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Low Impact Development – Stormwater Management

Green Infrastructure Program

AMPS-Rain Garden

Slow Runoff, Water-Retention Facilities

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Low Impact Development (LID)-Stormwater Management

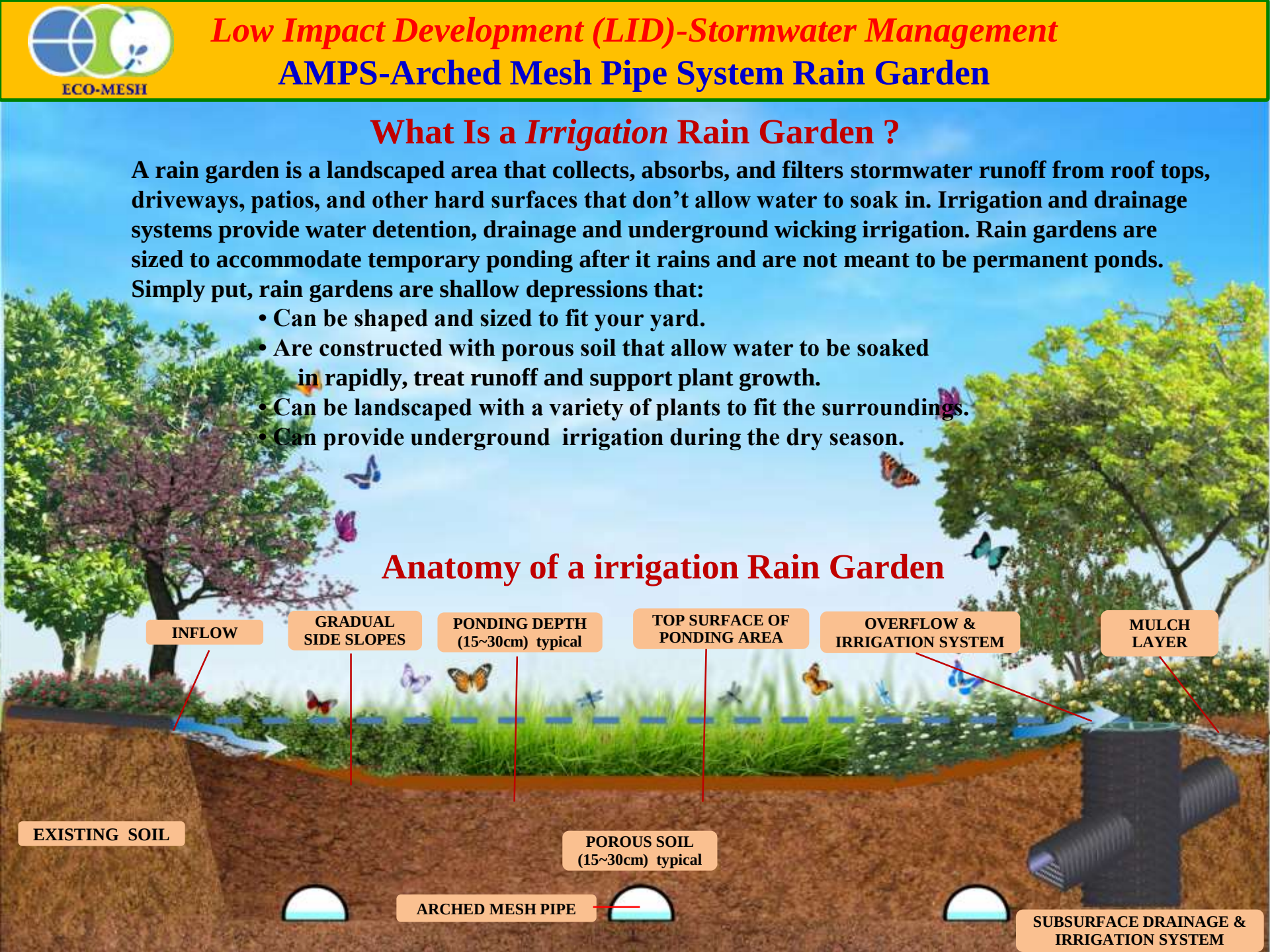
AMPS-Arched Mesh Pipe System Rain Garden

What Is a *Irrigation* Rain Garden ?

A rain garden is a landscaped area that collects, absorbs, and filters stormwater runoff from roof tops, driveways, patios, and other hard surfaces that don't allow water to soak in. Irrigation and drainage systems provide water detention, drainage and underground wicking irrigation. Rain gardens are sized to accommodate temporary ponding after it rains and are not meant to be permanent ponds. Simply put, rain gardens are shallow depressions that:

- **Can be shaped and sized to fit your yard.**
- **Are constructed with porous soil that allow water to be soaked in rapidly, treat runoff and support plant growth.**
- **Can be landscaped with a variety of plants to fit the surroundings.**
- **Can provide underground irrigation during the dry season.**

Anatomy of a irrigation Rain Garden



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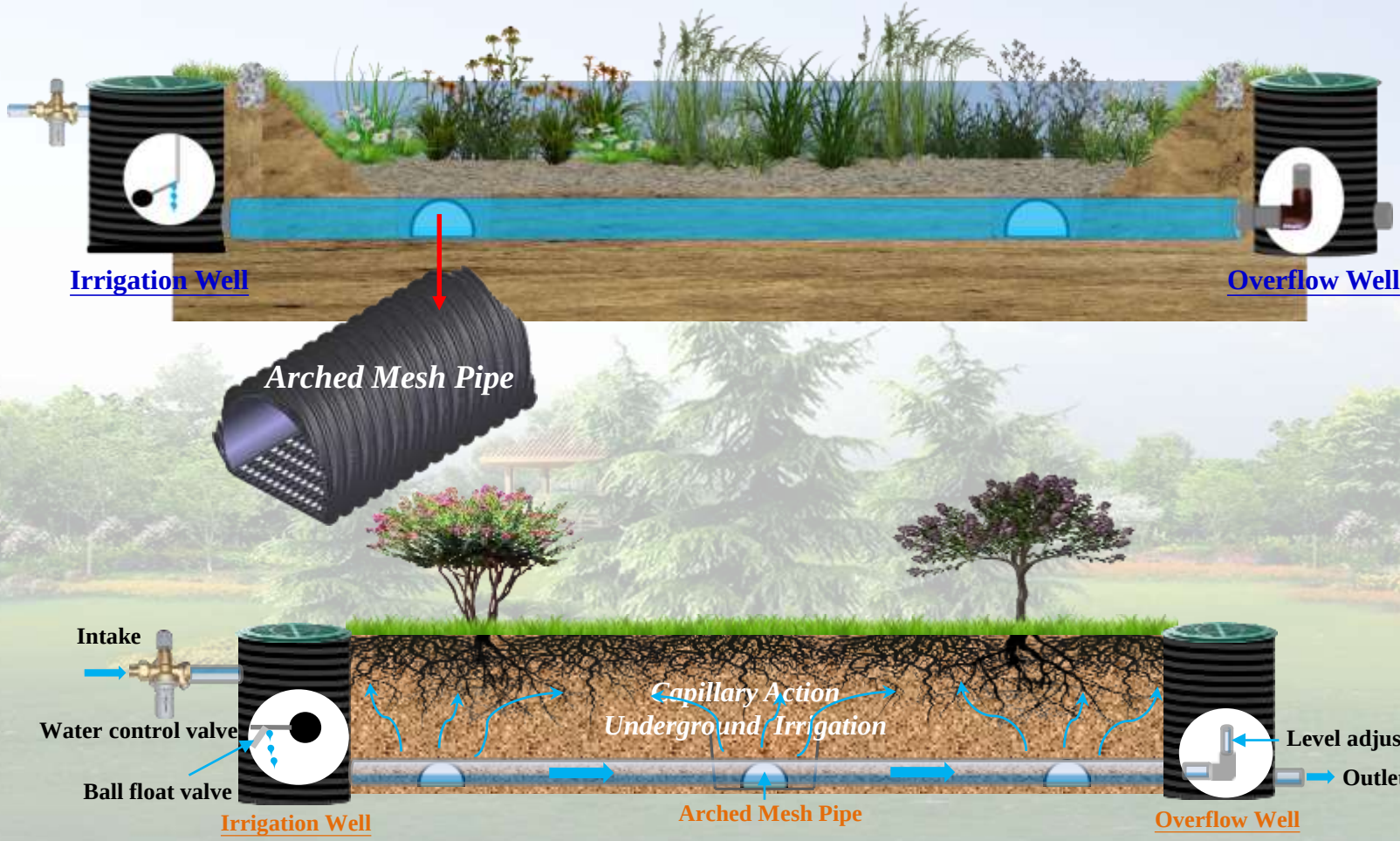
AMPS-Arched Mesh Pipe System Rain Garden

Rain Garden

AMPS-Underground Irrigation, Infiltration and Overflow System

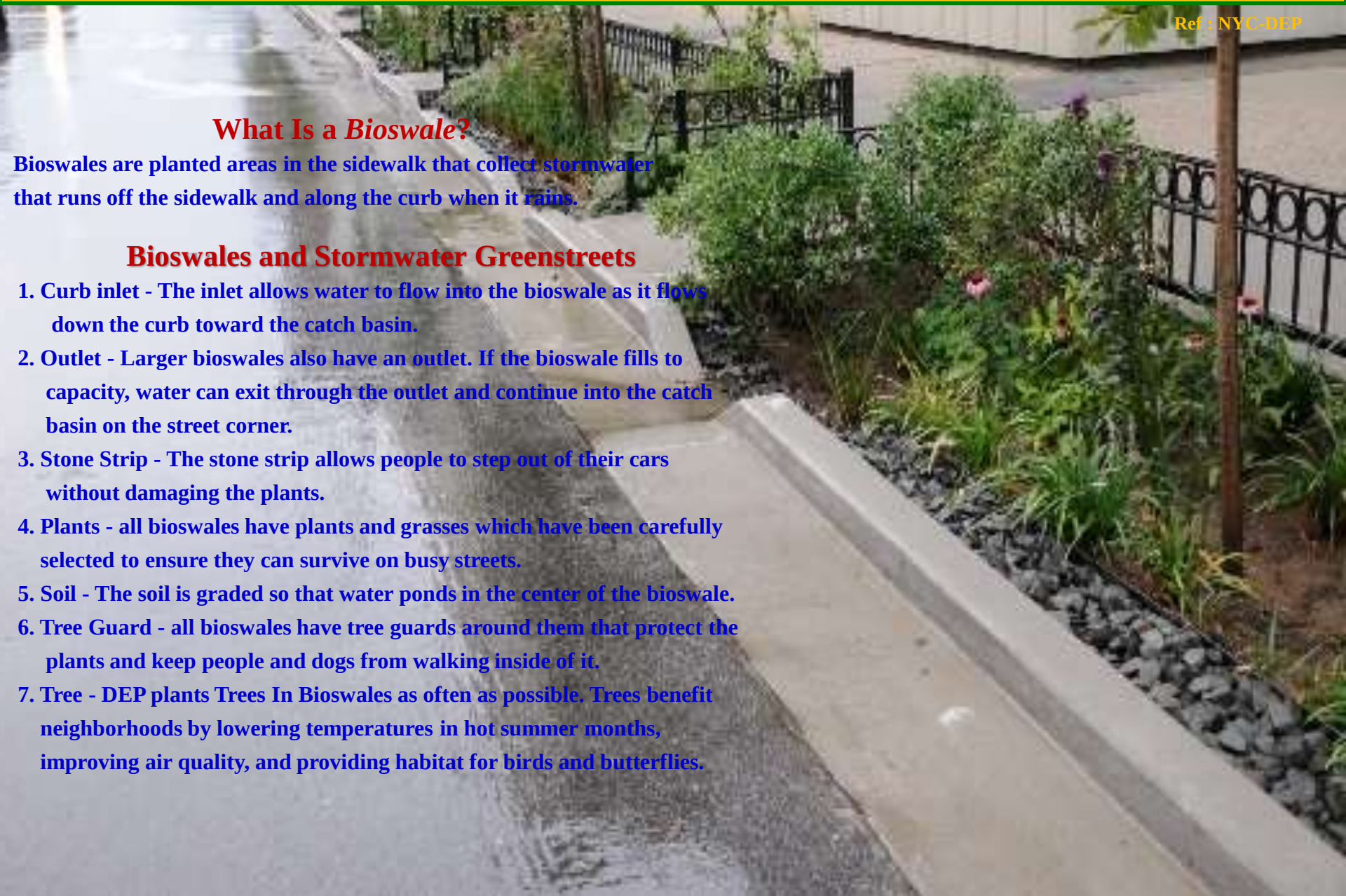


AMPS - Arched Mesh Pipe System

Low Impact Development (LID)-Stormwater Management

Bioswale

Ref : NYC-DEP



What Is a *Bioswale*?

Bioswales are planted areas in the sidewalk that collect stormwater that runs off the sidewalk and along the curb when it rains.

Bioswales and Stormwater Greenstreets

1. Curb inlet - The inlet allows water to flow into the bioswale as it flows down the curb toward the catch basin.
2. Outlet - Larger bioswales also have an outlet. If the bioswale fills to capacity, water can exit through the outlet and continue into the catch basin on the street corner.
3. Stone Strip - The stone strip allows people to step out of their cars without damaging the plants.
4. Plants - all bioswales have plants and grasses which have been carefully selected to ensure they can survive on busy streets.
5. Soil - The soil is graded so that water ponds in the center of the bioswale.
6. Tree Guard - all bioswales have tree guards around them that protect the plants and keep people and dogs from walking inside of it.
7. Tree - DEP plants Trees In Bioswales as often as possible. Trees benefit neighborhoods by lowering temperatures in hot summer months, improving air quality, and providing habitat for birds and butterflies.

Managing Stormwater with Challenge

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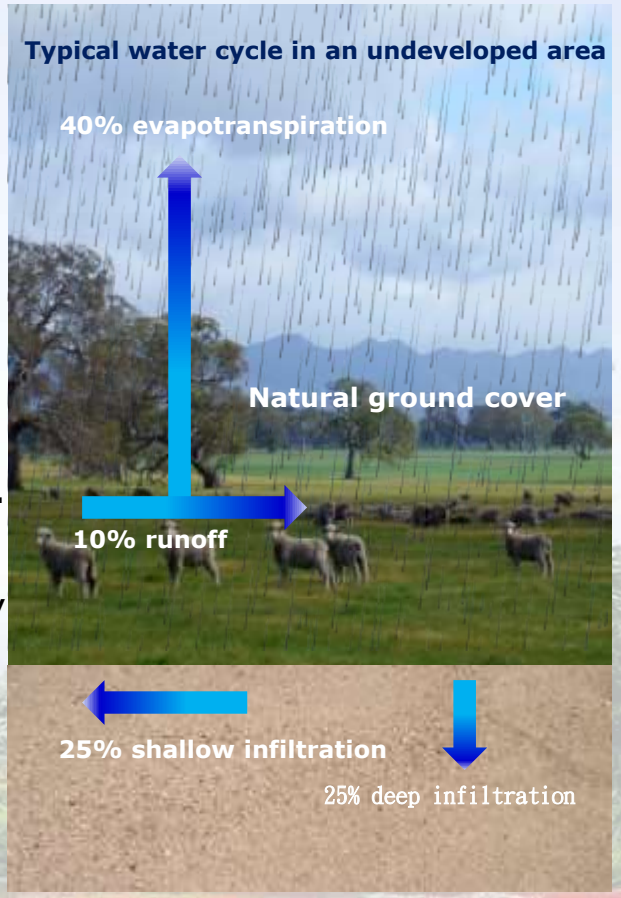
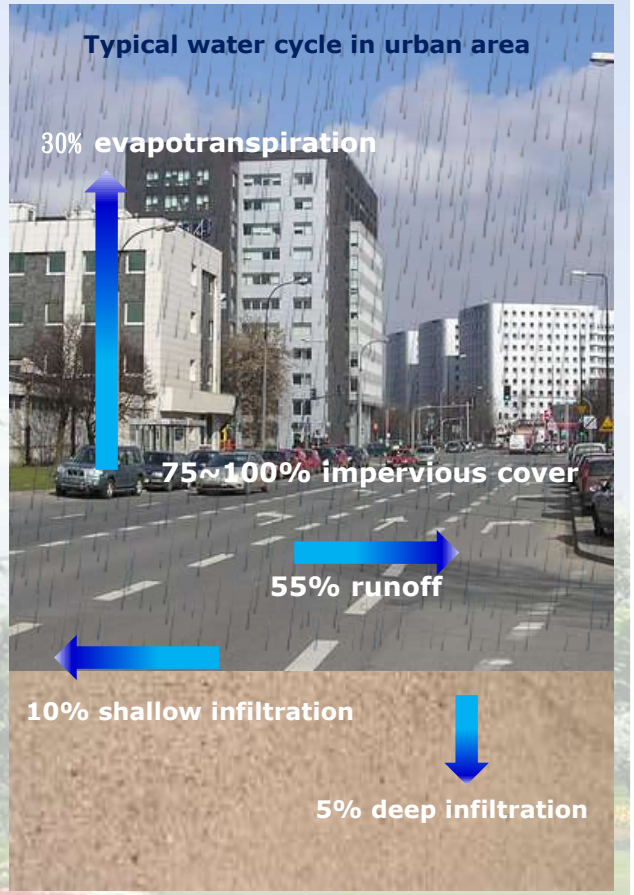
A Challenge in Urban Environments

Under natural conditions, most rain and snow melt soak into the ground, filtering slowly through the soil on its way to lakes and rivers. In developed areas, this natural cleansing process is blocked by roofs, pavement, and compacted soil.

During rain storms, large volumes of water enter the city storm drains. Pollutants (sediment, motor oil, metals and bacteria) are carried untreated into rivers and streams. Increased volumes of stormwater cause erosion of stream banks and destruction of wildlife habitat.





Rain gardens、Bioswale

A rain garden is a landscaped area that collects, absorbs, and filters stormwater runoff from roof tops, driveways, patios, and other hard surfaces that don't allow water to soak in.

Landscaping with

Rain Gardens

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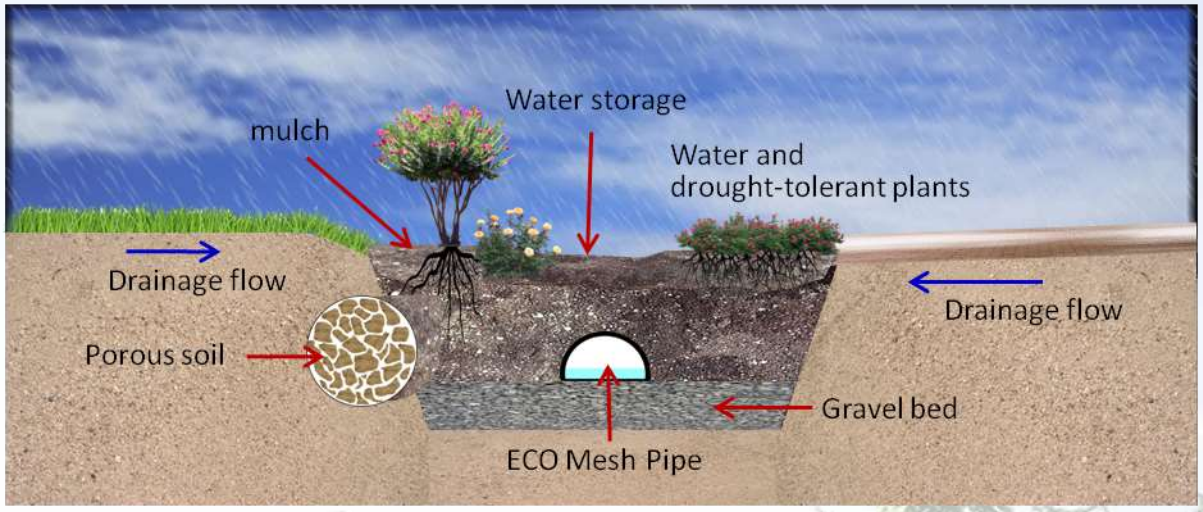

Soaking it All in

The diagram represents a Rain Garden or bioretention cell which is designed to act as a sponge and retain stormwater runoff. It includes specially selected soils and plants that are both water and drought tolerant. Rain garden are designed to mimic natural processes in forests and meadows where rainfall is evaporated, is taken up by plants and is drained into the soil. Rain gardens are simple to build and can be installed in residential and school yards, parks, parking lots, along roads-almost anywhere.

◆ Rain Gardens are Constructed in Layers with Different Materials

- To construct a rain garden, an area is excavated and partially filled with gravel.
- Growing medial composed of sand and planting soil is installed over the gravel and then protected with a layer of mulch.
- Plants are added to maintain soil porosity, take up water and treat pollutants.
- Selected plants should be hardy and able to tolerate both wet and dry soil.

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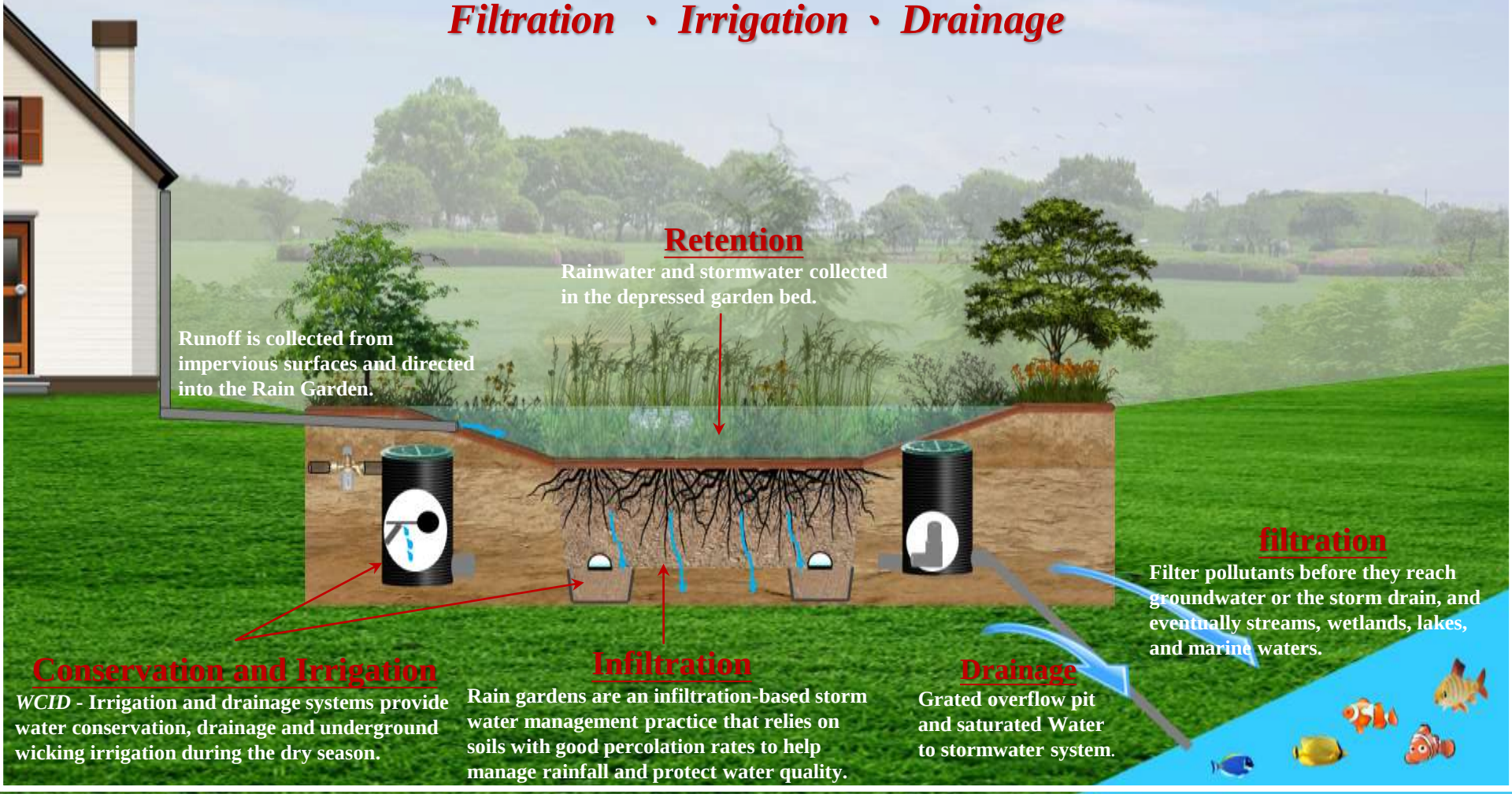
Low Impact Development (LID)-Stormwater Management

Rain Garden、Bioswale

Irrigation Rain Garden - Features

Infiltration、Retention、Conservation

Filtration、Irrigation、Drainage



Retention

Rainwater and stormwater collected in the depressed garden bed.

Runoff is collected from impervious surfaces and directed into the Rain Garden.

filtration

Filter pollutants before they reach groundwater or the storm drain, and eventually streams, wetlands, lakes, and marine waters.

Conservation and Irrigation

WCID - Irrigation and drainage systems provide water conservation, drainage and underground wicking irrigation during the dry season.

Infiltration

Rain gardens are an infiltration-based storm water management practice that relies on soils with good percolation rates to help manage rainfall and protect water quality.

Drainage

Grated overflow pit and saturated Water to stormwater system.

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Rain Garden、Bioswale

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Rain Gardens Provide Multiple Benefits

Rain gardens can:

- Enhance the landscaping and appearance of the homes and yards.
- Provide habitat for beneficial insects and birds.
- Filter oil and grease from driveways, pesticides and fertilizers from lawns, and other pollutants before they reach groundwater or the storm drain and eventually streams, wetlands, lakes, and marine waters.
- Reduce flooding on neighboring property, overflows in sewers, and erosion in streams by absorbing runoff from hard surfaces.
- Increase the amount of water that soaks into the ground to recharge local groundwater.

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Rain Garden (Bioretention)

Residential Irrigation Rain Garden - Applications

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Low Impact Development (LID)-Stormwater Management

Rain Garden (Bioretention)

Roadside Irrigation Rain Garden Schematic Diagram

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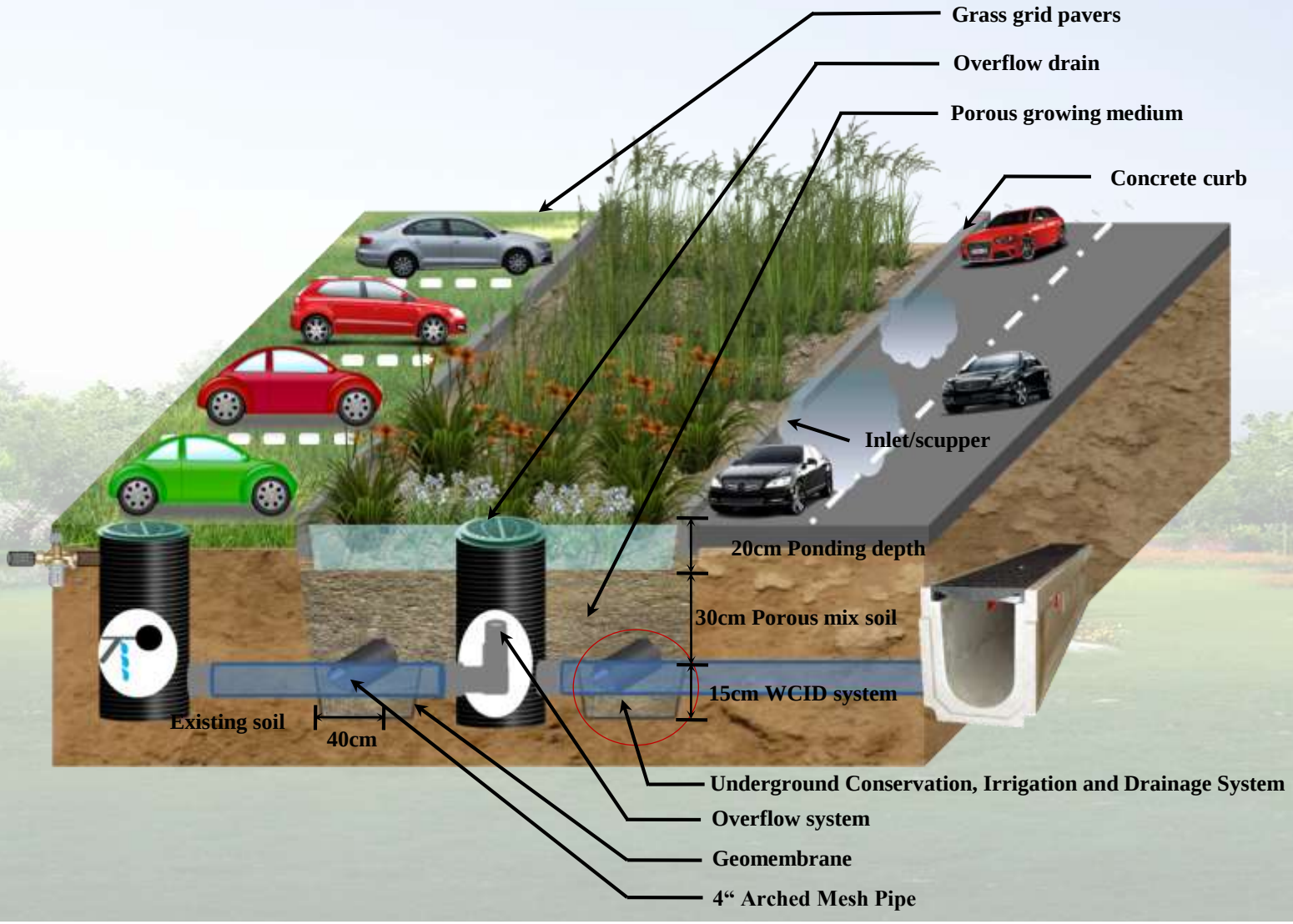
Low Impact Development Stormwater Management and Solution

Irrigation Rain Garden – Design Concept



Roadside Irrigation Rain Garden - Applications









Bioswale - Application