

2022 Watershed Update

Agenda

Wednesday, March 2, 2022

Municipality of Anchorage

Alaska Department of Transportation and Public Facilities

Online Meeting via MS Teams

The Municipality of Anchorage and Alaska Department of Transportation and Public Facilities
Invite you to the 2022 APDES Watershed Update Highlighting
Anchorage Storm Water Permit Compliance Activities

Program

9:00 APDES Storm Water Program

- Introductions
- APDES: What It's About -
- Agency Updates
 - ADEC Activities
 - CESCL Training
 - SWU Activity

Green Infrastructure at the Alaska DOT&PF

Ron Searcy, DOT&PF

Monitoring Program

- Dry Weather Screening -
Alena Gerlek, HDR, Inc.
- Stormwater Outfall Monitoring –
Kacy Grundhauser, HDR, Inc.

Scoop the Poop and Other Pet Waste Mgt. Projects -

Cherie Northon, AWC

11:00

Low Impact Development Training - *This training will focus on the Municipality's requirement for Green Infrastructure treatment of stormwater runoff. The discussion will include details regarding what Green Infrastructure means, how to successfully implement Green Infrastructure, and ways to address challenges such as inability to infiltrate stormwater into the subgrade.*

Attendees are eligible to receive one PDH.

Janie Dusel, AWR Engineering

~12:00 Discussion and Adjournment

2022 Watershed Update

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- 9:00 - APDES Storm Water Program
 - Introductions
 - APDES: What It's About
 - Agency Updates:
 - ADEC Activities
 - CESCL Training
 - SWU Activity
 - Green Infrastructure at the Alaska DOT&PF – **Ron Searcy, DOT&PF**
 - Monitoring Programs
 - Dry Weather Screening – **Alena Gerlek, HDR, Inc.**
 - Stormwater Outfall Monitoring – **Kacy Grundhauser, HDR, Inc.**
 - Scoop the Poop and Other Pet Waste Mgt. Projects – **Cherie Northon, AWC**
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Janie Dusel, AWR Engineering
- ~12:00 – Discussion and Adjournment

Municipality of Anchorage Watershed Update

Presented by:
MOA and DOT&PF

March 2022 update



<http://anchoragestormwater.com/>

Anchorage's MS4 permit

- Joint MOA and DOT&PF
- Administration by ADEC as part of APDES authorization
- Fourth MS4 permit for Anchorage – Escalating Enforcement
 - Assess operations and management practices
 - Implement required programs, plan reviews, inspections and training
 - Manage - based on national norms
 - Deicing agents, street sanding and sweeping practices, snow disposal policies, water quality

NPDES/APDES – National/Alaska Discharge Elimination System

Stormwater – means storm water runoff, snow melt runoff and surface runoff [40 CFR 122.26(b)(13)]

MS4 – Municipal Separate Storm Sewer System

MS4 Permit

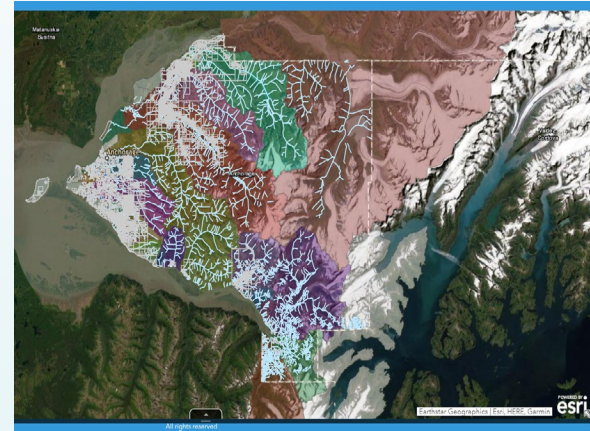


Stormwater
is identified
as a
Pollutant

- MS4 outfalls are designated as **point source** discharge of pollutants to waters of the U.S.
- Includes **non-point sources** of pollutants in the drainage area

MS4 Permit

- Allows permittees to discharge stormwater and certain non-stormwater to waters of the U.S. within boundaries of Municipality
- Discharges must meet state water quality standards
 - Treated to the **Maximum Extent Practicable (MEP)** (or **numeric limits** if established)
 - Within a framework of a **Storm Water Management Program (SWMP)**
 - Demonstrate compliance through self-assessment, annual reporting, and monitoring



7 Permit elements

1. Construction
2. New and Redevelopment
3. Industrial and Commercial Stormwater Discharge Management
4. Storm Water Infrastructure and Street Maintenance
5. Illicit Discharge Management
6. Public Education and Involvement
7. Monitoring

Construction Site Runoff

- Review Plans - Storm Water Pollution Prevention Plan (SWPPP)
- Verify coverage under Alaska Construction General Permit (CGP) and Common Plan of Development
- Inspect Project Sites
 - monthly for 5 acres and sites that pose higher threats (*based on slope, soil, location, etc.*)
 - minimum once per season for smaller sites
- Escalating enforcement policy
 - fines and stop work orders

Construction Controls fall into 3 categories:

- **Stabilization and/or cover** practice BMPs (e.g., seeding and mulching)
- **Structural** practice BMPs (e.g., sediment ponds, filter fence, straw bales)
- **Management measures** (e.g., construction scheduling, maintenance)



New and Redevelopment

Permanent Stormwater Controls

-10,000sf and greater Commercial

- Maintenance Agreements
- Inspection
- Track permanent controls

Low Impact Development and Green Infrastructure

- Incentives - design criteria



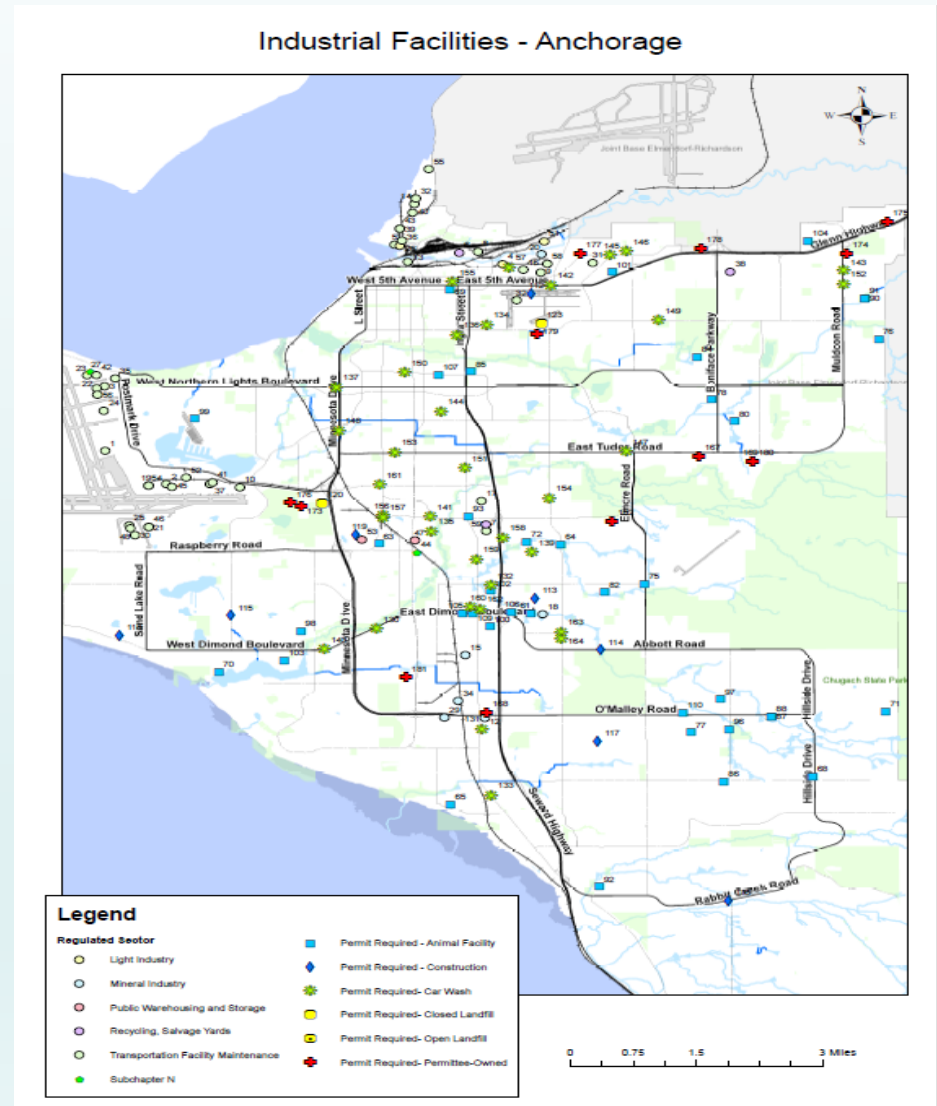
AWR Engineering

Green Infrastructure Incentives

- 20% Area Allowance: This provision allows runoff from up to 20% of a site to be untreated provided an equivalent volume of water is treated from somewhere else on the site using Green Infrastructure techniques.
- Utilizing Landscape: Provisions for incorporating stormwater treatment facilities into site landscaping and grading. This helps maximize utilization of space on a site.
- Detention and Downstream Analysis: Provides increased on-site detention without analysis of downstream capacity.
- Alternative Compliance: may waive conflicting requirements to encourage the use of Green Infrastructure

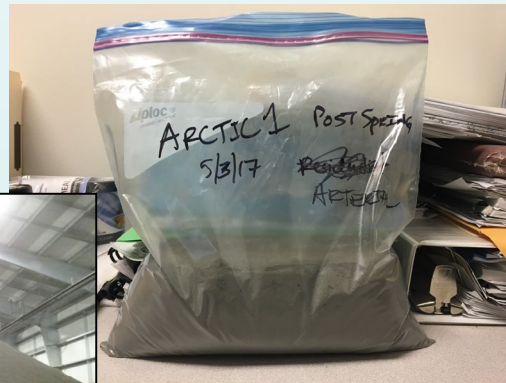
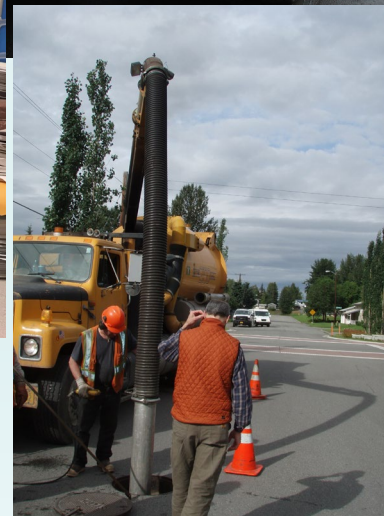
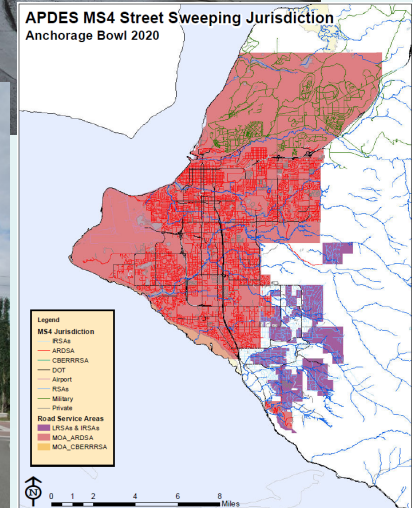
Industrial / Commercial/ Illicit Discharge

- Track Pollution through complaint follow-up and code enforcement
- Track multi-sector general permits & Community Right-to-Know facilities
- Regulate specific activities
 - Animal facilities
 - Private snow disposal sites
- Spill Response Plan



Street Maintenance and Facilities

- Implement best management practices for deicing, snow removal, street materials management, and maintenance
- Sweep Streets and Parking Lots
- Implement Pollution Prevention Plans for M&O facilities
- Inspect and Clean Catch Basins/OGS
- Manage Snow Disposal Sites
- Manage Materials – sand, salt, waste



Permit Tracking # _____ The Agency _____

Alaska Department of Environmental Conservation
MSGP Annual Reporting Form

Section 1: General Information

Facility Name: **Kloop Station Maintenance & Storage Facility**

APDES Permit Tracking Number: **N/A**

Facility Street Address: _____

Street: **5601 Northwood Drive**

City: **Anchorage** State: **Alaska** Zip: **99502**

Lead Inspector's Name: **Patrick Butler** Title: **SWPPP Inspector**

Additional Inspectors Name: **Dustin Richmond**

Contact Person: **Eric Hodgson** Title: **Superintendent**

Phone: **(907) 243-3100** email: **eric.hodgson@anchorageak.gov**

Inspection Date: _____

Section 2: Data

1. All part of the report shall be submitted to the lead inspector.

2. All data shall be submitted to the lead inspector.

3. All data shall be submitted to the lead inspector.

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10. All data shall be submitted to the lead inspector.

Monitoring and Assessment

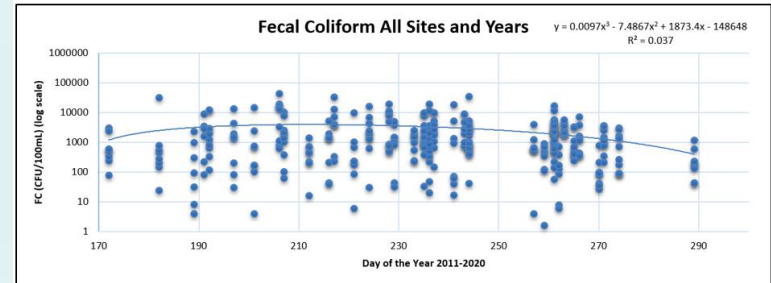
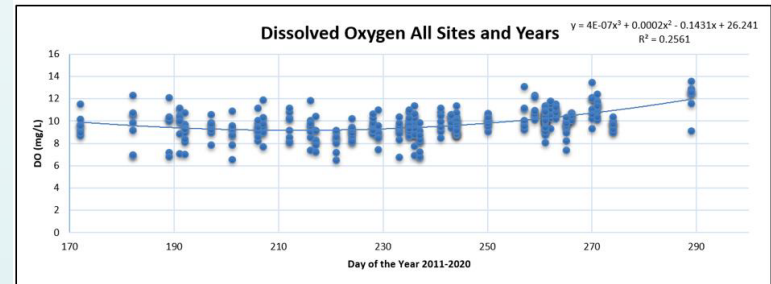
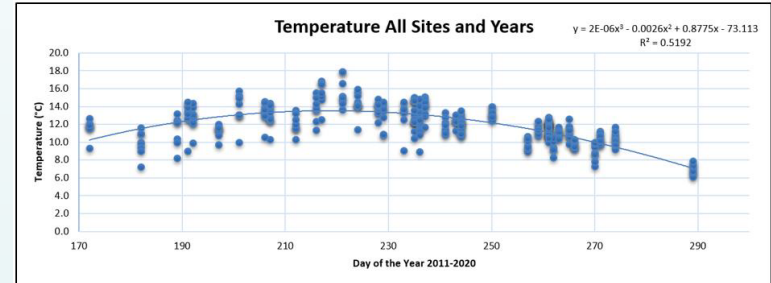


Assess performance of controls

-Pesticide Screening

-Stormwater outfalls

- Dry Weather
- Wet Weather



Photos by HDR

Public Education & Involvement

Community Education
through Anchorage Waterways Council

- General Public
- Businesses
- Landscapers/Property Managers/Homeowners

Anchorage creek cleanup is underway



Visit:
AWC@anchoragecreeks.org

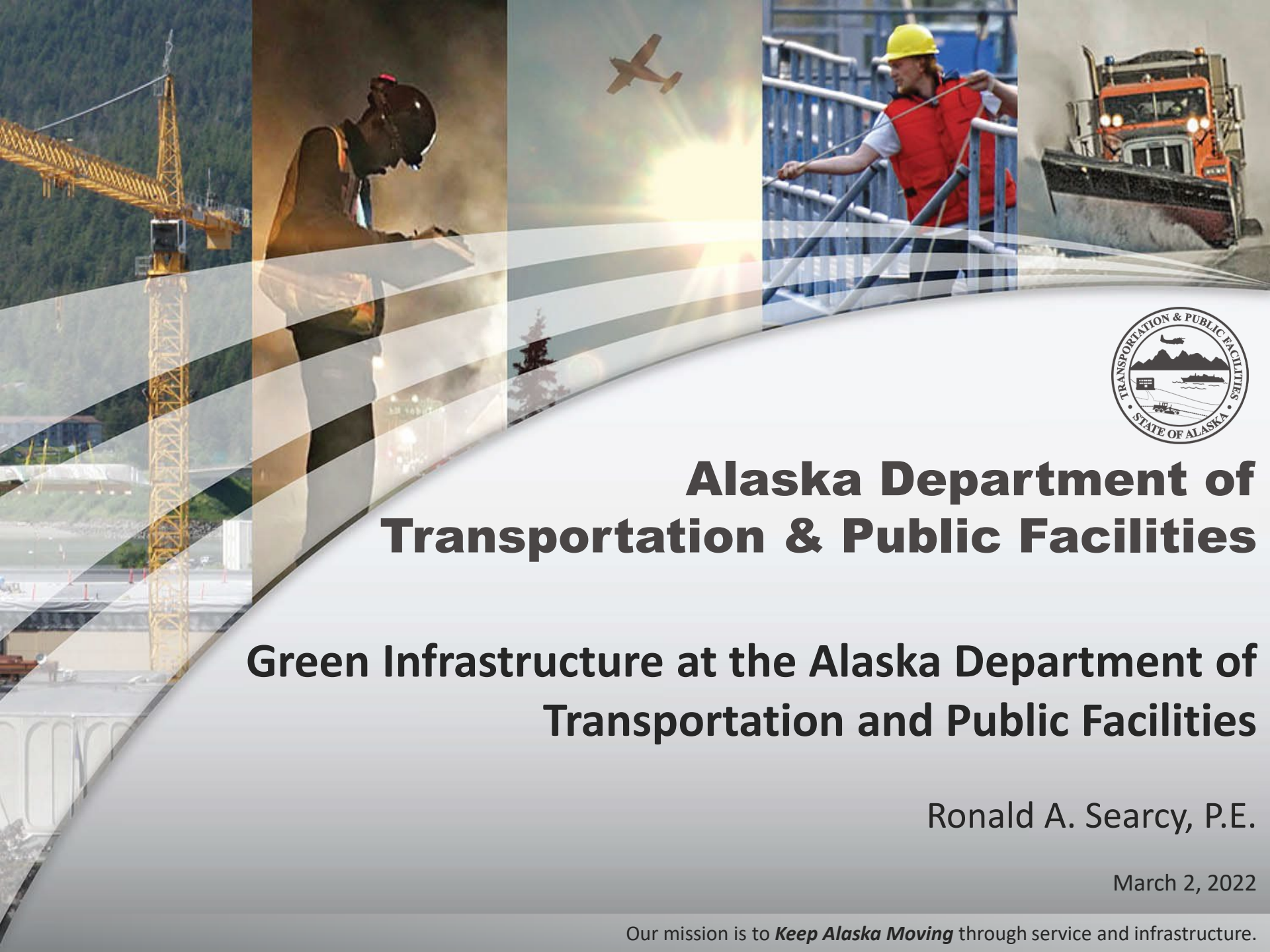


Photos by AWC

For maps & information...

Watershed Management Services
Website

<http://anchoragestormwater.com/>



Alaska Department of Transportation & Public Facilities

Green Infrastructure at the Alaska Department of Transportation and Public Facilities

Ronald A. Searcy, P.E.

March 2, 2022

Our mission is to *Keep Alaska Moving* through service and infrastructure.

Stormwater Runoff Problems

- The creeks, streams, wetlands, and other waters within the Municipality of Anchorage give our city much of its unique character.
- This network of waterways supports not only fish, wildlife, and natural habitats, but also businesses, neighborhoods, and the health of our community, improving our quality of life.

Stormwater Runoff Problems (Continued)

- Stormwater runoff continues to be a major cause of water pollution in urban areas. It carries trash, bacteria, heavy metals, and other pollutants through storm sewers into local waterways.
- Heavy rainstorms can cause flooding that damages property and infrastructure.
- Carries soils and sediment from one place to another place.



Federal Regulations

- 23 CFR 650 Subpart B states that:
- “ . . . all highways funded in whole, or in part under title 23, United States Code, shall be located, designed, constructed and operated according to standards that will minimize erosion and sediment damage to the highway and adjacent properties and abate pollution of surface and ground water resources.”



Historical

- Communities have used gray infrastructure—systems of gutters, pipes, and tunnels—to move stormwater away from where we live to treatment plants or straight to local water bodies.
- The gray infrastructure in many areas is aging, and its existing capacity to manage large volumes of stormwater is decreasing in areas across the country.

Historical (Continued)

- To meet this challenge, many communities are installing green infrastructure systems to bolster their capacity to manage stormwater. By doing so, communities are becoming more resilient and achieving environmental, social, and economic benefits.

What is Green Infrastructure?

- In 2019, Congress enacted the Water Infrastructure Improvement Act, which defines green infrastructure as "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters."
- Basically, green infrastructure filters and absorbs stormwater where it falls.



Benefits of Using Green Infrastructures

- When green infrastructure systems are installed throughout a community, city or across a regional watershed, they can provide cleaner air and water as well as significant value for the community with flood protection, diverse habitat, and beautiful green spaces.

Examples of Green Infrastructure

- Examples of Green Infrastructure (EPA):
 - 1. Downspout Disconnection
 - 2. Rainwater Harvesting
 - 3. Rain Gardens
 - 4. Planter Boxes
 - 5. Bioswales
 - 6. Permeable Pavements
 - 7. Green Streets and Alleys
 - 8. Green Parking
 - 9. Green Roofs
 - 10. Urban Tree Canopy
 - 11. Land Conservation

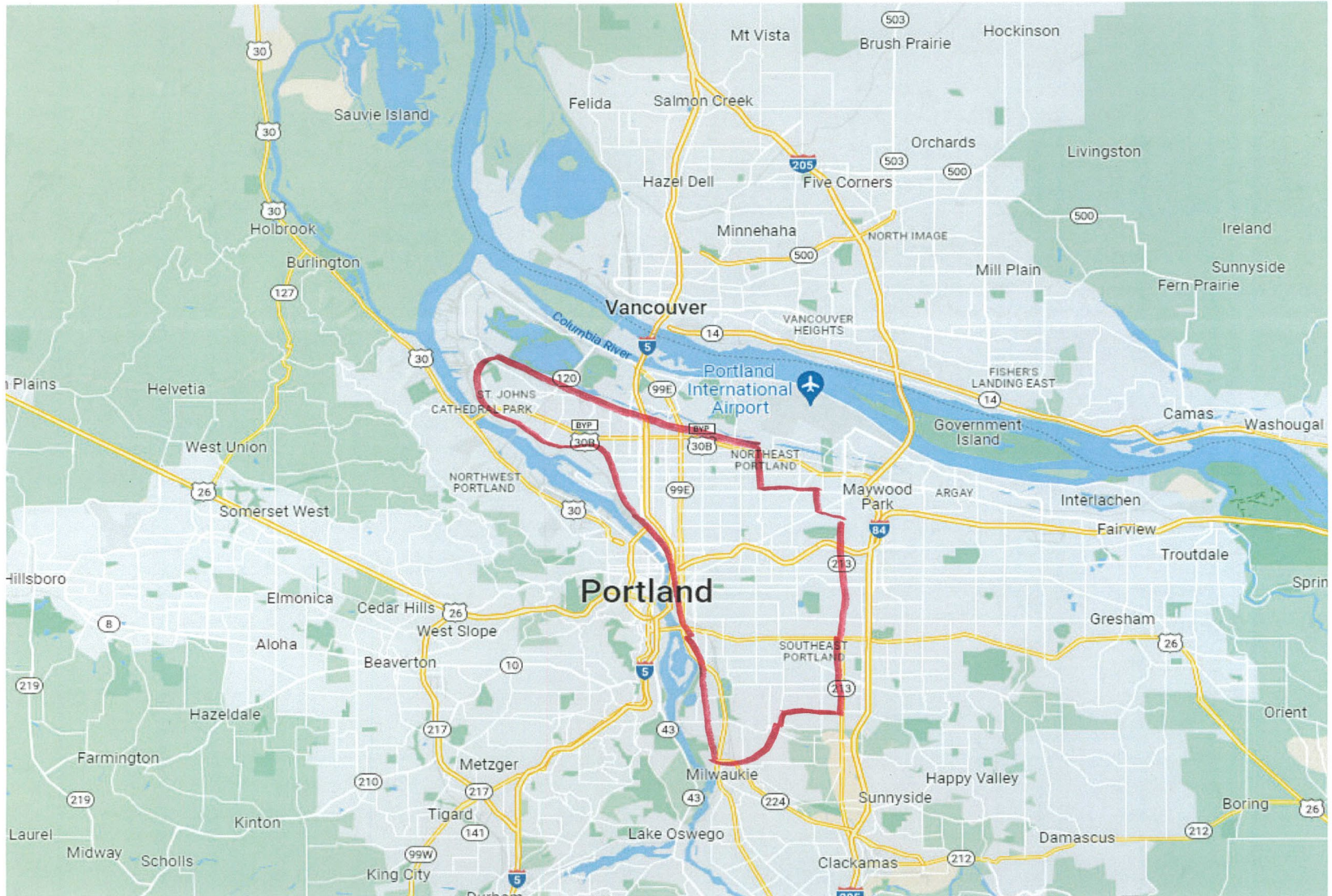
Downspout Disconnections

- This simple practice reroutes rooftop drainage pipes from draining rainwater into the storm sewer to draining it into rain barrels, cisterns, or permeable areas. You can use it to store stormwater and/or allow stormwater to infiltrate into the soil. Downspout disconnection could be especially beneficial to cities with combined sewer systems.

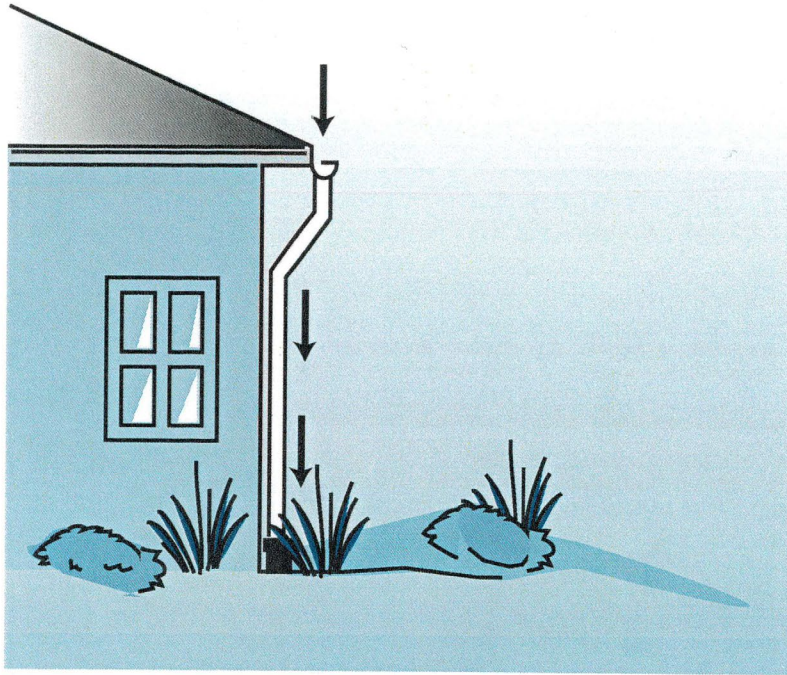
Downspout Disconnection Example

- Between 1993 and 2011, Portland Oregon's Downspout Disconnection Program disconnected over 56,000 downspouts from the city's combined sewer system in the target areas shown on this map.
- It is estimated that doing this removes over 1.3 billion gallons of stormwater from Portland's combined sewer system each year.

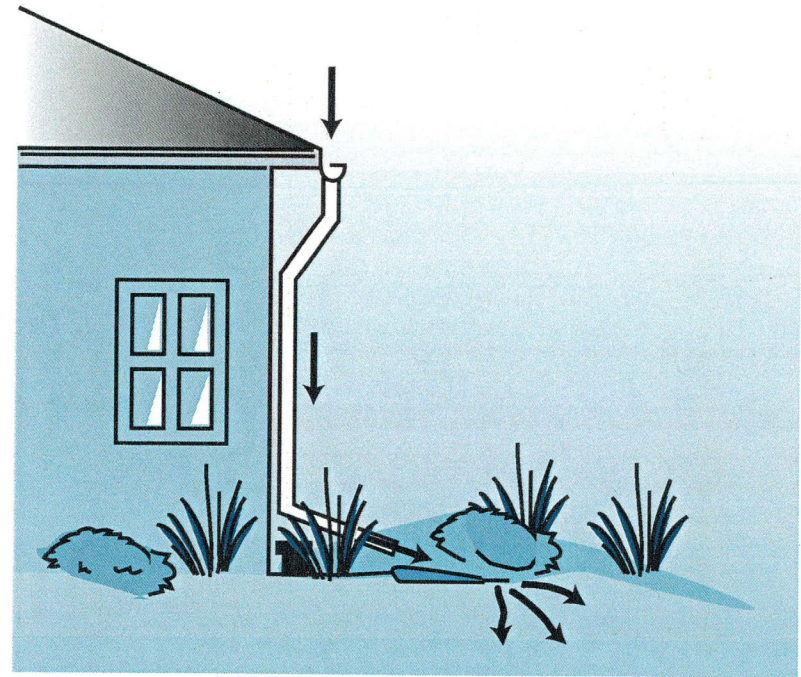
Downspout Disconnection at DOT&P



Downspout Disconnection at DOT&PF



CONNECTED DOWNSPOUT



DISCONNECTED DOWNSPOUT

DOT&PF Statewide Public Facilities brings the roof downspout system up to code when replacing or upgrading a State building roof.

Rainwater Harvesting

- Rainwater harvesting systems reduce stormwater pollution by slowing runoff and collecting rainfall for later use.
- The variety of systems range from:
 - ❖ Backyard rain barrels
 - ❖ Commercial building cisterns
 - ❖ Ground level pits
 - ❖ Nets that capture dew and fog
- These types of systems have been implemented world-wide.

Rainwater Harvesting Examples

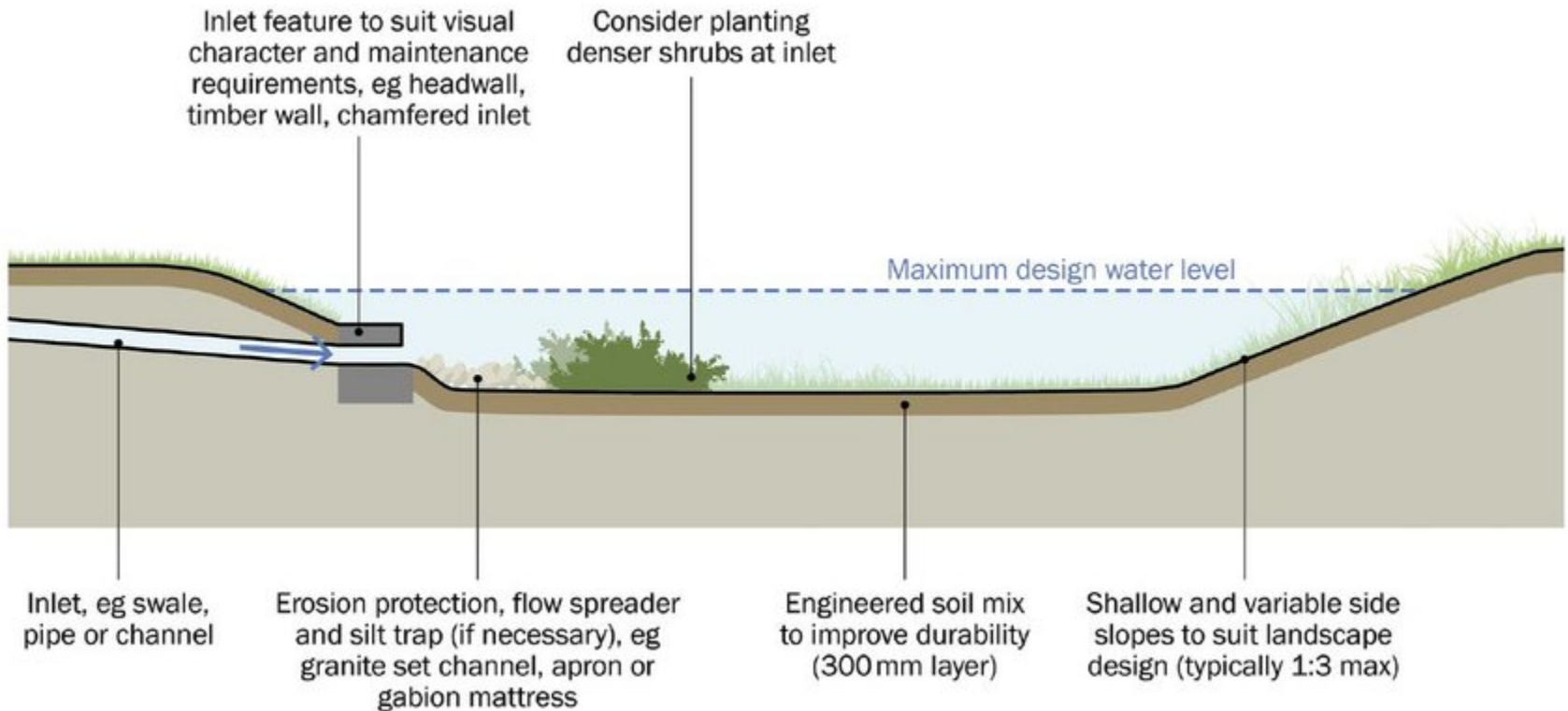


Milwaukee Metropolitan Sewerage District
(MMSD)

Rainwater Harvesting

- India is looking at ways to improve the water table levels is to capture the rainwater and utilize it for recharging of ground aquifers.
- Infiltration Basins - An infiltration basin is defined as an open impoundment (greater than 15 feet wide in its minimum dimension) created either by excavation or embankment with a flat, densely vegetated floor dedicated to the infiltration of runoff through the ground surface.

Infiltration Basin Example



Rainwater Harvesting at DOT&PF



Rainwater Harvesting at DOT&PF

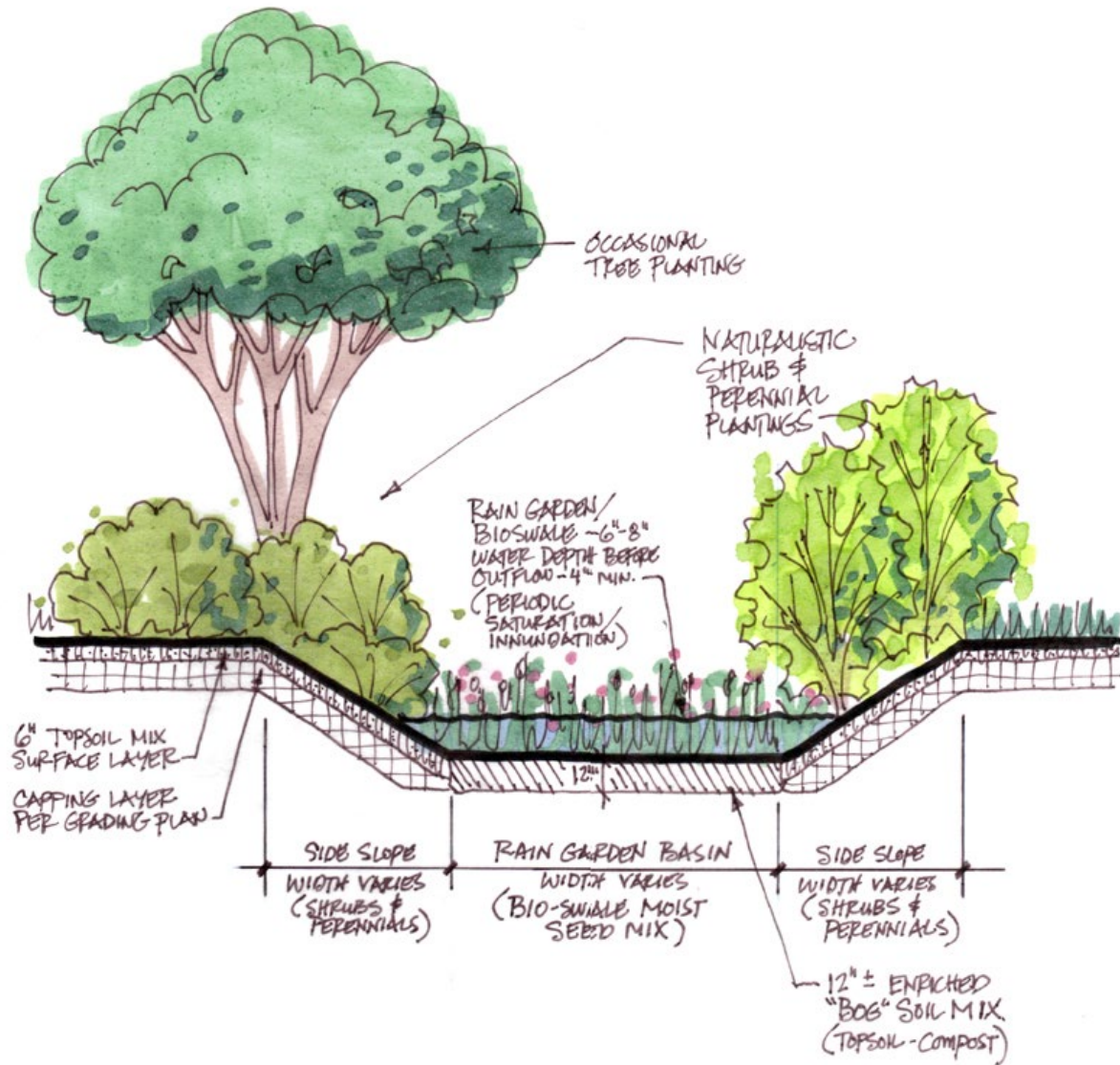




Rain Gardens

- Rain gardens are small, shallow, sunken areas of plantings that collect stormwater runoff from roofs, streets, and sidewalks.
- Also known as bioretention cells, they are designed to mimic the natural ways water flows over and absorbs into land to reduce stormwater pollution.

Rain Garden Example



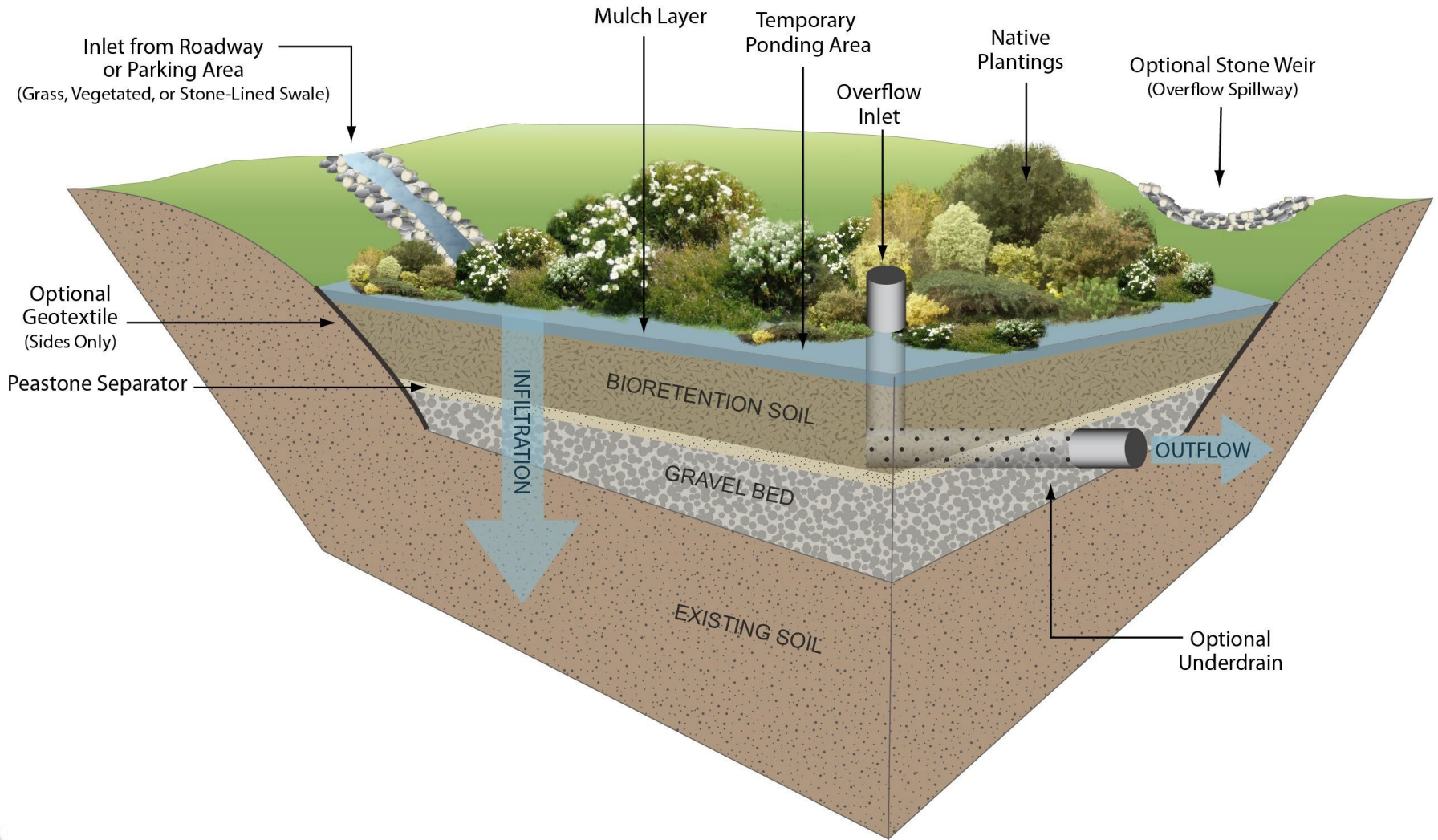
Rain Garden Example



Drawing provided by
Emmons & Olivier Resources, Inc.



Rain Garden Example



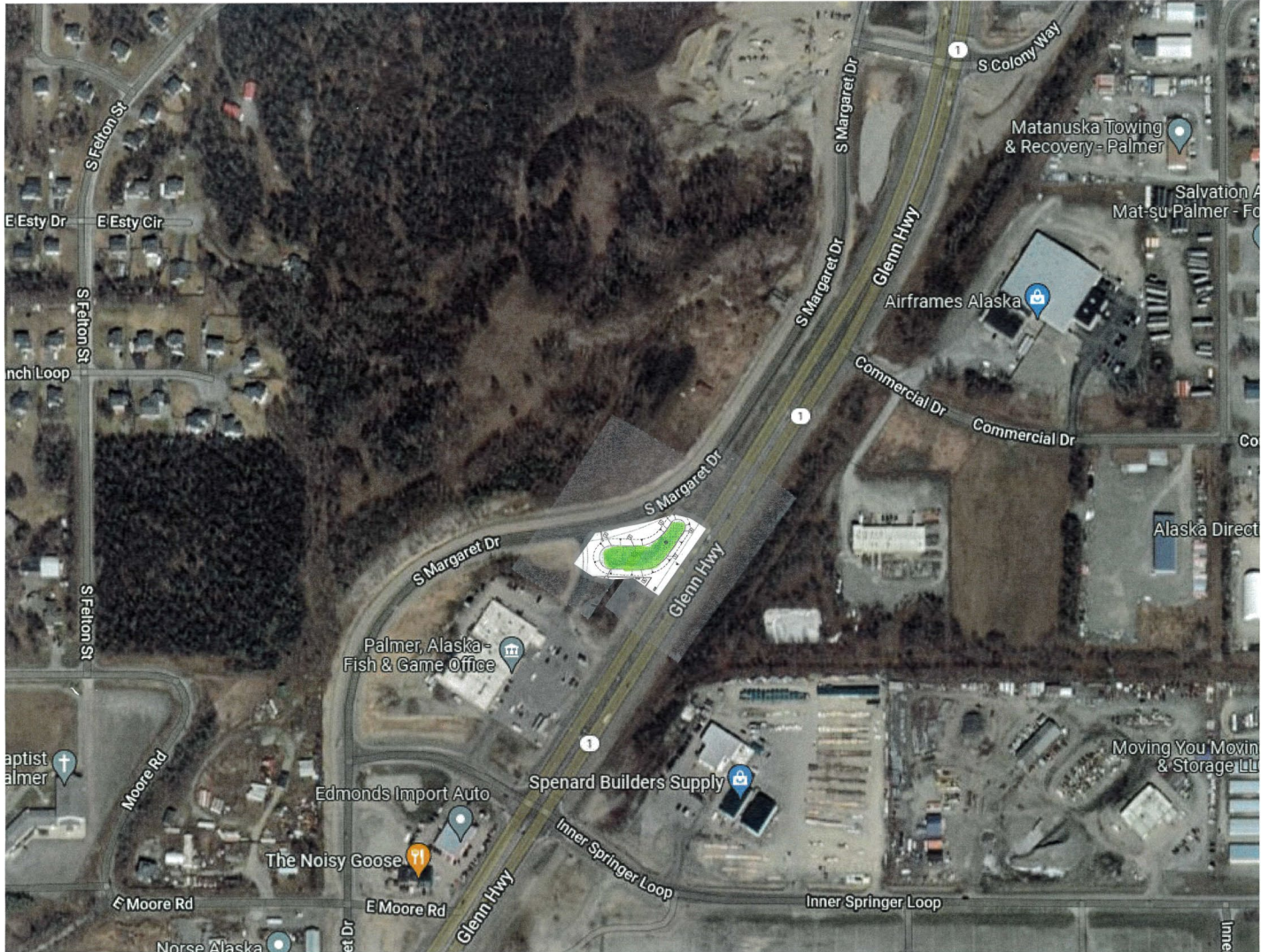
Rain Gardens at DOT&PF

- Glenn Highway: S. Inner Springer Loop to W. Arctic Avenue (2019 to 2020 Construction).
 1. SB Glenn at E. Clair Street (approximately 11,400 sq. ft)
 2. SB Glenn at S. Margaret Drive (approximately 15,000 sq. ft)
 3. S. Margaret Drive at W. Harold Street (approximately 24,000 sq. ft)
 4. S. Margaret Dr at E. Moore Road (approximately 6,000 sq. ft)
 5. S. Margaret Dr. at E. Jay Street (approximately 9,500 sq. ft)

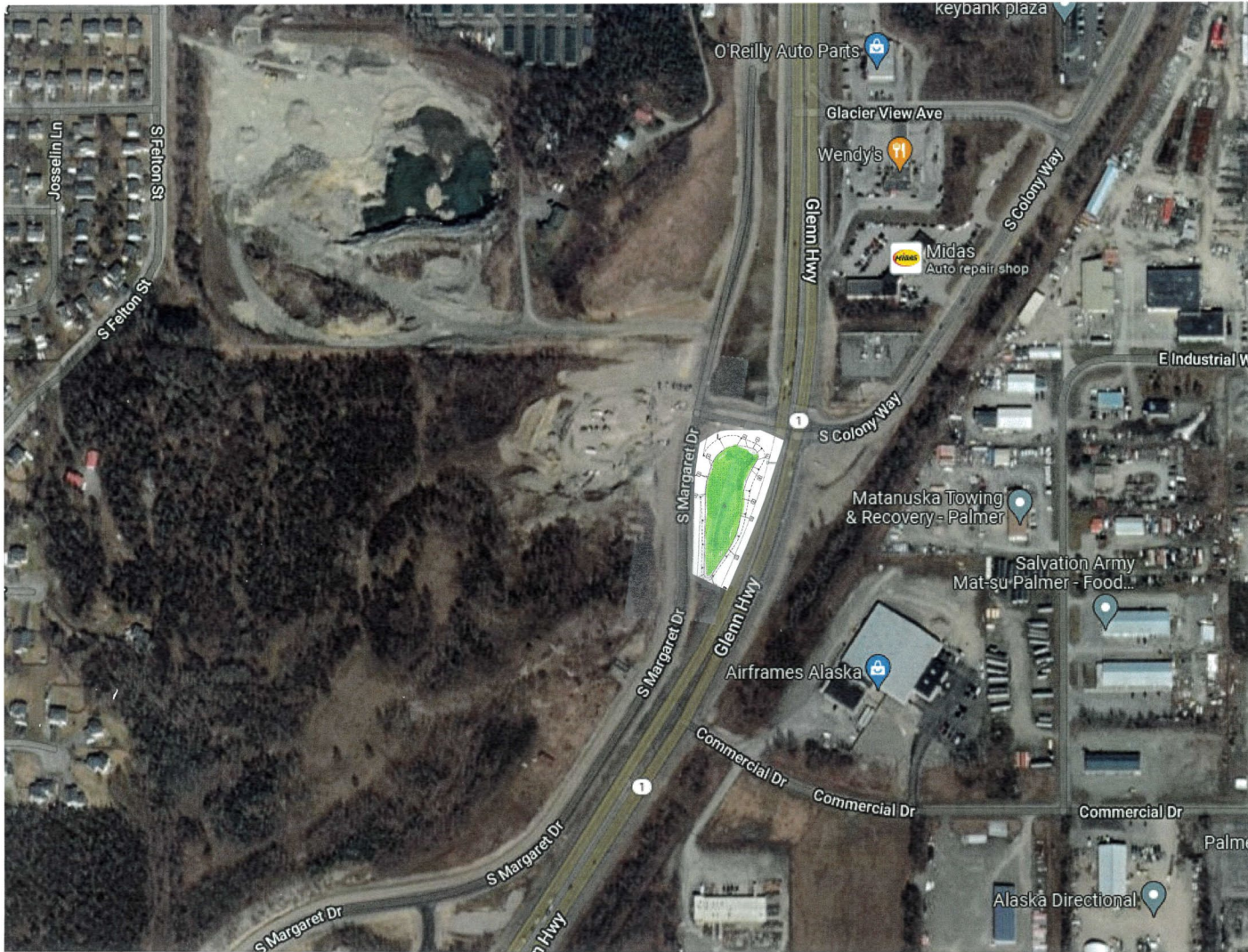
Rain Gardens at DOT&PF



Rain Gardens at DOT&PF



Rain Gardens at DOT&PF



Rain Gardens at DOT&PF





Planter Boxes

- Planter boxes are urban rain gardens with vertical walls and either open or closed bottoms.
- Usually found in downtown areas, they collect and absorb runoff from streets, sidewalks, and parking lots.
- Ideal for areas with limited space, planter boxes can be a useful way to beautify city streets.

Planter Box Example



Planter Box Example



Planter Boxes at DOT&PF

- Safety is a national transportation performance goal area, but more importantly, it is the number one priority for all transportation system users.
- DOT&PF is addressing transportation safety through a "Toward Zero Deaths" approach, which focuses on zero fatalities and the promise to move residents and visitors to their destinations safely.



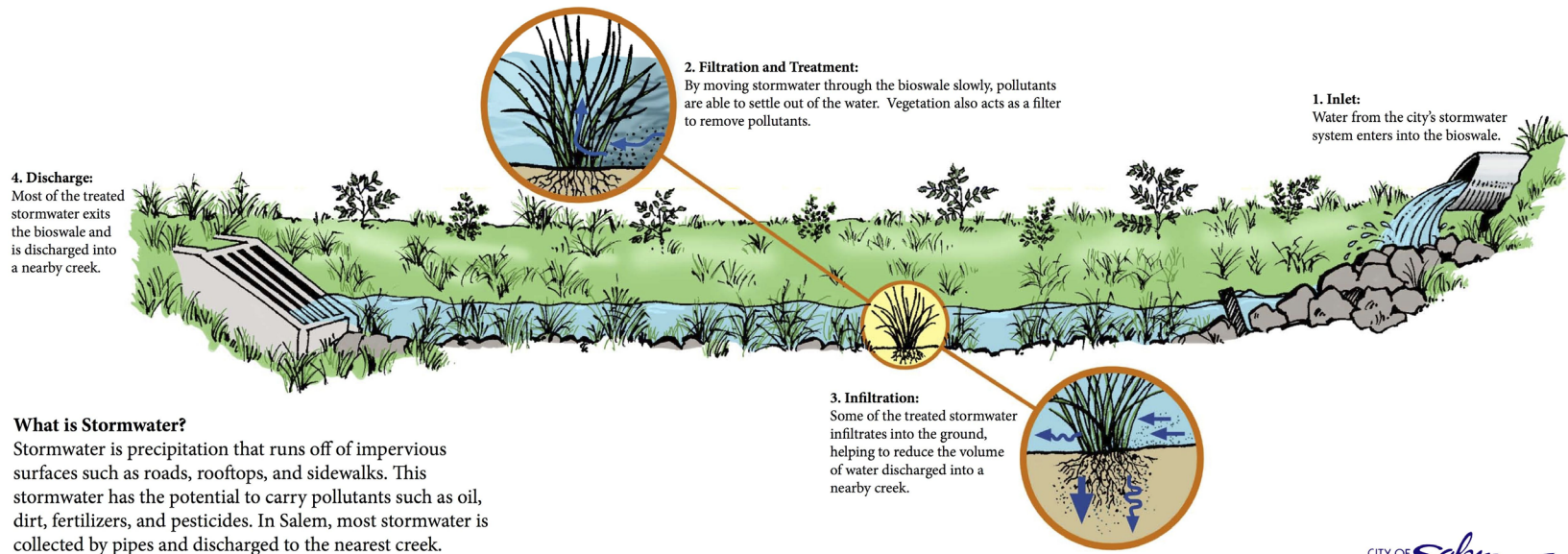
Bioswales

- Bioswales are storm water runoff conveyance systems that provide an alternative to storm sewers.
- They can absorb low flows or carry runoff from heavy rains to storm sewer inlets or directly to surface waters.
- Bioswales improve water quality by infiltrating the first flush of storm water runoff and filtering the large storm flows they convey.
- Bioswales, often found along curbs and in parking lots, use vegetation or mulch to slow and filter stormwater flows.

Bioswale Example

The 12th Street Bioswale

A bioswale is a vegetated depression that treats stormwater run-off from nearby surfaces such as roads and rooftops. Although similar in appearance to a ditch, a bioswale differs in that it is designed to convey water at a slow speed. Slowing the water enables some of it to infiltrate into the ground, and it also allows solids (dirt and pollutants) to settle out of water that does not infiltrate. Through infiltration and settling of solids, a bioswale helps improve the quality of stormwater before it enters nearby streams.



What is Stormwater?

Stormwater is precipitation that runs off of impervious surfaces such as roads, rooftops, and sidewalks. This stormwater has the potential to carry pollutants such as oil, dirt, fertilizers, and pesticides. In Salem, most stormwater is collected by pipes and discharged to the nearest creek.

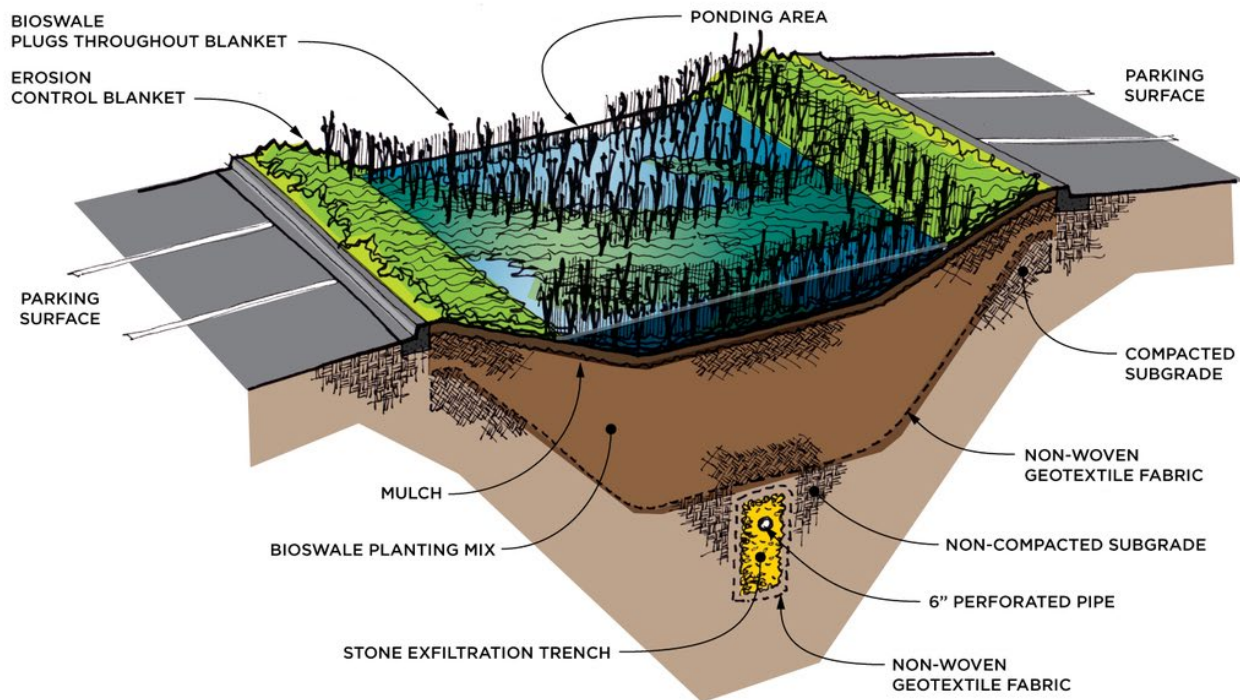


12th Street Bioswale Facts:

- Designed to treat potential stormwater pollutants such as oil, metals (copper, lead, and zinc), and sediment.
- Treats stormwater from more than 16 acres of surrounding roads and residential development, in the vicinity of Ewald Ave. SE and Oakhill Ave. SE. It is 270 feet in length.
- Constructed by the City of Salem Public Works Department to improve the quality of stormwater entering Pringle Creek.
- Planted with vegetation native to the area, including grasses, kinnikinnick, strawberry, rushes, sedges, and Oregon Grape.



Bioswale Example



Bioswales at DOT&PF

- DOT&PF follows:
 - ❖ Clean Water Act
 - ❖ Federal Policy: 23 CFR 650 Subpart B
 - ❖ AASHTO Policy: Erosion and Sediment Control Policies control is directly associated with proper provision for drainage and fitting landscape development
 - ❖ Alaska Pollutant Discharge Elimination System (APDES) permit
 - ❖ Anchorage Municipal Separate Storm Sewer System (MS4) Permit
 - ❖ Alaska Highway Drainage Manual Chapter 16, Erosion and Sediment Control
 - ❖ Consent Decree with EPA (September 21, 2010)

Permeable Pavements

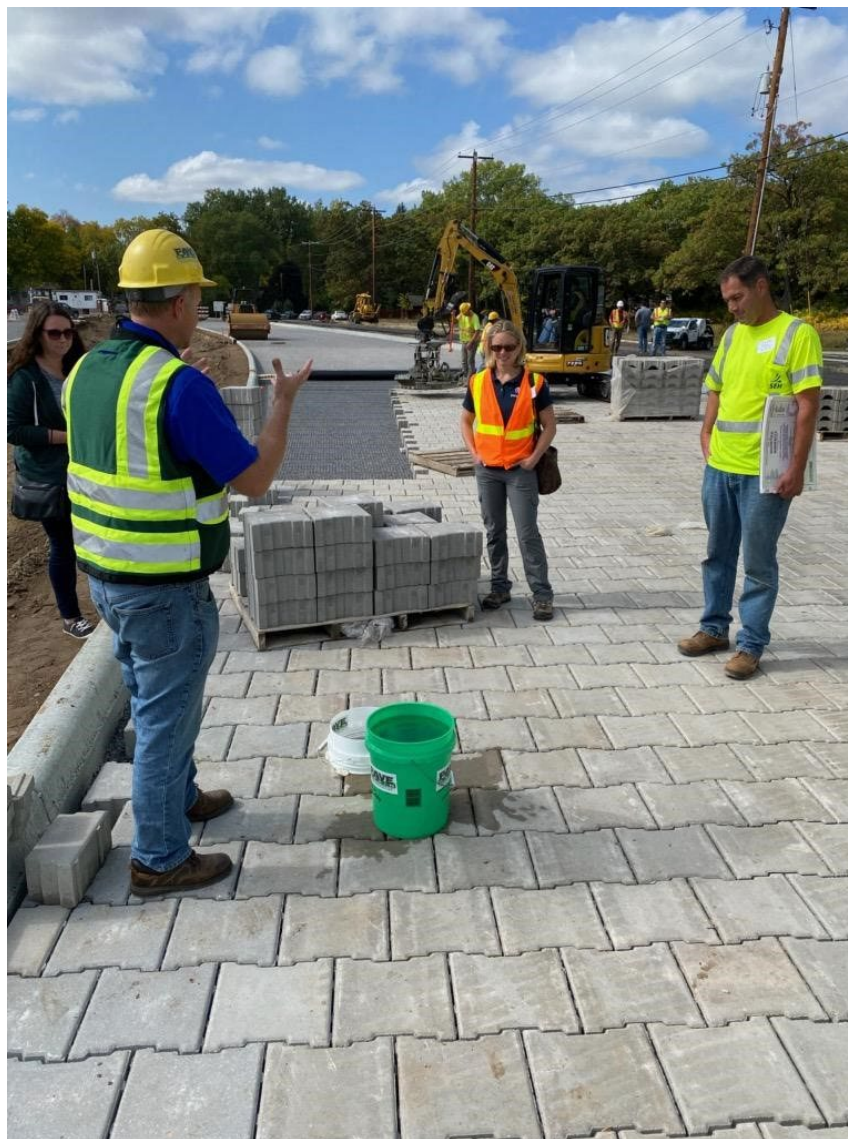
- Permeable pavements infiltrate, treat, and/or store rainwater where it falls.
- They can be made of pervious concrete, porous asphalt, or permeable interlocking pavers.
- This practice could be particularly cost effective where land values are high, and flooding or icing is a problem.

Permeable Pavement Example



- In 2009 a residential street project in Shoreview, Minn. — a suburban area north of St. Paul — received national attention because it was the largest public street project in the country to use pervious concrete in lieu of storm sewers. The city installed about 1 mile of the porous pavement that will allow water to drain straight to the ground below and prevent runoff that can be damaging to waterways. There were no catch basins, pipes, or settling ponds. But this project also deserves a closer look because of the thoughtful and innovative forensic research conducted by the parties involved before the job even began.

Permeable Pavement Example



Permeable Pavement Example



Permeable Pavement Example



Permeable Pavement at DOT&PF

- Airport Way/Cushman Street Intersection Reconstruction in Fairbanks (currently under design)
- Traffic Islands – Permeable Pavers

Permeable Pavement at DOT&PF



Permeable Pavement at DOT&PF

- Challenges with Permeable Pavements in Alaska :
 - ❖ Constructability and durability in freeze-thaw susceptible areas.
 - ❖ Prone to heaving, creating uneven surfaces, which in turn create catchpoints for snowplows.
 - ❖ They require regular maintenance to clean out debris in order to maintain runoff filtration capabilities.
 - ❖ Research by Minnesota State Department of Transportation stated, “Permeable pavements require regular maintenance via pressure washing and/or vacuuming to prevent clogging that decreases infiltration capacity. Sand cannot be used for winter maintenance, and road salt application can be reduced.”
 - ❖ Safety – DOT&PF Roads tend to have higher speeds

Green Streets and Alleys

- Green streets and alleys are created by integrating green infrastructure elements into their design to store and filter stormwater. Permeable pavement, bioswales, planter boxes, and trees are among the elements that can be woven into street or alley design.

Green Street and Alley Example



Chicago alley with impermeable pavement and poor drainage.

Green Street and Alley Example



Chicago alley incorporating green alley principles.

Green Streets and Alleys at DOT&PF





Green Parking

- Many green infrastructure elements can be seamlessly integrated into parking lot designs. Permeable pavements can be installed in sections of a lot and rain gardens and bioswales can be included in medians and along the parking lot perimeter. When built into a parking lot, these elements also reduce the heat island effect and improve walkability in the area.

Green Parking Example



- Permeable pavers, porous asphalt, and bioretention cells at the Silver Lake beach parking lot for the Ipswich River Watershed Project, Wilmington, Massachusetts
- Purpose of the Project:
 - ❖ Reduce stormwater runoff and nonpoint source pollution to Silver Lake and maximize infiltration to groundwater.
 - ❖ Demonstrate the use and performance of different types of permeable paving materials.
 - ❖ Demonstrate the use of bioretention cells to reduce runoff and pollutants from impervious surfaces.
 - ❖ Assess and characterize potential impacts to groundwater quality could result from the use of permeable pavement.

Green Parking Example



Green Parking at DOT&PF

- No green parking lot projects to date.
- DOT&PF Division of Facilities Services includes Statewide Public Facilities (Design & Construction), and Maintenance & Operations supports multi-departmental facilities statewide.
- Green parking lots could be part of future parking lot maintenance work.



Green Roofs

- Green roofs are covered with growing media and vegetation that enable rainfall infiltration and evapotranspiration of stored water. They are particularly cost-effective in dense urban areas where land values are high and on large industrial or office buildings where stormwater management costs are likely to be high.

Green Roof Examples



Green Roof Examples



Juneau Transportation Center

Green Roof Examples



Juneau Transportation Center

Green Roof at DOT&PF???

- [Goats on Renndølsetra, Norway](#)





Urban Tree Canopy

- Trees absorb stormwater in their leaves and branches. Many cities have set tree canopy goals to restore the benefits of trees lost when the areas were developed. Homeowners, businesses, and community groups can participate in planting and maintaining trees throughout the urban environment.

Urban Tree Canopy Example



Rural Tree Canopy Example



Tree Canopies at DOT&PF

- Challenges with Tree Canopies in Alaska :
 - ❖ Roadway designs need to meet AASHTO Standards for Highway Geometric Design
 - ❖ Constructability – will take a long time for the trees to grow.
 - ❖ Safety issues for the traveling public.
 - ❖ Icing issues in the shade – especially in the spring.
 - ❖ Hides moose

Tree Canopies at DOT&PF



Land Conservation

- Land conservation has several meanings.
 - ❖ Land conservation can refer to various methods of preserving land, and ensuring it is protected forever from development.
 - ❖ In terms of statistics, land conservation refers to the correct water flow over agricultural land that minimizes loss of sediments in the soil.
 - ❖ Land conservation can also refer to the planting of trees, or the setting of an easement around industrial-use land (combined with protected forests), which helps to reduce atmospheric carbon, and keep the property in pristine condition.

Land Conservation (Continued)

- ❖ The water quality and flooding impacts of urban stormwater also can be addressed by protecting open spaces and sensitive natural areas within and adjacent to a city while providing recreational opportunities for city residents.
- Natural areas that should be a focus of this effort include riparian areas, wetlands, and steep hillsides.

Land Conservation (Continued)



Land Conservation (Continued)

- Prevents Massive Future Problems

Copper River Hwy Bridge No. 339 in 2010

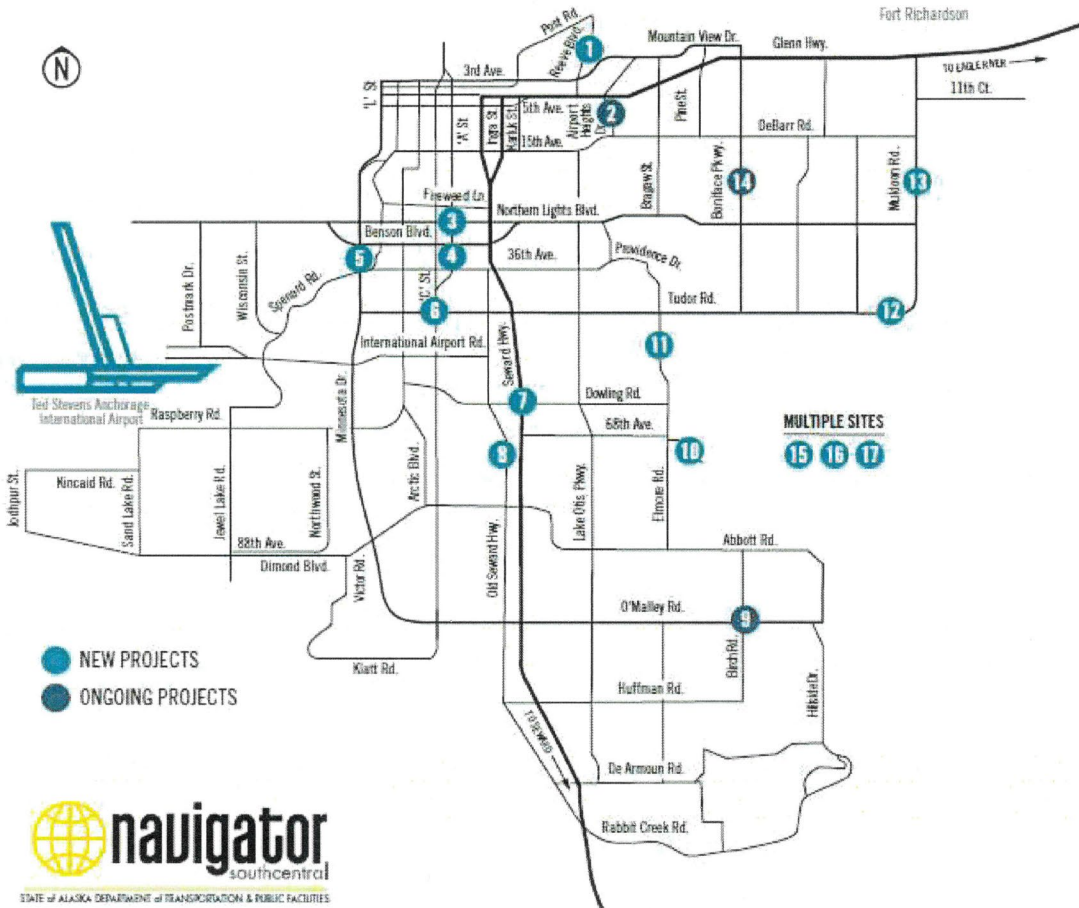


Copper River Hwy Bridge No. 339 in 2013



DOT&PF Projects in 2022

ANCHORAGE



- 1 AMATS: REEVE BOULEVARD, 5TH AVENUE to POST ROAD PAVEMENT PRESERVATION
- 2 AMATS: AIRPORT HEIGHTS, DEBARR ROAD to GLENN HIGHWAY PAVEMENT PRESERVATION
- 3 HSIP: A STREET, MIDTOWN COUPLET OVERHEAD SIGNAL INDICATION U/G
- 4 A STREET, NORTHERN LIGHTS BOULEVARD to 40TH AVENUE PAVEMENT PRESERVATION
- 5 MINNESOTA DRIVE, TUDOR ROAD to 15TH AVENUE, PAVEMENT PRESERVATION
- 6 HSIP: C STREET, TUDOR ROAD and DIMOND BOULEVARD INTERSECTIONS
- 7 DOWLING ROAD and SEWARD HIGHWAY INTERCHANGE RECONSTRUCTION
- 8 OLD SEWARD HIGHWAY, DIMOND BOULEVARD to DOWLING ROAD PAVEMENT PRESERVATION
- 9 AMATS: O'MALLEY ROAD RECONSTRUCTION, LIVINGSTON STREET to HILLSIDE DRIVE, PHASE II
- 10 CTF: BLM ROAD to CAMPBELL TRACT FACILITY ALTERNATE ENTRANCE ALIGNMENT (WFL)
- 11 ELMORE ROAD, ABBOTT ROAD to PROVIDENCE DRIVE, PAVEMENT PRESERVATION
- 12 AMATS: CHUGACH FOOTHILLS CONNECTOR, PHASE II
- 13 MULDOON ROAD, DEBARR ROAD to EAST 36TH AVENUE, PAVEMENT PRESERVATION
- 14 BONIFACE PARKWAY, TUDOR ROAD to JBER GATE, PAVEMENT PRESERVATION
- 15 ANCHORAGE AREA DRAINAGE IMPROVEMENTS FY 2019
- 16 AMATS: ANCHORAGE AREA PATHWAY and TRAIL PAVEMENT REPLACEMENT
- 17 HSIP: ANCHORAGE PEDESTRIAN LIGHTING

DOT&PF Projects in 2022 (Continued)

- Eagle River Loop Pedestrian Undercrossing Nov 2018 EQ PR
- Eagle River Loop Storm Drain Nov 2018 EQ PR
- Briggs Bridge Nov 2018 EQ PR
- Central Region Bridges Nov 2018 EQ PR
- Glenn Hwy at Mirror Lake Nov 2018 EQ PR
- Dowling Road and 3rd Ave-NOV 2018 EQ PR (MOA)
- Anchorage District Group B - Nov 2018 EQ PR

DOT&PF Projects in 2022 (Continued)

- Seward Highway MP 75-90, Phase II
- AMATS: Hiland Rd MP 0 to MP 3.2 Pavement Preservation
- AMATS: Boundary Ave: Boniface to Oklahoma
- Lake Hood Aircraft and Lakeshore Drive Rehabilitate
- HSIP: Glenn Hwy Median Barrier MP 30 to 34
- HSIP: Anchorage Pedestrian Lighting, Phase I
- HSIP: Seward Highway Rockfall Mitigation

Dry Weather Screening



APDES Annual Meeting
March 2, 2022



Program Objective

Detect and reduce illicit discharges to the MS4

Illicit discharge = any discharge not entirely composed of stormwater

Industrial
process
wastewater

Domestic
wastewater

Car wash water



Current Permit Cycle: 2020-2025



ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

ANCHORAGE MUNICIPAL SEPARATE STORM SEWER SYSTEM
INDIVIDUAL PERMIT – FINAL PERMIT

Permit Number: AKS052558

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

In compliance with the provisions of the Clean Water Act (CWA), 33 U.S.C. ' 1251 *et seq.*, as amended by the Water Quality Act of 1987, P.L. 100-4; this permit is issued under provisions of Alaska Statutes 46.03; the Alaska Administrative Code (AAC) as amended; and other State laws and regulations. The

**The MUNICIPALITY OF ANCHORAGE and
The ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
(hereafter "permittees")**

is authorized to discharge from all municipal separate storm sewer system (MS4) outfalls existing as of the effective date of this permit to receiving waters of the United States which include but are not limited to: Cook Inlet, Knik River, Eklutna River, Edmonds Lake Creek, Mink Creek, Parks Creek, Mirror Creek, Little Peters Creek, Peters Creek, Carol Creek, Fire Creek, Eagle River, Meadow Creek, South Fork Eagle River, Ship Creek, Chester Creek, North Fork Chester Creek, Middle Fork Chester Creek, South Fork Chester Creek, Fish Creek, Campbell Creek, North Fork Campbell Creek, South Fork Campbell Creek, Little Campbell Creek, Craig Creek, Bayshore Creek, Furrow Creek, Hood Creek, Little Survival Creek, Rabbit Creek, Elmore Creek, Little Rabbit Creek, Potter Creek, Rainbow Creek, Bird Creek, Indian Creek, Tidewater Slough, Alyeska Creek, California Creek, Glacier Creek, Virgin Creek, Winner Creek, Crow Creek, Peterson Creek, Twentymile River, Portage Creek, and Placer River, their tributaries, associated lake systems, and wetlands located within the corporate boundary of the Municipality of Anchorage, in accordance with the conditions set forth herein.

This permit shall become effective on August 1, 2020

This permit and the authorization to discharge shall expire after July 31, 2025

The Permittee must reapply for permit reissuance on or before February 1, 2025, 180 days before the expiration of this permit if the Permittee intends to continue operation and discharges from the MS4 beyond the term of this permit.

A handwritten signature in black ink, appearing to be "S. M.", written over a horizontal line.

Signature

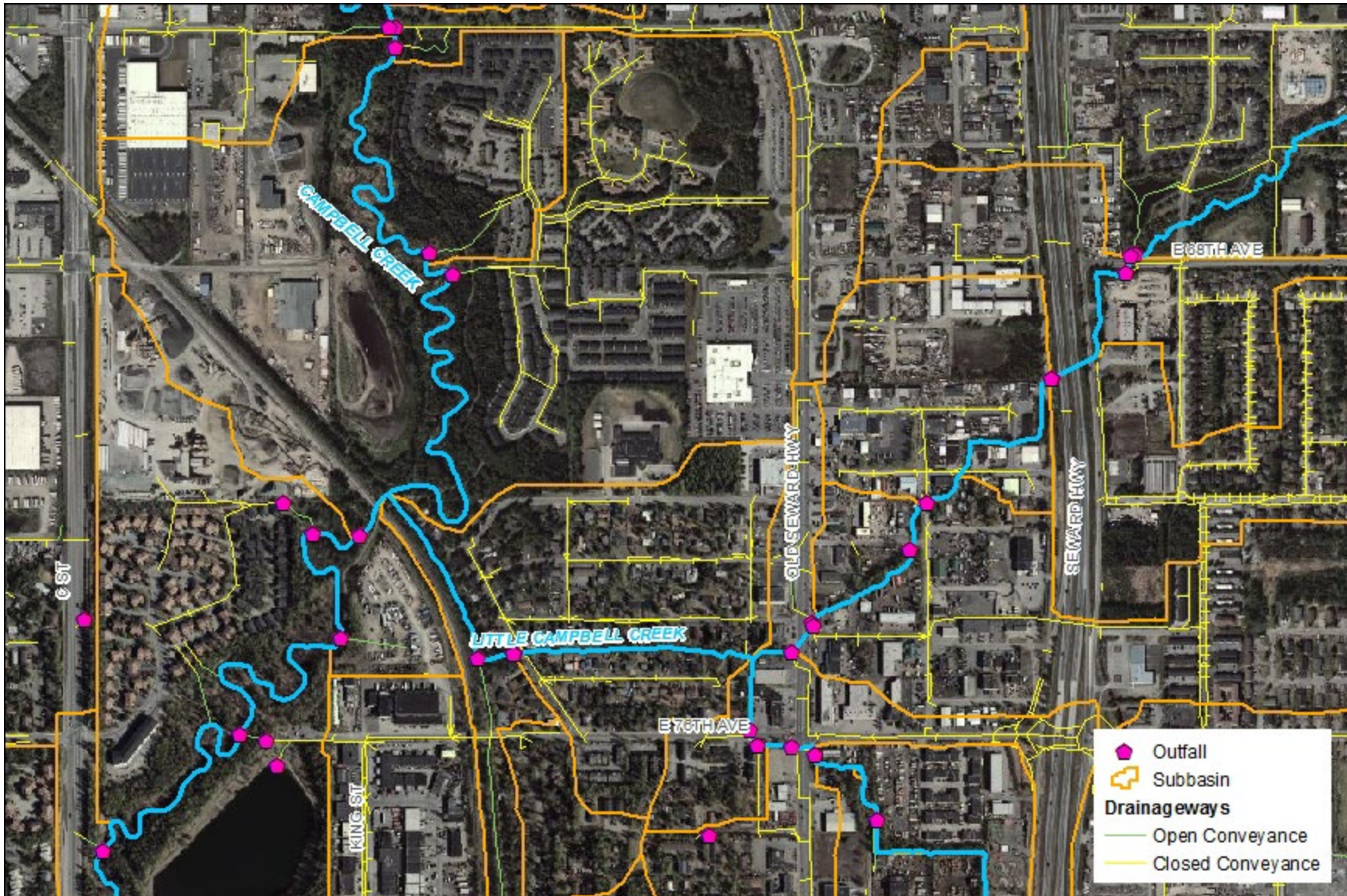
June 23, 2020

Date

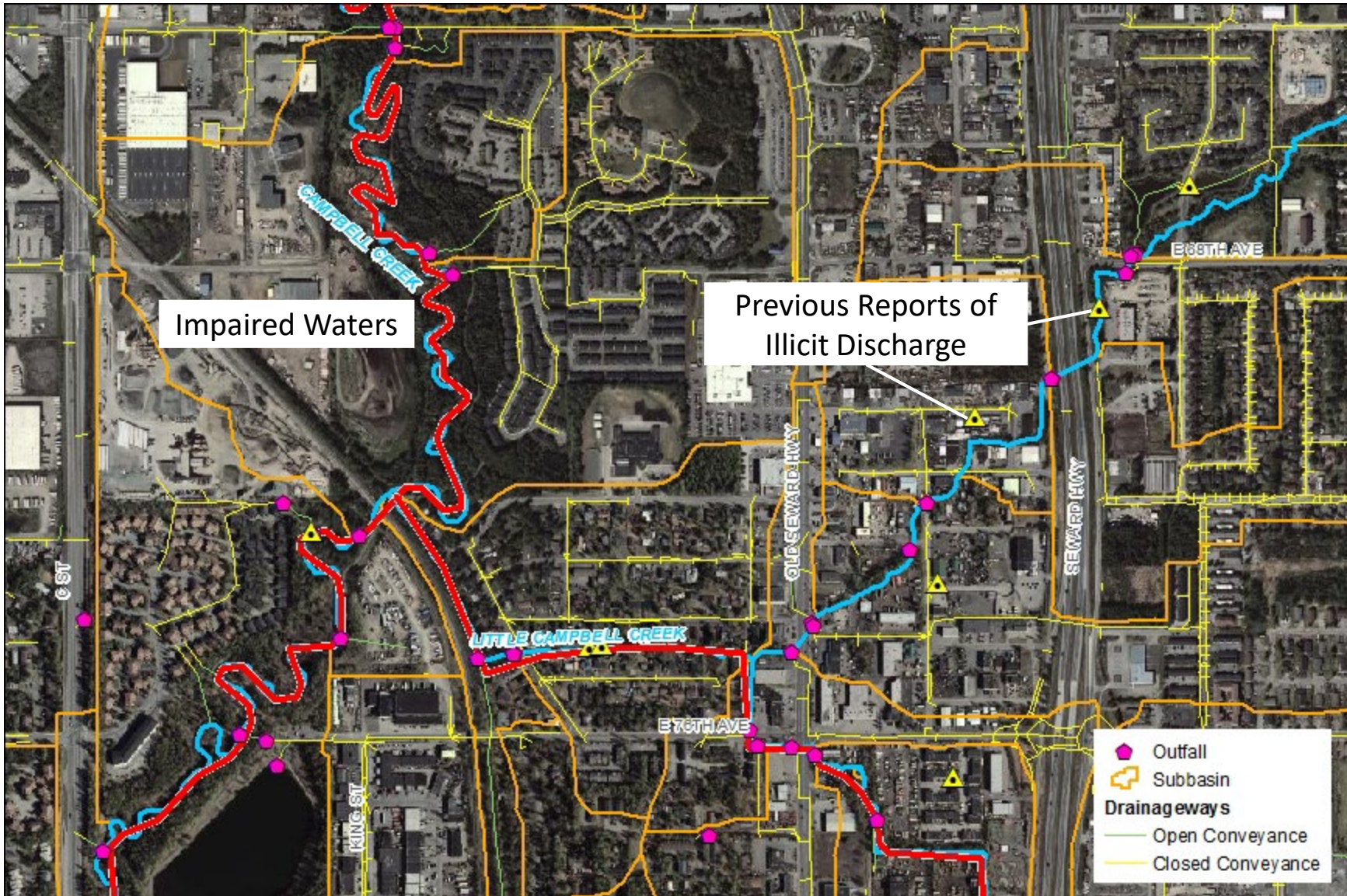
Program Overview

1. Outfall evaluation and prioritization
2. Annual monitoring of 30 outfalls
3. Sampling of suspected illicit discharges

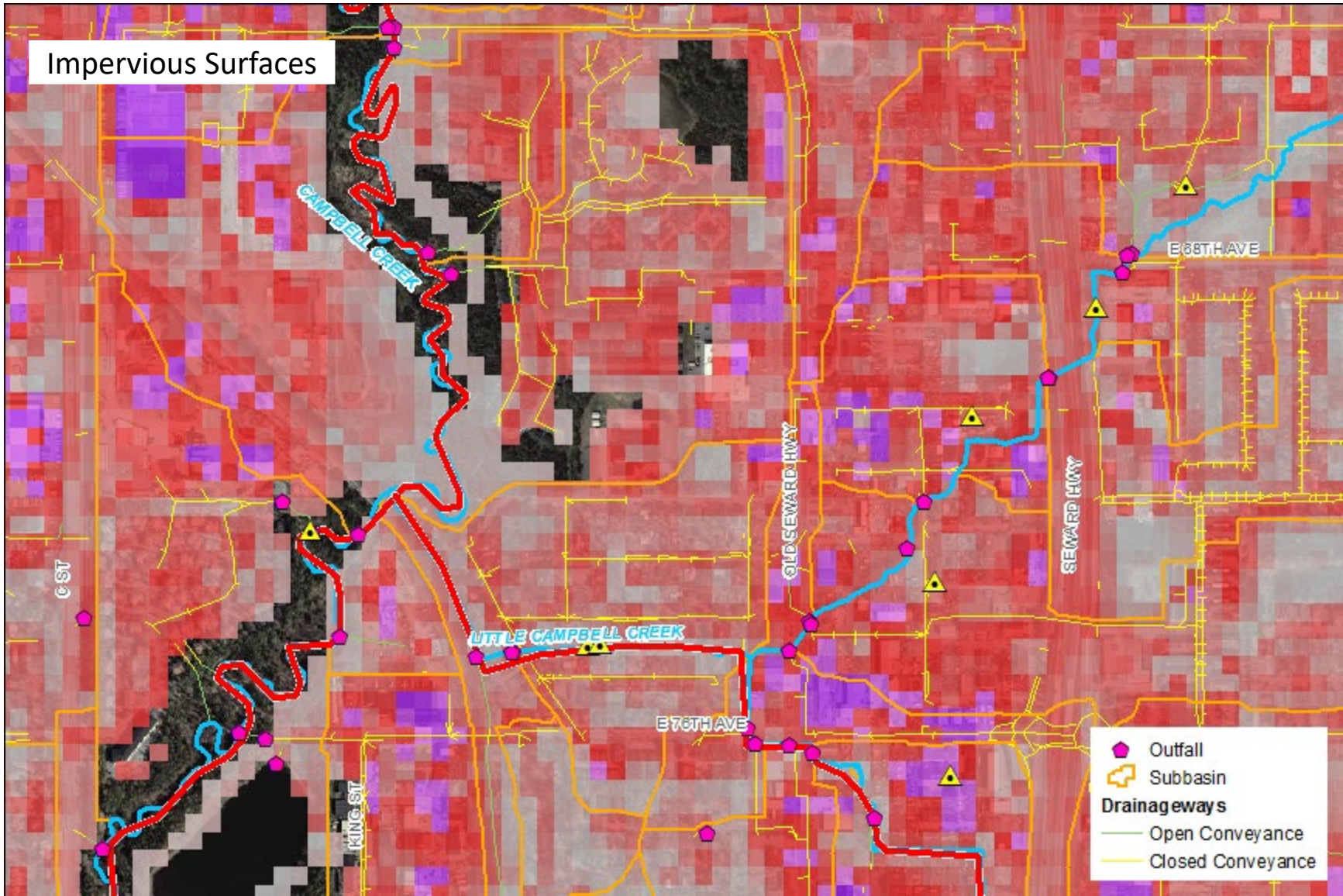




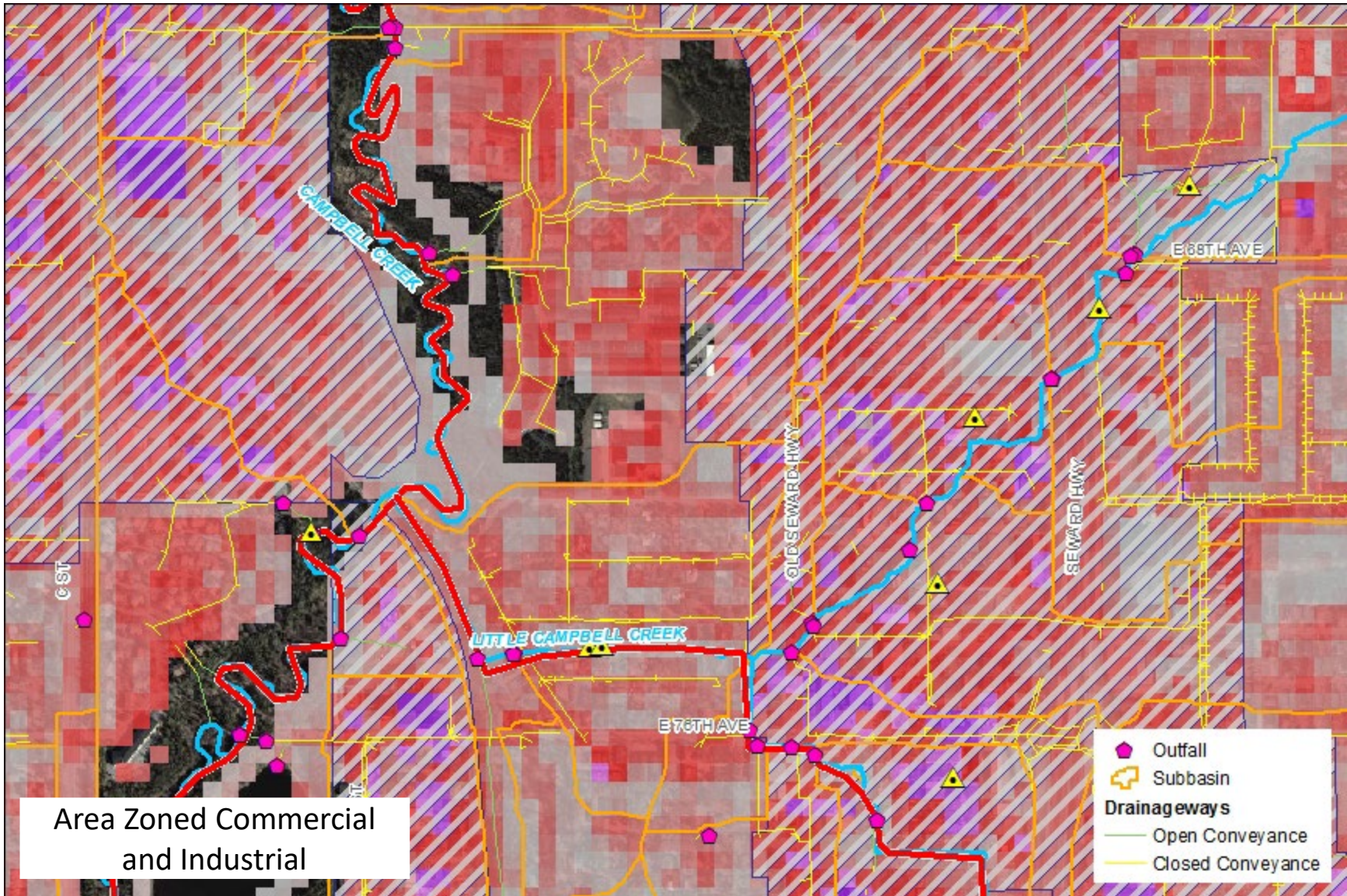
- ◆ Outfall
- ▭ Subbasin
- Drainageways**
- Open Conveyance
- Closed Conveyance

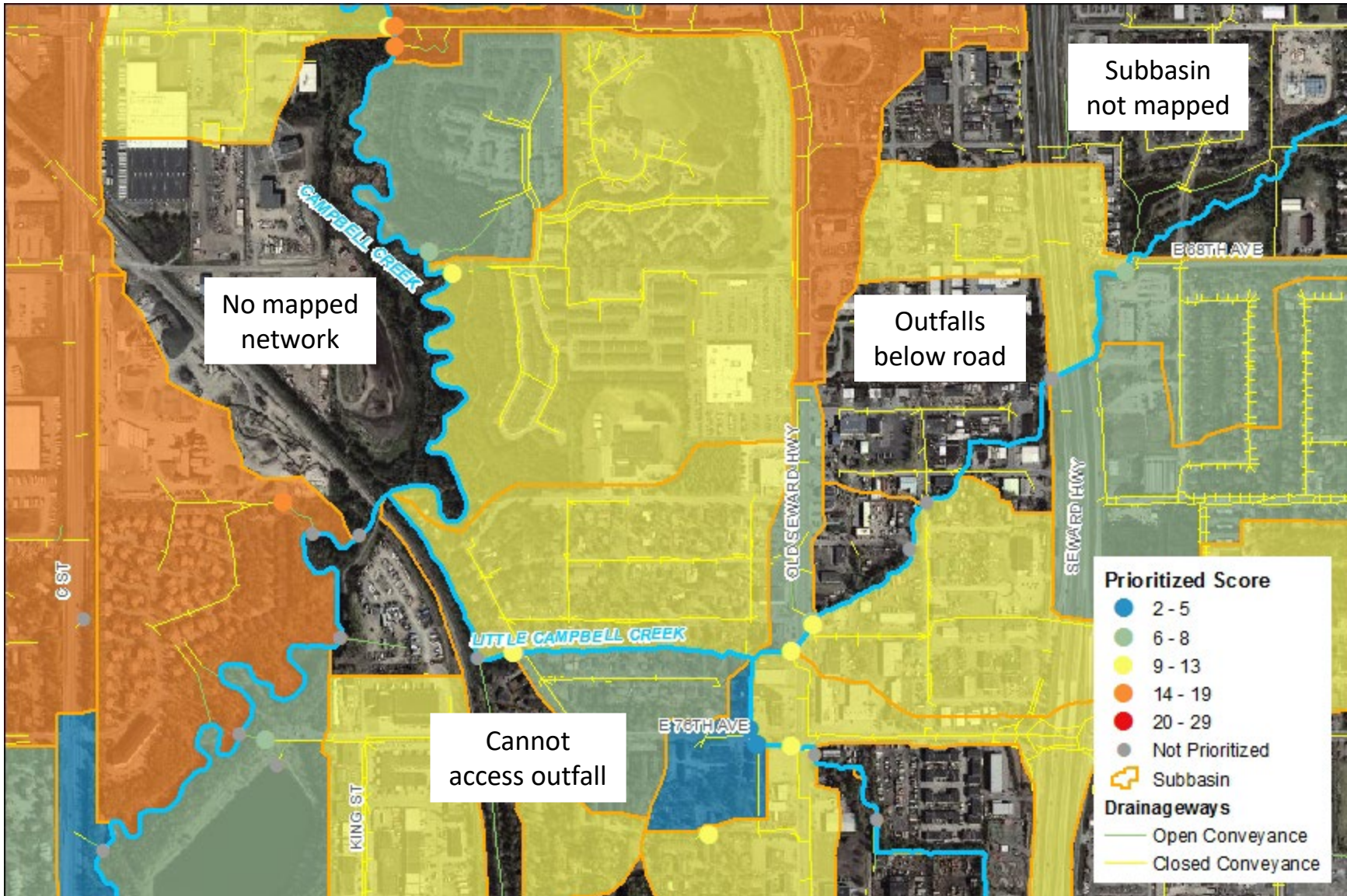


Impervious Surfaces



- ◆ Outfall
- ▭ Subbasin
- Drainageways
 - Open Conveyance
 - Closed Conveyance





Subbasin not mapped

No mapped network

Outfalls below road

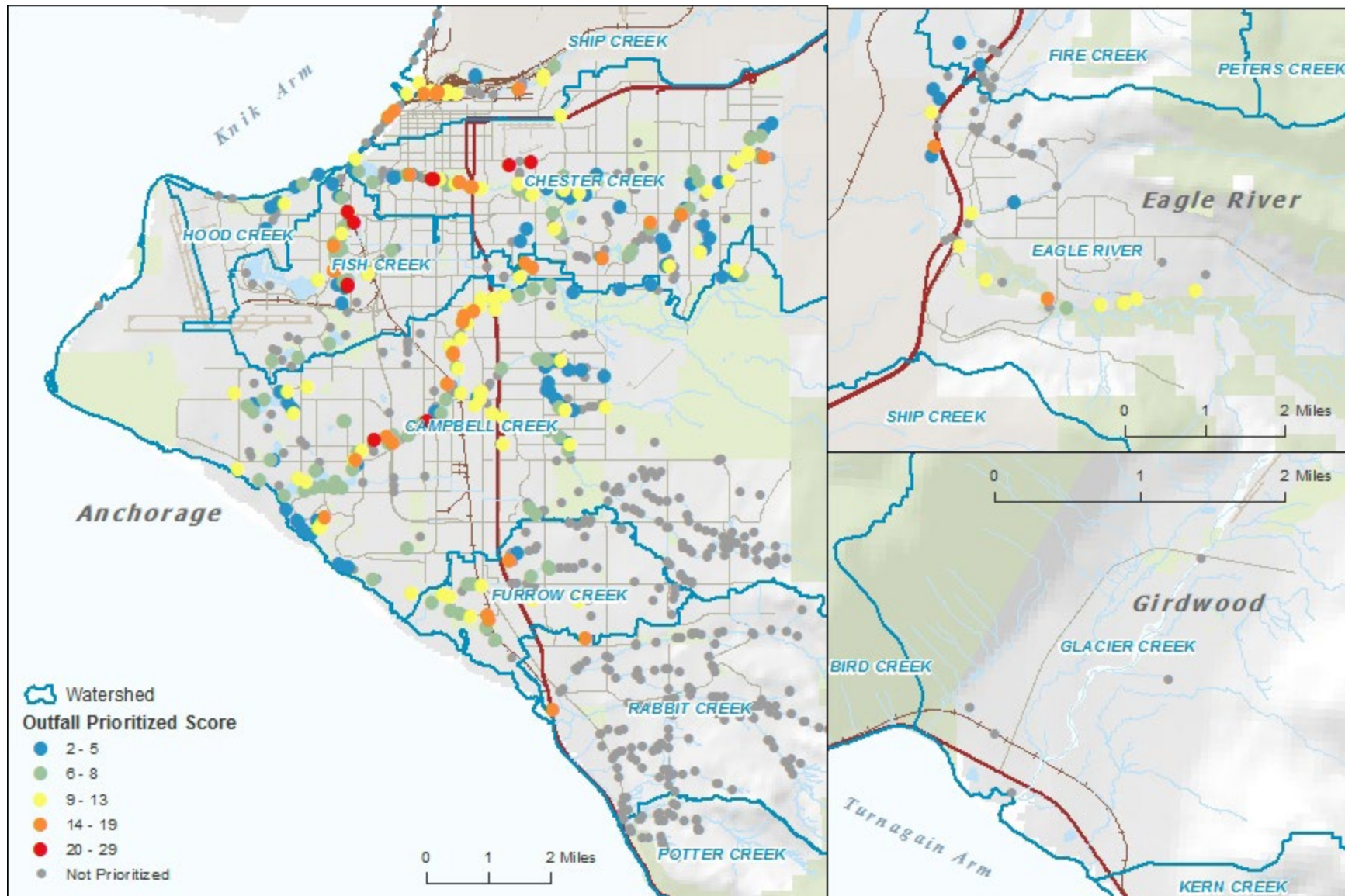
Cannot access outfall

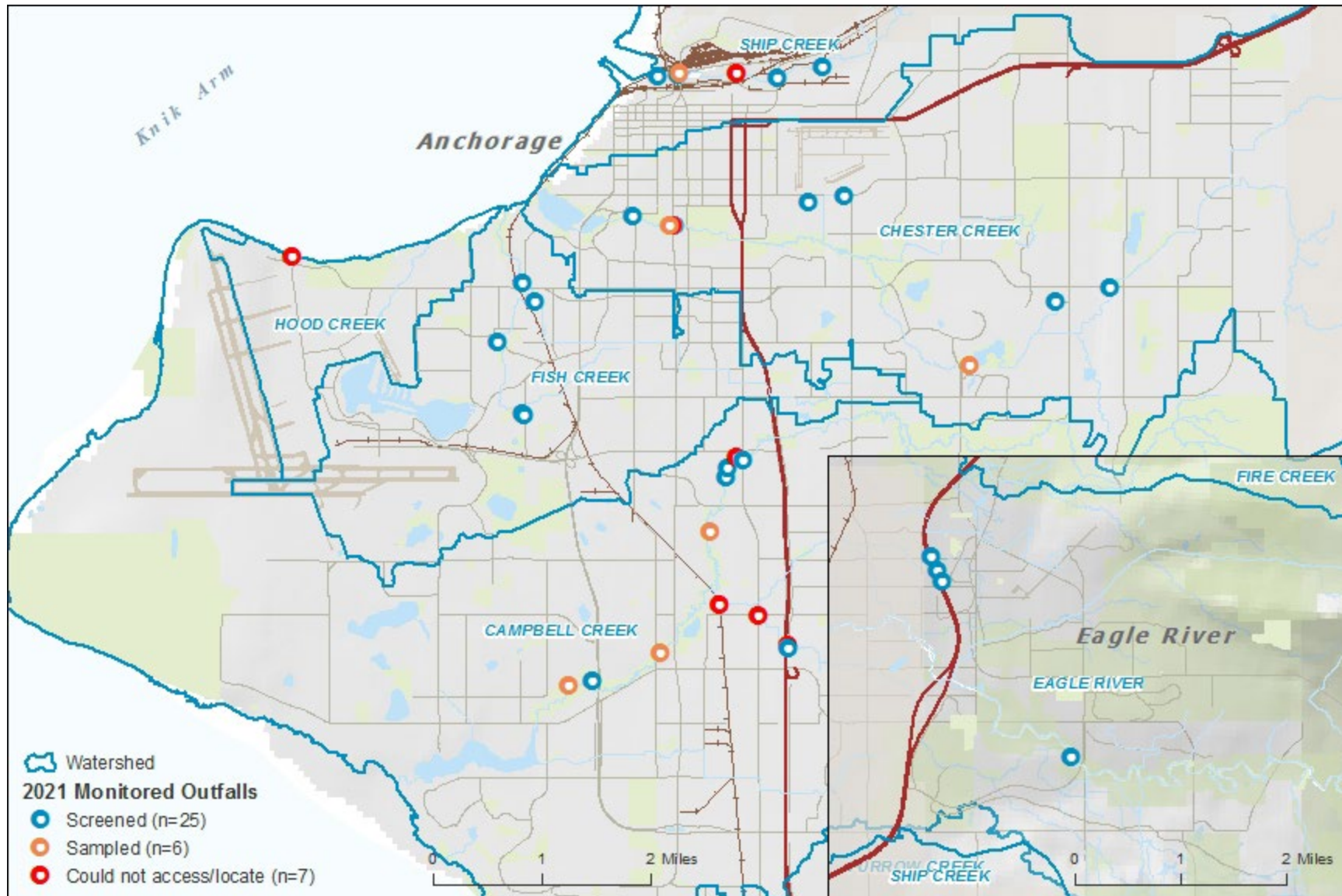
Prioritized Score

- 2 - 5
- 6 - 8
- 9 - 13
- 14 - 19
- 20 - 29
- Not Prioritized

Subbasin

- Open Conveyance
- Closed Conveyance





Water Quality Sampling

- 6 outfalls sampled where illicit discharges were suspected, or where historical records indicate illicit discharges may be present
 - Ship, Chester, and Campbell Creek watersheds
- Observe for maintenance issues



Campbell 1454-2



Ship 396-2

Measurement Type	Parameter	Reporting Range	Threshold
Field	pH	0 – 14 STD	≤ 4 or ≥9 STD
	Total Chlorine	0.1 – 3.4 mg/L	≥ 1.0 mg/L
	Detergents	0.05 – 1.2 mg/L	≥ 1.0 mg/L
	Total Copper	0.1 – 4.0 mg/L	≥ 1.0 mg/L
	Total Phenols	0.1 – 5 mg/L	≥ 0.5 mg/L
	Turbidity	0.1 - 1,000 NTU	≥ 250 NTU
Laboratory	Fecal Coliform	1 colony/100 mL – too numerous to count	≥ 400 colonies/100 mL

Results

Watershed	Outfall ID	Date	Flow	Indicators of Potential Illicit Discharge	pH	Total Chlorine (mg/L)	Detergents (mg/L)	Total Copper (mg/L)	Total Phenols (mg/L)	Turbidity (NTU)	Fecal Coliform (cfu/100 mL)
Ship Creek	396-2	8/3/2021	Medium	Outfall 396-1 (adjacent outfall, connected to same drainageway network) exceeded threshold for fecal coliform in 2020	7.8	<0.1	<0.05	<0.1	<0.1	1.36	ND
					R = 7.6	R = <0.1	R = <0.05	R = <0.1	R = <0.1	R = 1.05	R = ND
Chester Creek	654-1	8/3/2021	Medium	Water slightly rust colored	8.0	<0.1	<0.05	<0.1	0.2	3.95	17
					R = 7.9	R = <0.1	R = <0.05	R = <0.1	R = <0.1	R = 3.98	R = ND
Chester Creek	4-1	8/4/2021	Low	Close proximity to dog park, beaver activity, recent trail construction. Trash DS	8.0	<0.1	<0.05	<0.1	0.2	21.3	136
Campbell Creek	1488-1	8/4/2021	Medium	High prioritization score. Lots of algal growth on outfall, trash DS	8.6	<0.1	<0.05	<0.1	<0.1	23	3.0
					R = 8.6	R = <0.1	R = 0.1	R = <0.1	R = <0.1	R = 24.1	R = 2.0
Campbell Creek	1454-2	8/5/2021	Medium	Surface scum and soapy suds	8.1	<0.1	<0.05	<0.1	<0.1	3.2	12
Campbell Creek	651-1	8/5/2021	Medium	Water cloudy/muddy, light brown colored. GW influence suspected, screened for turbidity	8.2	<0.1	<0.05	<0.1	<0.1	59.7	25
					R = 7.6	R = <0.1	R = <0.05	R = <0.1	R = <0.1	R = 63.4	R = 2.7

Notes: NTU = nephelometric turbidity; cfu = colony forming unit; R = replicate sample; ND = not detected; DS = downstream; GW = groundwater
 Detection limit for fecal coliform is 16.7 col/100mL.

A photograph of a river flowing through a dense forest. The water is dark and turbulent, with white foam from rapids visible. The banks are lined with lush green trees and bushes. The sky is clear and blue. The word "Questions?" is overlaid in large white text in the center of the image.

Questions?

2021 MOA Stormwater Outfall Monitoring Program

March 2nd, 2022



**01 Stormwater Monitoring Program
Overview**

**02 2021 SWM Program Results
Overview**

03 2021 SWM Program Conclusions



Lynwood Rain Gauge

01

STORMWATER MONITORING PROGRAM OVERVIEW

Objectives of Stormwater Monitoring (SWM) Program

- Meet the requirements of the Municipal Separate Storm Sewer System (MS4) permit (2020 – 2025)
- Estimate annual pollutant loading

Used to:

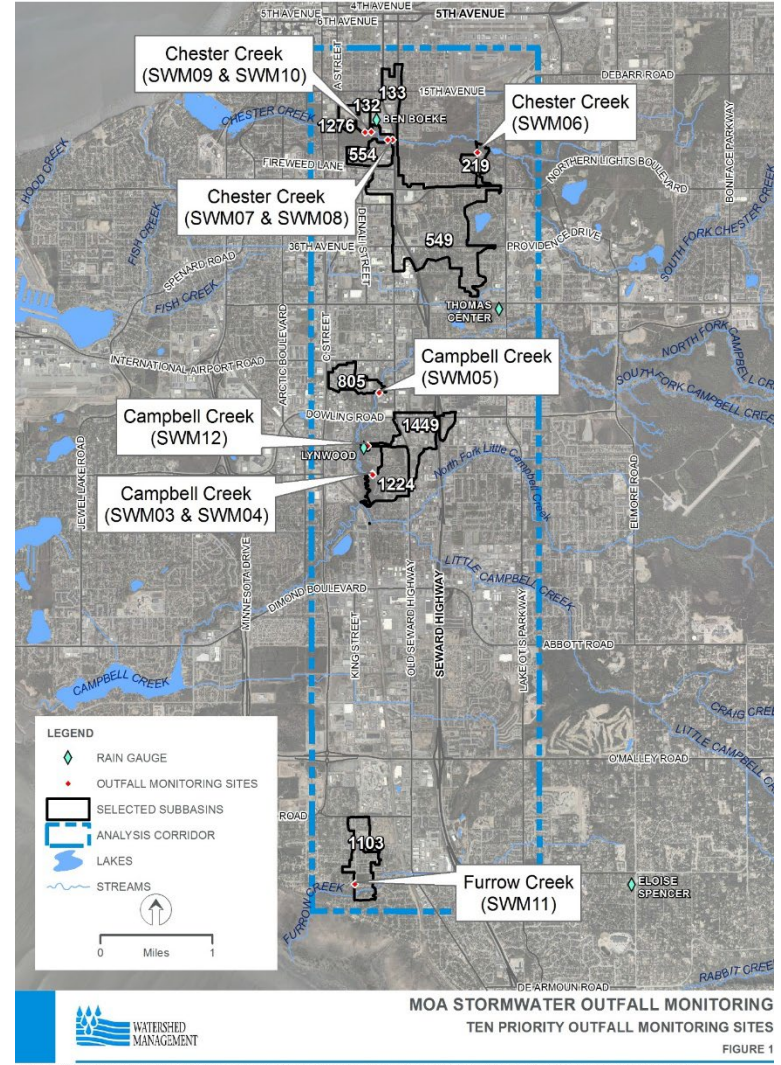
- Assess the effectiveness of existing stormwater controls
- Prioritize portions of the MS4 that need additional controls
- Measure whether Total Maximum Daily Load (TMDL) objectives are met



SWM11
Storm 1

SWM Monitoring Corridor

- Ten priority outfall sites
- Outfalls geographically distributed
- Represent variety of Subbasin land-use types
 - Industrial
 - Mixed
 - Residential
- Outfalls discharge to Campbell, Chester, and Furrow Creek Watersheds



SWM Program Methodology

- Stormwater outfall sampled after >0.1 inch of precipitation in 24 hours preceded by 24 hours of ≤ 0.1 inch of precipitation.
- Outfall discharge calculated from flow velocity and outfall geometry.
- Water quality parameters assessed through qualitative observations, field measurements, and laboratory testing.

SWM07



SWM Tested Parameters

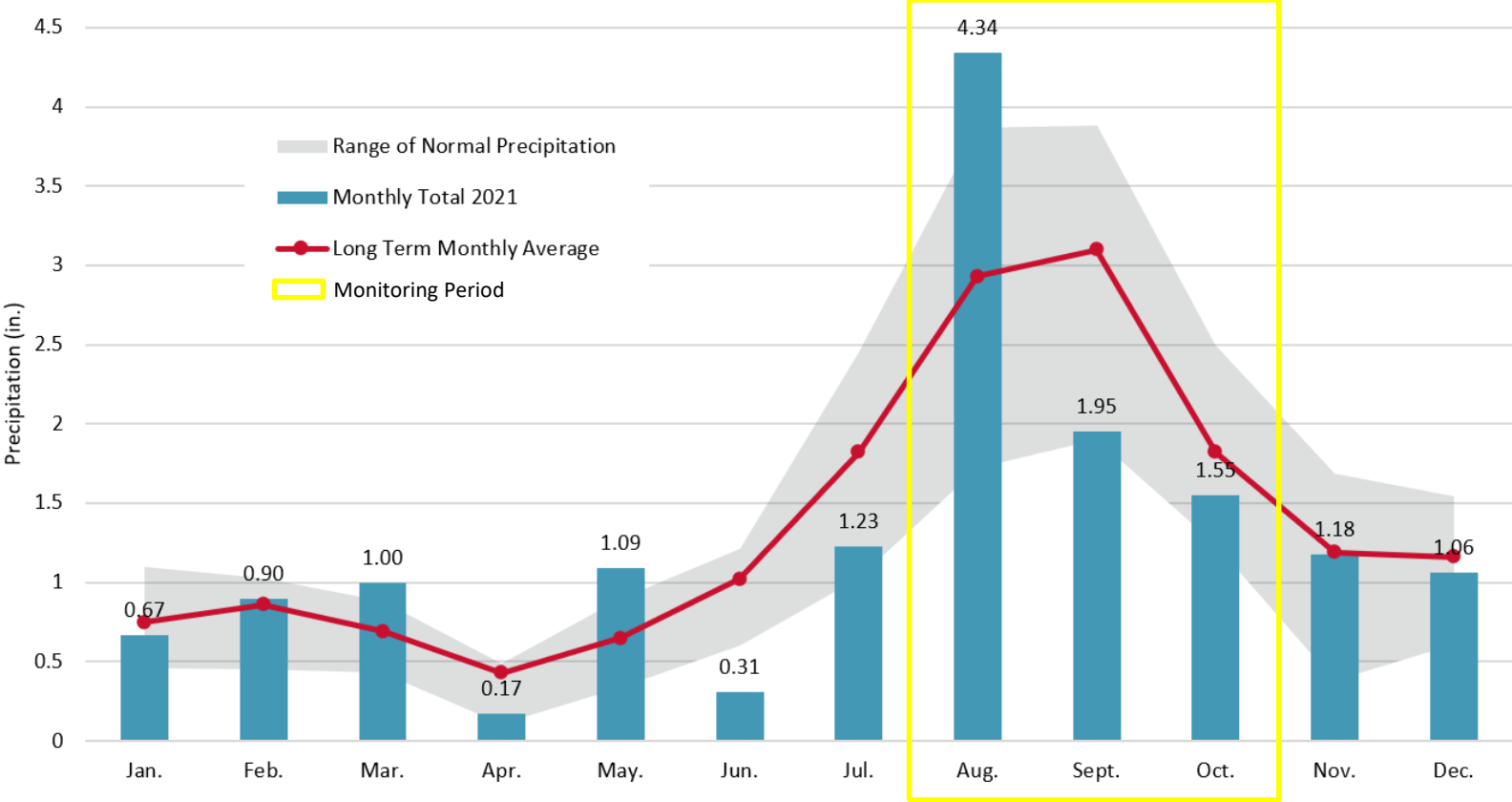
Field Measurements and Observations

Parameter	Purpose
Flow	Characterize flow & loading
Specific Conductivity	Stormwater quality
Dissolved Oxygen (DO)	Stormwater quality
pH	Stormwater quality
Temperature	Stormwater quality
Turbidity	Stormwater quality
Odor	Qualitative Observation
Color	Qualitative Observation
Clarity	Qualitative Observation
Floatables	Qualitative Observation
Deposits or Stains	Qualitative Observation
Sheen	Qualitative Observation
Surface Scum	Qualitative Observation
Debris	Qualitative Observation

Laboratory Measurements

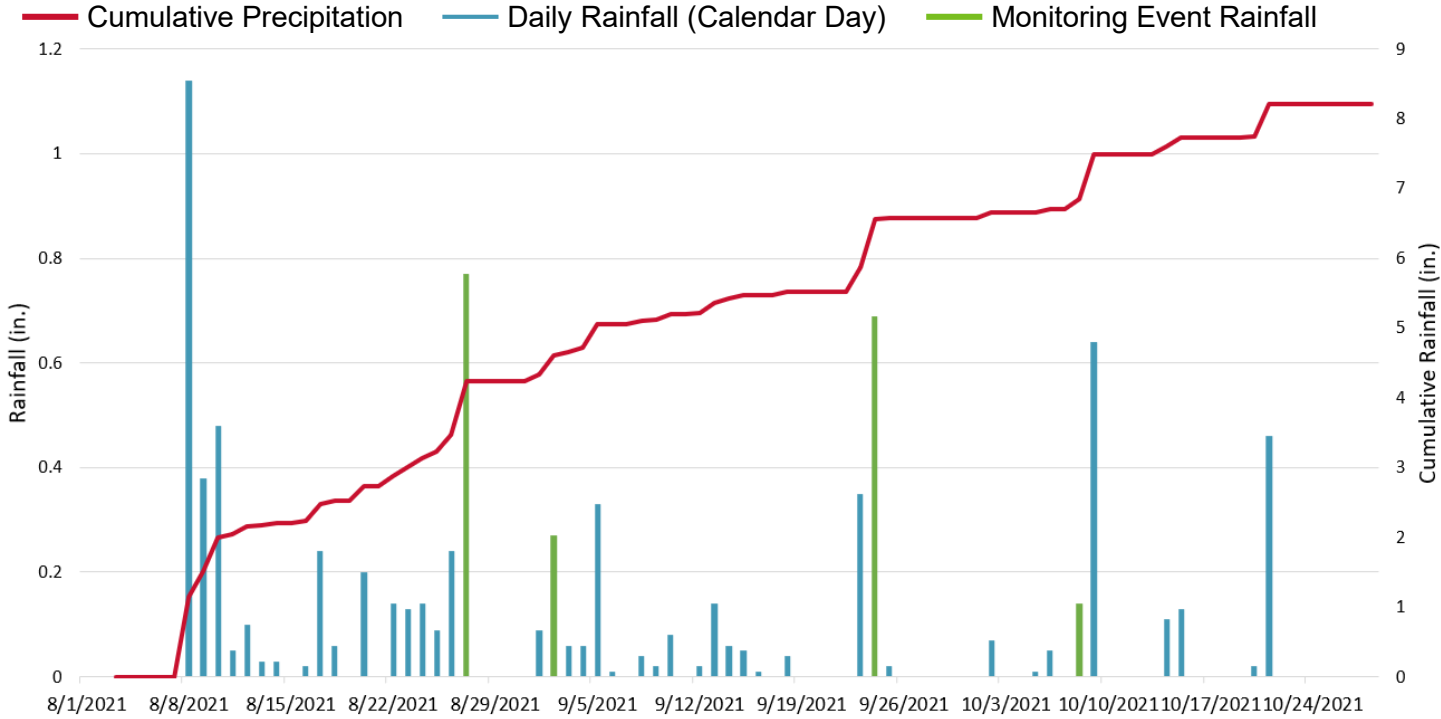
Parameter	Purpose
5-Day Biochemical Oxygen Demand (BOD ₅)	Stormwater quality
Fecal Coliform	Stormwater quality & loading
Total Suspended Solids (TSS)	Stormwater quality
Total Aromatic Hydrocarbons (TAH)	Stormwater quality & loading
Total Aqueous Hydrocarbons (TAqH)	Stormwater quality & loading
Dissolved Copper	Stormwater quality
Total Hardness	Stormwater quality

2021 Precipitation vs. Historical Averages



2021 Monitoring Events

Four Monitoring Events (measured at Ben Boeke Rain Gage)





SWM08

02

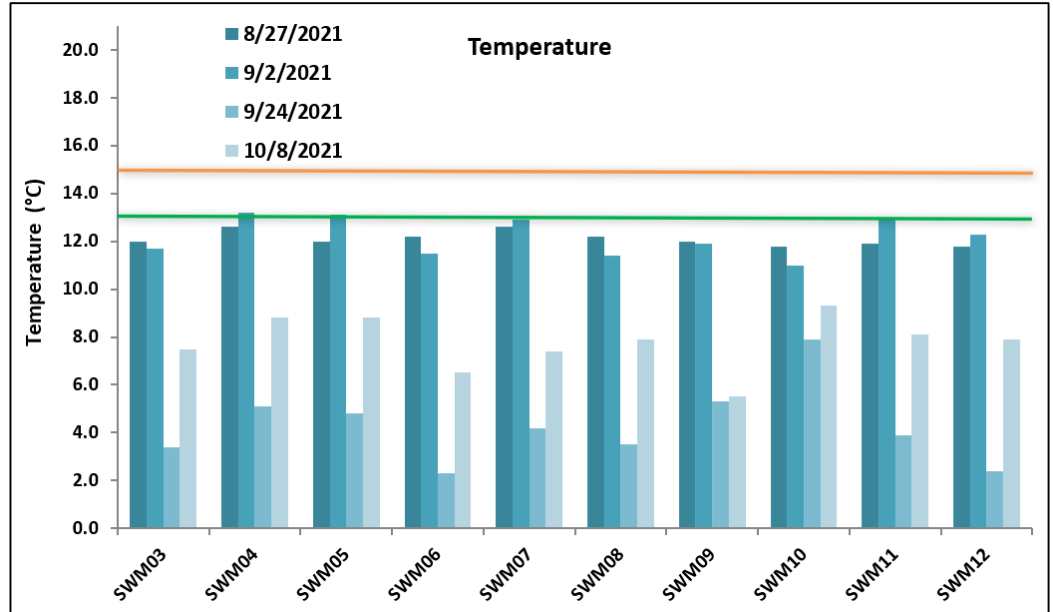
2021 SWM PROGRAM RESULTS OVERVIEW

2021 SWM Program Field Measurements

- Flow Rate
- Turbidity
- Dissolved Oxygen (DO)
- Total Dissolved Solids
- pH
- Temperature

TAKEAWAY –

- **Some outfalls with low flow**
- **Lowest temperature**
- **Highest DO**
- **Other field measurements within historical ranges**



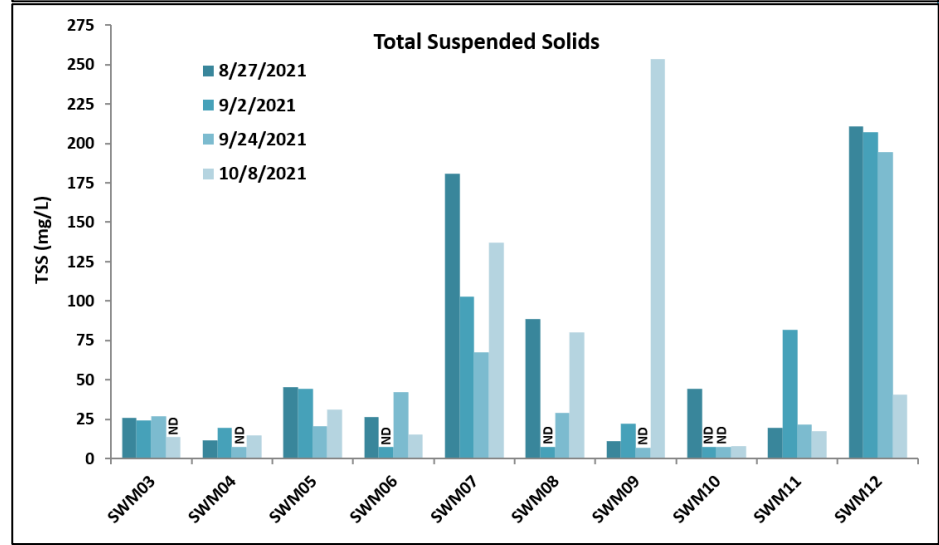
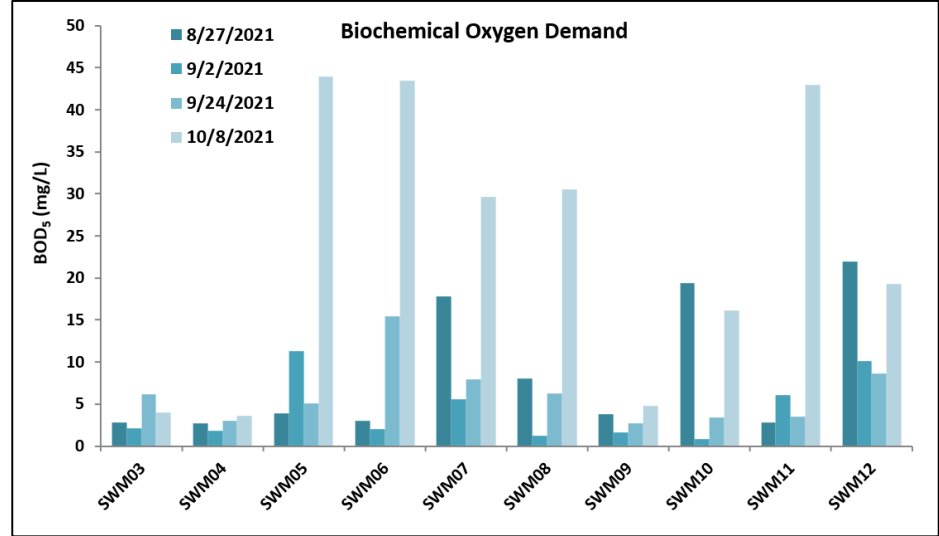
Orange line indicates the upper AWQS limit of 15°C for migration and rearing areas and green line indicates the upper AWQS limit of 13°C for spawning and egg/fry incubation.

2021 SWM Program Laboratory Measurements

- Biochemical oxygen demand (BOD₅)
- Total Suspended Solids (TSS)
- Fecal Coliform
- Hardness
- Dissolved Copper
- Hydrocarbons (TAH and TAqH)

TAKEAWAY

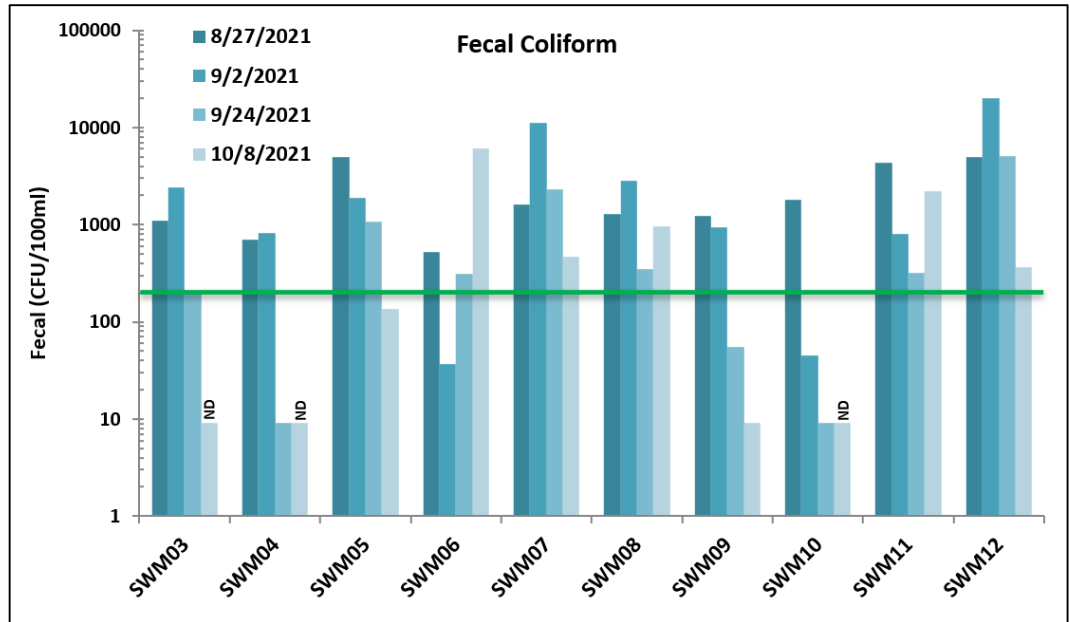
- **BOD₅** – high results during Storm 4
- **TSS** – isolated spikes
- **Copper and Hardness** within historical ranges



2021 SWM Program Fecal Measurements

- Fecal levels generally normal when compared to data record
- Levels generally lower than 2017 - 2018
- Levels generally higher than 2019 - 2020

TAKEAWAY – within historical range

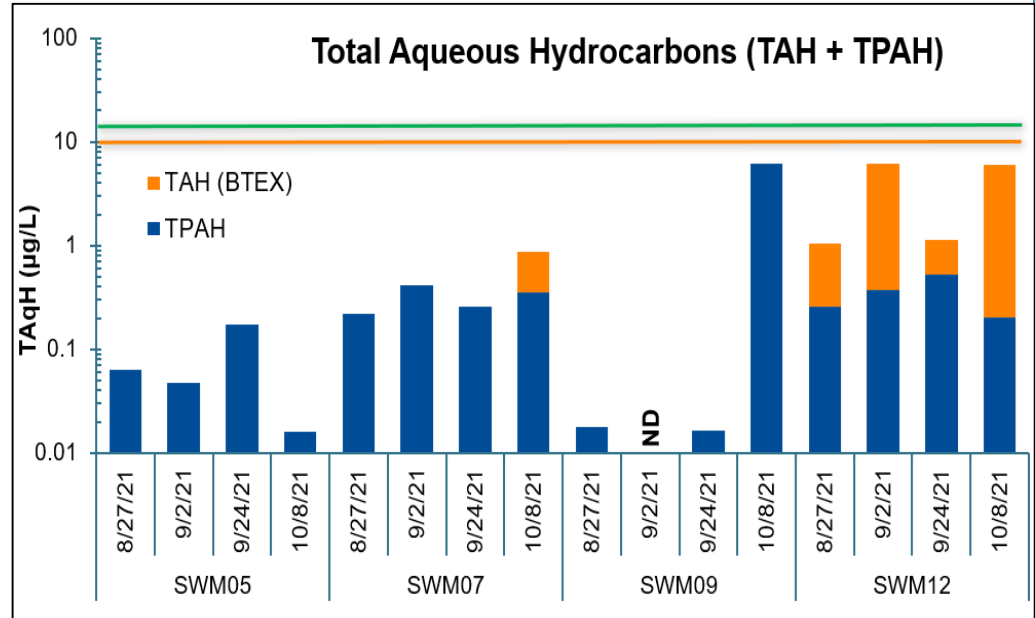


Green line indicates upper AWQS fecal coliform limit of 200 CFU/100 mL

2021 SWM Program Hydrocarbon Measurements

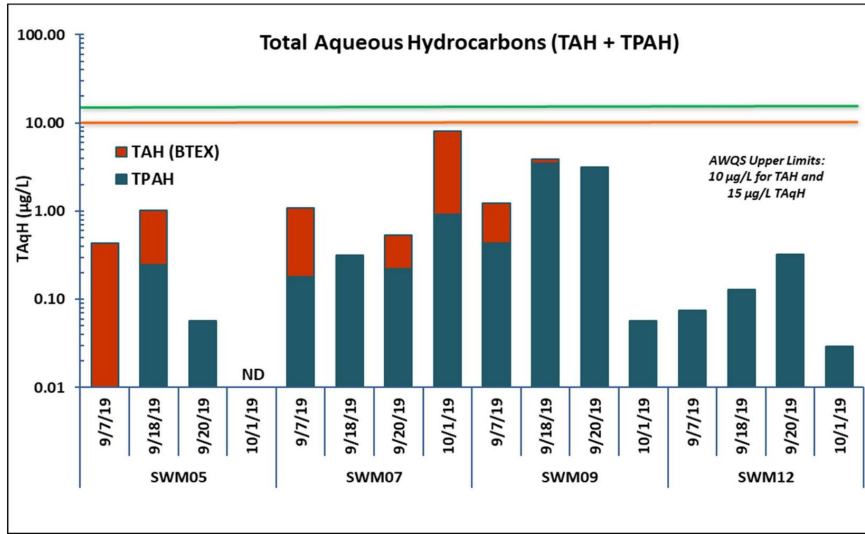
- All samples below AWQS limits for TAH and TAqH
- Decreased detection from 2019
- Increased detection from 2020
- First TAH (BTEX) detection at SWM12
- Many results are estimated low by lab

TAKEAWAY – similar to 2020 peaks but more frequent detection

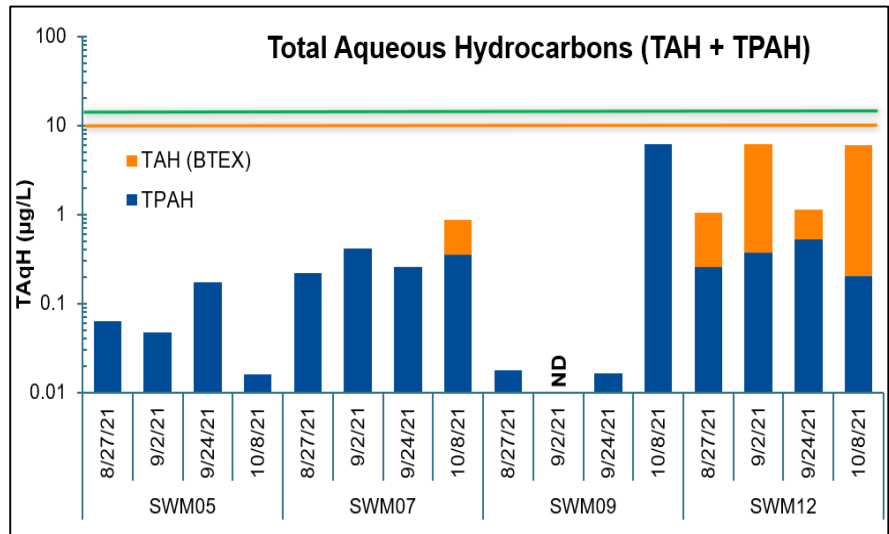


Comparison of Hydrocarbons

2019 Hydrocarbons

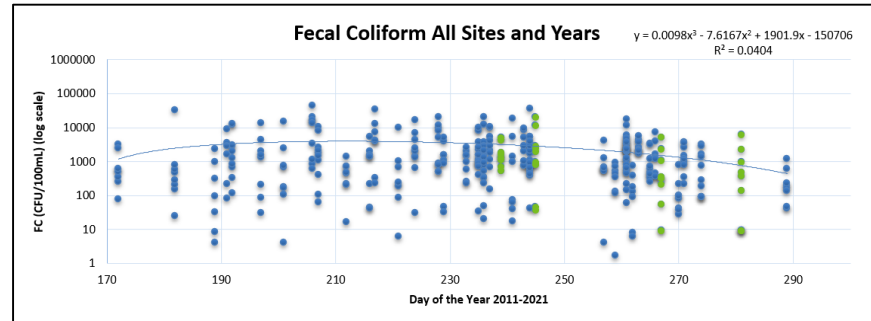
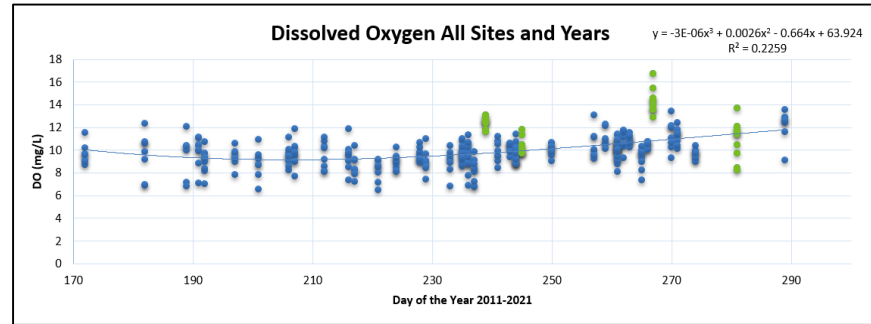
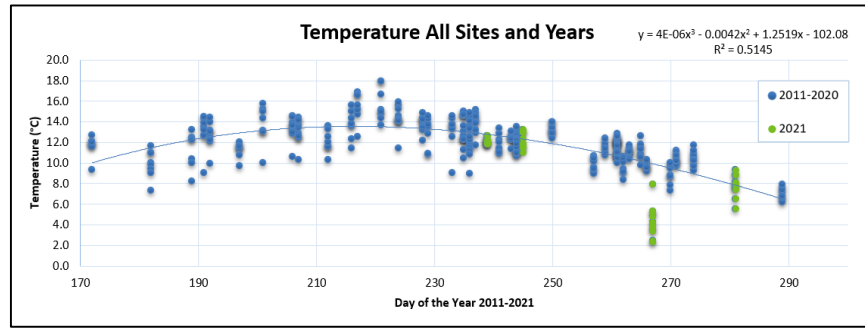


2021 Hydrocarbons



Seasonal & Multi-Year Trends

- Available data remains limited.
- Some seasonal effects observed in temperature-dependent parameters.
- Studies show 20-years of data needed to establish statistical power.





SWM12

03

2021 SWM PROGRAM CONCLUSIONS

2021 SWM Program Conclusions

- Late season sampling, broader coverage in data
- Samples generally fell within historical ranges for the program
- Storm events were long duration and low intensity
- Hydrocarbon (TAH) detection increased



*SWM11
Storm 3*

SWM Program: Looking Ahead

- Investigating intensity of storms and affects on results
- Continued monitoring of hydrocarbons to determine if part of a broader trend



SWM10

Thank you

Questions?

Scoop the Poop A Decade of Outreach

Anchorage Waterways Council

Cherie Northon, Ph.D.

March 2, 2022





History

- Scoop the Poop has been a continual campaign for AWC and dates back to 2001.
- Never a shortage of dog poop sadly
- Muni's estimate of how much pet waste is deposited in the Municipality everyday.
 - 65,000 estimated dogs x .75 lb. of poop = 48,750 lbs. = ~24 TONS DAILY
- Yards, trails, parks, neighborhood sidewalks, etc.
- In 2010, AWC began Stormwater Outreach and Education under the APDES permit, and Scoop the Poop is a major focus for this.



Impact

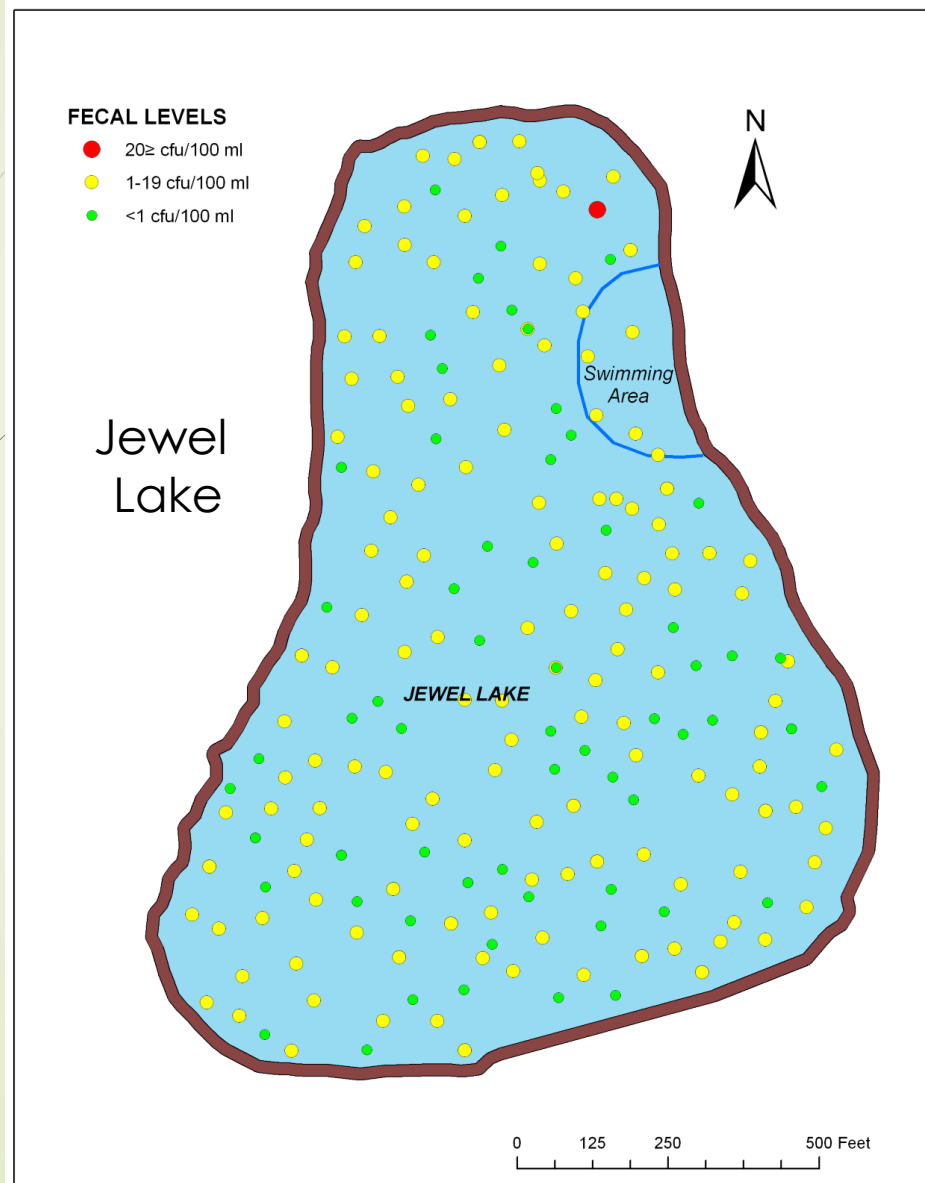
- ▶ Every creek and 3 lakes in the Anchorage Bowl have a fecal coliform (FC) impairment based on TMDLs (Total Maximum Daily Loads) established by the EPA and overseen by DEC:
 - ▶ Ship Creek
 - ▶ Chester Creek, University Lake, & Westchester Lagoon
 - ▶ Fish Creek
 - ▶ Furrow Creek
 - ▶ Campbell Creek, Little Campbell Creek, & Campbell Lake
 - ▶ Rabbit Creek, Little Rabbit Creek
 - ▶ Little Survival Creek
- ▶ Most TMDLs date to 2003-2005
- ▶ These waterways are listed on the EPA's "303(d) list" as "4A", which is an "impaired water with a TMDL" and the cause is "fecal coliform contamination"



Goal

- ▶ The goal is to get these waters off the Impaired Waters list.
- ▶ How?
 - ▶ Reduce FC levels to be within *Alaska's Water Quality Standards* for Drinking Water
 - ▶ In a 30-day period, the geometric mean may not exceed 20 fecal coliform/100 ml, and not more than 10% of the samples may exceed 40 fecal coliform/100 ml

Is "removal" possible?





Solution – Reduce pet waste on the ground

➤ How?

- Enforcement of pet waste infractions
- Amenities: MORE pet waste stations and trash cans
- Signage
- Education
 - Tabling at events
 - Presentations in schools
 - Regular media, PSAs and social media



Enforcement



- Folks are frustrated by having the infractions codified with a fine, but no one to enforce it.
- Not enough staff at Animal Control as they are too busy with loose dogs, aggressive dogs/bites, kennel inspections—about 100 a year.
- If an officer happens serendipitously to observe a situation, they will ticket, otherwise they don't.
- Some people have taken photos of cars and license plates, but the rigamarole is too much to make it worth anyone's time.



Amenities

- ▶ Pet owners continually clamor for more pet waste stations & trash bins
- ▶ Problems:
 - ▶ Staffing costs (Parks and Rec)
 - ▶ Accessibility to service pet waste stations and trash cans
 - ▶ Cost of bags - \$15k annually
 - ▶ Vandalism
- ▶ Perpetual problem of people not wanting to carry poop bags if they're jogging, skiing, or even walking
 - ▶ Often, their solution is to tie up a bag and leave it with the intention of returning later



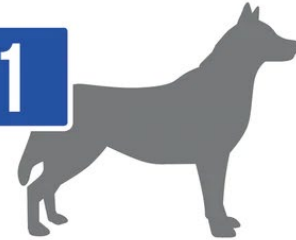


20_{oz} (600ml)

CAPACITY

Can Hold Loads Up To

1



LARGE DOG
(up to 110lbs)

OR

MULTI

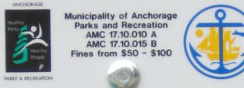


SMALL & MEDIUM SIZE DOGS

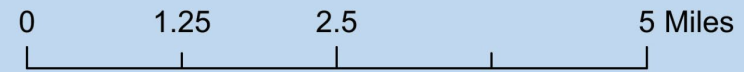


Attention Dog Guardians
Pick up after your dogs. Thank you.

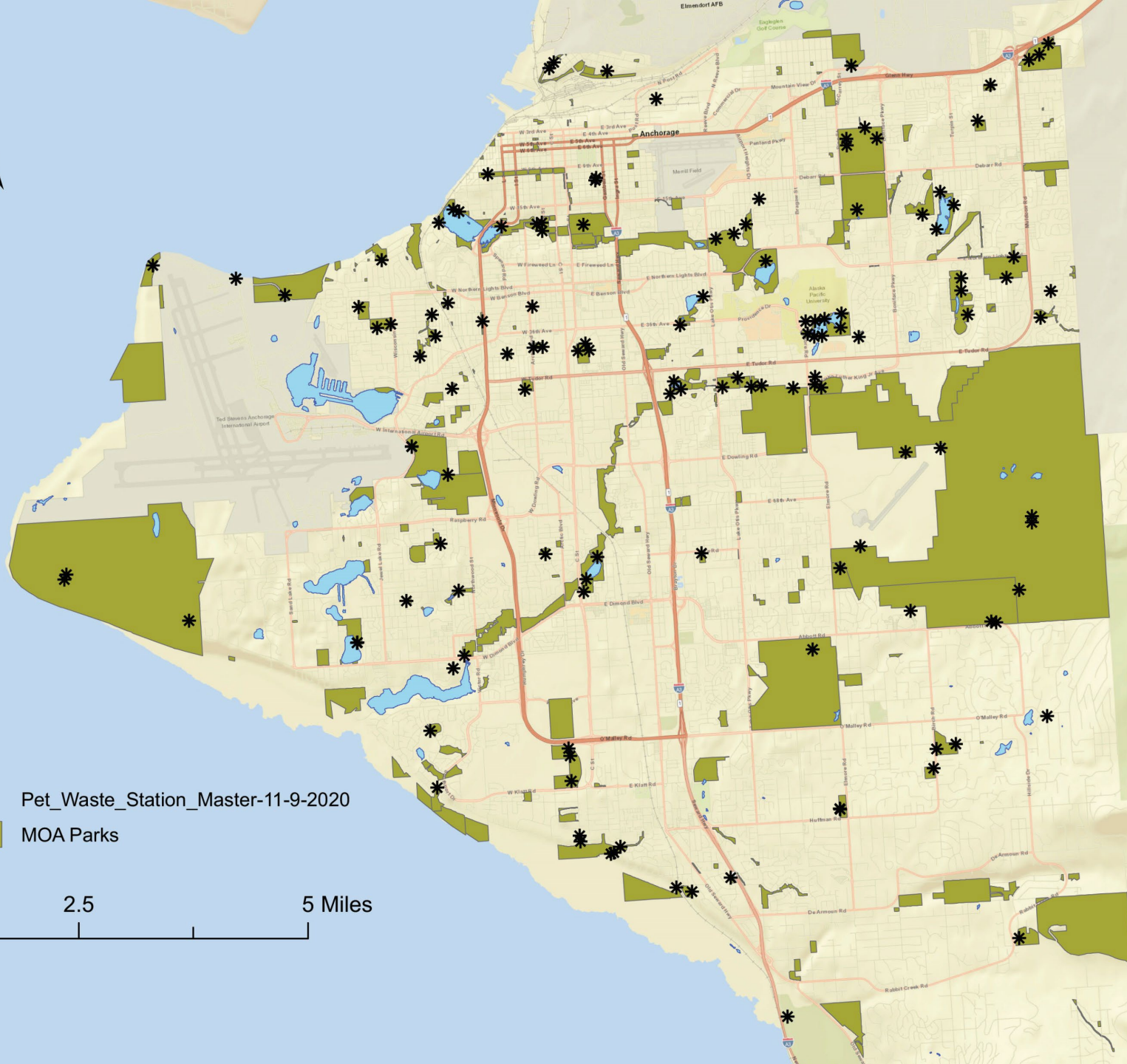
Attention Dogs
Grrrr, bark, woof.
Keep your guardians on a leash. Good Dog.



DONATED BY
Burr & Jazmine



- * Pet_Waste_Station_Master-11-9-2020
- MOA Parks



University Lake Park






University Lake

University Lake Dr


Elmore Rd

Ambassador Dr

Pet Waste Stations 7/10/14

-  NEW
-  Existing 2013
-  MOA Parks

0 125 250 500 Feet



Signage

- Permanent
- Rack cards
- Temporary
- Bus signage
- Bumper stickers

Attention Dog Guardians

**Pick up after your
dogs. Thank you.**

Attention Dogs

**Grrrr, bark, woof.
Keep your guardians
on a leash. Good Dog.**



Municipality of Anchorage
Parks and Recreation
AMC 17.10.010 A
AMC 17.10.015 B
Fines from \$50 - \$100



Be a SUPER hero,
SCOOP up after your pets.



Runoff carries dog waste
untreated into our community's
creeks and lakes.

Bag it!

Take it!

Dispose of it in the trash!

Do your part to keep
our waterways
clean and healthy.



anchoragecreeks.org





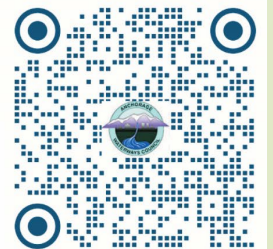
Temporary

Scoop your dog's
Poop! It's gross!!!
You have to do it because
you don't want other
people to do it for you!





**KEEP
CALM
AND
SCOOP
POOP**



BEA SPOOPER

SCOOPER TO


SAVE THE WORLD!

Signage on People Mover buses & Bumper stickers





Education

- Tabling at events
 - Presentations in schools
 - Regular media, PSAs and social media
- 

Events

- Pet events
 - Scoop the Poop Day
 - Adoption fairs
 - Dog jog
- Other events
 - Garden shows
 - Farmers' markets
- Trails Day
- Potter Marsh Day
- Migratory Bird Day
- Belugas Count!



IT'S YOUR DOOTY!

SCOOPING: IT'S THE LAW

When it comes to poop, it's the law within the Municipality of Anchorage (Girdwood to Eklutna) to pick up after your pet. If you violate the law, you could be fined \$100 for each occurrence, and residents can also be fined if pet waste builds up in yards.

E. COLI AND ROUNDWORM

All animal waste is filled with many kinds of bacteria, including *E.coli*. *E.coli* can be the source of many different illnesses from sore throats to diarrhea. You can get this from water polluted with dog waste. Roundworms are microscopic parasitic organisms that can live in the small intestines of dogs. The eggs are passed into the feces, and they then take two weeks to become infective. Old poop becomes a health risk. It's important to pick it up right away!



WHY SHOULD I PICK IT UP NOW?

In the springtime, rainwater and melting snow may wash away the feces, but where does it go? It goes into Anchorage's creeks, streams, and lakes, causing pollution and noxious odors. Before the feces wash away, it is unpleasant to look at and smell. It also poses a hazard that people can step in or slip in.

WHAT CAN I DO?

First, be a responsible pet owner and clean up after your pet, whether it's in your yard, on a local trail, or at one of our off-leash dog parks. Second, encourage your neighbors and other pet owners to Scoop the Poop! And finally, consider sponsoring a Poop Station for a trail head or park near you! **If we all pitch in, Anchorage will become a cleaner and healthier place to live!**

HOW TO PICK UP POOP.

Keep bags handy in your car, purse or pocket. You can use grocery bags, newspaper wrappers or commercial poop scooping supplies.

Step 1 - Place bag over hand like a glove.

Step 2 - Pick up poop.

Step 3 - Reverse bag.

Step 4 - Tie bag and throw away in a trash.



THE POOP CYCLE



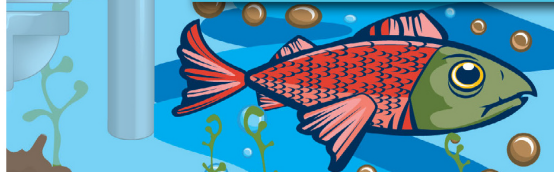
49,000 POUNDS
OF DOG POOP IS PRODUCED
EACH DAY IN ANCHORAGE



**DOG POOP TAKES
ONE YEAR TO DEGRADE**



**STORM DRAINS CONNECT
DIRECTLY TO THE CREEKS**



So scoop your dog's poop!



Swag





Scoop the Poop Day



**I POOP
SHE SCOOPS
#scoopthepoop**



BAZAART®



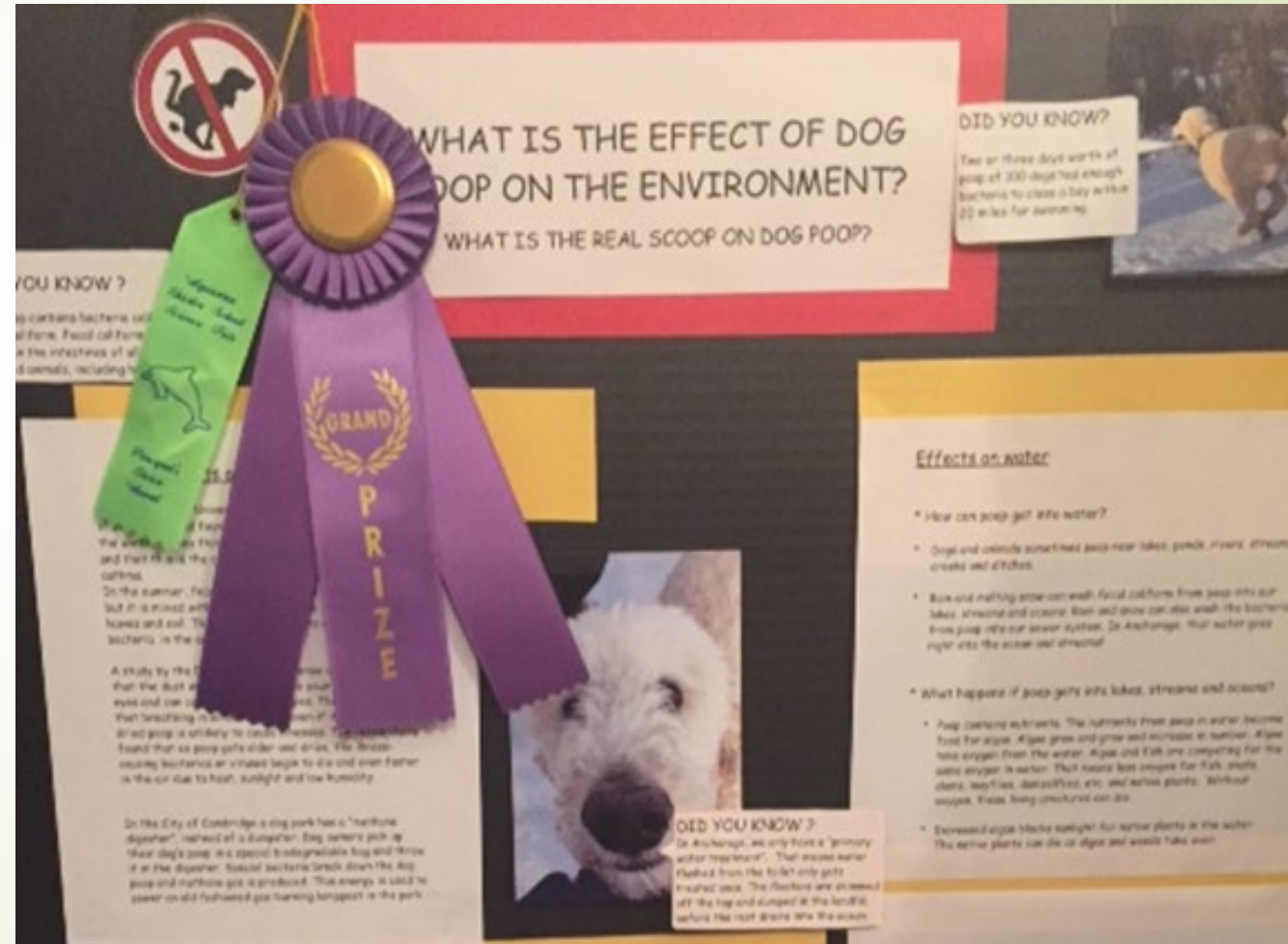
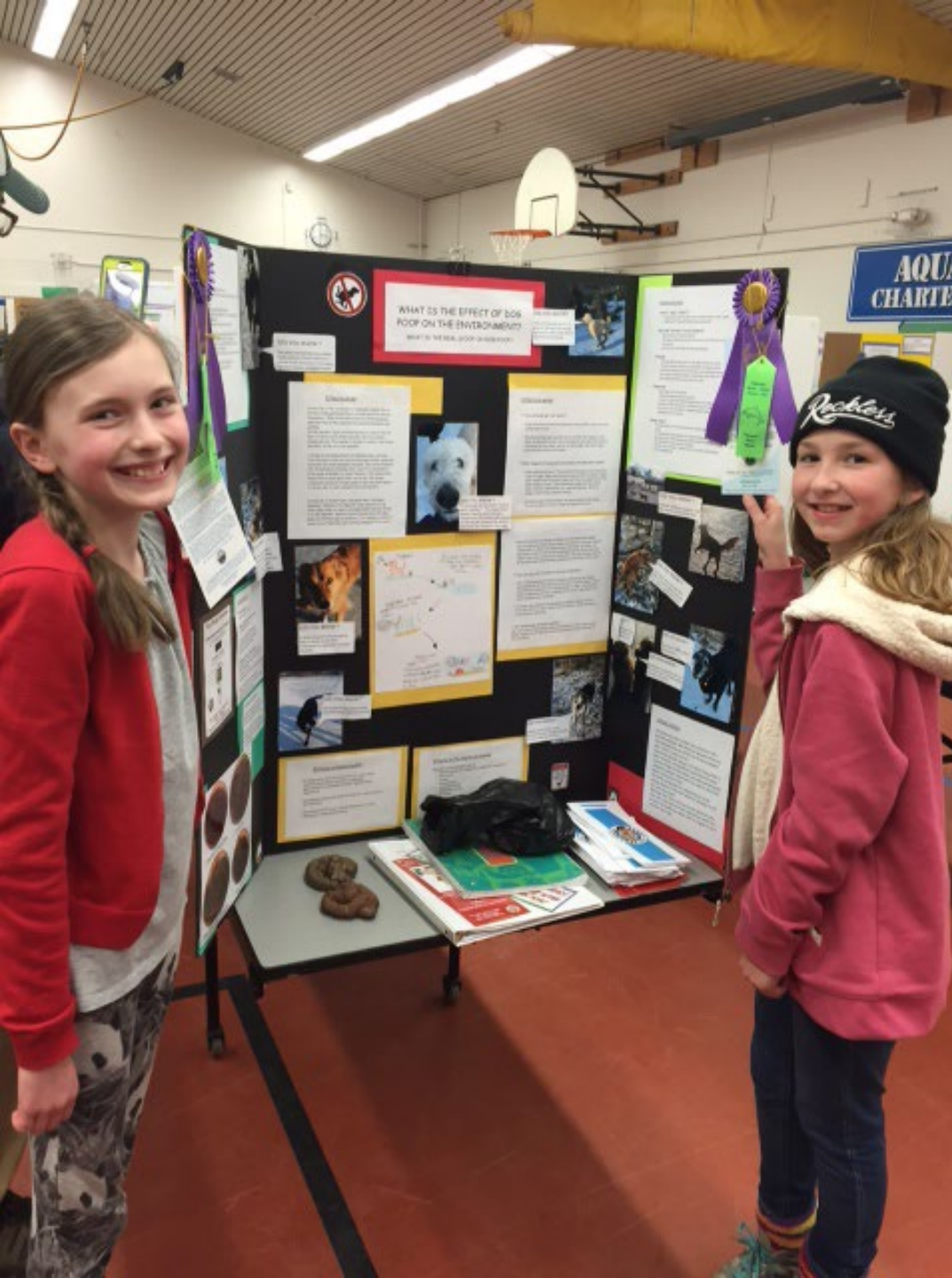
**I hope she washes her hands before
she feeds me #scoopthepoop**

Potter Marsh Day

South Anchorage Farmers Market



Aquarian Charter School Science Fair





Social Media

- ▶ Facebook – Scoop the Poop Anchorage
- ▶ “Let’s Talk about Poop!” a 2021 video on our website Anchoragecreeks.org at (anchoragecreeks.org/projecto-2) and on YouTube at (youtube.com/watch?v=8VBTr8JVCQ)

Illicit Discharge

AMC 21.07.040 – Regulates Discharges to MOA storm drains

- Defines specific prohibited discharges, but also defines “illicit discharge” as “pollutants or any materials other than storm water”.
- Streets drain to creeks - #1 public outreach message
- All drains are not equal - Storm drain flows DO NOT go to the sewage treatment plant



Illicit Discharge



Things to look for

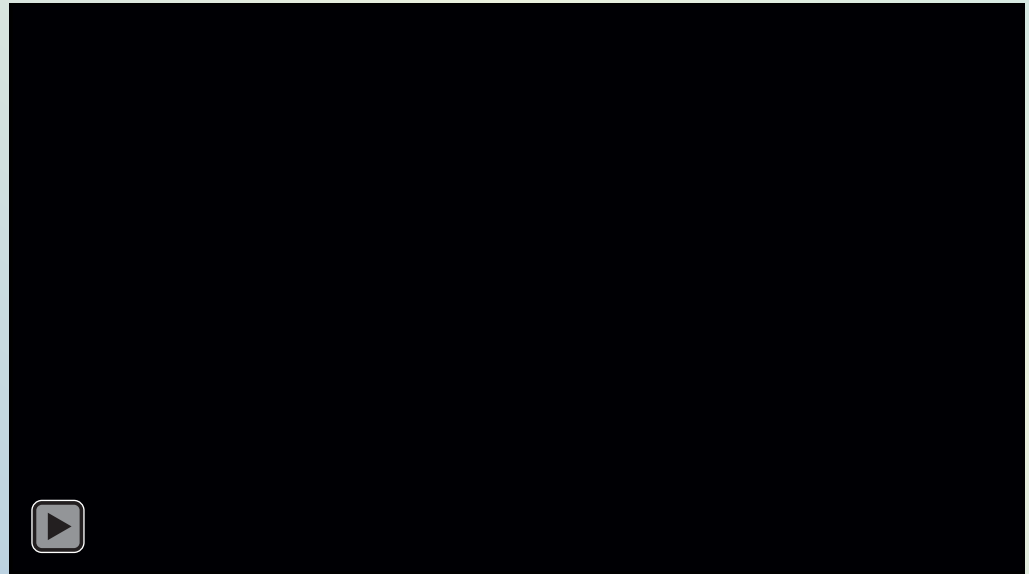
Illicit Discharge



Illicit Discharge



Illicit Discharge



Illicit Discharge



Restaurant/Food Truck Examples: Mobile smoker and food truck parked where runoff/drippings were running off to SD inlet in alley. Complaint received that employees were also pressure washing kitchen equipment and floor mats with water running off to SD inlet. Look for pavement stains indicative of non-stormwater runoff.

Illicit Discharge



Wet spent grain bins stored on impervious surface running off to SD inlets in street.



Plans showed a SD inlet in a covered area that is not exposed to stormwater which was not caught during review process. Brewery stored wet spent grain bins and had spent grain chute almost directly over inlet. Brewery has since purchase leak-proof storage bins and has installed protective sheeting around chute to ensure all spent grains end up in bins. !!!Check all drains on plans!!!

Illicit Discharge

Fish Processing:

Fish totes stored too close to street caused blood and fish slime to run off to SD system. Yard had drain (with connection to sanitary sewer) in center with most of the yard graded to run off to drain. Fish totes were pushed away from the edges of the property to areas that were graded to SS drain.



Check all drain connections on plans!!!

Illicit Discharge



Illegally installed drainage system on property with fish processing and storage. Melt water from ice in fish totes stored nearby with scales and fish slime running off to grated drain connected to 4" pipe in ARR ROW.

Illicit Discharge



Illicit Discharge



Illicit Discharge

Free Disposal for Household Hazardous Waste



Not sure what to do with that leftover household hazardous waste?

The Anchorage Regional Landfill and the Central Transfer Station accept up to 5 gallons (40 pounds) of household hazardous waste, paint, turpentine, aerosols, poisons, antifreeze, oil, etc. for **FREE!!!**

Anchorage Regional Landfill

Glenn Highway & Hiland Road Interchange

Tues – Sat 8 am – 5 pm

Provided by the Municipal
Watershed Management Program

428-1742

Central Transfer Station

Old Seward & E. 54th Avenue

Tues, Thurs, Sat 8 am – 5 pm

343-6262

Fish Waste



Fish Waste Handling & Disposal

August 2016



Division of
Environmental Health

Solid Waste Program

Anchorage Office:
555 Cordova St
Anchorage, AK 99501
(907) 269-7802
Fax (907) 269-7510

Fairbanks Office:
610 University Ave
Fairbanks, AK 99709
(907) 451-2108
Fax (907) 451-2188

Juneau Office:
410 Willoughby Ave.
Suite 303
Juneau, AK 99801
(907) 465-5318
Fax (907) 465-5362

Improper disposal of fish waste from sport fishing, personal use fishing, and commercial fisheries poses a potential risk to the environment and public health and safety. The Alaska Department of Environmental Conservation (ADEC) Solid Waste Program only regulates the land disposal of fish waste from commercial operations. However, it is important to understand the best management practices for disposing fish waste to reduce nuisances and animal attraction.

Personal Use & Sport Fish Waste

Even for sport and personal use fishing, disposing of fish waste on public or private land is illegal and can result in fines. The [Alaska Department of Fish & Game](#) recommends that you clean fish riverside or in port, chop fish carcasses into numerous pieces, and throw them into deep or fast-moving water or use a provided fish grinder. Anglers who remove fish from the fishing site and fillet or process them must also dispose of fish waste in a safe manner:

- α Fish waste should be taken directly to a permitted landfill that will accept it.
 - The Central Peninsula Landfill in Soldotna accepts fish waste free of charge during the fishing season.
 - Anchorage Regional Landfill, the Central Transfer Station, and the Girdwood Transfer Station accept residential fish waste.
 - Matanuska-Susitna Borough takes bagged residential fish waste at the Palmer Central Landfill and the Big Lake, Butte, and Sutton transfer stations.
- α If you have local trash pickup, freeze the fish waste to eliminate odors and then put it out the morning of your trash pickup day. Do not place waste out the night before or put it in commercial dumpsters.

Commercial Fish Waste

ADEC Solid Waste Program allows three methods for managing commercial fish waste on land:

- α Landfill Disposal: Commercial fish waste may be disposed in a permitted landfill willing to accept it.

Improper disposal of fish waste creates a dangerous bear attractant.

- **Chop the fish carcass up and throw it into fast-moving water;**
- **Take it directly to the landfill; or**
- **Put it in YOUR trash the morning of pickup.**



Illicit Discharge

GREEN INFRASTRUCTURE IMPLEMENTATION IN THE MUNICIPALITY OF ANCHORAGE

Presented by Janie Dusel, PE | AWR Engineering, LLC

March 2, 2022

INTRODUCTION AND PURPOSE

- Training Purpose: To discuss barriers to implementation of Green Infrastructure in Anchorage and ways to overcome them.



Stormwater pond in south Anchorage.

REVIEW: WHAT IS GREEN INFRASTRUCTURE?

- What is Green Infrastructure?

From the US EPA: *The **range** of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters.*

Simpler Definition: *Measures that use natural processes to clean stormwater.*

- What does Green Infrastructure do?

Slows runoff and allows it to filter through soil or plant media allowing removal of sediment and attached pollutants.

Green Infrastructure ≠ Infiltration

REVIEW: WHAT IS GREEN INFRASTRUCTURE?

- Why is it needed?

Practically: Stormwater picks up pollutants as it runs across (primarily) impervious surfaces. Most of these pollutants bind to sediment. Removing sediment and particulates removes pollutants.

From Regulatory Standpoint: Stormwater treatment is required per the joint MOA/ADOT&PF MS₄ (stormwater) permit.



Taku Lake Rain Garden

REVIEW: WHAT IS GREEN INFRASTRUCTURE?

- Which seems cleaner?

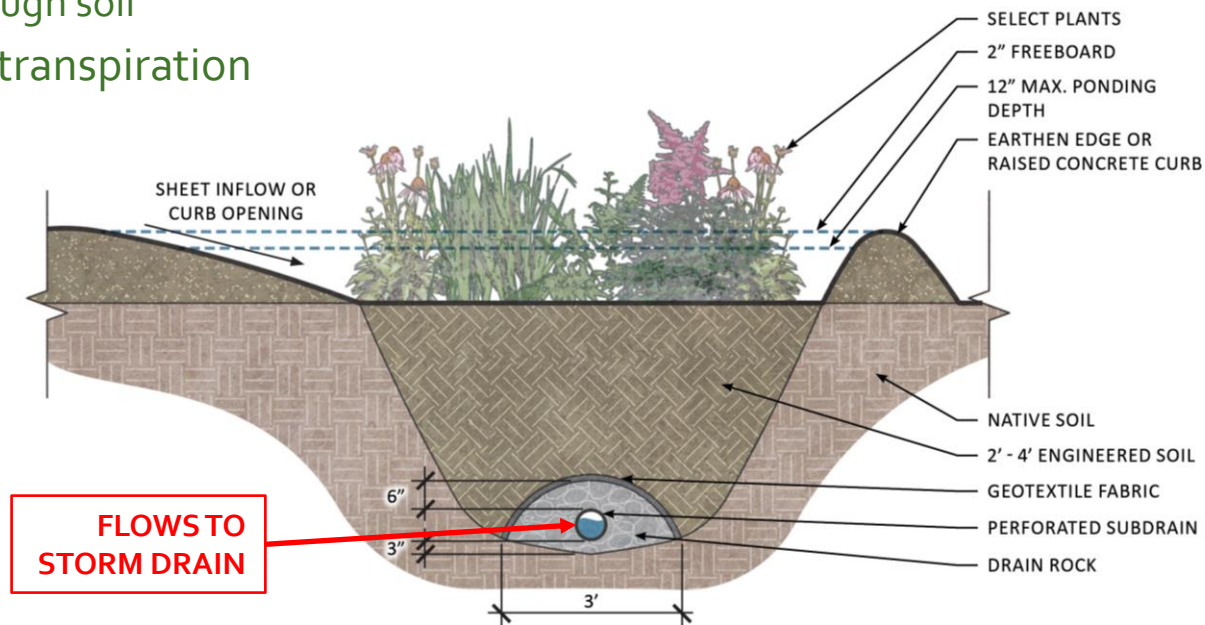


Above: Water flowing into traditional curb inlet.
Right: Water outflow from the Taku Lake rain garden.



FACILITIES AND PROCESSES

- Countless types of Green Infrastructure *facilities*
- Most of them rely on one or more of the following *processes* to achieve pollutant removal:
 - Infiltration
 - Filtration
 - Through vegetation
 - Through soil
 - Evapotranspiration



REVIEW MOA REQUIREMENT

- MOA Green Infrastructure Requirements
 - DCM Chapter 2, *Section 3.3.2.1 Water Quality Treatment*
 - Stormwater **treatment** through Green Infrastructure for the first 0.52 inches of rain in a 24-hour period.
 - 20% Area Allowance
 - Roadway with rights of way 60 feet or less
 - Infeasibility determination
- Anchorage has a lot of challenging sites
 - Inability to infiltrate into the subgrade
 - Many conflicted demands for limited surface space
 - Constricted ROW

**Green
Infrastructure ≠
Infiltration**

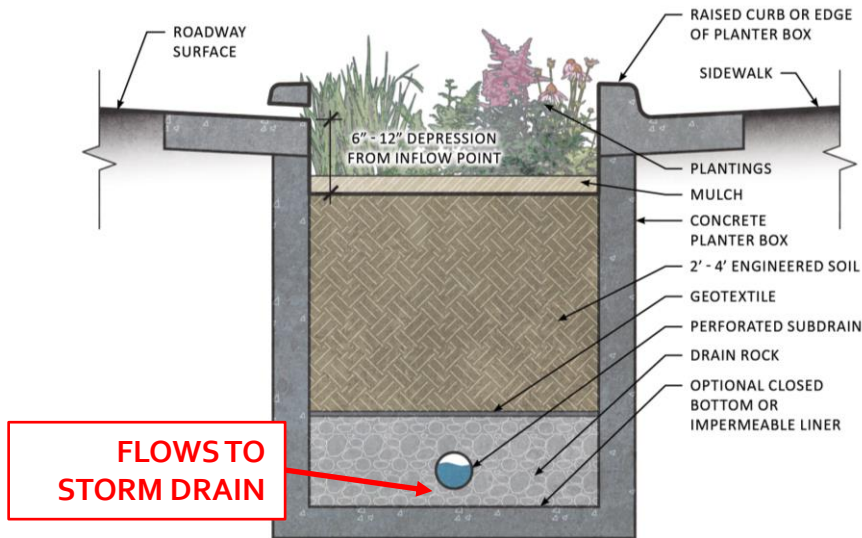
WHAT TO DO?

BARRIERS TO IMPLEMENTATION

- **Barrier # 1: Infiltration or Nothing:** If your site cannot infiltrate water into the subgrade, you think Green Infrastructure is not feasible.
- **Overcoming it:**
 - *Infiltration* is NOT a requirement.
 - Infiltration is only ONE of several processes available to achieve Green Infrastructure Treatment.
 - *Filtration* will often work when Infiltration does not.

BARRIERS TO IMPLEMENTATION

No-infiltration Stormwater Planter



Left: Stormwater planter from National Precast Concrete Association <https://precast.org/2014/12/rain-go/>
Above Right: Photo from Wilkes East Neighborhood in Gresham, Oregon. <http://www.wilkeseastna.org/node/628>

BARRIERS TO IMPLEMENTATION

- **Barrier # 2: All or Nothing Mentality:** When you have a challenging site, and you cannot fully meet the GI requirements, you do nothing.
- **Overcoming it:**
 - All or SOMETHING
 - Treating only part of the site
 - Treating a lesser volume
 - Modifying specific design parameters
 - What CAN you do?
 - How can your runoff contact vegetation or soil?
 - WMS will work with you on design variances, but SOMETHING is always preferred over nothing.

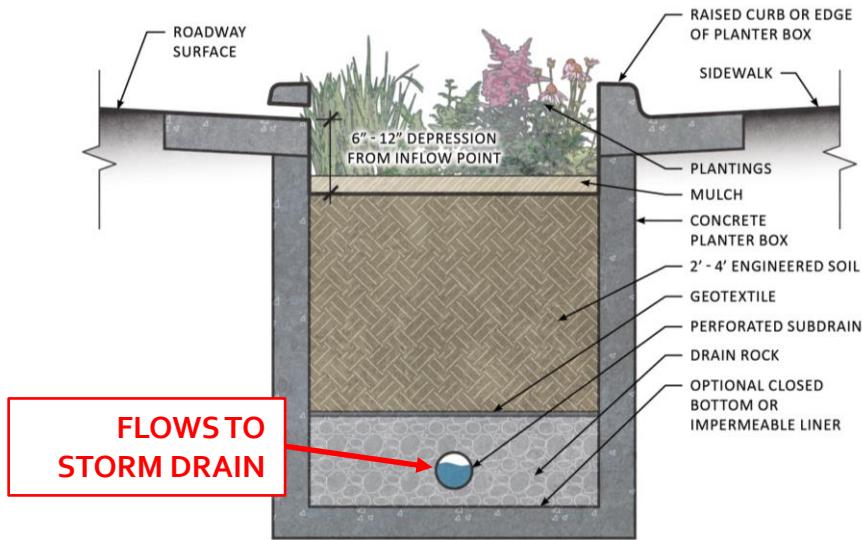
BARRIERS TO IMPLEMENTATION

- **Barrier # 3: Limiting Your Toolbox:** You think the facilities presented in the DCM are the only available/allowable options.
- **Overcoming it:**
 - See Section 6.6 Paragraph 1: *There are a variety of stormwater controls and Green Infrastructure/LID elements that are not discussed here that may be applicable to specific situations. The designer is encouraged to explore additional stormwater controls and LID elements.*
 - Tools in the DCM are the early basics.
 - These tools may not always work for your site.
 - Countless additional tools and configurations available. The entire US is doing this.
 - Understand the intent and the processes and then eliminate “cookie cutter” mentality.

BARRIERS TO IMPLEMENTATION:

Examples of Additional/Modified/Under-utilized Tools

No-infiltration Stormwater Planter

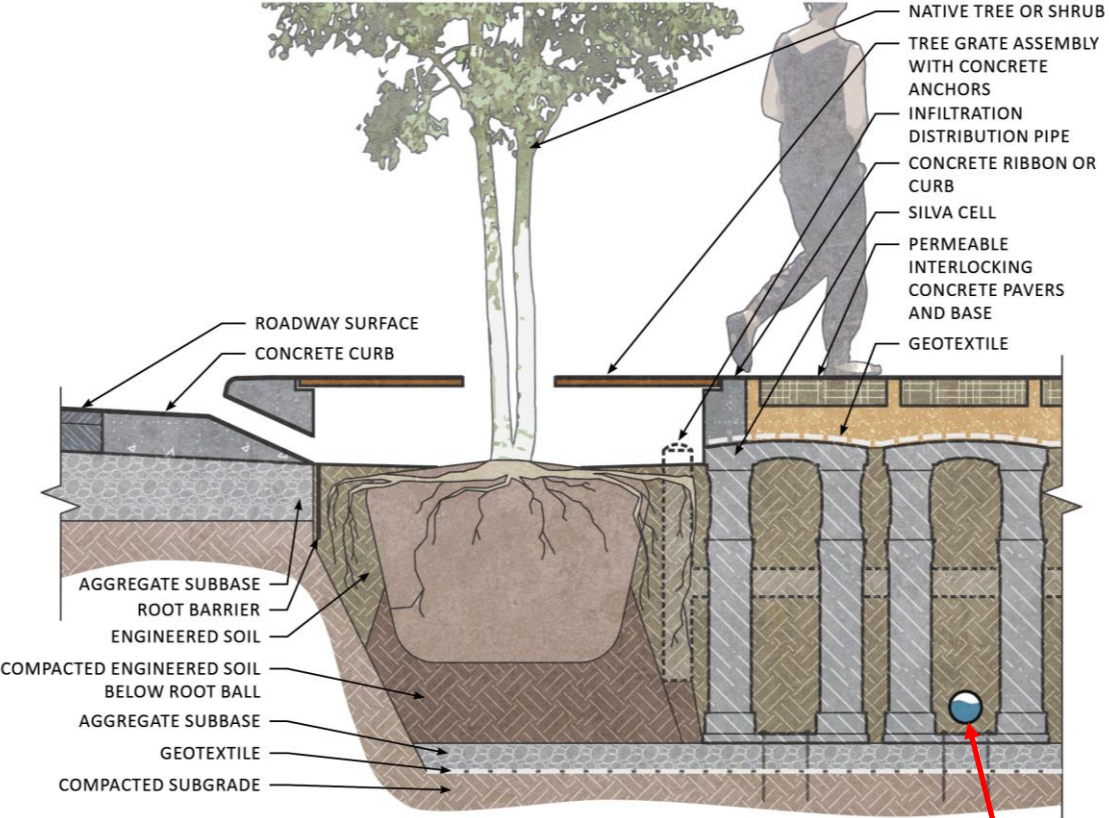


Left: Stormwater planter from National Precast Concrete Association <https://precast.org/2014/12/rain-go/>
Above Right: Photo from Wilkes East Neighborhood in Gresham, Oregon. <http://www.wilkeseastna.org/node/628>

BARRIERS TO IMPLEMENTATION:

Examples of Additional/Modified/Under-utilized Tools

Silva Cells



Typical Silva Cell Section

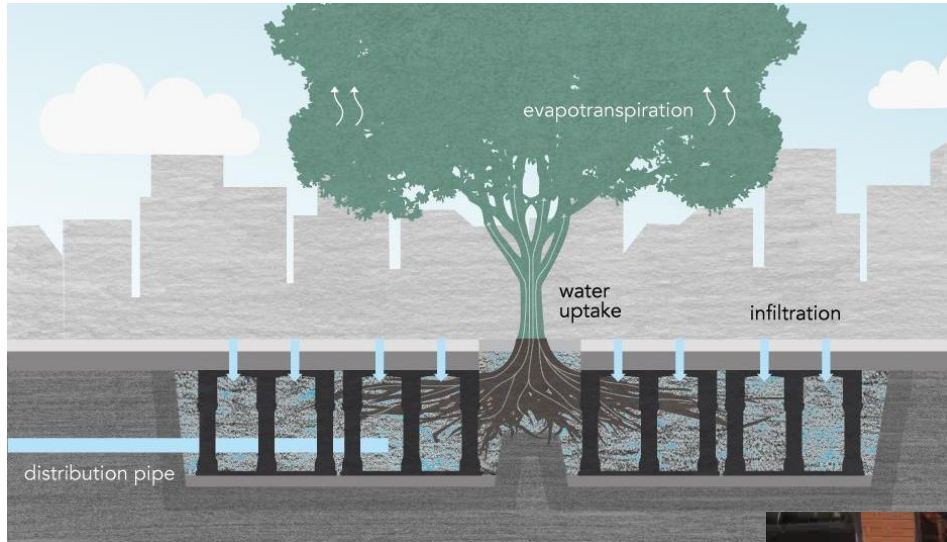
**FLOWS TO
STORM DRAIN**



Silva Cell in Downtown Fairbanks

BARRIERS TO IMPLEMENTATION:

Examples of Additional/Modified/Under-utilized Tools



Above: Silva Cell Section Schematic

Right: Silva Cell Construction



BARRIERS TO IMPLEMENTATION:

Examples of Additional/Modified/Under-utilized Tools

Filter Strips



Clockwise from top left: Taco bell parking lot in south Anchorage; Taco Bell/McDonald's area in South Anchorage; Filter strip in Minnesota from the MN Stormwater Manual https://stormwater.pca.state.mn.us/index.php?title=File:Filter_strip_for_bioswale.jpg; Natural Water Retention Measures <http://nwrn.eu/measure/filter-strips>

BARRIERS TO IMPLEMENTATION

- **Barrier # 4: Believing Myths:** You are concerned about many of the existing stormwater management myths.
- **Overcoming it:**
 - Most Green Infrastructure myths started with a misconception or a poor design that failed. Good design practices can overcome these.
 - Before discounting an idea, find out if the myth is true and if it can be overcome.

GREEN INFRASTRUCTURE MYTHS

- **Myth:** All Green Infrastructure fill with sediment and fail.
- **Truth**
 - They need to be properly sized
 - They need an overflow for flood flows
 - If they rely on infiltration, they need a field-measured infiltration rate and an appropriate factor of safety.
- **Myth:** All Green Infrastructure are maintenance-intensive
- **Truth**

You can design them to help minimize maintenance

Landscaping requires maintenance as well – try to combine them.



NSH/Alpenhorn infiltration facility. Accepting stormwater from nearly 7 acres of impervious surface.

GREEN INFRASTRUCTURE MYTHS

- **Myth:** Curb cuts don't work because they fill with sand and block inflow
- **Truth:**
 - The drop behind the curb cut needs to prevent that from happening.
 - You can usually use an inlet-style opening instead.

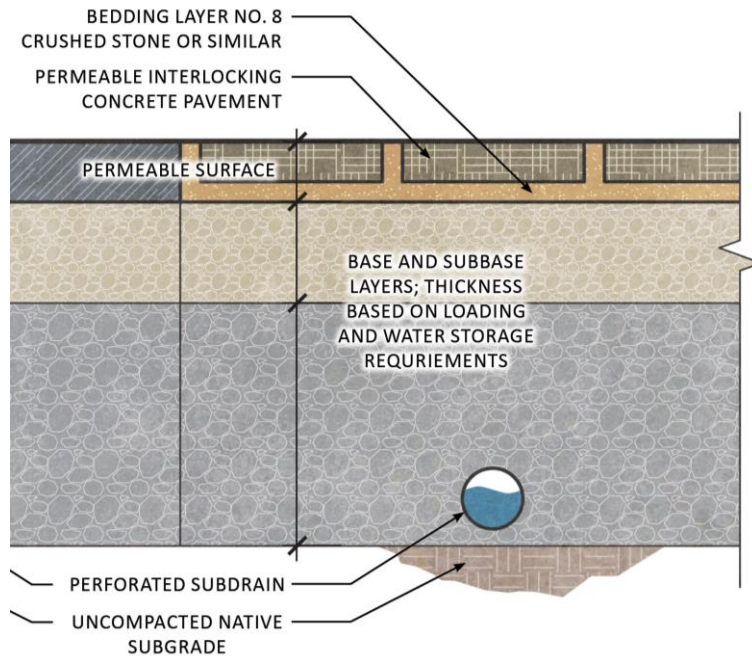


Above: Curb cut not functioning in Anchorage
Upper Right: Stormwater Planter from the City of Salina, CA
www.cityofsalinas.org/
Lower Right: Bioretention example from Chesapeake Bay
Stormwater Network <https://chesapeakestormwater.net/>



GREEN INFRASTRUCTURE MYTHS

Permeable Interlocking Concrete Pavers (PICP)



Top left: Typical PICP Section

Top Right: PICP Installation in Anchorage. Photo source: Cold Climate Evaluation of PICP and Porous Concrete Pavement Systems, 2010

Lower Right: PICP example from US Green Building Council.

www.usgbc.org

GREEN INFRASTRUCTURE MYTHS

- **Myth:** Permeable interlocking concrete pavers (PICP) will not work in Anchorage because they will heave during freeze/thaw and they cannot be plowed.
- **Truth**
 - This is only true if they are poorly designed and/or poorly installed.
 - ASCE studied the performance of PICP in Chicago, Minneapolis, and Toronto. Study shows it does not heave when it is frozen.
 - When it is properly installed so that the blocks form a uniform surface, it can be plowed with a blade like other asphalt surfaces.
 - AWR spoke with seven snowplow operators that regularly plow PICP in parking lots and streets in colder climates such as Minnesota and Illinois. All said they do not plow any differently than other areas.

GREEN INFRASTRUCTURE MYTHS

- **Myth:** I have to infiltrate stormwater.
- **Truth:** No you don't. You can filter it instead.

*Can't emphasize this
too much*



West Dowling Bioswale

FINAL TIPS FOR IMPLEMENTATION CHALLENGES

- **Use your site's landscaping**

- Nearly all sites and most roadways have landscaping of some kind. Let it double as stormwater treatment.
- Specifically allowed by Municipal code

- **Start Early**

- You have to think about stormwater treatment WITH your grading plan or general site/roadway drainage.
- Much fewer options if you try to add in treatment as an afterthought.

- **Get Creative**

- Look for options that can work with your site
- Mix and match
- Consider design variances where needed

HELPFUL RESOURCES

- **FAST Planning Green Streets Plan**
 - https://fastplanning.us/wp-content/uploads/2019/07/fast_planning_greenstreetsplan_6-18-19.pdf
- **Minnesota Stormwater Website**
 - https://stormwater.pca.state.mn.us/index.php/Main_Page
- **EPA Green Infrastructure Design and Implementation**
 - <https://www.epa.gov/green-infrastructure/green-infrastructure-design-and-implementation>

QUESTIONS?

Thank you for attending.