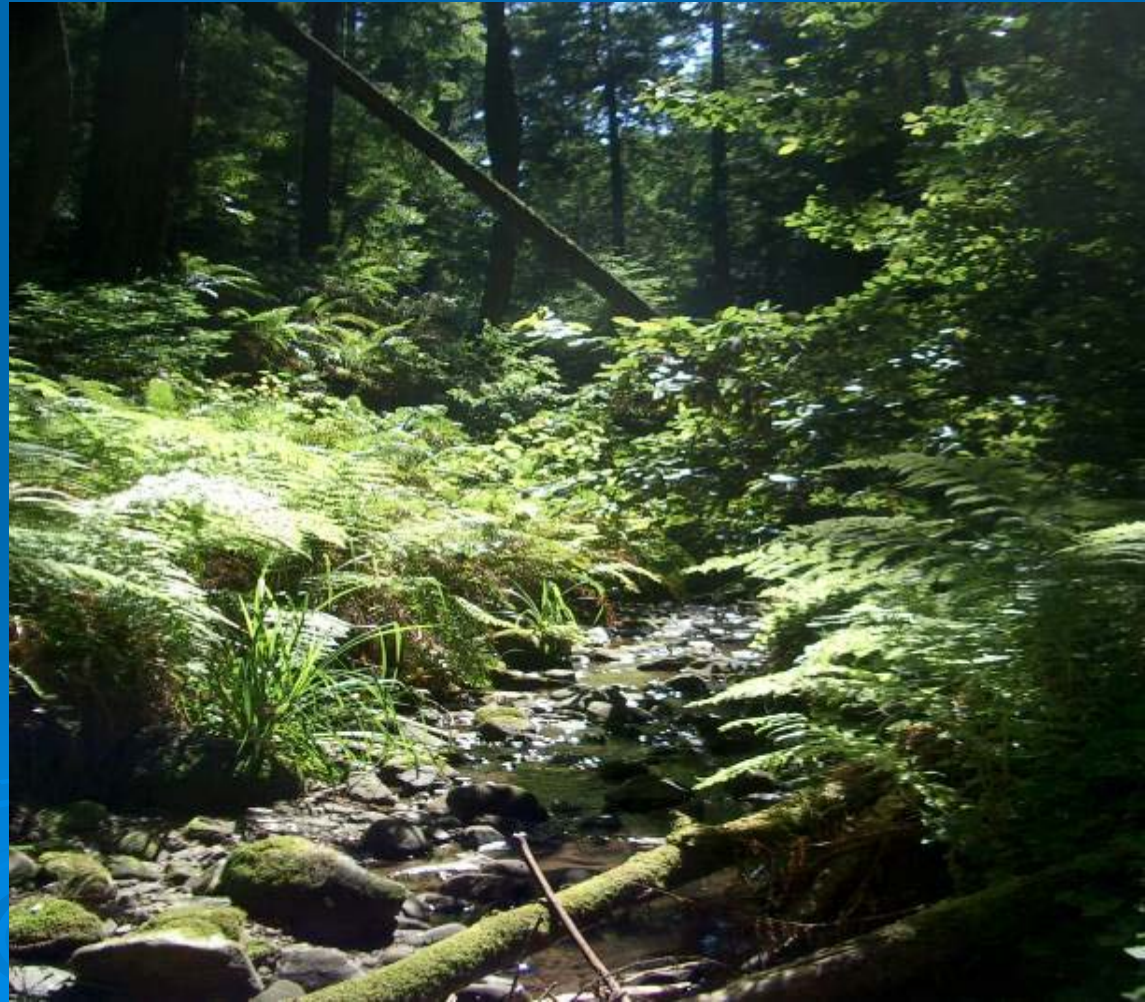


US EPA ARCHIVE DOCUMENT

Protecting Water Quality with Green Infrastructure

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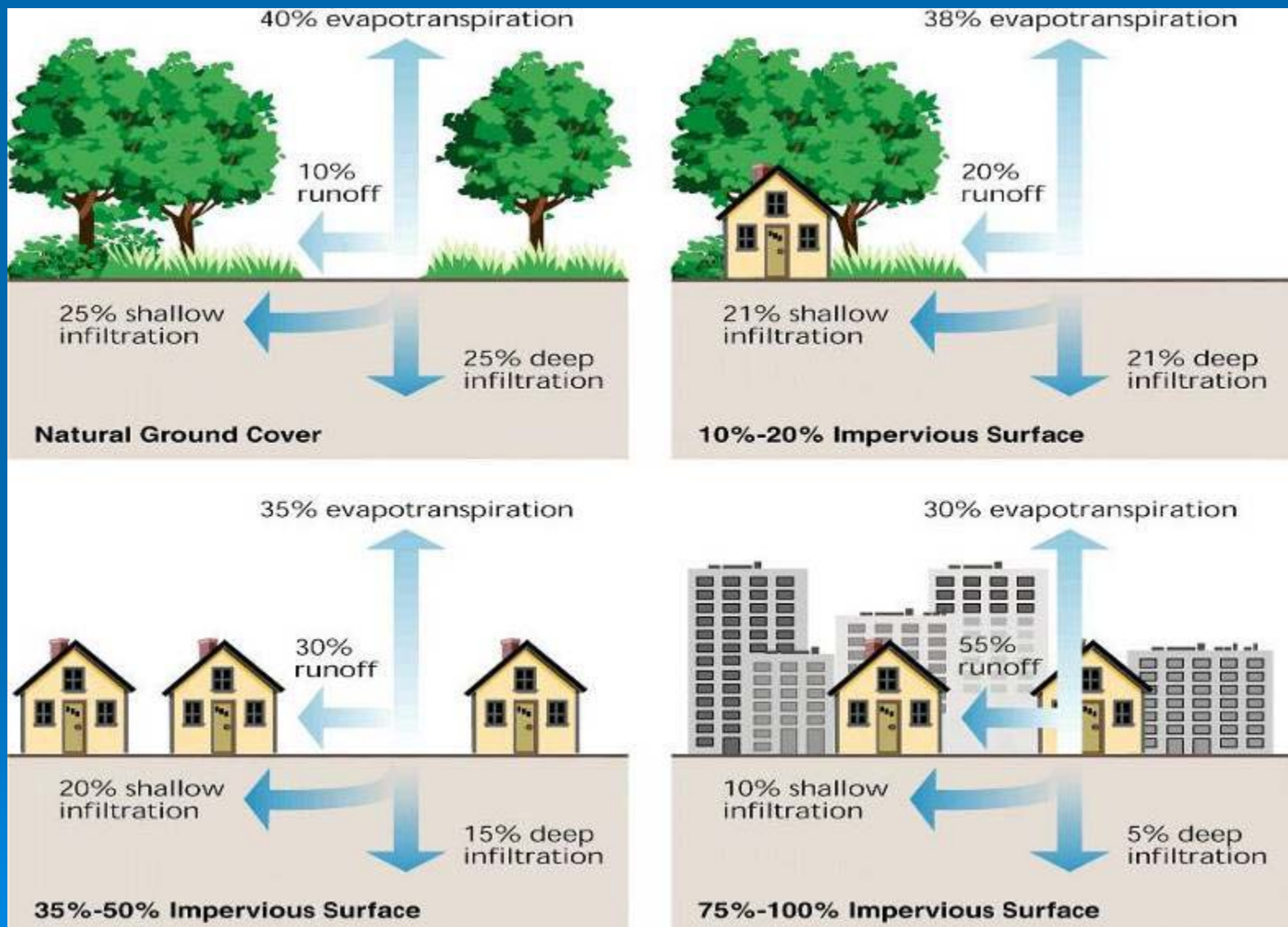
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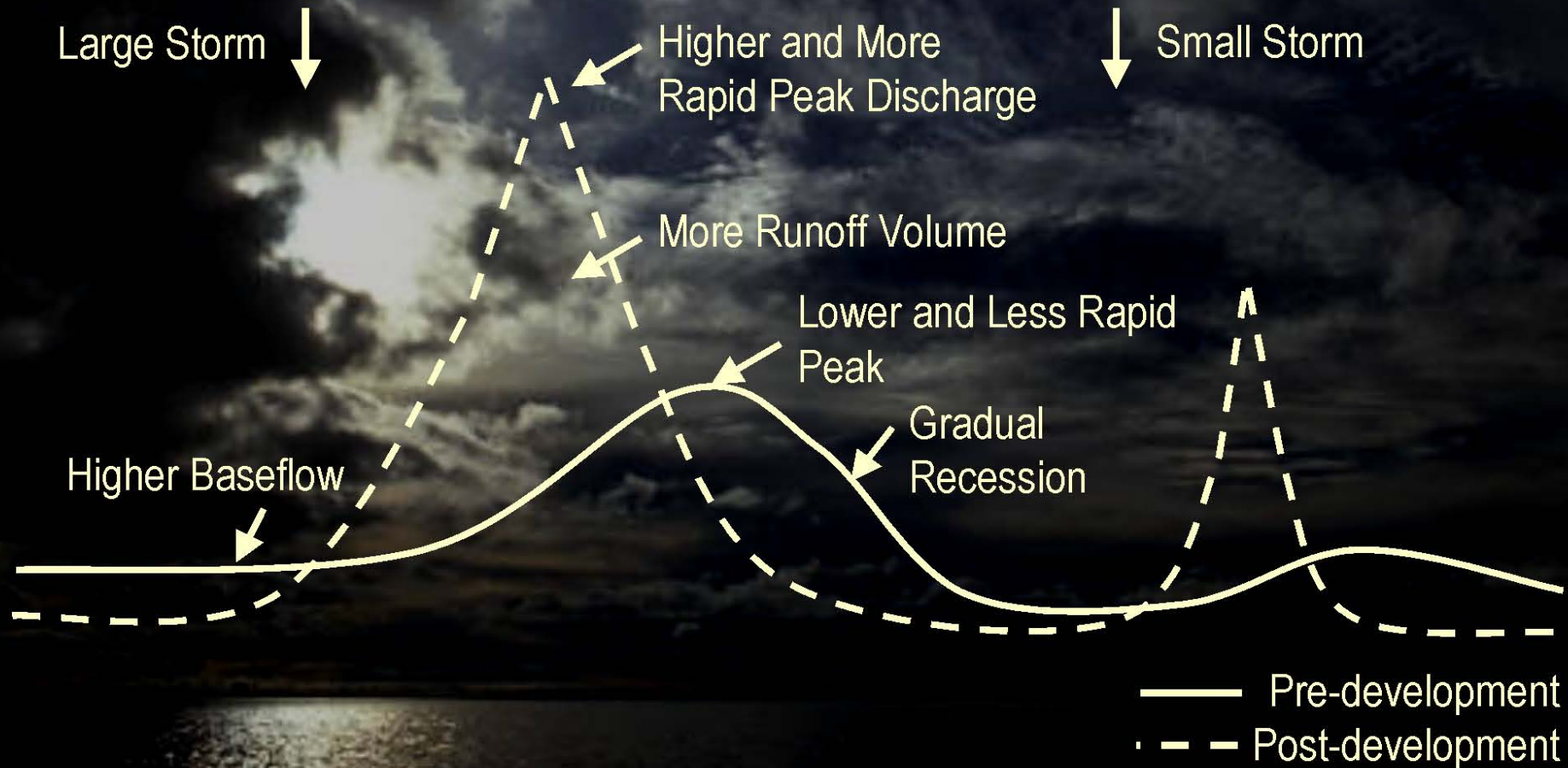
Impacts of Development on Water Resources

- 
- 1) Increase Impervious Area
 - 2) Increase Pollutant Runoff
 - 3) Habitat/Resource Destruction

1) Increase in Impervious Area



Increase in Impervious Area: Stream Hydrograph



Increase in Impervious Area

- Erosion
- Loss of pool & riffles
- Loss of vegetation & riparian canopy
- Decrease in dry weather flow regime



2) Pollutants in Stormwater Runoff

- oil, grease
- heavy metals
- sediment, trash
- temperature
- pesticides, herbicides



Pollutants Generated from:

- Construction
- Parking lots
- Maintenance areas
- Material storage areas
- Restaurant washing
- Trash storage



3) Habitat/Resource Destruction




Low Impact Development (Green Infrastructure)

- New approach to stormwater management
- Cost-effective
- Sustainable
- Environmentally friendly



Green Infrastructure

- Utilize natural systems & engineered systems to:
 - mimic natural landscapes,
 - capture, cleanse and reduce stormwater runoff using plants, soils and microbes

 - Maximize Stormwater
 - Infiltration
 - Evapotranspiration
 - Storage for re-use
- 

Low Impact Development Concepts

- Preserve environmentally sensitive areas
- Reduce sources of pollution
- Minimize impervious areas
- Remove direct connections
- Utilize Natural systems



LID: Preserve environmentally sensitive areas

- Wetlands
- Stream Buffers
- Springs
- Habitat areas/native vegetation
- Maintain natural drainage paths
- Mature trees



LID: Reduce sources of pollution

Site design to contain or treat/recycle washwater

- Restaurant Areas –
- Vehicle washing area –



LID: Reduce sources of pollution

Site Design to prevent exposure
(shed/cover) or contain and treat washwater

- Material Storage -
- Trash dumpsters -
- Fueling area -



LID: Minimize impervious areas

- Permeable and porous pavement



Porous pavement
& raingarden

LID: Remove Direct Connections



Parking lot drains to swale

Disconnect
Roof Drains



Photo from Alameda Countywide
Clean Water Program

LID: Parking Lots Infiltration, Retention



Grassy Swale

LID: Parking Lots Infiltration, Retention



Parking lot treatment- vegetative buffer strip



**Standard
Asphalt**

**Porous
Asphalt**



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➤ Photo: California Nevada Cement Council



LID: Bioretention, Raingardens



LID: Bioretention, Raingardens



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Multiple Benefits

- Reduce pollutants
- Maintain natural hydrograph
- Cost Effective
- Increase property values
- Climate change
- Maintain habitat



LID Resources

- www.epa.gov/NPDES/GreenInfrastructure
- California Stormwater Quality Association BMP Handbooks. www.CASQA.org
- www.lowimpactdevelopment.org
- “Start at the Source” - Bay Area Stormwater Management Agencies
- Alameda Countywide Clean Water Program Site Design Guidebook
 - www.BASMAA.org