CLEAR CREEK COUNTY

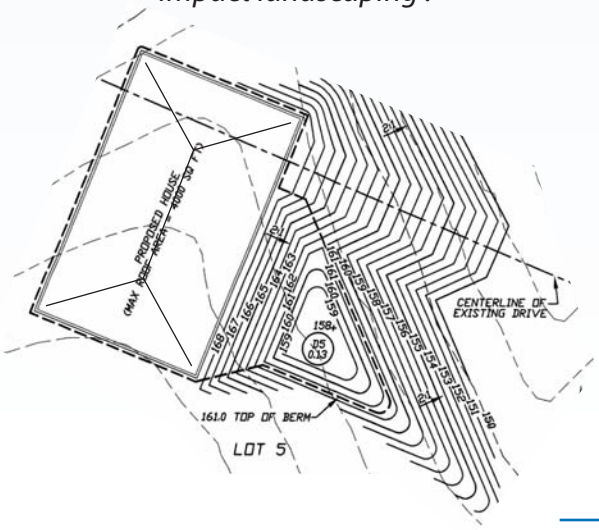
Managing Stormwater Around the House

Conservation design seeks to minimize the generation of runoff by decreasing impervious areas and encouraging the protection of open spaces.

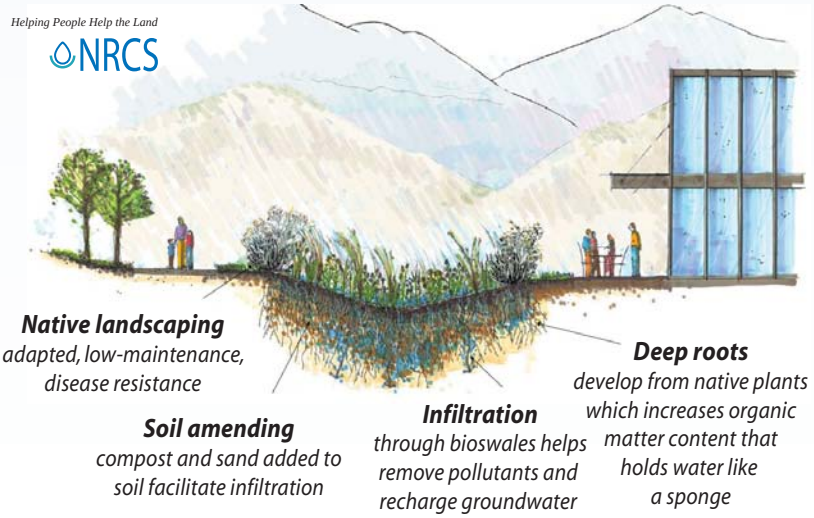
Added impervious area from roof tops and driveways drain water from the watershed. Before your home and driveway was constructed, rainfall and snow melt soaked into the ground and contributed to recharge.

Filtration practices treat runoff by routing it through vegetation as a filter to reduce flow velocity, settle solids and capture pollutants.

Begin at the planning stage by considering conservation design and low-impact landscaping .



Vegetated Swale



Native landscaping *adapted, low-maintenance, disease resistance*

Soil amending *compost and sand added to soil facilitate infiltration*

Infiltration *through bioswales helps remove pollutants and recharge groundwater*

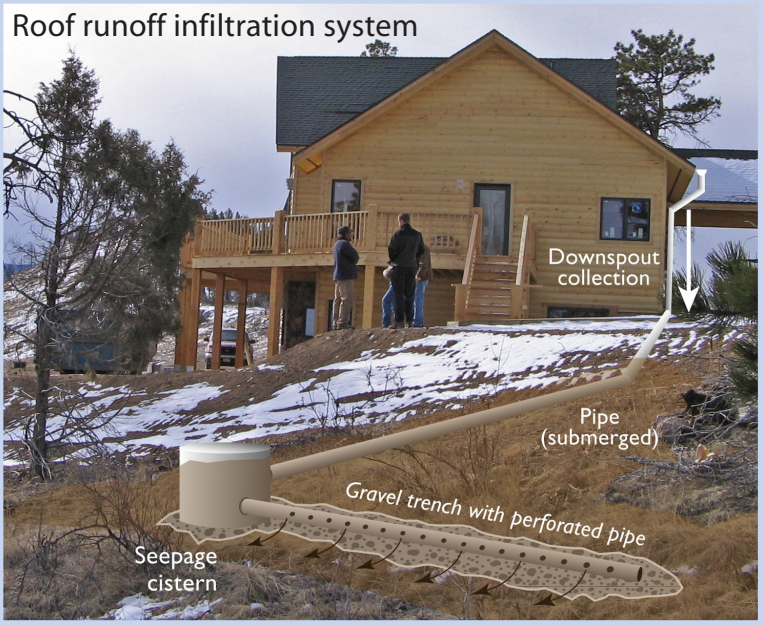
Deep roots *develop from native plants which increases organic matter content that holds water like a sponge*

Please contact Clear Creek County staff at (303-679-2421) to discuss stormwater runoff reduction practices applicable to residential development.

CLEAR CREEK COUNTY

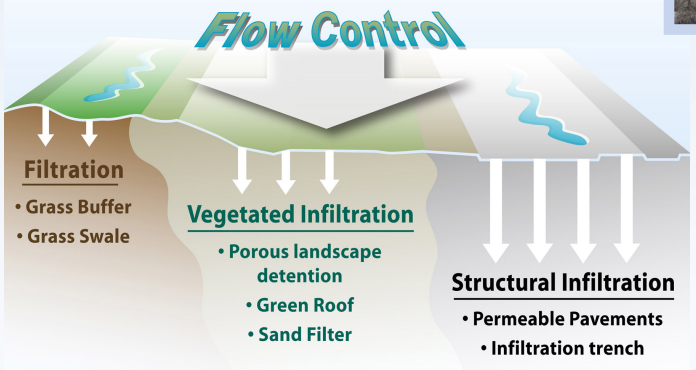
The County has adopted a revegetation policy and recommended seed mix to help control soil erosion, sedimentation and slope stability.

Roof runoff infiltration system

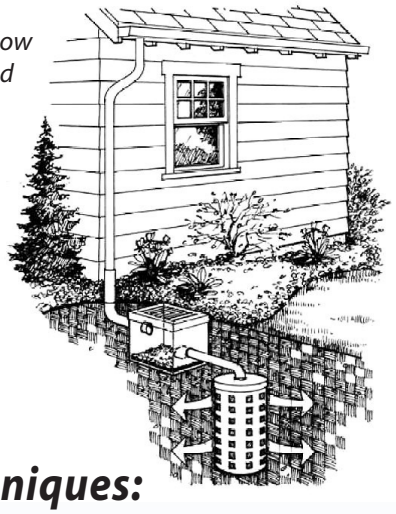


Infiltration practices are engineered structures and landscape features designed to capture and infiltrate stormwater runoff, thereby reducing runoff.

Infiltration Effectiveness



Roof runoff - Install gravel trenches, pits or swales to allow water to soak into the ground near roof down spots.



Infiltration Techniques:

- ***Reduce access road and parking imperviousness***
- ***Rooftop downspout disconnection***
- ***Infiltration basins/trenches***
- ***Bioretention***

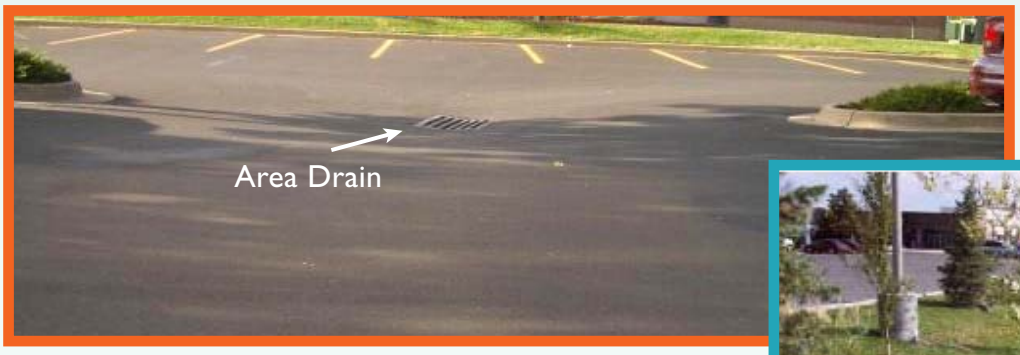
Pervious or porous pavement systems allow runoff to infiltrate through a permeable layer of pavement or other stabilized permeable materials to prevent run-off of driveways and parking lots.

CLEAR CREEK COUNTY

Stormwater Management on Commercial Areas

Problem:

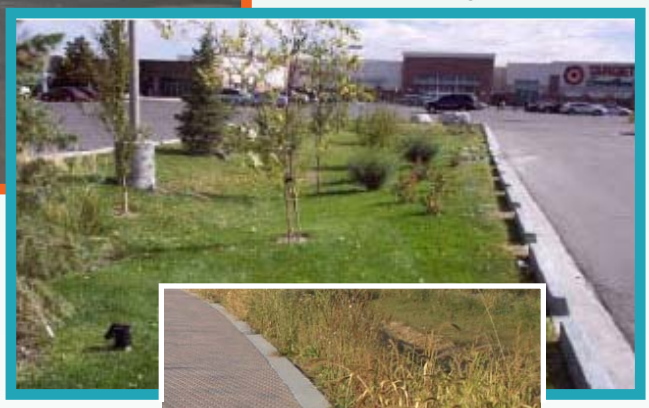
Conventional engineered systems are designed to drain water resources.....



A combination of roads and parking areas with raised curbs and raised landscape islands increase stormwater runoff and miss opportunities for infiltration.

Solution:

.....promoting infiltration



Solutions include promoting *INFILTRATION* with:

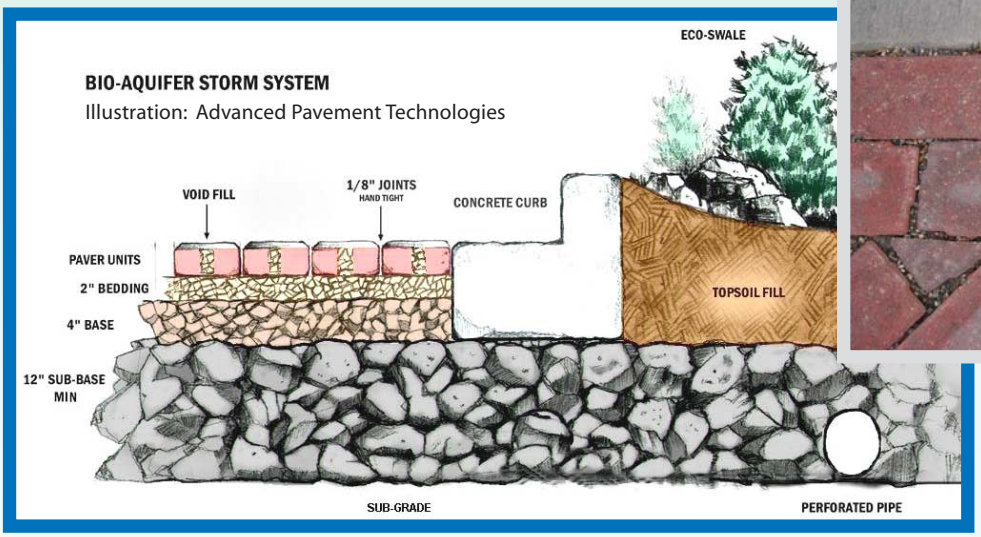
- **Permeable pavement systems such as permeable pavers, pervious asphalt and porous concrete that don't produce runoff.**

- **Flush curbs, wheel stops and curb cuts to reduce conveyance and concentration of runoff.**

- **Sumped landscaping to allow runoff to flow into landscape areas.**

Please contact Clear Creek County staff at (303-679-2421) to discuss stormwater runoff reduction practices applicable to commercial development.

Permeable pavement systems: all use layers of open-graded aggregate for structural loading and to provide void space for infiltration



Aggregate sub base and base courses are used for pervious concrete and porous asphalt wearing courses. Permeable interlocking concrete paver installations require additional aggregate setting bed and joint fill.

Curbing Changes and Sumped Landscaping:

Multiple curb cuts allow flow into sumped landscaping without causing scour.

Flush curbs allow sheet flow into native landscaping, or into adjacent infiltration BMP's

Single entry curb cuts are appropriate when landscaping and pavement elevations are similar.

Bollards are used instead of raised curbs to protect vegetation infiltration areas.

CLEAR CREEK COUNTY

Water Resources and Mountain Roads

Most of the impervious surfaces in low-density mountain areas is from roads. Runoff from roads becomes concentrated in ditches and culverts and causes erosion as more water leaves the watershed.

Managing road runoff begins during construction by using dirt berms and brush barriers, which are more effective than a silt fence.

Access roads such as the erosive driveway cut in this photo can be a source of large sediment loads.

Revegetation is the best BMP to help control soil erosion, sedimentation and slope stability. The County has adopted a revegetation policy and recommended seed mix.

Ditches need maintenance . When ditches fill with sediment, there is no capacity for runoff in the ditch and excess flow can cause scour downstream. .....

....or at an outlet

The Solution is to slow down stormwater flows, spread them out, and let the water soak in.

Please contact Clear Creek County staff at (303-679-2421) to discuss stormwater runoff reduction practices applicable to roads and driveways.

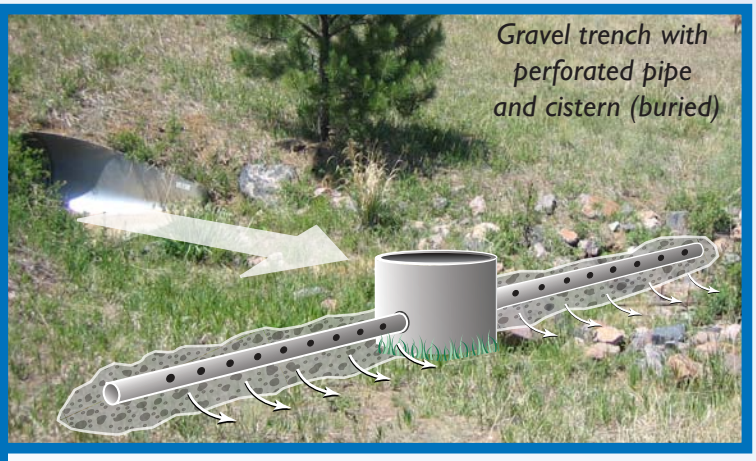
CLEAR CREEK COUNTY

Slow it down

Placement of boulders and planting vegetation in the flow path help to diffuse the flow and slow it down.

A series of rock check structures in the ditch line can provide many benefits including creating capacity and slowing runoff to promote infiltration, reducing scour, and allowing sediment to drop out in an area that is convenient to maintain.

Spread it out



Culvert outflow can be routed to a buried level spreader to promote sheet flow.

Concrete cistern seepage rings can be used as a flow diffuser. Large rocks are placed around the structure for stability and to allow the water to soak into the surrounding area.

Let it soak in

Extending rocks from natural ridge features produces a check dam that allows water to infiltrate and protect this drainage valley from erosion.

Detention ponds provide temporary volume storage from larger storm events and allow excess water to infiltrate.