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# ESCS

The Clear  
Choice for  
Storm Water  
Management



**AYDITE**

DiGeronimo Aggregates

## Storm Water Management

It is costing billions of dollars annually to address environmental concerns about the threat of storm water to our clean water supply. Expanded Shale, Clay and Slate (ESCS) ceramic lightweight aggregate is providing new, consistent and cost effective options to meet these concerns. ESCS provides design flexibility for storm water management programs in meeting this environmental crisis.

ESCS offers low-maintenance solutions that meet existing and proposed government regulations without the use of chemicals, specialized equipment or major facility upgrades. On-site storm water management contributes toward LEED green building certification credit. The use of ESCS in such designs offers improved performance and longevity.



### What Is ESCS?

ESCS is a manufactured lightweight, porous ceramic material produced by expanding and vitrifying select shales, clays and slates in a rotary kiln. The process produces a consistent and predictable high quality ceramic aggregate that is structurally strong, physically stable, durable, environmentally inert, light in weight and highly insulative. It is a non-toxic, absorptive aggregate that is dimensionally stable and will not degrade over time.

As a filter medium, ESCS is very durable, and coupled with its porous structure and increased surface area, it is an exceptional filtering material for metalloids, suspended solids, oils and grease. ESCS has the long-term

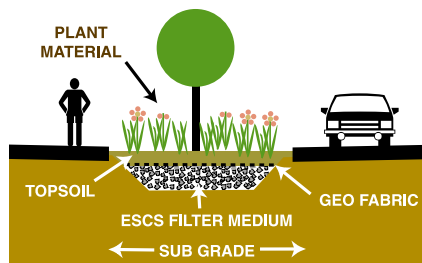
ability to adsorb nutrients and maintain hydraulic flow to ensure that water treatment is effective and sustainable.

## Types of Self Contained Urban Storm Water Treatment Systems

Conventional swales are sometimes used as a settling pretreatment for storm water before it enters the other treatment systems.

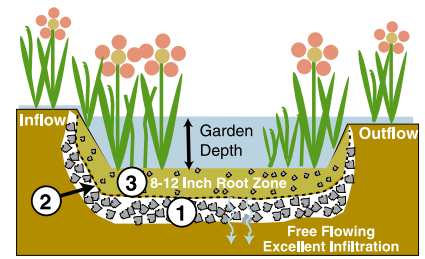
**Filter Strips** are areas of vegetation over which sheet or dispersed runoff flows at a very shallow depth. Filter strips are very well suited to treat runoff from impervious areas such as parking lots and may be designed into the overall landscape as parking area islands or edge borders.

ESCS in filter strips promote faster water percolation through the filtering system and reduces the amount of time standing water remains exposed. This can be an important element in mosquito control. ESCS also facilitates cationic exchange and microbial action which break down organic substances and reduce pollutants.



*Cross Section of Filter Strip*

**Rain Gardens**, unlike a swale or filter strip, are designed to retain water and allow infiltration. Water is cleansed by vegetation and by simple soil systems filtration. Rain gardens also help control mosquitoes because they are designed to drain in less than 24 hours.



1. ESCS Filter Medium
2. Geo-fabric Between Root Zone & ESCS
3. 8"- 12" Root Zone (in uniform mixture of ESCS, Compost and Soil)

*Cross Section of Rain Garden*

ESCS in rain gardens provides the same filtering function as in filter strips. It is an excellent medium for amending heavy clay or compacted soils to promote plant root growth, improve drainage and retain moisture during dry periods. In this application a good geo-fabric must separate the root zone from the filter zone to maintain a long performance life.



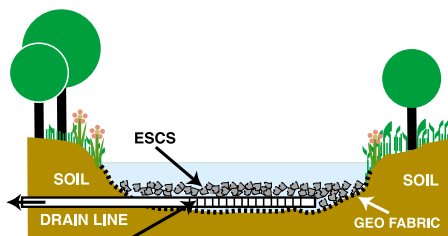
*Milton High School, Alpharetta, GA (before planting)*



*Milton High School, Alpharetta, GA (after planting)*

**Rain Basins** are an integral part of storm water management design that is gaining in popularity. Runoff water is collected and filtered before discharge. Increased infiltration into the ground reduces or eliminates storm water runoff into the municipal system.





**Collection Pipe at Bottom of ESCS and above Geo-fabric**

*Cross Section of Rain Basin with ESCS*

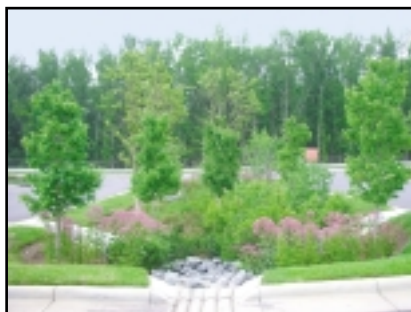
ESCS in rain basins enhances bioremediation of collected runoff and promotes increased infiltration of water into the subsoil. It can also help to stabilize basin banks and channels.



*Jordanelle Ridge, Heber City, UT, Storm water rain basin under construction*



*Jordanelle Ridge, Heber City, UT, Storm water rain basin after completion*



*North Lake Mall, Charlotte, NC, Rain garden*

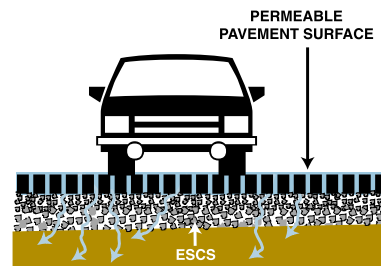
**Underground Filtering Fill** is layered aggregate fill material beneath permeable paved surfaces. It stores water underground, removes pollutants and allows water to percolate into the subgrade.

With the increasing numbers of paved urban surfaces (parking lots, walkways, streets, etc.) the problem of storm water management has been growing rapidly. More and more developers are using permeable surfaces to reduce storm water sheet flow which also mediates water volume and helps to remove pollutants. Additional benefits of these permeable surfaces include reduced infrastructure for storm water conveyance, increased aquifer recharge, reduced stream bank erosion, and lowered temperatures of discharge flowing into streams, thereby increasing dissolved oxygen and improving fish and micro-organism habitat. Low Impact Development (LID) technologies encourage a reduction of impervious cover through the use of permeable pavements. Additionally, LEED credits are available for using these surfaces in commercial projects.

The EPA, along with many other government agencies, recognizes permeable surfaces as BMP's (Best Management Practices), and with approval of local authorities, can be used in lieu of conventional storm water treatment technologies. A key element with any type of permeable surface is the underlying storage area. Unlike the typical compacted stone base usually found under conventional pavements, permeable technologies use three layers of open-graded aggregates under the bearing

surface. With a 40% void space in the underlying 12" aggregate layers, a 4.8" rain event can be stored and slowly released into the subgrade.

Why and where are these surfaces being used? In addition to new construction, these permeable surfaces with underground storage are being used in retrofit developments where a BMP is required to treat storm water flow, but where the available land is insufficient for a pond. In these cases, a permeable surface allows the BMP to be literally



**ESCS Granular Filtering medium may consist of 1, 2 or 3 different aggregate sizes. Depth will vary according to traffic load and sub soil conditions.**

*Cross Section of Permeable Paved Surface*

under the parking lot, thereby providing more commercially developable property and an increased tax base for the municipality.

While conventional aggregates can be used as the storage media beneath permeable surfaces, ESCS, with its greater porosity, increased surface area and larger interstitial space, is a better medium for storing water and capturing suspended solids, hydrocarbons, metals, nitrogen and phosphorous. This technology is at the forefront of LID and green building techniques. As an integral part of *green* development, the use of ESCS makes both environmental and economic sense.

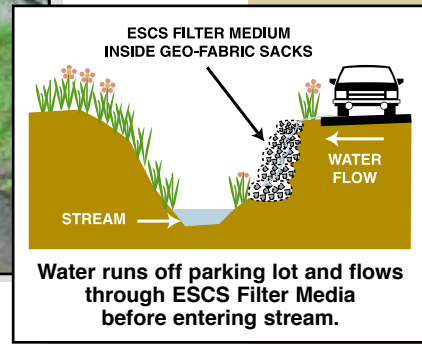
## Lightweight Aggregate in Storm Water Treatment Units

ESCS adds a new dimension to the medium contained in storm water treatment units. As a replacement for sand, ESCS raises the bar for storm water treatment performance to new heights. The effectiveness of this new application is currently being tested by treatment unit manufacturers across the country.



Geo-sacks filled with ESCS Filter Media

*ESCS Stacked Inside Geo-Fabric Sacks, Portland, OR*



Water runs off parking lot and flows through ESCS Filter Media before entering stream.

*Cross Section of ESCS Stacked Inside Geo-Fabric Sacks*

## Advantages of Using ESCS as a Filter Medium

### **ESCS Physical Properties**

- Consistent, dependable (100% manufactured)
- Physically and chemically inert
- Greater surface area
- Hydraulic conductivity allows fast, free drainage
- Ceramic properties reduce material degradation
- High angle of internal friction provides stability and strength
- Reduced weight lowers freight and handling costs

### **ESCS Performance Properties**

- Predictable performance
- Removes or reduces phosphorus, arsenic, metals, grease, oils and more
- Combines nutrient removal and effluent filtration for cleaner discharge
- Employs ion exchange to enhance treatment process
- Removes TSS and solid material to prevent clogging
- Lower maintenance cost
- Longer service life
- Economical, readily available and easy to use



For Additional Information Contact Your Local Supplier



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