Stormwater Master Planning in Vermont

What Is Stormwater and How Do We Plan For It?

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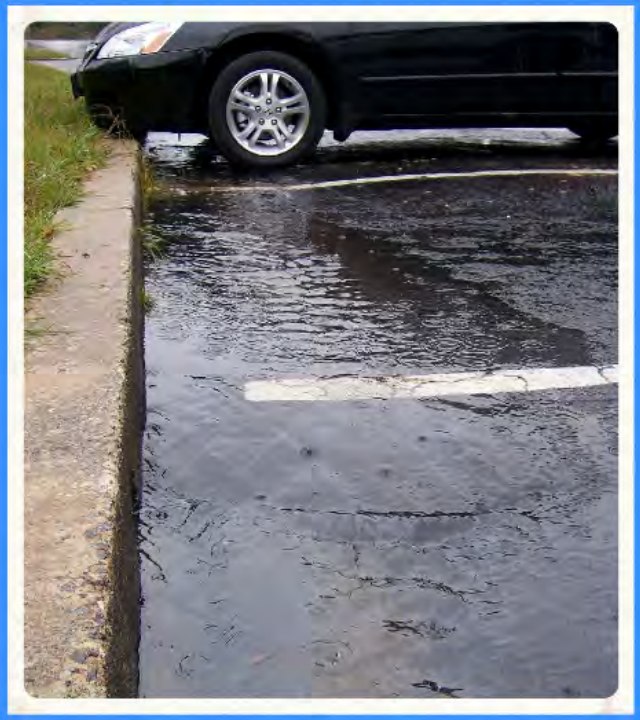
Introduction to Stormwater Master Planning in Vermont

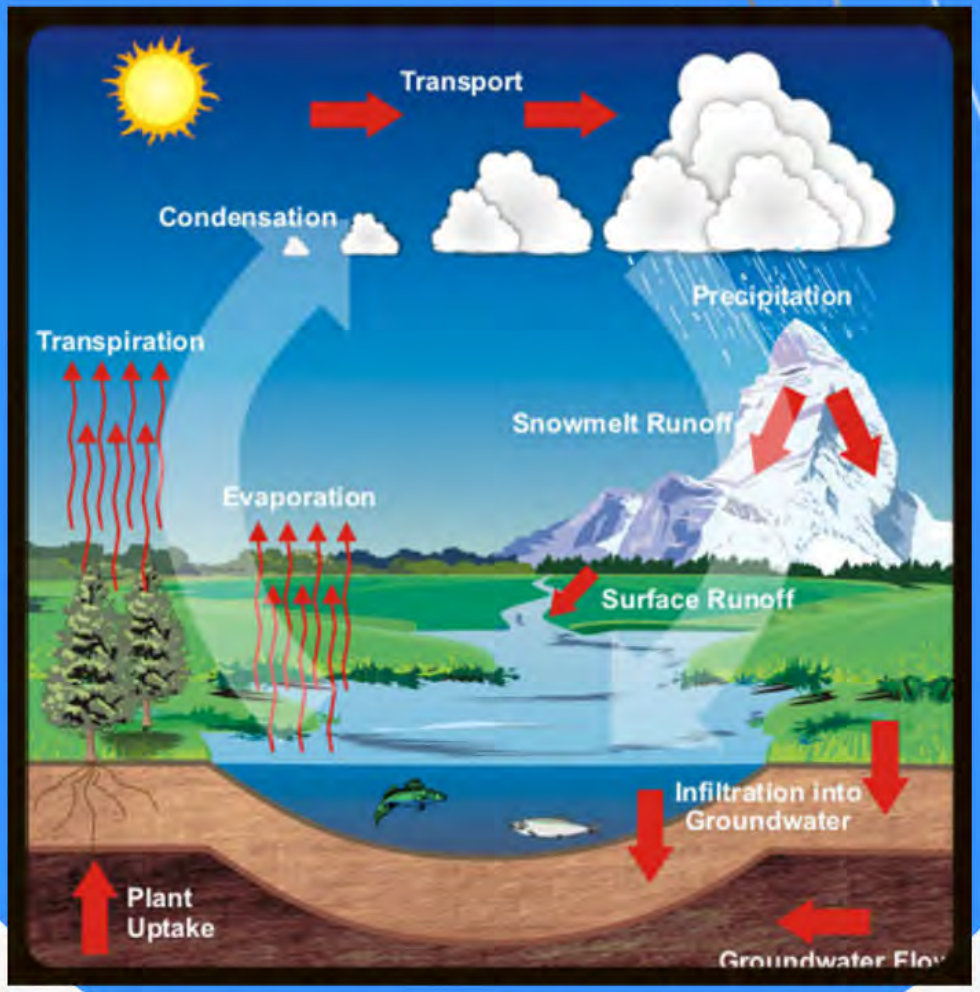
- What is Stormwater - issues and need for planning
- Stormwater Management - 'gray' and 'green'
- Stormwater Master Planning -
  - Cost-effectivness?
  - Efficiency - is Stormwater Master Planning better?
- Getting Started with SWMPs
  - Who can create a SWMP?
  - Urban vs. Rural SWMPs
  - SWMPs and Growth Center Planning
- SWMPs - Basic Practices
  - Structural
  - Non-Structural
  - Combinations
- Model SWMP Outline

What is Stormwater Runoff?

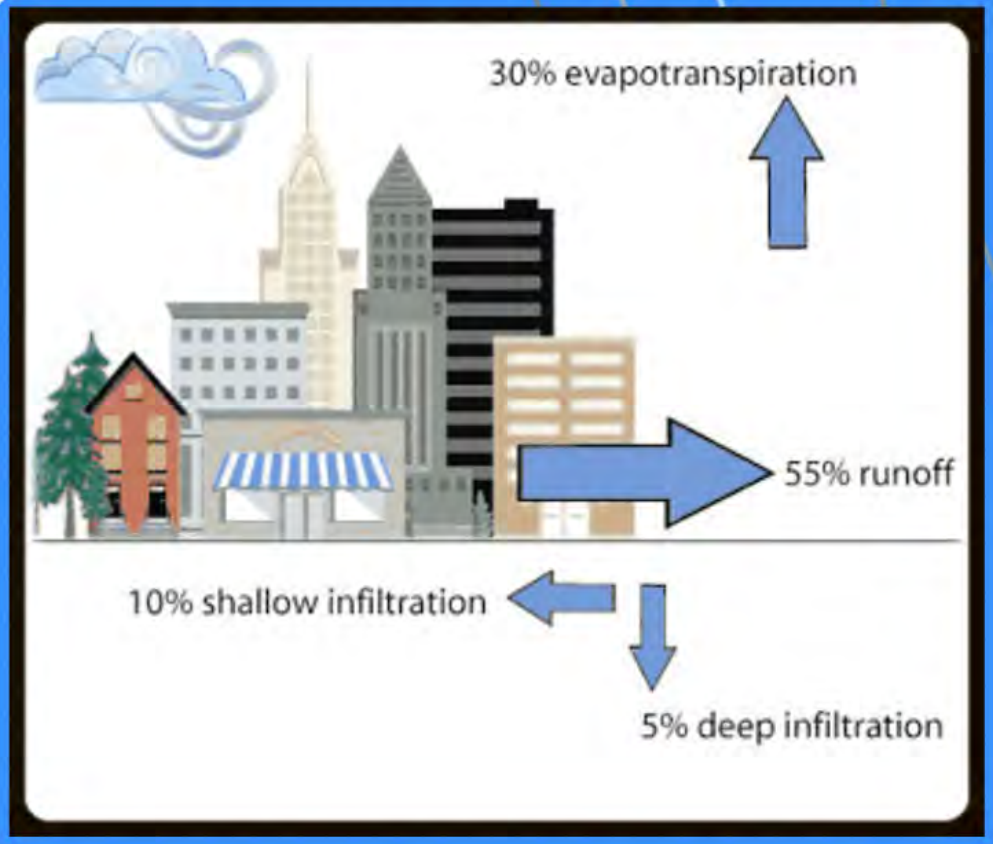
Stormwater runoff is generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not percolate into the ground (US EPA).



Impervious Surfaces Interrupt Natural Hydrology



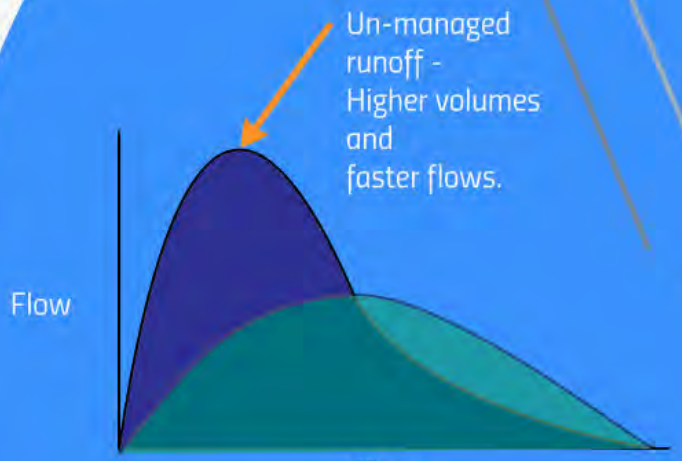
This Creates the Urban Hydrologic Cycle



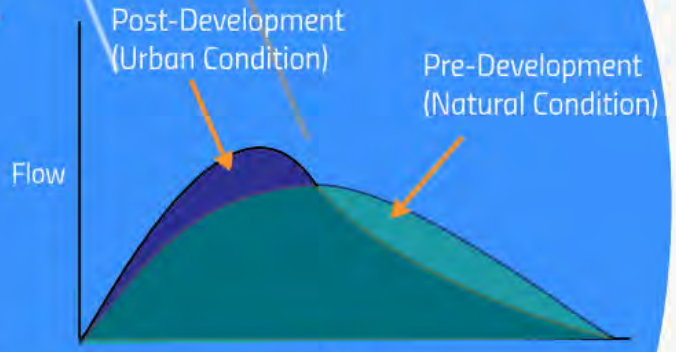
This can be a problem - 55% runoff is a lot more than natural systems can handle.

Why Does This Matter?

We want to match pre- and post-development hydrology.



Un-managed-Development Hydrology



Managed-Development Hydrology

So what is Impervious?

Pavement

Rooftops

Gravel Roads

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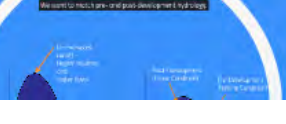

What are the effects of impervious surfaces?

Flooding

Sediment Plumes

Pollutant Washoff

Erosion

So why do we need to plan?

Pollutant Impacts:

Runoff = River Damage / Change

Habitat Alterations

Recreational Impacts

Property Value Impacts

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Habitat Alterations

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Property V

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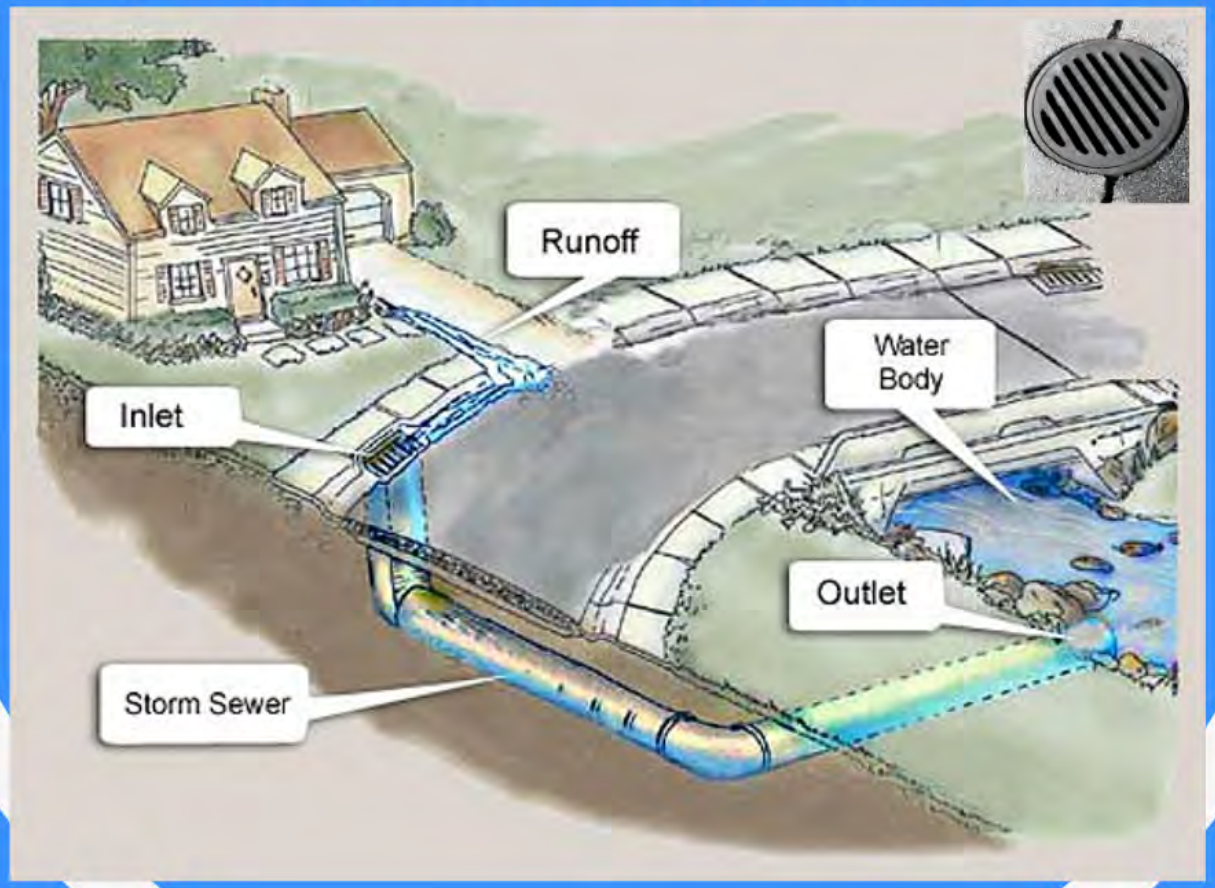
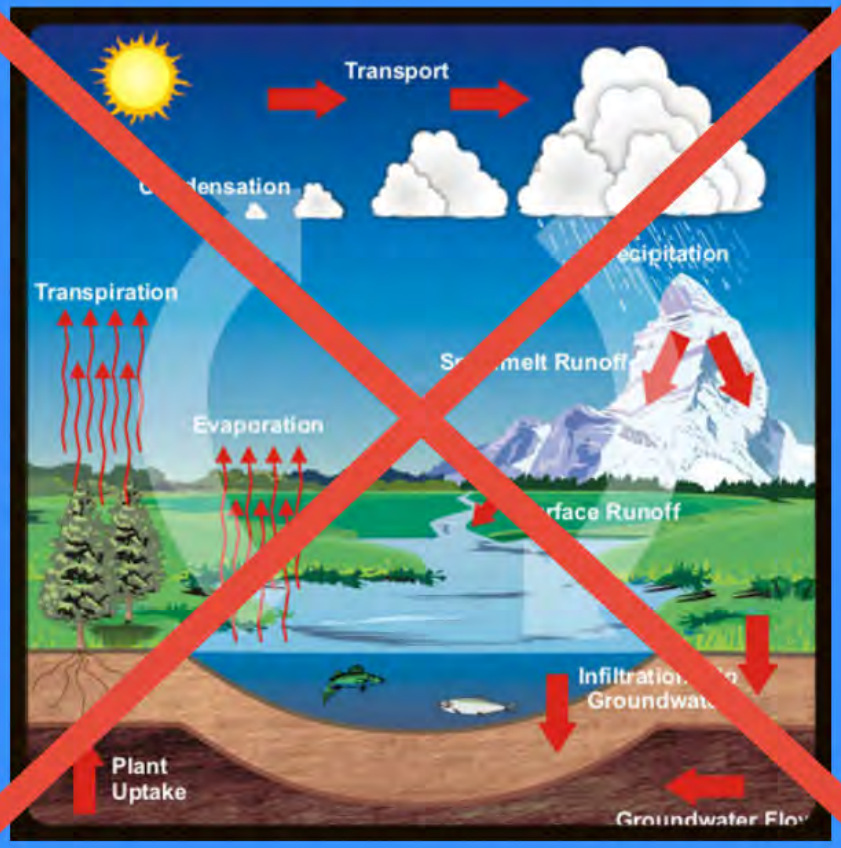
How is Stormwater typically managed?

Engineered Systems - aka 'gray' infrastructure

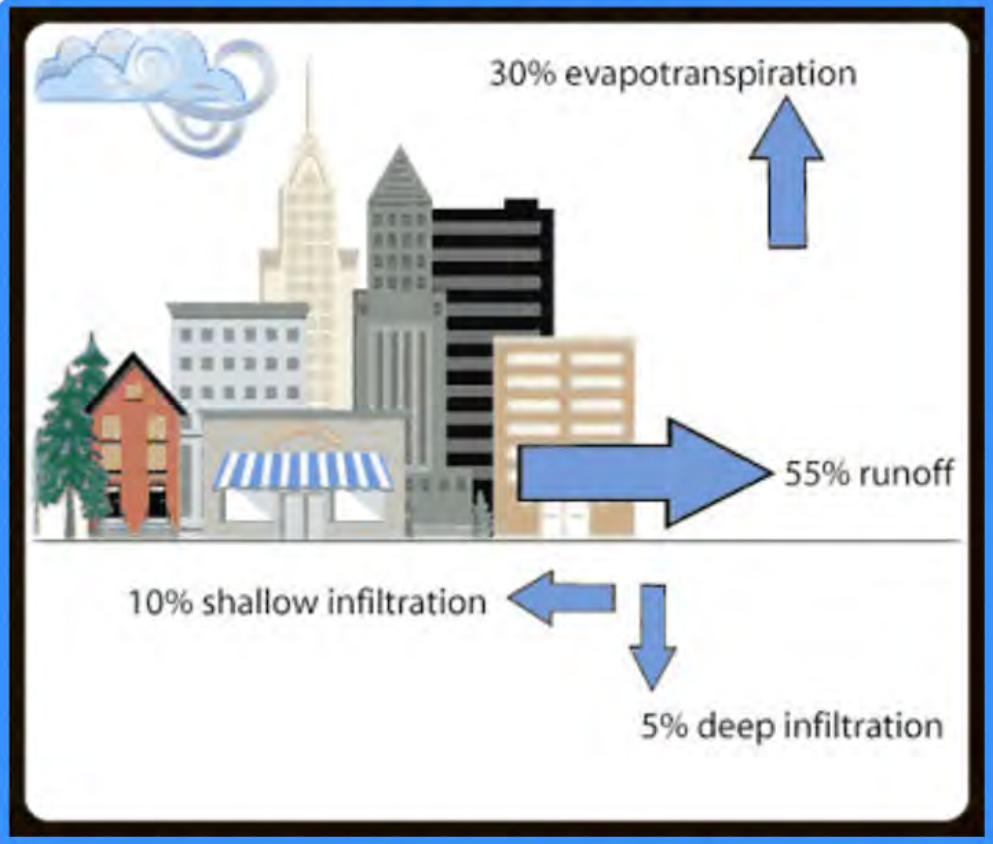


'Gray' Infrastructure links Impervious Surfaces and Water Resources

This moves us farther away from the natural hydrologic cycle



...and farther towards the urban hydrologic cycle



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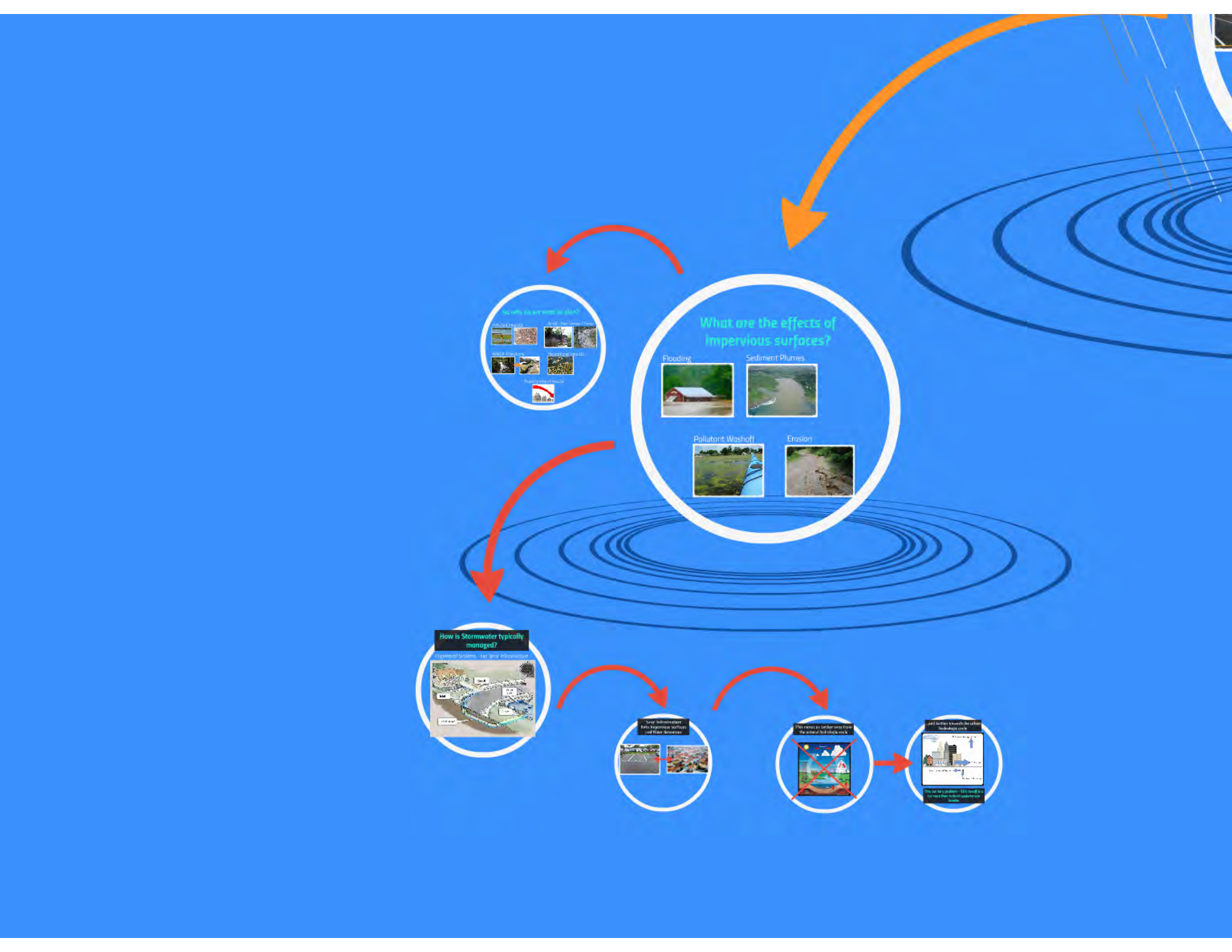
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Sediment Plumes
Pollutant Washoff
Erosion
How is Stormwater typically managed?

How does Stormwater Master Planning create cost-effective solutions?

SWMP IDs Pollution 'Hot Spots'

SWMP proposes solutions to capture and treat pollution where it can most effectively be managed

Why will this work better?

SWMPs provide the (sometimes cheaper) ounce of prevention, not always the (often costly) pound of cure

SWMPs look at areas (watersheds/towns) comprehensively and involve public input

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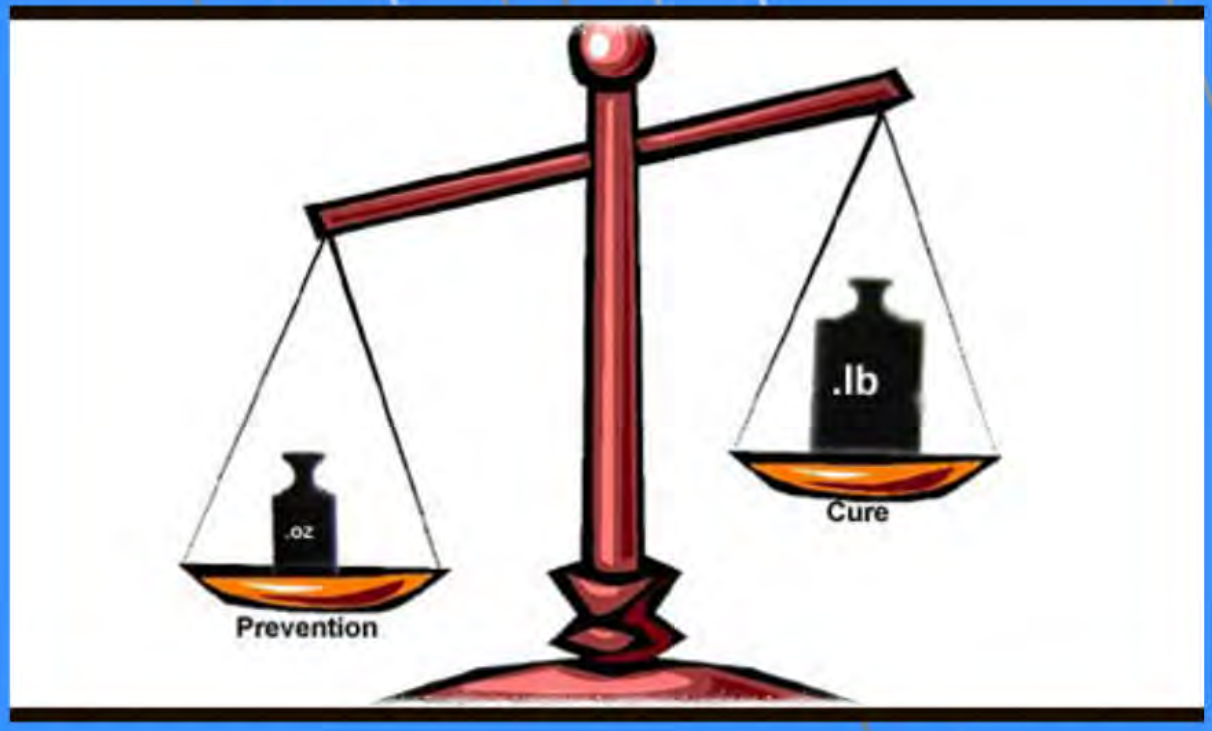
prevention, not always the (often costly)



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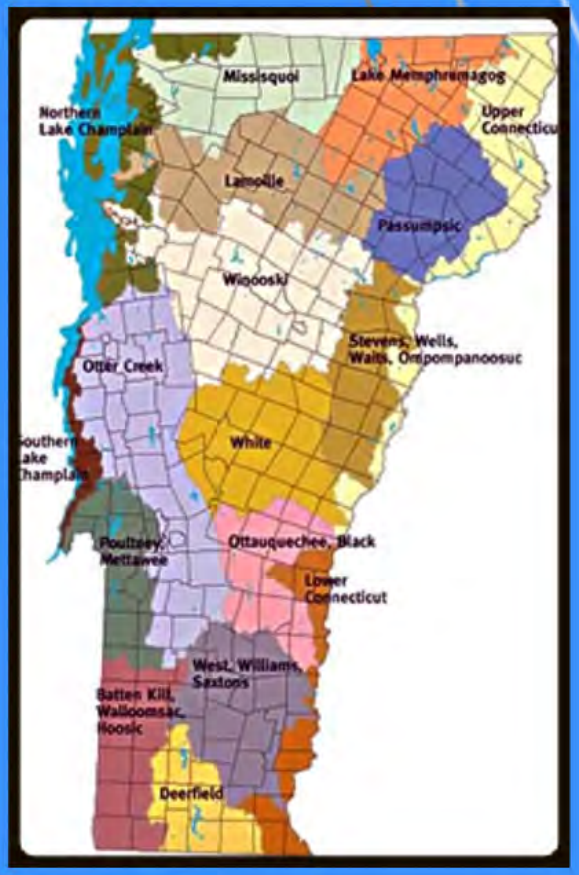

SWMPs allow for the preservation of beneficial natural features...

...and create lists of prioritized, evaluated alternatives...

- Gravel Wetland
- Bioretention
- Vegetated Swale
- Reducing Impervious
- Buffer Strips
- Pervious Pavement
- Cistern
- Infiltration Trench
- Disconnecting Impervious Surfaces

...more choices than gray infrastructure.

- Catch Basin
- Storm Sewer
- Pond

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Resorts

Who can create a Stormwater Master Plan?

Watershed Associations

Private Developments

Academic Campuses

Municipalities

Resorts

Who can create a Stormwater Master Plan?

Urban VS. Rural SWMPs

The largest impacts of stormwater runoff are usually due to impervious surfaces

However, all land-use change has an impact

This can be change like:

- Golf Course Development
- Ski Trails
- Timber Harvesting
- Hobby Farms
- Corn Fields
- Lawns

Urban VS. Rural SWMPs

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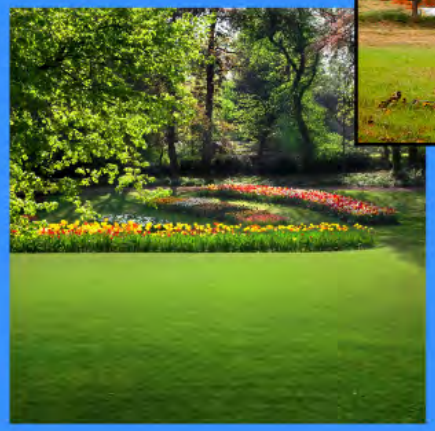
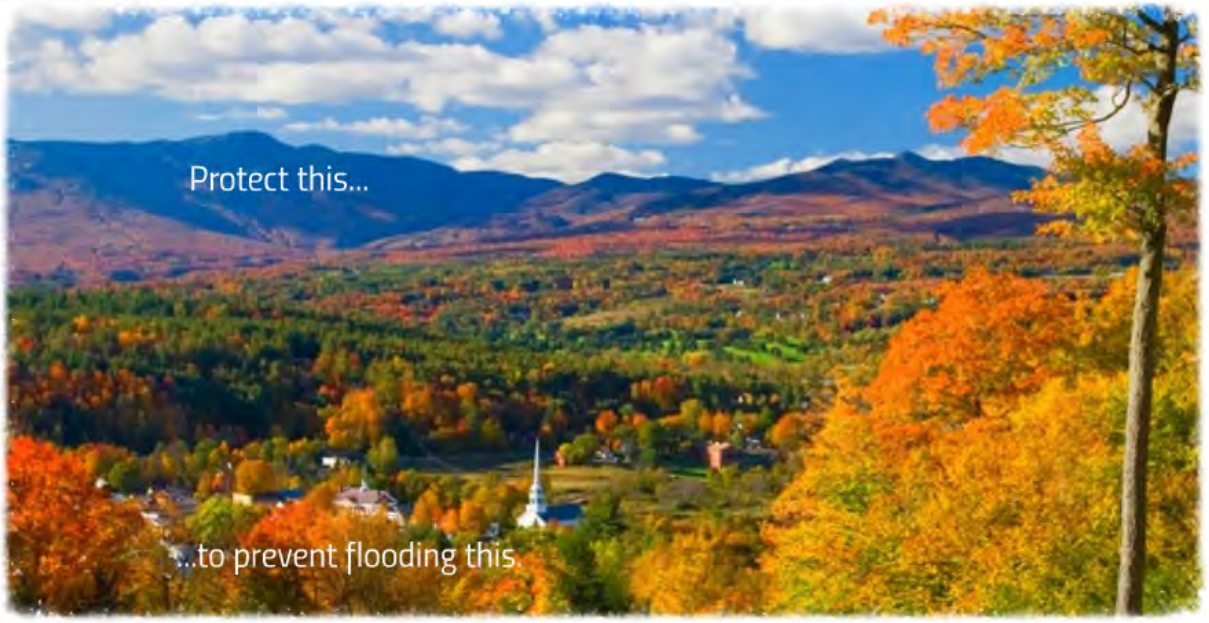


These types of land use changes can deliver pollutants to water bodies as well

Managing runoff in rural areas can help increase flood resiliency downstream

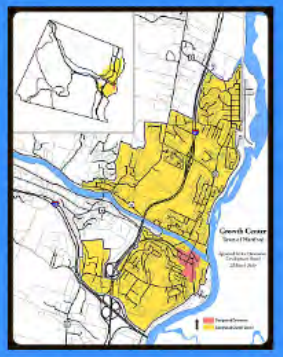



Protect this...
...to prevent flooding this.

SWMPs and Growth Center Planning

Growth Center Planning:
Protection and Enhancement of -

- Designated Downtowns
- Village Centers
- New Town Centers
- Neighborhood Development Centers



Growth Center Planning Requires:

- 20 Year Buildout Analysis
- 5 Year Capital Improvement Plan for wastewater / stormwater (with 20 year projection estimate)
- Inventory of Public Spaces
- ID of Natural Resources and Potential Impacts

SWMPs and Growth Center Planning Can Easily Parallel Each Other

Many of the requirements and processes are the same

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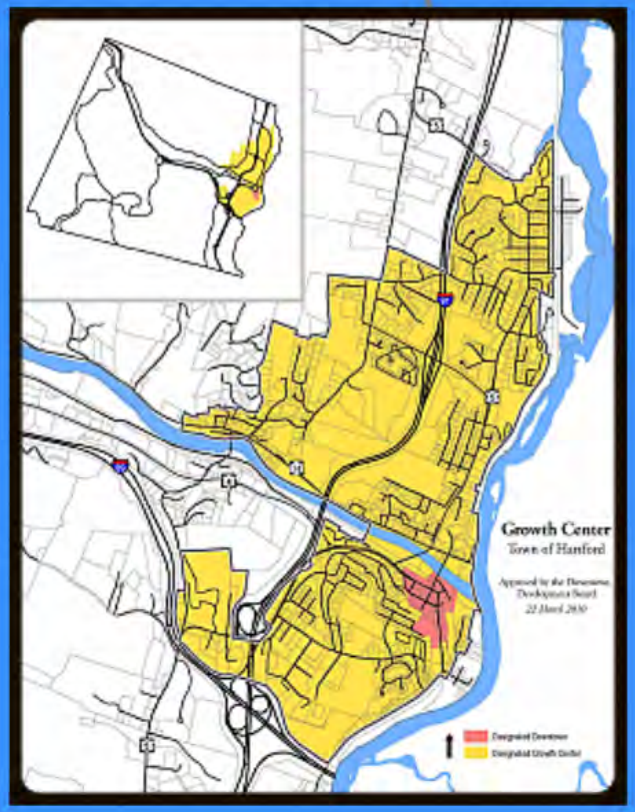

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SWMP - Basic Outlines

First off - not all water quality problems require the same level of planning

This is not the right tool to kill mosquitoes

SWMPs can use

- Structural Practices
- Non-Structural Practices
- Combinations of the two

What is a Structural Practice?

Bioretention

Constructed Wetland

Stormwater Pond

What are Non-Structural Practices?

Enhance Urban Tree Canopy

Impervious Disconnection

Courtesy: MMSD.com

Street Sweeping

Combination of Structural and Non-Structural Practices

Urban Trees with Silva Cell Infiltration Chamber

Water Quality Requirements in Zoning Codes

Model home LID landscape design at Madera community in Gainesville. Designed by Glenn Acomb Associates, Inc.

Urban Preserve with Stormwater Treatment

Model Outline for Stormwater Master Plans

Define Problem

Collect Existing Data

Collect New Data

Program Evaluation

Summary and Recommendations

Problem Definition

Example -
Excess Sediment Deposition in local streams

Collect Existing Data

GIS Data
Geomorphic Studies
Flow-Monitoring Data
Road Erosion Inventories
Existing and Proposed Stormwater Permits

Collect or Create New Data

Road Erosion "Windshield" Surveys
New GIS Data (Drainages, Outfalls, etc)
Flow Monitoring Study
Water Quality Study

Program Evaluation

Evaluate Existing Programs

- On-Site Stormwater Management Requirements (zoning, etc)
- Off-Site BMPs (ponds, basins)
- Erosion Control Measures

Create New Programs

- Stricter Zoning Ordinances?
- Update Existing BMPs
- Evaluate Effectiveness of Erosion Control Measures

Summary And Recommendations

- Summarize Data
  - Reports
  - Geodatabases
  - Presentations for Stakeholders
- Recommend Future Actions
  - Prioritize Projects
  - Recommend Schedule of Implementation
  - Recommend Sources of Funding
  - Determine Responsible Parties

Model Outline Achievement

i. Problem Definition
ii. Existing Data Collection
iii. New Data Collection
iv. Existing and Proposed Program, Procedure, or Practice Evaluation
v. Summary and Recommendations

Completing These Steps Fulfills All Model Template Requirements

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