



Case Study: Building Site Run-off Treatment Using Recycled Organics

Location:	Bear Cottage Hospice Development - Manly
Participant:	NSW Department of Public Works and Service
Product:	Enviro-media
Market:	Enviro-remediation Segment

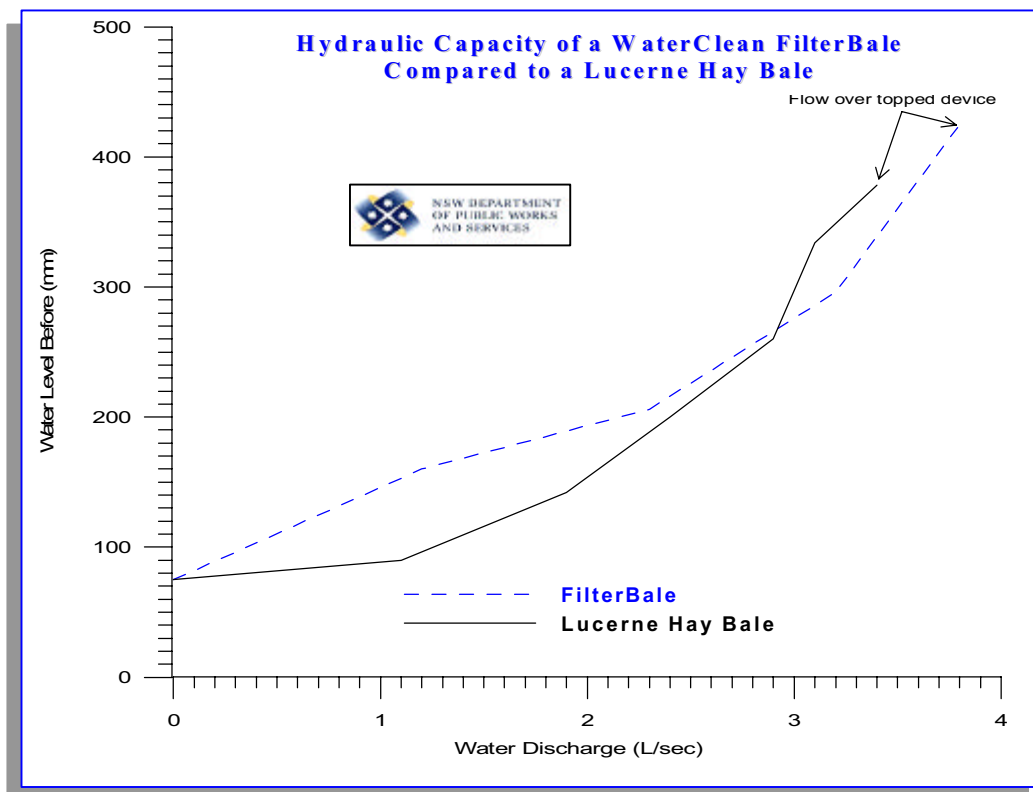
Enviro-media is a specifically engineered infiltration medium that uses selected organic matter or a blend of selected organic matter and minerals such as sand and soil that is used to physically, biologically and chemically purify or treat contaminated air, soil and water. Treatment and purification is achieved by physically filtering sediments and contaminants, chemically binding contaminants to organic matter and biologically degrading contaminants.

In 2000, The NSW Department of Public Works and Services took control of a development site in Bower St. Manly that had previously been fined for discharging sediment laden storm water on to nearby Fairy Bower Beach. A \$1,500 fine had been imposed on the previous contractor each time an offence occurred. Recent changes under the Protection of the Environment & Operations (POE&O) Act gave responsibility of policing such offences to local councils.

This problems were caused by the use of ineffective run-off control measures while extensive earth works were in progress. Hay bales used by the previous contractor allowed sediment to freely migrate from the construction site.

The NSW Department of Public Works and Services and it's new contractor Multiplex decided to trial products containing recycled organics as an alternative to conventional practices such as hay bales and silt fences. Before installing on-site, both parties decided to trial recycled organics content products at the NSW Department of Public Works and Services Hydrology Laboratory at Manly Dam.

The laboratory testing compared the performance of a filter bale that uses a specific type of Enviro-media as a filtration medium with the sort of hay bale generally used for erosion and sediment control. The test involved comparing the ability of each product to retain and filter sediment-laden storm water similar to that experienced on construction sites and road run-off. A rig was set up in which running water containing sediment had to pass through each product

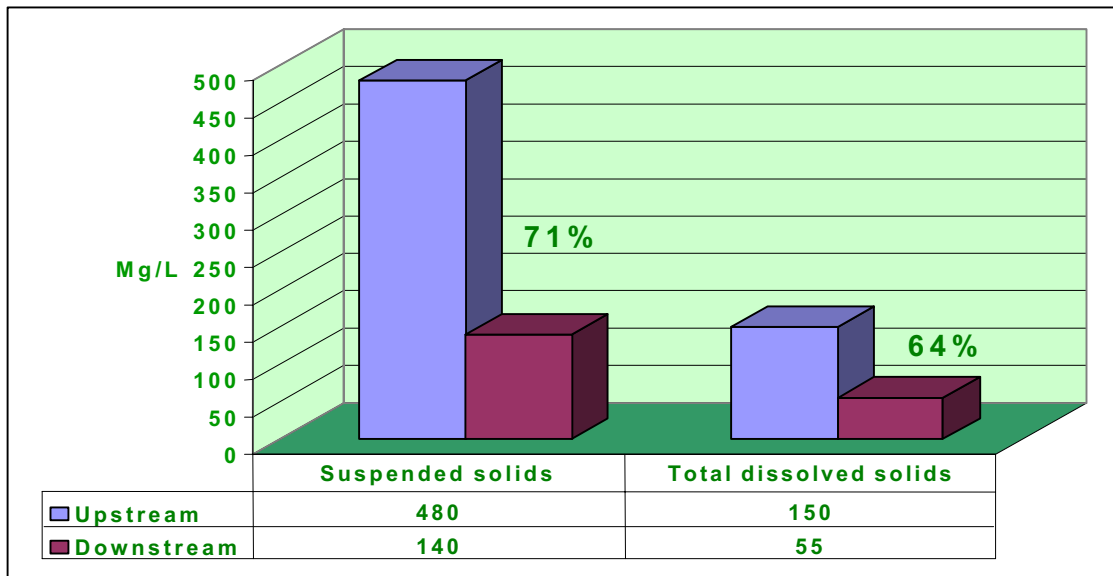


Hydraulic Performance Chart

The preceding chart indicates the ability of each product to retain water over a given period of time. The level of rise higher, earlier with the filter bale as compared with the hay bale. The results also indicate that under extreme hydrological conditions the water flowed over the top of the hay earlier than with the filter bale.

The filter bale is constructed of a rigid, recycled plastic frame that is resistant to deterioration and can be reused indefinitely. Filter socks made from a specialised geotextile cover containing recycled organics were also used on the site.

The following test results from Manly Hydraulics Laboratory also demonstrated the superior performance of the filter bale in comparison to the hay bale. The following chart illustrates the comparative removal rates of suspended and dissolved solids typically found in construction site and road run-off.



Sediment Removal Performance Chart

A visit to the testing laboratory was arranged during the Healthy Parks & Gardens Program where a demonstration trial illustrated the superiority of the recycled organics product over the hay bale. The site visit attendees, including representatives from councils, Northern Sydney Waste Board, Roads and Traffic Authority and the Department of Public Works and Services clearly witnessed how the hay bale discharged discoloured water where as the filter bale using Enviro-media discharged clear water.

One of the visitors to the testing laboratory, Councillor Barbara Aird from Manly Council stated:

“ The demonstration clearly showed a significant difference in the water quality passing through the filter bale as opposed to the commonly used hay bale. Now that we have best practice our challenge is to make these new, environmentally superior products common practice.”



Case Study: Water Purification Using Recycled Organics

Location:	Gaerloch Reserve, Coastal Walk, Tamarama Beach
Participants:	Waverley Council, Southern Sydney Waste Board, Envirogreen & Atlantis Corporation
Product:	Enviro-media
Market:	Storm Water Purification Segment

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Waverley Council selected Gaerloch Reserve (Coastal Walk) at Tamarama Beach to demonstrate the performance of enviro-media containing recycled organics to purify run-off from nearby Gaerloch Avenue. The run-off usually travels in pipes straight into the ocean from cliffs near Tamarama Beach without any additional treatment. There is a two metre section where the pipe has broken away that can be fitted with drainage channel made from recycled plastics and surrounded by the Enviro-media. The area would then be leveled off using Enviro-media that captures any excess road run-off.

The system would allow contaminated run-off to be treated by the Enviro-media before the water permeates over the cliff face. There are many situations along the coastal walk where this application can be implemented as well as other streetscape applications. Waverley Council is very receptive to using environmental best practice solutions. The upcoming implementation of Storm Water Management Plans by urban councils will give Waverley Council some direction on how to implement the plans in a practical manner using Enviro-media containing recycled organics.



Exposed Drain prior to Enviro-media installation

For more information contact Scott Ingwersen, Waverley Council, 02 9369 8070 or Darren Bragg, Resource NSW at darren.bragg@resource.nsw.gov.au



Case Study: Sediment Run-off Management Using Products Containing Recycled Organics

Location:	M2 Motorway, Epping, NSW
Participants:	NSW Roads & Traffic Authority & Northern Sydney Waste Board
Product:	Enviro-media
Market:	Rehabilitation

Enviro-media is a specifically engineered infiltration medium that uses selected organic matter or a blend of selected organic matter and minerals such as sand and soil that is used to physically, biologically and chemically purify or treat contaminated air, soil and water. Treatment and purification is achieved by physically filtering sediments and contaminants, chemically binding contaminants to organic matter and biologically degrading contaminants.

Many large building and construction projects such as freeway developments require measures to be implemented to control erosion and sediment run-off. The M2 Motorway in Northern Sydney passes through a number of ecologically sensitive bushland areas and has numerous embankments, escarpments, gardens and steep sloping sites.

With three traffic lanes each way and substantial paved surfaces, the potential for large volumes of surface run-off to cause erosion to sensitive areas is a major environmental concern. Although drainage systems are in place there are a number of areas that pose erosion potential.

A trial was established with the Roads and Traffic Authority on the M2 Motorway south of the Pennant Hills Rd. exit. The trial, which also included Abi Groups' toll-way management company Tollaust Pty Ltd., trialed a range of products containing recycled organics in and around median strip garden beds. The purpose of the trial was to compare the performance of these products with conventionally used products such as sandbags.

Operational staff indicate that the recycled organic content products (filter bags and filter socks) are more durable, easier to handle and potentially longer lasting than sandbags that degrade relatively quickly. The degrading sandbags are threatening the very same waterways they are intended to protect.

Dean Sullivan, Landscape Supervisor for Tollaust Pty Ltd. reports,

“ So far, the new products containing recycled organics are performing better than previously used methods. We believe this may lead to long term cost savings and reduce the risk of contaminating adjacent waterways.”

The trial is also expected to demonstrate that these recycled organic content products have a superior permeability rate than conventional products. The following picture shows the RO filter bags placed in front of degraded conventional sandbags on the M2 Motorway.



Case Study: Stormwater Run-off Management Using Products Containing Recycled Organics

Location:	North Steyne, Manly
Participants:	Manly Council, Environment Australia, Industry Participants
Product:	Enviro-media
Market:	Stormwater treatment

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The Manly Council Stormwater Treatment And Reuse (STAR) Project is designed to remove high-volume toxic contaminants and litter and nutrient rich and polluted stormwater currently being discharged directly into the coastal environment.

While previous projects such as the Stormwater Trust Project at Concord Council have identified impressive removal of key contaminants, the beachfront environment has many unique factors that subject it to even greater exposure to pollution. Intensive developments combined with high transient populations give rise to a substantially greater amount of vehicles and litter resulting in increased pollution loadings which exacerbates environmental impacts.

The STAR Project uses integrated catchment management approaches based on capital works that incorporate source control measures and community education and engagement programs that are designed to serve as innovative best practice models for future implementation in Manly and elsewhere.

The Manly STAR Project includes the use of stormwater litter traps that are fitted on drains to stop litter and sediments from roads flowing to the beach. Innovative porous paving installed on a nearby road also catches particulate matter.

The highly polluted run-off from short term parking bays along Ocean Beach is filtered through pervious pavers that are built into the drain. A five hundred metre section along the access road to the beach captures polluted stormwater from the corresponding road and carpark catchment.

After passing through a permeable paving system the polluted stormwater is treated using Enviro-media. Containing naturally occurring micro-organisms Enviro-media biologically degrade and remediate toxic chemicals that are the result of daily urban and industrial pollution. Infiltrating through the specially designed structural Enviro-media used in Manly, typical contaminants such as hydrocarbons and metals found in road and car park run-off are treated without compromising the structural integrity of the pavement. The micro-organisms in Enviro-media eliminate the pollutants by degrading the toxic chemicals prior to water infiltrating into permeable channels.

From the channels purified water passes into 100,000 litres of storage tank. A pump system then uses the water to spray irrigate the Norfolk Pines that are a major feature of the Manly seascape. Excess purified water overflows and percolates through the existing sandy site soils to recharge ground water.

The University of NSW's Water Research Laboratory and Sydney Water will carry out monitoring programs to evaluate the effectiveness and efficiency of the project.

For more information contact Joanne Scarsbrick, Manly Council on 02 9976 1560



Photo courtesy of Atlantis Corporation



Case Study: Stormwater Contamination Treatment Using Recycled Organics

Location:	Powells Creek East Catchment – Concord West
Participants:	Concord Council, EPA NSW (Stormwater Trust) Atlantis Corporation
Product:	Enviro-media
Market:	Enviro-remediation Segment

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Analyses of stormwater contamination from roads clearly identifies high levels of dissolved pollutants including oil, grease, petrol, metals, nutrients and sediment that are creating a cocktail more toxic than untreated sewage. This contamination is spilling into our rivers, creeks and oceans causing substantial environmental damage.

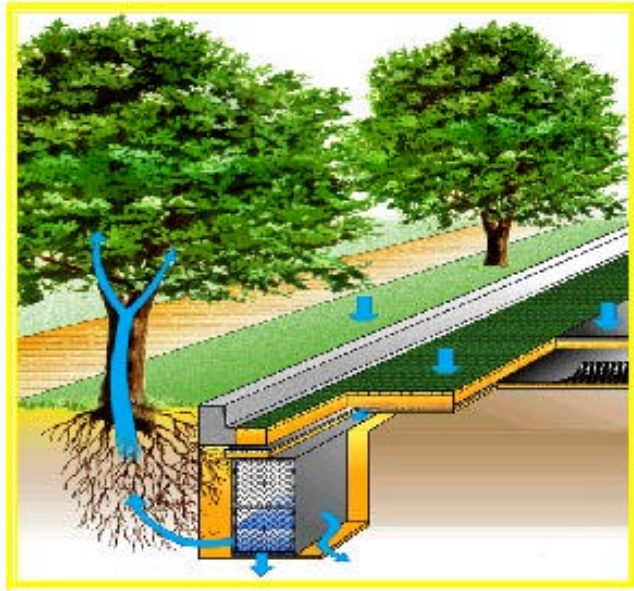
Enabled by a NSW Government stormwater trust grant, the Powells Creek East Catchment Project is a public and private sector partnership (PPP) between Concord Council, Atlantis Corporation and the NSW EPA.

The Concord project demonstrates the use of Enviro-media with the Atlantis infiltration system in an area where the sub-soils are predominantly clay based. The grant project covers the catchment area of five streets in Concord West, Sydney, that run from George Street towards Powells Creek.

The location was selected because of the silting and pollution problems in Homebush Bay, the proximity to the Olympic site and the distributed nature of the catchment, which features a series of small parallel catchments.

“The success of the project is a landmark for achieving sustainable river systems”, said Humberto Urriola, Managing Director of Atlantis. “The future of human survival depends on a sustainable supply of clean water. This project is a great example of where successful collaboration between government and industry can create a more sustainable future”

The stormwater is treated at the source by the construction of a porous road shoulder consisting of grass cells and turf. The runoff filters through the grass cells and then through an amended biologically engineered soil containing recycled organics that underlies this porous road shoulder. From there, the runoff is collected in drainage tanks that continue the purification process and divert the water into nearby retention tanks.



kerb gully by pass system containing RO used in Concord

This water is then directed to a balancing tank and used to irrigate a nearby landscape area. Excess filtered runoff that can't be stored in the retention tank will either be stored in detention tanks and absorbed into the surrounding soils, if the soil permeability permits, or purified water will be discharged into Powells Creek.

Being an infiltration project on roads in trafficable areas, many civil engineering considerations are incorporated into the design including achieving suitable compaction of the filter medium to maintain the integrity of the road surface, while maintaining optimum infiltration rates.

The system incorporates the extensive use of physically and biologically engineered filtration media. There are a range of tailored filtration enviro-media formulas that are engineered to suit the specific soil and water properties of the particular site. The bio-remediating enviro-media contain bio-engineered naturally occurring micro-organisms that biologically degrade and remediate toxic chemicals that are the result of daily urban

and industrial activities. Toxic chemicals are transformed in the process into natural, non-toxic elements.

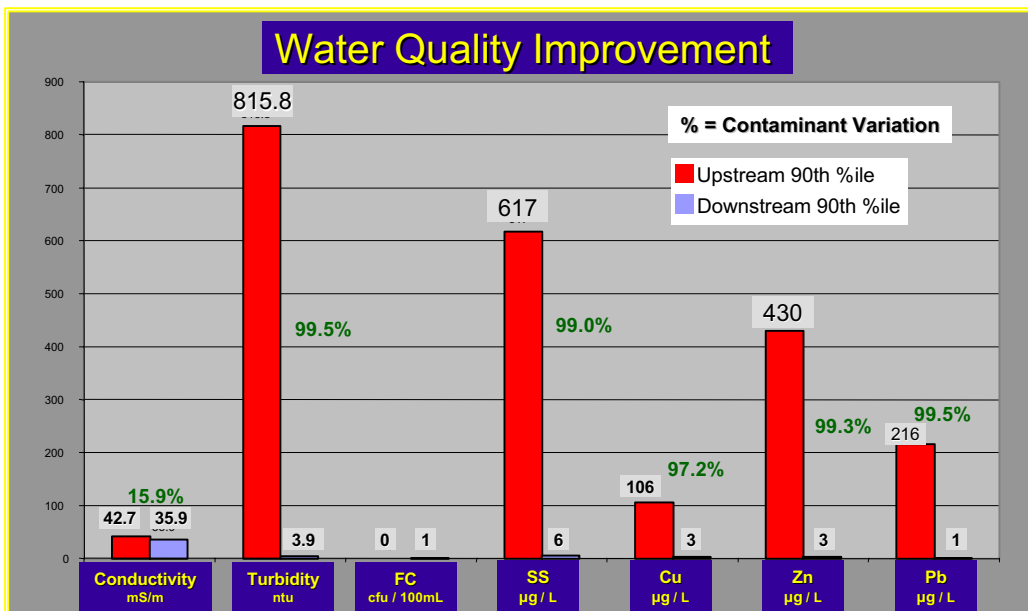
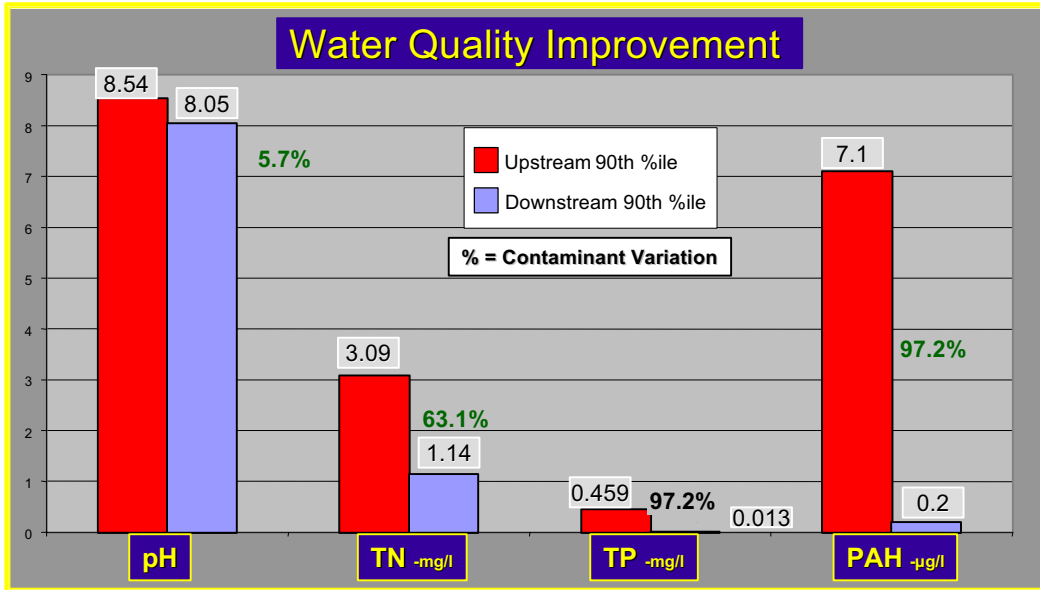
The toxic chemicals treated include PCBS, PAHS, Organophosphates, coal tars, pesticides and herbicides. These toxins are carcinogenic to humans and their accumulation in soils and waterways are a major health and environmental concern.

Some heavy metals such as arsenic, chromium and selenium can also be biologically degraded using enviro-media.

The project won a Gold Rivercare Award in 2000. "Concord Council is delighted to be part of this innovation in sustainable water quality" says Concord Mayor, Clr Peter Woods. "Concord has always been in the forefront of environmental protection, the Rivercare award is a win for the environment and a credit to the people of Concord".

Councils could save through reduced maintenance and cost of stormwater systems and through the re-use of recycled water for irrigating parks and other landscape areas. Water authorities would save through the reduced consumption of mains water. Future use of Enviro-media in stormwater purification will depend on local councils enforcement of quality standards and regulations for stormwater discharge management .

Independent monitoring of the water quality was carried out by Australian Water Technologies. The monitoring includes testing stormwater at surface level, as well as after infiltration and storage in the retention tanks. Ten samples were collected during rainfall events over a six month period. Analysis of the data identifies substantial water quality improvement as shown in the following charts.





Case Study: Water Purification/Erosion Control Using Recycled Organics

Location:	Salt Pan Creek Landfill, Narwee, Canterbury Council
Participants:	Canterbury Council, Southern Sydney Waste Board & PPI Services
Product:	Enviro-media
Market:	Water Purification Segment and Erosion Control

Enviro-media is selected organic matter or a combination of selected organic matter and minerals such as sand, soil that is used to either, physically, biologically and/or chemically purify or treat contaminated air, soil or water.

Canterbury Council nominated Salt Pan Creek landfill site to demonstrate the use of products containing recycled organics for leachate and erosion control. The site currently accepts councils' street sweepings that potentially contain some contaminants such as hydrocarbons that can be bio-remediated using recycled organics. It was proposed to establish berms made from council derived recycled organics in conjunction with other products containing recycled plastic and organics.

The disposal site has a distinct fall away to the backyard of residential properties which is intercepted and council is keen to prevent erosion and carriage of pollutants into the storm water system. The berms will also act as a wind barrier for air-borne litter from the street sweepings. The project will act as a high profile demonstration site for landfill operators and also influence council engineers to use products containing recycled organics in other applications.

The treatment site was selected following a site meeting and concentrated on a area of depression that acts as a channeling point for the leachate.

Chipped recycled organics were stockpiled on-site prior to installation day and sediment control and purification products containing recycled organics were selected to enhance the treatment process.



Salt Pan Creek Landfill, Treatment Site Area

Chipped fresh Recycled Organics were selected to filter sediment, absorb nutrients contained in the leachate and to host microorganisms that biologically degrade toxic compounds. Prior to installing this material secondary treatment devices containing composted and sized Recycled Organics were positioned. These devices remove finer particulate matter via filtration and chemically/biologically treat a wide range of pollutants.



Installation of devices containing RO

Waste Services Manager for Canterbury Council, Mr. Les Andrews commented, "There was a noticeable difference in water quality immediately following the installation of the system containing recycled organics." "The system was very cost effective and provides Council with an efficient method of dealing with our residual organics collected in the Council region in the future." said Mr. Andrews. Council is now examining other uses for the treatment system throughout the local area.

Freshly chipped recycled organics were then placed over the treatment devices as a berm to direct and primary treat contaminated run-off. The mulch grade material also provides protection for the secondary treatment devices and an aesthetic appearance.



Freshly chipped RO formed into a berm

The freshly chipped recycled organics is a perfect medium for absorbing sediments, nutrients in water and act as a host for microorganisms responsible for degrading many toxic compounds contained in road run-off and storm water. This system can also provide an effective method of erosion control on embankments and sloping ground.

For more information regarding the Canterbury Council Salt Pan Creek demonstration project contact Les Andrews, Canterbury Council, 02 9789 9371 or Darren Bragg, Resource NSW at darren.bragg@resource.nsw.gov.au



Case Study: Infiltration Basin Using Products Containing Recycled Organics

Location:	Whites Creek Valley Park, Annandale.
Participants:	Leichhardt Council, EPA NSW (Stormwater Trust)
Product:	Enviro-media
Market:	Enviro-remediation

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Leichhardt Council was successful in gaining a Storm Water Trust Grant to improve the quality of local waterways by demonstrating quality storm water management practices. The project is located in Whites Creek Valley Park at the corner of Smith and Gillies St, Annandale.

The construction involves conveying stormwater collected from one of Leichhardt Councils' Annandale drainage sub-catchments and channelling the contaminated stormwater into an infiltration basin located in an adjacent park. The infiltration material is an Enviro-media containing 20% Recycled Organics (RO) that removes various contaminants including, gross litter, leaves, grass clippings, animal droppings, heavy metals and hydrocarbons.

The infiltrated water is then collected in a layer of drainage cells made from recycled plastic and directed back into Whites Creek Channel. The system is fully gravitationally operated and requires no power supply and consequently is energy efficient. The environmental significance is that the channel discharges into Rozelle Bay that flows into Sydney Harbour.



Until now, storm water detention basins have been used to regulate the flow of storm water quantities however, little focus has been placed on the quality of water detained. The Annandale infiltration basin combines both the volume aspects of regulating storm water as well as purifying contaminated storm water.

The Enviro-media used in the infiltration bed purifies the contaminated storm water in three ways – physically, chemically and biologically. The infiltration media physically removes contaminant-laden sediments and suspended solids by filtering these particles from the storm water. Dissolved contaminants such as nutrients are removed by a process known as cation exchange whereby organic particles attract the contaminants. Bio engineering facilitates assimilation of the contaminants by micro-organisms that convert them to plant nutrients and elements.

Selected recycled organics used in Enviro-media substantially improves the cation exchange efficiency compared to a pure sand filter. Sand on its own has a cation exchange efficiency of 2 milligrams equivalent (meq) whereas recycled organics have a cation exchange efficiency of 160 meq at pH 7. (Hendreck and Black, 1994)

Leichhardt Council has reported that the Storm Water Infiltration Basin has been well received by the local community and test results indicate that the level of reduction in contaminants has been most encouraging. The project was completed in May 2000 and the School of Geo-sciences, Sydney University, is conducting ongoing testing.