Minimizing the Impact of Development on Water Quality

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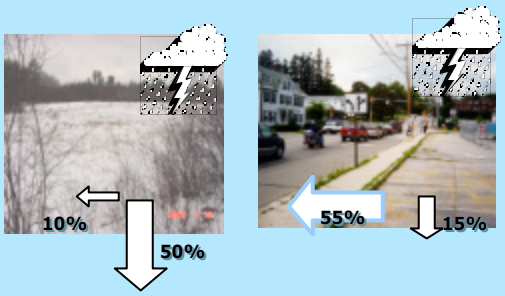
October 21, 2003

How Does Development Affect Water Quality?

Replaces natural cover with grass and manmade surfaces = Increased Imperviousness

Reduced Infiltration/Increased Runoff



Altered Stream Flow

Increased Pollution

Increased Pollution - Nutrients

Land Cover	Phosphorus Load (lbs/acre/year)
Developed Land	1
Agriculture	.8
Pasture	.7
Forest	.175

Source: Center for Watershed Protection

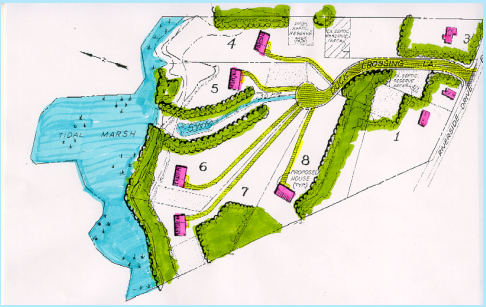
Goal: Protect Water Resources

- Reduce Impervious Cover
- Limit Disturbance/Maintain Natural Areas
- Protect Critical Areas

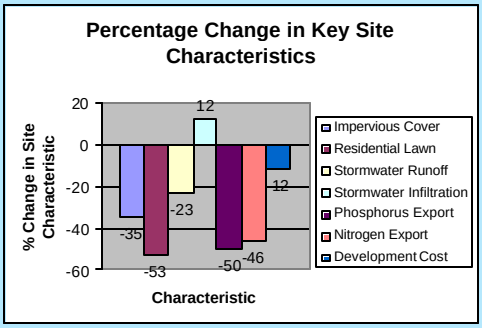
How to Protect Water Resources

- Site Design
- Open-space/Conservation Subdivision
- Location of Development in the Watershed

Example: Low-Density Conventional Subdivision

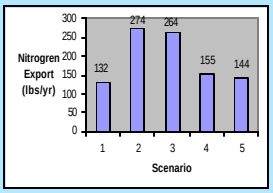


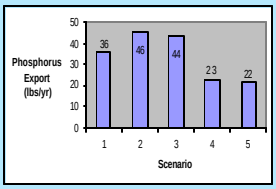
Example: Creative Subdivision



Annual Nitrogen and Phosphorus Loads for Alternative Development Types

1 – Pre-Development
2 - Conventional Design (no practices)
3 – Conventional Design (with practices)
4 – Open Space Design (no practices)
5 – Open Space Design (with practices)





Site Design - Streets

- **Street Width**

Goal: 18-22 ft for low volume (< 500 ADT)

Site Design - Streets

- **Street Length**

Goal: Standards to promote efficient layout

Site Design - Streets

- **Right-of-Way**

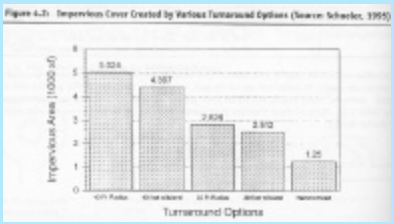
Goal: Less than 45 ft for residential

Source	ROW Width	Pavement Width and Purpose
Portland, Oregon	35' 40	20' residential street 26' residential street
Montgomery County, Maryland	20' 44' 46'-60'	16'; residential alley 20'; residential street 26'; residential streets
ASCE, 1990 (Recommendation)	24-26' 42'-46'	22'-24 residential alley 26' residential street

Site Design - Streets

- **Cul-de-Sacs**

Goal: Less than 35' radius or hammerhead



Site Design - Lots

- **Set Backs and Frontage**

Goals: 20' front,
25' rear,
8' side, and
less than 80' min frontage

Site Design - Lots

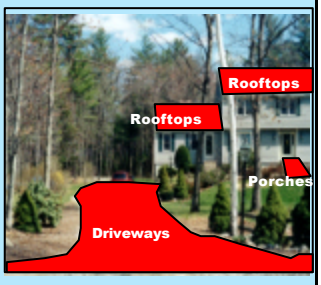
- **Driveways**

Goal: Minimum 9' wide or less

Site Design - Lots

- **Limit Impervious Cover**

Goal: Minimize Impervious Cover



Site Design - Lots

- **Disconnect Impervious Surfaces**

Goal: All Runoff Flows to Grassed or Natural Area

Site Design - Lots

- **Landscape Requirements**

Goal: Minimize Water Use

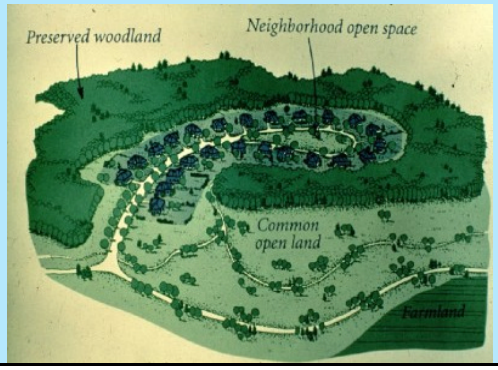
The Commonwealth of Massachusetts
Massachusetts Water Resources Commission

Guide to Lawn and Landscape Water Conservation

May 2002

A Guide for Communities, Property Owners, Managers, and Massachusetts State Agencies

Conservation Subdivision Design



Conservation Subdivision Design

- Step 1: Identify Primary Conservation Areas

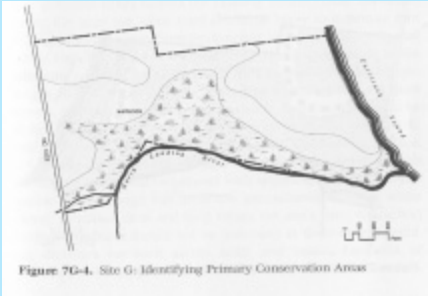


Figure 7G-4. Site G: Identifying Primary Conservation Areas

Source: Randall Arendt *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks*

Conservation Subdivision Design

- Step 2: Identify Secondary Conservation Areas

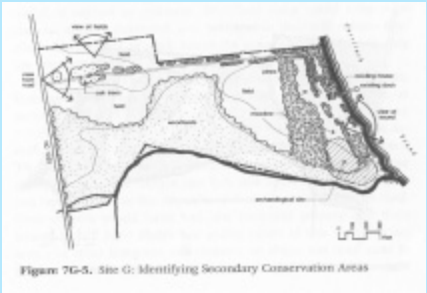
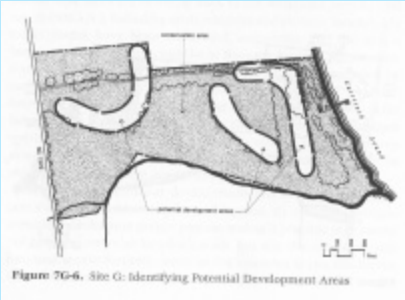


Figure 7G-5. Site G: Identifying Secondary Conservation Areas

Source: Randall Arendt *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks*

Conservation Subdivision Design

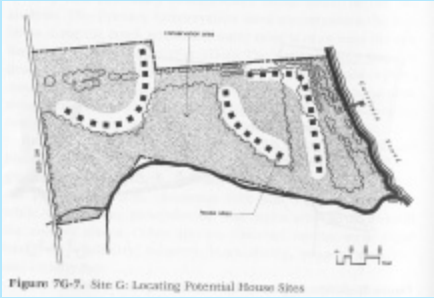
- Step 3: Identify Potential Areas for Development



Source: Randall Arendt *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks*

Conservation Subdivision Design

- Step 4: Locate Potential House Sites



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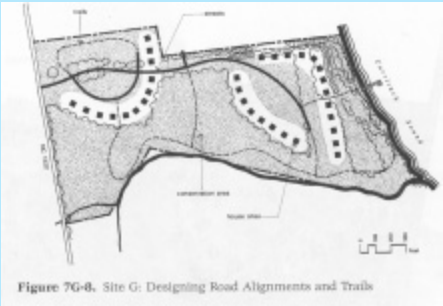
Conservation Subdivision Design

- Step 5: Design Roads and Trails



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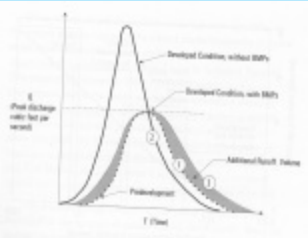
Conservation Subdivision Design

Stormwater Management

- **Maintain Natural Hydrology:**

Maintain Undeveloped Amount and Location of Runoff and Infiltration

Volume, Rate, Duration, Quality



Stormwater Management

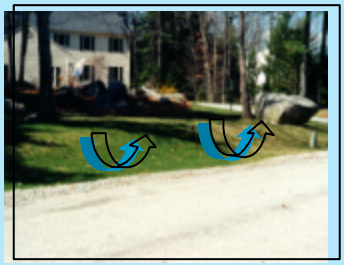
- **Disperse flow in multiple directions**

Stormwater Management

- **Capture and infiltrate stormwater throughout development**

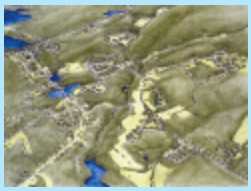
Stormwater Management

- **Use grassed, open channels**



Watershed Scale

- **Rearrange development on landscape**



Watershed Scale

- Rearrange development on landscape to:
  - **Preserve important natural resources**
  - **Locate Development Away from Streams and Wetlands**

Watershed Scale

- **Increase Density of Development in Areas of Minimum Impact to Resources and Community**

How to Get Started

- **Focus on a specific issue to change**
- **Conduct a broader review of local regulations using Local Roundtable Approach**