2021 Watershed Update

Agenda

Wednesday, February 24, 2021
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 2021 APDES Watershed Update Highlighting
Anchorage Storm Water Permit Compliance Activities
Starting at 9:00am

Program

APDES Storm Water Program

- Introductions
- APDES: What Its About - ***Kristi Bischofberger, MOA, WMS***
- Watershed Mapping – ***Jeff Urbanus, MOA, WMS***
- SWU Update
- Agency Updates
    - DOT&PF Activities – ***Ron Searcy***
    - ADEC - CESCL Training/CGP – ***James Rypkema***

Current Projects

- Monitoring Program
    - Dry Weather Screening -

      Alena Gerlek & Kacy Grundhauser, HDR, Inc.
    - Stormwater Outfall Monitoring -

      Eric Packer, HDR, Inc.
- Storm Sewer System Master Planning -

  Aaron Havel, AWR Engineering
- Watershed Perception Survey -

  Cherie Northon, Anchorage Waterways Council
- Discussion and Adjournment

You can find additional information on the stormwater permit at anchoragestormwater.com

Anchorage's

Municipal Storm Sewer Permit

MOA and DOT&PF

February 2021

http://anchoragestormwater.com/

Clean Water Act

The jargon:

- NPDES – National Pollutant Discharge Elimination System
- APDES – Alaska Pollutant Discharge Elimination System (Primacy as of 2015)
- MS4 – municipal separate storm sewer system: a publicly owned and operated conveyance
- Stormwater – means storm water runoff, snow melt runoff and surface runoff [40 CFR 122.26(b)(13)]

Clean Water Act

Authorizes NPDES System of Permits for "Fishable, swimmable waters"

- Construction General Permit (CGP)
- Multi-Sector General Permit (MSGP)
- Wastewater Discharge Permits
  - Municipal Separate Storm Sewer System (MS4)
    - Phased into communities based on population
      - Anchorage is Phase 1

Clean Water Act

- NPDES permits are required for point source discharge of pollutants to waters of the U.S.

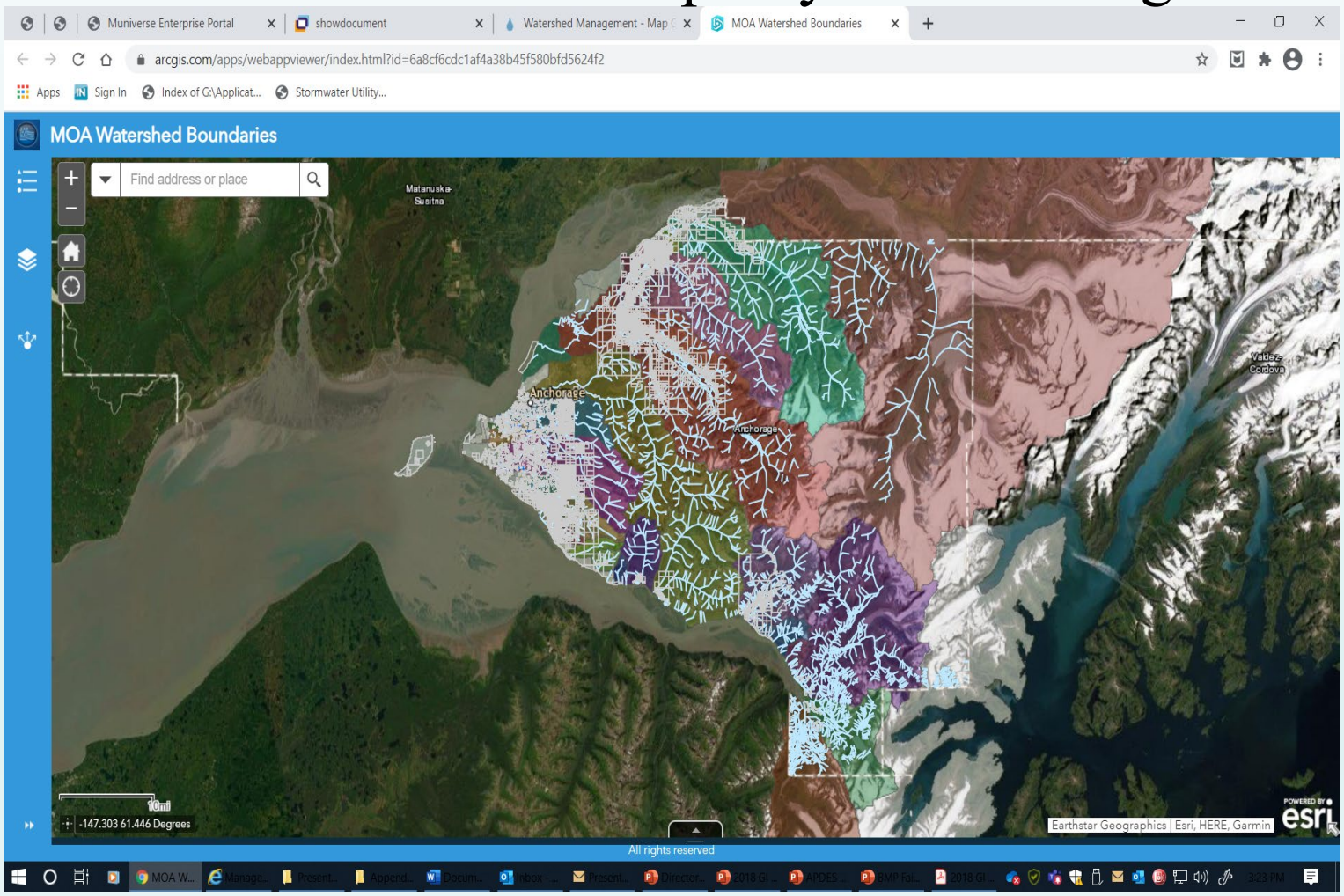
- Stormwater identified as a "point source" for certain activities and jurisdictions –
  incl. MOA and DOT&PF

MS4 permit basics

- Allows permittees to discharge stormwater and certain non-stormwater to waters of the U.S.
- Discharges must meet state water quality standards
  - Discharges must be 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

MS4 Boundaries

The Entire Municipality of Anchorage



Anchorage's MS4 permit

- Joint MOA and DOT&PF, Administered by ADEC
- First MS4 permit for Anchorage issued in 1999 for 5 years followed by 5 years administrative extension
  - Assessed operations and management practices
    - Deicing agents, street sanding and sweeping practices, snow disposal policies, water quality
  - Implemented required programs, plan reviews, inspections and training
- Subsequent permits in 2010, 2015, 2020, issued with escalating compliance, requirements consistent with national norms

Permit elements

1. Construction – review, inspect, enforce
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

- Apply to min.10,000 sf (and any site that disturbs soil)
- Review Plans
  - Storm Water Pollution Prevention Plan (SWPPP)
- Verify CGP & 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)

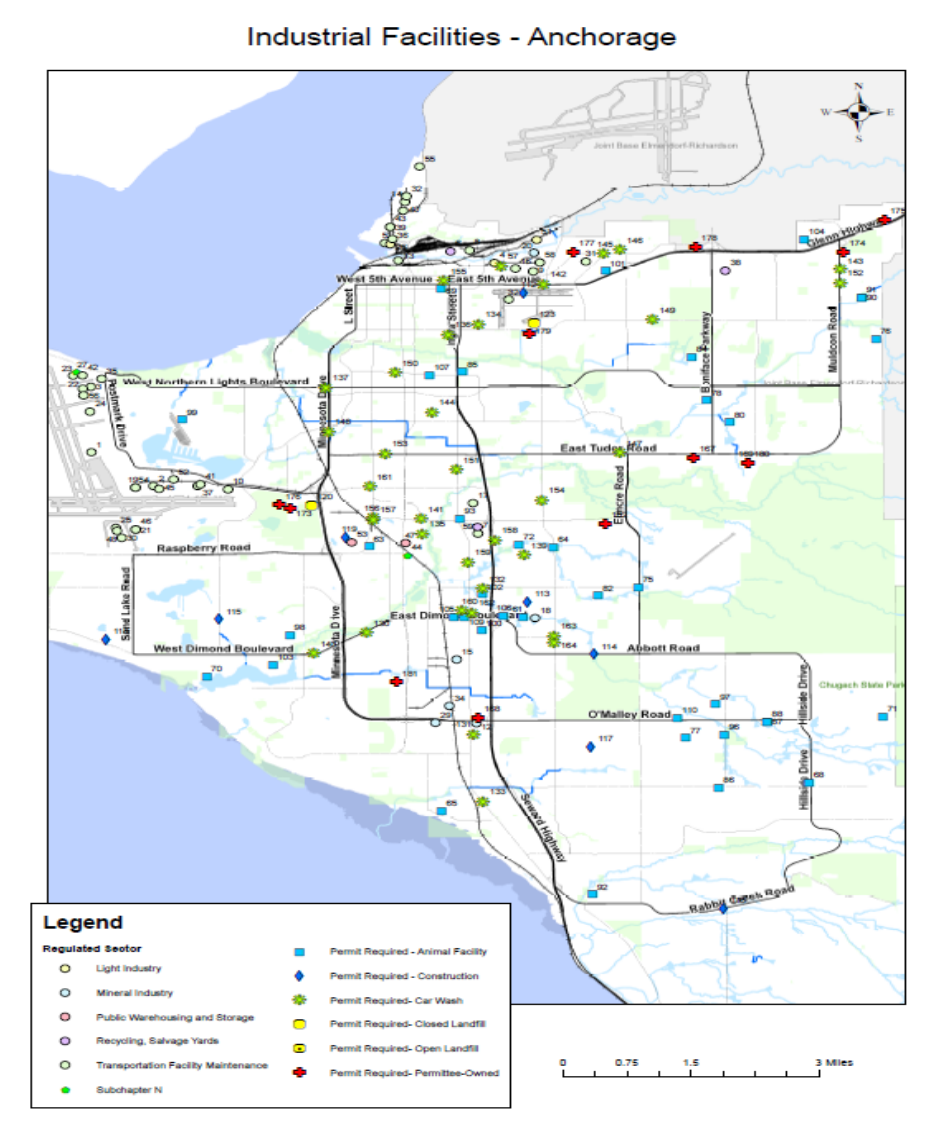
New and Redevelopment

- Require Permanent Stormwater Controls for 10,000 sf and greater Commercial
- Require Maintenance Agreements & Inspection
- Manage stormwater quality and quantity
- Provide incentives for green infrastructure development - through design criteria
- Track permanent controls

Green Infrastructure Examples

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
- Maintain MOA 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

Public Education & Involvement

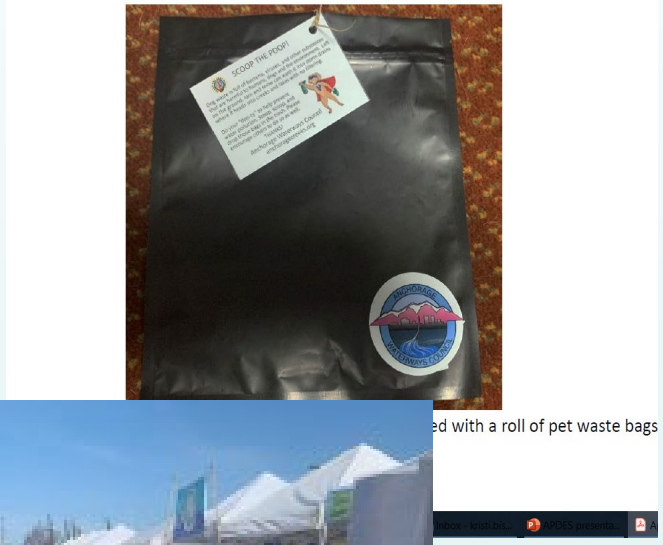
Community Education

(Partner: Anchorage Waterways Council)

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

Targeted Education

- Construction
- New Development
- M&O



Monitoring and Assessment

- Assess performance of treatment/controls
- Pesticide Screening
- Stormwater outfalls
  - Dry Weather
  - Wet Weather

Impacts of Non-Compliance

- Regulatory Fines and Imprisonment
  - Civil and Administrative
    - $500 - $100,000 escalating fines & $10K/day ongoing
  - Criminal
    - Unspecified fines

For maps & information…

Watershed Management Services Website

http://anchoragestormwater.com/

WMS Mapping

2021 APDES GIS MAPPING UPDATE

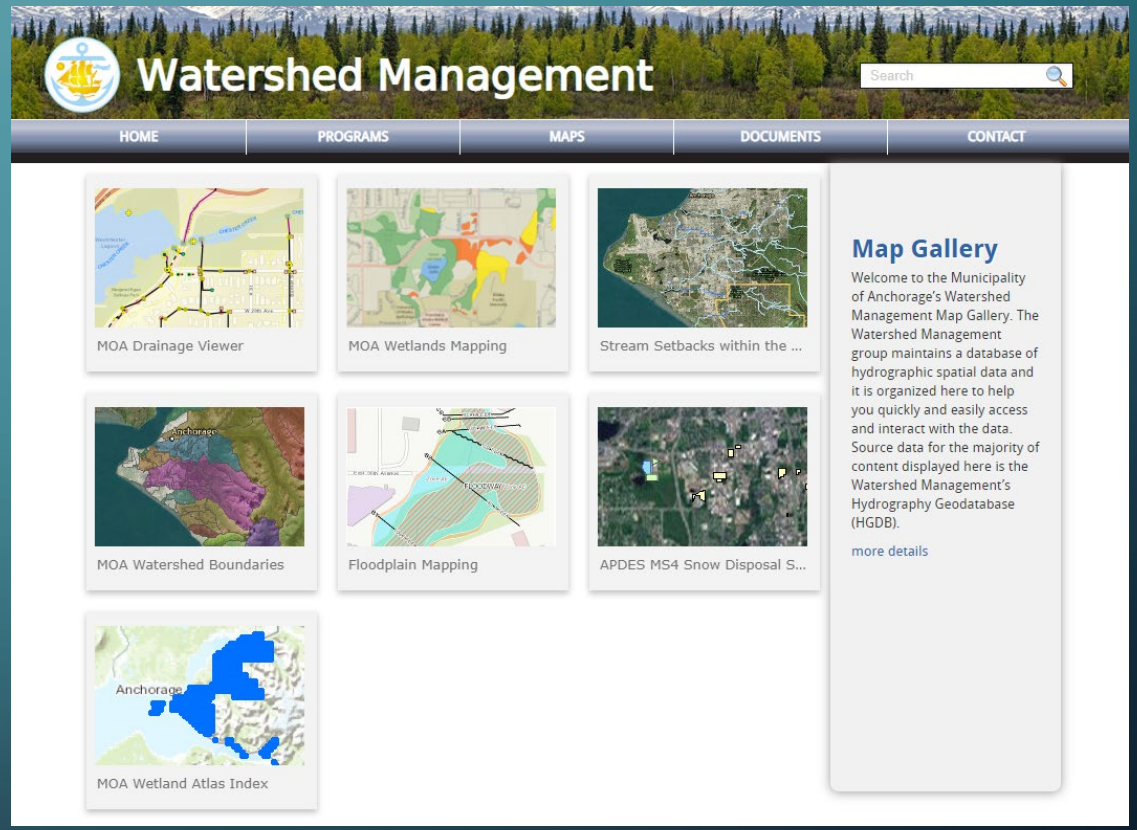
FEBRUARY 24, 2021

STORMWATER AND DRAINAGE MAPPING SOURCES

Interactive Web Maps	• Online GIS maps for everyday tasks and for most users.
Map PDFs	• Downloadable static maps for printing or field work – Stormdrain Map Books, etc.
GIS Mapping Services	• Service URLs for dynamic data links for AGOL or ArcPro.
Data Downloads	• Static data downloads for CAD and ArcMap

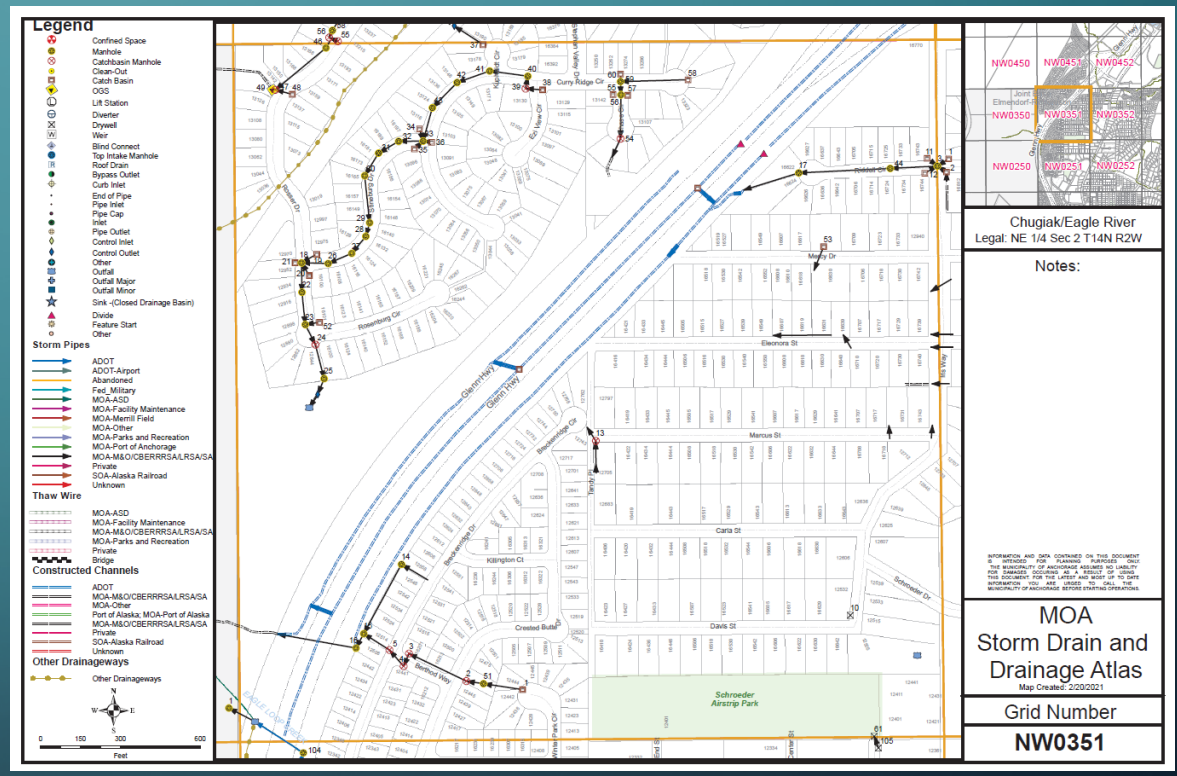
INTERACTIVE WEB MAPS

- Can be accessed from the WMS Webpage or the MOA GIS Webpage
- Data is updated daily
- Maps for stormdrains, watershed boundaries, streams, wetlands, and FEMA floodplains.
- Updated Daily



MAP PDFs

- Downloads for map PDFs
- Map-based index for maps
- 100-Scale Stormdrain Map Books –MOA GIS Page
- MOA Wetland Atlas –WMS Webpage
- FEMA FIRM Maps – WMS Webpage
- Updated Weekly



GIS SERVICES VS DOWNLOADS

GIS Services

- Data updates on our end automatically show up in your maps –dynamic data
- Feature and Map Service URLs
- For use in AGOL and ArcPro
- Automatically symbology
- There can be some limits in functionality

GIS Data Downloads

- Access to current data requires additional downloads – static data
- Shapefiles, CAD, Geodatabases
- For use in AutoCAD and ArcMap
- Requires symbology
- Full Data Control

DATA LINKS

- WMS Web Maps – http://anchoragestormwater.com/maps
- Map Book PDFs:
  - Stormdrain Maps - https://maps.ancgis.com/AGOL_ElectronicMapFileViewer
  - Wetland Atlas - http://anchoragestormwater.com/maps
- Services and Downloads - https://moa-muniorg.hub.arcgis.com/pages/data or through the WMS Webpage - http://www.anchoragestormwater.com/datalibrary.html
  - Other MOA Data – Streets, Zoning, Parcels, etc. are also available

CONTACTS

- Streams, Wetlands, or Eagle River, Hillside, Girdwood Stormdrain Mapping – Jeff Urbanus or Kyle Cunningham
- ARDSA Stormdrain Mapping – Hope Stitzel
- General MOA GIS Questions – ancgis@anchorageak.gov
- Please let us know if you see something that doesn't look right or have suggestions for improvements. We always looking to make our maps better!

Stormwater Utility Update

- Stormwater Utility Commission -10 Members from Public Stakeholders
  - MOA Assembly created to facilitate more input from public and stakeholders
  - Monthly meetings, currently collecting information from MOA staff and contractors about MOA stormwater management practices
- Phase 2 Contract for Stormwater Utility Study
  - Contract was awarded to Stantec – Managed by AWWU
  - Notice to Proceed has been issued for "Task Zero"
    - Scope and Schedule adjustment due to COVID-19
    - Public Involvement Process
- Stormwater Policy Committee – Executive Level Advisory Group
  - AWWU, WMS, Maintenance and Operations Department, PW Administration

2021 Construction General Permit (AKR100000)

- **Submission Deadlines** – Previously authorized projects from 2016 CGP
  - **May 2, 2021** – NOI within 90 days of effective date (Feb 1, 2021)
    - Copy of SWPPP and payment of fee not required for permitted ongoing projects.
    - In OASys, **Select** "Storm Water Construction General Permit **eNOI_REISSUANCE** (CGPNOIREI)

2021 Construction General Permit (AKR100000)

- In the interim, continue to comply with the terms and conditions of the 2016 CGP until granted authorization under the 2021 CGP or submit a Notice of Termination (NOT);
  - If permittee is eligible to submit a NOT (e.g., construction is finished and final stabilization has been achieved) before the 90th day (i.e., May 2, 2021), a new NOI is not required to be submitted provided a NOT is submitted.

- **NEW PROJECTS**: new NOI, SWPPP (as applicable), and permit fee as usual.

http://dec.alaska.gov/water/wastewater/stormwater/construction

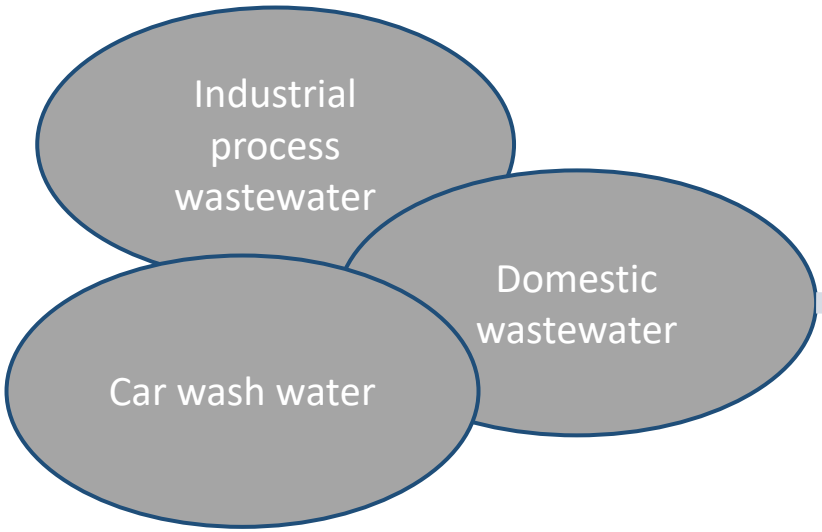
Dry Weather Screening

APDES Annual Meeting
February 24, 2021

Program Objective

Detect and reduce illicit discharges to the MS4

Illicit discharge = any discharge not entirely composed of stormwater



Screening Methods

Water samples collected from flowing outfalls during periods of dry weather

7 parameters screened for concentrations above those expected in stormwater

	Parameter	Reporting Range	Threshold
Field tested	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
Lab analyzed →	Fecal Coliform	1 colony/100 mL – too numerous to count	≥ 400 colonies/100 mL

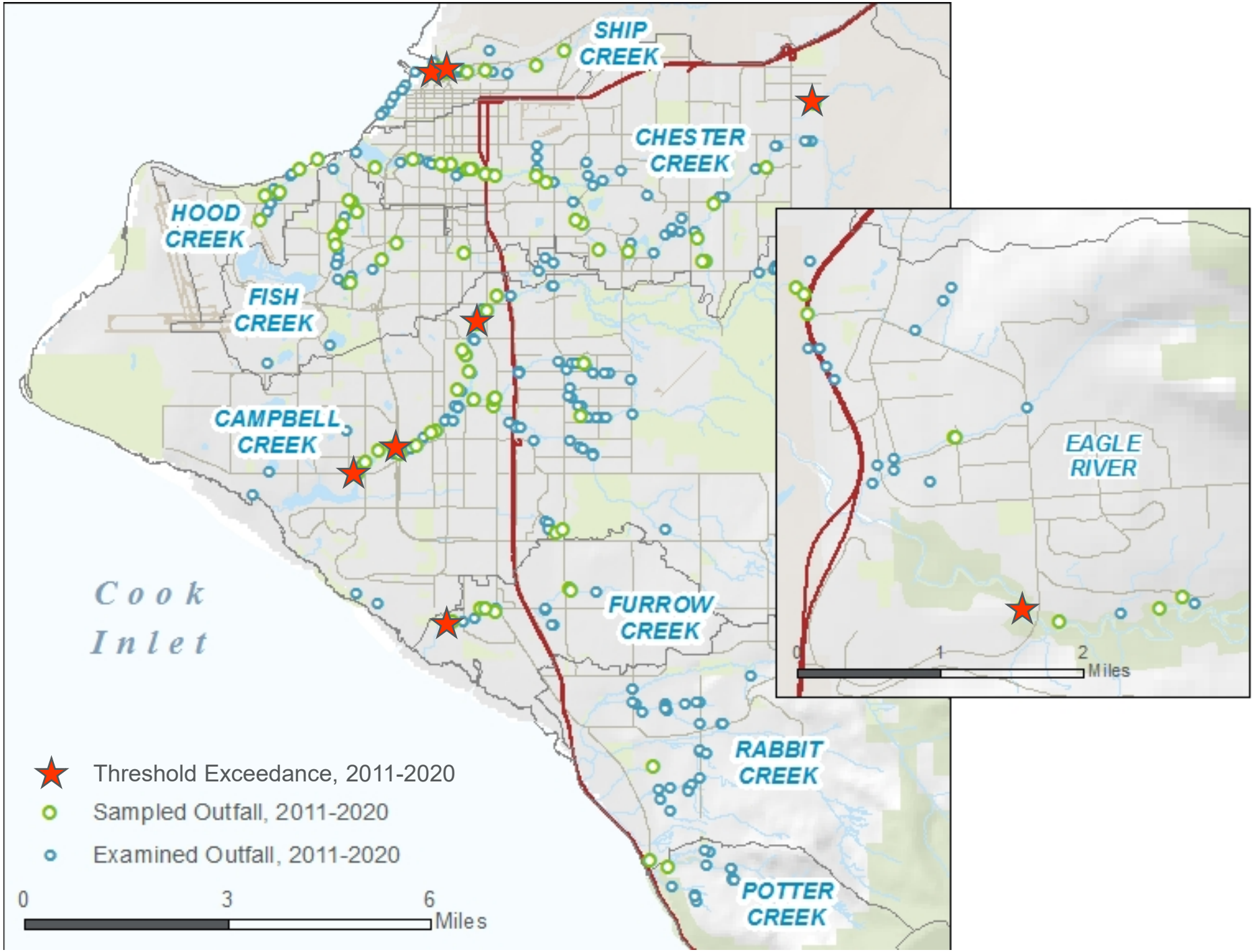
Sampling

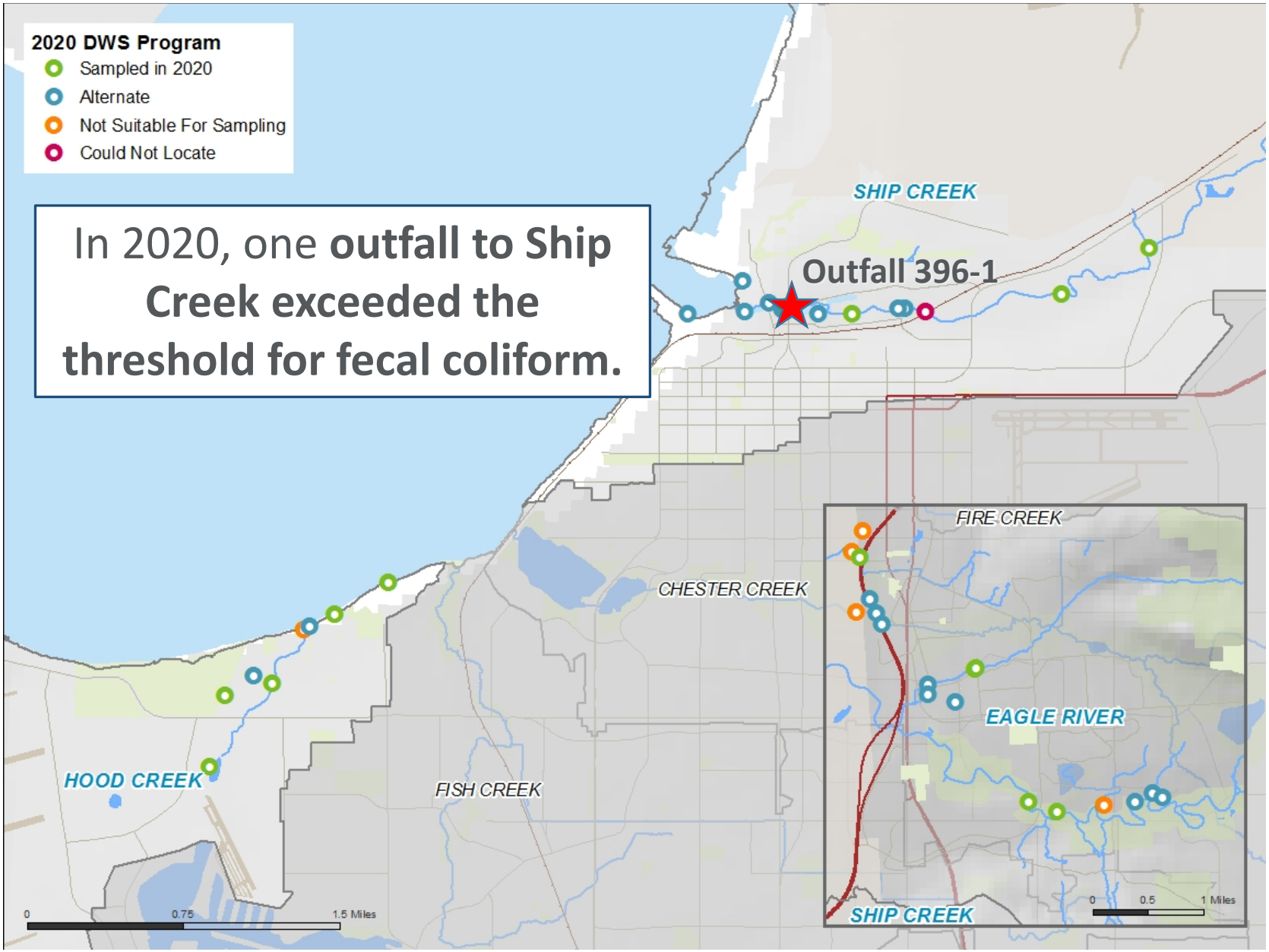
- 3 watersheds investigated each year
- 15 outfalls sampled (5 per watershed)
- 30 alternates identified

Results

Between 2011 and 2020, 8 outfalls sampled have exceeded the threshold for measured parameters. Following an exceedance, the connected network is examined for potential sources of illicit discharge.

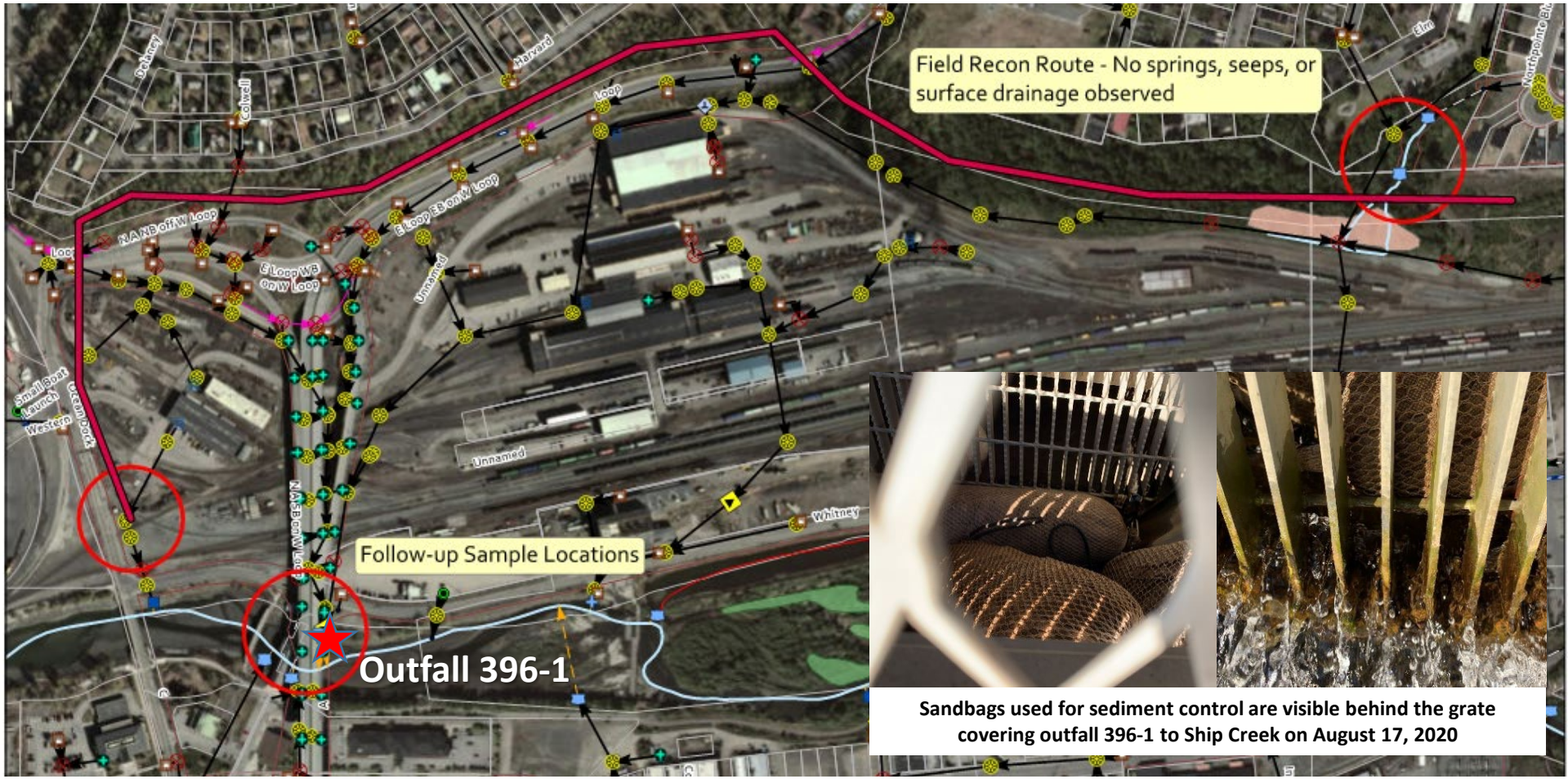
Watershed	Outfall ID	Year	Exceedance Parameter
Campbell Creek	17-1	2011	Turbidity
Ship Creek	71-1	2012	Fecal coliform
Campbell Creek	556-1	2013	Fecal coliform
Chester Creek	115-1	2015	Fecal coliform
Campbell Creek	105-1	2016	Fecal coliform
Furrow Creek	5-1	2017	Fecal coliform
Eagle River	1335-1	2017	Fecal coliform
Ship Creek	396-1	2020	Fecal coliform


SHIP CREEK
CHESTER CREEK
HOOD CREEK
FISH CREEK
CAMPBELL CREEK
FURROW CREEK
RABBIT CREEK
POTTER CREEK
EAGLE RIVER
Cook Inlet
Threshold Exceedance, 2011-2020
Sampled Outfall, 2011-2020
Examined Outfall, 2011-2020
0
3
6
Miles
0
1
2
Miles



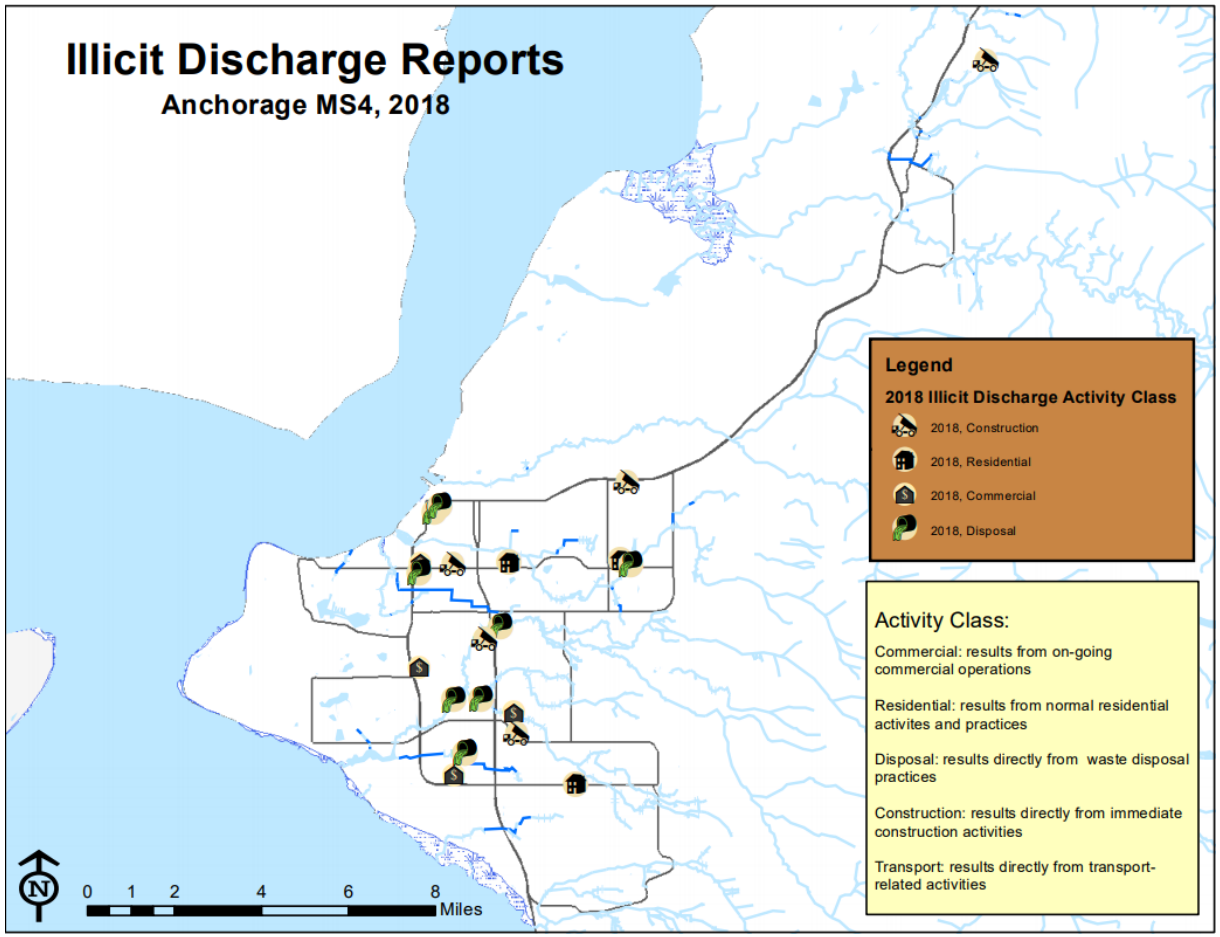
Outfalls sampled or examined in summer 2020

Follow-Up Investigations



Enforcement

MOA responds to complaints regarding potential illicit discharges year-round

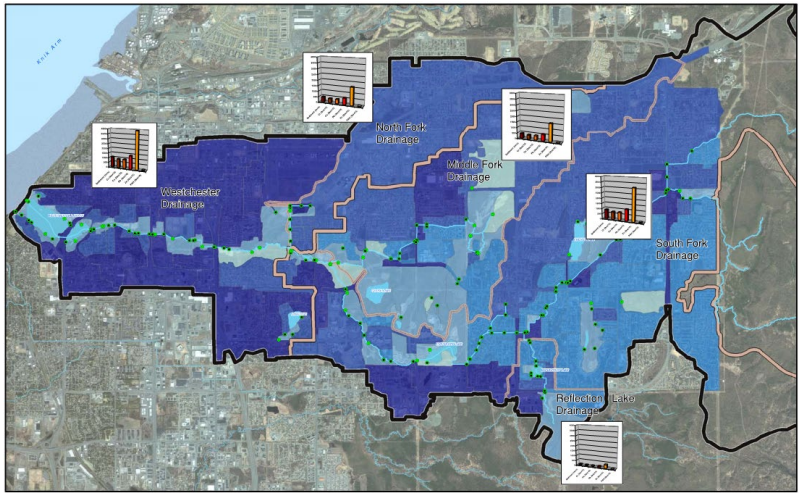


Pollution Hotline: (907) 343-4141

Source: MOA 2018 APDES Annual Report

Education is Key!

Source: Anchorage Waterways Council (photo taken pre-Covid)



Source: WMS Characterization of Chester Creek Watershed

Source: Anchorage Waterways Council

New 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.

Signature

June 23, 2020
Date

Many outfalls from the MS4 have been observed to flow regularly during dry weather conditions

Permit Updates

Part 3.5.4.2: “The permittees must survey a minimum of 30 outfalls per year for evidence of illicit discharges, and **conduct monitoring at outfalls where illicit discharges are suspected**.”

Proposed Program Updates

- Evaluate and score outfalls
- Establish a visual baseline of dry weather flows
- 30 outfalls targeted for screening annually

What would NOT change?

- Frequent, geographically widespread monitoring
- Indicator parameters and thresholds
- Analytical screening methods
- Follow-up of suspected illicit discharges


Questions?

2020 MOA Stormwater Outfall Monitoring Program

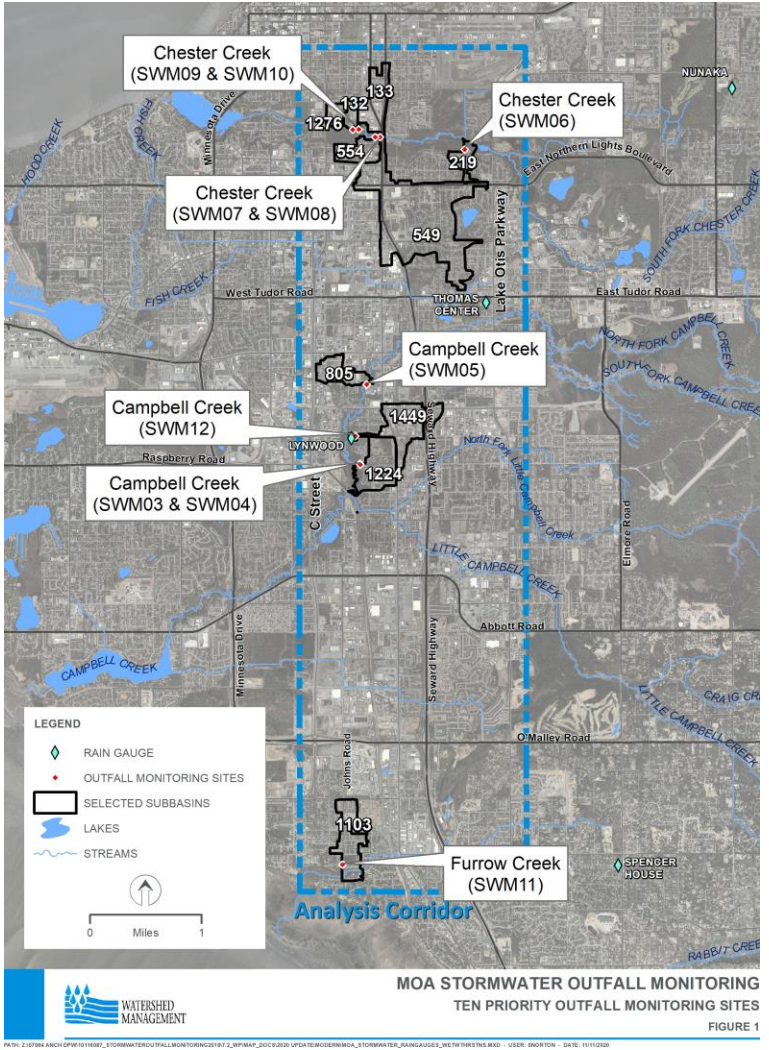
01 STORMWATER MONITORING PROGRAM OVERVIEW

Objectives of Stormwater Monitoring (SWM) Program

- Meet the requirements of the MS4 Permit.
- Estimate annual pollutant loading.
- 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.

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.

SWM Tested Parameters

Field Measurements

Parameter	Measurement Type	Purpose
Flow	Field	Characterize flow & loading
Specific Conductivity	Field	Stormwater quality
Dissolved Oxygen (DO)	Field	Stormwater quality
pH	Field	Stormwater quality
Temperature	Field	Stormwater quality
Turbidity	Field	Stormwater quality

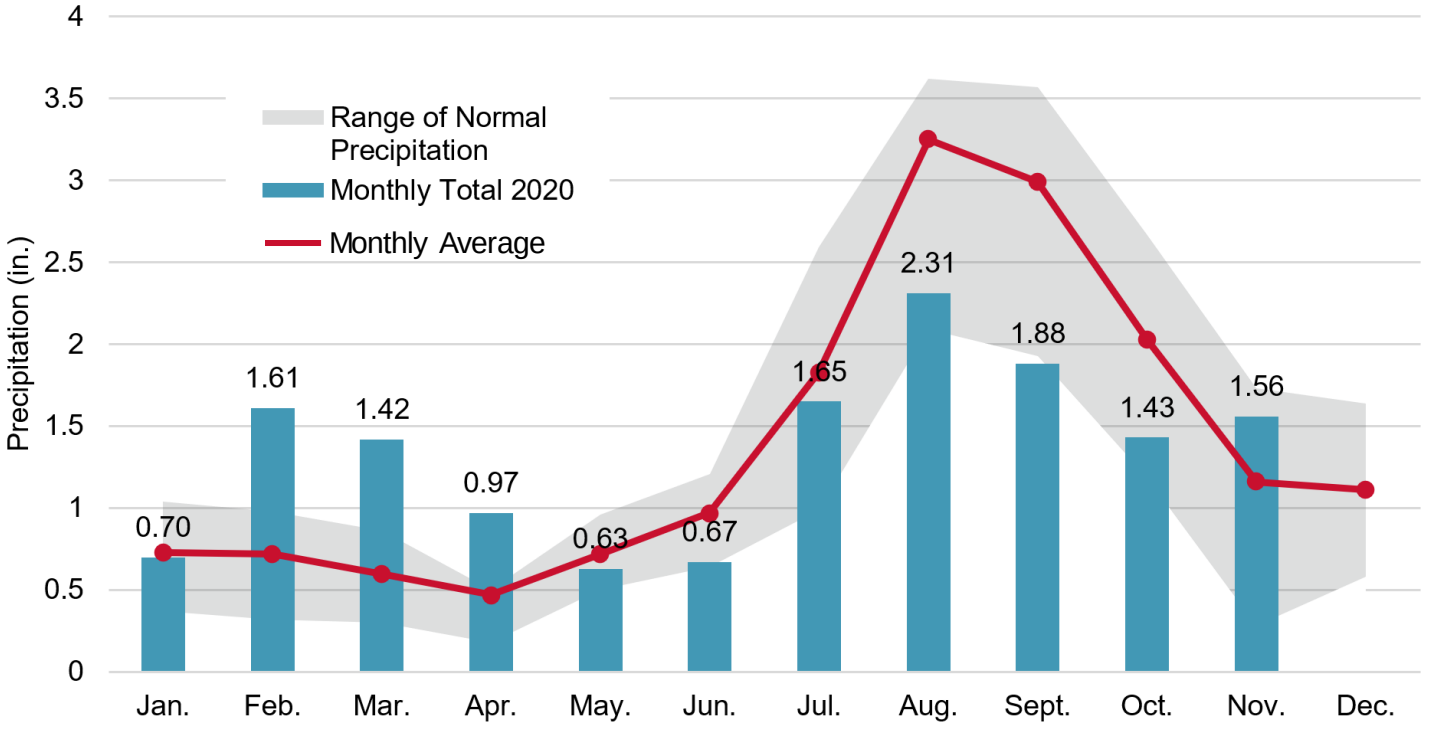
Field Observations

Field	Measurement Type	Purpose
Odor	Field	Qualitative Observation
Color	Field	Qualitative Observation
Clarity	Field	Qualitative Observation
Floatables	Field	Qualitative Observation
Deposits or Stains	Field	Qualitative Observation
Sheen	Field	Qualitative Observation
Surface Scum	Field	Qualitative Observation
Debris	Field	Qualitative Observation

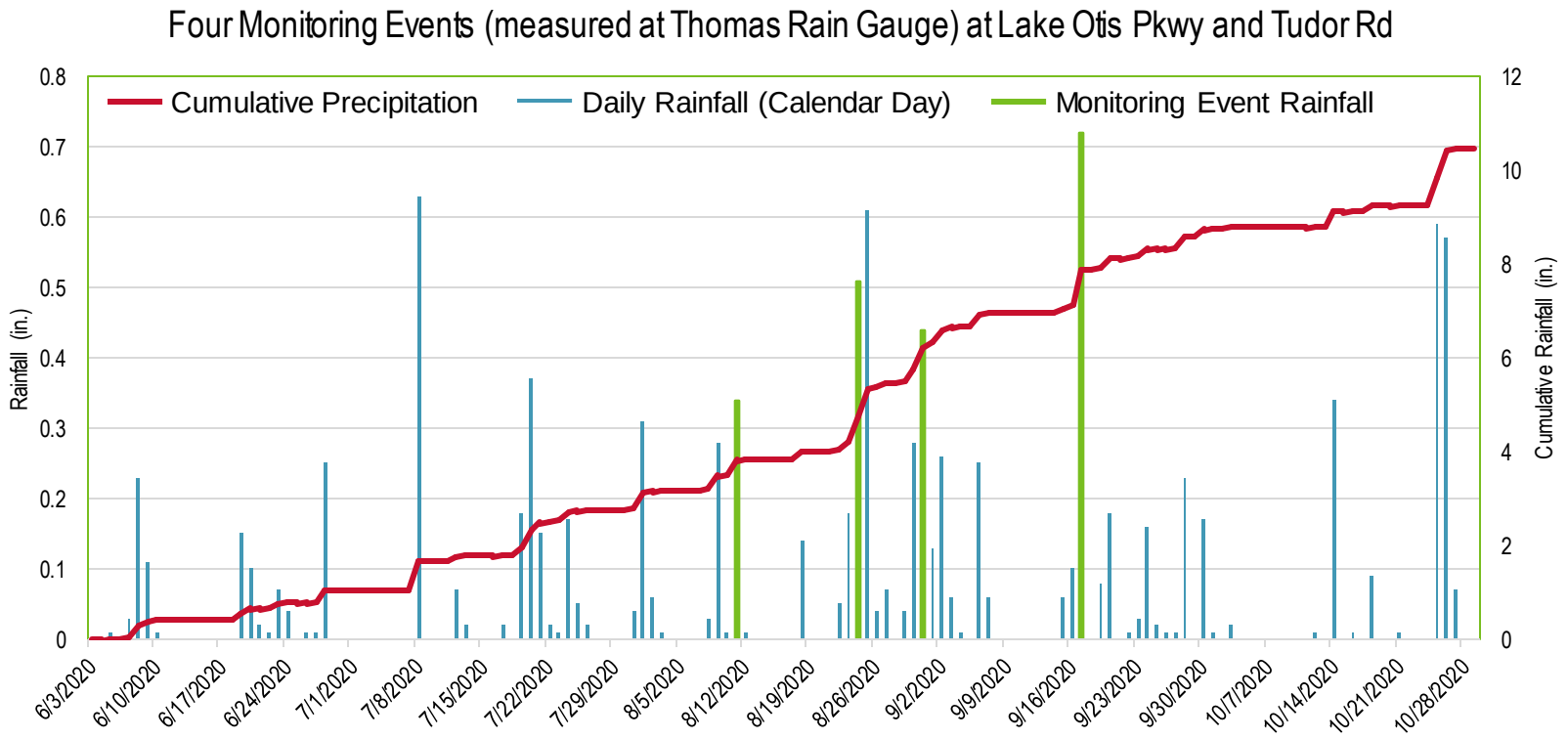
Laboratory Measurements

Parameter	Measurement Type	Purpose
5-Day Biochemical Oxygen Demand (BOD_5)	Laboratory	Stormwater quality
Fecal Coliform	Laboratory	Stormwater quality & loading
Total Suspended Solids (TSS)	Laboratory	Stormwater quality
Total Aromatic Hydrocarbons (TAH)	Laboratory	Stormwater quality & loading
Total Aqueous Hydrocarbons (TAqH)	Laboratory	Stormwater quality & loading
Dissolved Copper	Laboratory	Stormwater quality
Total Hardness	Laboratory	Stormwater quality

2020 Precipitation vs. Historical Averages



2020 Monitoring Events

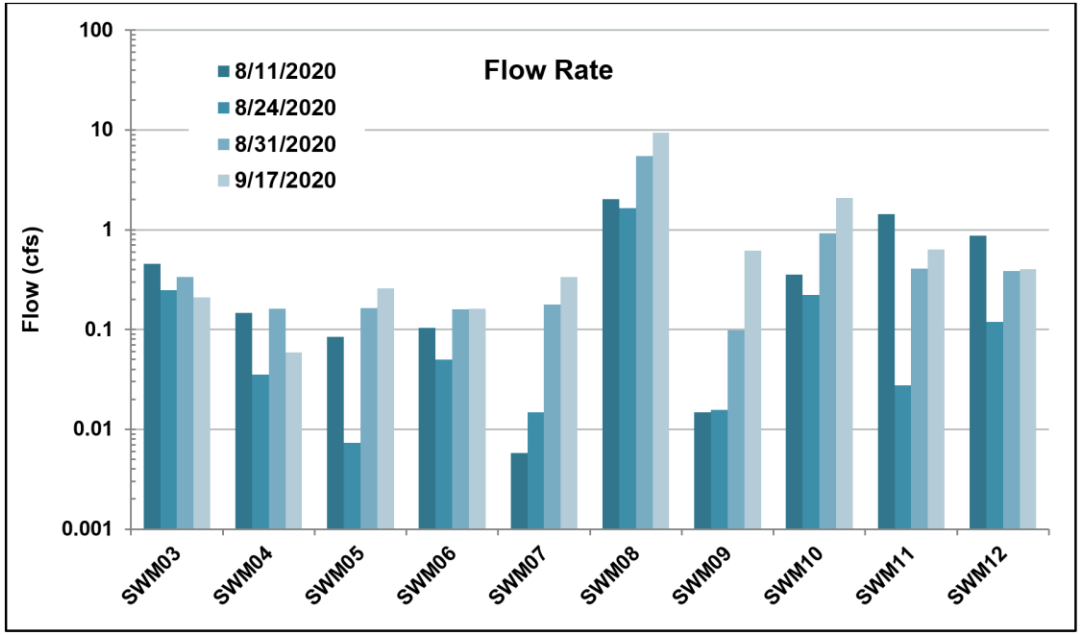


02 2020 SWM PROGRAM RESULTS OVERVIEW

2020 SWM Program Field Measurements

- Flow Rate
- Turbidity
- Dissolved Oxygen
- Total Dissolved Solids
- pH
- Temperature

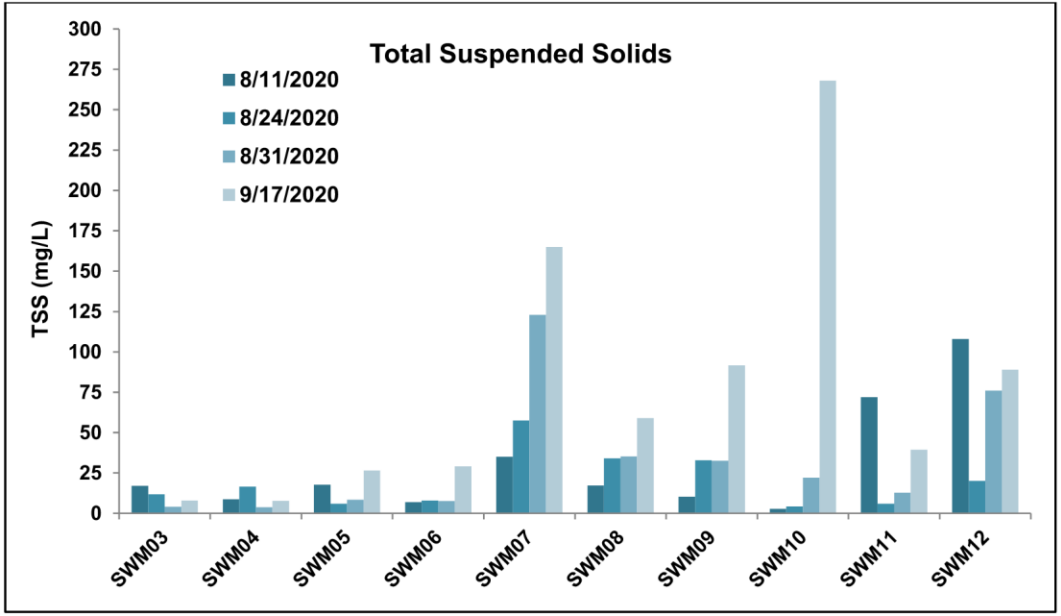
KEY TAKEAWAY – All field measurements within historical ranges.



2020 SWM Program Laboratory Measurements

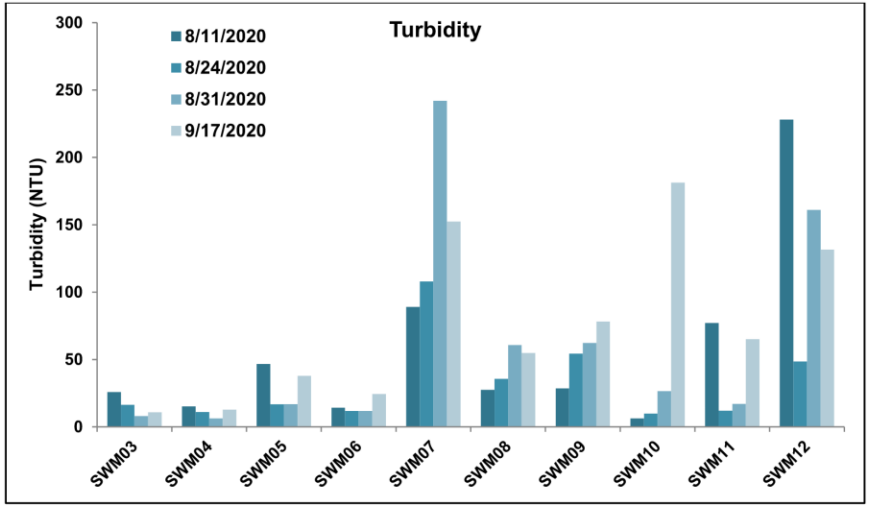
- Biochemical oxygen demand (BOD_5)
- Total Suspended Solids
- Fecal Coliform
- Hardness
- Dissolved Copper
- Hydrocarbons (TAH and TAqH)

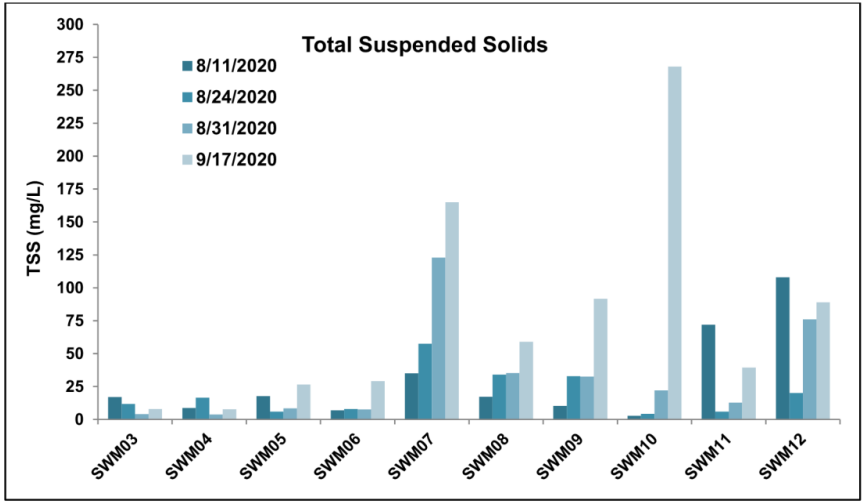
- **KEY TAKEAWAY – All lab measurements within historical ranges.**



Example Comparisons

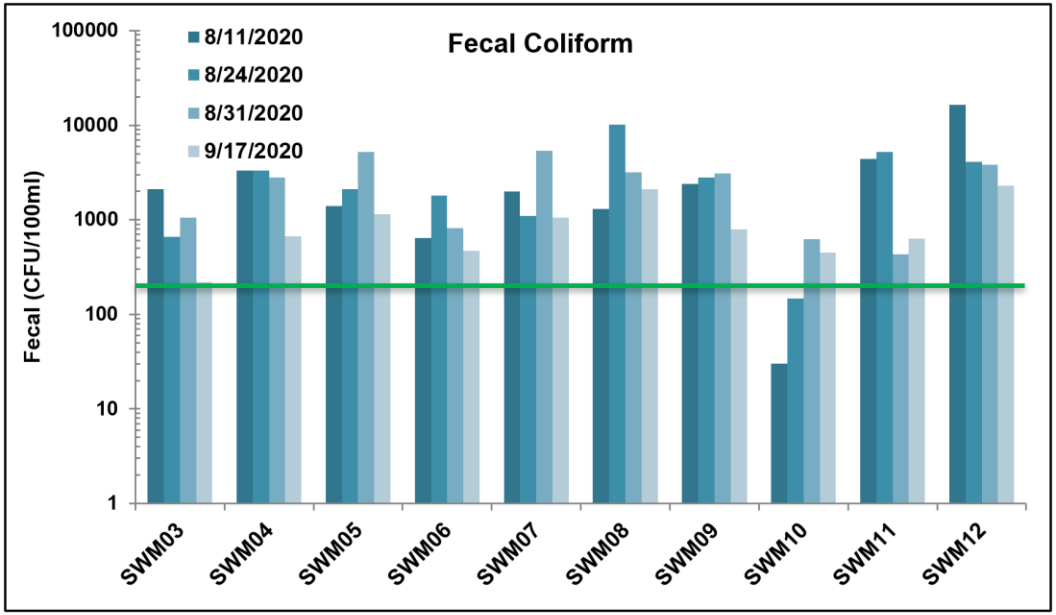
Field Measurements (Turbidity) vs Lab Measurements (TSS)





2020 SWM Program Fecal Measurements

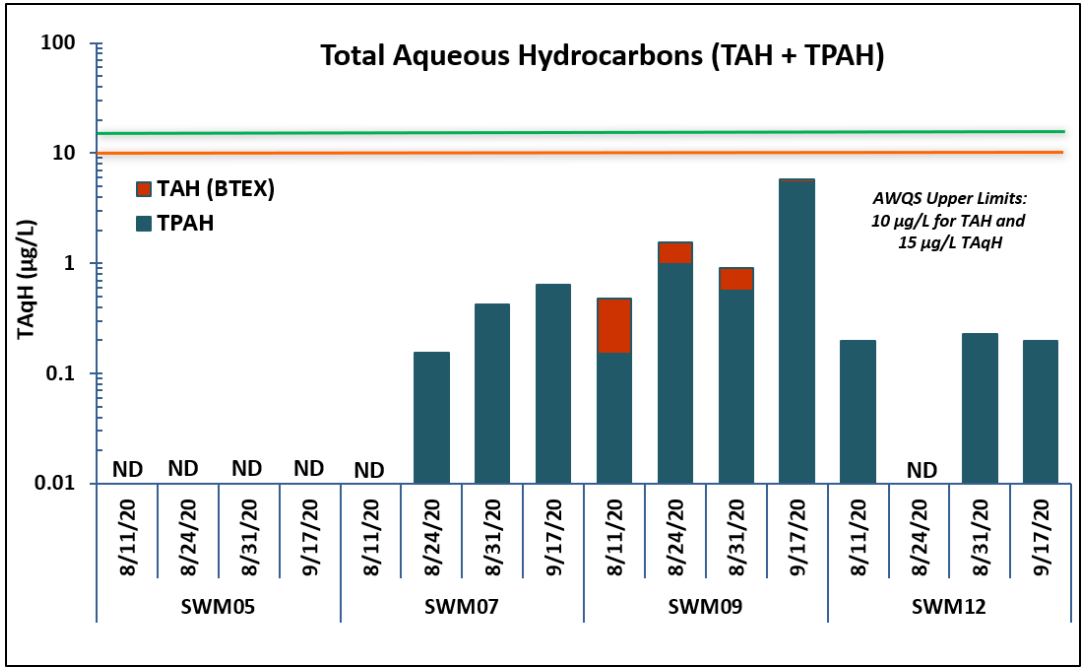
- Fecal levels generally normal when compared to data record.
- Levels generally lower than 2016-2018 period.
- Levels higher than 2019 measurements which were made unusually late in the fall.



Green line indicates AWQS benchmark of less than 200 CFU/100 mL.

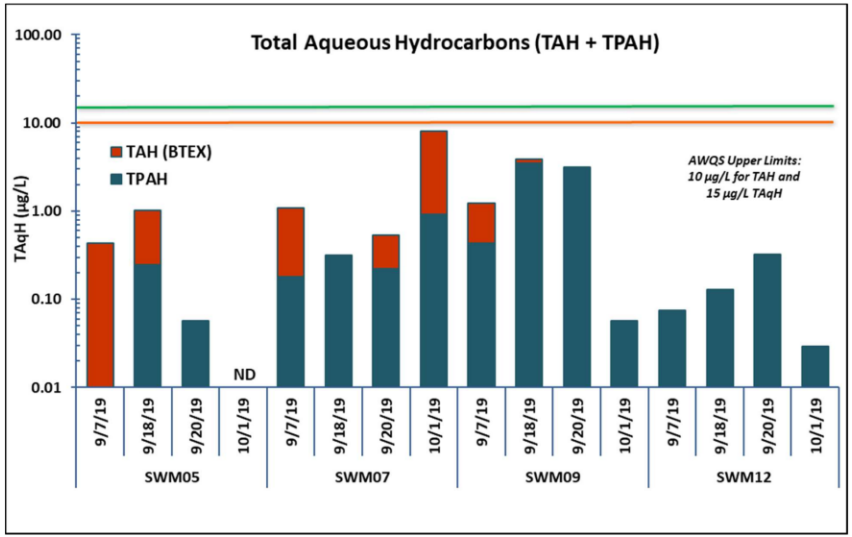
2020 SWM Program Hydrocarbon Measurements

- All samples below AWQS limits for TAH and TAqH.
- Decreased detection from 2019.
- Increased hydrocarbon detection at SWM09.

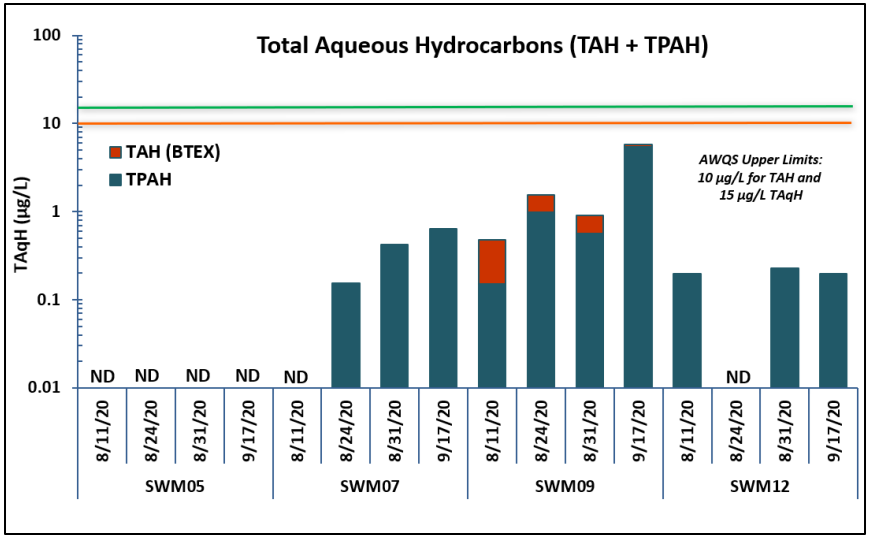


Comparison of Hydrocarbons: 2019 and 2020

2019 Hydrocarbons

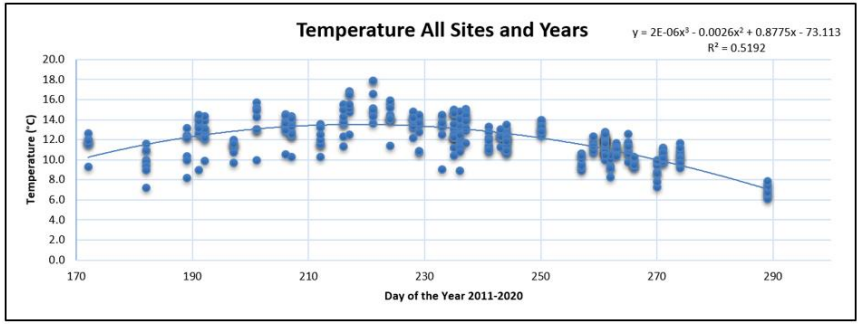


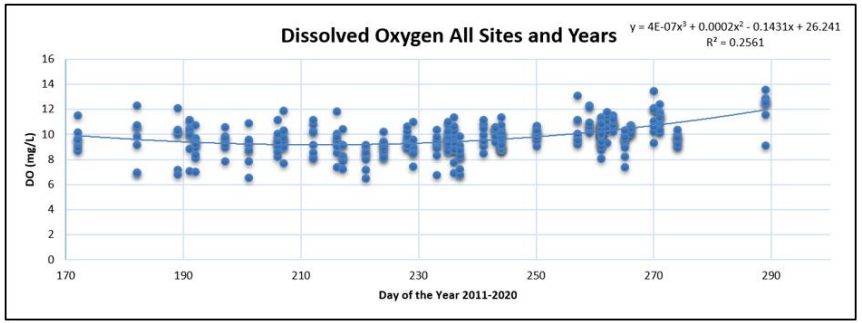
2020 Hydrocarbons

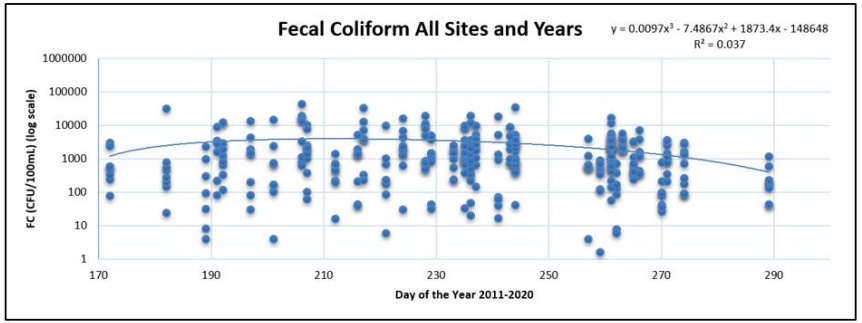


Seasonal & Multi-Year Trends

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



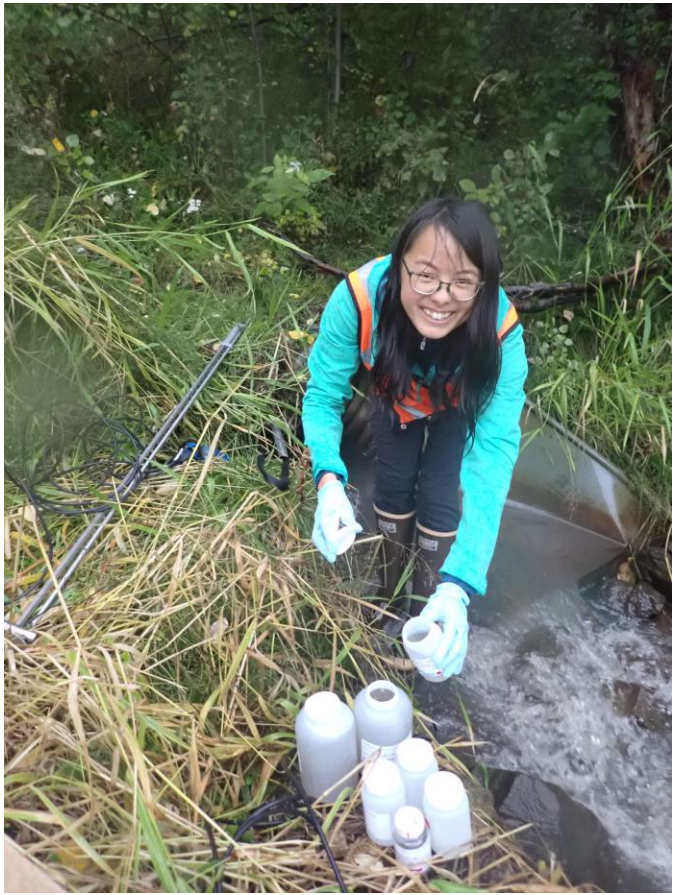




03 2020 SWM PROGRAM CONCLUSIONS

2020 SWM Program Conclusions

- Generally normal year with any significant outliers.
- Samples fell within historical ranges for the program.
- Hydrocarbon (TAH) detection generally decreased from 2019.
- Fecal coliform slightly increased from 2019 but decreased relative to 2016-2018 period.



SWM Program: Looking Ahead

- Last year of sampling under the 2015 MS4 Permit.
- New 2020 MS4 Permit applies to Stormwater Monitoring next year.
  - No significant proposed changes

Thank you!

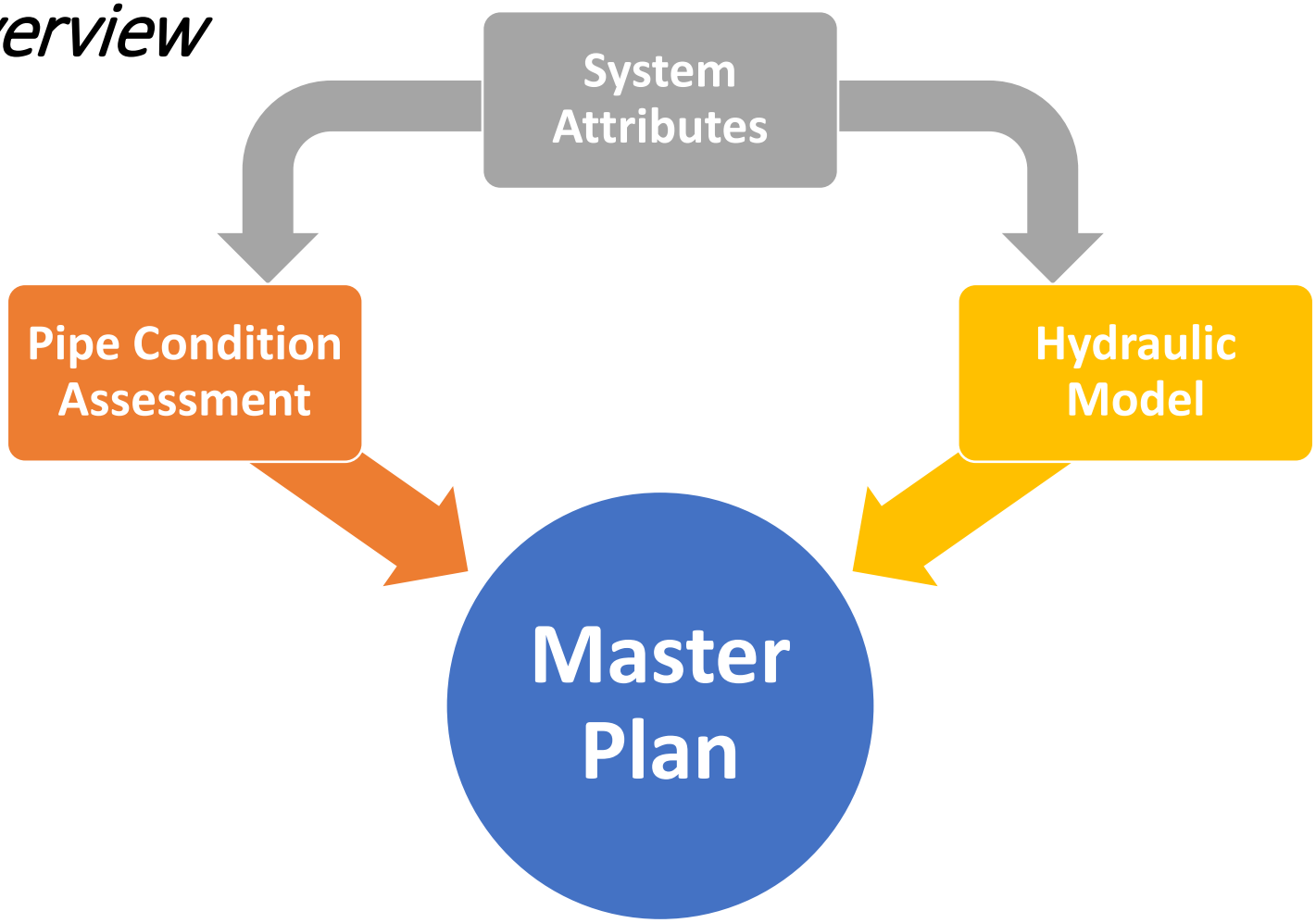
Chester Creek Master Plan Update

Presented by Aaron Havel, PE

AWR Engineering, LLC

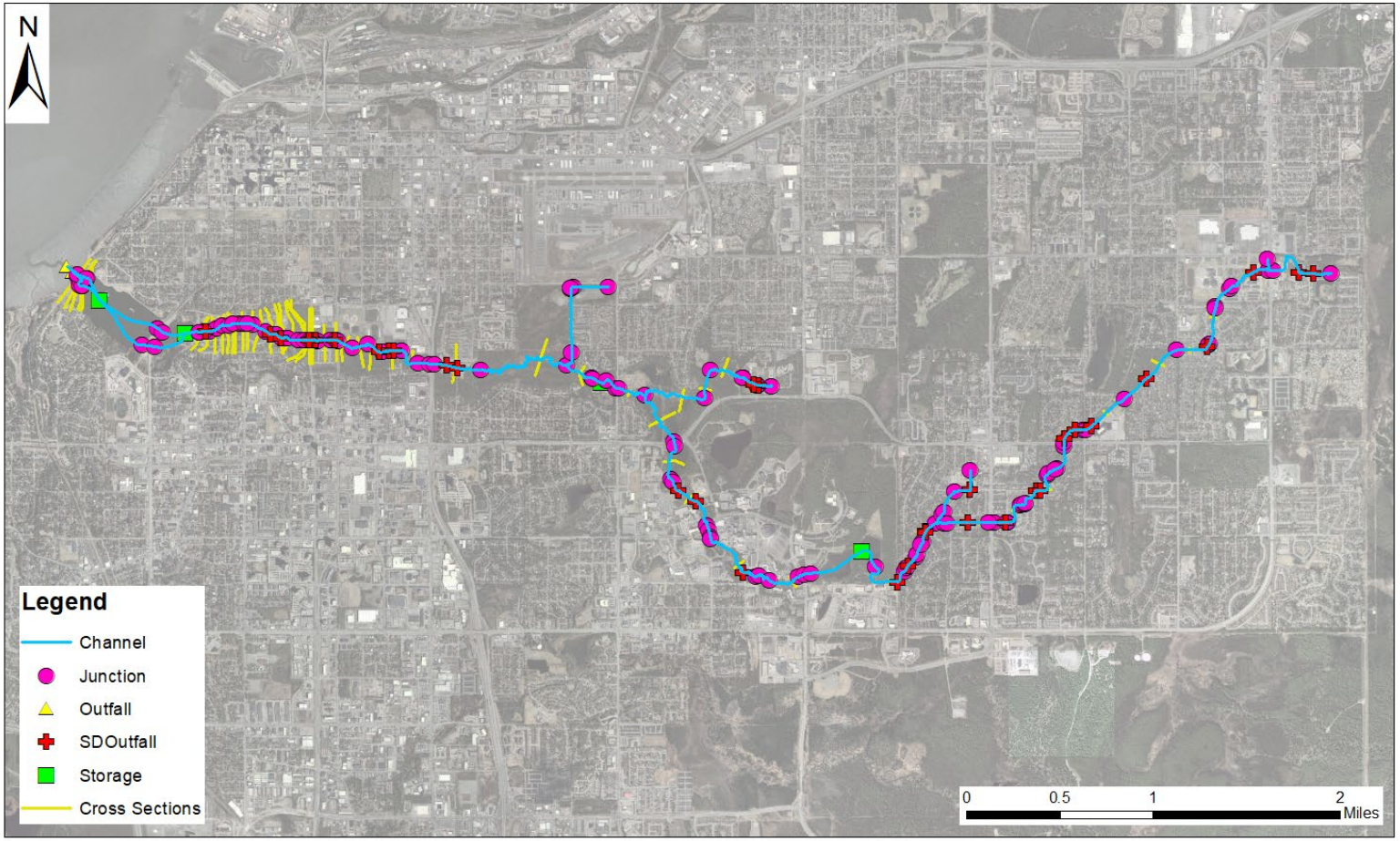
2021 Watershed Update – February 23, 2021

Master Plan
Overview

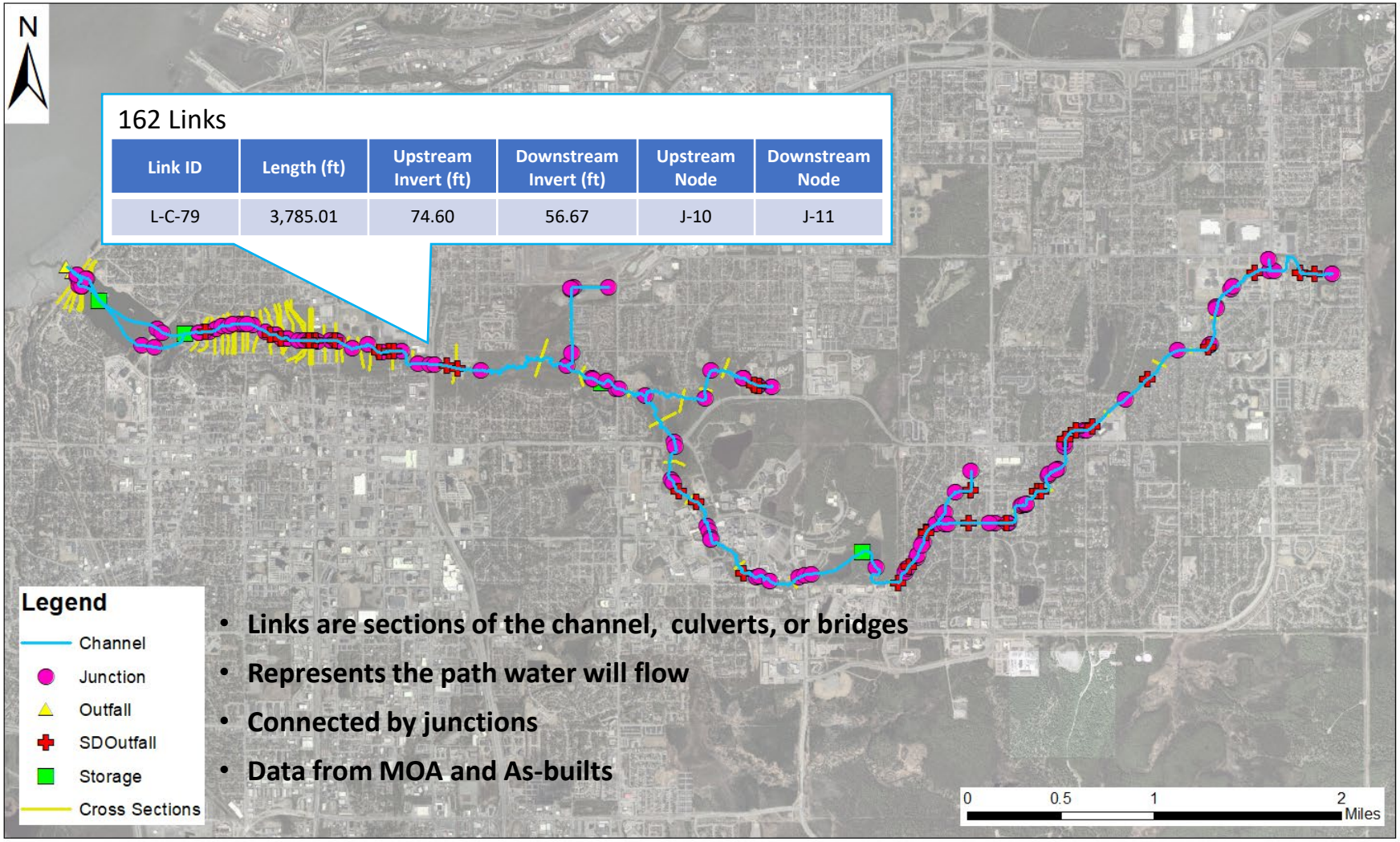


Know where system issues exist and plan accordingly.

Hydraulic Model
Main Channel Network

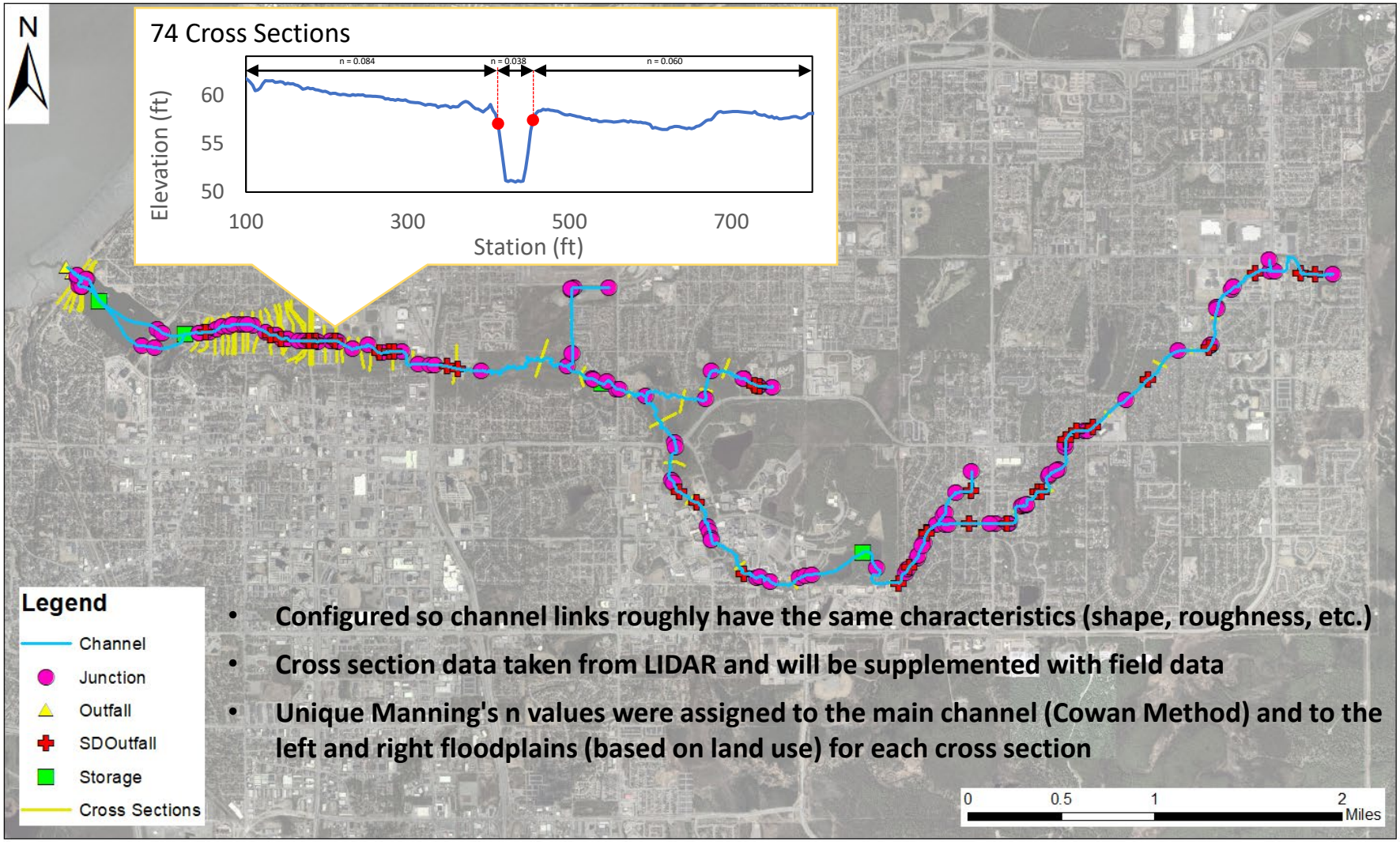


Hydraulic Model
Main Channel Network - Links



Hydraulic Model

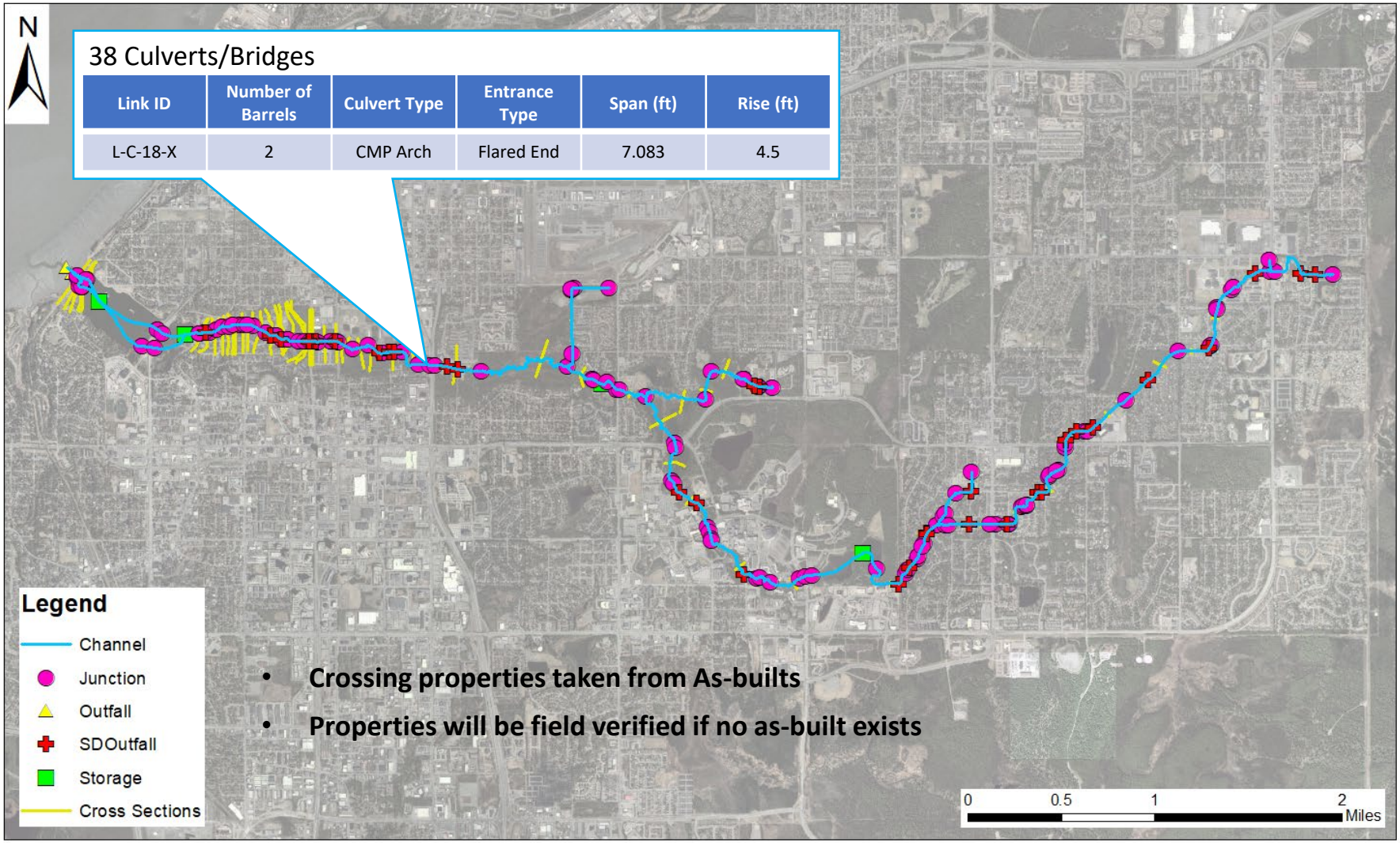
Main Channel Network – Channel Links



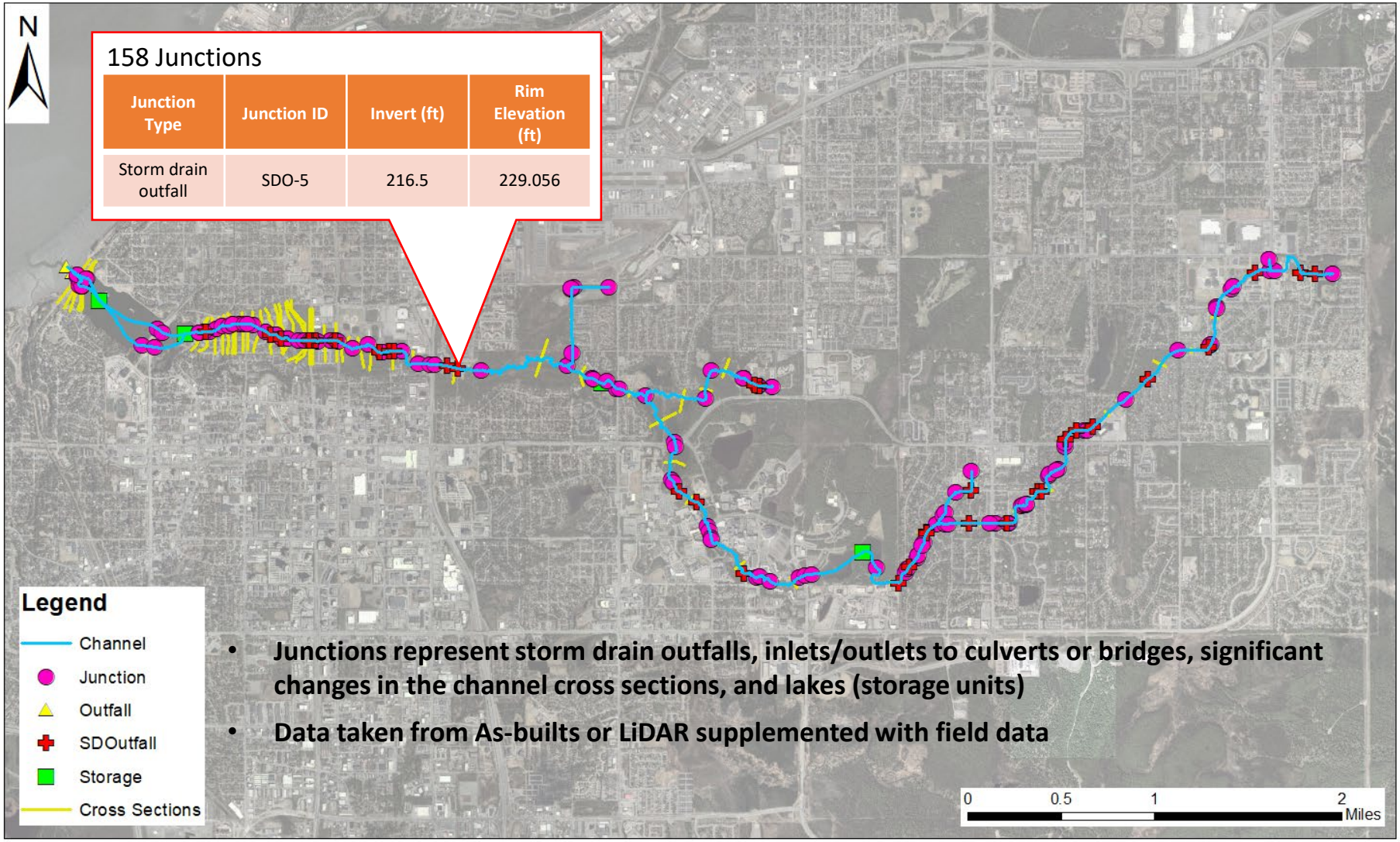
- **Configured so channel links roughly have the same characteristics (shape, roughness, etc.)**
- **Cross section data taken from LIDAR and will be supplemented with field data**
- **Unique Manning's n values were assigned to the main channel (Cowan Method) and to the left and right floodplains (based on land use) for each cross section**

Hydraulic Model

Main Channel Network – Culvert & Bridge Links



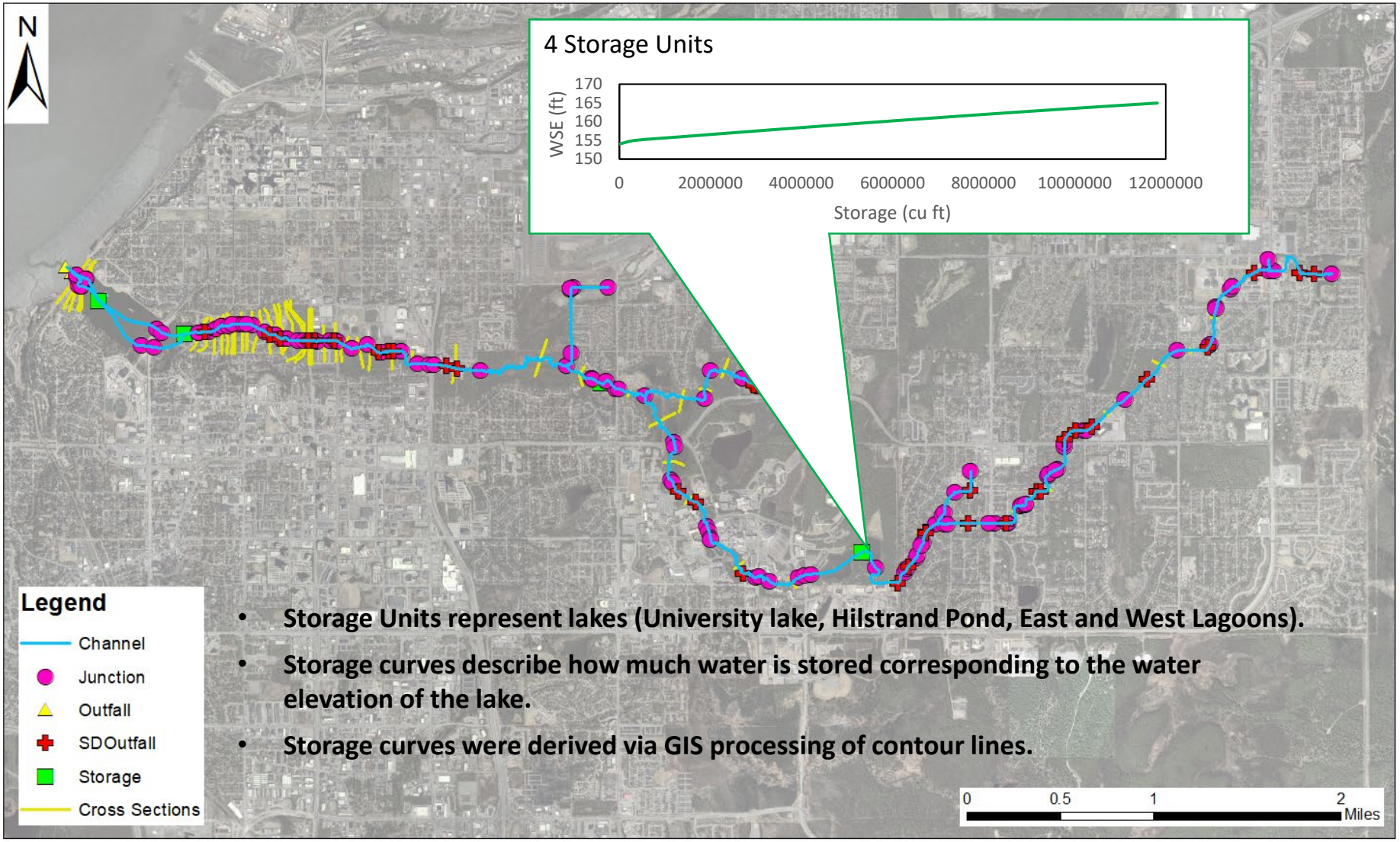
Hydraulic Model
Main Channel Network - Junctions



- **Junctions represent storm drain outfalls, inlets/outlets to culverts or bridges, significant changes in the channel cross sections, and lakes (storage units)**
- **Data taken from As-builts or LiDAR supplemented with field data**

Hydraulic Model

Main Channel Network – Storage Units

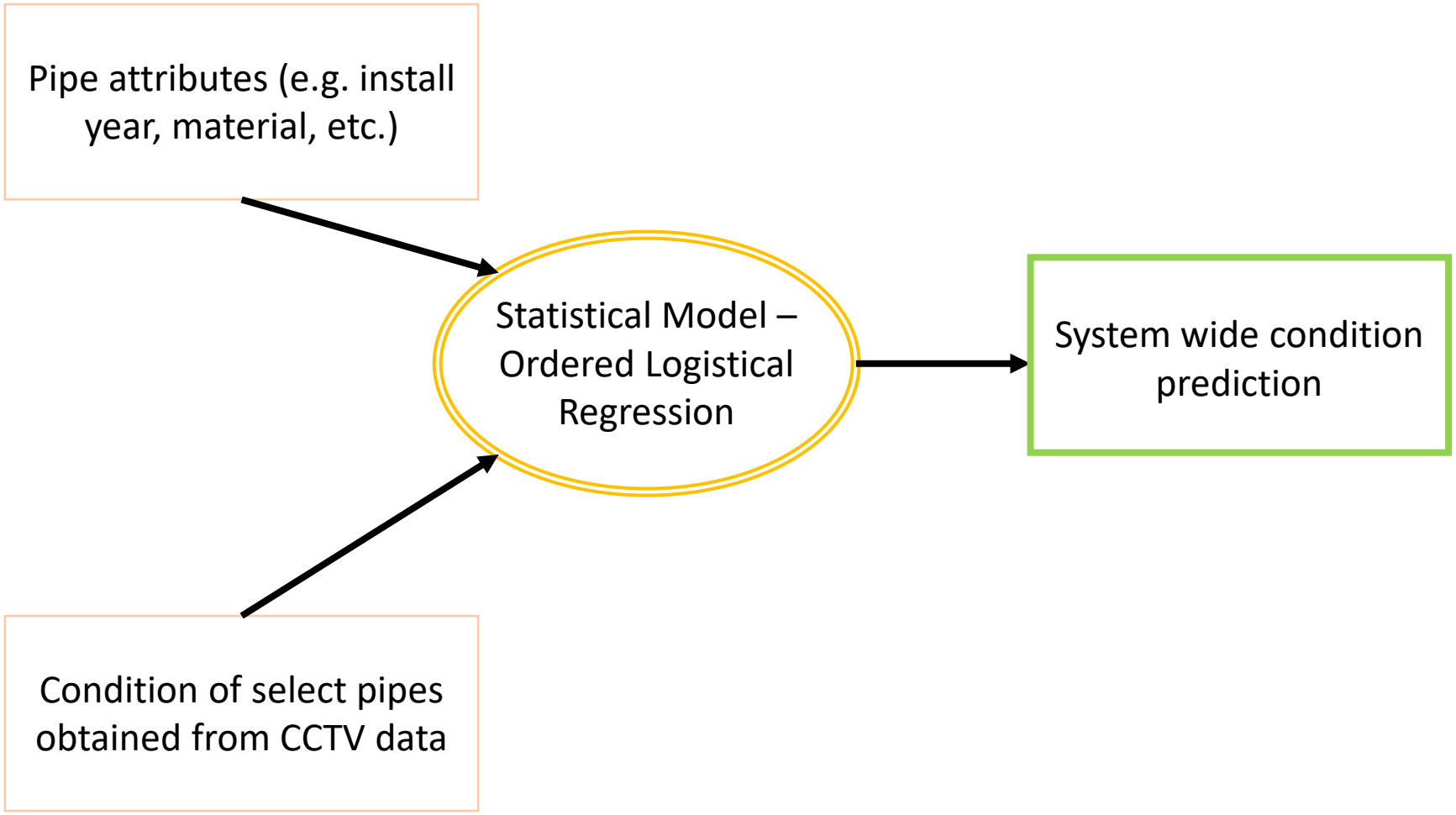


- **Storage Units represent lakes (University lake, Hilstrand Pond, East and West Lagoons).**
- **Storage curves describe how much water is stored corresponding to the water elevation of the lake.**
- **Storage curves were derived via GIS processing of contour lines.**

Hydraulic Model
Next Steps

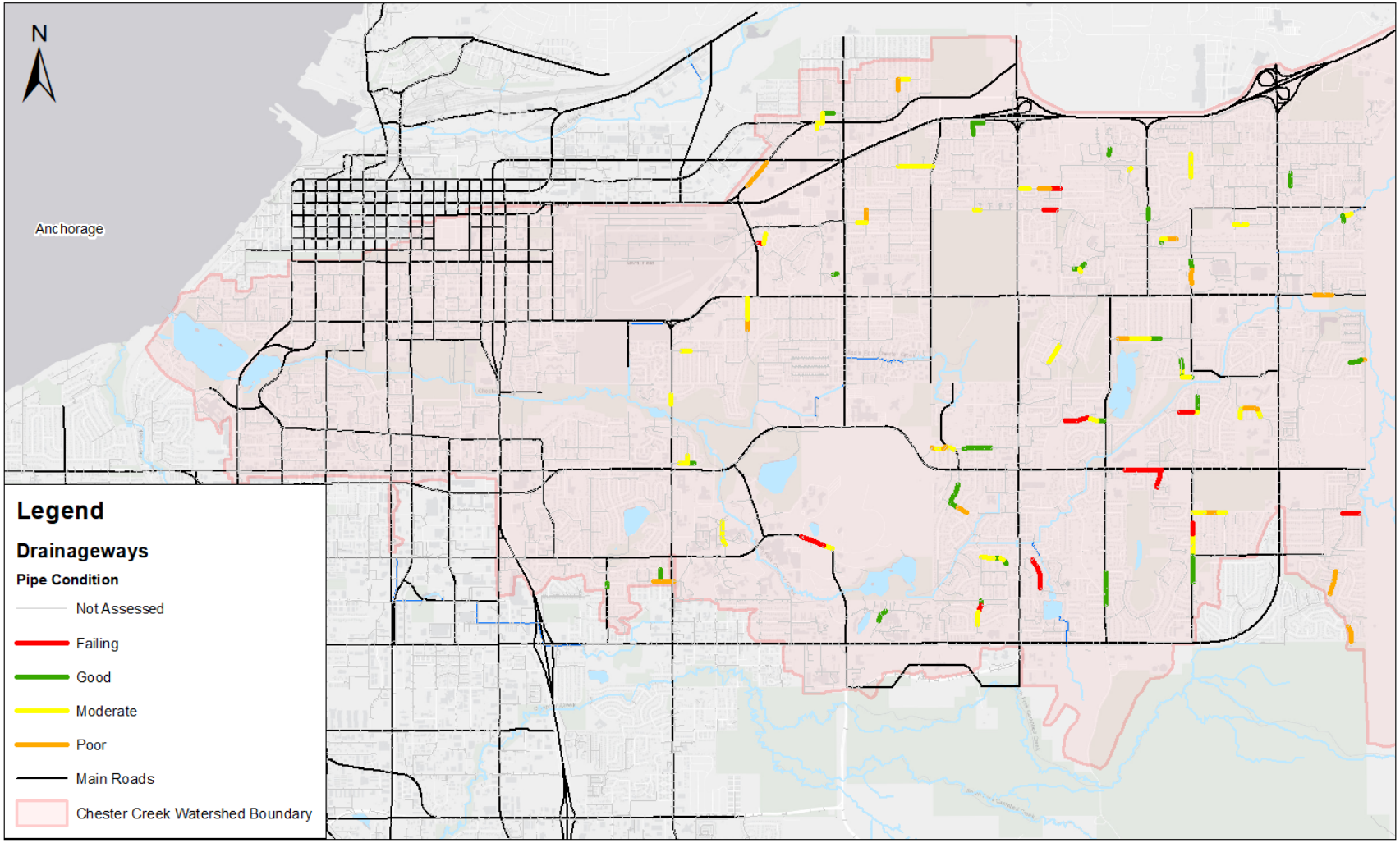
- Add in storm drain system
- Basin delineation
- Assign basin parameters
- Calibrate and test model

Pipe Condition Assessment
Overview



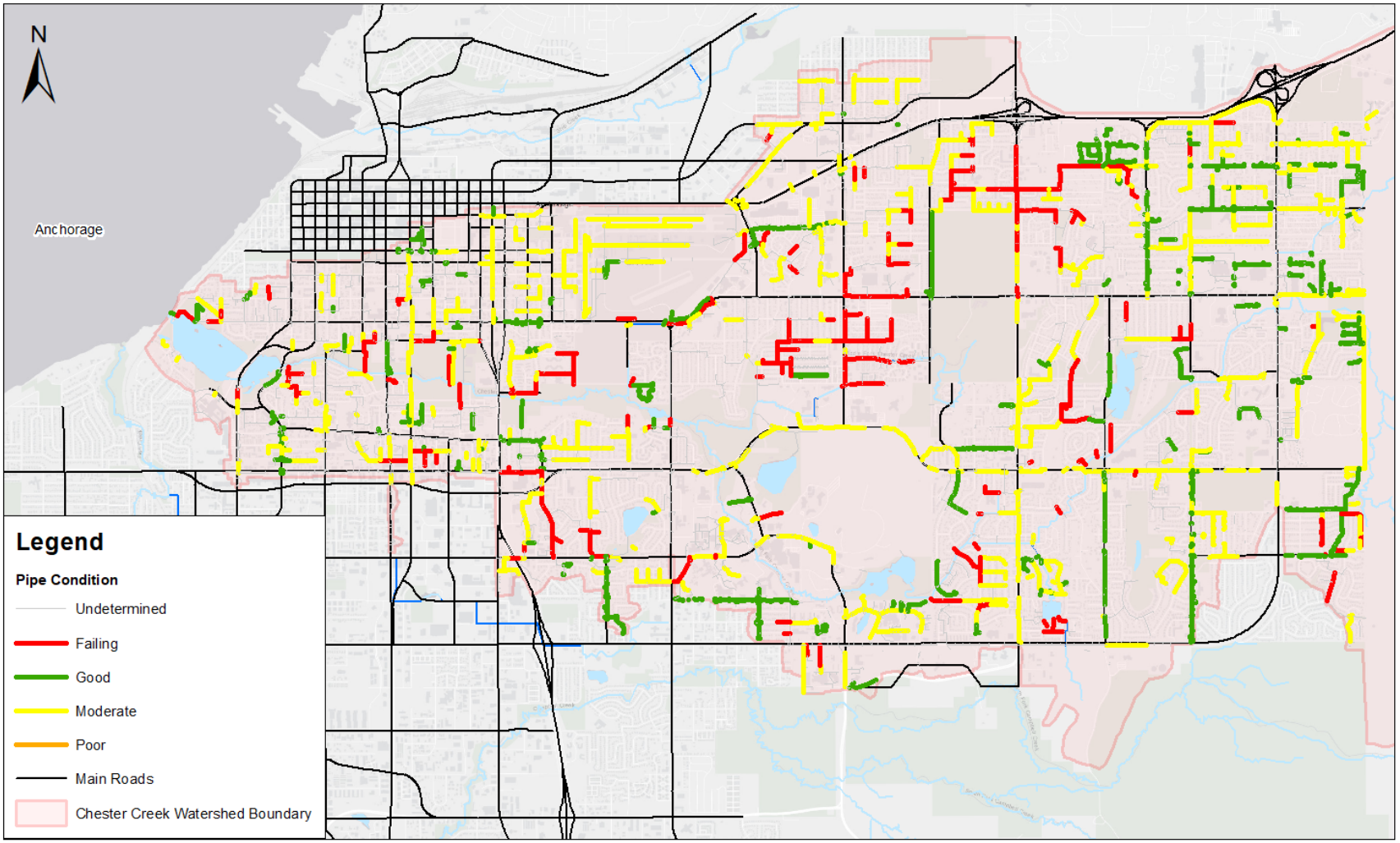
Pipe Condition Assessment

Field Verified Pipe Conditions (work in progress)



Pipe Condition Assessment

System Condition Prediction (work in progress)

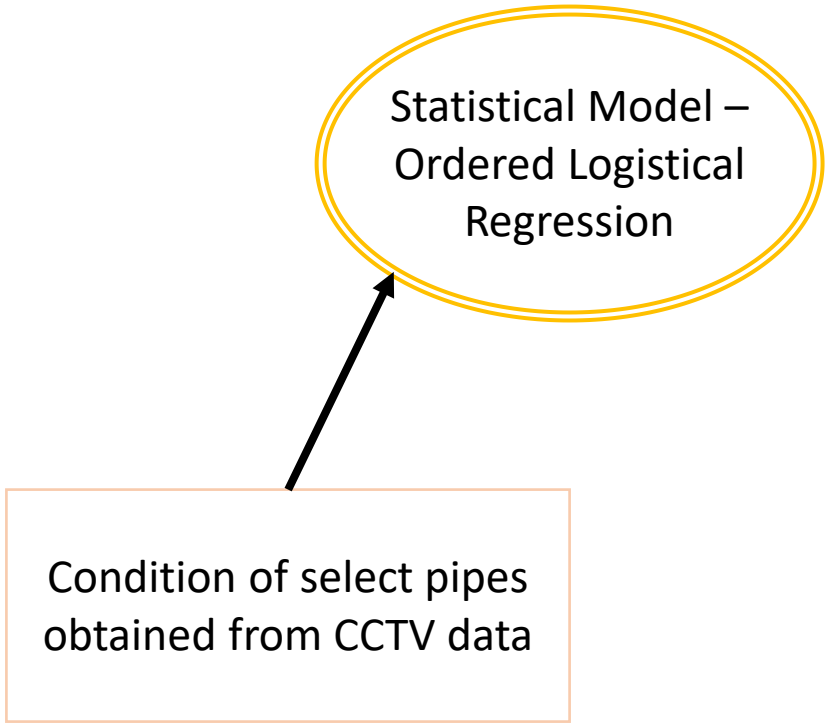


Pipe Condition Assessment
Prediction Variables

- Variables or pipe attributes that can be considered:
  - Pipe material
  - Installation year
  - Installation decade
  - Pipe size
  - Wetlands
  - Soil type

- Current prediction:
  - Metal pipe condition is based on installation year and historic wetlands
  - Plastic pipe condition is based on historic wetlands
    - *Based on very limited data points. Expected to change over time.*

Pipe Condition Assessment
Automation



Concept/Process

- Currently using a program developed in-house to automate regeneration of the statistical model and extraction of GIS pipe attribute data

Benefits

- Efficiently produce new results as more data is gathered
- Easily choose different variables to use in the statistical model

Pipe Condition Assessment
Looking Ahead

- Ongoing CCTV requests of specific pipes from Streets
- Ongoing updating of MOA GIS attributes with field verified data
- Ongoing updating of system wide condition prediction
- Continually improve statistical model and program

Questions

2020 Watershed Perception Survey

Cherie Northon, Ph.D.

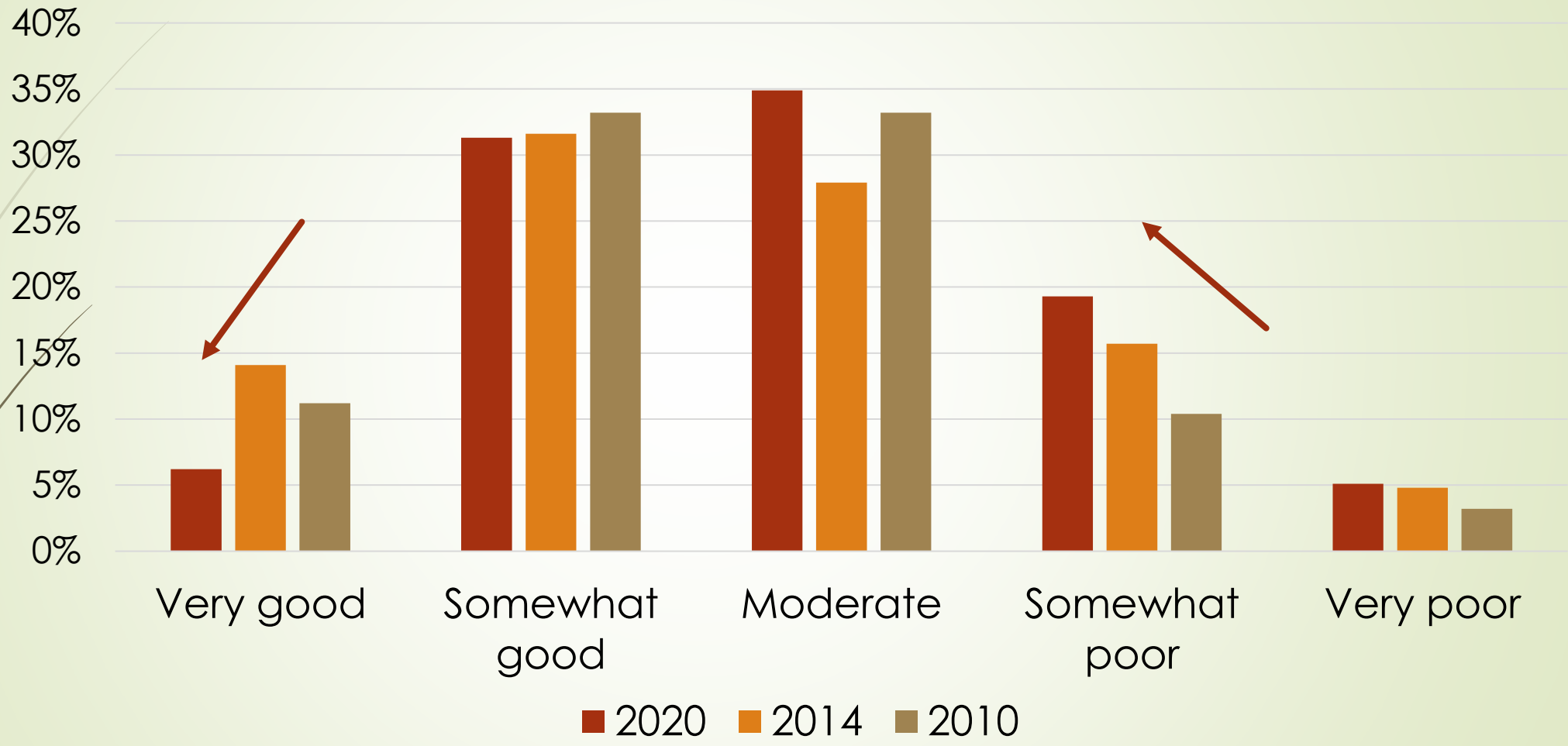
Anchorage Waterways Council

February 24, 2021

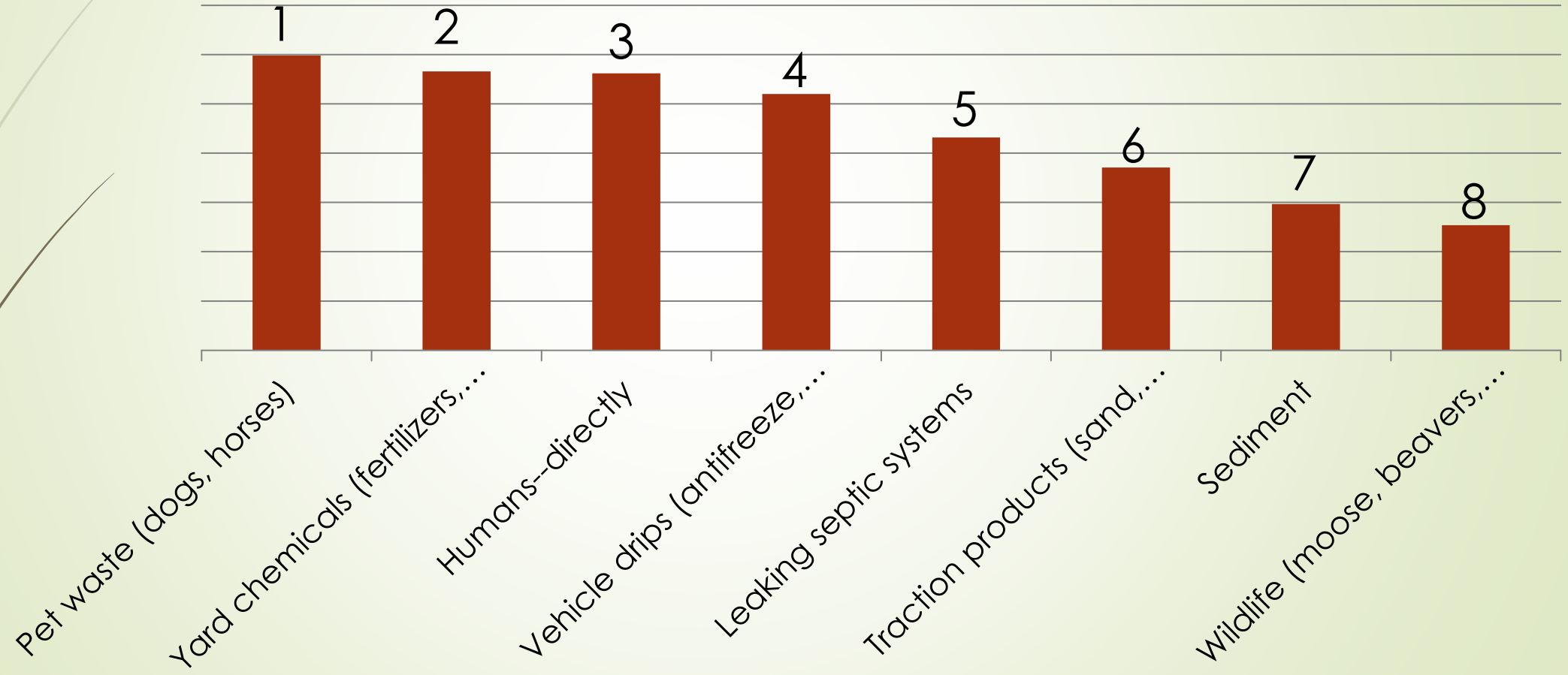
2020 Watershed Perception Survey

- Required at year 5 of the permit
- Previous surveys were completed in 2010 and 2014
- There are about 45 questions that are repeatedly asked in each survey, although sometimes they need updates
- There were 450 responses (384 needed for a 95% confidence level with a ±5% error) across the community, and Survey Monkey was used to collect them
- They are elicited primarily through social media

Residents' perception of water quality



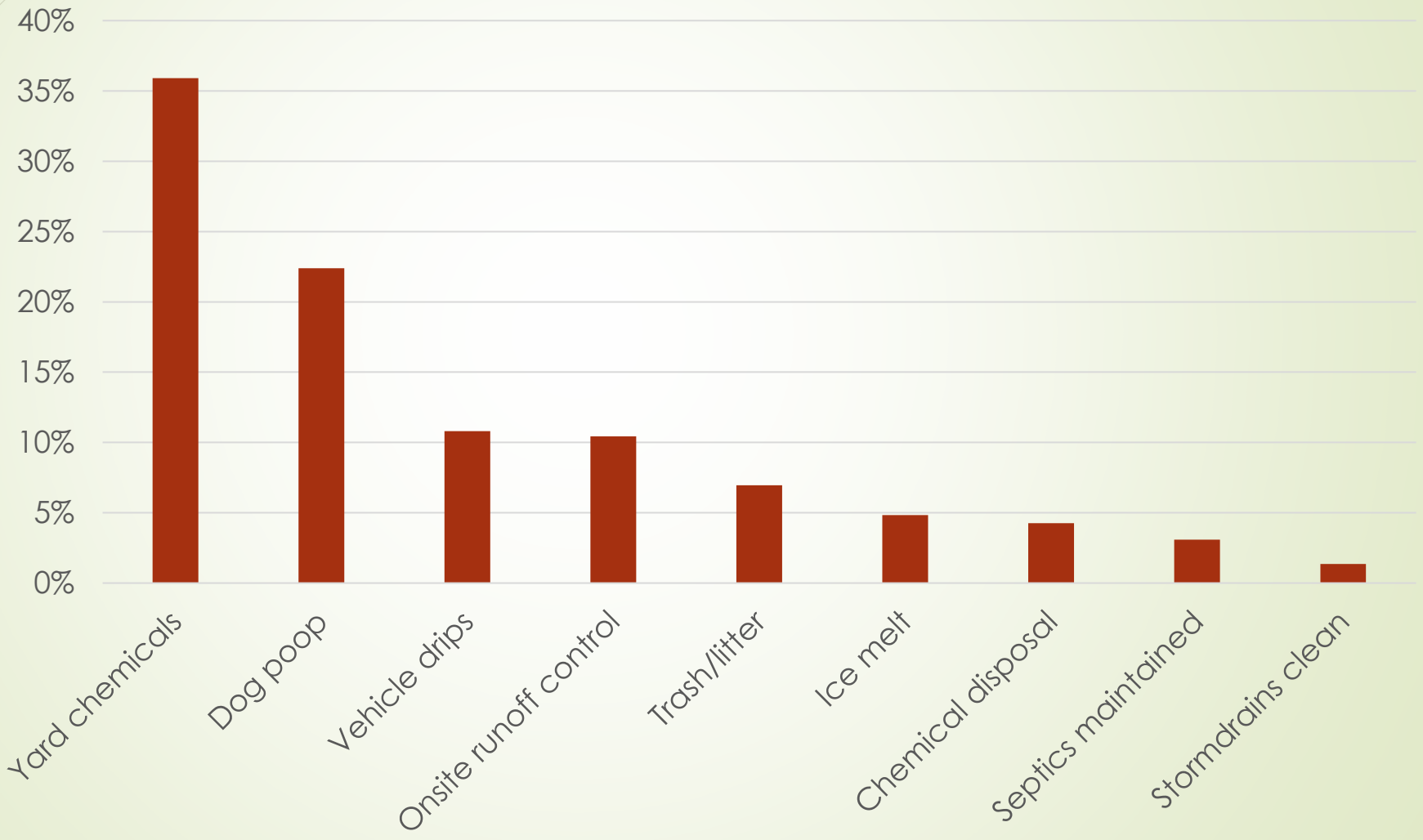
What do you think is the BIGGEST threat to water quality in Anchorage's creeks? (Ranked—categories provided)



Rank	2020	2014	2010
1	Pet waste	Runoff	Runoff
2	Yard Chemicals	Animal Waste	Animal Waste
3	Humans-directly*	Lawn & Household Chemicals	Human Trash
4	Vehicle Drips	Sewage/Leaking Septic Systems	Pollution
5	Septic systems	Urban Development	Vehicle Fluid
6	Traction products*	Human Trash	Urban Development
7	Sediment*	Pollution	Lawn Care Products
8	Wildlife		

* New categories

What is the most important action that you can take to help keep Anchorage creeks healthy?



Thank you!

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