

Water Quality Units



The Most **Advanced** Name in Drainage Systems®



WATER QUALITY UNITS

Standards for storm water quality will vary by location and land use. The most targeted sources of runoff pollution are paved areas in urban and industrial sites. These are generally areas with high traffic loads, such as parking lots and gas stations, that generate significant concentrations of contaminant particles and hydrocarbons.

Because of land constraints, ADS underground Water Quality Units have become an increasingly efficient solution for treating storm water. These durable, lightweight structures have been specifically designed for fast installation and easy maintenance.

Benefits

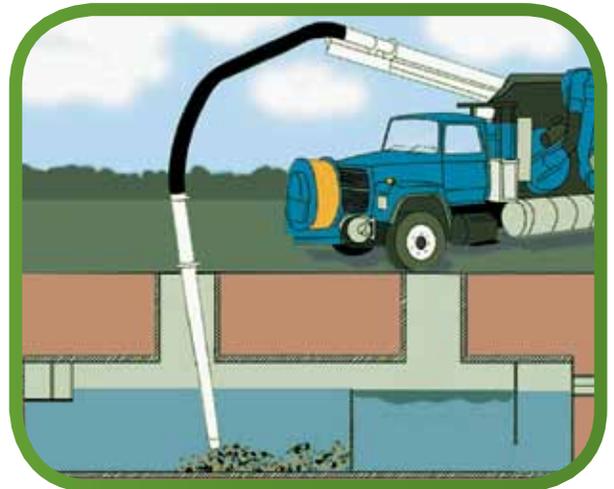
- Independent testing shows the following:
 - 80% TSS removal
 - 80% oil & grease removal
 - Greater than 43% TP removal
 - 74% heavy metals removal
- Removes floatable debris such as oils and greases.
- Available in 900 mm (36") through 1500 mm (60") diameters.
- Lightweight High Density Polyethylene (HDPE) unit installs easily with a minimum of manpower. Heavy cranes are not necessary to install the unit.
- Each unit is fitted with access risers for easy inspection and maintenance of the sediment and oil chambers.
- The unit is inexpensive because the design is simple and there are no moving parts.
- The bypass system prevents re-suspension of captured solids by diverting water flows greater than the first flush.
- HDPE resists abrasion and chemicals found in storm water and in the surrounding soil.



The ADS Water Quality Unit (above) is lightweight and easy to install, requiring little in the way of manpower or heavy equipment.

A bypass system (above right) is installed to prevent water flows greater than the first flush from re-suspending captured pollutant particles.

The ADS Water Quality Unit (below) is fitted with access risers for easy inspection and maintenance.



Standard Models

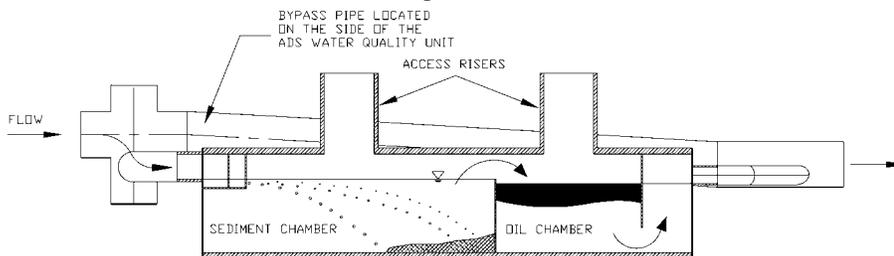
Product Number	Diameter mm (in)	Length m (ft)	Inlet Size mm (in)	Outlet Size mm (in)	Treated Flow L/S (cfs)	Sediment Vol. m ³ (ft ³)	Oil Volume m ³ (ft ³)	Sieve Size
3612WQA	900 (36)	3.7 (12)	250 (10)	250 (10)	24 (0.86)	1.0 (37)	0.5 (17)	140
3612WQB	900 (36)	3.7 (12)	250 (10)	250 (10)	42 (1.5)	1.0 (37)	0.5 (17)	200
3620WQA	900 (36)	6 (20)	250 (10)	250 (10)	42 (1.5)	1.8 (65)	0.8 (30)	140
3640WQA	900 (36)	12 (40)	250 (10)	250 (10)	67 (2.38)	3.9 (137)	1.8 (63)	140
3620WQB	900 (36)	6 (20)	250 (10)	250 (10)	20 (0.7)	1.8 (65)	0.8 (30)	200
3640WQB	900 (36)	12 (40)	250 (10)	250 (10)	45 (1.6)	3.9 (137)	1.8 (63)	200
4220WQA	1050 (42)	6 (20)	300 (12)	300 (12)	49 (1.75)	2.3 (83)	1.1 (38)	140
4240WQA	1050 (42)	12 (40)	300 (12)	300 (12)	104 (3.66)	5.0 (175)	2.3 (81)	140
4220WQB	1050 (42)	6 (20)	300 (12)	300 (12)	24 (0.86)	2.3 (83)	1.1 (38)	200
4240WQB	1050 (42)	12 (40)	300 (12)	300 (12)	52 (1.83)	5.0 (175)	2.3 (81)	200
4820WQA	1200 (48)	6 (20)	300 (12)	300 (12)	64 (2.26)	3.3 (116)	1.6 (55)	140
4840WQA	1200 (48)	12 (40)	300 (12)	300 (12)	112 (3.94)	6.9 (245)	3.3 (115)	140
4820WQB	1200 (48)	6 (20)	300 (12)	300 (12)	32 (1.13)	3.3 (116)	1.6 (55)	200
4840WQB	1200 (48)	12 (40)	300 (12)	300 (12)	68 (2.39)	6.9 (245)	3.3 (115)	200
6020WQA	1500 (60)	6 (20)	375 (15)	375 (15)	84 (2.95)	5.2 (183)	2.5 (87)	140
6040WQA	1500 (60)	12 (40)	375 (15)	375 (15)	176 (6.23)	10.9 (385)	5.2 (184)	140
6020WQB	1500 (60)	6 (20)	375 (15)	375 (15)	42 (1.47)	5.2 (183)	2.5 (87)	200
6040WQB	1500 (60)	12 (40)	375 (15)	375 (15)	88 (3.12)	10.9 (385)	5.2 (184)	200

140 sieve is equal to a particle size of 0.106 mm (0.0042"). 200 sieve is equal to a particle size of 0.075 mm (0.0030").

Design Variations

The standard models listed above will provide efficient removal of pollutant particles and hydrocarbons for the majority of site conditions. For unusual conditions, ADS can recommend a system combining a variety of sizes and configurations.

ADS Storm Water Quality Unit



Unit configuration & availability subject to change without notice. Product detail may differ slightly from actual product appearance.

Peak Flow Rate

The by-pass pipe of the ADS WQU is designed to convey the peak storm water flow of the storm line.

For example, @ a 1% slope, peak flow rates for the by-pass line are as follows:

	L/S	CFS
300mm	103.9	3.8419
375mm	188.0	6.971
450mm	307.0	11.343
600mm	661.0	24.451
750mm	1,240.0	44.37
900mm	1,950.0	72.19
1050mm	2,950.0	108.95
1200mm	4,210.0	155.61
1500mm	7,630.0	282.36

Design and Installation

Available in 900mm (36”) through 1500mm (60”) diameters, ADS Water Quality Units are modified sections of N-12® pipe with weir plates at specific locations and heights to remove high percentages of sediment and oils from the first flush of a storm event. They can be installed at any point in the subsurface drainage system, and are ideally suited to treat “hot spots” in existing storm water lines.

The unit is designed using the fundamental principles of Stoke’s Law and a standard orifice outlet control. The settling velocity of a particle is calculated based on the smallest particle to be removed. Standard units offer a choice of 140 or 200 sieve size removal (106 µm and 75 µm particle sizes, respectively).

The outlet orifice is sized to release a typical first flush discharge and to redirect any excess flow to a bypass piping system installed with the unit. All ADS Water Quality Units are designed and manufactured to meet ASTM F2737 - Standard Specification for Corrugated High Density Polyethylene (HDPE) Water Quality Units.

Installation of Water Quality Units follows the same accepted practices as for the installation of large diameter flexible pipe.

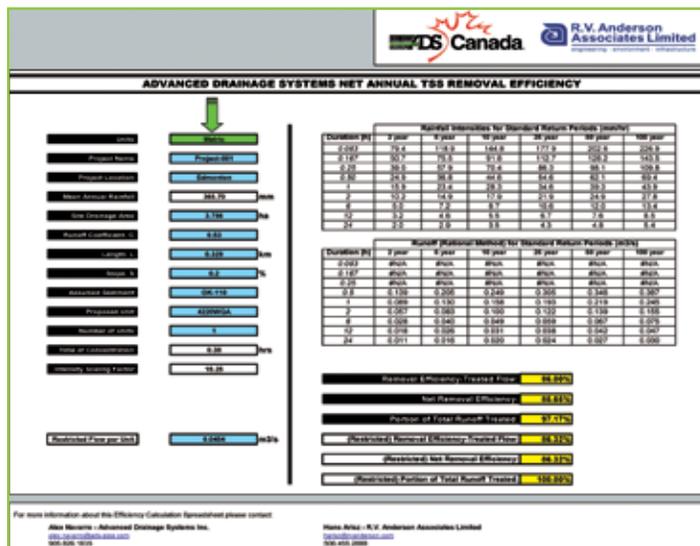
Removal Efficiency

The ADS SWQU has been subjected to several different testing protocols to determine the removal rates for both total suspended solids (TSS) and oil and hydrocarbons. Testing has been conducted in both the laboratory and the field. One of the most significant field tests was the one conducted by the University of New Hampshire (UNH) Stormwater Center, which was established in 2004, to help land use decision makers develop stormwater management programs to protect water quality. The site is adjacent to a 3.6 hectare (9 acres) commuter parking lot in Durham, New Hampshire.

The contributing drainage area, curbed and almost completely impervious, generates stormwater runoff typical of developed urban and suburban sub-catchments. Literature review indicates that the lot’s contaminant concentrations were above, or equal to, national norms for parking lot runoff. The site was designed to test treatments under similar conditions.

Each treatment was uniformly sized to address a Water Quality Volumen (WQV) that targets a rainfall-runoff depth equivalent to 90 percent of annual volume of rainfall, or 25 mm of precipitation. One of the systems that was evaluated was the ADS Water Quality Unit (WQU).

The data generated from the UNH study has validated the performance principles of the unit. R.V. Anderson Associates Limited, an independent consultant, has developed and maintains a design tool to size the ADS WQU based on third-party laboratory tests results. Specific installation instructions, along with details on specifying the proper size of a Water Quality Unit, are available in Technical Note 1.03 & Installation Guide 2.01. You can also find more information on our website at www.ads-pipecanada.com.



The Heart of the Treatment Train

For many drainage sites, the Water Quality Unit by itself can provide the required degree of pollutant removal. However, certain sites with higher concentrations of hydrocarbons or sediment runoff will need further treatment upstream and/or downstream of the Unit. This multi-tiered approach to storm water quality is known as the *treatment train*.

Upstream measures include sediment prevention (vegetated swales, etc.) and inlet protection devices such as screens, filters and silt fences. These techniques are designed to prevent a large percentage of pollutants from ever entering the storm drain system. For impervious surfaces such as paved parking areas, catch basin insert filters are most commonly used for early stage treatment.

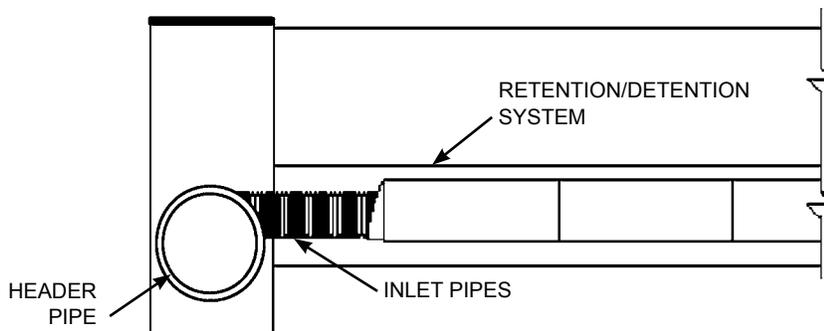
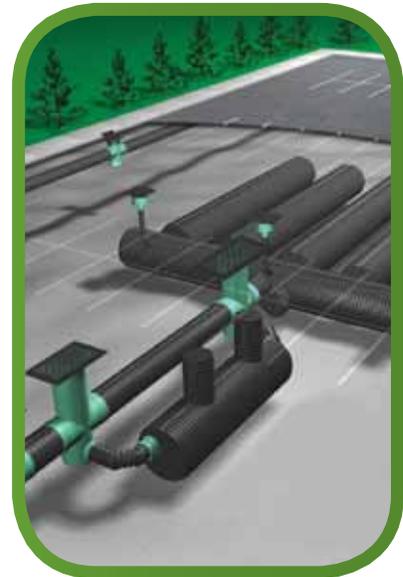
Retention/Detention

Treatment downstream from the Water Quality Unit generally involves some form of retention or detention system. Retention allows accumulated storm water to gradually percolate into the surrounding soil, while detention meters the water through an outlet to a ditch, stream or other receiving area.

Inlet designs to such underground storage vessels can also enhance pollutant removal. The “eccentric header system” consists of a large diameter manifold pipe with an invert positioned lower than those of the smaller inlet pipes to the storage vessels. The large header pipe thus acts as a sump into which suspended particles may settle. Manholes and/or risers may be installed to facilitate inspection and cleaning.

Designers can choose between two methods of constructing the retention or detention system. The first is the use of ADS N-12® large diameter corrugated high density polyethylene pipe, known for its economy and ease of installation. The second option is StormTech®, specially engineered to meet the demands of subsurface storm water management applications.

ADS supplies a complete line of pipe, fittings and fabricated manifolds, along with detailed sizing, design and installation instructions on our website at www.ads-pipe.com.



The “eccentric header” is installed with its invert lower than the inlet pipes, thus acting as a sump to collect suspended sediment.

ADS STORM WATER QUALITY UNIT PRODUCT SPECIFICATION

SCOPE

This specification describes 900 through 1500 mm (36-60 inch) Storm Water Quality Units for use in on-site point source storm water treatment applications.

REQUIREMENTS

Storm Water Quality Units shall have a smooth interior and annular exterior corrugations meeting the requirements of ASTM F2737. The unit shall have at least three containment zones, each zone separated from the next by use of a weir or baffle plate. Weir and baffle plates shall be welded at all interfaces between the plate and water quality unit. First weir plate shall incorporate a saw tooth design and shall be reinforced with stiffeners positioned horizontally on the downstream side of the plate to be retained. Storm Water Quality Units shall provide adequate clean-out and inspection access.

JOINT PERFORMANCE

Connections for the bypass line and the unit shall utilize the same joint quality as specified for the main storm sewer pipe. Couplers for the bypass line may be either in-line bell couplers, bell-bell couplers, or welded bell couplers.

MATERIAL PROPERTIES

Virgin material for pipe & fittings used to produce Storm Water Quality Units shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 100 through 250 mm (4" - 10") diameters, and 435400C for 300 through 1500 mm (12" - 60") diameters as defined and described in the latest version of ASTM D3350. The virgin pipe material shall be evaluated using the notched constant ligament-stress (NCLS) test as specified in Section 9.5 and 5.1 of AASHTO M294 and ASTM F2306, respectively. All smooth baffle and weir plates shall be high density polyethylene.

INSTALLATION

Installation shall be in accordance with the ADS installation guidelines, utilizing a class I (ASTM D2321) structural backfill material or flowable fill (CLSM – Controlled Low Strength Material). Contact your local ADS representative or visit www.ads-pipe.com for the latest installation instructions.

PERFORMANCE

Water Quality Units shall remove a minimum of 80% of the first flush total suspended solids (TSS) based on flow rates and corresponding sieve sizes shown in Table 1. Water Quality units shall be installed "offline" to prevent re-suspension of solids in high flow situations. Offline installation shall be constructed utilizing an ADS By-Pass structure. Flow through the unit shall be controlled by an orifice fabricated on the outlet end of the structure.

TOP: Setting the Water Quality Unit and the inlet tee fitting

MIDDLE: Bedding and backfilling the unit in 300 mm (12") lifts

BOTTOM: Backfill over the Water Quality Unit and installation of bypass line complete



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