Rhode Island Stormwater Design and Installations Standards Manual

Public Workshop

Overview of Manual Content and Why the Manual was Updated

January 13, 2011

Horsley Witten Group, Inc.

RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL

DECEMBER 2010

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT AND

COASTAL RESOURCES MANAGEMENT COUNCIL

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Legislative Mandate

Rhode Island General Law, Section 45, Chapter 61.2, entitled "The Smart Development for a Cleaner Bay Act of 2007" states that "stormwater, when not properly controlled and treated, causes pollution of the waters of the state…" and "development often results in increased stormwater runoff by increasing the size and number of paved and other impervious surfaces…" The Bay Act of 2007 requires DEM and CRMC to amend the 1993 Stormwater Design and Installation Standards Manual to:

a) Maintain groundwater recharge to predevelopment levels;

b) Maintain post-development peak discharge rates to not exceed pre-development rates; and

c) Use LID techniques as the primary method of stormwater control to the maximum extent practicable.

1993 Manual

- Peak rate attenuation (2 & 25 year storms, often 100 yr as well);
- Proper conveyance of 10 yr storm;
- 80% TSS Removal Rate with 1” / impervious area;
- Additional controls for impaired waters, drinking supply reservoirs, ONRWs, etc.
- Acceptable Water Quality BMPs
  - Wet Ponds;
  - Extended Detention Ponds;
  - Infiltration Practices;
  - Pretreatment Devices;
  - Grassed Swales with higher infiltration soils;
  - Vegetative Filter Strips as last resort.

Where did 80% TSS Removal Originate?

- The 80% standard was a product of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requiring EPA to develop NPS guidance based on being:
  - economically achievable
  - reflect the greatest degree of pollutant reduction achievable through the application of the best available non-point pollution control practices.

1993 EPA Guidance

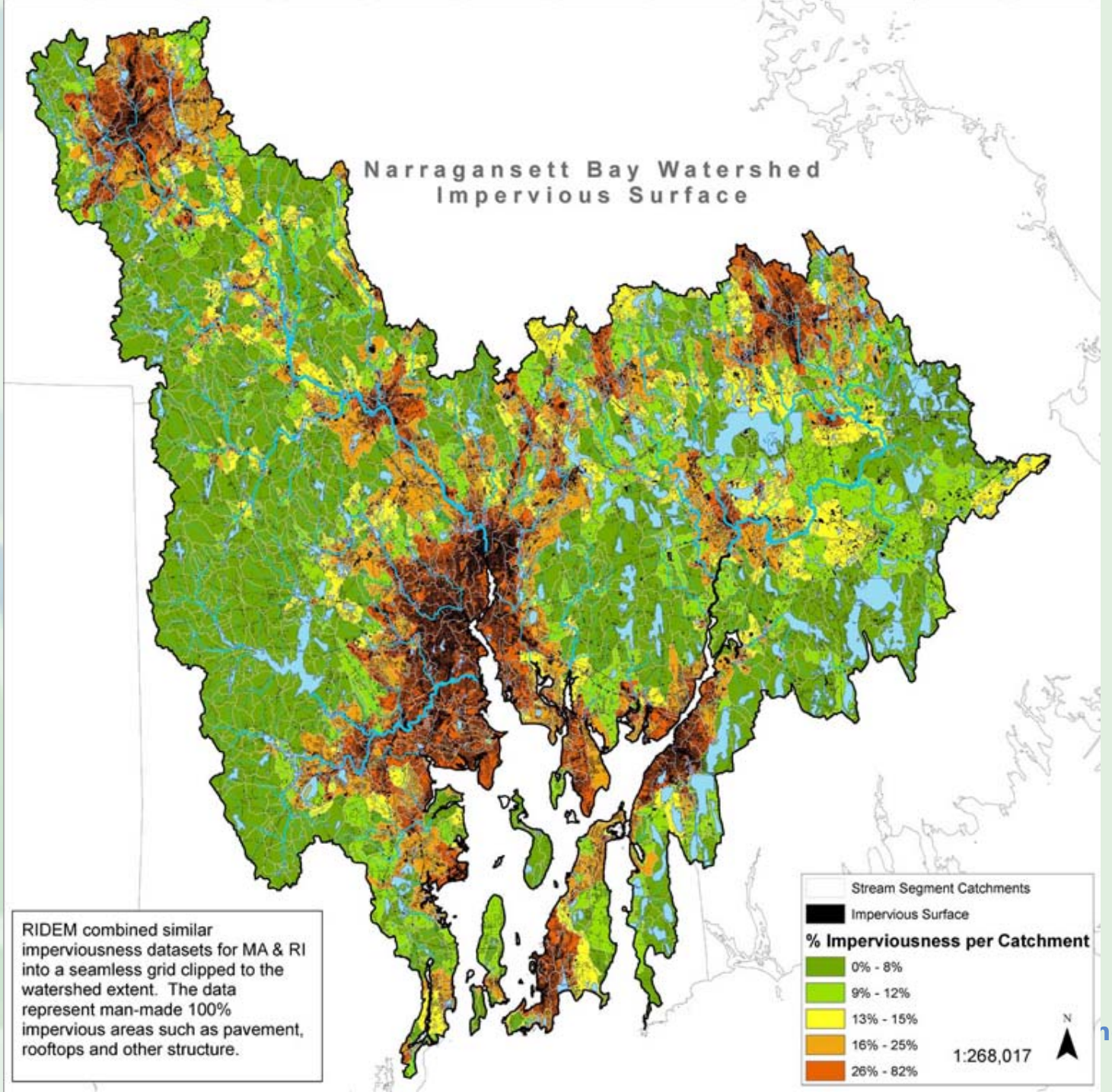
Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993)

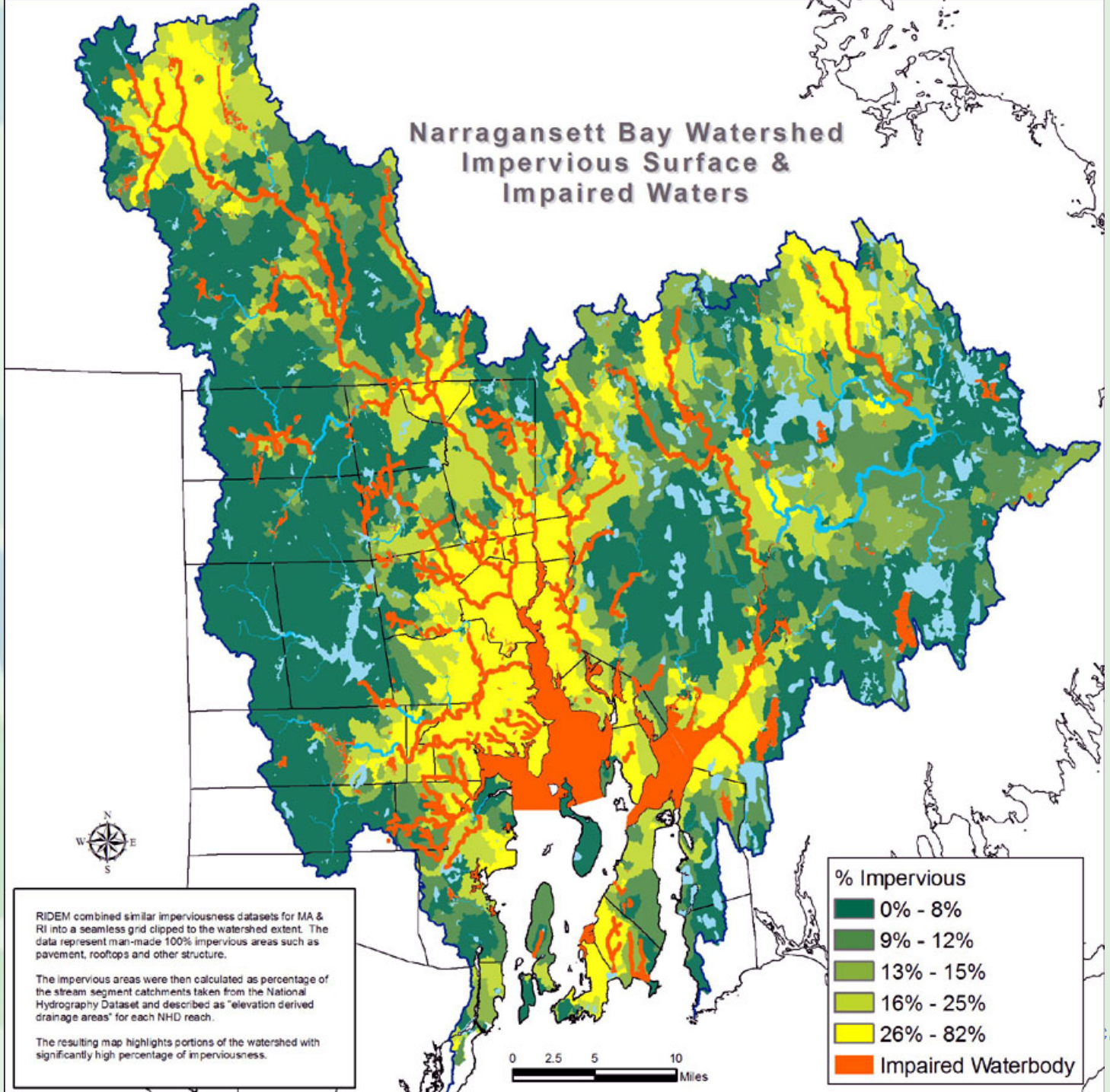
Recommends by design or performance:

1. Either
   a. Post construction reduce average annual TSS loadings by 80% …or
   b. Reduce post-development loadings of TSS so that average annual TSS load = pre-development conditions
2. To the MEP maintain post-development peak runoff rate AND average rainfall volume at levels similar to pre-development conditions

Why is the manual being updated?

- Several technical/scientific advances since 1993 (both in assessment and controls);
- Methods and techniques seem to have fallen short in adequately protecting water resource quality;
- We now know a lot more about the important of volume control (aka “runoff reduction”)
- Hydrologic alteration of new development was not addressed in the 1993 manual (recharge and volume controls);
- 80% TSS removal requirement does not appear to have prevented resources from degrading; and
- Widely recognized that a more holistic management approach is necessary.


Narragansett Bay Watershed
Impervious Surface
RIDEM combined similar imperviousness datasets for MA & RI into a seamless grid clipped to the watershed extent. The data represent man-made 100% impervious areas such as pavement, rooftops and other structure.
Stream Segment Catchments
Impervious Surface
% Imperviousness per Catchment
0% - 8%
9% - 12%
13% - 15%
16% - 25%
26% - 82%
1:268,017
N


Narragansett Bay Watershed
Impervious Surface &
Impaired Waters
N
W
E
S
RIDEM combined similar imperviousness datasets for MA & RI into a seamless grid clipped to the watershed extent. The data represent man-made 100% impervious areas such as pavement, rooftops and other structure.
The impervious areas were then calculated as percentage of the stream segment catchments taken from the National Hydrography Dataset and described as "elevation derived drainage areas" for each NHD reach.
The resulting map highlights portions of the watershed with significantly high percentage of imperviousness.
0 2.5 5 10
Miles
% Impervious
0% - 8%
9% - 12%
13% - 15%
16% - 25%
26% - 82%
Impaired Waterbody

Stormwater Impacts

At < 10% impervious we begin to see:

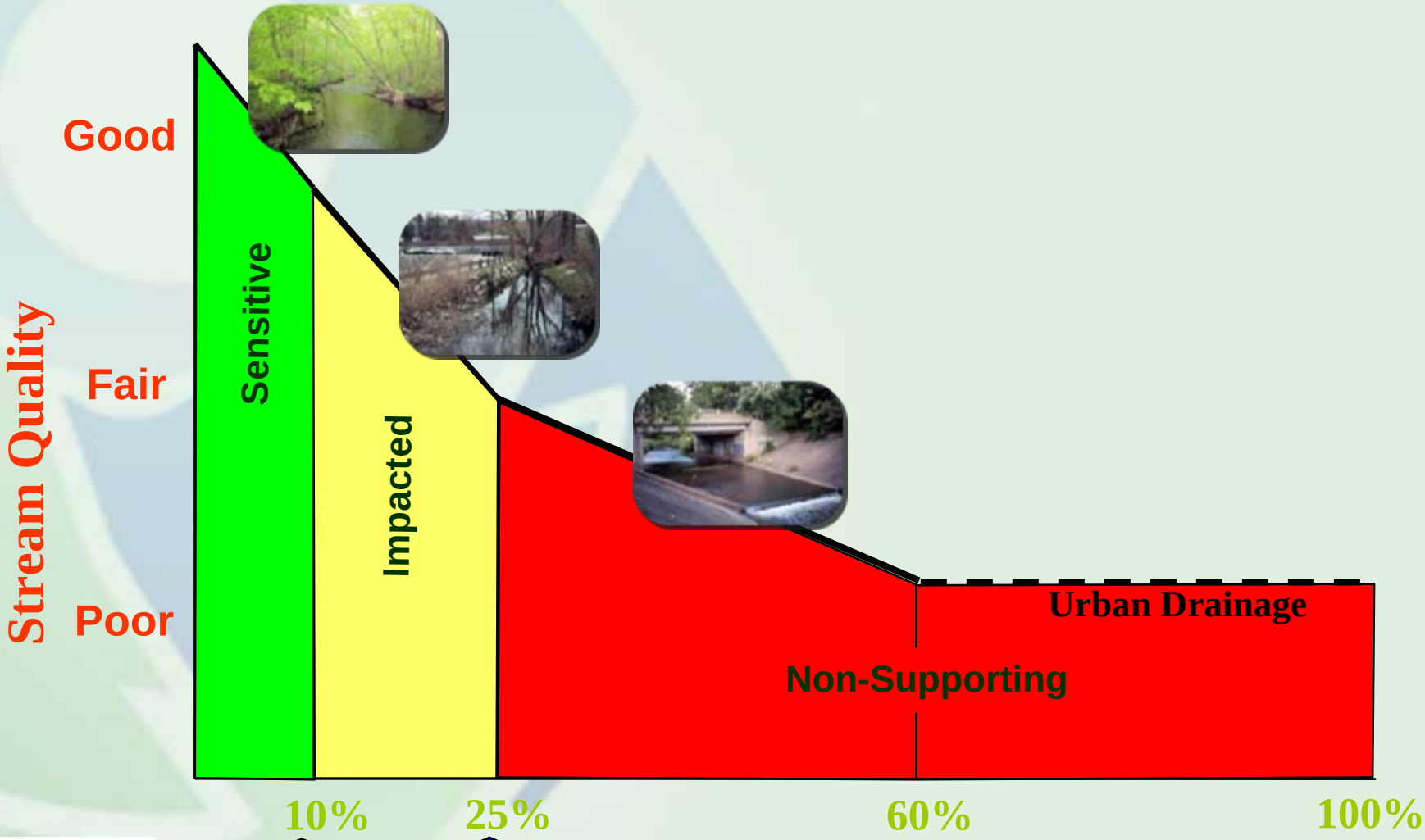
- Water quality issues
- Impacts to biological communities
- Increased flooding
- Stream erosion
- Loss of recreational uses
- Shellfish bed closures
- Reduced baseflow and recharge

The Effects of Urbanization

The Effects of Urbanization

Inc.

The Impervious Cover Model



CENTER FOR WATERSHED PROTECTION

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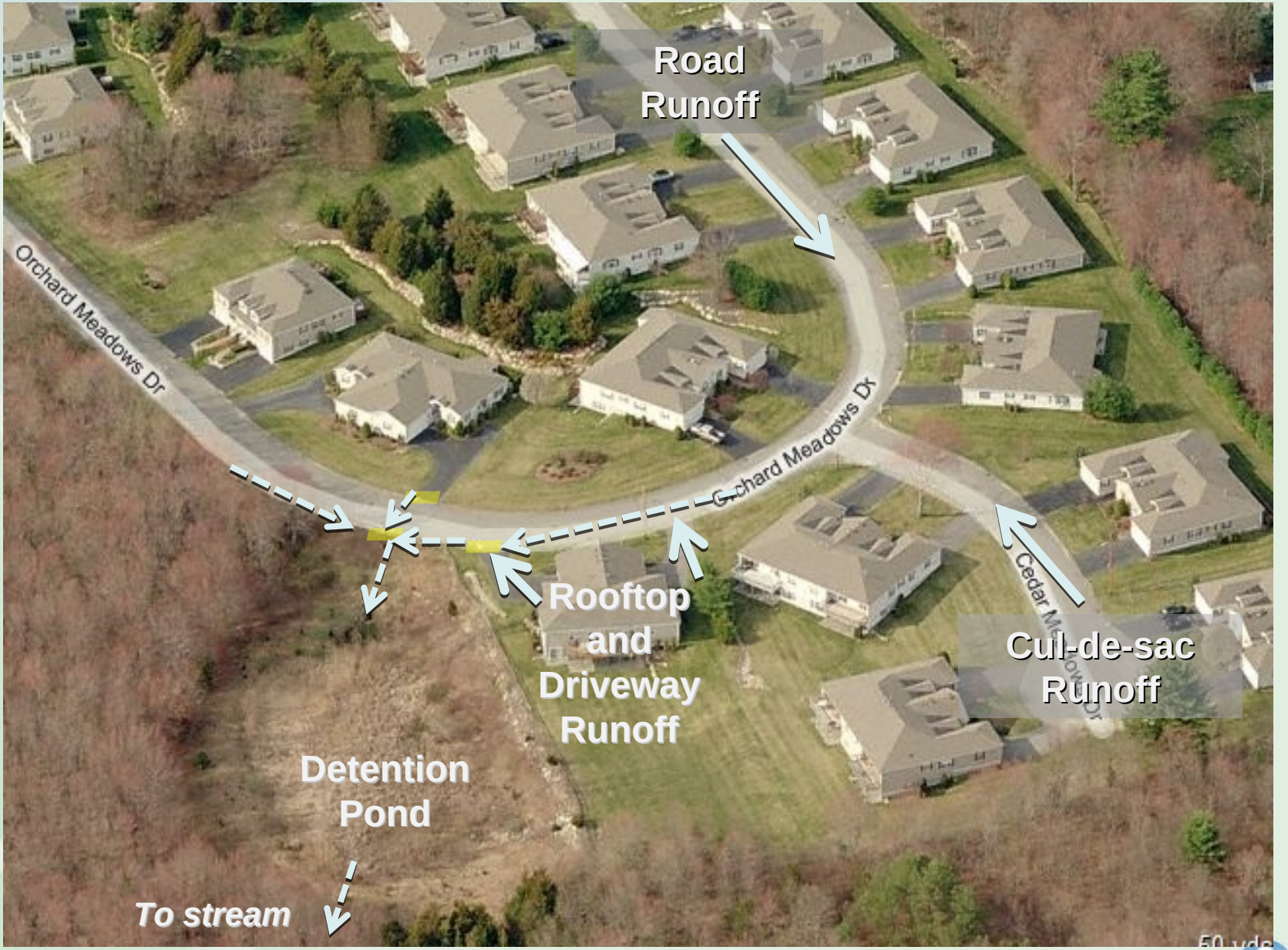
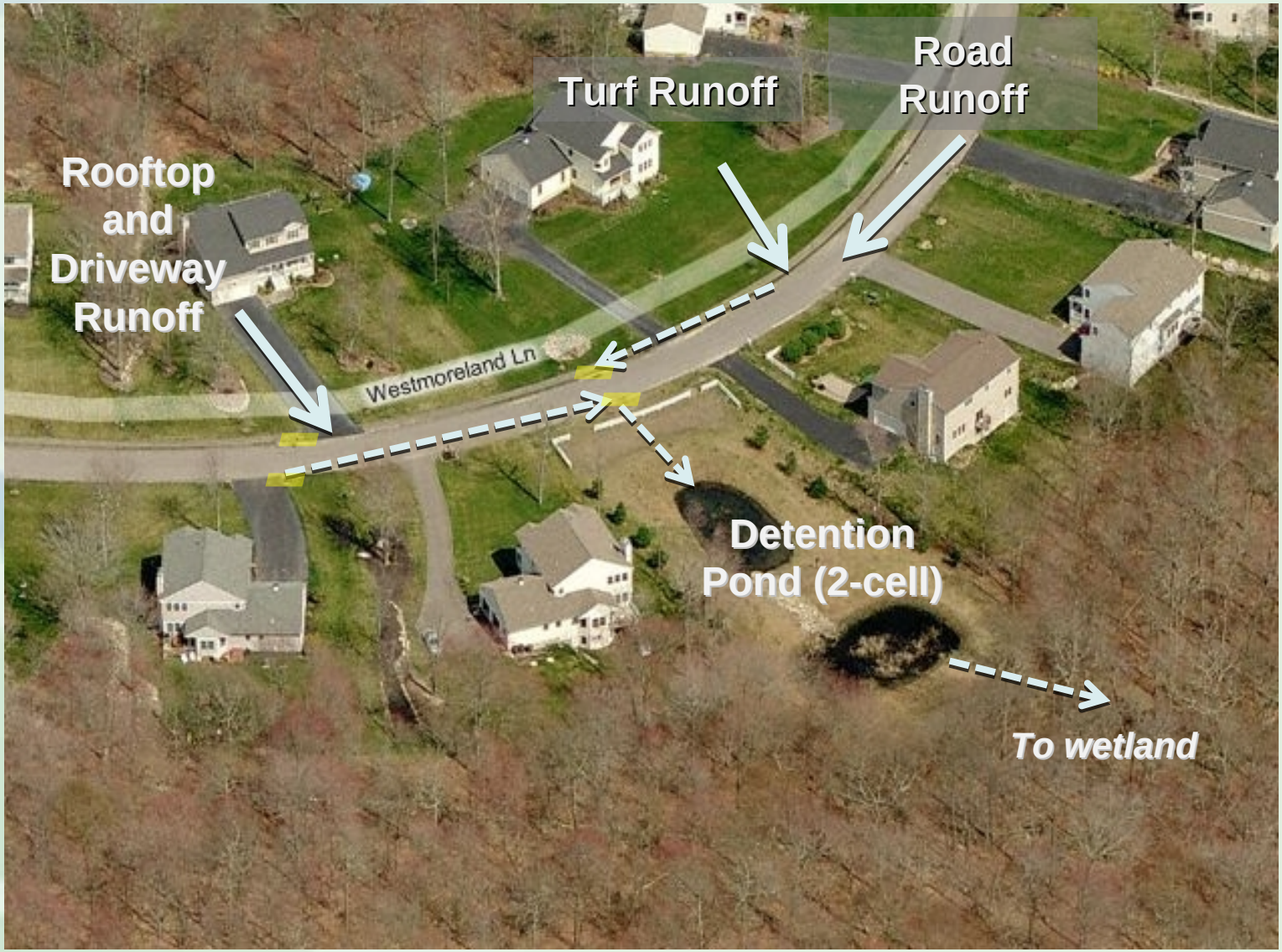
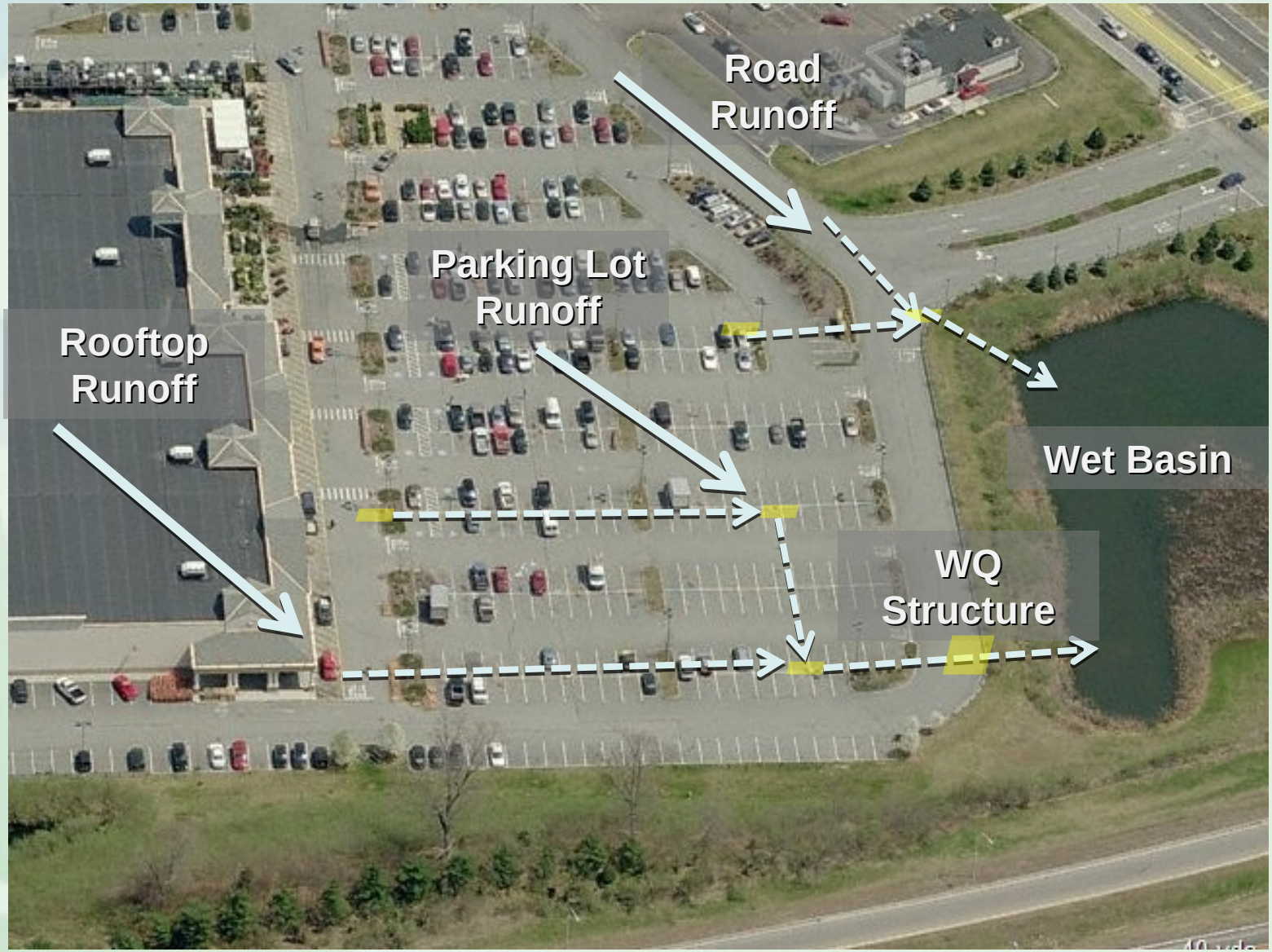
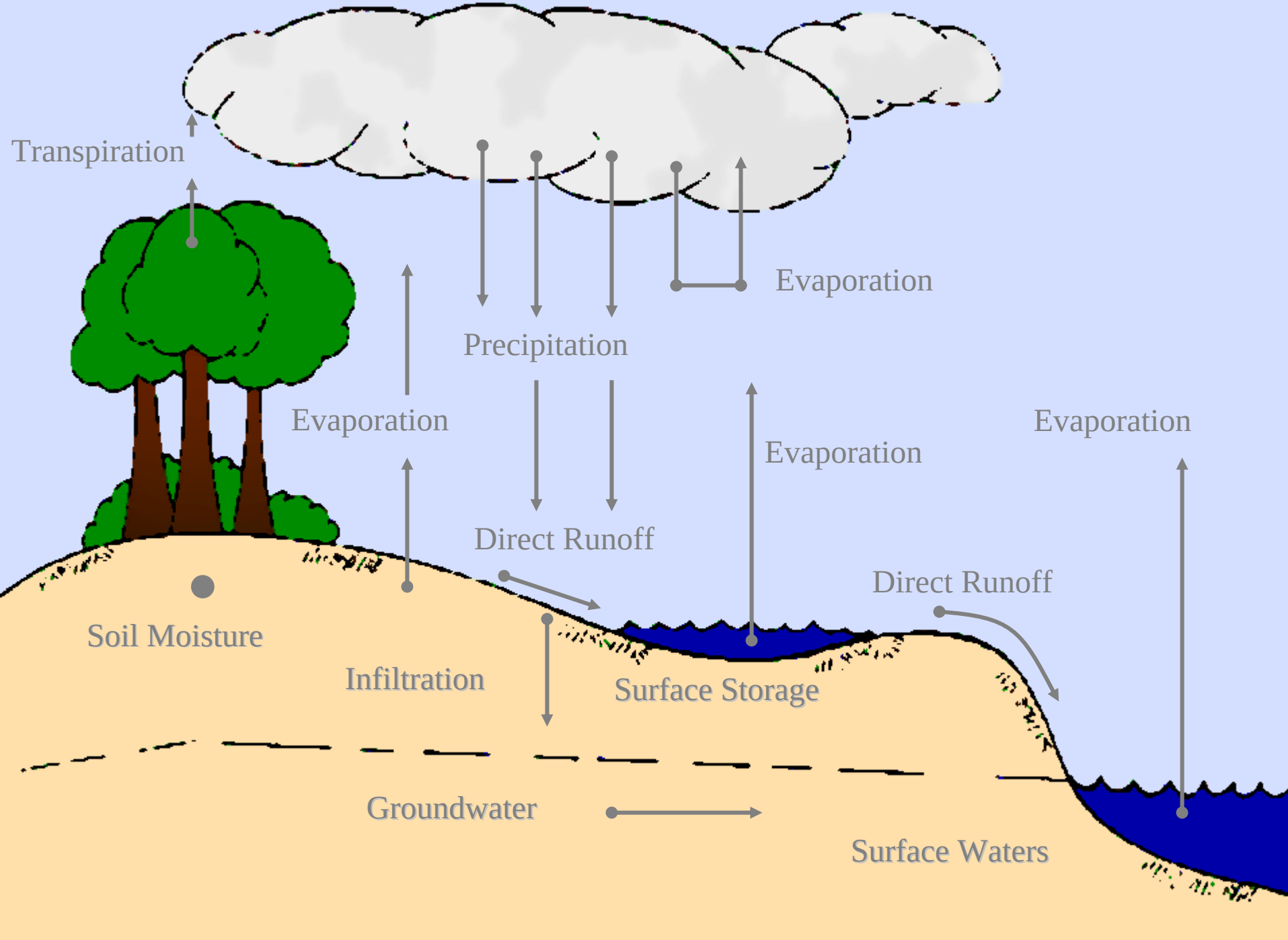

Road Runoff
Orchard Meadows Dr
Orchard Meadows Dr
Rooftop and Driveway Runoff
Cul-de-sac Runoff
Detention Pond
To stream


Turf Runoff
Road Runoff
Rooftop and Driveway Runoff
Westmoreland Ln
Detention Pond (2-cell)
To wetland


Detention Pond
Rooftop and Driveway Runoff
Turf Runoff
Road Runoff

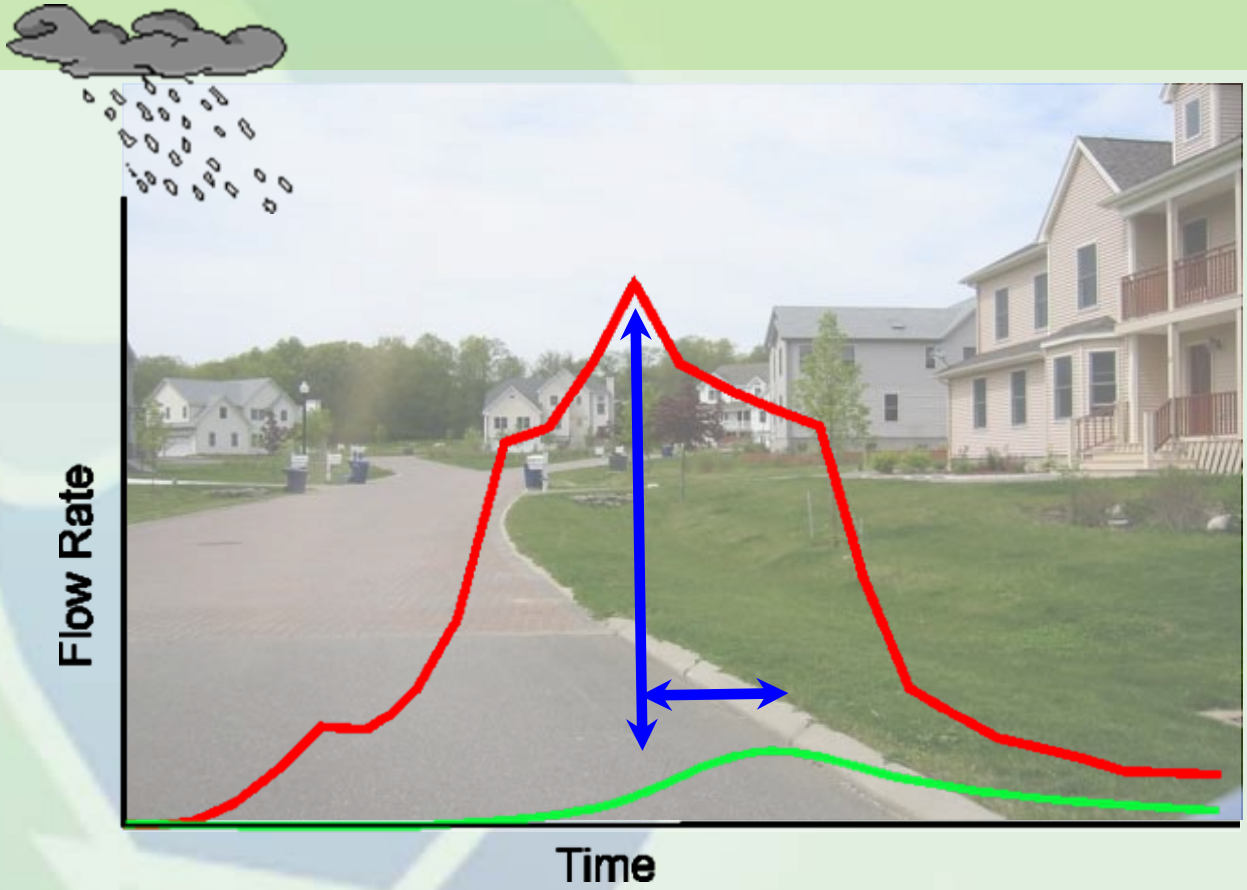

Road
Runoff
Parking Lot
Runoff
Rooftop
Runoff
Wet Basin
WQ
Structure

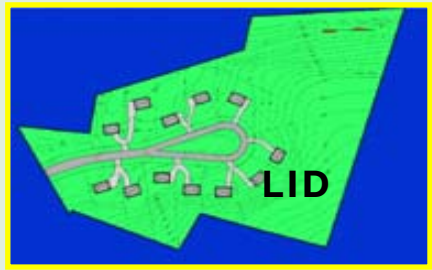

Transpiration
Evaporation
Precipitation
Evaporation
Evaporation
Evaporation
Direct Runoff
Direct Runoff
Soil Moisture
Infiltration
Surface Storage
Groundwater
Surface Waters

"LID Cluster" subdivision

- 12 lots clustered on 6.9 acres
- Designed to minimize site runoff

Jordan Cove Results





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Adapted from J. Clausen, UConn

Most significant changes since the 1993 manual?

- Low impact development (LID) required to the MEP;
- Recharge criteria to infiltrate runoff from up to 0.6″/Imp acre;
- Revised design precipitation rates based on latest rainfall data;
- Expanded water quality pollutant removal targets (85% TSS, 60% Pathogen, 30% TP, 30% TN);
- Changed the type of practices acceptable for water quality treatment (extended detention, wet basins, and filter strips no longer acceptable as stand-alone practices), flow splitters now required for some practices;

Continued

- Changes to infiltration practice application – must fully pre-treat for direct discharge at a high rate, limitations on fill applications, significant dewatering requires water budget analysis;
- Special design requirements for discharges in cold-water fisheries;
- Extended detention of the 1-year storm required;
- Changed how sediment load is addressed;
- Pollutant loading approach and analysis updated (when req'd); and
- New approach and criteria for re-development and infill projects.