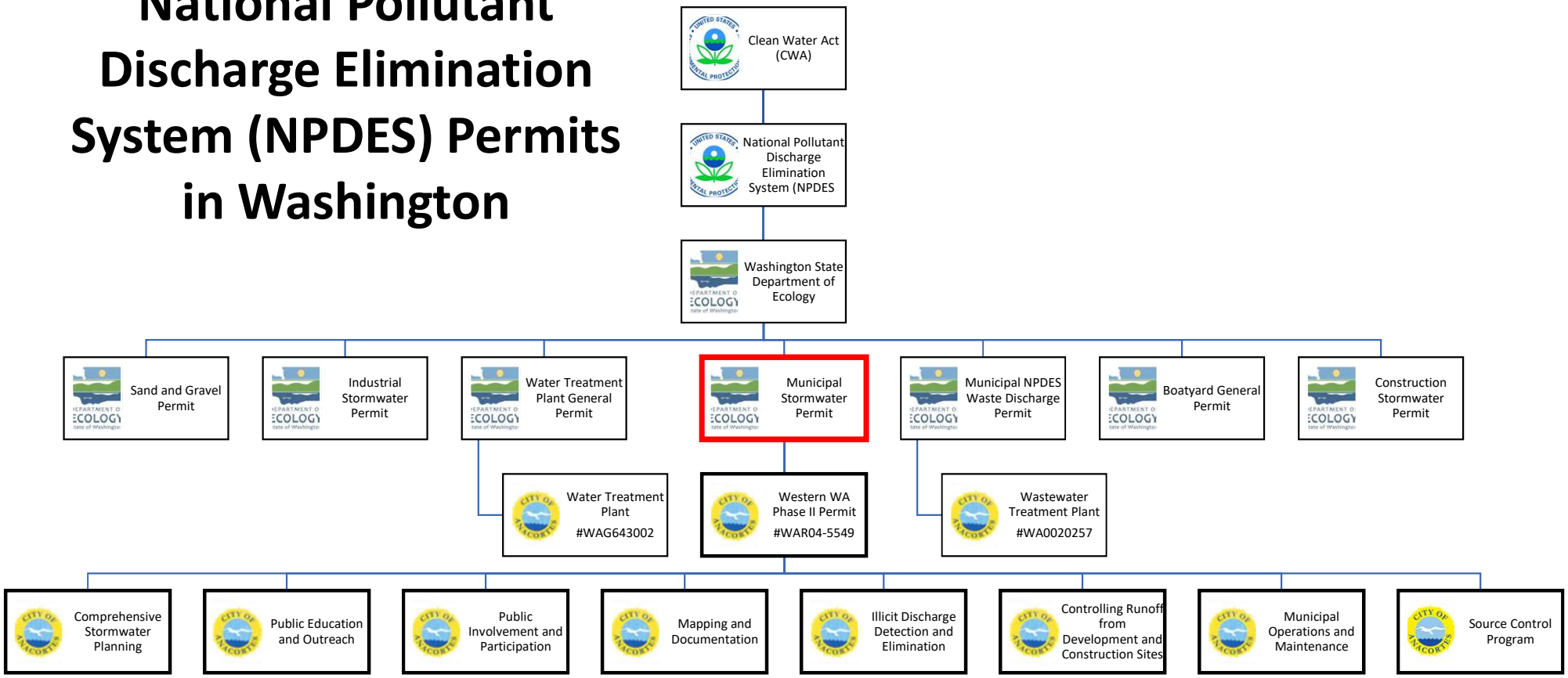
Municipal Stormwater Management

Detention Pond Maintenance Workshop

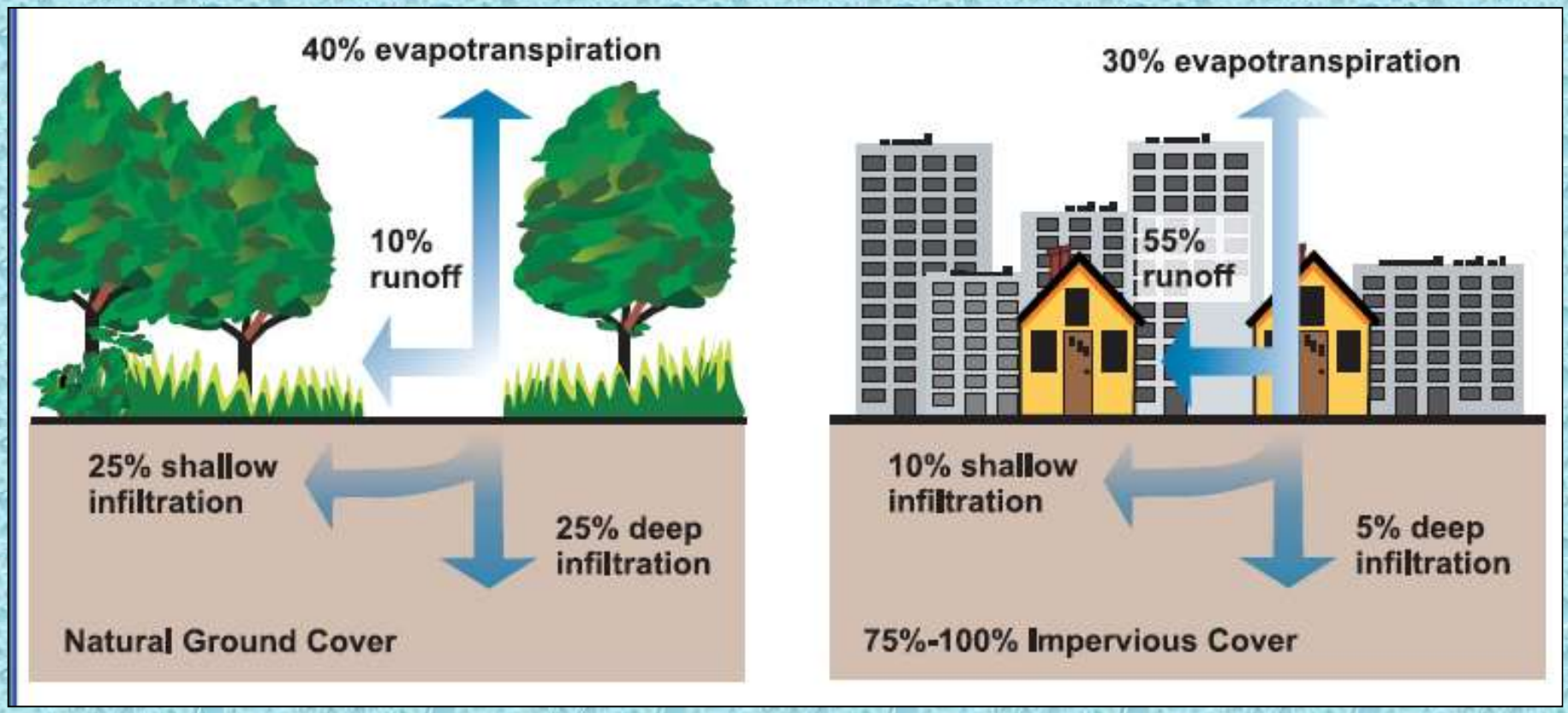
July 15, 2021

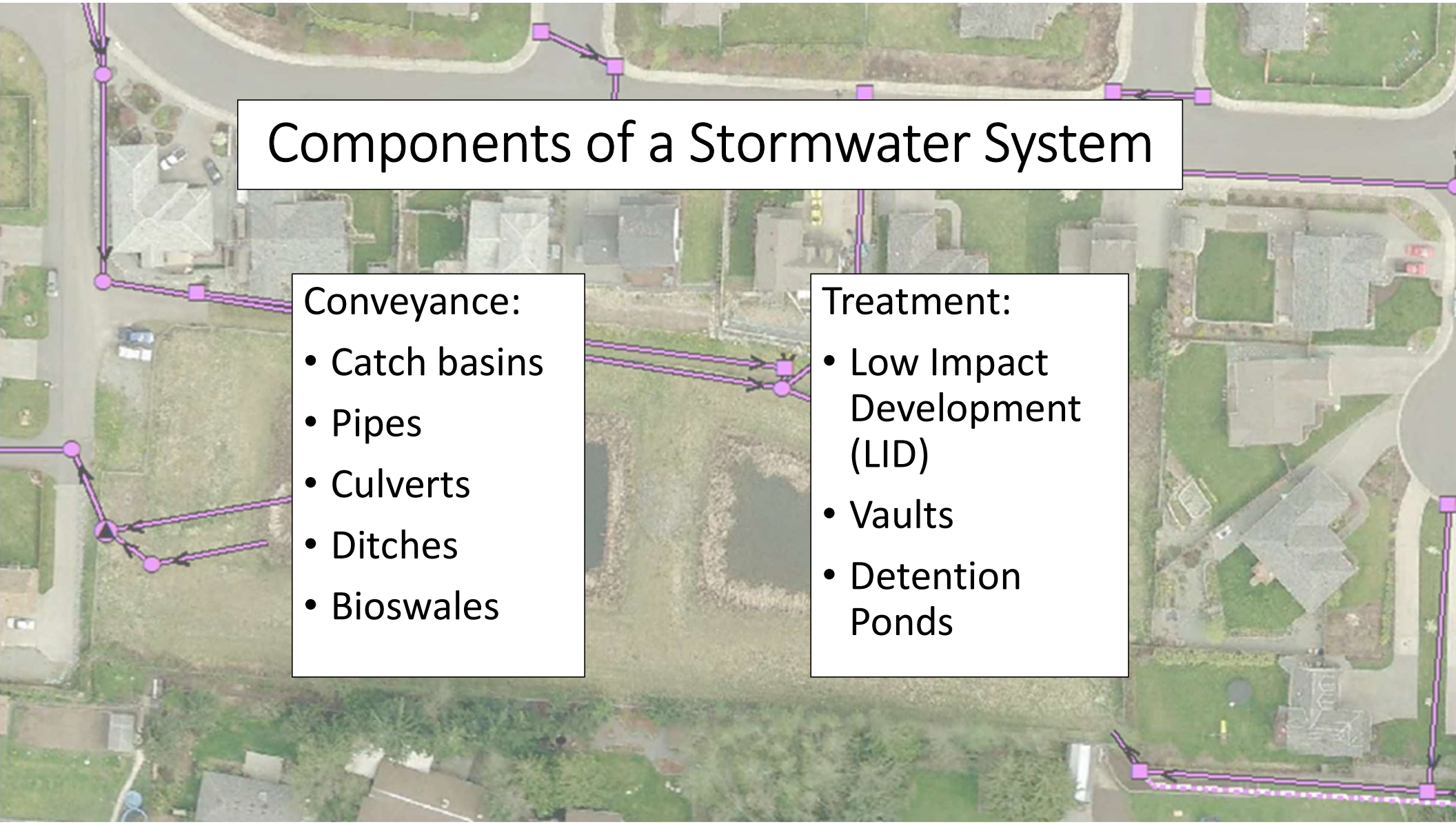
Purpose of Stormwater Management

National Pollutant Discharge Elimination System (NPDES) Permits in Washington



Development and Runoff





Components of a Stormwater System

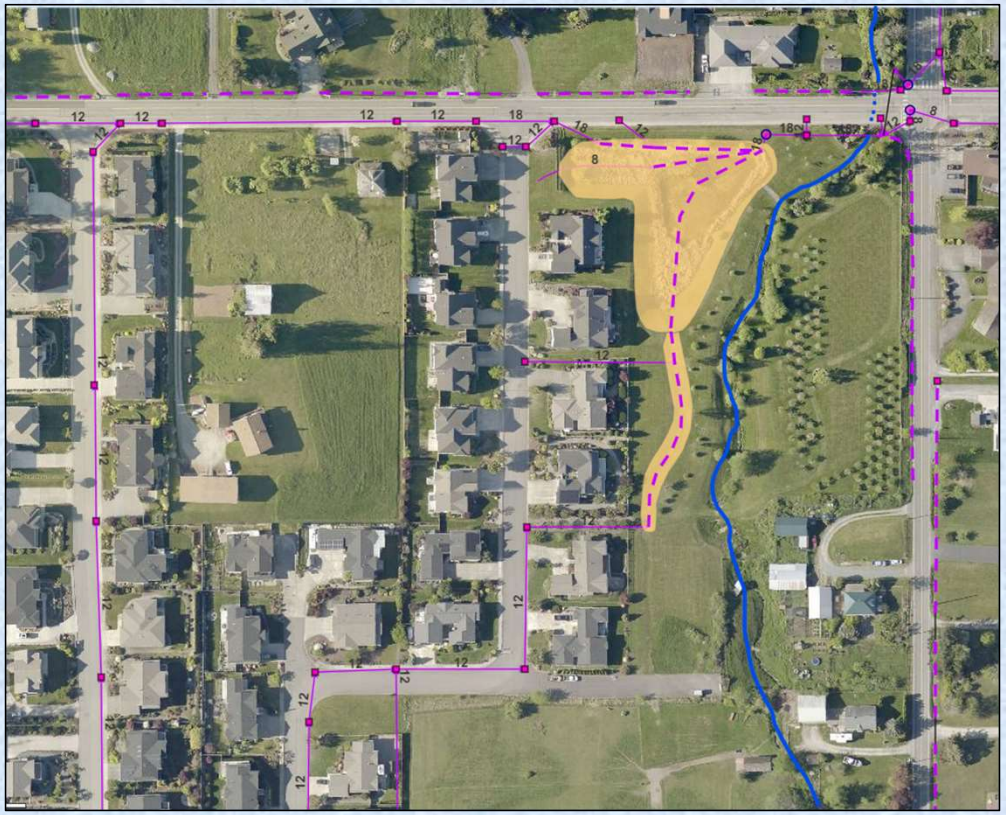
Conveyance:

- Catch basins
- Pipes
- Culverts
- Ditches
- Bioswales

Treatment:

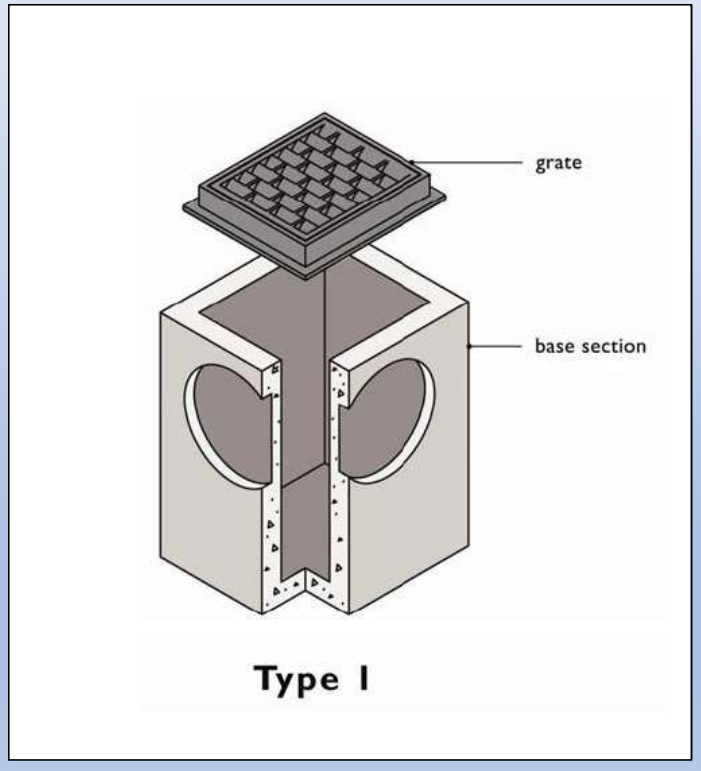
- Low Impact Development (LID)
- Vaults
- Detention Ponds

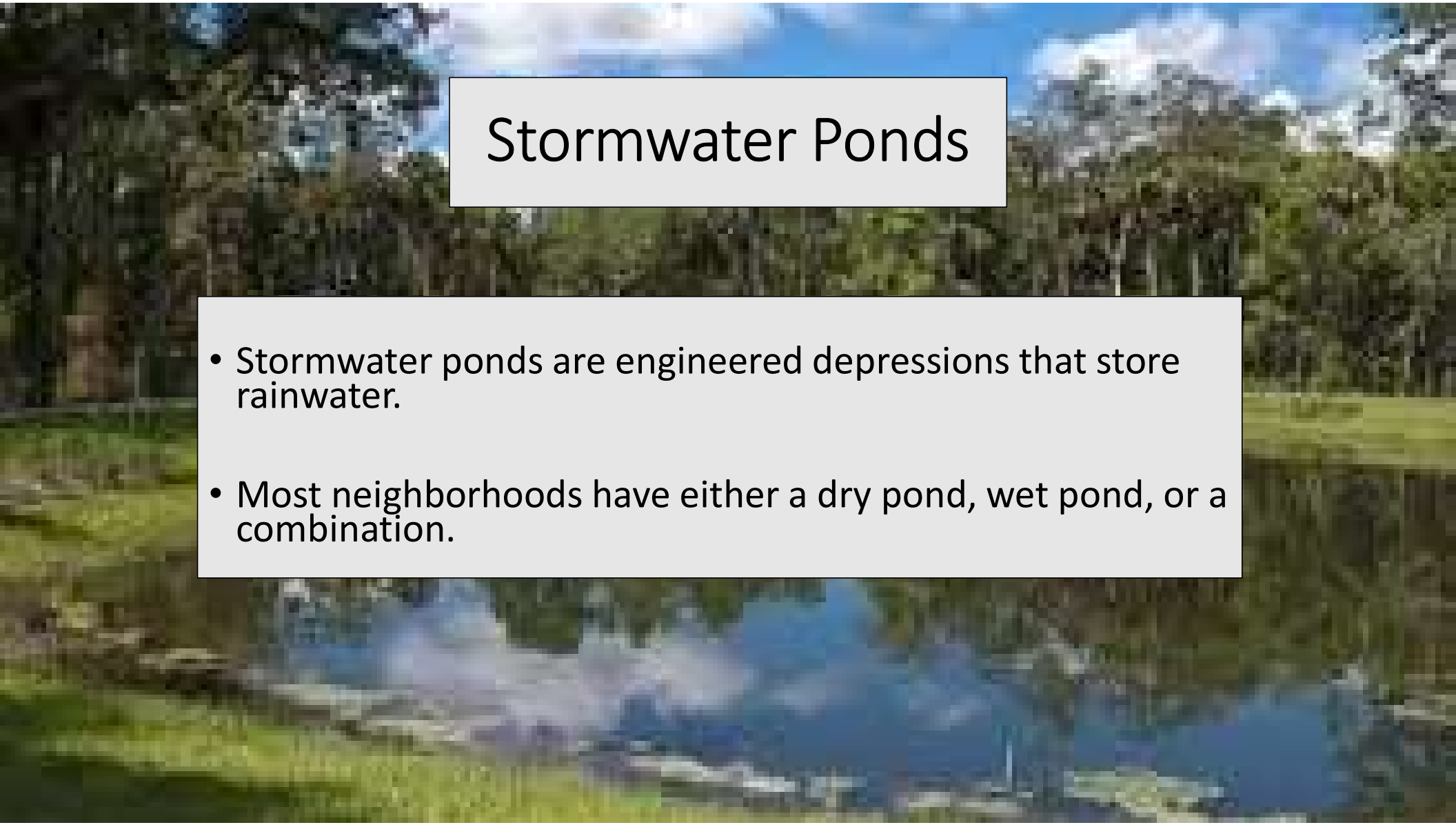
Typical Stormwater Facilities



Catch Basin

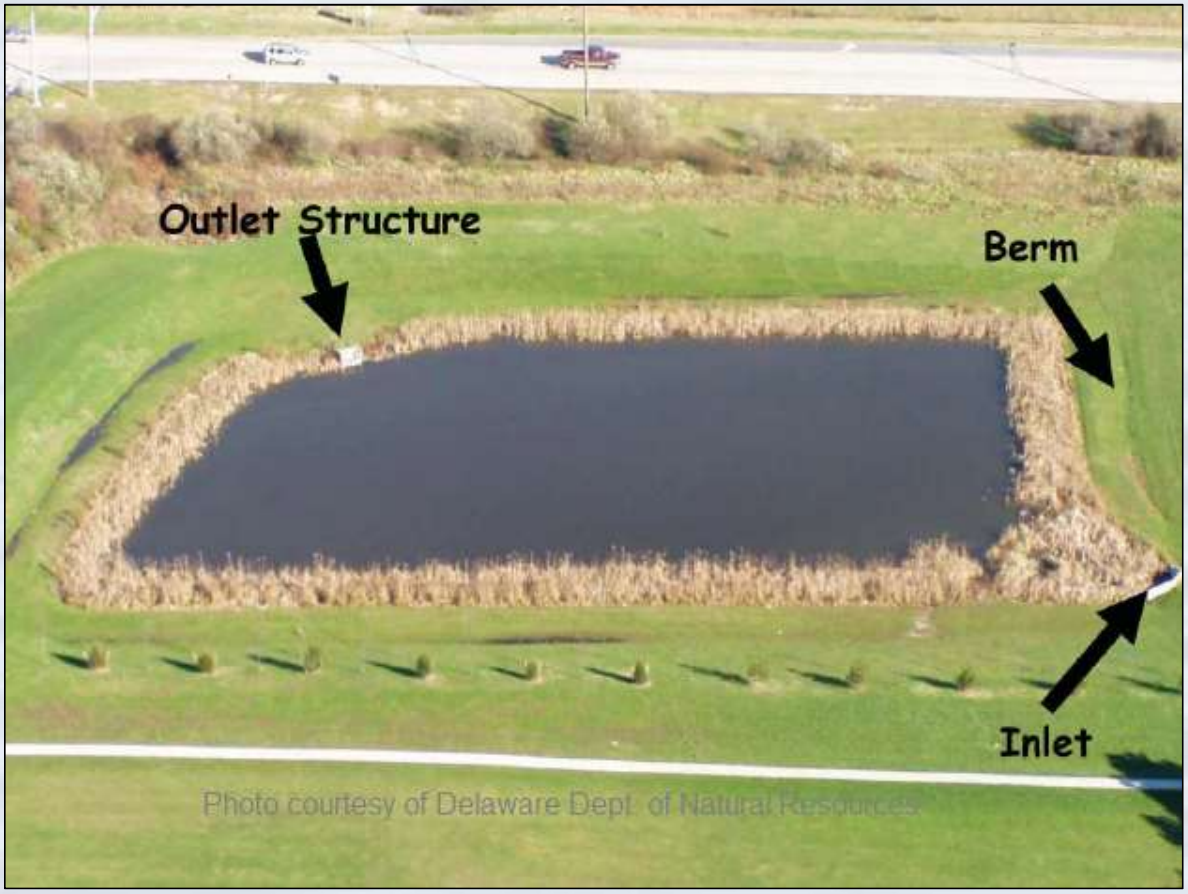
- An underground structure that collects stormwater
- Polluted sediments settle to the bottom
- Cleaner water on top flows out





Stormwater Ponds

- Stormwater ponds are engineered depressions that store rainwater.
- Most neighborhoods have either a dry pond, wet pond, or a combination.



Pond Components

Wet Ponds

- Often lined with clay or plastic to allow pooling.
- Pollutants settle to the bottom or are absorbed by vegetation.

Dry Ponds

- Store stormwater and gradually allow the water infiltrate.
- Designed to go dry within a few days (2-6 days).
- Usually seeded with grass to absorb pollutants.

Inlet/Outlet Pipes

- Typically have trash racks
- Inlet pipe may have splash pad of rip-rap

Flow Control Structure

- Metering devices that slowly release stormwater from a pond.
- Hire a professional for maintenance.

Overflow/Spillway

Allows water to overflow in a significant rain event.

Slow the Flow

Rock Baffle

Check Dam

Berms and Dams

- A berm is a sloping, earthen sidewall of a stormwater pond.
- Above ground earthen berms and concrete walls (dams) require closer attention since they hold back water.

Fences

- Used for safety around steep ponds.
- Required when slope is greater than 3:1.
- Required if the pond's perimeter is made of concrete walls.

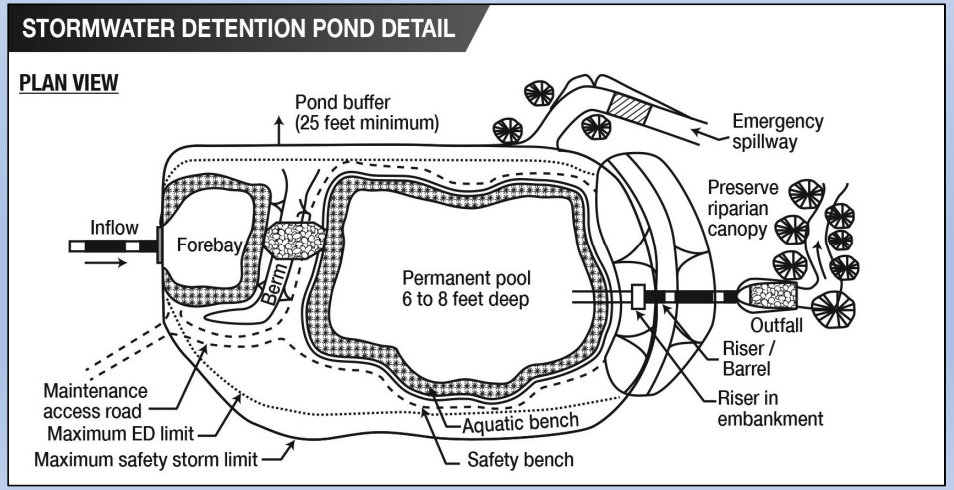
Access Roads and Ramps

Bioswales

Bioswales are wide, shallow, vegetated channels with gently-sloping sides and a flat bottom.

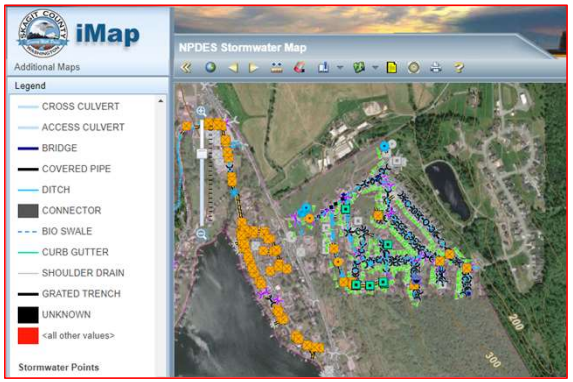

Swales should never be filled in with pipes, gravel, decorative rock or beauty bark.

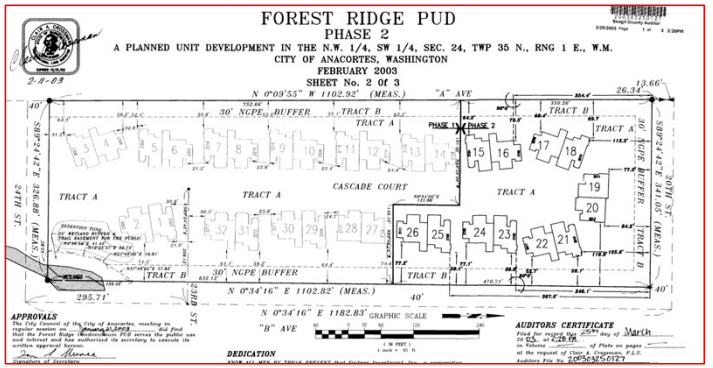
Maintenance starts with knowing your detention pond or facility!

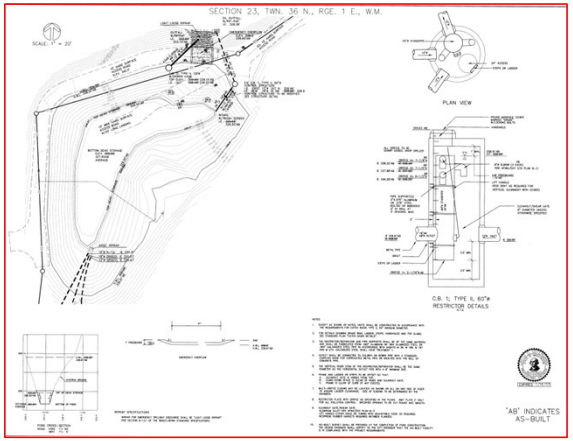


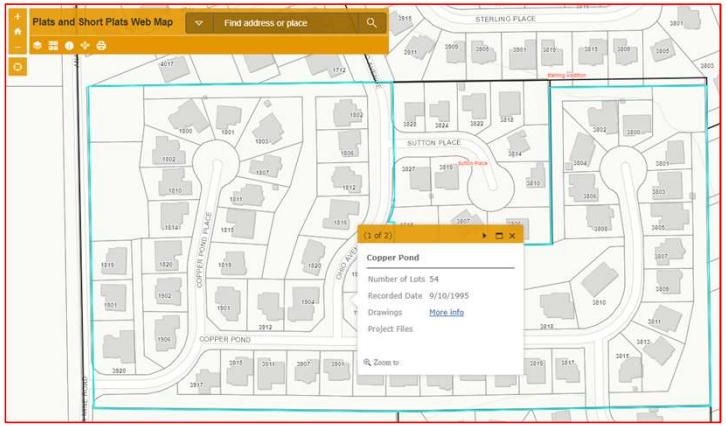
Locating Records

- Plat map
- Drawings
- Operations & Maintenance Guide
- Covenants, Conditions & Restrictions (CC&Rs)
- Easements









Document Resources

- **Skagit County**

  iMap

  https://www.skagitcounty.net/Maps/iMap/

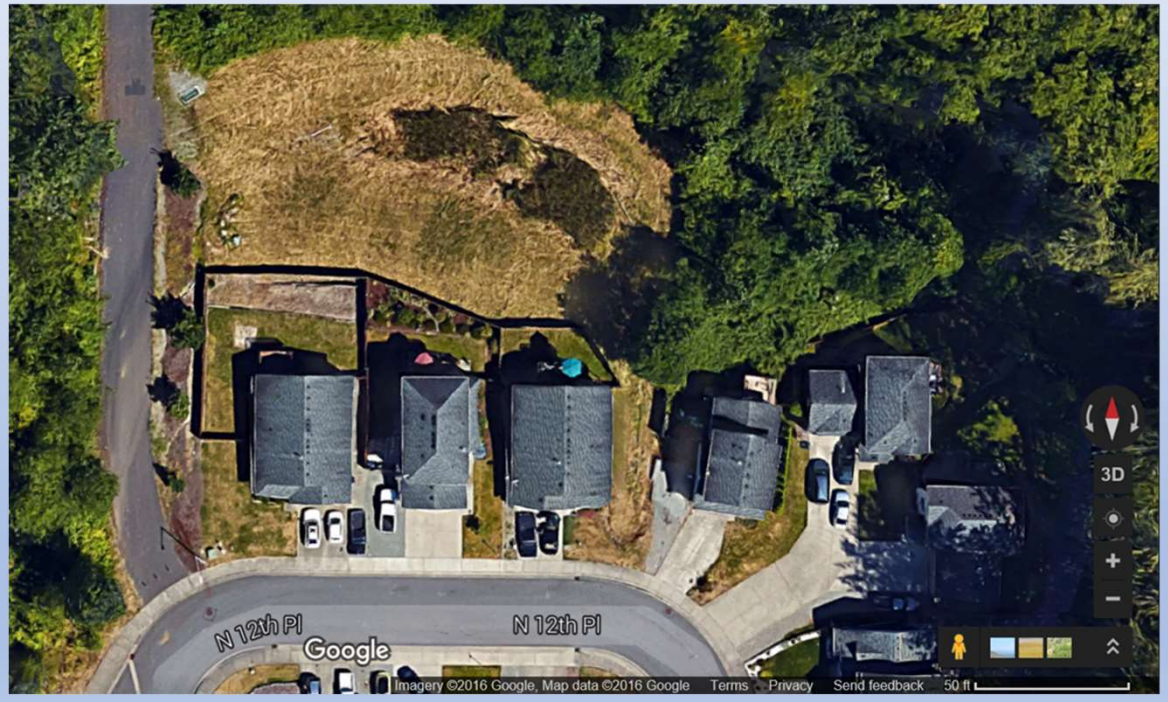
  Auditor Files

  https://www.skagitcounty.net/Search/Recording/

- **City Hall**

  (County – Public Works Dept.)

Aerial Photos
(Google Maps, Skagit iMap)



Know Your Facility – Find the Features

Watch Your Pond/Facility

Before, during and after a storm event.

What if I don’t have an Operations and Maintenance Plan?

- Department of Ecology’s Stormwater Management Manual for Western Washington
  https://fortress.wa.gov/ecy/ezshare/wq/Permits/Flare/2019SWMMWW/2019SWMMWW.htm

- Professional guidance

Regular Inspection and Maintenance Can Save $$

Mow to Outpace Trees

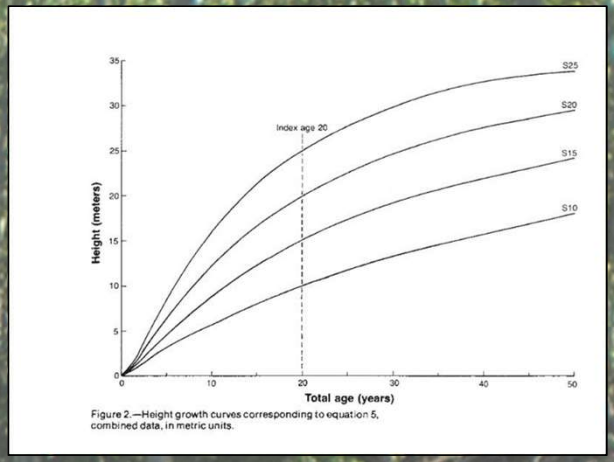
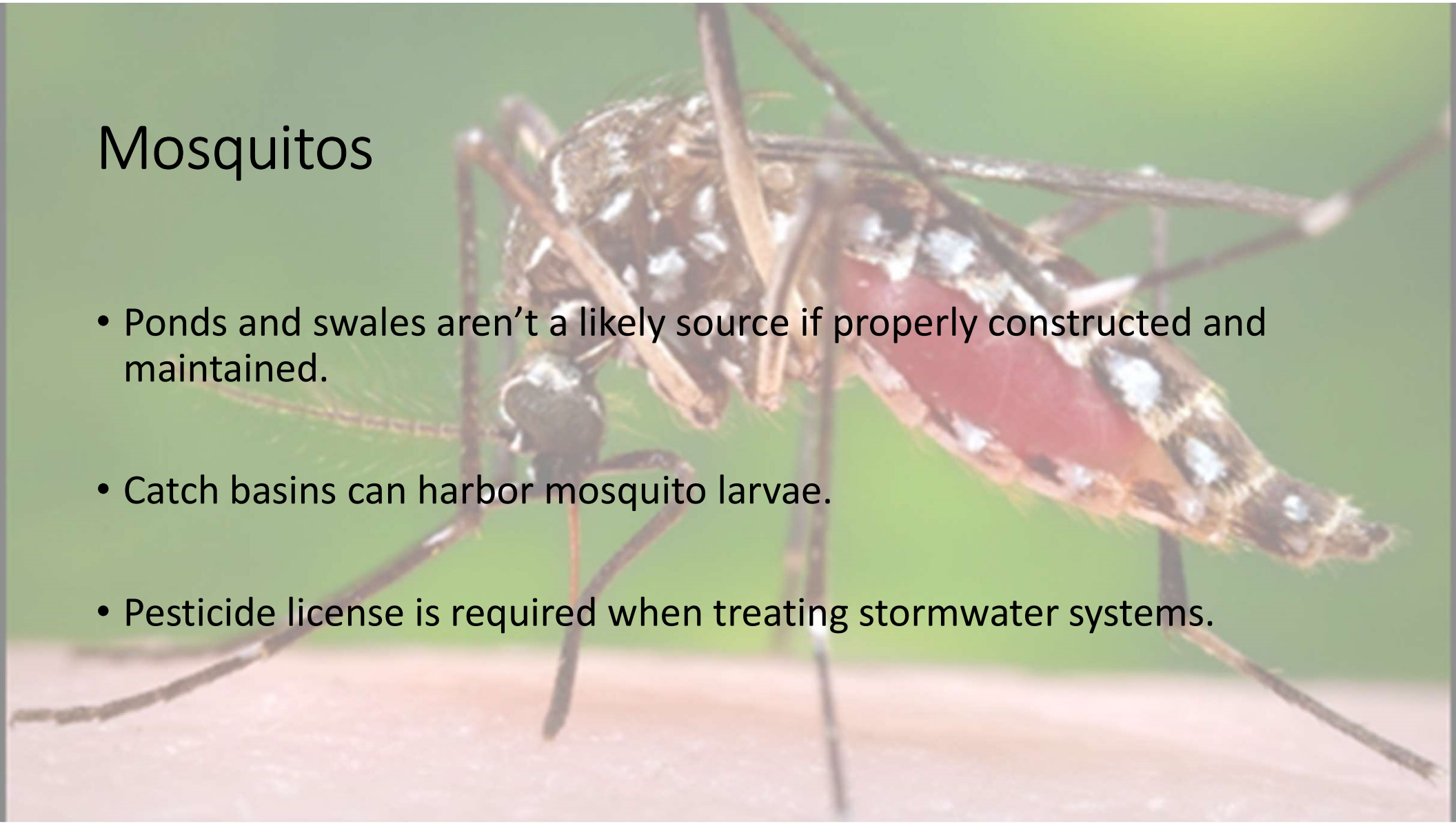


Figure 2.—Height growth curves corresponding to equation 5, combined data, in metric units.

Harrington, Constance A., and Robert 0. Curtis. 1986. Height growth and site index curves for red alder. USDA Forest Service, Research Paper PNW-358. Pacific Northwest Research Station, Portland, OR. 14 p.

Weedwhack areas that can’t be reached with a mower



Mosquitos

- Ponds and swales aren't a likely source if properly constructed and maintained.
- Catch basins can harbor mosquito larvae.
- Pesticide license is required when treating stormwater systems.

Report Spills

- Know your local spill hotline number

- For emergency situations that include spills of raw sewage, gasoline, or other hazardous materials – Dial 911

Summary

- Know your pond
- Maintain your pond to avoid costly repairs
- Report illegal discharges into stormwater

For more information:

Anacortes
Diane Hennebert
dianeh@cityofanacortes.org
360-661-3747

Burlington
John Abenroth
360-755-9715
johna@burlingtonwa.gov

Mount Vernon
Daniel Schmidt
360-336-6204

Sedro-Woolley
David Lee
dlee@ci.sedro-woolley.wa.us
360-855-3219

Skagit County
Jason Quigley or Andrew Wargo
360-416-1400

Neighborhood and Commercial Stormwater Facilities

INSPECTING AND MAINTAINING YOUR FACILITY

Reid Armstrong
Kulshan Services, LLC

Topics

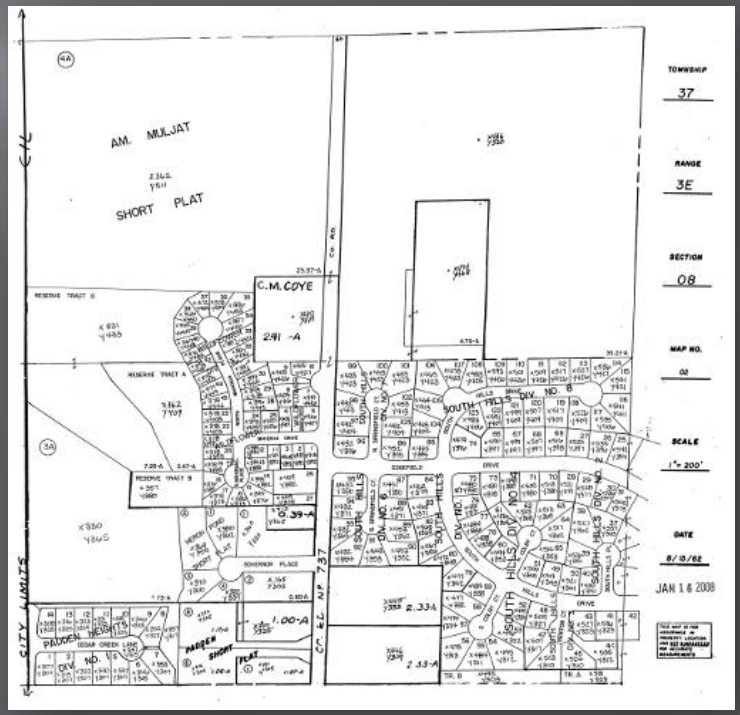
- Importance of maintenance
- First steps
- Systems overview
  - Key maintenance concerns and inspection activities
- What to do; when to do it; and who should do it
- Liabilities and record keeping
- Plan for current and future needs

Why is maintenance important?

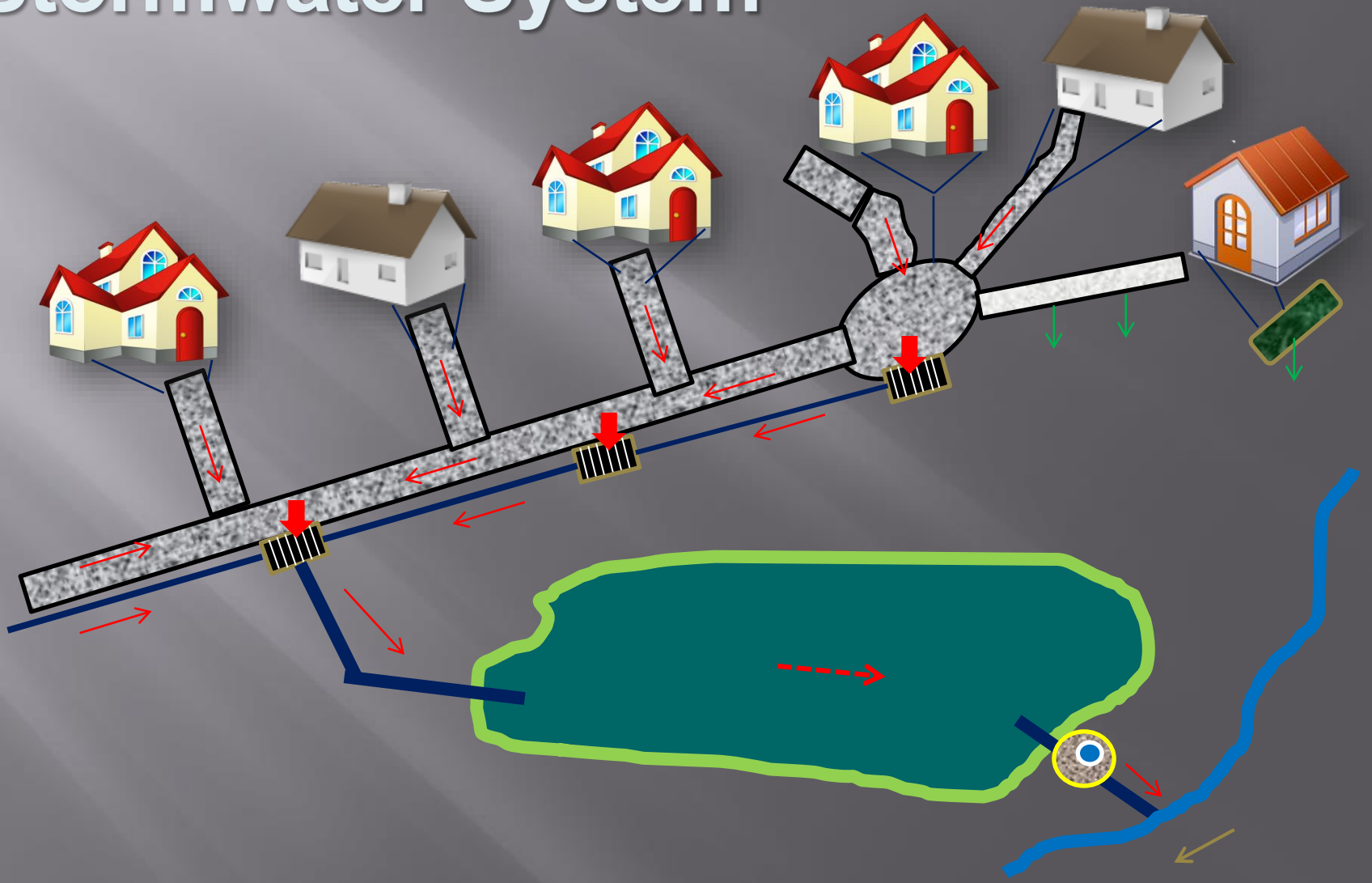
- Small regular investments prevent costly repairs in the future
- Stormwater systems need regular maintenance to operate properly
- A properly functioning system protects aquatic ecosystems and reduces the risk of flooding and liability

What are the first steps?

- What do you own?
- What are you required to do?
- What condition is it in?



Typical Neighborhood Stormwater System



What are you required to do and when?

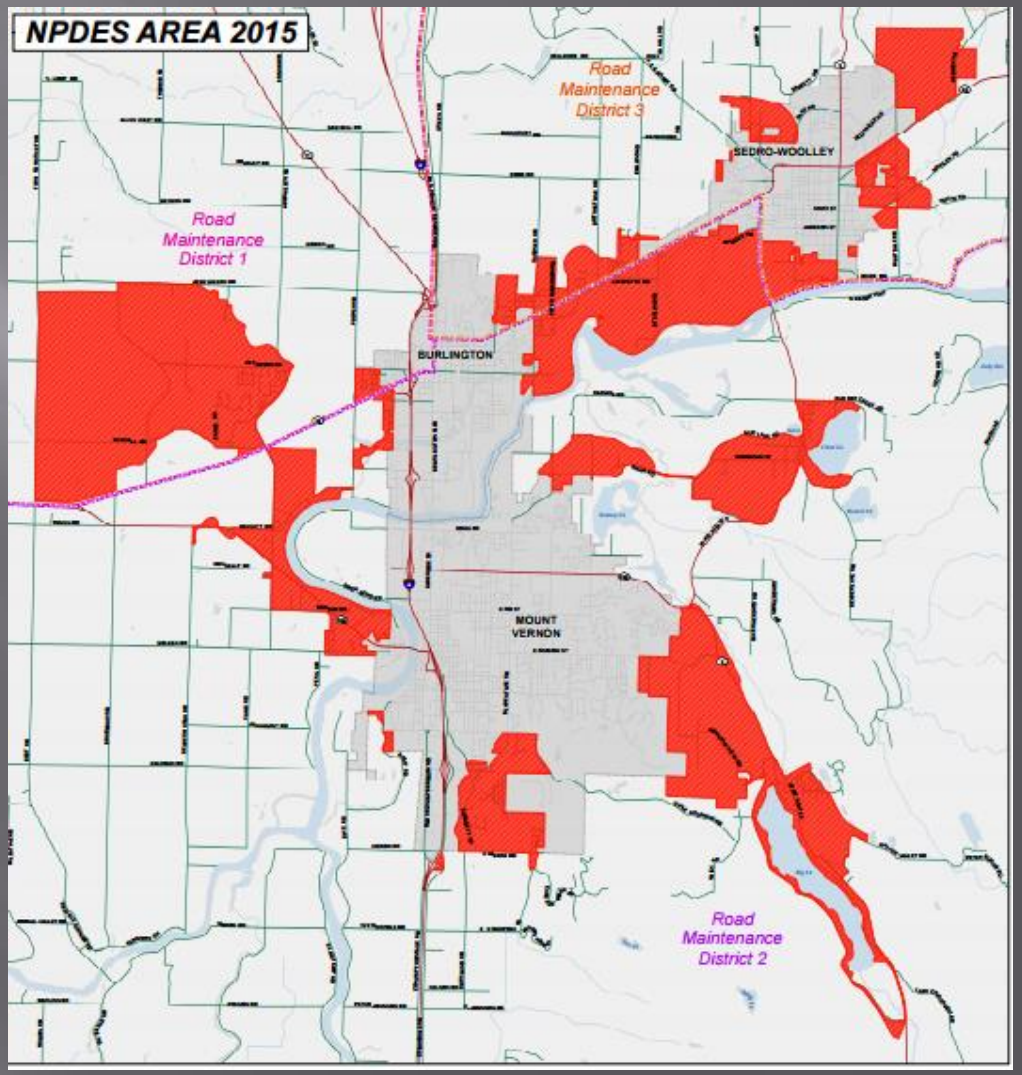
Specific maintenance and inspection requirements for:

Burlington

Mt. Vernon

Sedro-Woolley

Skagit County UGAs



Stormwater System Components

- Ditches
- Pipes
- Catch basins
- Ponds
- Vaults
- Bioswales
- Raingardens

Ditches

Inspection:

Monthly and after large storms

BMPs:

- Check dams – replace rocks if necessary
- Vegetation – mow, cut back & remove (no trees or shrubs)
- Structure – remove sediment; repair undercutting, scouring or slumping; remove trash

Photo: Whatcom County Public Works

Grass taller than 9”, trees, or shrubs may impede the flow of water

Ditches

Photo: RE Sources

Conveyances (ditches and pipes) along private roads are the owner's responsibility. Conveyances along city and county roads are not owner's responsibility, but they may impact your facility. Call for maintenance when needed.

Pipes

Inspect:

Monthly & after large storms

BMPs:

- Remove sediment if exceeds 20% of diameter
- Remove vegetation growth blocking openings and outlets
- Prevent erosion at inlets and outlets
- Repair damage that may create an obstruction or erosion

Type 1 Catch Basins

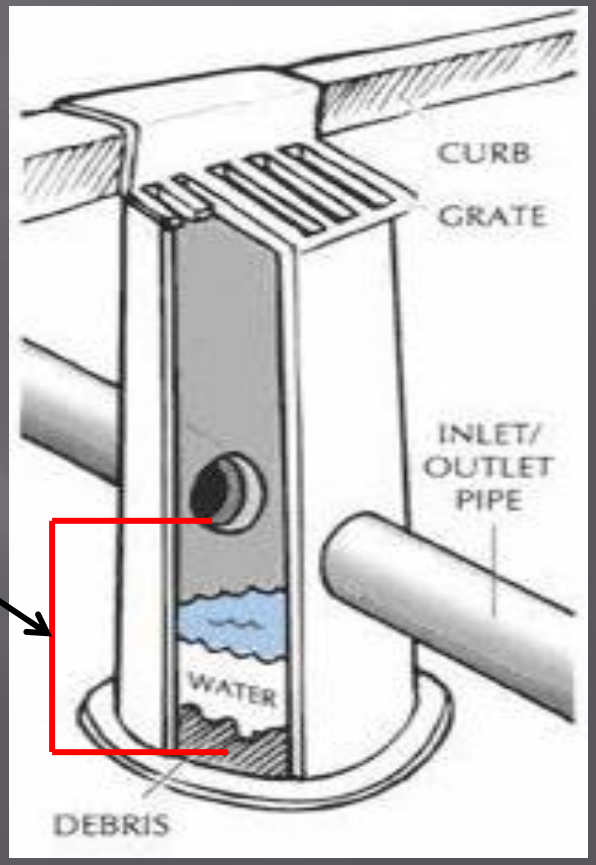
Inspect:

- Monthly and after storms check exterior
- Annually check interior for sediment and debris
- Catch Basins along public roads are maintained by the city

BMPs:

- Remove debris from grate
- Check structure and grout for cracking
- Remove sediment when 60% of sump is filled or <6 inches of invert clearance.

Sump



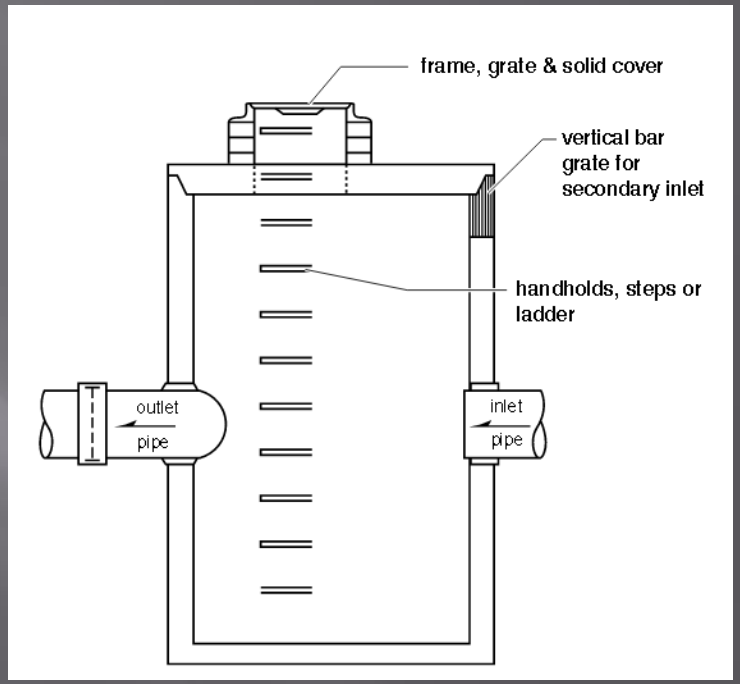
Type 2 Catch Basins

Inspect:

- Annually and after large storms

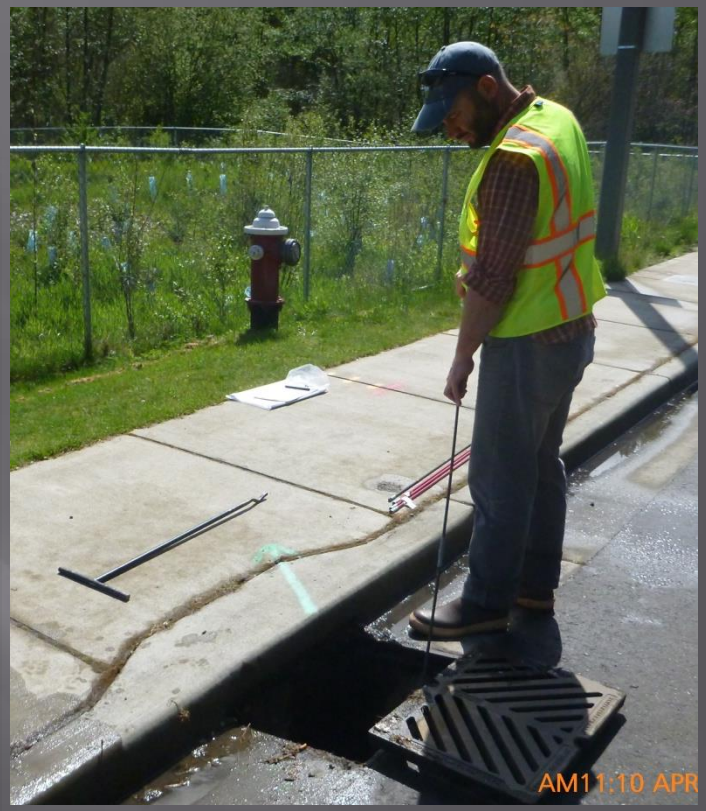
BMPs:

- Remove trash and debris Remove sediment when it <12" clearance to invert or > than 1/3 of the sump depth.
- Caution! Confined space. Do not Enter without proper training and equipment! Toxic Gas!



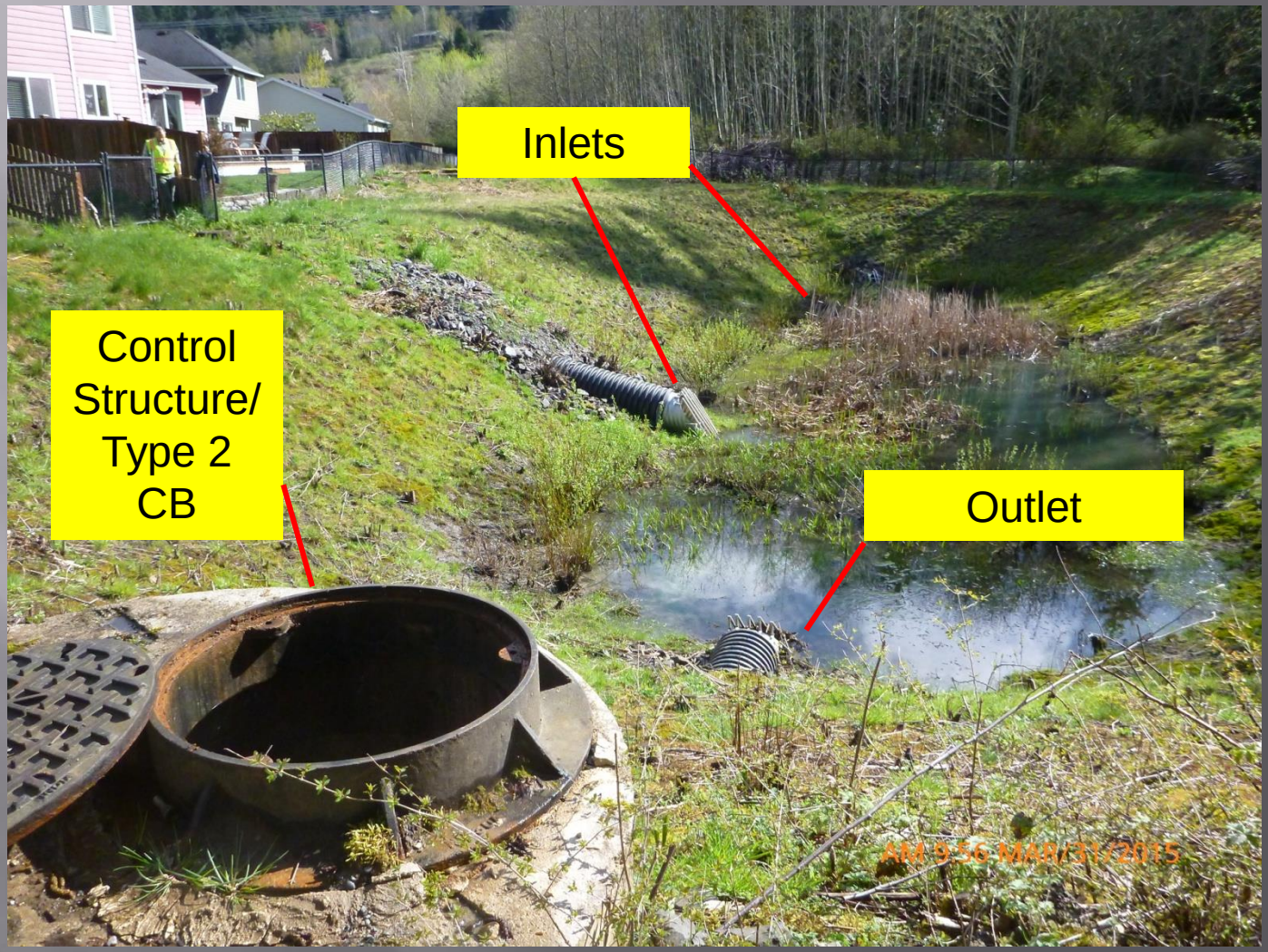
Catch basins

Vactor truck cleaning out catch basins

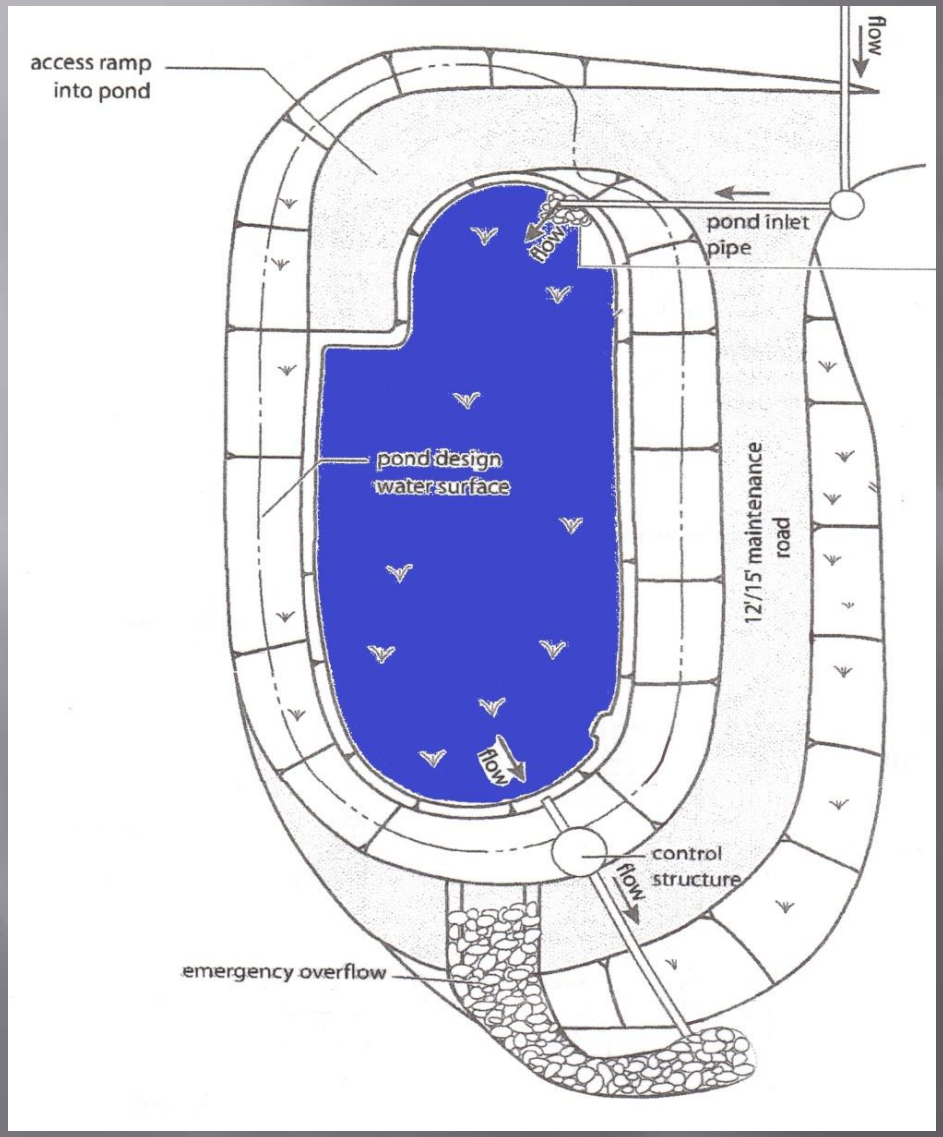


Checking sediment depth

Typical Stormwater Pond



Typical Stormwater Pond



- Access ramp into pond
- Energy dissipater
- Emergency overflow
- Pond Inlet Pipe
- Pond Outlet Pipe
- Control Structure

Dams, Berms, Spillways, and Ramps

Berm failure

- Erosion, bare soils, boring animals, settlement, and sloughing can lead to major costly problems

Photo: WA Department of Ecology

Photo: RE Sources

Trees vs. Grass?

- Trees in right places are good for aesthetics, stabilization and habitat
- Remember – no trees on berms!

- Access, visibility, shading, inspection, leaf and debris management
- Keep grass < 9” long and remove after cutting

Dams, Berms, Spillways, and Ramps

Inspect:

Quarterly and after major storms

BMPs:

- Control vegetation – Remove trees >4” and brush; control invasive species
- Repair erosion – Keep slopes vegetated
- Address structural problems – Slumping and settling >4 inches; Get an engineer
- Protect the overflow – Keep rocked and limit vegetation growth
- Remove burrowing animals

Inlets and Outlets

- Keep inlets and outlets clear, and well marked

Marked inlet to pond

Blocked outlet to control structure

Energy dissipaters

- Add rock to prevent erosion and to maintain energy dissipaters

Pond Bottom

Inspect:

Check pond bottom annually during the dry season and check inlets and outlets monthly and after major storms

BMPs:

- Inlets and outlets – clear of vegetation, leaves and debris
- Erosion control – add or restore energy dissipaters
- Remove cattails and sediment if cattails cover 25-50% of the pond and sediment is > 12”
- Remove trees and woody vegetation
- Exposed or damaged liner – cover or repair
- Oils, fuel or chemical smells – investigate and report
- Debris and trash – remove

Cattails

- Build organic sediment
- Release nutrients

Fix by:

- Cut and remove annually
- Pulling out when small
- Removing with associated sediment

Good vegetation

- Low growing plants with less biomass
- Native species enhance habitat and beauty of a pond

Sedge

Salal / Ferns

Rush

Control Structures

The heart of the stormwater facility!

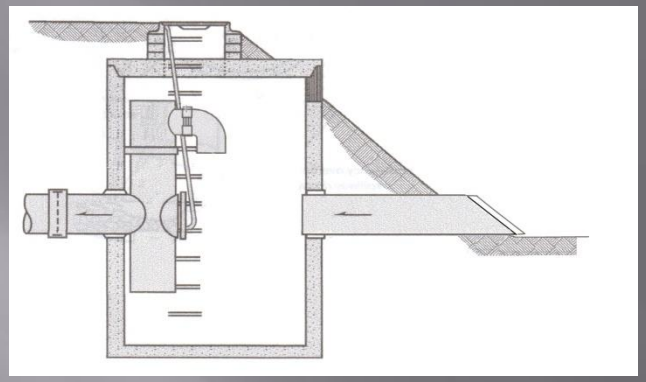
Control Structures

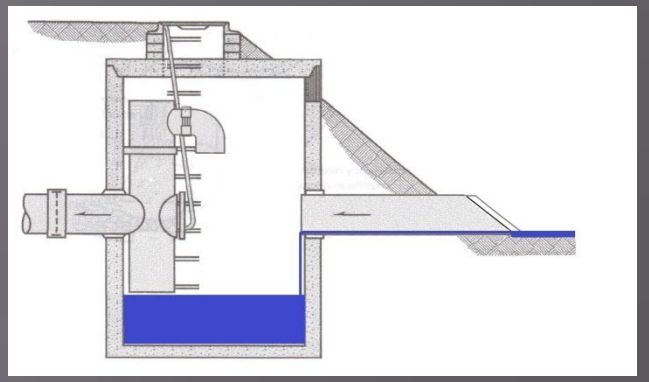
Caution!

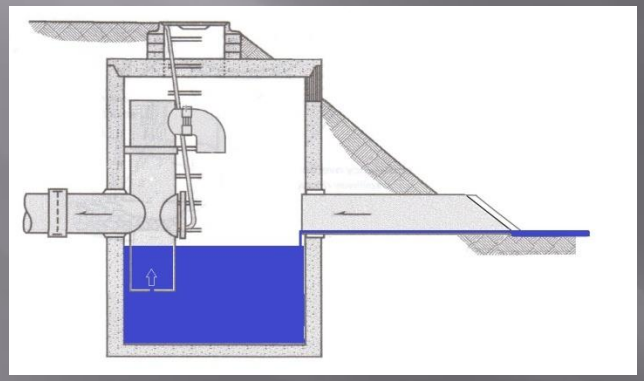
Confined space!

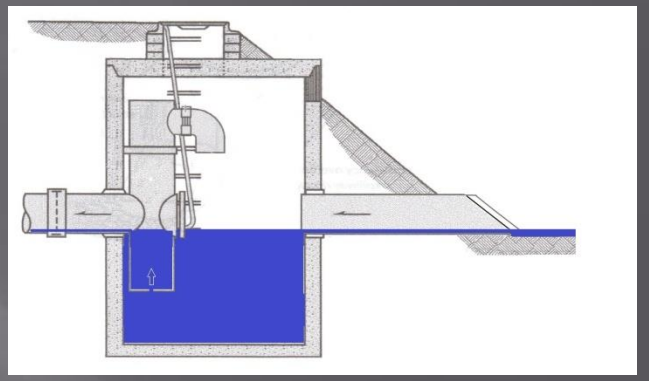
Do not enter!

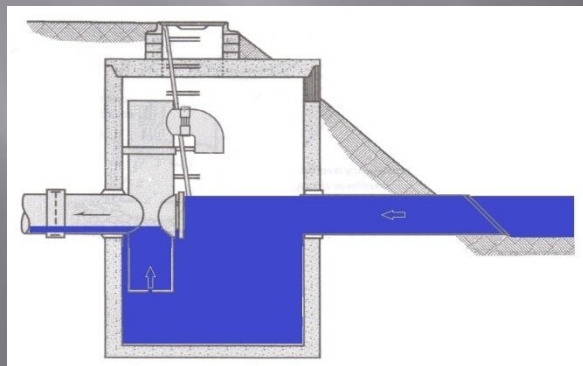
Typical Control Structure Operation

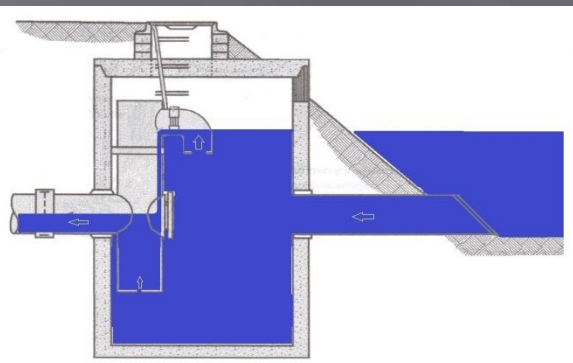


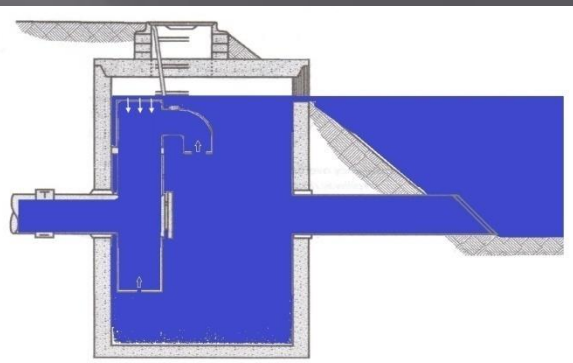












Control Structures

Inspect:

Annually and after storms

if ponding levels abnormal

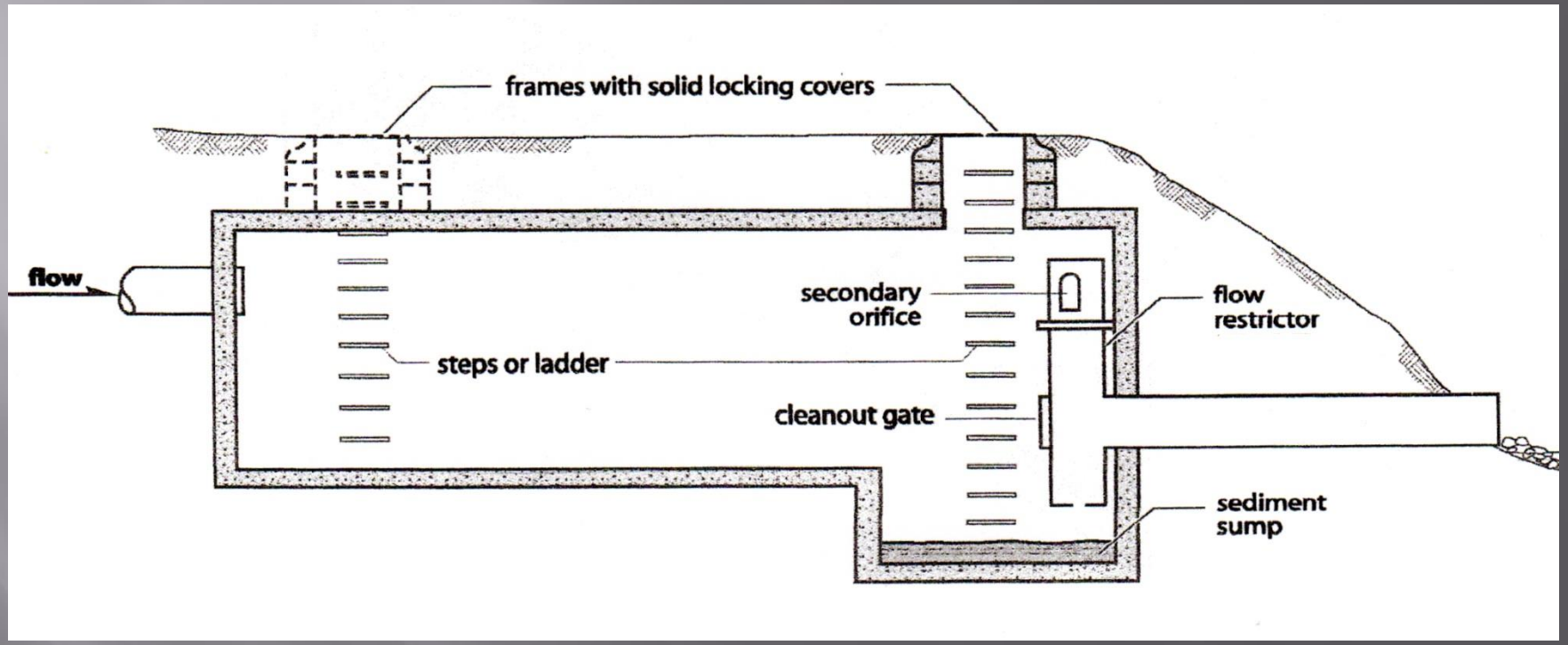
BMPs:

- Cover & Ring – Repair grouting, reposition ring
- Sediment – Remove if clearance <12” or more than 1/3 of sump depth
- Debris and Trash - Remove
- Piping – Repair cracks in concrete and grouting; secure pipes
- Shear Gate– Operational; handle or chain intact; leakage; closed
- Water level - should be about bottom of shear gate between storms

Control Structures

- Watch for indications of high water and high water for long periods of time (tub line)

Vaults



Remember – No entry to confined spaces!

Vaults

Inspect:

Annually and after major storms

BMPs:

- Sediment – Remove if clearance to invert <12” or more than 1/3 of sump depth
- Debris and trash – Remove (pool net)
- Oils, fuel or chemical smells – note and report
- Control Structure - Grouting, strapping, piping, vertical
- Shear Gate – Operational, handle or chain intact, leakage, closed
- Water level - should be about bottom of shear gate between storms

Bioswales

Inspect:
Quarterly and after large storms

BMPs:

- Remove excess sediment
- Replant bare spots
- Maintain desirable plants and remove inappropriate species
- Clear inlets and outlet

Bioretention and Raingardens

- Follow same inspection schedule and BMPs as bioswales

Access Control

Fencing – Keep in good condition

***Inspect*:**
Quarterly

***BMPs*:**

- Access – Maintain perimeter access to inlets, outlets, berm, overflow and control structure
- Poisonous plants and insects – Remove if they limit access
- Yard waste dumping – Work with property owners

Invasive Vegetation

***Inspection*:**
Semi-annually, during growing season

***BMPs*:**
- Remove or control using appropriate methods
- Pull out or cut back before they go to seed


Blackberry


Knotweed

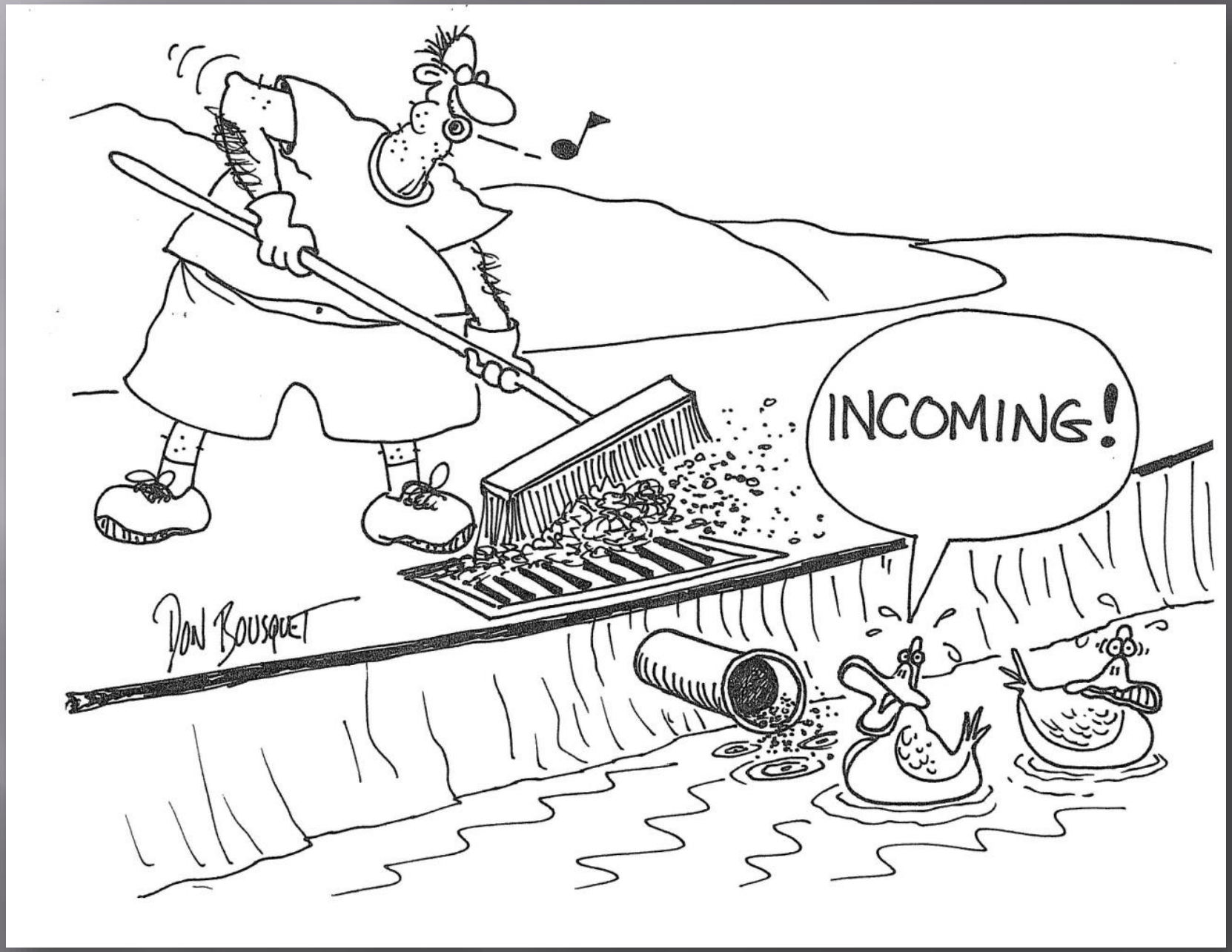

Photo: RE Sources

English Ivy

http://www.whatcomcounty.us/923/Current-Weed-List

Discharge to Streams

- Observe turbidity of water
- Outlets should have energy dissipaters
- Check for proper placement of rocks, and replace if necessary


INCOMING!
DON BOUSQUET

What can you do?

- Grass cutting and brush clearing
- Trash rack clearing
- Cattail & brush removal near inlets and outlets
- Garbage clean-up
- Fence and signage upkeep
- Clean catch basin grates (dog walks)

Other things you can do…

- Observe seasonal pond conditions
- Control access and unauthorized uses
- Prevent encroachments that limit access
- Prevent dumping of yard waste or garbage
- Keep leaves and bark out of the street
- Request street sweeping and catch basin cleaning when needed
- Watch out for runoff from construction piles

Safety Concerns

- Confined spaces
- Steep and slippery slopes
- Insects and poisonous plants
- Lifting and exertion
- Equipment

What work should professionals do?

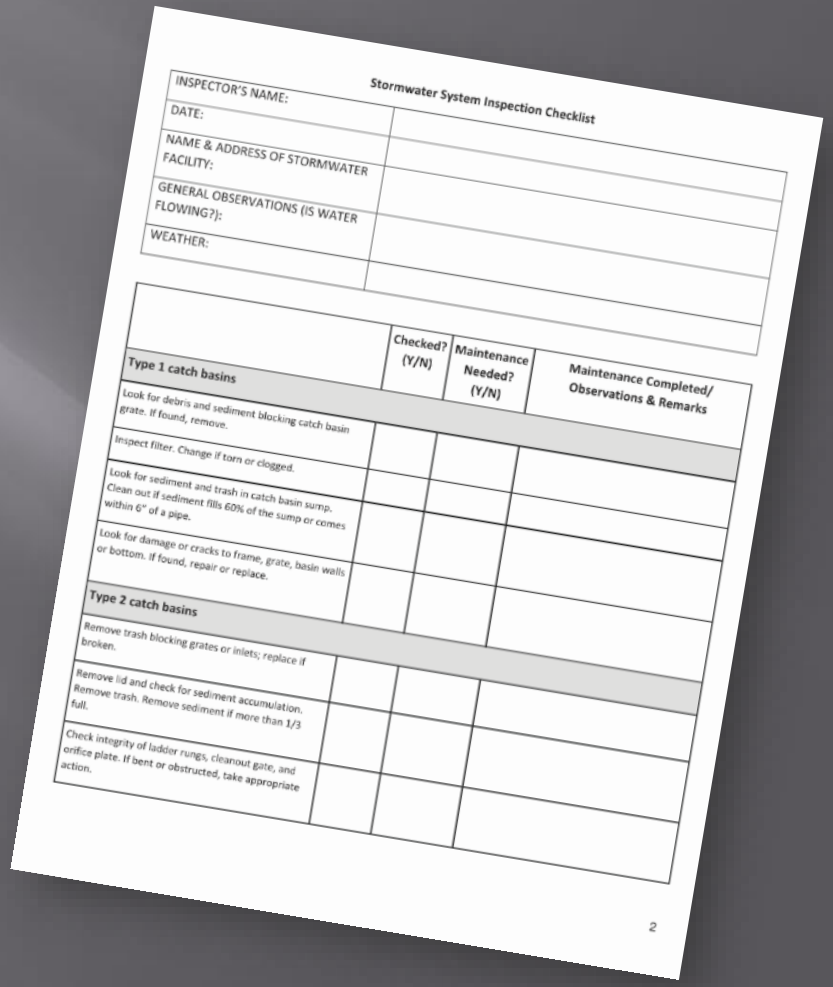
- Vault inspections and cleaning
- Confined spaces
- Pesticide application
- Large vegetation removal
- Sediment removal
- Structural or plumbing repairs or improvements
- Design planting program

What are your liabilities?

- Personal injury
- Damage to public or private property
- Regulatory – water quality and/or habitat

Record Keeping

- Record observations on paper
- Take photos of issues
- Report any problems to managers
- Keep in a file



Stormwater System Inspection Checklist

INSPECTOR'S NAME:	
DATE:	
NAME & ADDRESS OF STORMWATER FACILITY:	
GENERAL OBSERVATIONS (IS WATER FLOWING?):	
WEATHER:	

	Checked? (Y/N)	Maintenance Needed? (Y/N)	Maintenance Completed/ Observations & Remarks
Type 1 catch basins			
Look for debris and sediment blocking catch basin grate. If found, remove.			
Inspect filter. Change if torn or clogged.			
Look for sediment and trash in catch basin sump. Clean out if sediment fills 60% of the sump or comes within 6" of a pipe.			
Look for damage or cracks to frame, grate, basin walls or bottom. If found, repair or replace.			
Type 2 catch basins			
Remove trash blocking grates or inlets; replace if broken.			
Remove lid and check for sediment accumulation. Remove trash. Remove sediment if more than 1/3 full.			
Check integrity of ladder rungs, cleanout gate, and orifice plate. If bent or obstructed, take appropriate action.			

2

Planning current and future needs

- Understand **condition** of your facilities and how they function over time
- Identify ongoing and major **maintenance** requirements
- Understand your **liabilities** and water quality concerns
- Consider **enhancements** if opportunities are there
- Seek **support** of neighbors and/or members
- Develop a **simple plan** with a prioritized list of activities and projects

Budgeting current and future needs

- Evaluate what work can be done in house vs. contracted
- Prioritize projects
- Solicit estimates
- Develop budget scenarios
- Get support and approval
- Use annual assessments
- Implement plan
- Review your plan and facility conditions each year

Maintaining your stormwater system will:

- Reduce long-term maintenance and repair costs
- Protect water quality
- Protect downstream property from flooding and erosion
- Retain and enhance property values
- Provide a green space amenity

QUESTIONS?

Please contact the Kulshan Services Stormwater Team

www.KulshanServices.com

Welcome

Managing Stormwater Facilities: Maintenance Guidelines for Private Property Owners and HOA's

The Value of Educating and Involving Your Neighborhood Community

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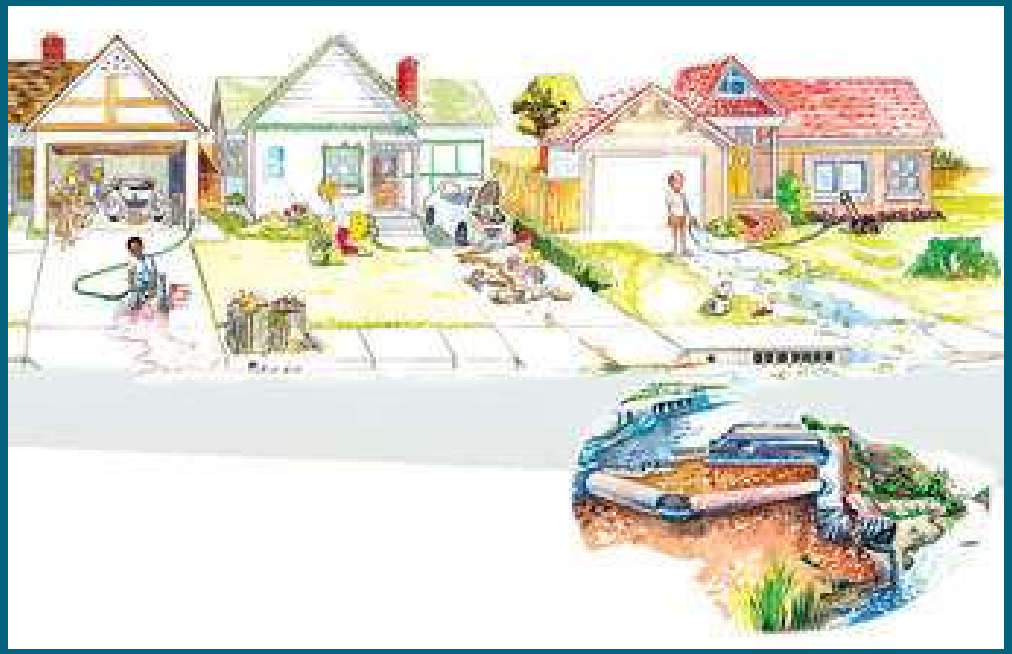
Skagit Conservation District

Stormwater picks up and transports many of the pollutants it encounters:

- **oil**
- **grease**
- **metals**
- **yard and garden chemicals**
- **bacteria**
- **sediment**
- **nutrients**
- **pet & livestock waste**
- **other pollutants from paved areas**



Where does my stormwater go?

Beyond our backyard

The way we landscape and manage our yards affects water quality and habitat in our streams, rivers, and marine waters

What you can do to Reduce Stormwater Runoff

- **Never dump *anything* down storm drains or in ditches**
- **Check your car for leaking fluids and recycle your motor oil**
- **Don't litter! Pick up trash you see on the ground (even if it is not yours) and participate in a creek or neighborhood clean-up!**

Pick up after your pet

Estimated daily production of dog waste in Skagit County is over 6,135 pounds per day.

Sweep sidewalks, driveways, and steps

- Sweeping your driveway and sidewalk rather than using a hose will save you as much as 100 gallons of water every time you do it. And, it will reduce stormwater runoff pollution.

- Direct downspouts and gutters into lawn and plant beds or into rain barrels, cisterns, or contained areas
- Use fertilizers, pesticides and hebicides sparingly
- Reduce size of lawn – add more trees, shrubs and plants – consider natives!
- Support Low Impact Development – such as rain gardens and bioswales, permeable pavement, green roofs

Reduce Lawn

Support Low Impact Development Practices

- Rain gardens and bioswales
- Permeable pavement
- Rain barrels
- Native plantings
- Green roofs

The Case for sustainable landscapes

- Human populations have grown substantially over the past century.
- Growing population places increasing pressure on our soils, waters, forests, and other natural resources.
- It is difficult, expensive, and sometimes impossible to duplicate these natural services once they are destroyed.




Do not empty a household fish aquarium into the stormwater detention pond.

Neighborhood clean up events

Neighborhood Storm Drain Labeling Project


EVEN THE SMALLEST PERSON CAN CHANGE THE COURSE OF THE FUTURE." - BILBO BAGGINS, THE HOBBIT

It is important to protect our resources for our benefit and the benefit of future generations.

“Never doubt that a small group of thoughtful, committed people can change the world; indeed it's the only thing that ever has.”

Margaret Mead (1901-1977), Anthropologist