One Water

天一雨水管理

STORMWATER HARVESTING - PRODUCT information SHEET

雨水收集与水质处理系列产品 **SQID – stormwater filtration for removal of gross pollutants**

INNOVATION IN STORMWATER MANAGEMENT & WATER QUALITY IMPROVEMENT

A system of integrated product devices for surface water collection and contaminate reduction in a

micro distributed catchment model (MDCM)

SPARKLE | WATER | QUALITY *as a leading innovative brand, introduces a multi-dimension stormwater harvesting (SH) and water quality improvement model (SQID) that raises the level in water quality outcomes, providing high-quality resource availability for utilisation alongside environmental water quality release.*

Key features and ideology:

- Capture rainfall close to where it falls onto the ground or preferably roof catchments as early as possible before rainwater is compromised by further pollutants.
- Pre-filtering at point-of-capture (POC) in real time as a mechanical measure or otherwise use ground swales as a vegetated measure before harvesting.
- A **SPARKLE | WATER | QUALITY** mechanical approach ***creates a dual channel treatment train*** – a waste stream (approx. 1/3 flow) with high contaminate load in a low volume stream and a separate harvesting stream (approx. 2/3 flow) with low contaminate high volume that does not mix with the macro drainage systems.
- Stormwater management is all positive - essentially a harvesting approach for all surface water, beginning at the top of the catchment where the rain falls, reducing the potential contaminate loading with savings in intensive treatment costs and ease of installation in WSUD. Localised storage high up in the catchment also retains the embedded energy of water and can be timely and safely released for environmental hydration and stream flows or with utilisation for our urban and rural applications as needed being more beneficially well after the storm event has passed.
- The **SPARKLE | WATER | QUALITY** innovative approach harvests the stormwater stream including managing flooding effects otherwise aggregated with potential property inundations and damage downstream. SH provides for locally stored high-quality water resource to be used for periodic hydrating of catchment needs, public and landscape amenity developments and other non-potable high demand water applications that builds resilience in a climate constrained environment!

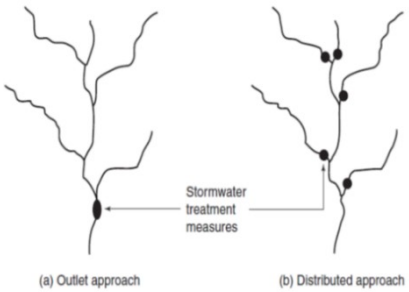

Figure 1 - outlet depiction compared to micro distributed network model

A sustainable, scientific and practical solution for any catchment

Our engineering design for stormwater product solutions incorporate ongoing management associated with WSUD and LID developments, municipal flood and drainage engineering and civil infrastructure construction projects.

SPARKLE | WATER | QUALITY product and solutions deliver with water quality improvements; MDCM for effective harvesting, avoidance of flow channel effects and flooding, with longer term healthy water resource availability and backed up with effective waste removal and scheduled cost-effective maintenance.

STORM product

US Pat. 10,301,188

A system of strategically connected devices to improve water quality

The **SPARKLE | WATER | QUALITY** product range function in two modes:

1) micro distributed catchment model (MDCM)
2) A 4-step treatment train process

STEP 1
A MDCM uses the Point of Capture (POC) STORM_save devices in multiple segments of up to 3,000 M^2 area each of hard surface or vegetated surfaces.
Our FLOCAL tool matches ARI, pipe capacity and storm intensity criteria to nominate how many STORM_save to meet our design performance specifications.

The STORM_save device is a separator of gross pollutants and sediment and may have an optional first-flush component that allows the first 2-3mm of rainfall on the segmented area to pass directly to the waste stream before harvesting reducing the soluble and particulate contaminate loading by up to 50%.

STORM_save ***crucially*** divides the water flows into two individual streams for treatment processing. 1) a waste stream with high contaminate, low volume stream (using regular drainage pipe) and 2) a harvesting stream of high volume, low contaminate channel for downstream finer filtration . {see Figure 4}

STEP 2
STORM_clean device is capable of operating as a stand-alone multi-faceted filtration module or as a system component of a full treatment train. STORM_clean processes target all the major contaminates and acts as a barrier for removal of solid waste from the water flows.

STORM_clean can be applied in a waste channel with or without integrated STORM_gpt for course level filtration of bulk organic and other gross pollutants. {see Figure 3}

STEP 3
Larger storage is provided by the STORM_qube or the EcoVault tank combination or wetlands can be used. This allows hydraulic retention time (HRT) to optimise natural biological systems to deliver a high quality water resource and managed by the WiWo smart controller.

STEP 4
WiWo smart control manages aeration of the primary storage, responds to on-demand water requirements and provides UV disinfection of the water delivery.

The STORM range of product solutions incorporate functional built-in waste processing using recurrent maintenance schedules based on rainfall instances.

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Ph: 0427 192 837

SPARKLE | WATER | QUALITY
斯巴克雨水和水质管理

雨水收集与水质处理系列产品 SQID – stormwater filtration for removal of gross pollutants

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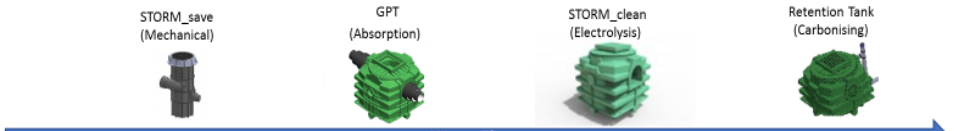
Design features:

- **A catchment wide engineered design** of integrated stormwater quality improvement devices (SQID)
- A **system design using a four-step approach** to high level contaminate reduction, removal of waste avoiding sludging of water bodies, removal to land managed disposal, maintaining the health of the stored water resource for long-term availability, then with disinfection deliver quality water resources on demand to any application.
- **A treatment train** that raises the quality of the treatment process beyond separation, avoiding by-passes or contaminating the whole of the stormwater flow to the highest level of catchment wide contamination that infects even the subsequent storm event flows until delayed maintenance on ever-larger sump pollutant pits is undertaken.
- SQID's that are designed as **a barrier to the gross pollutants above 490µm**, sediments, hydrocarbons capture, in-solution nutrients, absorbed metals and particulate contaminates with post-storm vacuum removal from the water cycle.
- Providing **pre-filtering in support of vegetated filters, wetlands or membrane** processes that allow the water cycle to carry out effective natural biological remediation.
- **Begin stormwater management at the top of catchment** with collection of stormwater flows that avoid water flow paths that potentially pick-up contaminates that are easily soluble with water, have a lower density than water or create contamination from erosion in the collection catchment that get carried to the bottom of the catchment degrading the environment with contamination all the way downstream.

Water Quality improvement from contaminate reductions and biological support: -

SPARKLE | WATER | QUALITY uses an integrated system of devices that respond to the catchment conditions and needs of the project and its application in: -

- firstly, avoided carrying of contaminates in the water flow as far as possible with top of catchment capture of surface water.
- separation and incorporating first flush process reduces the level of in-solution and particulate contaminates nearly 50%, which is channeled in the low flow stream for finer filtration with peak reduction flow processing.
- Finer filtration is then more effective and allows the removal of trapped contaminates that are absorbed, decanted or crystalised into particulate.
- Hydraulic residence time (HRT) in waterbodies or storage allows biological process to cope with peak flows and minimised contaminate levels so ecologies are sustainable and harvested healthy water is available for use.



Pollutants	SS1	SS2	GPT	STORM_ clean	Retention Tank	Optimal Residual Contaminate Load by using SS1 (Harvest Stream 2/3 flow)	Optimal Residual Contaminate Load by using SS2 (Harvest Stream 2/3 flow)	Residual Contaminate Load (Waste Stream 1/3 flow)	Optimal Combined Harvest and waste stream water quality reductions (using SS1)	Optimal Combined Harvest and waste stream water quality reductions (using SS2)
P	0.7% ↓	50%↓	10% ↓	40% ↓	36% ↓	34%	17%	35%	66%	76%
N	10% ↓	76%↓	10% ↓	40% ↓ (including 95% of ammonia)	32% ↓ (including 80% of DON and 100% of CON)	33%	9%	37%	66%	81%
SS	21.3%↓	77%↓	0%	45% ↓	85%	6%	2%	8%	93%	96%
Hydro Carbon	0%	0%	50%	90% ↓	0%	5%	5%	5%	95%	95%
Trash/Organic/ Sediment	85% ↓	85%↓	85% ↓	75% ↓	0%	0.6%	0.6%	6%	97%	97%

Figure 2 – segment, stream and process contaminate reduction potential within system to targets

SPECIFICATIONS

PARAMETERS:
Medium density polyethylene (MDPE)

- Elastic modulus (Mpa) 350/500
- Poisson's ratio 0.44
- Mass Density (Kg/m^3 935
- Yield strength (Mpa) 20

FEA:
All **SPARKLE | WATER | QUALITY** products have undergone FEA and CFD analysis. As an example, the 8k base device was tested under the following performance criteria: - top load 5000N – side pressure loading equivalent to 20592N/M^2 (S.G. 2.0)

8 M^3 Tank	Uniform wall 16mm	3.6 meter	BLF 1.28
8 M^3 Tank	Uniform wall 20mm	4.2 meter	BLF 1.34

INSTALLATION:

- Geofabric lined excavation, backfill with porous S.G 1.4 pea gravel material only.
- Use engineered designed specification for finish ground surfaces.
- Concrete backfill optional – with full internal support of installed tank.

PIPE CONNECTION:

DN150 double start Acme thread adaptor
DWV DN100-DN300; PE_rib DN300-DN600

ACCESS OPENING: - 900mm x 600mm

MDPE serviceability 6.7kN or 10kN Class A
Ductile Iron 80kN or 200kN Class B or D lids.

GROUND LEVEL ADJUSTMENT:

Max 2 collar extenders for tank base to 3.6M or 4.2M depth

OPTIONS:

- Hydrostatic lift control
- Internal ladder and access grab rail
- Galvanised grate cover
- Secure dual keylock PE access cover

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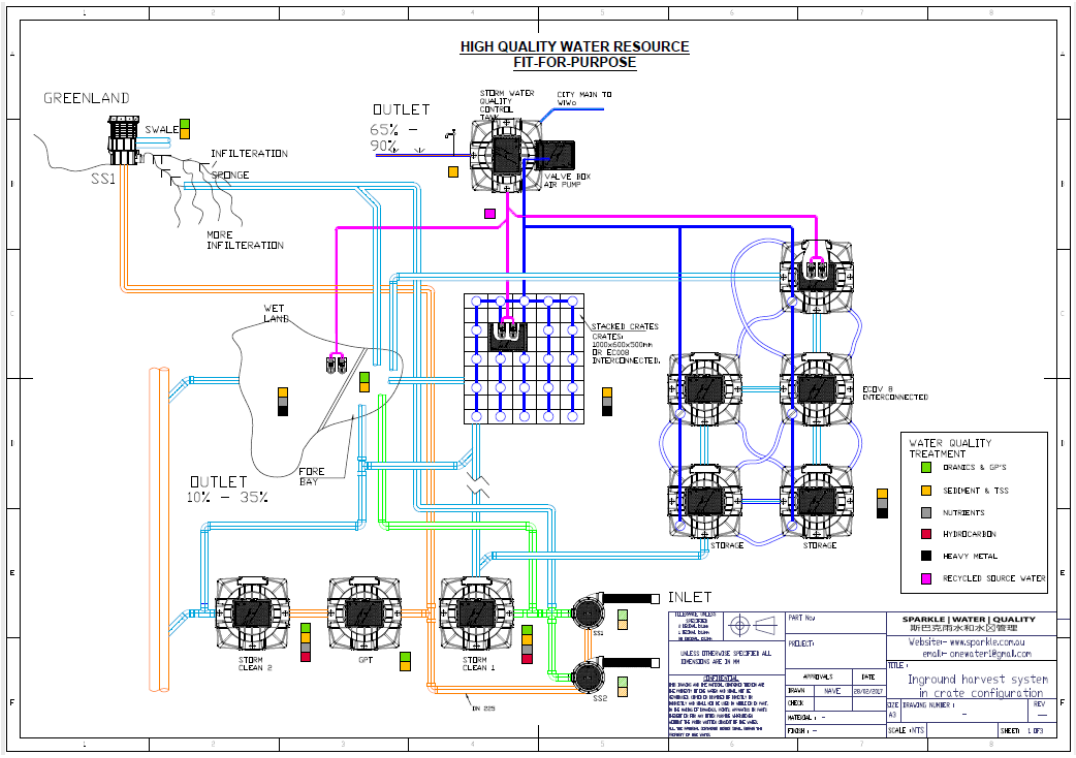

Figure 3 - schematic layout of SPARKLE | WATER |QUALITY system

GRAVITY SEPERATION: -

Settling velocity is affected by particle size, shape, specific gravity and by water temperature. Storage is a part of the solution!

TYPICAL CONSTRUCTION DECISIONS:

Polyethylene (PE) devices are robust and less prone to handling damage; easier, quicker, more cost-effective construction; inert and do not affect pH water balance; do not corrode in toxic catchments; 100-year life expectancy.
Structured Concrete devices are typically used in mid-level to macro drainage systems for deeper excavations and loadings from heavy engineering but provide limited sophistication for water quality as basic separators with anoxic pits for GP's.
FRP filament wound barrel devices can be manufactured for sizing requirements with the strength of steel at a higher manufacturing cost. They must be sealed against filament water ingress and avoid impact issues. FRP tanks are typically used in very deep installations as manholes

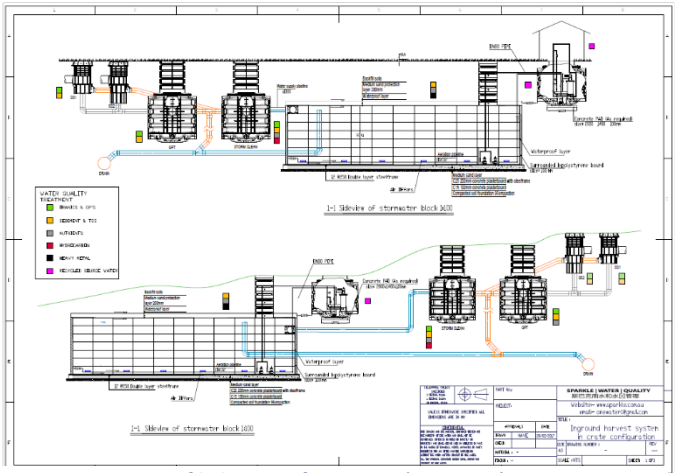

Figure 4 - profile layout of SPARKLE | WATER | QUALITY system

Polyethylene (PE) devices outperform concrete pits and pipes for water quality.

ONE WATER PTY LTD
International Office
P.O. Box 690
Mona Vale 1660
Tel: (+612) 8212 4348

Australian Inquiries
Tilley lane
Frenchs Forest 2086
Tel: (02) 8212 4348

China Office
Guangzhou
Mob: (+61) 427 192 837
AU: 0427 1water

Follow us on
Electronic Contact:
sales@1water.com.au

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