



Stormwater Management

Amalia Leighton, PE, SvR Design Company

Tom von Schrader, PE, SvR Design Company



Presentation Overview

- ❑ Hydrologic Cycle
- ❑ Aurora Corridor Drainage Basins
- ❑ What is Stormwater Management?
- ❑ Stormwater Regulations and Manuals
- ❑ Design Guidelines for Stormwater
- ❑ Conventional Stormwater Management
- ❑ Low Impact Development Stormwater Management
- ❑ Implementation Strategy and Next Steps
- ❑ Group Discussion

Hydrologic Cycle

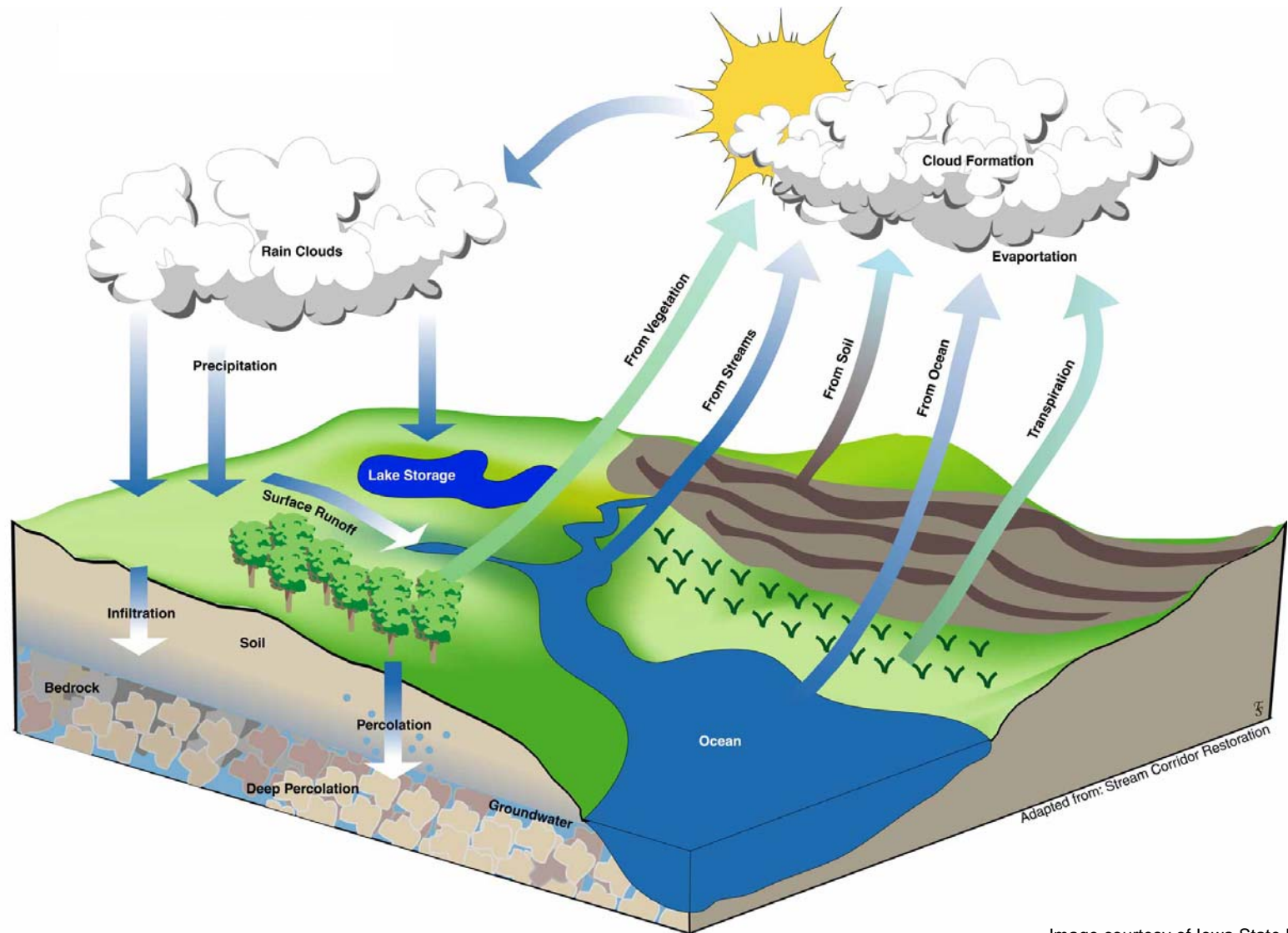


Image courtesy of Iowa State University

Aurora Corridor Drainage Basins

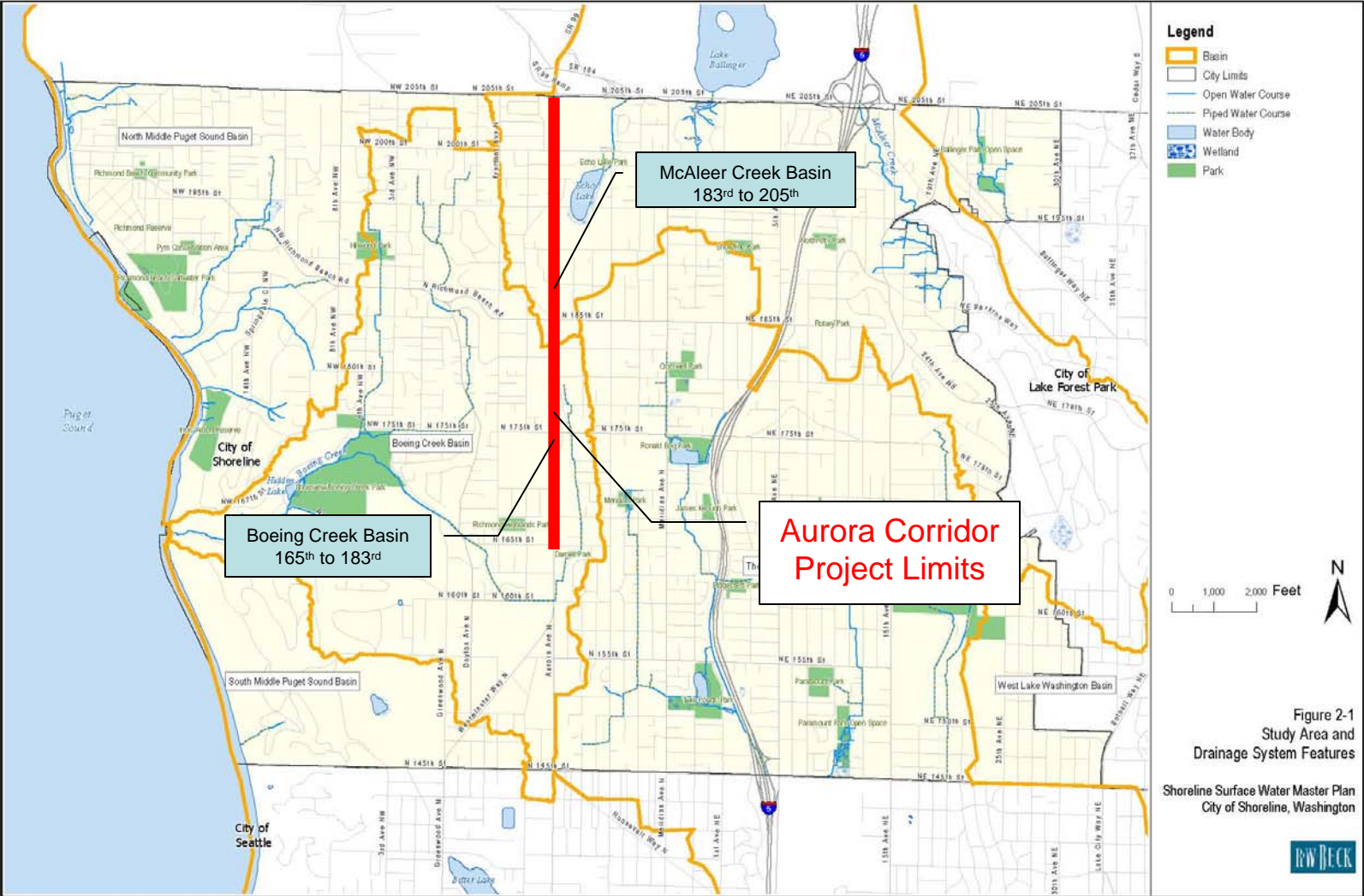


Image from City of Shoreline Surface Water Master Plan

What is Stormwater Management?

- ❑ In urban areas, rain falls on impervious surfaces such as roads and parking lots. Because it does not infiltrate the soil, surface runoff must be managed to reduce flooding and to prevent pollutants from entering lakes, streams, and Puget Sound.





Stormwater Regulations

- ❑ **Goal:** Evaluate Stormwater at the Basin Level
- ❑ **Goal:** Improve Water Quality Treatment and Flow Control along Aurora Corridor
- ❑ **Goal:** Incorporate Low Impact Development and Best Management Practices during Construction
- ❑ City of Shoreline currently uses the 1998 King County Manual and will strive to use the 2005 King County Manual



Stormwater Manuals

Stormwater Management Minimum Requirements:

- ❑ Preparation of Stormwater Site Plans
- ❑ Construction Stormwater Pollution Prevention
- ❑ Source Control of Pollution
- ❑ Preservation of Natural Drainage Systems and Outfalls
- ❑ On-Site Stormwater Management
- ❑ Runoff Treatment
- ❑ Flow Control
- ❑ Wetlands Protection
- ❑ Basin/Watershed Planning
- ❑ Operation and Maintenance



Stormwater Management Design Requirements

Development and redevelopment exceeding certain thresholds triggers minimum requirements.

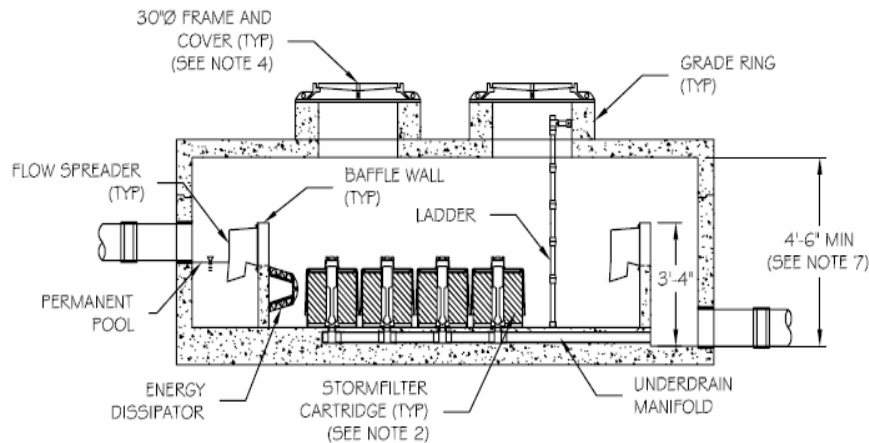
Water Quality

- ❑ Phosphorus
- ❑ Metals
- ❑ Sediments
- ❑ Oils and Grease

Flow Control

- ❑ Existing
- ❑ Proposed

Conventional Stormwater Treatment



- Stormfilters[®] are prefabricated cartridges filled with a filtering media based on the contaminants in the runoff.
- Number of filters depends on the size of the area being collected.
 - Catch basin inserts can be used for small areas of pavement replacements.
 - Vaults can contain multiple cartridges for larger areas.

Conventional Stormwater Treatment



- ❑ Stormwater Treatment Vault Construction on First Mile of Aurora Improvements

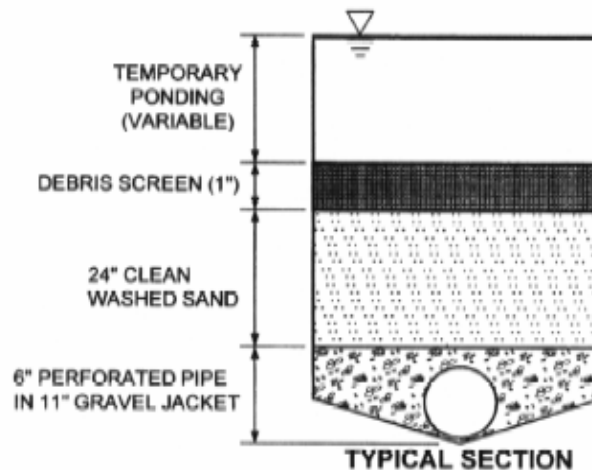


Conventional Stormwater Treatment



- Compartmentalized vaults are installed as Oil/Water Separators
 - sediment settles out
 - oil trapped to evaporate

- Infiltration trenches or sandboxes used to improve water quality
 - Soil permitting
 - Removes sediments and pollutants.



Conventional Conveyance

- ❑ Large catch basins and maintenance holes collect surface water flows



Conventional Conveyance

- Detention Pipes or Vaults

- Hold water and release slowly
- Can allow sediment to settle out



- Structure to control flow out of detention pipes and vaults





Beyond Convention

- ❑ Ponds
- ❑ Natural Drainage Swales
- ❑ Rainwater Harvesting / Cisterns
- ❑ Porous Pavement
- ❑ Stormwater Planters
- ❑ Rain Gardens
- ❑ Green Roofs
- ❑ Art and Water Integration

Ponds

Design for Runoff Peaks and Durations from Larger Storms
Detention vs. Retention
Dry Ponds vs. Wet Ponds

Water Quality
Sediment Settlement

Can be used
for recreation
and open
space



Natural Drainage Swales

- ❑ Reduce Pollutants from Streets and Lawns
- ❑ Allow for Sediment to Settle Out
- ❑ Amend soils for increased infiltration
- ❑ Attenuate Flows
- ❑ Reduce Storm Runoff Peaks from Small Storm Events
- ❑ Improve Habitat



Rainwater Harvesting / Cisterns

- ▣ Located within public right-of-way



Kitsap County Administration Building



Growing Vine Street

Porous Pavement



Fremont Trail
160th to 163rd – Constructed during
Shoreline Public Works Retreat



Permeable Pavers



Seattle Fremont Park



32nd Avenue SW



Public Sidewalk

Stormwater Planters

SW 12th Avenue, Portland, OR



Photo by Kevin Perry, Bureau of Environmental Services, City of Portland

- Collect water from right-of-way to treat and infiltrate run off from the adjacent streets and sidewalks.



Stormwater Planters

- Collect water from buildings adjacent to right-of-way



Portland, OR

Rain Gardens



High Point



High Point Library
and
Health Center

Art and Water Integration



- ❑ Design with Water as a feature
- ❑ Integrating Water Images



Art and Water Integration



- ❑ Collect water from adjacent buildings
- ❑ Public Art in the right-of-way



Community Education



- Opportunity to educate community on innovative stormwater management along Aurora Corridor



Implementation Strategy

- ❑ Brainstorm and Plan Early in the Design Process – Focus on Developing a Natural Stormwater Concept
- ❑ Coordinate with Utilities, WSDOT, and Transit for compatibility with Street Use and Utility Infrastructure
- ❑ Evaluate Space Availability, Constructability, Costs, Maintenance
- ❑ Provide Public Information and Education



Next Steps

- ❑ Stormwater Management Discussion Tonight
- ❑ Brainstorm a list of Natural Drainage Stormwater Systems and how they can work with more Conventional Approaches
- ❑ Technical Team including SvR Design, Tom Holtz, Jones & Stokes and City of Shoreline Staff will Evaluate Options
- ❑ Revisit Stormwater Topics at March ABC Team Meeting
- ❑ Incorporate Findings and Results into the Discipline Report