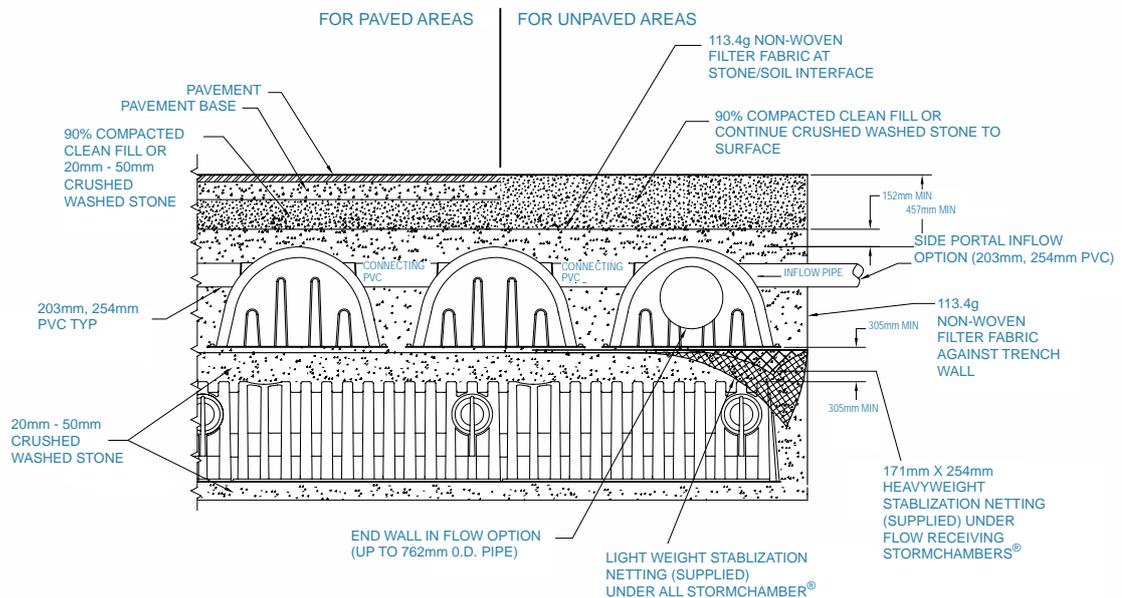
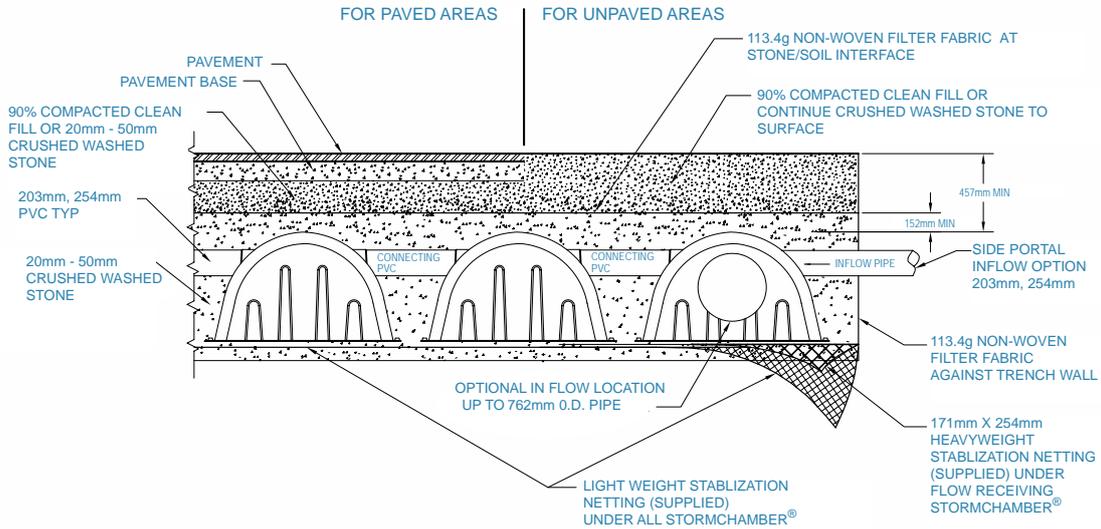
### StormChamber Features

- Standard module = 2.12m<sup>3</sup>
- Design storage capacity = 3.26 to 4.56m<sup>3</sup>
- Length = 2.59m
- Width = 1.52m
- Height = 0.86m

# SPEL STORMCHAMBER

## Modular stormwater storage

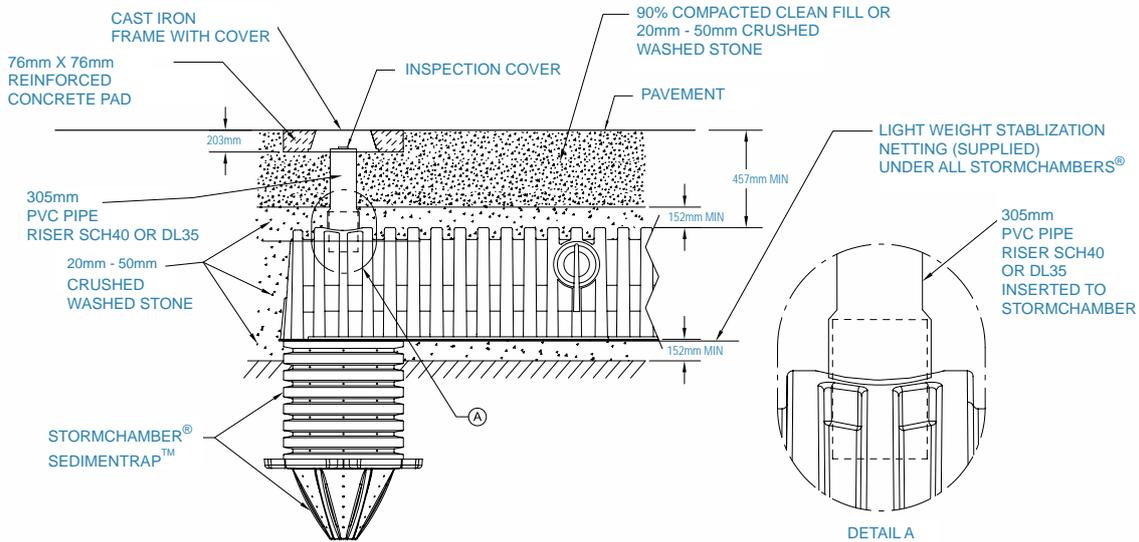
### RECOMMENDED INSTALLATION OF SPEL STORMCHAMBER®



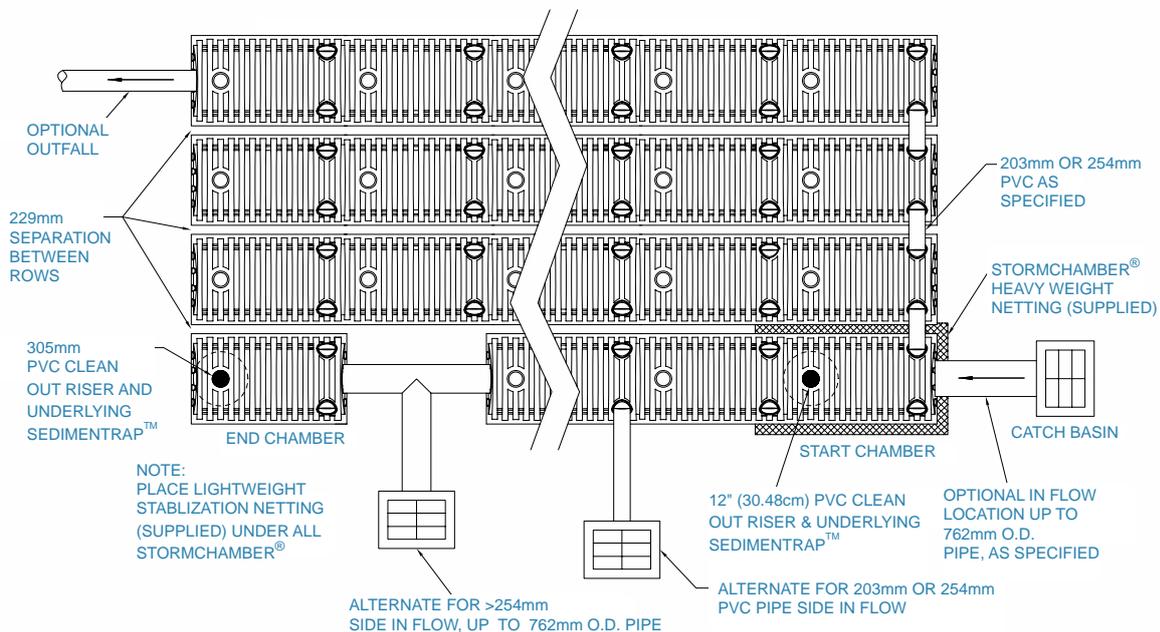
# SPEL STORMCHAMBER

## Modular stormwater storage

### SEDIMENTRAP™ AT BEGINNING AND END OF ROW(S) RECEIVING INFLOW



### EXAMPLE "STANDARD" CONFIGURATION



# SPEL THIRSTY DUCK

## Buoyant Flow Control

### Features

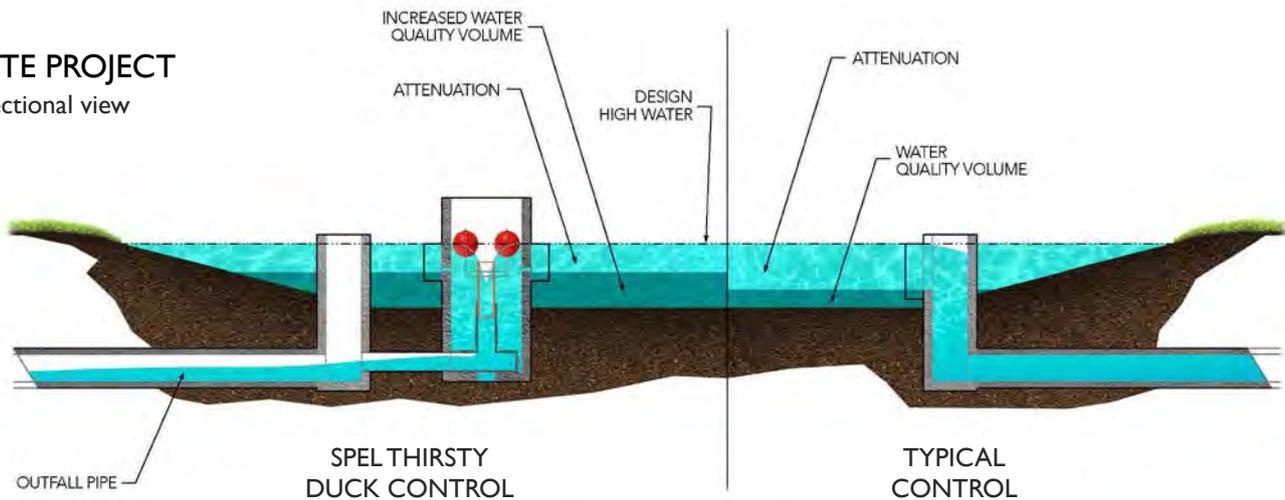
- TD Series is a buoyant body housing an orifice.
- Buoyant module is connected to an expanding conduit (“the bellows”).
- Bellows fabricated from high strength, welded polyurethane with stainless steel reinforcing rings in each pleat.
- The “Duck Body” rests in its “Nest” when it’s not floating.
- Uses standard flange to connect to outfall system.
- Device is self-skimming. Water enters the body from its underside.
- Reduces detention basins up to 50%.
- Larger ER series can convey flows greater than 1 cumecs.



TD

### SITE PROJECT

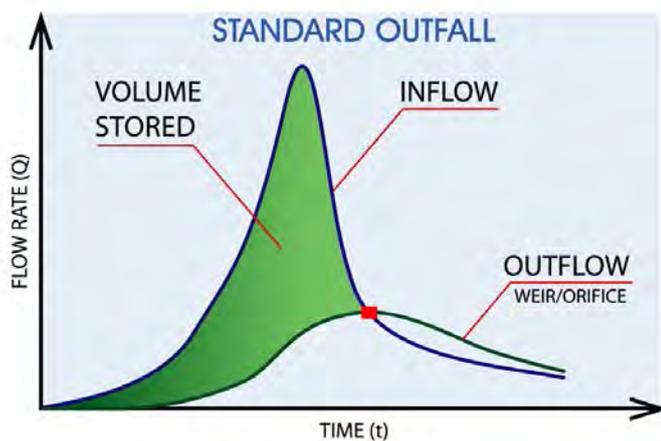
Sectional view



### Volume Comparasion

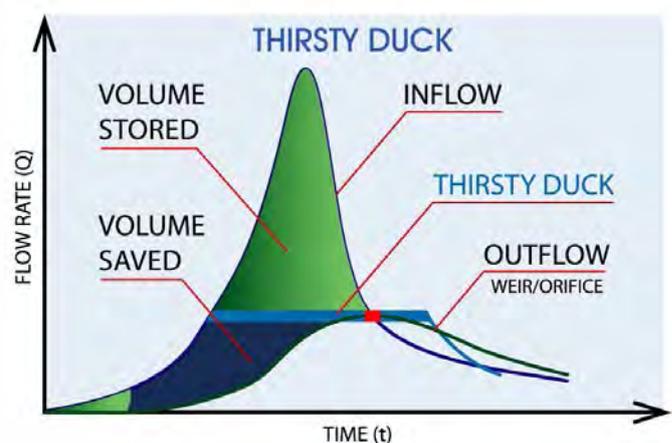
Traditional Outlet Control Device

Volume=Inflow-Outflow



Traditional Outlet Control Device

Volume=Inflow-Outflow



# SPEL THIRSTY

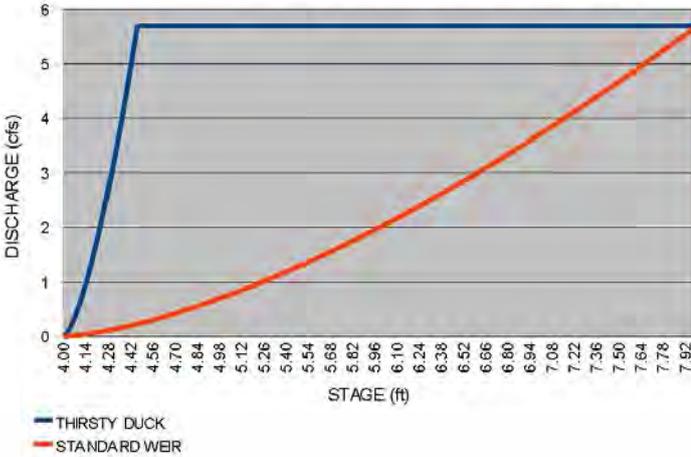
## Buoyant Flow Control



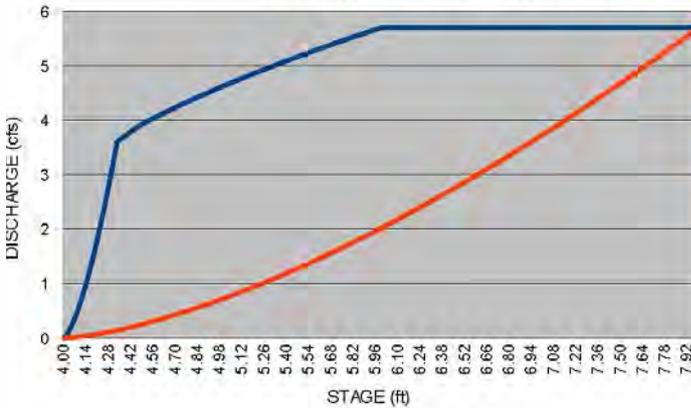
ER SERIES

### Performance Curves

#### Free Discharge Condition



#### High Tailwater Condition



### APPLICATIONS

Retention Basins

Bio Retention Basins

Increase Water Quality volumes



# SPEL AQUAFLO

## Underground Water Storage

Why have your precious backyard or recreation area occupied with unsightly above ground storage tanks, when you can install an all new and innovative “AquaFlo” storage system in ground?

The new modular “AquaFlo” storage system has a standard capacity range from 5000L up to 30,000L (larger on request).

With water storage being a continuing demand for our drought prone environment, not only can we help the local farming community, but also councils, industry right down to your individual domestic requirements.

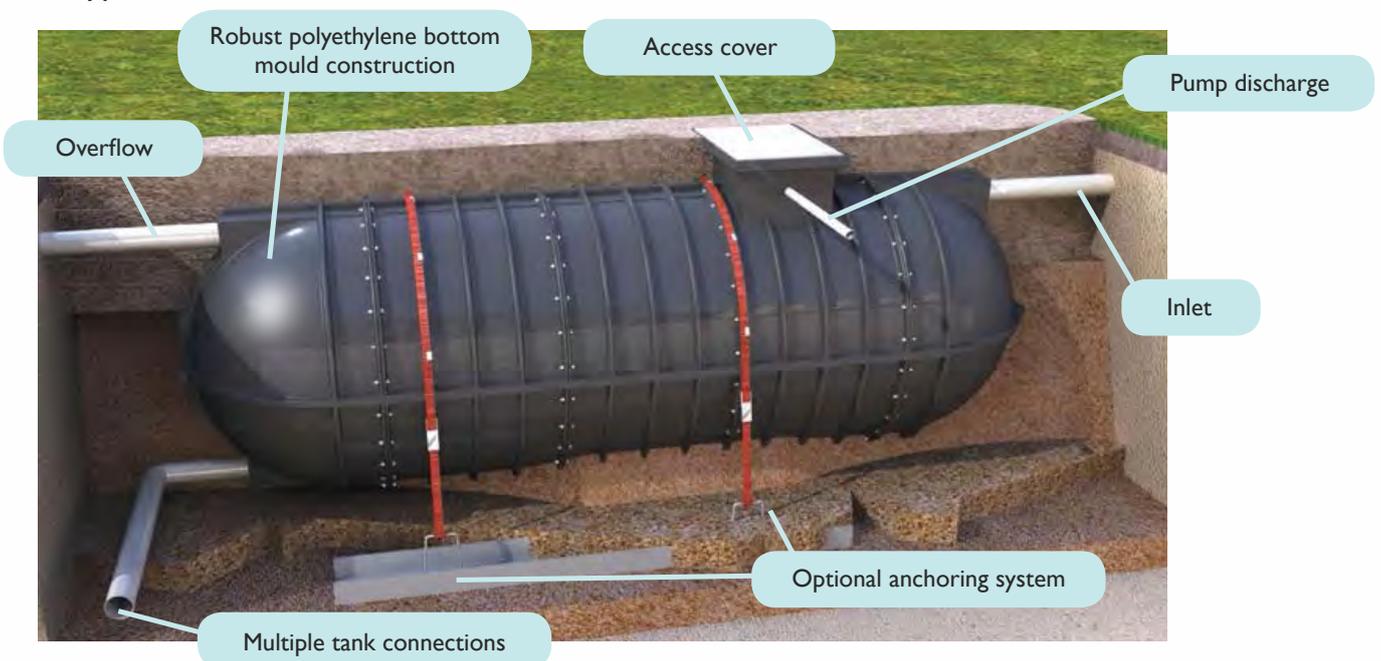
These innovative and robust storage systems are made from high density polyethylene (HDPE) and are suitable for all types of in ground installations — even in your driveway.



### APPLICATIONS

Residential	Golf Courses	Industrial
Hotel	Park Irrigation	Mine Sites
Townhouses	Sewerage Treatment	Truck Stops
Motel	Flood Irrigation	Waste Stations
Retirement Villages	Playing Fields	Nursery Irrigation
Commercial	Stadiums	Council Recreation
Shopping Centres		

### Typical Installation



# SPEL TANKSTOR

## Underground Water Storage



SPEL Tankstor tanks are manufactured for many applications and in a wide range of specifications to handle such substances as water, sewage, farm effluent, petroleum products and chemicals.

Our modern plant, equipment and quality assurance procedures ensure both quality and competitive pricing.

Being manufactured in glass reinforced plastics, SPEL tanks are light, easy to handle and install. They are not susceptible to rust, exhibit excellent corrosion resistant properties and have a life expectancy in excess of 50 years.



### Range

- Series 200 (1.2m inside diameter): 1,000 – 10,000 litres capacity
- Series 300 (1.8m inside diameter): 4,000 – 40,000 litres capacity
- Series 400 (2.6m inside diameter): 13,650 – 100,000 litres capacity
- Series 500 (3.5m inside diameter): 60,000 – 200,000 litres capacity
- Series 600 (4.0m inside diameter): 100,000 – 300,000 litres capacity

### APPLICATIONS

---

Stormwater attenuation

---

Fire fighting sprinkler reservoirs

---

Potable water storage

---

Septic/settlement tanks

---

Cesspools & silage effluent holding tanks

---

SPEL RainSave rainwater reservoirs

---

Accidental spillage containment

---

Transformer oil dump tanks

---

package pumping chambers

---

Above ground storage

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# SPEL OSORB

## Water Treatment

### Overview

Osorb is an absorbent nano-engineered glass useful for capturing petroleum hydrocarbons and other organics, allowing biological degradation to occur in the soil in stormwater systems.

Specialised, reductive Osorb materials have been modified to both capture and break down a wide spectrum of volatile organic compounds (VOCs) and other contaminants, including:

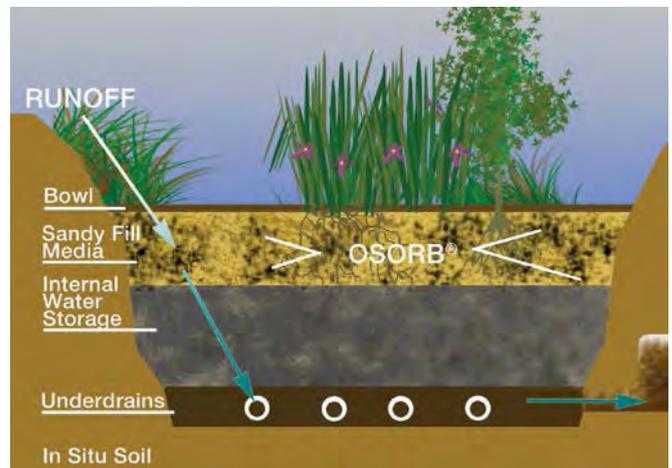
- Polyaromatic hydrocarbons (PAHs)
- Endocrine disruptors
- Pharmaceuticals
- Nutrients, such as nitrates and phosphates
- Pesticides, such as atrazine
- Some metals, including copper, zinc, and lead ions

### Advantages

- Integrates into existing stormwater systems
- Aesthetically remediates many persistent contaminants
- Has a high absorption capacity
- Does not affect natural soil composition
- Recharges groundwater with a clean, safe source

### Features

- Osorb removes contaminants such as:
  - Oil
  - Gas
  - Pharmaceuticals
  - Pesticides
  - Nutrients from Stormwater
- Improves plant growth
- Protects healthy soil microbes from toxicity overloading



# SPEL OSORB

## Water Treatment

Below is an absorption chart with information about some of the compounds Osorb can remove from water. Specialty forms of Osorb embedded with reductive metals can also chemically reduce many captured compounds, indicated below.

ABSMaterials has engineered over 30 varieties of Osorb for specific applications, and not all captured compounds are listed below.

ABSMaterials labs test water samples from your unique site to determine which Osorb suits your specific needs.



Natural tensioned state      Solvent is added drop-wise      Expanded Osorb

Osorb (pictured above) is a regenerative material that swells up to 14x its original size to absorb organics from water, often reducing them to less than 1ppb.

Chlorinated Solvents	Osorb Absorption	Metal Osorb Reduction*
Trichloroethylene (TCE)	***	Yes
Perchloroethylene (PCE)	***	Yes
Dichloroethylene (DCE)	**	Yes
Vinyl Chloride (VC)	**	Yes
Trichloromethane (Chloroform)	**	Yes
Carbon Tetrachloride	***	Yes
Dichloromethane	*	No

Aromatic Compounds	Osorb Absorption	Metal Osorb Reduction*
Toluene	***	No
Naphthalene	***	No
Phenol	**	No
Benzene	***	No
Ethylbenzene	***	No
Nitrobenzene	***	No
Trinitrotoluene	***	Yes
Chlorobenzene	***	Yes
Phthalate Esters	**	No
Polychlorinated Biphenyl (PCBs)	***	Yes
Bisphenol A	**	No
Xylene	***	No
Atrazine (herbicide)	***	Yes

Pharmaceuticals	Osorb Absorption
Triclosan (antibacterial)	***
Fluoxetine (antidepressant)	***
Ibuprofen (anti-inflammatory)	**
Diphenhydramine (antihistamine)	**
Estradiol (birth control)	***
Imipramine (antidepressant)	***

Alcohols	Osorb Absorption
Methanol	*
Ethanol	*
Butanol	**
Hexanol	**

Solvents	Osorb Absorption
Octane	***
Hexane	***
MTBE	**
Dioxane	**
Acetone	*

Osorb Absorption  
 \*\*\* > 99%  
 \*\* > 75%  
 \* > 30%

\*Metal Osorb reduction refers to reduction of the compound when treated with specialty metal-embedded Osorb varieties.



VOC SOCKS® for in-well treatment



Green Stormwater Solutions



Underground Injections



VOCEater™ Pump-and-Treat Unit

# SPEL OSORB

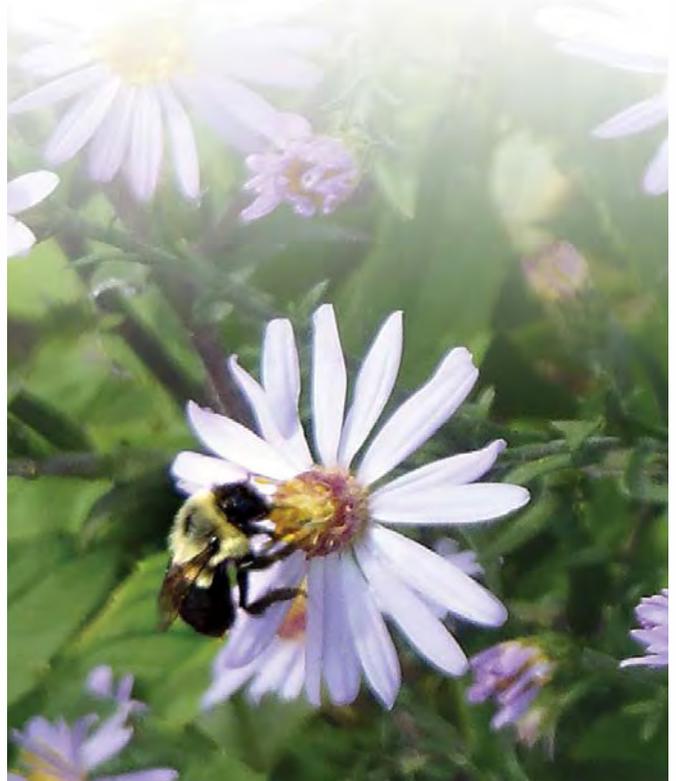
## Soil Amendments

Protect soil by capturing and destroying biocides, fuels, and volatiles.

Osorb is an engineered glass material. Osorb swells to capture thousands of volatile contaminants and is used today to clean up superfund sites, brownfields, and industrial waters. SPEL Materials, with support from the National Science Foundation, has developed a BioMix-Osorb which reduces oil, biocides, household chemicals, and volatile organic compounds (VOCs) common to stormwater runoffs and impacted urban soils.

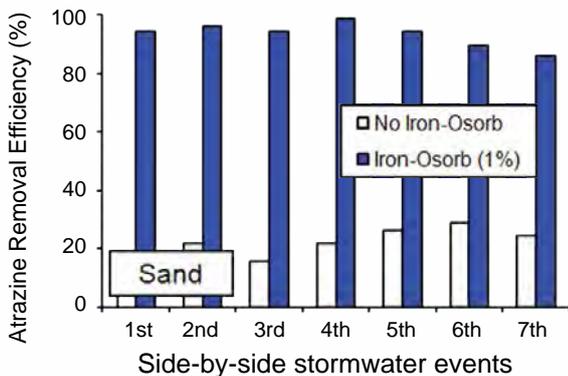
These contaminants may be legacy toxins, spilled locally, or have entered soil beds through stormwater, which can carry them for miles. Many volatiles can persist in soil for decades. Osorb captures and breaks down persistent, dangerous contaminants into nontoxic compounds, and is now in use in urban, suburban, sensitive parkland, and industrial runoff settings.

Some of the contaminants BioMix-Osorb can capture and destroy include: atrazine, triclosan, malathion, 2,4-D, chlorinated solvents, and all roadway fuel spills. BioMix-Osorb is blended with soil media to remove these contaminants and more from soil. It promotes healthy soils and is believed to be effective on an ongoing basis for 10+ years.



Atrazine, most common herbicide in U.S., reduced in soil by >99%

The graph below shows results from a National Science Foundation study of Osorb soil media to buffer contaminated stormwater. Most VOCs were reduced by at least 90%, and often >99%, which was significantly more than the control media.



## Soil Amendments



### Healthier soil

Healthy soil yields more robust plants and fosters microbial and insect diversity, holds water and nutrients, and prevents carbon from leaching into the atmosphere. Soil with persistent chemicals from contamination does not. By reducing volatiles to simple salts and phenols, Osorb® soil amendments protect soil function and the organisms it sustains.

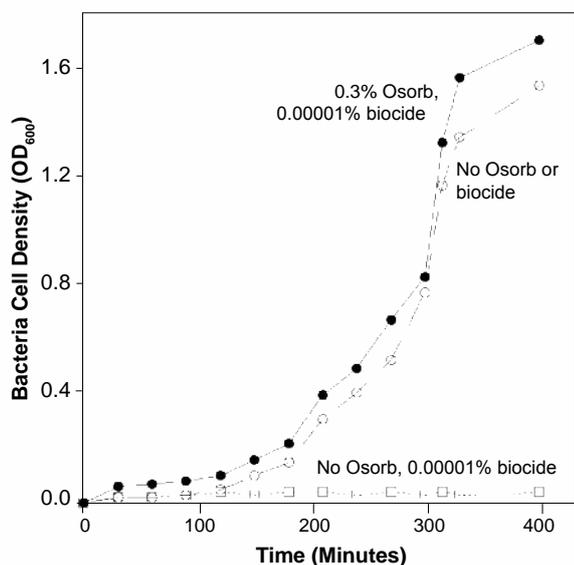
### Hardier, faster growing plants

As part of a National Science Foundation study using lavender, chives, and flower seeds, Osorb amendments were found to facilitate germination and overall plant growth significantly when added to soil media in as little as 0.3% concentrations.

### Increased nutrient uptake

Because plants, soil, and microorganisms are protected by Osorb, as much as a 400% increase in biomass may result. These species then lead to an uptake of nutrients, also with as much as 400% increase. You can look at the example below of an NPK-consuming bacteria protected by Osorb.

### Beneficial bacteria always grow better in soils with Osorb



Osorb captures nearly all commercial biocides while ignoring beneficial organic matter. This increases primary ecological processes in soils, leading to greater activity, diversity, and productivity within the microbial biomass.

The graph at left shows the growth rate of beneficial bacteria in three samples of the same media: one with Osorb and a common hand soap antibiotic (triclosan) added, one with just triclosan, and one with neither. The Osorb-protected media performs best.

In unprotected soils, any biocide reduces species of bacteria, insects, and plants. Osorb protected soils, even with biocides or other volatiles present, see all organic species thrive.

# SPEL OSORB

## Stormwater System Retrofit

Reduce runoff contaminants in parking lots, shoulders, and high traffic areas.

A retrofit application of KBI Flexi®-Clean, Powered by Osorb® from SPEL Materials, allowed Waste Management Inc., a waste collection service provider, to cost effectively clean stormwater from their heavily trafficked parking area while eliminating extensive construction and permitting challenges.

The retrofit included an application of Flexi®-Pave permeable pavement plus Flexi-Clean, Powered by Osorb®, to capture and break down contaminants from parking, traffic, and other roadway activities. The solution is unobtrusive and both quickly conveys and treats stormwater runoff.



### Flexi®-Pave

- Removes up to 83% nitrate and up to 83% dissolved phosphate
- Uses recycled tires
- Diffuses water force



### Flexi®-Clean, Powered by Osorb®

- Utilizes SPEL Materials' advanced bioreactive glass, Osorb®
- Remediate 99.9% of petroleum products, synthetics, vehicular fuels, pesticides, and more
- Chemically alters pollutants
- Reduces nutrient and contaminant loading to groundwater



The installation was quick and efficient and allowed us to minimize downtime and expense. No permits were required as it was a repair, rather than a replacement, of an existing stormwater system. Aesthetically, it looks great and is very unobtrusive.”

Michele Lersch - Waste Management, Inc. Florida Environmental Protection Manager

# SPEL OSORB

## Stormwater System Retrofit



Original site conditions at Waste Management parking site

Installation of monitoring port

### The Challenge

Many gray infrastructure solutions for managing stormwater volume are expensive and require an extensive amount of downtime, permitting, and construction. Heavy traffic or industrial land use can also lead to heavy contamination loading in stormwater. While low impact development can solve the challenges related to stormwater volume, it often fails to address the heavy contamination loading that can result from heavy traffic or industrial land use.

The existing parking area at the Waste Management site drained to an undersized inlet that offered no ability to monitor or treat the groundwater. Poor layout and physical challenges due to the low lying nature of the property made traditional gray solutions, such as drop-in units and underground tank systems, impossible or economically unfeasible to implement. These solutions would have also required heavy construction, significant downtime, and more depth than the site allowed due to the low elevation and high water table.

### The Solution

The existing site and drain provides less than 1' of fall, requiring a shallow, unobtrusive method to be used. This led to the selection of Flexi®-Clean, solving the challenges related to both stormwater volume and contamination. Over the first three months of operation in 2013, all runoff from this complex industrial site has met EPA discharge standards.

The system starts with a layer of Flexi®-Clean, a bioreactive media that treats stormwater as it passes through the material. Once the material was installed, the surface was capped with a structural layer of Flexi®-Pave, a recycled tire and aggregate permeable paver system allowing for high-volume drainage of stormwater from the site. This combination allows for high-volume conveyance of stormwater coupled with effective point treatment before allowing the water to exit the property into the stormwater drain.

This easy-to-install Osorb-powered solution integrated a monitoring port that allows the client to monitor water quality in an easy, ongoing manner. Since the project was a repair to an existing stormwater system, no permits were required and valuable time and resources were saved.



# SPEL OSORB

## Airport Runoff Remediation

Protect soil by capturing and destroying biocides, fuels, and volatiles.

Osorb® is a nano-engineered, swellable glass capable of capturing and destroying 99.9% of petroleum products, synthetics and de-icers, industrial solvents, and a wide range of organics.

Using specialty BioMix-Osorb®, we capture and eliminate runoff contaminants at heavily impacted air traffic locations and other industrial sites, preventing water pollution and keeping you in compliance with regulations.



Osorb removes de-icer from runoff

### Benefits of Osorb for airport runoff systems:

- Much higher capacity than other sorbents (14x dry volume)
- Both captures and then eliminates many compounds, reducing them to less than 1ppm
- Protects plants and soil, resulting in 15% accelerated growth
- Prevents runoff from reaching surface water or sewers
- Can integrate into existing runoff water systems



BioMix-Osorb Stormwater System at a 17-acre industrial site

Osorb® glass is the winner of 7 SBIRs for water remediation and numerous other awards.

- 2011 and 2012 Artemis Project Top 50
- 2011 Popular Mechanics Breakthrough Award
- 2010 NorTech Innovation of the Year
- 2009 MIT Clean Energy Prize

Osorb® is an advanced adsorption media that can clean thousands of environmental toxins in water.

- Large carrying capacity (up to 14x its dry volume)
- Hydrophobic and regenerative
- Reduces many organics to <1ppb



Lauded by the US DOE National Energy Technology Laboratory:

Osorb “was found to remove >99% of oil and grease, >90% of dissolved BTEX, and significant amounts of production chemicals.” -DOE NETL News Release, 2011

# SPEL OSORB

## Airport Runoff Remediation

BioMix-Osorb® improves bioswales and other stormwater systems by using reductive Osorb in the soil to capture and break down common water contaminants. Not only does BioMix-Osorb reduce the volume of stormwater runoff with a large area of control, but it also remediates runoff water, sending a clean effluent back into the environment.

Osorb systems meet or exceed all local, state and federal requirements for water quality discharge.



Before

After

In a side-by-side bioswale study funded by the National Science Foundation, a control garden and Osorb bioswale with a 1% Osorb soil amendment were exposed to identical runoff and weather conditions (shown above). Both gardens reduced runoff by >95% of the normal flooding and sewer system overflow. However, the Osorb bioswale showed no signs of petroleum leaching in the effluent compared to the control garden's effluent. The Osorb garden also showed 15% accelerated plant growth due to soil health.



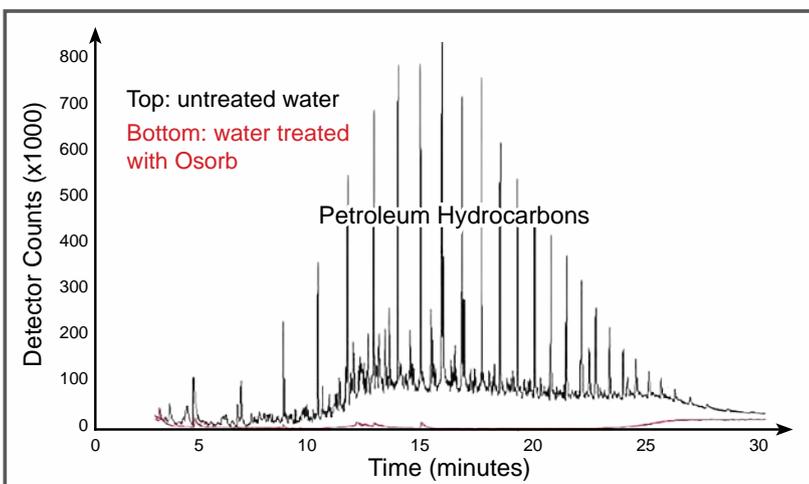
Influent water

Effluent water

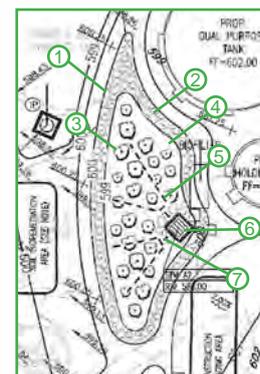
### How it works:

Osorb® glass material swells to mechanically (not chemically) capture volatile organics and other contaminants. Micrometals embedded inside the glass then chemically reduce many compounds into benign phenols, salts, and bioaccessible hydrocarbons.

### Osorb® Testing in Oily Water

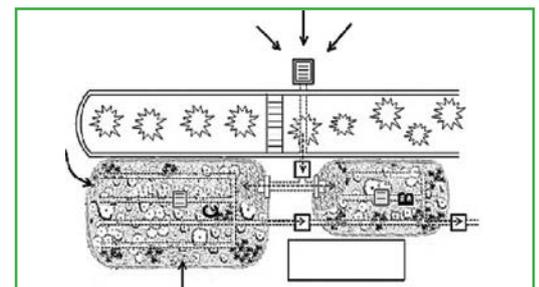


Gas chromatogram of total petroleum hydrocarbons (TPH) in water. Species were reduced by Osorb from 218-261 ppm to <0.1 ppm.



1. Top of Bank
2. No. 2 Aggregate
3. Plant
4. Osorb Fill Media
5. Underdrain (6")
6. Overflow Grate
7. Underdrain (8")

9 Mile Creek bioretention schematic



Runoff control design for industrial maintenance garage

# SPEL ALGACLEANER

## Algal Bloom Control

### Overview

Ultrasonic equipment to relieve algal blooms from ponds, irrigation reservoirs, and lakes without chemical products.

It is now possible to prevent the bloom of algae in your pond, irrigation reservoir, lake, fountain, cooling towers, etc, without the need for chemical products.

SPEL ultrasonic equipment will ensure the bloom is eliminated in the most sustainable method possible. It is easy to install. All you need to do is float the device in the water and connect it to a power source or solar panel.

### Advantages

- Ecological
- Non-toxic
- Causes no harm to humans, animals and plants
- Environmental — no need for chemical products
- No need for maintenance
- Easy to install
- 24/7 service
- Low power consumption



### Map of range

The SPEL Algacleaner is the most powerful equipment on the market. Depending on the region it has a range of between 50 and 350 metres. The depth of the pond is irrelevant. This map is a guide to the operating ranges in the different geographic regions.

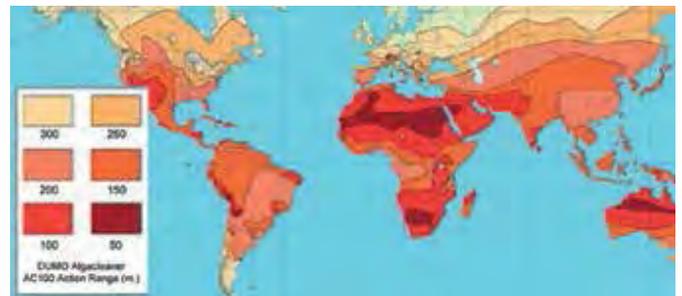
## APPLICATIONS

Irrigation Reservoirs

Ponds

Lakes

Swimming Pools



# SPEL ALGACLEANER

## Algal Bloom Control

### Operating principles

The ultrasonic transmitter produces a high-frequency mechanical vibration in the water, which reverberates throughout the pond at great distances due to the capacity of water to transmit sound vibration.

Ultrasonic signals are emitted in pulse waves of variable shape and duration at frequencies ranging from 20kHz to 60kHz.

The algae cannot tolerate this vibration. It prevents them from reproducing and destroys them. Other organisms including bacteria are also broken down, resulting in clearer and higher-quality water. Superior animals such as fish, reptiles, amphibians and birds are not affected. Quite the opposite – the absence of chemical products means the wildlife leads to healthier existence and gains up to 20% in weight.

### Prevention of cellular growth by means of ultrasonic pulsation

The growth of algae, fungi, protozoa and other eukaryotic, aquatic microorganisms is basically a result of cellular reproduction. This process, known as mitosis, enables the cells to equally distribute their genetic material (DNA) among the two daughter cells.

This event can be observed under a microscope and consists of a dark thick string-shaped material resembling wool (chromosomes, the carriers of the DNA) which settles in the centre of the cell and then splits and moves to opposite sides. The cell membrane then constricts and separates the mother cell into two daughter cells.

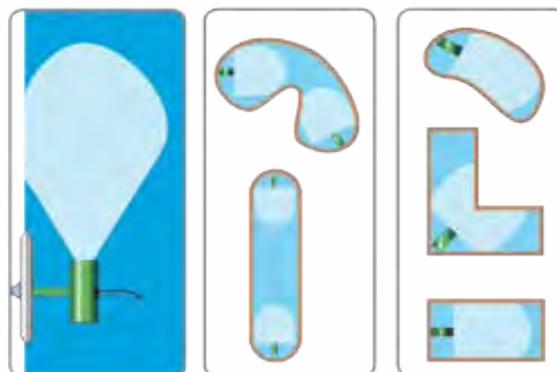
This process, whereby the chromosomes separate and move to opposite sides of the cell is called anaphase, and is mediated by fibres known as microtubules which assemble from the sides to the centre of the chromosomes. When all the chromosomes are attached to the microtubules, the signal is given to proceed to the state of anaphase where the chromosomes are dragged to the sides by these fibres. Any disturbance whatsoever will destabilize the microtubule chain, the cellular cycle and prevent the cells from multiplying. This is how the ultrasonic pulses disrupt the polymerisation of the microtubules, thereby stemming cellular growth.

### Installation and operating capacity

The operating capacity of the SPEL Algacleaner depends on the semi-circular surface area swept by the acoustic signal emitted by the equipment. The surface area is comprised of an angle of around 168° and a range radius that depends on the geographic region displayed in the map below, with an estimated average range of 100 metres.

The equipment should be installed with the aim of covering the greatest surface area possible. In the event of doubt with regard to irregular geometry or such, we advise you to contact SPEL. A special accessory is provided for anchoring the equipment.

Algae can evolve as a result of the intensity of solar radiation, the number of hours of sunlight, the nutrients contained in the water used to fill the pond, the nutrients brought by the wind and the animals and birds that frequent the same and also if the sides of the pond are made of plastic or earth and contain plants. In certain cases it may be advisable to use both an ultrasonic and a conventional system, albeit on a lesser scale than usual.

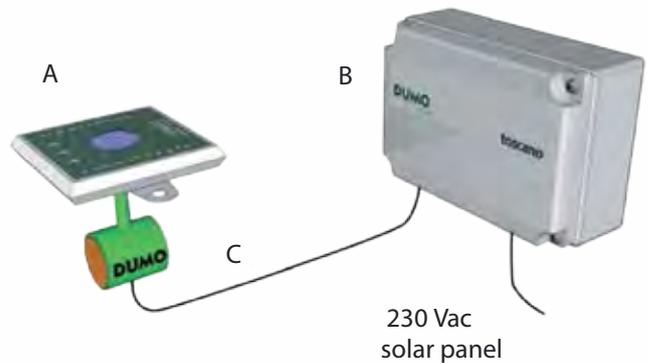


# SPEL ALGACLEANER

## Algal Bloom Control

### Components of the system

- A. An ultrasonic transmitter attached to a float is placed under the surface of the water.
  - B. An ultrasonic electronic generator to activate the transmitter is installed out of the water powered by a 230V mains circuit or a solar panel.
  - C. A 20-metre cable connecting the transmitter and generator.
- Significantly reduces the use of chlorine in swimming pools, eliminating problematic green and black algae.
  - It is extremely effective in removing biofilm from boat hulls and tank, pond and swimming pool walls.
  - Eliminates green, blue and many other species of algae and cyanobacteria, depending on the conditions.



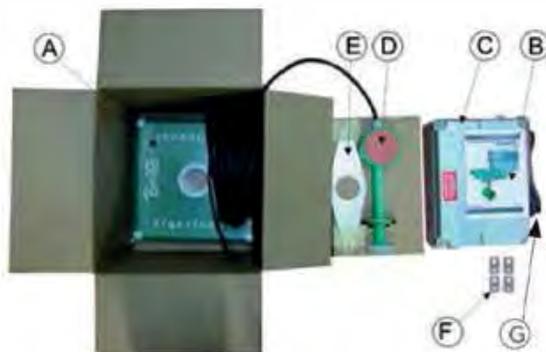
### Technical specifications Model AC100

<b>Power</b>	230 Vac (50/60 Hz) or 24 Vdc
<b>Length of transmitter cable</b>	20m
<b>Average/maximum consumption</b>	30/130 W
<b>Pulses/bursts/type of ultrasonic wave</b>	Multifrequency with automatic sequence changes
<b>Alarm output of non-issuance</b>	N.C. auxiliary contact (3A 250V)
<b>Protection</b>	Power surge/Overheating/ Breakage of transmitter cable
<b>Environmental protection</b>	IP55
<b>Operating temperature</b>	-10 +70°C
<b>Signage</b>	VOLTAGE and EMISSION pilot lights
<b>Control switch</b>	ON/OFF on generator
<b>Options</b>	Solar panel 24 Vdc 20 metre cable extension
<b>Size and weight of package</b>	320 x 370 x 350 mm / 7.3kg



# SPEL ALGACLEANER

## Algal Bloom Control



- A. Float.
- B. User manual.
- C. Electronic generator.
- D. Transducer with cable and connector.
- E. Stainless steel fastening device.
- F. Clamping legs.
- G. 230V socket with cable and plug.



### Biological information

Compiled by the Grupo Bioindicación Sevilla. Samples taken by Toscano Medioambiente before and after installation of the SPEL Algacleaner in the San José (Seville) irrigation reservoir.

### Conclusions

The results obtained show a substantial difference between before and after ultrasonic treatment, hence significant changes can be seen in the volume of filamentous algae due to the treatment. Likewise, the breakage of the filaments is obvious, the process having left the same scattered, fragmented and missing cells.

The chlorophyll analyses conducted show a reduction in both mg of chlorophyll A/m<sup>3</sup> (62.6 before to 40.31 after) and the number of cells (112.7 before to 72.6 after). The results of the Margalef index and the D430/D665 relationship show higher values in connection with the release of pigment into the milieu as a result of the fragmentation of the filamentous algae caused by the ultrasonic signal, in addition to the active chlorophyll.

The effect of the ultrasonic process has destroyed cells and thus active chlorophyll and the productivity of the phytoplankton. This result, taking into account that the sampling was carried out under similar conditions, can only be attributed to the ultrasonic treatment, as the tendency for the temperature to rise has a direct effect on an increase in the growth of blue-green algae, which has not been happening.



## Compact Waste Water Treatment Train

### Overview

The SPEL electrocoagulation process destabilises suspended, emulsified and dissolved contaminants in an aqueous medium by introducing an electrical current into the medium. The electrical current provides the electromotive force to drive the chemical reactions. When reactions are driven or forced, the elements or compounds will approach the most stable state. As this occurs, the contaminants form hydrophobic entities precipitate and can easily be removed by a number of secondary separation techniques.

SPEL electrocoagulation is the distinct economic and environmental choice for meeting water treatment discharge standards and compliance requirements. Capital and operating costs are greatly improved in comparison to traditional technologies with distinct process advantages.



### APPLICATIONS

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Sewerage Treatment

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Water Treatment

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Mining Process Water Treatment

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Pre-Treatment For Ro Desalination

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Vehicle Wash Down

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Industrial/Commercial Process Water Treatment

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Stormwater Re-Use

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Boiler Water Treatment

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## Compact Waste Water Treatment Train

SPEL EDA TT is the distinct economic and environmental choice for meeting water treatment discharge standards and compliance requirements. Capital and operating costs are greatly improved in comparison to traditional technologies with distinct process advantages.

The SPEL EDA TT process destabilises suspended, emulsified and dissolved contaminants in an aqueous medium.

The process has been proven effective for a wide range of contaminants

- Removes heavy metals such as oxides that pass TCLP (Toxic Classification Leaching Procedure)
- Removes suspended and colloidal solids
- Removal of dissolved solids
- Breaks oil emulsions in water
- Removes fats, oil and grease
- Removes complex organics
- Destroys and removes bacteria and viruses
- Processes multiple contaminants



### Features

- Designed & Manufactured to Australian Standards
- Assembled & Manufactured in Australia
- Pilot Plant Available For Client Testing
- FAT - Factory Acceptance Testing
- Low Maintenance
- pH buffering
- Electro Coagulation
- Dissolved Air Flotation
- Activated Filter Media
- 10L/min to your requirements

Due to the broad range of a contaminants targeted by the SPEL EDA TT process, It is able to be used in many applications or processes;

- Reduces/eliminates Anoxic Zones
- Reduces/eliminates Anaerobic Zones
- Reduces/eliminates Aerobic Zones
- Reduces/eliminates Chemical Batching
- Reduces/eliminates Coagulant Dosing
- Reduces loading on membrane technologies
- Reduces disinfection requirements

Other benefits of the SPEL EDA TT process include;

- Reduced footprint
- Reduced operation costs
- Reduced waste
- Reduced water consumption
- Reduced operation complexity

SPEL EDA TT can be incorporated into new water treatment process or applied to existing processes to improve functionality and reliability.

Processes where SPEL EDA TT can be applied are;

- Coal seam gas operations
- Mining process water treatment
- Sewage treatment
- Water treatment
- Pre-treatment for RO desalination
- Vehicle wash down
- Industrial/Commercial process water treatment
- Stormwater re-use
- Boiler water treatment



## Compact Waste Water Treatment Train

### Typical Removal Rates

#### Typical removal rates in waste and process waters

Contaminant	% Removal Rate
Aldrin (pesticide)	>95
Aluminum	>98
Ammonia	>58
Arsenic	>95
Barium	>90
Benzene	>98
BOD	>96
Boron	>68
Cadmium	>94
Calcium	>95
Chlorieviphos (pesticide)	>96
Chromium	>98
Cobalt	>80
Copper	>98
Cyanide (Free)	>98
Cypermethrin (pesticide)	>90
DDT (pesticide)	>98
Diazinon (pesticide)	>98
Ethyl Benzene	>98
Fluoride	>60
Gold	>72
Iron	>98
Lead	>98
Lindane (pesticide)	>98
Magnesium	>98
Manganese	>96
Mercury	>95
Molybdenum	>90
MP-Xylene	>98
MTBE	>98
Nickel	>98
Nitrate	>75
Nitrite	>40
Nitrogen TKN	>92
NTU	>98
O-Xylene	>98
PCB (Arochlor 1248)	>80
Petroleum Hydrocarbons	>98
Phosphate	>98
Platinum	>82
Potassium	>43
Proptamphos (pesticide)	>98
Selenium	>42
Silicon	>98
Sulfate	>32
Silver	>90
Tin	>88
Toluene	>98
TSS	>98
Vanadium	>98
Zinc	>98

#### Typical results of radioactivity testing

Contaminant	% Removal Rate
Americium-241	>98
Plutonium-239	>98
Radium	>98
Uranium	>98

#### Typical removal rates for sewage applications

Final Analysis	% Removal Rate
COD	>90
Total Solids	>40
Suspended Solids	>88
Settleable Solids	>75
Total Hardness	>90
Alkalinity	>90
IOD	>88
BOD	>94
Coliform	>98
Phosphates	>98

#### Typical bacteria removal examples

Contaminant	% Removal Rate
Bacteria	>98
Coliform	>98
E coli Bacteria	>98
Enterococcus Bacteria	>80
Total Coliform Bacteria	>98



## EC Module - Electrocoagulation



PROTOTYPE SHOWN IN PICTURE

### Features

- No chemical dosing for coagulation
- 50% > 90% less power usage then traditional EC systems
- 10 L/M > 450 L/M Flow rates per module
- 0 > 120.000 microsiemens
- pH buffering
- pH monitoring
- Easy cleaning
- No heat build up in reactor
- VSD driven feed pump
- Flow meter and display
- PLC control
- SCADA interface
- SKID mounted
- Very low cost maintenance
- Operational manuals
- Manufactured to Australian Standards
- Full FAT
- GA Drawings
- Training process advantages.



SPEL offers technologies for water and waste water treatment applications. SPEL cartridge configured Electrocoagulation reactors are available in different sizes for incrementally larger flow rates up to 450 litres per minute per reactor.

# SPEL EDATT

## DAF Module - Dissolved Air Flotation



PROTOTYPE SHOWN IN PICTURE

### Features

- 1/2 footprint of standard DAF systems
- Flows > 10 L/M
- Minimal maintenance
- No compressor required
- No compressed air tank required
- SKID mounted
- Single phase/Three phase
- VSD driver
- PLC / HMI controller
- Effluent sample points
- FRP - Long life
- Australian manufactured
- FAT



## AFM Module - Activated Filter Media



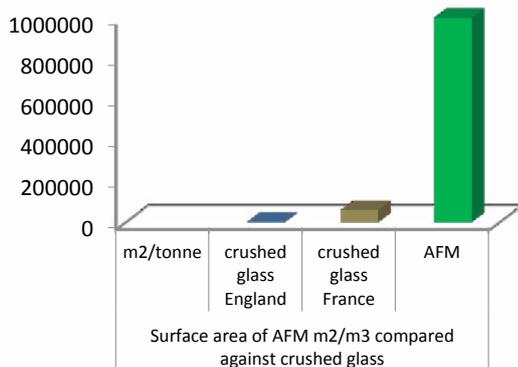
PROTOTYPE SHOWN IN PICTURE

### Features

- The only glass activated filter media
- Electro-mechanical filtration media
- Very hydrophilic electrically charged surface
- High surface catalytic oxidation potential
- Self sterilising (will not biofoul, reduces legionella risk)
- Certified for drinking water under UK Reg 31 regulations
- Compliant with International standard NSF61
- AFM exceeds the standard BSEN12902 & BSEN 12904
- AFM exceeds European Water directive (98/83/EC) & (80/778/EEC)
- Manufactured under ISO9001-2008 quality system
- 80% better performance than sand or crushed glass media, confirmed by national government organisations

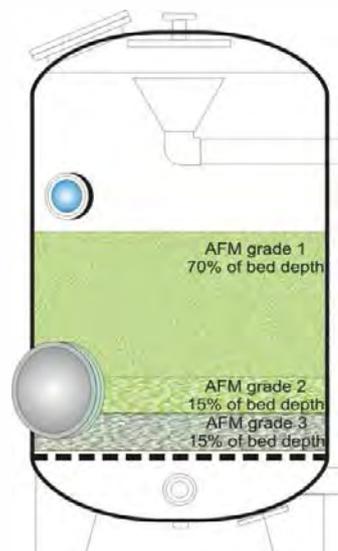


### Surface area of AFM available for adsorption reactions



The performance of AFM is connected to the surface area, AFM has approximately 300 times greater surface area to crushed glass or sand.

### Grades & Particle size distribution









**SPEL** ENVIRONMENTAL  
INTEGRATED WATER SOLUTIONS

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