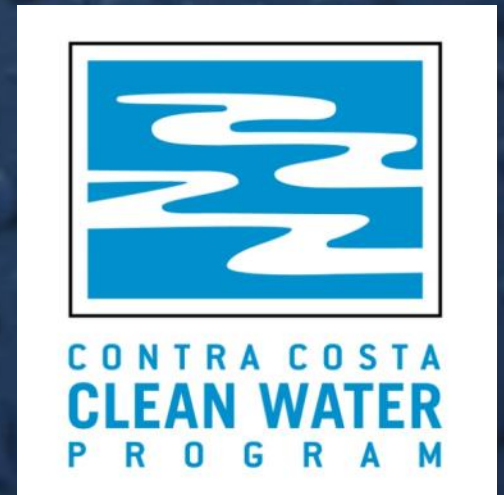


Low Impact Development

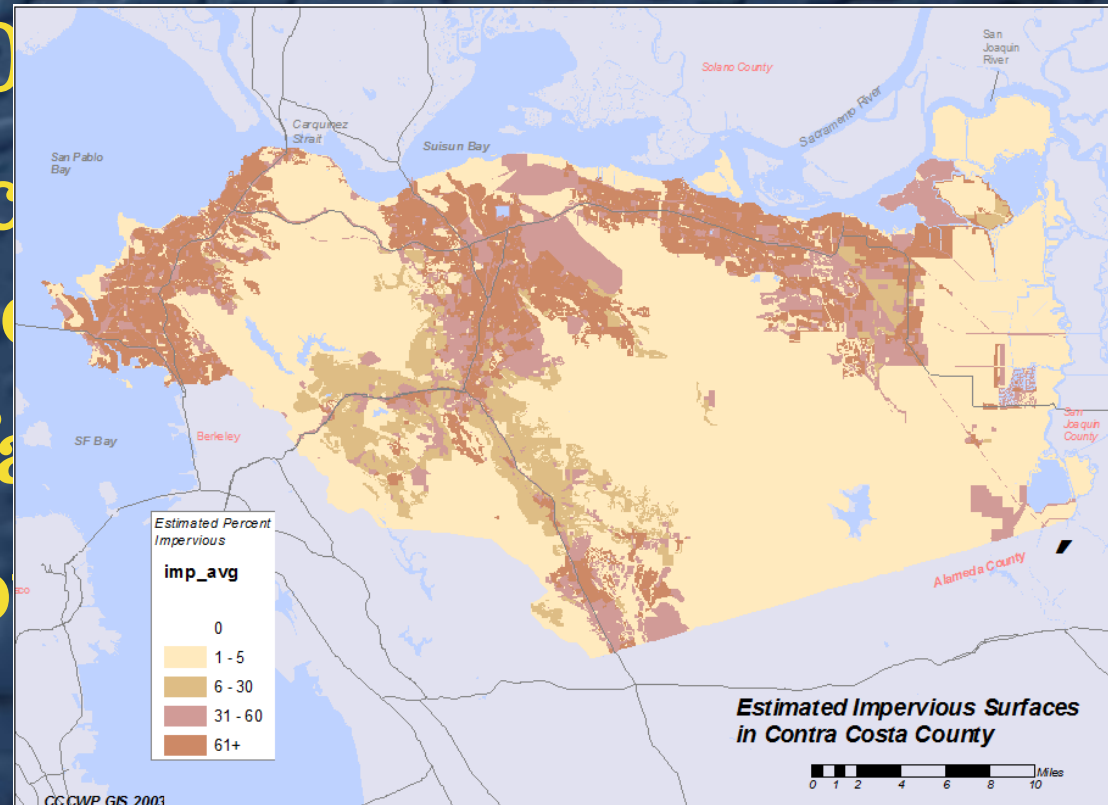
What it is and what it does

Tom Dalziel
Assistant Program Manager



Contra Costa Clean Water Program

- 21 Copermitttees
- One million residents
- Grew 8% 2000
- Oldest city inc
newest incorpo
- Average rainfa
- Mostly clay so



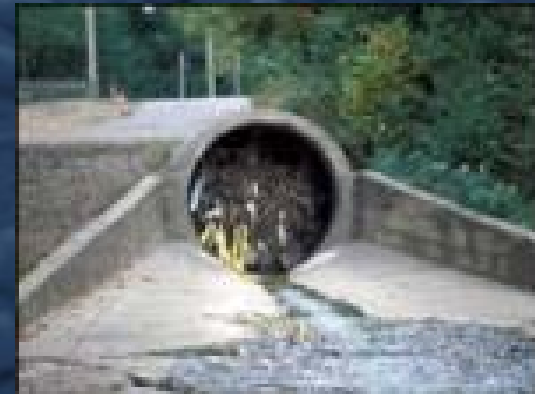
Topics

- How conventional urban drainage design affects watersheds
- How Low Impact Development can mitigate effects of urban drainage
- LID drainage design principles
- LID for NPDES Compliance
- Myths and reality about LID

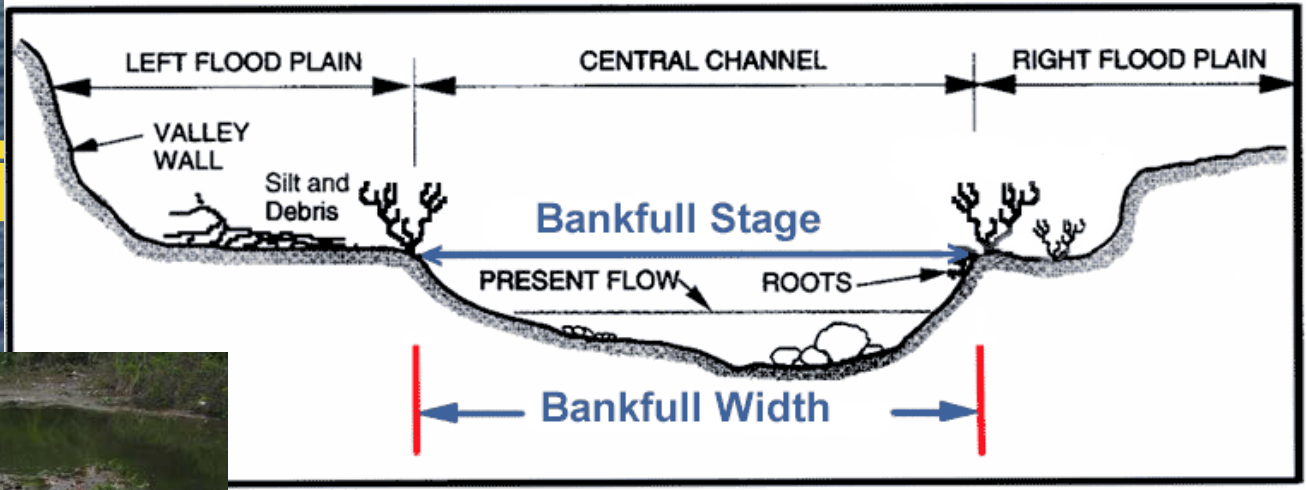
Conventional Urban Drainage

■ Features

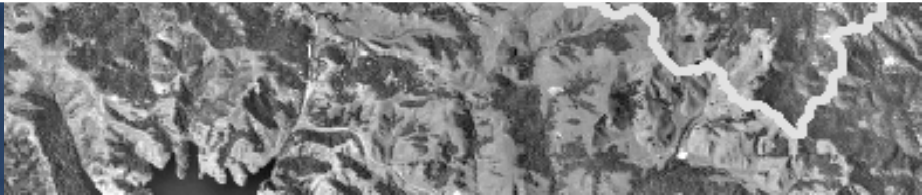
- Impervious surfaces: roofs and pavement
- Catch basins and piped drainage
- “Collect and convey” design objective



Drain



Watershed and Stream Scale	
	Flooding and scouring of stream beds
Concentration	Flash flows
Storms	Discharge when runoff did not
Urbanizations	Stream erosion at moderate s
Impervious surfaces	Higher pollutant loading
Greater runoff energy	Conveys trash and gross pollu
Decreased infiltration	Lower and less frequent strea
Dry weather discharges	High pollutant concentrations

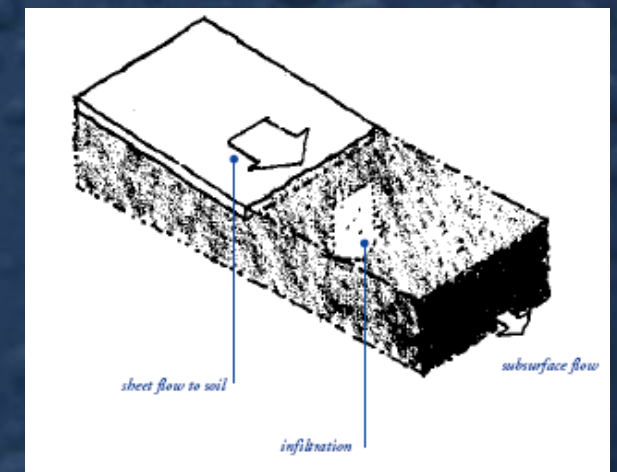
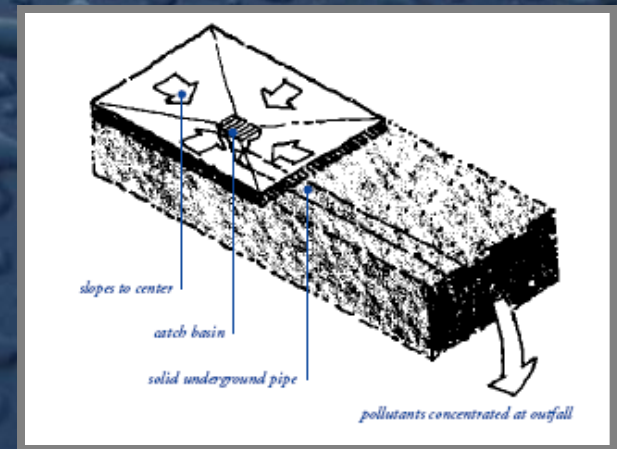


LID Design Objectives

Watershed and Stream Scale	Site scale
Reduce peak flows	Detain runoff on site
Increase time of concentration	Slow runoff from leaving site
No runoff from small storms	Infiltrate, evapotranspirate and reuse
Reduce duration of moderate flows	Let runoff seep away very slowly
Reduce runoff volume	Infiltrate and reuse where possible
Reduce runoff energy	Detain and slow flows
Increase groundwater storage and stream base flows	Facilitate infiltration
Reduce pollutants in runoff	Detain and filter runoff
Protect against spills and dumping	Disconnect drainage and filter runoff

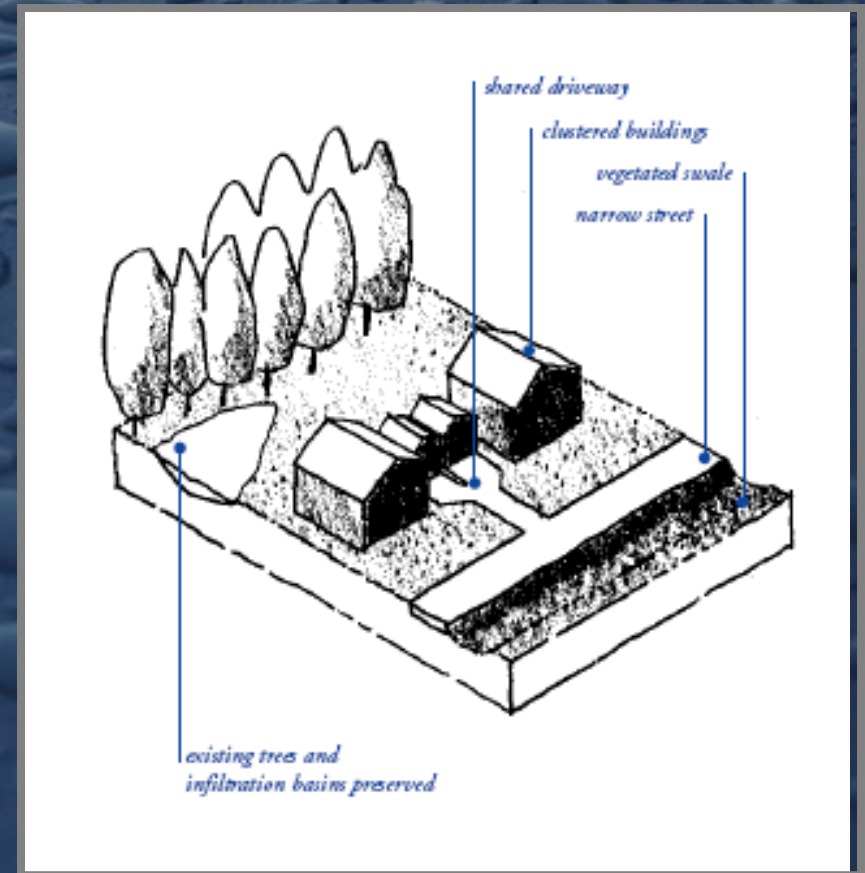
LID Drainage Principles

- Instead of “collect and convey,” “slow it, spread it, sink it.”
 - Avoid concentrating flows
 - Keep drainage areas small
 - Promote infiltration
 - Detain
 - Treat
- Route high flows so they flood safely



LID Design Steps

- Optimize the site layout



LID Design Steps

- Optimize the site layout
- Use pervious surfaces and green roofs where possible



LID Design Steps

- Optimize the site layout
- Use pervious surfaces and green roofs where possible
- Disperse runoff to landscaping



LID Design Steps

- Optimize the site layout
- Use pervious surfaces and green roofs where possible
- Disperse runoff to landscaping
- **Direct drainage from impervious surfaces to bioretention facilities, flow-through planters, or dry wells**



LID for NPDES Compliance

- Site design criteria
 - maximize infiltration (where appropriate)
 - provide retention or detention
 - slow runoff
 - minimize impervious land coverage
- Stormwater treatment criteria
 - Sizing requirements
 - Soil or filtration media specifications
- Flow-control (hydrograph modification management) criteria

LID Design Challenges

- Drain the site effectively for all size storms
- Integration into site design and landscape
 - Aesthetics
 - Multiple use
 - Circulation
 - Maintenance
- Ownership and maintenance responsibility
- Planning for adaptations in use