Matanuska-Susitna Borough

Stormwater Management Plan




It's our water:
let's keep it clean!

Adopted November 5, 2013
Assembly Ordinance #13-137

Prepared by:

USKH
SHARED VISION. UNIFIED APPROACH.

TETRA TECH

The Wasilla Lake Habitat Restoration Project is helping to reduce erosion and enhance water quality.

Acknowledgements

A special thanks to everyone who provided input and assistance, including the following key stakeholders and Stormwater Advisory Committee members:

Matanuska-Susitna Borough

C. Peter Curtis, P.E., Public Works, Civil Engineer (Project Manager)

Mike Campfield, P.E., Environmental Engineer

Frankie Barker, Environmental Planner

Jim Jenson, Civil Construction Project Manager, Operations and Maintenance Division

Assemblyman Steve Colligan (District 4, Greater Wasilla Area)

Assemblyman Ronald G. Arvin (District 3, Gateway/Core Area)

City of Wasilla

Archie Giddings, P.E., Public Works Director

City of Palmer

Tom Cohenour, Director of Public Works

Greg Wickham, Maintenance Superintendent

City of Houston

Garland Forschen, Public Works Director

Mat-Su Region Development Sector

Marc Cottini, P.E., Quest Engineering

Jess Hall, Hall Quality Homes

Robert Kennerson, Kennerson Excavation Inc.

Scott Walther, Bristol Alaskan

Mat-Su Homebuilders Association, Board of Directors Governmental Affairs Committee

Water Sciences

Bill Rice, P.E., U.S. Fish and Wildlife Services

Jeff Davis, Aquatic Restoration and Research Institute

Alaska Department of Transportation and Public Facilities (Central Region)

Pat Harvey, Construction Project Manager

Laura Paul, P.E., Construction Project Manager

Todd Vanhove, Maintenance and Operations Manager

Neal Henslee, Mat-Su District Superintendent

Steve Banse, Mat-Su District Superintendent

Renee Forque, Stormwater Permit Compliance

Jennifer Reed, Stormwater Permit Compliance

Jennifer Lindberg, Environmental Impact Analyst

Alaska Department of Environmental Conservation (Division of Water)

Laura Eldred, Nonpoint Source Water Pollution Control

William Ashton, P.E., Stormwater and Wetlands Engineer

Jake Greuey, Waste Water Coordinator

Matanuska-Susitna Borough
Stormwater Management Plan

TABLE OF CONTENTS

Appendices:

Figures:

Tables:

List of Acronyms:

ADEC – Alaska Department of Environmental Conservation
ADF&G – Alaska Department of Fish and Game
ADOT – Alaska's Department of Transportation
APDES – Alaska Pollutant Discharge Elimination System
AK-CESCL – Alaska Certified Erosion and Sediment Control Lead
BMP – Best Management Practice
Borough – Matanuska-Susitna Borough
CGP – Construction General Permit
DNR- Alaska Department of Natural Resources
EPA – U.S. Environmental Protection Agency
FEMA – Federal Emergency Management Agency
GIS – Geographic Information System
IDDE - Illicit Discharge Detection and Elimination
HUC – Hydrologic Unit Code
LID – Low Impact Development
LUST – Leaking Underground Storage Tank
Mat-Su – The Matanuska Susitna region
MEP – Maximum Extent Practicable
MCM – Minimum Control Measure
MSGP – Multi-Sector General Permit
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NPDES – National Pollutant Discharge Elimination System
O&M – Operations and Maintenance
PWS – Public Water System
SOP – Standard Operating Procedure
SMP – Stormwater Management Plan
SWOT - Strengths Weaknesses Opportunities Threats
SWPPP – Storm Water Pollution Prevention Plan
TMDL – Total Minimum Daily Load
WELTS – Well Log Tracking System
USFWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey

Chapter 

Introduction

1.1 Purpose and Organization

The primary purpose of this plan is to provide guidance for managing stormwater in the Matanuska-Susitna region (Mat-Su). The plan is intended for use by the Matanuska-Susitna Borough (Borough), as well as the region's cities, agencies, community interests, and citizens. It includes tools for working together regionally on important issues such as water quality protection and flood prevention.

The plan could also be used as the primary requirement for an Alaska Department of Environmental Conservation (ADEC) Alaska Pollutant Discharge Elimination System (APDES) Municipal Separate Storm Sewer System (MS4) permit application when required. MS4 permits are driven by population- and density-based thresholds recognizing that once communities begin to urbanize, they begin to discharge pollutants into "waters of the U.S" and are regulated under the U.S. Clean Water Act.

MS4 permits require local and regional governments to reduce pollutants in stormwater discharges to the maximum extent practicable. MS4s require use of a variety of best management practices (BMPs), within a given time frame, with measurable results.

MS4 permits in Alaska are administered by ADEC. Over the past decade, permits have been issued to Alaska's urbanized areas in Anchorage and Fairbanks. Based on 2010 U.S. census data, ADEC may apply a small MS4 designation to a specific urbanized geographic area within the Borough.

Elements of this Stormwater Management Plan (SMP) help meet the initial five-year permit requirements associated with an anticipated Mat-Su urbanized area MS4. At the same time, the SMP planning process has initiated a constructive regional dialogue on stormwater, and related drainage and water quality issues. Thus, in the event that an MS4 is not designated, this document provides a flexible framework for moving forward as a region to address stormwater and water quality issues.

The plan is organized as follows:

- **Chapter One** introduces the document's purpose and organization. It then describes regional stakeholders' input, including goals for Mat-Su stormwater efforts.
- **Chapter Two** describes in more detail what stormwater is, and its potential impacts and costs over time. It also gives an overview of management practices, and ways that stormwater liabilities are being addressed at the local, regional, state, and federal levels.
- **Chapter Three** provides a general overview of stormwater-related impacts to water quality in Mat-Su's more urbanized areas. This "State of Our Water" summary is intended to highlight regional water quality trends by watershed (see Figure 7, page 16), and serve as a baseline for future reference.
- **Chapter Four** provides a "Water Quality and Drainage Toolbox," tailored to the unique values, needs, and conditions of this region. The chapter describes the Toolbox generally, and then lists each tool along with performance outcomes.
- **Chapter Five** provides implementation strategies for working across jurisdictions (water does not observe jurisdictional boundaries). This is followed by an overview of what to expect under an MS4, with potential costs and funding approaches.

The cities of Wasilla and Palmer are on the "front lines" of dealing with water quality and drainage issues.

1.2 Regional Stakeholder Input

Beginning in August 2011, key stakeholders in the Mat-Su were invited to participate in a regional Stormwater Management planning process. Stakeholders were contacted representing three target sectors:

1) Affected and interested parties: Private and public interests, such as the Alaska Department of Transportation & Public Facilities (ADOT) that are significantly affected by a possible MS4 permit program, either in terms of implementation or compliance.

2) Government and community interests: The Borough generally, including its assembly, planning commission, and community councils; the cities of Wasilla, Palmer, and Houston; and commercial and community entities.

3) The regional public at large: Interested citizens and broader public interests regarding water quality and public resource issues.

1.2.1 Stakeholder Input Themes

At the project outset, interviews were conducted with more than twenty-five key regional stakeholders. Interview input focused on themes that give a regional perspective on stormwater issues. The themes were refined based on feedback at public presentations, and are presented below (not in any particular order):

***Theme 1 – Growth and urbanization*:** Strong population growth is creating urbanization and raising new concerns related to stormwater, including polluted water bodies and flooding.

Theme 2 – Natural assets and filtering: The Mat-Su has natural features and intact assets, such as good soils, natural drainage patterns, and dispersed, large lot development, which are of great benefit to managing stormwater and filtering runoff, particularly when using green infrastructure approaches.

Theme 3 – Growing pains: Many residents see the Borough as having a rural identity with inherent positive qualities: clean water, great fishing, and freedoms associated with private property use. Yet the strong population growth is causing growing pains by eroding these qualities, and triggering new regulatory requirements based on population thresholds.

Theme 4 – Wasilla and Palmer are "on the front lines" of managing stormwater and dealing with its impacts: The communities with the most urbanization are already spending resources and having problems associated with stormwater and urban runoff.

Theme 5 – Stormwater issues are "invisible": It is challenging getting residents to care about stormwater, as it is hard to "see" the problem. Public education is needed to help people see that it is in their own best interest to care.

Theme 6 – Exclusive use of ditches and pipes are not the only answer: To retain water quality over the long term and be cost-effective in terms of public investment, we need to get away from only piping water and dumping it into surface waters. A better way in terms of cost and water quality outcomes is to retain natural drainage patterns and treat stormwater on site for debris and silt using passive infiltrative systems (e.g., settling ponds, rain gardens, and other types of green infrastructure).

Although stormwater issues and costs are present in the Mat-Su, they are invisible to most residents.

Theme 7 – Costs vs. benefits: Public benefits need to be weighed against costs as options are considered. On the one hand, not addressing stormwater can have dire consequences over the long term (e.g. contaminated drinking water, flooding, loss of fish stocks, lawsuits, and high maintenance and infrastructure costs). On the other hand, no one wants to see a new, expensive regulatory process or government program. Investments associated with stormwater should directly address local risks and outcomes.

Theme 8 – This plan puts the region "ahead of the curve": Doing work as a region now provides opportunities by getting us ahead of the regulatory curve on some U.S. Clean Water Act requirements (this document is likely the basis for a MS4 permit). This can allow more local control and streamlined regulations as well as help the region develop tools to use as needed.

Theme 9 – Stormwater BMPs should become "the way we do business": We need to shift the way business is done so everyone "does the right thing"—not because of regulations, but based out of professional and community pride, and an understanding of local costs and benefits.

Theme 10 – The Borough is the regional government, and needs to "step up to the plate": The Borough is the only entity with a broad enough coverage in terms of its boundary, roles, and responsibilities to deal with watershed-level issues. Yet, at the same time, the Borough is a huge land area, with a great diversity of communities, and residents who tend to favor limited government. Stakeholders are looking to the Borough to overcome these obstacles and "bring everyone to the table to work together" to address watershed level issues.

Stormwater Advisory Committee Input

Between December 2011 and April 2012, a regional Stormwater Advisory Committee of around twenty-five stakeholders met for five working meetings to provide input and help shape this plan. A lot of learning, discussion, and review took place at these meetings. Committee meetings were advertised and open to the public, with proceedings documented online (www.matsustormwater.info).

The Committee included key stakeholders in the region with strong representation from the private development sector and maintenance and operations staff at the city, borough, and state levels. The Committee helped focus this effort on the real issues and choices Mat-Su faces at this time. These are summarized in a "SWOT Analysis." SWOT specifically stands for:

Strengths: Local assets and resources.

Weaknesses: Local disadvantages, limited resources and capacity.

Opportunities: Favorable trends, expanded capacity and resources.

Threats: Risks, loss of resources, outside impacts and influences.

The Mat-Su region SWOT analysis can be found in Figure 1, pages 4-5. It has been used in considering regionally-appropriate options and possible outcomes (including doing nothing).

A Stormwater Advisory Committee helped to guide this effort and set regional goals. Above, Laura Eldred with Alaska's Department of Environmental Conservation, and Neal Henslee with Alaska's Department of Transportation discuss maps.

Figure 1. Mat-Su Regional Stormwater SWOT Analysis.

Mat-Su Stormwater: Strengths

Strengths = Local assets and resources, including **people** (local knowledge, community collaborations, local identity and values); **natural environment** (natural resources, ecosystem functions, land and water features); **economy** (revenue sectors, agency and corporate talents, local assets); and **infrastructure** expansion possibilities.




- There is a strong appreciation for a way of life in the Mat-Su region that features clean drinking water, large lot/lower density development, open space, and plentiful fish stocks.
- The region's natural drainage patterns are largely intact, and an abundance of gravels and well-drained soils in the region support opportunities for on-site water infiltration.
- Although the Mat-Su has strong growth, it is a long way from full "build-out." Large lots, less intensive development, and intact ecosystem functions (e.g., native vegetation, organic soil layer, wetlands) support groundwater recharge and filter runoff.
- The region's knowledge base and capacity to address stormwater management is expanding in both the public and private sectors. Examples include new projects that "slow down, spread out, and soak in" drainage on site, such as "rain gardens," and Iditapark's stormwater catchment system and settling pond.

Mat-Su Stormwater: Weaknesses

Weaknesses = Local disadvantages and limited resources or capacity, including **people** (skill and knowledge gaps, lack of coordination, conflict, lack of capacity to address issues); **natural environment** (inability to protect resources, insufficient resources, changes, health issues); **economy** (high costs, capacity limitations); and **lack of infrastructure**.




- Stormwater is everywhere, but its impacts can be invisible to those who lack awareness.
- The region is lacking data, knowledge, and a coordinated approach to dealing with stormwater and runoff related issues.
- Old drainage paradigms persist that focus on "ditching or piping to get rid of stormwater." New approaches such as "green infrastructure" that manage drainage on site require a change in approach and technologies, and a different investment model.
- Limited stormwater management can cause drainage problems and flooding, damage to roads and other infrastructure assets, lawsuits, water pollution, and an increase to public costs.
- Conflict occurs as developers and infrastructure upgrades are blamed for flooding and drainage problems.
- Since water crosses property boundaries, a regulation-averse citizenry with the attitude that "I can do what I want on my land," makes pollution prevention and drainage control efforts more challenging.

Figure 1. Mat-Su Regional Stormwater SWOT Analysis (continued)

Mat-Su Stormwater: Opportunities

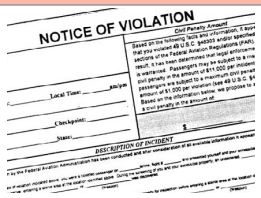
Opportunities = Favorable trends, expanded capacity and resources including **economy** (cost saving measures, new job niches); **infrastructure** (improved design, function, and lifespan); **natural environment** (resource conservation, restoration of ecosystem functions); and **people** (training, education, collaboration/partnership opportunities).

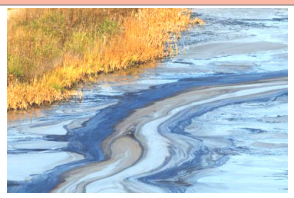



- Water quality and drainage issues will be easier and cheaper to address now than in 10 or 20 years.
- Working now gives us the ability to get the region "ahead of the regulatory curve" using local, streamlined responses while creating new job possibilities in the environmental and water quality sectors.
- Drainage planning can prevent land development problems (e.g., undevelopable lots, flooding).
- Mat-Su can take advantage of other communities' investments and lessons learned.
- Water quality and stormwater goals have been adopted by Palmer, Wasilla, the Borough's Core Area, and Borough-Wide in comprehensive plans based on community input and involvement.
- It is significantly more cost-effective to:
  - Prevent water pollution vs. treating degraded water.
  - Design for good drainage vs. frequent maintenance.
  - Preserve ecosystem functions vs. restoration.
  - Minimize risk exposure vs. court costs, fines, and project delays.
- As water crosses jurisdictional boundaries, a regional approach makes good sense.

Mat-Su Stormwater: Threats

Threats = Risks, loss of resources, outside impacts and influences including **people** (outside interests making decisions impacting local interests); **economy** (agency permit/compliance costs, fines); **natural environment** (pollution, loss of resources and ecosystem functions); and **infrastructure** (risks, costs, permit delays on projects).



- If we do nothing about growing stormwater issues, there could be dire mid- to long-term consequences:
  - Drinking water sources may become polluted with chemicals or bacteria and pose public health risks;
  - Declines of salmon and other fish stocks can erode recreation and tourism economic sectors;
  - Flood events may increase the risks to life and property and court costs; and
  - Fines to local governments and impacted property owners and/or contaminant clean up costs.
- The Clean Water Act is a currently enforced federal mandate that our local governments must deal with.
- Once the area reaches the population thresholds of a small regulated MS4 community, an MS4 permit would be required and failure to regulate storm water discharges would be a violation of federal and state law, and could block federal funds for roads and other civic projects.
- Stormwater permitting incurs compliance costs and inspections that delay development. Particularly in a poor economy, these can reduce profit margins and discourage economic activity.
- Fines and stop-orders on projects could put local contractors out of business, even for minor mistakes.

1.3 Goals

The Mat-Su Region Stormwater Advisory Committee worked over five meetings to develop goals to guide future regional efforts related to stormwater. These five goals, presented in Figure 2, page 7, serve as a foundation for this plan and its recommendations.

"It is possible to fund a stormwater program and still lose our salmon and water supplies. Clean water, not a program, is the legacy to work toward."

Mat-Su Stormwater Advisory Committee Member.

Clean water is essential to retaining residents and attracting visitors to the region, as well as supporting public safety and stable property values.

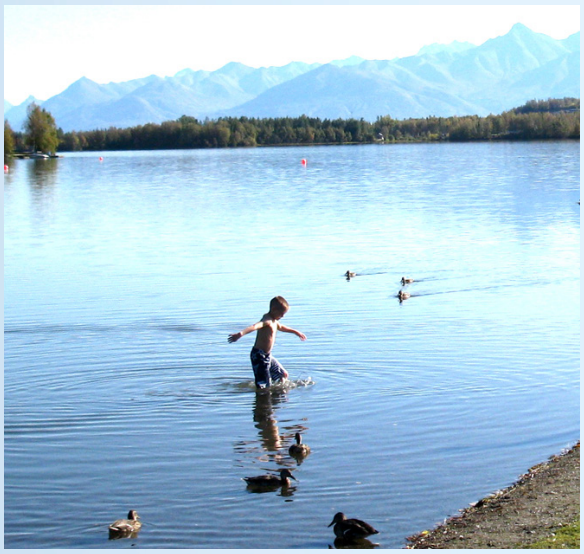


Figure 2. Mat-Su Stormwater Goals.

Mat-Su Stormwater Management Goals

Goal 1) Clean Water

Retain healthy watersheds and natural drainage patterns as the region grows in order to protect drinking water, fish stocks, and the scenic and recreational values of waterways.

Goal 2) Reduce Liabilities, Costs, and Risks

Protect Borough residents from the high costs and risks associated with "doing nothing."[1] Risks can include:

- Frequent road maintenance and increase of costs to upgrade.
- Public infrastructure and private property damage.
- Impacts to waterways, fish stocks, and drinking water.
- Lawsuits, legal fees, and non-compliance fines.
- Loss of federal funding, fines, and delays due to stop-work orders associated with non-compliance.

Goal 3) Cost-Effective Development

Protect property owners', public facilities', and businesses' development interests to the degree that no off-site stormwater impacts and no off-site costs occur (e.g. runoff is addressed on-site; stormwater does not impact regional waterways or pollute groundwater). At the same time, where off-site impacts may occur, provide guidance and a simple, streamlined, cost-effective development approach to remediate or correct the impact.

Goal 4) Build Awareness

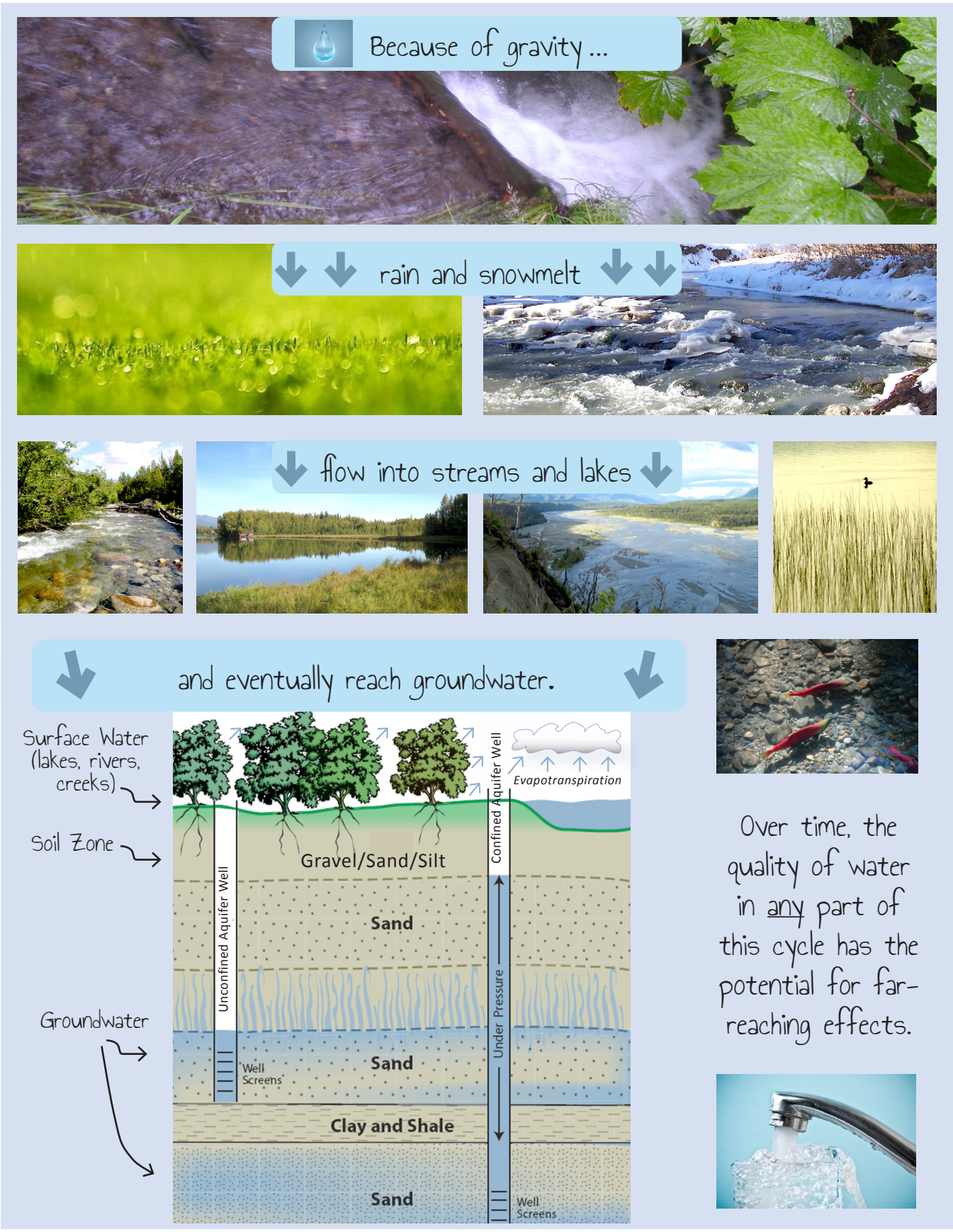
Create a culture of community and professional pride around protecting and enhancing regional watersheds; build a common understanding that it is in everyone's own self-interest to care about stormwater management and water quality. Back this up with the enforcement capacity to effectively protect public water resources.

Goal 5) Achieve Compliance

Comply with state and federal clean water and stormwater requirements using a cost-effective, incremental approach.

[1]*Note: U.S. Clean Water Act compliance is not optional or voluntary.*

Figure 3. Natural Water Cycling.



Chapter 2

Stormwater 101

2.1 What Is Stormwater?

Rain water that does not immediately soak into the ground is called stormwater, and is a by-product of natural water cycling processes (see Figure 3, page 8). Starting in the atmosphere, water begins its journey as rain and snow. Following gravity, water is always on the move to find low ground. When rain and snow fall on land that has intact native vegetation, the water gradually soaks into the soil, replenishing groundwater supplies. Most excess water discharges into local streams, although some goes back into the air through evapotranspiration.

As roads and sidewalks are paved, buildings constructed, or other hard or "impervious" surfaces are added, the amount of water that can be naturally absorbed after a rain or snow event is dramatically reduced. As a result, water flows and drainage patterns change significantly with urbanization (see Figure 4, page 10).

Instead of infiltrating, stormwater flows across surfaces, such as lawns or pavements, picking up pollutants like fertilizers, motor oil, sediments, pet waste, litter, and debris. Stormwater can transmit any pollutants it picks up into streams, lakes, and waterways.

Stormwater can also become concentrated, creating drainage, flooding, and erosion problems. In order to prevent the flooding of homes, businesses, and local roads, in most developed communities stormwater runoff is diverted into ditches, or curb and gutter, and piped storm drainage systems.

Most storm drain systems in the Mat-Su do not treat or clean the runoff entering storm drains. Rather, they convey untreated water into nearby waterways.

Typical catch basin and storm drain piping networks convey runoff directly into nearby streams and waterways, without treatment to remove pollutants. Large debris is usually screened out by inlet grates, and some units have oil and grit separators, which allow these elements to settle out and be manually removed. However, if accumulated oil and grit is not cleaned out before large storm events or break-up, high volumes of water can dislodge previously collected oil and grit, and send it directly into waterways all at once.

Stormwater is everywhere: in the summer (left, as rain), during winter (middle, as snow), and in-between (right).

Figure 4. Urbanization and Stormwater.

Waterflows and drainage change with urbanization.

The Wasilla area is beginning to experience water quality impacts from growth and urbanization. Two water bodies in the Wasilla area are designated as polluted by the State of Alaska from stormwater-related discharges.

Forest vegetation, native plants and wetlands filter and soak in water.

In contrast, roofs, compacted gravel, asphalt and other impervious surfaces create "runoff."

Runoff picks up pollutants and goes wherever gravity takes it.

Municipal Stormwater

In the Mat-Su, stormwater traditionally has been treated more as a drainage issue than a water quality concern. The cities of Wasilla and Palmer have codes that make it a developer's responsibility to minimize runoff into streets, adjoining lots or wetlands, streams or lakes.

In the most urbanized portions of Wasilla and Palmer, usually where curb and gutter and storm drains are present, stormwater enters municipal storm drainage systems, which are also called "grey infrastructure." These carry runoff to the nearest stream, river, and ultimately Cook Inlet (or in a few limited cases, into a stormwater runoff settling basin).

Wasilla's Iditapark is a good example of "green infrastructure," an approach that uses vegetation and soil to manage precipitation where it falls. Infiltration basins and "rain gardens" help slow, spread, and soak stormwater into the ground. This approach takes advantage of Mat-Su's good gravel and soils, which help screen out sediment and some pollutants. Furthermore, where a healthy organic mat is intact, some pollutants may begin to chemically and physically break down naturally. This is true of fecal matter from pets or failing septic systems as topsoil supports plants and bacteria that help break some contaminants down.

Wasilla and Palmer also have large vacuum or "Vactor" trucks, which they use to clean out grit and oil that has settled out into storm drain systems. These trucks can also help during break-up to vacuum large amounts of flooded water, which tends to gather in roadways as snow melts before storm drains and culverts have thawed out (or are melted by maintenance staff using high powered streams of steam).

Borough Stormwater

In the rest of the Borough, stormwater is generally directed into road rights-of-way via ditches and culverts and conveyed into local waterways or drainage basins. Although gravel can become compacted and effectively act as if it is impervious, some runoff may infiltrate into the soil or evaporate. At the same time, regular traffic use and wet weather conditions on gravel roads can lead to runoff collecting and causing recurring road damage. Poor drainage and related maintenance takes a big portion of Borough and Road Service Area budgets.

Borough operations and maintenance (O&M) staff see some of the region's local roads as big liabilities given their ongoing maintenance challenges and costs.

When the Borough plats subdivisions, contour mapping is submitted, showing proposed on-site stormwater management plans that respond to locally available topography. Often this means that a developer will dedicate a small portion of land outside the rights-of-way as a drainage easement. Natural vegetation may be left intact (forest, wetlands, etc.) to help support infiltration. In some instances, detention basins are constructed to hold, treat, and dispose of stormwater.

Where drainage issues are not adequately addressed by developers, the Borough may not accept the roads for public maintenance. This often leaves residents with substandard roads and having to pay for private maintenance.

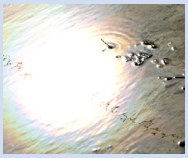
As the density and full build-out within subdivisions increases, the likelihood of flooding and property damage also increases. The lack of consideration for stormwater during design on many private and public projects limits the Borough's ability to properly manage stormwater. This leads to costly solutions and may not properly address the problem. In the future a regional network of drainage corridors

Figure 5. Stormwater Issues and Risks.

As communities grow, so do stormwater runoff issues.

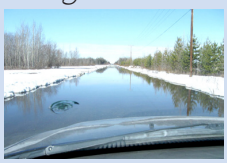
Oil and Chemicals.

Algae bloom.



Heat.

Sediment & debris.



Flooding.

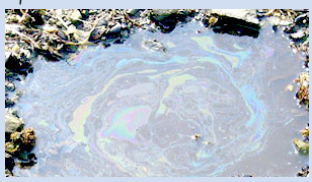
Erosion.

Temperature pollution: *Warm water is often cited as a cause for Salmon declines. Cool temperatures help water hold dissolved oxygen, a critical requirement for aquatic life. Stormwater heats as it flows across warm pavement and then drains into streams. Also, the removal of shade trees next to streams can raise water temperatures.*

Loss of streambank edges: *Salmon cannot live in streams if stormwater surges widen banks and remove the edges and shallows.*

Stormwater management helps communities avoid serious risks.

Short term:
polluted storm water.



Medium term:
polluted waterways.

Long term:
polluted groundwater.

Preventing pollution and water resource impacts is critical. Once waterways are "impaired," recovery can be expensive and even unfeasible. In 2012 three Mat-Su water bodies are listed as "Impaired" by ADEC:

Lake Lucille: *Fertilizers, septic leaks, and urban runoff contribute to algae blooms.*

Cottonwood Creek: *Fecal coliform from septic system failures and urban runoff.*

Matanuska River: *A historic dumpsite in the riverbank near Palmer holds 200 to 400 tons of debris.*

and collection sites may be needed, incorporating green and grey infrastructure, with stormwater conveyance and retention systems, in addition to drainage design criteria.

2.2 Why Does It Matter?

Many communities that have replaced native vegetation with structures and roads have had some form of localized drainage issues and occasional flooding. So what is the big deal?

Modern communities have an abundance of cars, petroleum products, and chemicals. They have learned the hard way (and at great expense) that stormwater's slow and steady migration is directly linked to water quality.

At some tipping point, stormwater issues and risks (see Figure 5, page 11) tend to grow from localized issues to regional crises. Fortunately, this process takes time, and is largely preventable with relatively low-cost private and public investments. Moreover, there are many warning indicators between having generally good water quality, and water quality crises. Surface water pollution is a first red flag for communities. Often this is localized, and communities may not be aware of most instances where this occurs until bigger concerns manifest, such as polluted and impaired water bodies, or loss of fish populations.

If water quality continues to degrade (which can take decades or longer), over the long term groundwater can become polluted. The U.S. Clean Water Act of 1972 and other environmental laws were passed in response to the growing number of extreme water pollution crises, such as rivers catching on fire, the loss of fisheries, or groundwater contamination that requires expensive cleanup or new infrastructure to pipe in potable drinking water. The U.S. Clean Water Act's approach to municipal stormwater changes the investment equation so that entire communities invest relatively minor resources incrementally to prevent problems, rather than wait until irreversible or expensive problems occur.

In terms of the Mat-Su's water quality, major portions of the land are undeveloped, and much of the region enjoys clean water. At the same time, the Borough is also one of the fastest growing populations in the country, and this generally healthy water condition could change.

Population Growth and Water Quality

Today Mat-Su's population is nearing 90,000 residents (2010 U.S. census). Current water quality threats in the region include soil and sediment runoff, failing septic systems, household chemicals, oil leaks, and fertilizers. Negative impacts to Mat-Su residents from these threats can include:

- **Contaminated wells and drinking water:** This is a significant concern given that nearly all residents in the region are dependent on individual or community wells.
- **Sportfish declines:** Salmon are vulnerable to runoff silt, oil and chemical pollution, and warmer stream temperatures from stormwater that is heated as it flows across parking lots. Increased impervious surfaces also alter habitat. When streams have stormwater surges, rather than slow, percolating drainage, the increased flow significantly widens stream banks. Surges also erode bank edges and alter stream beds, removing gravels and shallows. With these features gone, salmon have no where to lay eggs, hatch, or live in the juvenile state. According to some studies, impervious surfaces even as low as 10% to 15% in a landscape change the shape of streams, and begin to remove salmon habitat. A U.S. Geological Survey (USGS) study on the Anchorage Hillside found that even 1-5% impervious surface changed biotic invertebrate communities.

Stormwater contamination (oil, chemicals, or silt) can harm young salmon. Stormwater surges into streams can also scour and remove egg laying gravel beds and fry nursery habitat, thereby reducing salmon populations.

- **Loss of healthy waterways:** Many residents seek to live on or near waterways, and along with tourists, are attracted to Mat-Su's rivers and lakes for fishing and recreation. Impaired and polluted waterways lose their attractive qualities, with negative impacts to property values and tourism-related uses, especially if there are aesthetic changes (smell, visible pollution) or public health warnings. For example, stormwater discharges into Lake Lucille containing excessive nutrients from lawn and garden fertilizers, legacy septic systems, and urban runoff contribute to algal blooms. This decreases oxygen levels in the lake, impacts fish, and makes the lake less attractive for recreation and settlement.

These impacts are preventable, yet many people do not make a clear connection between land use practices, site-specific issues, and the overall quality of the region's waterways.

The Mat-Su region today is in a relatively good position in terms of water quality. It is not heavily urbanized, and has not had significant costs related to stormwater and water quality issues. At the same time, the region is beginning to see some indicators that there could be growing stormwater issues on the horizon:

- The cities of Wasilla and Palmer are on the frontlines of dealing with stormwater. Both of these entities are proactively seeking the tools and resources to better address growing water quality concerns and drainage issues, especially in their more urban areas.
- The Borough's O&M Division and Road Service Areas, are paying significant costs to upgrade inadequate, inconsistent, and poor drainage, and deal with maintenance and facility problems.
- Three water bodies in the region have been identified as "impaired" by the Alaska Department of Environmental Conservation for runoff related water pollution problems.

2.3 Minimizing Risks and Liabilities

Stormwater Management

Simple, cost-effective stormwater management tools and public education efforts have been successful in communities all over the U.S. in helping to maintain water quality, and lower life-cycle infrastructure costs associated with drainage problems. Because of the incremental and preventable nature of stormwater issues, "stormwater management" can be a strategic community investment (see Figure 6, page 13).

Figure 6. Stormwater Management as a Strategic Community Investment.

Strategic investments to deal with stormwater issues pay long-term dividends.

Clean water supports tourism, stable property values, and public health.

On-site infiltration and thoughtful design reduce infrastructure life-cycle costs.

Sport-fish are vulnerable to silt, oil, chemicals, and warmer runoff temperatures.

Clean up costs for impaired waterways and groundwater can be exorbitant.

For flood and drainage control, setting aside areas with native vegetation is the cheapest way to slow drainage down, spread it out, and soak it in.

As communities lose their natural drainage patterns and their infiltrative abilities, expensive stormwater collection systems are required to prevent flooding.

So what is stormwater management? Basically, it is anything that addresses the quantity and/or quality of stormwater. The term Best Management Practice (BMP) is often used to refer to stormwater management tools. These can include any variety of technologies or approaches. Typical BMPs help to:

- Plan carefully to create solutions and prevent problems.
- Construct stormwater systems so contaminants are removed before they pollute surface waters or groundwater.
- Manage and control hazardous materials and potential pollutants to prevent their release into the environment (source control).
- Educate a community on how its actions affect water quality, and about what it can do to improve water quality.
- Build green infrastructure ("soft" structures such as ponds, swales or wetlands) to work with existing or grey infrastructure ("hard" drainage structures, such as curb and gutter and piped systems).
- Enhance and enforce existing ordinances to make sure property owners consider the effects of stormwater before, during, and after development of their land.
- Design projects to address the site's anticipated stormwater and help control flooding and erosion.

The City of Wasilla uses a variety of BMPs in its urbanized areas to manage rain and snowmelt runoff, including Grey Infrastructure (e.g. curb, gutter, and stormpipes) and Green Infrastructure (e.g. catchment ponds, swales, and rain gardens).

- Acquire and protect natural waterways where they still exist or can be rehabilitated.
- Revise current stormwater or pollution regulations to address community risks.

Legal Tools for Protecting Water

Because of the health, safety, and cost issues associated with water quality, there are legal frameworks in place to help communities minimize risks and liabilities. At the local level, these historically have included laws to protect property rights, and to hold people responsible for their actions. Courts have played an important role in holding water polluters accountable, so that one property owner does not perpetrate injury to their neighbors, or to the public's use and enjoyment of waters.

Currently the cities of Wasilla and Palmer and the Borough have water pollution laws that are especially aimed at protecting public health and community safety. **Stormwater, interestingly, presents a challenge to legal approaches for stopping water pollution.** For example, stormwater runoff is everywhere, and in many cases pollution is decentralized, with tiny contributions from most property owners combining for a much bigger impact. Community and technical tools for addressing more decentralized forms of pollution are needed.

Even where blatant pollution is likely occurring (such as illegal dumping of hazardous chemicals next to a stream) these actions can be very hard to monitor or prove evidence of harm. Because of these challenges, stormwater at the regional, state, and federal level is addressed in a legal framework, which includes options for suing polluters, permitting for industrial and development activities that can cause stormwater quality impacts, and programs that help reduce harm from more dispersed stormwater pollution sources.

As communities become more urbanized, their stormwater discharges fall under the U.S. Clean Water Act of 1972, as amended in 1987. Once a community meets a population threshold, an APDES permit (administered by the state in Alaska) is required to specifically outline how the region will work together to keep pollutants out of stormwater and the environment. This population threshold is where the Borough and the cities of Wasilla and Palmer are headed.

Stormwater pollution may come from point sources such as spills, dumping, and construction sediment, or from non-point sources such as stormwater picking up pollutants from lawns, ditches, parking lots, and roads.

Point Source Pollution

Point source pollution is a single identifiable localized source of something. Examples of point-source pollution include:

- Contaminants, sediment, or debris entering a river from a construction site;
- Fuel entering a municipal storm sewer system from an overturned vehicle; or
- Septic effluent entering waterways because of a system failure (or illicit discharge, which in the recent Houston case was illegally dumped into a wetland by a business owner, who was seeking to avoid the costs of proper disposal).

Where point-source pollution is anticipated to flow into "waters of the U.S.," permits are available that outline efforts to mitigate and reduce impacts. If activities can be undertaken so that no pollution will enter public waters of the U.S., permits are not required.

Alaska Pollutant Discharge Elimination System (APDES) Permits

In Alaska, point-source pollution permits are administered by the state government under an APDES program, administered by ADEC. Permits issued under APDES include:

- A **Construction General Permit (CGP)** applies to construction projects disturbing one or more acres, and requires preparation of a **Storm Water Pollution Prevention Plan (SWPPP)**, filing a **Notice of Intent (NOI),** implementation of BMPs, inspections, reporting and recordkeeping; and/or
- **A Multi-Sector General Permit (MSGP)** is a stormwater permit that applies to facilities defined by the U.S. Environmental Protection Agency (EPA) as industrial with a discharge to waters of the United States (landfills, gravel extraction, port facilities, timber processing, etc.). This permit requires preparation of a SWPPP, filing an NOI, implementation of BMPs, inspections, stormwater sampling and analysis, reporting, and recordkeeping.

Non-Point Source Pollution

Non-point source water pollution affects a water body from generalized sources such as polluted runoff from agricultural areas, parking lots, or neighborhood streets and lawns, which eventually drain into a stream. This form of pollution comes from the everyday actions of local residents (car washing, cars leaking oil, over-fertilizing lawns, improper waste disposal, etc.). With non-point source pollution it is hard to identify and directly address polluters.

MS4 Permits and Minimum Control Measures (MCMs)

To help reduce stormwater pollutants entering waters of the U.S., MS4 permits can be required by larger public entities as described in Chapter 1. These require a stormwater management program comprised of BMPs and measurable goals specific to six MCMs:

MCM 1 – Public education and outreach on stormwater impacts.

MCM 2 – Public involvement and participation.

MCM 3 – Illicit discharge detection and elimination (IDDE).

MCM 4 – Construction site stormwater runoff control.

MCM 5 – Post construction stormwater management in new development and redevelopment.

MCM 6 – Pollution prevention/good housekeeping for municipal operations.

Chapter 4's toolbox specifically addresses these MCMs using a mix of locally identified BMPs intended to help protect the region from drinking water pollution, flooding, fisheries loss, and other stormwater-related impacts and liabilities.

Figure 7. Diagram and Definition of a Watershed.

What is a Watershed?

A watershed is the land area that drains to surface water bodies. Watersheds include lakes, rivers, wetlands, and streams, as well as the surrounding landscape that feeds them.

Water in a watershed (dotted line) travels downhill to sea-level.

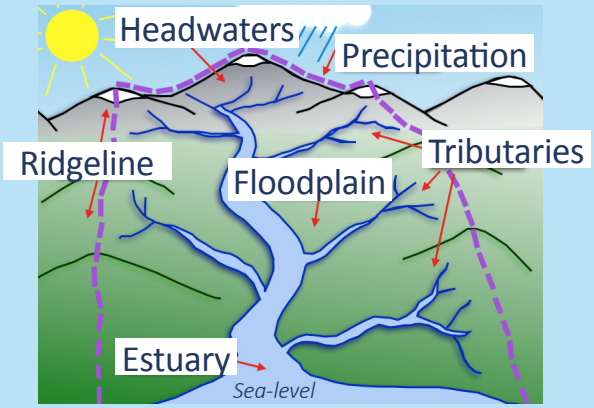
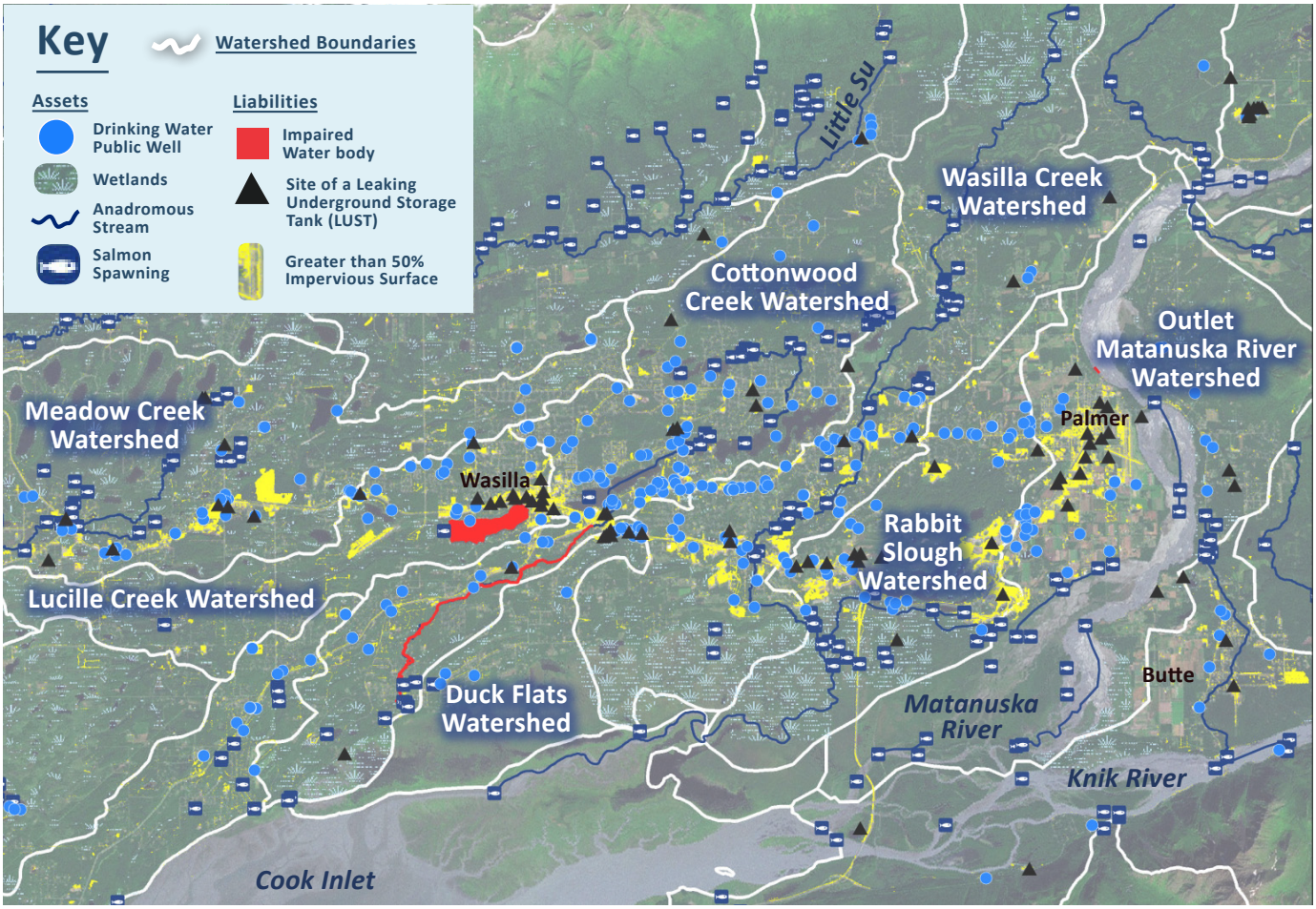


Figure 8. Mat-Su Urbanized Area Watersheds.



Sources: *U.S. Watersheds are mapped under Hydrologic Unit Codes (HUC); this map uses HUC 12 sub-watershed boundaries. Public Water System information has been provided by the Drinking Water Program of the ADEC. Leaking Underground Storage Tank (LUST) site and impaired water body information are also from ADEC databases. The information provides a data snapshot as of June 25th, 2012. There may be errors in well location as well as other information.*

Chapter 3

State of Our Water 2012

3.1 Our Everyday Actions Affect Water Quality

Over time, small amounts of pollution from everyday activities accumulate in a community's water. This chapter is intended to help Mat-Su citizens in more urbanized areas appreciate how their everyday actions in the region are affecting local water quality. It provides an overview of water quality indicators, especially drinking water and fish populations, to serve as a baseline for future reference.

Because urbanization is a primary concern related to stormwater, only Mat-Su's central, more densely populated areas are covered in this summary. Also, the chapter emphasizes "watersheds" and "sub-watersheds" rather than political boundaries, which water flows across.

Watersheds are geographical areas that serve as a "catch basin" for rainwater or melting snow and ice, with an integrated drainage network above and below ground. All rainfall and snowmelt runoff in a watershed flows downhill into water bodies, and toward sea-level (see Figure 7, page 16).

This plan addresses seven urbanized sub-watersheds in the Mat-Su. Figure 8 on page 16 highlights these watersheds and gives a snapshot of clean water assets (wetlands, spawning areas, public drinking water wells) and liabilities in 2012. The liabilities or concerns include three water bodies listed by ADEC as having "impaired status" due to pollution issues, as well as Leaking Underground Storage Tank (LUST) sites, and areas where vegetation has been generally removed and replaced by impervious surfaces such as pavement.

Although all watersheds in the Borough ultimately drain toward Cook Inlet, some rain and snowmelt never makes it that far. Some portion evaporates or soaks into the ground, recharging underground aquifers and drinking water supplies. This water also helps increase water levels in local lakes, streams, and wetlands – a benefit to people and to fish.

3.2 Mat-Su Water Quality Indicators

Regional Clean Water Assets

Mat-Su's way of life depends on clean water:

- Our entire drinking water supply comes from clean groundwater, piped up through public and private wells.
- Residents and tourists all enjoy the scenic values of our local streams and lakes. Fresh surface water supports swimming, boating, and other water sports.
- The Borough enjoys healthy runs of wild and stocked fish, including salmon and trout. The Borough has been trademarked as Alaska's Still Water Fishing Capital based on its high quality angling opportunities.

Photo of Wasilla Lake in 1939, prior to any urbanization.

In 2012, the Mat-Su enjoys an abundance of clean water. Assets that support water quality include the region's well-draining gravelly soils, a large stock of undeveloped lands, intact wetlands, and ecosystem functions supported by native vegetation and organic soil layers, which support groundwater recharge and filter runoff. Additionally, the region's natural drainage patterns are intact.

Although the Mat-Su has experienced strong growth in recent decades it is also a long way out from "build-out." The region's predominant pattern of large lots and less dense development helps to retain, filter, and disperse current levels of drainage and runoff.

Water Quality and Drinking Water

Public Well Systems

Fifty-eight percent of the Borough's population depends on public water systems (PWS). Regular sampling and reporting are mandated for PWS under federal and state Drinking Water Health Standards. Annual tests generally meet or exceed water quality standards, and most residents in the region on public water systems have safe, high quality, potable water.

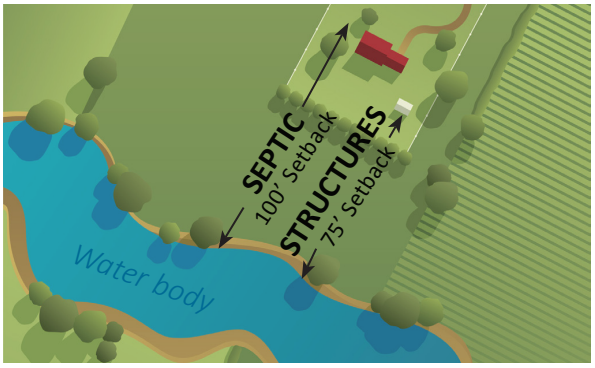
Private Well Systems

Forty-two percent of the Borough residents with water service rely on private on-site wells. Residential wells typically do not get tested unless required for a new mortgage. As the state does not regulate private wells, localized well water quality trends are often unknown unless residents test their own water regularly. In terms of tracking well locations, the State of Alaska's Department of Natural Resources (DNR) has a voluntary Well Log Tracking System (WELTS) online service.

Water Quality Concerns

Although most residents are enjoying clean, quality drinking water, there are some areas of concern and isolated issues in the Mat-Su:

- **Arsenic, natural toxins, and minerals** are sometimes found in groundwater and require filtration.
- **Private wells** are not regularly tested for water quality.



Following setbacks and using proper construction and decommission practices for wells and septic systems are important for regional water quality.

- **Underground storage tanks** can contaminate groundwater (typically from petroleum tanks). See LUST sites in Figure 8, page 17.
- **Improperly constructed and abandoned wells** are one of the biggest contributors to groundwater contamination in Alaska.
- **The maintenance of septic systems** is often overlooked and can lead to impacts on water quality for downstream drinking water sources.
- **Groundwater recharge** feeds many wells in the region, which could introduce above-ground pollutants into groundwater. Additionally, changes to the land can interrupt groundwater recharge and flow patterns (e.g., road construction, collection and conveyance piping). Finally, although not a water quality issue, some areas of the Mat-Su do not have sufficient groundwater supplies to support development.
- **PWS well head locations make them vulnerable to contamination** from above ground sources. For example, the City of Wasilla recently completed a study and well-head source protection plan to address water contamination concerns from both inside and outside of Wasilla's City limits. The City of Palmer also has concerns. For example, a minor airport fuel spill near to two of Palmer's PWS well heads was caught and cleaned up quickly, but could have become a serious concern.

Overall, most problems and concerns are occurring as isolated incidents. That said, it is important to recognize that the State of Alaska

has limited authority to protect against potential sources of contamination, and there are only limited drinking well head protection plans in the Borough. Local initiatives and oversight are needed to increase the protection of public drinking water sources, and to help private well owners be aware of the issues and risks.

Water Quality and Fish Stocks

The Alaska Department of Fish and Game (ADF&G) is concerned that declining water quality in the Borough may be negatively affecting fish stocks. Some of the concerns around retaining healthy fish populations include:

- **Removal of streambank vegetation on private property.** Small modifications of habitat by individual landowners may lead to large-scale changes when multiplied throughout an area.
- **Temperature variations.** Temperature increases may be the result of the removal of riparian vegetation, but they may also be caused or worsened by low stream flows. Salmon spawning and reproduction are very sensitive to these changes; ADEC and the Wasilla Soil and Water Conservation District have documented increases in stream temperatures in some local waterways.
- **Flow Variations.** Surface and subsurface water withdrawals affect the amount of water left in our streams and lakes. Lower stream flows have the following issues for fish:
  - Concentrated pollutants;
  - Reduced sediment transport; and
  - Tends to be warmer, which reduces the oxygen available to salmon fry.

  Instream flow reservations are a mechanism used to maintain the minimum amount of surface water necessary to support fish, but many streams within the Borough do not currently have reservations in place. Individuals, organizations, and governments can apply for an instream reservation of water to support fish, recreation, and other purposes under Alaska Statute 46.15.145 by submitting a fee and paperwork to the DNR. Renewals are required every ten years.
- **Impervious surfaces.** Increasing amounts of impervious surfaces such as roads, parking lots, and large roofs can change the natural drainage pattern within a sub-watershed, causing scouring and other negative affects to the stream's natural flow and ability to support fish populations and control flood waters.
- **Stream modification.** Portions of non-specified anadromous streams, including spawning areas, have been impacted or lost completely due to development. Especially sensitive are the headwaters, and egg laying and rearing areas in streams with salmon, Dolly Varden, and Arctic Grayling.
- **Culverts that block fish passage.** Recent studies have mapped and documented culverts and stream crossings in the Mat-Su that do not support fish passage. The Borough, the US Fish and Wildlife Service (USFWS), and other local organizations have been partnering to address this concern.

Native vegetation along this stretch of Wasilla Creek helps slow and filter stormwater and offers fish habitat. Trees shading the creek help protect cold-water fish species from urbanized heat pollution (salmon generally require temperatures under 64° F for oxygenation).

Mat-Su's Urbanized Area Watersheds

More urbanized watersheds in central Mat-Su will be the first to witness impacts related to stormwater. This following section presents a general summary of what we currently know about each of Mat-Su's Urbanized Area Watersheds (see Figure 8, Page 16) in terms of water quality and possible concerns. Sources

are included in Appendix 2, in a regional water quality bibliography and resource list. This summary is followed by an overview of efforts underway to monitor and enhance Mat-Su's water quality, and some representative images from the region's most urbanized areas, Wasilla and Palmer (Figures 9 and 10, pages 22-23).

Wasilla Creek Watershed

Water bodies: *Wasilla Creek, Carnegie Creek, Gooding Lake, Walby Lake, Black Lake, and Reedy Lake.*

In general, the water quality is good for the lakes and streams in the Wasilla Creek watershed. Many of the lakes are naturally shallow and aging. Wasilla Creek is experiencing increased development pressures that could affect water quality and fish habitat. The headwaters of Wasilla Creek are an important area for groundwater recharge and fish habitat. Finger Lake is another water body in this watershed that has experienced much shoreline development. Local residents can help the lake's water quality by having a buffer of natural vegetation between their yard and the lake to help filter any pollutants running off a property.

Cottonwood Creek Watershed

Water bodies: *Hart Lake, Neklason Lake, Cornelius Lake, Dry Lake, Kings Lake, Anderson Lake, Cottonwood Lake, Mud Lake, Wasilla Lake, Dry Creek, Cottonwood Creek, Cottonwood Slough.*

Because of its location through the heart of the Wasilla area, much of the Cottonwood Creek watershed experiences urbanized pressure from roads, parking lots, septic systems, and stormwater discharges. The water quality reflects this, especially for Cottonwood Creek, which is listed by the State of Alaska as polluted by fecal coliform bacteria exceeding allowed limits. The bacteria levels increase during storm events, which shows it is most likely coming from stormwater discharges. BMPs for reducing bacteria sources within the watershed will improve the water quality.

Lucille Creek Watershed

Water bodies: *Lake Lucille, Lucille Creek.*

Lake Lucille is a naturally occurring spring fed shallow lake in Wasilla. At one time it was likely connected with Wasilla Lake but the two lakes are now hydrologically separated. Lucille Creek drains from Lake Lucille and flows through several wetlands before connecting to Meadow Creek and eventually Big Lake. Lake Lucille is listed by the State of Alaska as polluted with low dissolved oxygen and excess nutrients from stormwater runoff. The City of Wasilla has completed several projects that can improve lake water quality, including running sewer lines to lakeshore residents and re-routing much of the stormwater runoff from the Parks Highway and businesses to the Iditapark sedimentation basins for ground filtration. Additionally, local organizations are working with lakeside residents to improve water quality, including by taking care when applying lawn fertilizer.

Meadow Creek Watershed

Water bodies: *Little Meadow Creek, Meadow Creek, Fish Creek.*

This area has abundant water resources including lakes, small streams, and wetlands. All provide important functions for fish and wildlife habitat, flood control, water quality, and enjoyment by the many residents living in the watershed. In general, the water quality is good in the watershed, although there is not much data on several of the lakes. Current stormwater water quality assessments on Little Meadow and Meadow Creeks will provide a baseline to measure against in future years.

Duck Flats (Frontal Knik Arm) Watershed

Water bodies: *Palmer Hayflat wetland complexes.*

This watershed has a mix of uses including suburban areas and important wetlands that provide essential habitat for several bird species, moose, and other wildlife. It is a vibrant watershed with diverse vegetation and water resources. Water quality in this area is apparently good, although there is limited data. Keeping the wetland resources healthy with good water quality benefits the community in many ways, including providing recreational opportunities, flood control, and essential habitat for fish and wildlife.

Outlet Matanuska River Watershed

Water bodies: *Matanuska River, Ezi Slough, Echo Lake, Spring Creek, McLeod (Meirs) Lake, Reflections Lake*

The mighty Matanuska River is a braided glacial system that has shaped this watershed and provided rich soils for agriculture,

gravel resources, and areas for housing and development. While the Matanuska River provides these benefits, it also is challenging as it moves throughout its floodplain and can erode banks where development has occurred. The Matanuska River and its side channels provide fish passage and spawning habitat. The wetlands in this watershed provide essential functions for flood control, habitat for wildlife and fish, and recreational opportunities. The water quality is considered good within this watershed except for a small section of the Matanuska River that has a legacy open dump site.

Wasilla's Rain Garden is a good example of using green infrastructure to address localized issues.

Rabbit Slough/Palmer Slough Watershed

Water bodies: *Rabbit Slough, Palmer Slough, Spring Creek, Matanuska Lake, Kepler Lake, Bradley Lake, Canoe Lake, Irene Lake, Long Lake*

Abundant water resources occur throughout this watershed, including several lakes important for recreational opportunities and suburban development. This watershed also contains wetlands important for fish and wildlife in providing moose browse, waterfowl nesting, and fish habitat. Water quality data has been collected on some of the lakes within this watershed. For the most part water quality is considered good at this time and preventing additional runoff pollution will help keep these important waters healthy for years to come.

Regional Water Quality Efforts

During the past dozen years, a number of water quality research, monitoring, and clean up efforts have been underway in the region, with volunteers playing an important role (see photos this page). Key efforts include:

- The Mat-Su Borough's Volunteer Lake Monitoring Program was established in 1998 to obtain baseline water quality information on the region's lakes. As the population grows and urbanization increases in the Mat-Su, the need for information about our water bodies becomes increasingly important. The Borough has thousands of lakes, and agencies often do not have the funds to study a particular lake unless it is identified as impaired. The Borough's lake monitoring volunteers collect data to determine the lake's overall condition, and the trophic status of the lake.

  Trophic status refers to how nutrients enrich the lake. Highly enriched lakes tend to be murky with a lot of plant growth and possibly algal blooms; less enriched lakes generally have clear water without a lot of vegetation. Development and watershed urbanization can enrich a lake beyond its natural trophic condition by introducing additional nutrients (such as phosphorus) from the watershed.
- Streambank and lake edge restoration efforts have been implemented in some of the region's more urban waterways.
- Property owners and communities are beginning to install "rain gardens" to help address drainage and water quality issues.

Borough Lake Monitoring

Sunshine Creek Restoration Project

Students lay erosion control mat along the Little Susitna River

Figure 9. Greater Wasilla Area Clean Water Assets and Concerns

Greater Wasilla Area Clean Water Assets

Lake shoreline vegetation and expanded sanitary sewer lines.

Creek and stream setbacks and vegetation.

Functioning wetlands and estuaries.

Greater Wasilla Area Clean Water Concerns

Untreated roadway runoff (Lake Lucille).

Fertilizer/sewer algae bloom (Lake Lucille)

Runoff from impervious surfaces, large roofs, snow storage, roads, and the Parks Highway.

Figure 10. Greater Palmer Area Clean Water Assets and Concerns

Greater Palmer Area Clean Water Assets

Functioning floodplain wetlands and estuaries.

Waterway setbacks and intact vegetation.

Large lots and pervious surfaces.

Greater Palmer Area Clean Water Concerns

Matanuska Riverbank dump site debris (200 – 400 tons).

Three city water wells are vulnerable to airport fuel spills.

Improper storage of hazardous materials.

Erosion, bare soils, and flood events.

Silt runoff into local waterways.

TOOLBOX "AT A GLANCE"

The tools below cover the minimum requirements for a five-year MS4 permit and respond to Stormwater Advisory Committee goals and input (see pages 3 – 7).

A number of the tools listed below are designed to gain credit or build from efforts already underway in the region.

Clean water and improved drainage outcomes require a multi-faceted, incremental approach and regional collaboration.

(A) COMMUNITY ENGAGEMENT

(A) 1 – "Keep it clean" campaign.

(A) 2 – www.matsustormwater.info

(A) 3 – www.matsugov.us/public works/

(A) 4 – Salmon Safe Property owner's program.

(A) 5 – Demonstration projects and "how-to" manuals.

(A) 6 – Watershed and waterway specific signage, monitoring and clean-ups.

(A) 7 – Annual State of Our Water meeting and newsletter.

(A) 8 – Ongoing partnerships and Advisory Committee.

(A) 9 – Baseline data on public attitudes.

(B) WATER POLLUTION PREVENTION

(B) 1 – Review existing pollution prevention resources, laws, and response capacity for adequacy; adopt local regulations as needed.

(B) 2 – Cross train local emergency responders to give pollution prevention support.

(B) 3 – Map stormwater outfalls, develop local regulatory authority, implement and enforce an IDDE program, and aid in spill response.

(B) 4 – Conduct a baseline water quality study.

(B) 5 – Determine sub-watersheds and document pollution concerns; search, isolate, and fix individual discharges.

(B) 6 – Educate and involve residents, community councils, organizations, and businesses.

(C) SITE RUNOFF CONTROL

(C) 1 – Establish a Borough Watershed Team.

(C) 2 – Assess the need for additional construction site (temporary) runoff controls and implement as needed.

(C) 3 – Adopt permanent site run-off control and enforcement.

(C) 4 – Anticipate build-out and plan for regional drainage needs.

(C) 5 – Borough incentives for land owners who retain or enhance vegetation that provides stormwater filtering and infiltration.

(C) 6 – When selling, leasing, or developing Borough lands and resources, retain vegetative buffers along all streams, waterways, and wetlands.

(D) PUBLIC SECTOR OPERATIONS

(D) 1 – Create a water/drainage maintenance Standard Operating Procedure (SOP) for each public facility.

(D) 2 – Undertake coordinated cleaning operations and activities, and review for effectiveness.

(D) 3 – O&M internal education, with cross training and professional development for key individuals.

(D) 4 – Verify that SWPPPs are in place for Borough and city-owned industrial facilities (e.g. airports, port, wastewater treatment facilities, landfills).

(D) 5 – Flood management water quality assessment.

Chapter 4

Water Quality & Drainage Toolbox

4.1 A Toolbox for the Region

Because water issues are regional in nature, this section incorporates tools to support collaborative efforts, primarily focused in Mat-Su's more densely populated areas. A tool is considered as any means or method that can enhance water quality, or help to address, control, or dispose of stormwater.

There are direct benefits from applying what is in the toolbox. Based on a cost-benefit analysis of communities in the U.S., four categories of tools have been proven to have measurable financial and water quality benefits when applied incrementally over the years and decades. These categories, described below, are the framework for the toolbox contained in this chapter of the SMP:

A. Community Engagement Tools

Citizens need facts and current information so they can take responsibility for their everyday actions that affect local water. Communities need ways of collaborating to address challenges related to local stormwater issues. Direct benefits occur as citizens take personal responsibility for water quality. Their enhanced awareness can help the region more cost-effectively address causes and effects.

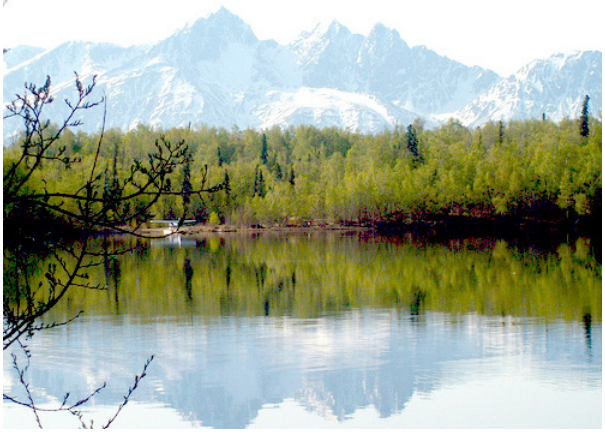
B. Water Pollution Prevention Tools

Communities need to be able to detect and prevent pollution. This includes hazardous material spills, improper dumping and disposal, onsite septic failures and illegal waste disposal. Contaminants can pose high-stakes risks to fish stocks and human health. Direct benefits from developing and using these tools include cleaner water due to better coordinated response, reduced illicit discharges (water with unauthorized pollutants), and better public knowledge and accountability about proper disposal procedures for substances that can contaminate water supplies.

C. Site Runoff Control

Given that clearing and grading over a site and constructing impervious surfaces causes increased runoff, property owners need tools to ensure that their individual activities do not injure their property, downstream neighbors, or pollute local waterways. Runoff control tools aim to reduce the total amount of water that runs off and to reduce the pollutants in the runoff. Runoff controls include temporary measures during construction and permanent measures to improve water quality and control drainage.

Direct benefits from site runoff control tools include controlled drainage, protection of private property, lower life-cycle and reduced maintenance costs, and stream conditions that support salmon reproduction. For instance, properly designed and constructed runoff control tools reduce sediment that travels into streams, which can kill or stunt the growth of salmon fry



Stormwater management tools seek to protect a region's water supplies and community health.

The most cost-effective protection for water supplies comes from detecting and preventing pollution.

by affecting gills and oxygen intake. They also control the amount of water runoff and help slow rain water surges into waterways. Without stormwater management, rain quickly floods into waterways, scouring away or silting over the gravel bars where salmon eggs are laid.

D. Public Sector Operations

City and borough work crews need day-to-day practices that help protect public water quality and also address regional drainage issues and flood concerns.

Benefits from using these tools include enhanced water quality, employee health protection, and public awareness that occurs as local and regional O&M crews lead the community by good example.

4.2 Tool Selection Criteria

Tools can be expensive to develop and use, and the wrong application of a tool can do more damage than good. The stormwater tools in this chapter were selected based on criteria developed by diverse stakeholders participating in a Stormwater Advisory Committee. The criteria are intended to measure whether a tool is locally appropriate.

At the same time, the criteria also embody the spirit of the Committee's intent for implementation of the plan. As collaborative efforts move ahead, the criteria can be reviewed and revised to make sure that stormwater-related activities are being administered in line with regional wishes and values. The ten criteria are:

#1 Simple

Stormwater-related measures must be easy for anyone to use and understand, from the trained professional to the layperson.

#2 Streamlined

Create a one-stop approach for meeting stormwater and drainage requirements, which is easy to staff and administrate regionally across jurisdictional boundaries.

#3 Supportive

Focus resources on providing support for compliance, rather than enforcement. Provide information, current data, and the guidance for people to succeed. Use knowledgeable, well-trained staff with a customer-service orientation to help users avoid "honest mistakes" and poor outcomes.

#4 Cost-effective

Take incremental and positive steps forward but do not over reach the requirements. Limit costs, fully utilize existing resources, consider life-cycle costs and outcomes, use proven tools (no need to re-invent the wheel), and prioritize actions to deal with "hot spots" and achieve direct benefits.

#5 Defensible/Site Appropriate

Borrow "what works" from science and engineering best practices, and base decisions on sound, reasonable, and reproducible data. Focus on site-appropriate action (e.g., responsive to soils, slope, proximity to water resources, and acknowledging costs and benefits specific to each site).

Drainage corridors and collection sites can be set aside while vacant land is available. As build-out occurs, treatment and disposal options will be limited and expensive.

#6 Northern Climate Compatible

Anticipate and address snow storage, sanding, salting, mid-winter warming trends (Chinooks), spring break-up, and other stormwater issues associated with our northern climate.

#7 Use an "Incremental, Victory Approach"

Take a strategic, incremental approach focused on building capacity for a long term outcome. For example, work toward having high quality site data (e.g. mapping, hydrology, rainfall) publicly available to support efficient site planning. Work collaboratively at the local and regional levels. Ease into implementation.

#8 Anticipate Build-Out

Knowing that growth is coming, we need to prepare for future stormwater needs. Set needed lands aside for stormwater collection, treatment, and disposal. Create a good neighbor policy for vegetative buffers and building sets backs from established waterways to promote a localized, cost-effective stormwater management plan. Promote on-site drainage solutions for large land developments except where subsurface conditions prevent detention/ absorption or where adjacent water resources may be impacted by the surface disposal of untreated stormwater. Create a system of collection, treatment, and disposal redundancy and plan for a balance of both green and grey infrastructure.

#9 Diversified Funding Approach

Seek resources for implementation from diverse local, state, and federal funding sources and consider creative funding approaches. This can include: cost recovery from improved design and construction and overall reductions in life-cycle infrastructure/maintenance costs; utilization of existing staff positions; stormwater utilities; partnerships; and volunteer efforts. Carefully analyze economic impacts of stormwater management.

#10 Promote Good Stewardship

Help educate and inform people to "keep it clean" and protect their local water resources. Use an education and outreach campaign that helps people understand the complex issues associated with stormwater and urbanization. Promote stewardship as a feature of community pride, and develop knowledgeable leadership in support of water protection efforts.

4.3 Clean Water Toolbox

The tools that follow in this chapter are listed within four categories of stormwater action that can have direct public benefits. In addition to each tool being a good practice, altogether the tools will help fulfill the requirements of a regional MS4 permit.

For each tool there is a discussion of its desired outcomes, and a listing of benchmarks, timelines, and measurable outcomes that could support implementation. Additionally, lead entities for implementation are listed along with partners, or in some cases, agency-specific efforts are highlighted.

4.3 (A) Community Engagement Tools

Possible regional costs for implementation: 0.05¢ to $0.25 per household per year

Source: Study of 26 U.S. communities (EPA)

Stormwater management is more effective when the broader community is engaged. Engagement specific to stormwater and drainage can mean many things:

- **Education** – Communities can protect and improve the quality of local water when citizens understand the issues and costs of prevention versus cleanup, and are aware of the individual actions they can take.
- **Outreach** – Outreach across diverse sectors of the community can generate broad support and provide sustained investment in the efforts required to successfully address stormwater quality and drainage control.
- **Partnerships and coordination** – Collaborative efforts and coordination between public and private sector interests in the region can ensure a more cost-effective approach to addressing both localized and larger watershed issues.
- **Local knowledge** – Stormwater is a complex issue and open civic engagement can improve decision-making and cost-effectiveness, and create positive outcomes.
- **Involvement** – Many residents and organizations take pride in their community, and are willing to contribute to improve local water quality. Volunteers can perform monitoring, partner in clean-ups, and support many other activities associated with protecting water quality.

When communities understand stormwater issues and work effectively together, improved water quality and reduced pollution risk are the outcome. In the Mat-Su, drinking from wells, fishing, and water recreation are integral to our way of life. Retaining high water quality over the long-term requires committed action and investment. Community engagement is a fundamental tool that can help us share the facts, increase awareness, and work effectively to keep our water clean.

Tools in this section:

(A) 1 – "Keep it clean" campaign.

(A) 2 – www.matsustormwater.info

(A) 3 – www.matsugov.us/public works/

(A) 4 – Salmon Safe Property owner's program.

(A) 5 – Demonstration projects and "how-to" manuals.

(A) 6 – Watershed and waterway specific signage, monitoring, and clean-up projects involving local Community Councils, Road Service Areas, schools, and youth.

(A) 7 – Annual State of Our Water meeting and newsletter to help the region better understand water quality issues and trends.

(A) 8 – Ongoing partnerships and Advisory Committee in support of implementation.

(A) 9 – Baseline data on public attitudes specific to water quality and drainage issues.

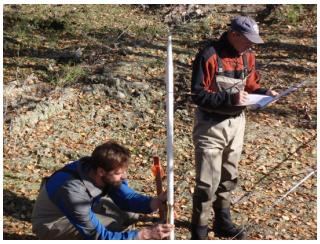
4.3(A) Community Engagement Tools

Tool / Ownership	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(A) 1 – "Keep it clean" campaign. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *ADOT* *Non-profit and private sector support*	*1. Residents understand stormwater issues, impacts, and actions they can take locally to protect their water.* *2. Positive messages that focus on community pride, clean drinking water, salmon, and watersheds help engage community support and interest in addressing stormwater issues and preventing pollution.*	**Year 1** – Create and distribute a press release and campaign package using developed materials (see Appendix A and www.matsustormwater.info) emphasizing the following themes: - "It's our water: let's keep it clean!" - "Everyday actions affect local water." - "Only rain down the drain." - "Keep it clean using the 4Cs: Cover, Capture, Clean Contain." - "Slow it down, spread it out, and soak it in." Mail and/or present campaign materials to the media, community organizations, schools, professional organizations, garden clubs, and post materials in visible locations (libraries, schools, post offices, cafes, etc.). **Year 2** – Repeat year one. Refine press package to reflect "State of Our Water" findings, and seek new and broader ways to circulate the message (sponsorship based banners, t-shirts, calendars, etc.), and feature success stories. **Years 3-5** – Repeat year two efforts.
(A) 2 – www.matsustormwater.info *Lead Entity* *Mat-Su Borough*	*1. Distribute visually engaging, positive message information on regional stormwater via the internet.*	**Year 1** – Continue to pay hosting fees for the site designed during the SMP process (www.matsustormwater.info) and/or retain the web page and maintain links to the Borough's website. Update as needed. **Years 2-5 –** Repeat year one efforts.
(A) 3 – www.matsugov.us/public works/ *Lead Entity* *Mat-Su Borough*	*1. Provide "one-stop-shopping" resources such as forms, permit information, and BMP technical data via the Borough website.*	**Year 1** – Gather all available, regionally relevant documents, forms, and technical details available. Locate on the Borough website through the Public Works Department web page. **Years 2-5 –** Repeat year one efforts.

Watershed issues are complex and can be a challenge to communicate. Campaigns with themes, visual aids, and salmon safe decals (above, right) above have been used successfully in many communities.

4.3(A) Community Engagement Tools (continued)

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(A) 4 – Salmon Safe property owner's program. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *Community Councils*	*1. Help property owners, especially those located adjacent to anadromous streams, to understand and use best practices for retaining salmon stocks over the long term, such as retaining shade trees adjacent to the water, controlling site pollution and runoff volumes, retaining native vegetation along the streambank, etc.*	**Year 1** – Create a five-year project scope and budget and seek funding (including through partners and sponsors). **Year 2** – Work with partners to develop a Salmon Safe program (e.g., checklist and decal) that works with property owners to "do the right thing" and receive recognition that their parcel is "Salmon Safe." **Year 3** – Have funding secured to implement program. **Years 4-5 –** Continue program implementation and find celebrities and thought leaders to reach out through the media and at events in support of Salmon Safe practices.
(A) 5 – Demonstration projects and "how-to" manuals. *Lead Entity* *Mat-Su Borough* *Partners* *Non-profit and private sector support* *Public facilities*	*1. Give property owners, businesses, and residents tools to help them prevent pollution and allow natural absorption of stormwater into native soil.*	**Year 1** – Post the Borough's Low Impact Development (LID) document on the web, in libraries, and at community locations. Highlight green infrastructure demonstration projects in the region. Find the funding to make printed materials available for free over five years, and to present twice a year at regional trade shows, conventions, and events. **Year 2-5 –** Refine and re-print materials as needed and distribute as per year one.
(A) 6 – Watershed and waterway specific signage, monitoring, and clean-up projects involving local Community Councils, schools, and youth organizations. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *Community Councils* *Road Service Areas* *Schools/Youth Groups* *Non-profit and private sector support*	*1. Connect residents to the health and status of their waterways, and help them take a proactive role in improving water quality.*	**Year 1** – Create a five year program scope, determine a budget and seek funding (including through partners and sponsors). Develop watershed and waterway specific maps by community council area, city, and Road Service Areas. Work with local representative bodies using the maps to determine priority areas for signage (highlighting stream name and salmon species) and/or stenciling (e.g., "This storm drain empties into Cottonwood Creek"). **Year 2** – Work with communities and local artists to create signs/stencils that are attractive, non-toxic, and durable. **Years 3-4** – Install signage and stenciling. Train volunteers to lead monitoring, and help coordinate waterway clean-up projects involving local Community Councils, schools, and youth. Fund some of the basic costs and materials. **Year 5** – Explore and promote options for organizations and businesses to participate and fund basic costs and materials, and to help take over leadership for the efforts through something like an "adopt-a-waterway" program.



4.3(A) Community Engagement Tools (continued)

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(A) 7 – Annual State of Our Water meeting and newsletter to help the region better understand water quality issues and trends. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*1. Connect residents to the health and status of their waterways, and help them take a proactive role in improving water quality.* *2. Synthesize and more broadly share water quality data to help the region better understand and address localized stormwater pollution issues.*	**Year 1** – Seek funding or allocate staff time to develop one presentation and create one newsletter annually to synthesize and present the latest water quality data related to stormwater (building from Chapter 3 of this document, and annual science findings). **Year 2** – Create and deliver one presentation and one newsletter. Use mail and media releases to more broadly share results. Make these products available in conjunction with the Salmon Symposium. **Years 3-5 –** Continue year two.
(A) 8 – Ongoing partnerships and Advisory Committee in support of implementation. *Lead Entity* *Mat-Su Borough* *Partners* *Governmental, non-governmental, and stakeholder interests*	*At the regional and local level:* *1. Engage governmental, non-governmental, and stakeholder interests in supporting regional efforts.*	**Year 1** – Convene at least two meetings per year to help share progress, and to coordinate and refine efforts and solicit input on regional stormwater management efforts and planning. Conduct outreach to actively involve all pertinent interests. **Year 2-5** – Continue year one.
(A) 9 – Statistical study of public attitudes specific to water quality and drainage issues. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*1. Understand local attitudes and understanding of baseline issues related to stormwater, water quality, and drainage.* *2. Make community engagement efforts more effective by responding to public attitudes.*	**Year 1-2** – Seek funding for a statistically valid survey of all households in the Borough's more densely populated areas, including in Palmer, Wasilla, and down Knik Goose-Bay Road. Develop a survey instrument by population area that can measure public attitudes and understandings of stormwater, water quality, drainage, and the willingness to support clean water efforts. Refine questions working with partners, and hire a qualified consultant to deliver the survey and develop a memo summarizing results. Share the memo with all regional partners and stakeholders. **Years 3-5** – Refine community engagement efforts into an overall public outreach, education and involvement strategy informed by survey results. Develop questions for the Borough's 2020 resident survey to help gauge attitude shifts.

4.3(B) Water Pollution Prevention

When chemicals, oil, human waste, and other hazards get into stormwater, human drinking water supplies can be contaminated, and fish die-offs can occur. Additionally, roadway salts and sands, litter, and car wash soaps can mix in with stormwater and cumulatively damage a community's water resources.

To address these issues, water pollution prevention tools combine the following elements:

- Spill response.
- Illegal dumping prevention and clean-up.
- Careful siting of hazards away from waterways and floodplains.
- Hazardous material storage practices (covered, out of the rain).
- Detective work where pollution problems are suspected, such as improper plumbing hook ups (e.g., a shop floor drain emptying into a municipal storm sewer system, or daylighting into a ditch, carrying illicit discharges).

Altogether, these practices can help make sure that every roadside ditch, storm drain, culvert, or pipe carries only rain and snowmelt, free from harmful pollutants, and protects the region's waterways and groundwater supplies.

To address hazards, being observant and being prepared for emergencies are critical steps. Residents and municipal employees around the region should be trained to look for visible oil and chemical residues in waterways or signs of illegal dumping. Another indicator to watch for are dry weather flows (water flowing in ditches and curbs when it is not raining or melting, such as from car washing in a yard, pressure washing paved areas and parking lots, or flow from unauthorized pipes).

Once a problem or illicit discharge is identified, useful measures include spill hotlines and response protocol to contain pollutants. Suspected hazards can be reported to the State of Alaska's 24/7 Spill Hotline (1-800-478-9300) and to local Emergency Services (911) so that professionals with cleanup and hazmat training can respond. Less serious problems, such as dry weather and illicit discharges, can be reported to city or Borough public works departments.

One final practice is to monitor water quality changes. To date, a range of water quality research has been completed for Mat-Su (see bibliography and resource list in Appendix 2). However, once collected, this data is generally uncoordinated and dispersed among different agencies and entities, making it hard to identify trends. Baseline and regular sampling can help communities identify and correct unintentional problems (plumbing cross connections and failed onsite wastewater disposal systems). It can also assist in stopping discharges and recovering costs for clean-up.

Possible regional costs for implementation: 0.1¢ to 0.72¢ per household per year

Source: Study of 26 U.S. communities (EPA)

Tools in this section:

(B) 1 – Review existing pollution prevention resources, laws, and response capacity and adopt regulations as needed.

(B) 2 – Cross-train local emergency responders to give pollution prevention support.

(B) 3 – Map stormwater outfalls and adopt local ordinances or regulations to provide authority for the Borough to implement and enforce an IDDE program.

(B) 4 – Conduct a baseline water quality study of streams and lakes in the Borough's more densely populated areas.

(B) 5 – Determine sub-watersheds and document pollution concerns; search, isolate, and fix individual discharges.

(B) 6 – Educate and involve local residents, community councils, organizations, and businesses.

Illicit discharges can threaten aquatic life and human health, and yet are often preventable.

4.3(B) Pollution Prevention Tools

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(B) 1 – Review existing pollution prevention resources, laws, and response capacity for adequacy and effectiveness and adopt local regulations as needed. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *Non-profit/private sector*	*At the regional level:* *1. Clarity around risk exposure, legal tools, and responsibility channels.* *2. More effective pollution prevention, to avoid duplication of services.*	**Year 1** – Meet with partners to set up parameters for review and internal policies and procedures. **Year 2** – Partners independently conduct internal audits of all pollution prevention activities. **Year 3** – Work broadly with partners to develop strategies for clearer communication channels, greater effectiveness and capacity, and broad interagency implementation to avoid duplication of services. **Years 4-5** – Implement approximately 1/2 of recommendations each subsequent year.
(B) 2 – Cross-train local emergency responders to give pollution prevention support, and ensure that individuals responding to spills or handling hazardous substances are equipped to protect water quality. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer*	*At the local emergency response level:* *1. Community-specific hazard education.* *2. Enhanced spill response capacity.*	**Years 1-2** – Develop and distribute a resource directory, emergency contact lists, and other useful available materials (e.g., spill clean-up and hazmat protocol, legal reporting requirement posters). Seek funding for developing a Mat-Su specific training and education program for municipal staff, including first responders. **Year 3** – Finalize funding and refine a training program. **Years 4-5** – Hold a training seminar for emergency responders and provide them with outreach materials. Provide incentives (contests) that encourage emergency responders to perform outreach with relevant businesses and sectors and distribute emergency response resources. Provide cross training for IDDE response.
(B) 3 – Map stormwater outfalls and adopt local ordinances or regulations to provide authority for the Borough to implement and enforce an IDDE program. *Lead Entity* *Mat-Su Borough* *ADOT* *Partners* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*At the city and regional level:* *1. Mapping of stormwater outfalls for the IDDE program and to aid in spill response; developing local ordinances and regulations to provide implementation and enforcement authority to remove illicit discharges.* *2. For the purposes of pollution prevention and response, map high risk land uses, facilities, and potential hazard concerns.* *3. Identify areas that may be sensitive to water pollution (e.g., flood plains, drinking water supply watershed areas, anadromous streams).*	**Year 1** – Seek funding for Geographic Information System (GIS) mapping of stormwater outfalls, public facilities, and water resources; evaluate necessary code changes. **Year 2** – Convert existing stormwater outfall data into an electronic format that allows regional mapping and data transfer. Develop a three-year plan for incrementally mapping the entire system. Institute code changes as needed to implement and enforce IDDE program. **Years 3 - 5** – Develop regional and city maps based on existing land uses with aerial information. Add anadromous streams and waterways, public and private drinking water sources, outfalls which have been mapped, and other location-specific water resource information. Post a map at emergency response facilities with contact information for reporting discharges, and spill response protocol and contact information. Also, provide planning and platting staff with this map, and explore possible setbacks and zoning tools for locating sectors and land uses of a more industrial nature away from sensitive water resources. Each year map 1/3 of all remaining stormwater outfalls. Implement and enforce the IDDE program.

4.3(B) Pollution Prevention Tools (continued)

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(B) 4 – Establish a research regime and data sharing protocol to allow a comprehensive baseline water quality analysis for streams and lakes in the Borough's more densely populated areas. *Lead Entity* *Mat-Su Borough* *Partners* *State/Federal Agencies* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*At the regional and local level:* *1. Establish an understanding of the State of the Region's Water Quality.* *2. Enhance the region's capacity and understanding of water quality by gathering additional data and monitoring water quality trends over time.*	**Year 1** – Gather existing data in the region and analyze for gaps. Meet with partners to create a list of potential water quality concerns. **Year 2** – Meet with partners to discuss the list, and to identify priority data collection sites based on known stormwater discharges and areas of water quality concern. Work with agency representatives and scientists to develop a baseline water quality research regime to address data gaps and monitor priority sites. **Year 3 –** Work to finalize the research regime, ensuring that ADEC/EPA quality assurance standards are met. Develop a plan for centrally sharing and analyzing water quality data. Seek funding to implement, including through expansion of citizen monitoring, and training of volunteers. **Years 4-5 –** Begin baseline sampling, and annually share findings at a "State of our Water" presentation and in a brief newsletter format. Consider ways to tie clean-up efforts, education, and awareness to data findings.
(B) 5 – Within sub-watersheds with documented pollution concerns (ADEC impaired water bodies) search, isolate, and develop strategies to address individual discharges. *Lead Entity* *Mat-Su Borough* *Partners* *State of Alaska* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*At the regional sub-watershed level:* *1. Improve water quality and reduce pollution risks.* *2. Uphold water quality laws and property rights.* *3. Use education to discourage illicit discharges which cause damage and possible injury to their neighbors and public lands.*	**Year 1 –** Identify sub-watersheds with potential pollution concerns. Make a list of documented concerns and map sub-watersheds, highlighting suspect parcels. **Year 2 –** Create a fact sheet to post on city and Borough websites, which highlights existing water quality discharge laws and penalties. **Year 3 –** Consider strategies to address individual discharges and for working with property owners to avoid stormwater encroachment and litigation (e.g., use a reputable third-party contractor to do a site assessment and testing, and/or create an amnesty program and clean-up fund where resources that would normally be used in litigation are instead used to help fix problems). **Years 4-5 –** As outfall and water quality data emerge, conduct targeted outfall field searches for dry weather flows and possible problems. Take corrective action where feasible.
(B) 6 – Educate and involve local residents, community councils, organizations, and businesses in local water quality efforts. *Lead Entity* *Mat-Su Borough* *Partners* *City of Wasilla* *City of Palmer* *Community Councils* *Non-profit and private sector support*	*At the regional level:* *1. Connect residents with their watersheds using water quality data, tied to everyday activities (e.g., let's keep it clean!).* *2. Help train people to monitor for, detect, and respond to illicit discharges.*	**Years 1-3** Provide Community Councils, Road Service Area Boards, and Borough Libraries with stormwater outreach materials (see appendix A) and a "State of Our Water" newsletter. Invite volunteers to participate in ongoing water quality sampling, cleanup, and use of LIDs/BMPs. **Year 4-5** – For waterways where baseline water quality data will be collected, support local volunteer efforts such as "adopt-a-waterway" and "watershed councils." Provide positive education around watershed health, and involve the community in clean-up and rehabilitation projects. Train volunteers who live in watersheds to help with water quality sampling and to report suspected illicit discharges.

4.3(C) Site Runoff Control Tools

1. Runoff Control During Site Disturbance (CGP/SWPPP)

Land is most sensitive to erosion during construction. Initial site improvements typically include clearing native vegetation to create a development pad. Native vegetation holds soils and stores stormwater and snowmelt, allowing it to soak into the ground or evaporate back into the atmosphere (typically, one-acre of broadleaf forest can retain and release in excess of 8,000 gallons per day). Intact soils with groundcovering vegetation are biologically active, breaking down pollutants and helping filter the surface water. Site disturbance interrupts these complex ecosystem services, making them highly vulnerable to erosion and sedimentation. Until construction is complete and the site is stabilized with re-established vegetation, nearby streams and waterways may become silted and polluted.

Pollutants commonly discharged from construction sites include solid waste, phosphorus (fertilizer), nitrogen (fertilizer), pesticides, oil and grease, concrete truck washout, construction chemicals (paints), and miscellaneous construction debris. As these enter local waterways they block oxygen supplies for young fish, among other problems.

Across the U.S., runoff controls are required for land disturbances of greater than or equal to one acre. In Alaska, this includes requirements to develop and implement a site-specific SWPPP, as well as seek coverage under an ADEC CGP. ADEC has jurisdiction for these activities based out of Anchorage's regional office. Construction runoff control includes a number of BMPs which, when installed and

Silt fencing and BMPs limit runoff and erosion during site disturbance.

Possible regional costs for implementation: 0.31¢ to $0.73 per household per year.

Source: Study of 26 U.S. communities (EPA)

Runoff control also adds to construction timelines and site development costs. Costs are passed on during real estate sales, but are recovered in part by lower life-cycle costs and stable property values.

Tools in this section:

(C) 1 – Borough Watershed Team to provide regional support on:

- *Construction NOI filing, inspections, and erosion controls*
- *ADEC APDES CGP coordination and compliance (assist in development of site-specific SWPPPs).*
- *Online clearinghouse for construction and permanent BMP-related activities*
- *Review homeowner association BMP covenants regarding stormwater maintenance responsibilities.*
- *Educate homeowner associations about common maintenance needs for stormwater practices.*
- *Consider launching an adopt-a-lake and/or adopt-a-watershed program.*
- *Create an emergency contact list and distribute to inspectors and field crews for water quality problem reporting.*
- *Cross-train field personnel to recognize signs of pollution and clarify appropriate responses and lines of communication.*
- *Design options to slow down, spread out, and dispose of stormwater on-site.*
- *Create drainage easements.*
- *Waterway buffer protections.*
- *Stormwater-related mapping and site planning tools (GIS, Civil 3D) with user interface.*
- *BMP criteria, technical support, cold-climate best practices, and local BMP performance review.*
- *Runoff/snowmelt management strategies.*
- *Coordinate snow storage/disposal, right-of-way drainage, and water quality issues.*
- *Inspect erosion and sediment controls; offer technical assistance before taking enforcement action.*

(C) 2 – Assess the need for additional construction site (temporary) runoff controls and implement as needed.

(C) 3 – Adopt permanent site run-off control and enforcement.

(C) 4 – Anticipate build-out and plan for regional drainage needs.

(C) 5- Investigate Borough incentives for land owners who retain or enhance vegetation that provides stormwater filtering and infiltration.

(C) 6 – When selling, leasing, or developing Borough lands and resources, retain vegetative buffers along all streams, waterways, and wetlands.

.

maintained, can limit erosion and its impacts to water quality. Useful BMPs include:

Protect Natural Site Features

- Minimize clearing.
- Minimize the amount of exposed soil.
- Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
- Protect streams, stream buffers, wetlands, or other sensitive areas from disturbance or construction activity by fencing or otherwise clearly marking these areas.

Construction Phasing

- Sequence construction activities so that the soil is not exposed for long periods of time.
- Conduct grading within a manageable area and timeframe.
- Minimize earthwork activities during the rainy season (August to October).
- Install key sediment control practices before site grading begins.
- Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.

Vegetative Buffers

- Protect and install vegetative buffers along water bodies to slow and filter stormwater runoff.
- Maintain buffers by replanting periodically to ensure their effectiveness.

Site Stabilization

- Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.

Storm Drain Inlet Protection

- Use fabric or other appropriate material to cover the storm drain inlet to filter out debris and sediments.
- Make sure the rock size is appropriate (usually 1 to 2 inches in diameter, using fractured or angular stone).
- If using inlet silt filters, maintain them regularly.

Dirt Stockpiles

- Cover, seed, or protect by encircling all non-active dirt stockpiles.

Slopes

- Rough grade or terrace slopes that are vulnerable to erosion.
- Break up long slopes with sediment barriers, slope down drains, or divert stormwater away from slopes.

Construction Exits

- Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
- Size construction exit BMPs for all anticipated vehicles.
- Make sure that the construction exit does not become buried in soil. Clean regularly.

Sediment Control (straw wattles, silt fence)

- Continuously monitor, inspect, and maintain sediment control elements.
- Make sure the bottom of silt fences are buried in the ground.
- Securely attach the material to the stakes.
- Don't place silt fences in the middle of a waterway or use them as a check dam.
- Make sure stormwater is not flowing around or under the silt fence.

2. Site Design Opportunities to "Slow it down, Spread it out, and Soak it in"

As communities become more urban, natural vegetation and drainage patterns are replaced by impervious surfaces that tend to collect pollutants and concentrate runoff. BMPs are designed to slow down, spread out, and soak in stormwater on-site, and address localized drainage and water quality outcomes. Two types of BMPs accomplish this: "Non-Structural" and "Structural BMPs." For both of these BMP types, there are many techniques

and specifications easily available from online manuals. However, cold climate considerations and other factors make some more appropriate than others (see Table 1, page 39).

Non-structural BMPs include buffers and preservation of significant natural value lands. They also include policies that guide growth away from sensitive areas, restrict certain types of development (industrial, for example) to areas that can support it without compromising water quality, or limit imperviousness.

Structural BMPs help to slow, spread, and soak in stormwater. These include:

- Storage practices that gather and detain runoff to allow for a slow release, addressing flow rates, and settling of silt particulates for some pollutant removal.
- Infiltration practices that allow runoff to percolate through the soil to groundwater, help filter stormwater, increase flood control, and recharge aquifers. Examples include infiltration basins/trenches, bioretention features, dry swales, and subsurface chambers.
- Vegetative practices or landscape features that enhance filtering, flood control, and habitat: grassy swales, filter strips, man-made/ constructed wetlands, and rain gardens.

3. Runoff Control During Spring Break-Up and Major Weather Events

In the course of a year, many precipitation events occur within the region. Most events are quite small but a few can be several inches deep. A rainfall frequency spectrum describes the average frequency of the depth of rainfall events that occur during a normal year (adjusted for snowfall and rainfall events that do not produce runoff). Figure 11 on page 38 shows historical rainfall data for Palmer, 1949 - 2012.

Figure 12 on page 38 shows the percent of rainfall events that are equal to or less than the indicated rainfall depth, using long-term data from the Palmer Airport. Additional charts using data from elsewhere in the Mat-Su are needed since precipitation patterns vary across the region.

The curve shows that the majority of storms are relatively small but a sharp upward inflection point occurs between 1/2-inch and 1-inch of rainfall. The rainfall frequency spectrum helps identify the size of rainfall events that deliver the majority of the stormwater pollutants during the course of a year. Many localities have adopted a water quality-based approach of capturing and treating the 90th percentile storm, as defined by an analysis of a local rainfall frequency spectrum. This criterion, referred to as the water quality volume, optimizes runoff capture, resulting in load reduction for many stormwater pollutants.

The rainfall depth associated with the 90th percentile storm at the Palmer Airport is 0.38 inch. This rainfall depth is calculated within the development area and then typically multiplied by the area and runoff coefficient for the site to determine the actual water quality volume that is used to size BMPs to treat runoff at the site.

In the Borough, the snowmelt volume in the spring usually exceeds the maximum annual runoff volume in the growing season, so drainage infrastructure and stormwater BMPs should be sized based on expected snowmelt volume (see Figure 13 on page 39).

Regionally-appropriate methods for managing runoff and snowmelt are highlighted in tables 2 and 3 (see page 40). These approaches require some O&M attention as issues and seasons shift, such as cleaning litter and debris from drainage structures.

Silty runoff entering Wasilla Creek.

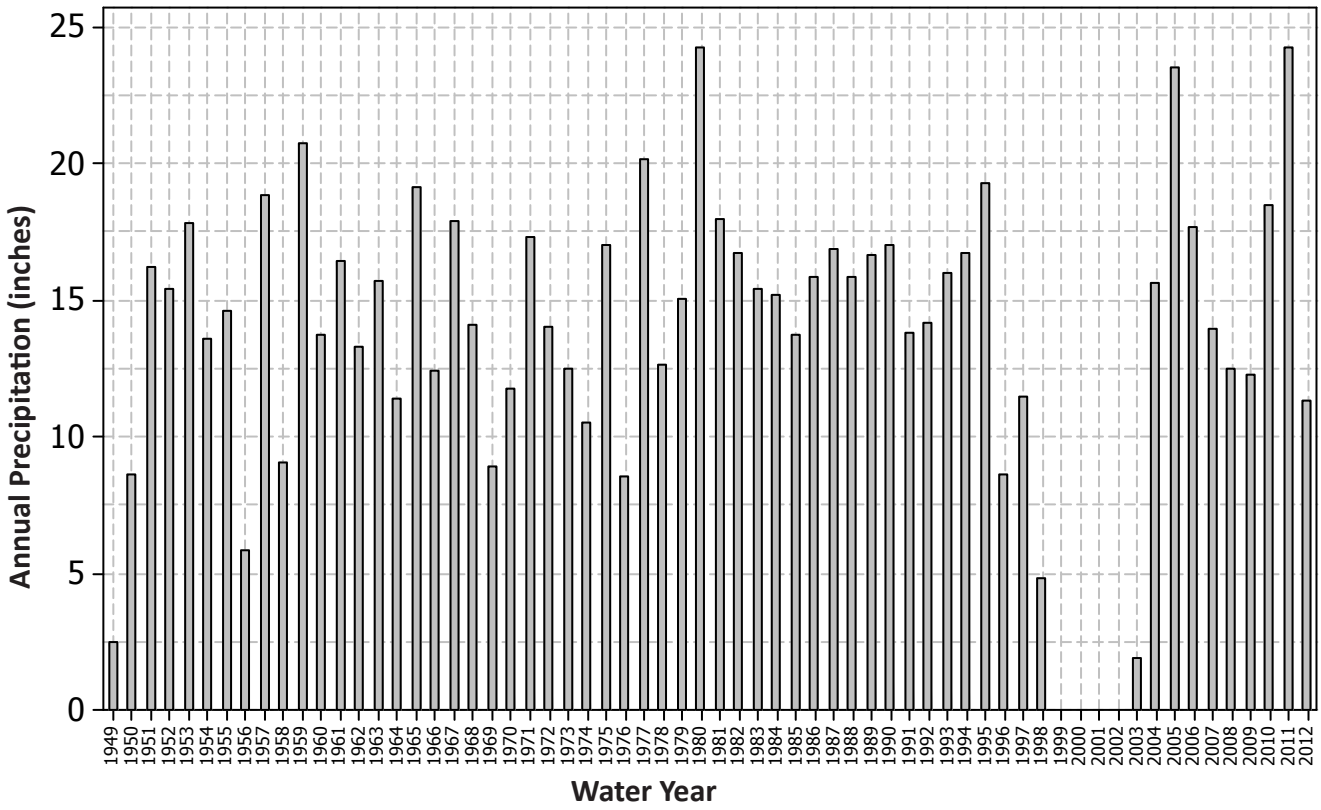


Figure 11. 1949 - 2012 Palmer, Alaska annual precipitation data from the Western Regional Climate Center's website station AK6870 (506870) by Water Year, measured in inches.

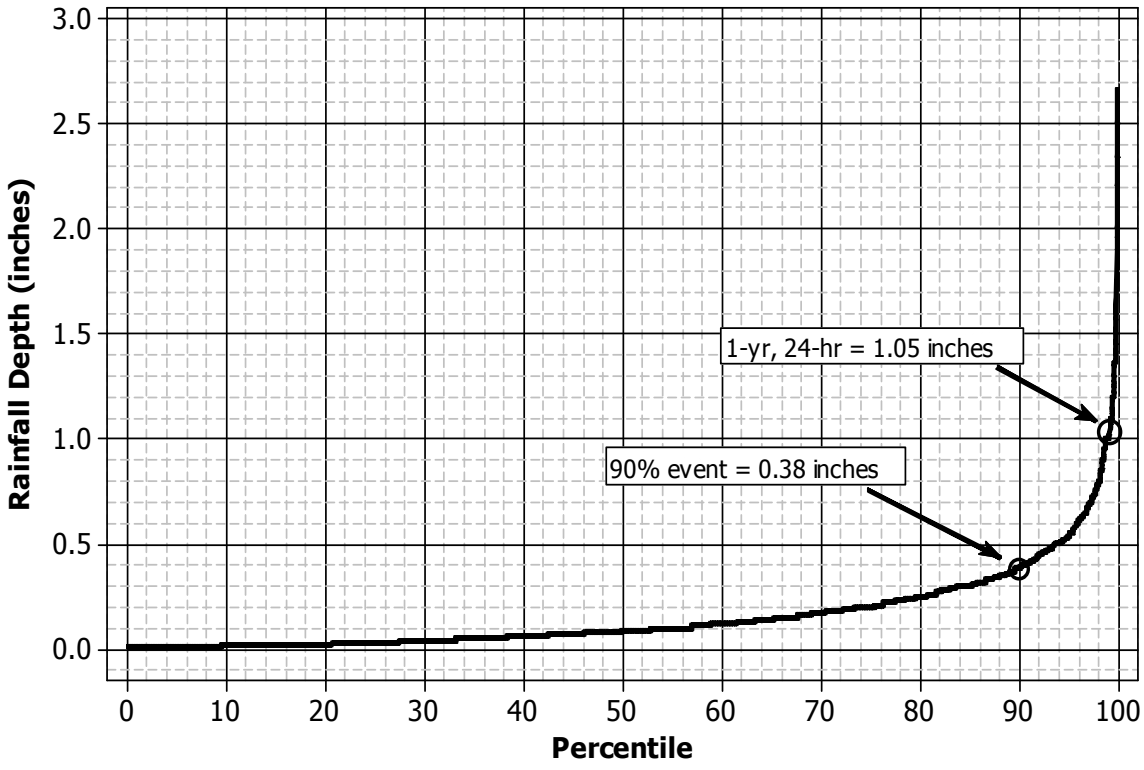


Figure 12. Rainfall Frequency Spectrum for Palmer, AK, 1949 – 2012.

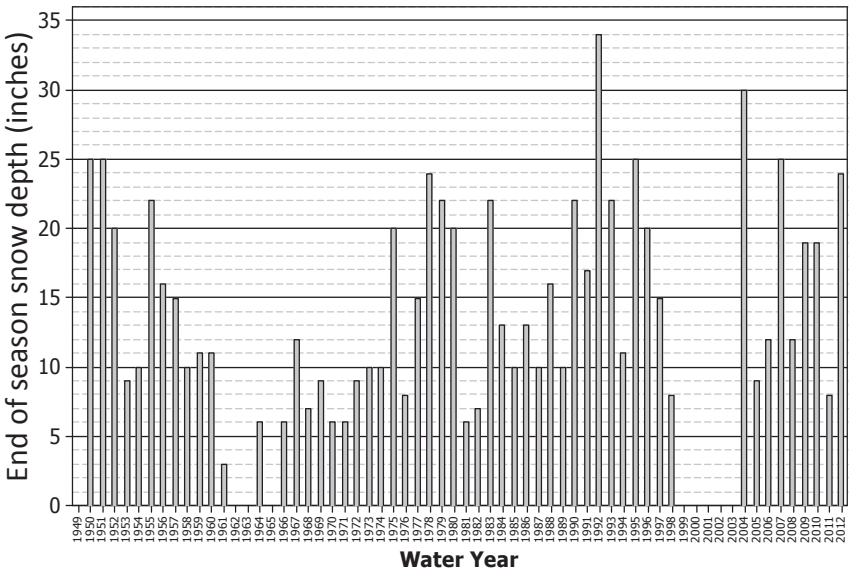


Figure 13. End of season annual snow depth for Palmer 1949 – 2012.

Table 1. Cold Climate Design Considerations for Permanent Stormwater Controls

Several basic design principles can improve the performance and longevity of stormwater treatment practices installed in cold climates. The following considerations are from local Stormwater Advisory Committee members, and research by Caraco and Claytor, 1997; VT DEC 2006b and NH DES, 2008).

- ***Select the types and designs of stormwater treatment structures that work well in the soil and climate conditions in the Borough.***
- ***Utilize broad, multiple cells and connecting swales for surface treatment.***
- ***Size detention ponds for design flows, not by easement size and location.***
- ***Design infiltration areas with soil capacity to infiltrate, not by ease of construction.***
- ***Use multiple and redundant cells in treatment practices and oversize the first pretreatment cells to account for high sedimentation rates.***
- ***In areas where road salt or deicers are likely to be used, choose salt-tolerant grass, shrub, and tree species to maintain vegetative cover.***
- ***Design practices to operate in a two-stage seasonal mode to allow water levels to be drawn down prior to winter so that the controls have extra capacity in the spring to accommodate extra melt-water.***
- ***Angle trash racks to prevent ice formation.***
- ***Avoid infiltration/design/construction where permafrost exists.***
- ***Avoid pipe ice blockages that may damage pipes or cause upstream flooding. Do not submerge inlet pipes into permanent pools.***
- ***Slope inlet pipes to have a minimum 1-1/2 to 2% slope to prevent standing water in pipes that could freeze.***
- ***Place drains and outlet pipes at least 1-foot below the frost line, and increase their design flow diameter by at least one pipe size.***
- ***When perforated pipes are used, the minimum opening diameter should be 1/2 inch and they should have a minimum pipe diameter of at least 6 inches.***
- ***Modify maintenance agreements to specify an annual spring-time maintenance inspection of stormwater practices to assess whether cleanups or repairs are needed to maintain function.***
- ***Granular filter beds should extend below the frost line, and use of peat and organic media should be avoided.***

Table 2. Runoff Management Strategy

Step 1. Site Assessment: Analyze site and prepare map showing environmental, drainage, and soil features prior to site layout.

Step 2. Vegetative Cover: Evaluate site to maximize retention and/or revegetation of native cover, particularly forest canopy where applicable, to intercept rainfall.

Step 3. Stream Protection: Reserve a buffer along the corridor of the perennial stream network, and maintain in forest or other native vegetation.

Step 4. Conserve Soils and Contours: Minimize the amount of mass grading and soil compaction.

Step 5. Impervious Cover in Site Design: Evaluate the proposed development design to look for opportunities to limit impervious areas, such as reduced road lengths, smaller parking lots, rooftop gutter disconnection, cluster lots and other better site design techniques (CWP, 1998).

Step 6. Reduce Runoff Near the Site: Install a series of passive infiltrative practices to capture, disconnect, store, or re-use runoff from the roof or yard (e.g., rain gutter downspouts draining to vegetative areas or rain barrels, rain gardens, infiltration basins).

Step 7. Filter Runoff: Filter runoff along driveways, streets, and roadways using dry swales, compost amended grass channels, wet swales, or mechanical separators.

Step 8. Final Runoff Treatment: Treat remaining runoff in wetlands, ponds, or biofiltration areas.

Table 3. Snowmelt Management Strategy

Step 1. Pollution Prevention: Keep polluting materials away from paved surfaces and snow piles. Use BMPs for chemical storage and handling (e.g., covered storage sites and mix areas).

Step 2. Winter Snow / Snow Pack Management: Reduce de-icing and anti-skid chemicals use. Remove and dispose of snow in less sensitive pervious areas.

Step 3. Temporary Snow Melt-Water Storage and Infiltration: Divert initial melt-water to pervious areas to allow some storage, infiltration, and evapotranspiration (e.g., bioretention area, filter strip, grass swale).

Step 4. Snow Melt Treatment: The main stage of melt-water should be treated in a dry detention pond, shallow wetland, or BMP with enough storage capacity to provide detention for the full snowmelt-water quality volume (in order to settle out debris, sediments, and particulate pollutants).

Step 5. Emergency Pumping: Wasilla and Palmer have Vactor trucks that can vacuum melt-water, and help address street flooding during break up and spring thaw events.

Step 6. Spring Housekeeping: Remove accumulated pollutants from streets, parking lots, and catch basins through intensive sweeping and debris removal from manholes but before the first summer rains. In addition, annual maintenance will need to be performed at snow storage sites, such as revegetation or stabilization.

4.3(C) Site Runoff Control Tools

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(C) 1 – Establish a Borough Watershed Team. <u>Lead Entity</u> *Mat-Su Borough* <u>Partners</u> *ADOT* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*1. Provide local, one-stop-shopping support on all stormwater and water quality related activities.* *2. Cost-effectively improve regional drainage and water quality outcomes by providing quality, service-oriented technical support.* *3. Use education and engagement, backed up by review, tracking, and enforcement, and potentially strengthening of development code to protect Mat-Su's drinking water supplies and fisheries.*	**Years 1 - 2** – Develop a job description and budget for one full time employee, a service-oriented office, a computer with GIS and CAD capabilities, and a resource library. The job description should include developing a site development review, tracking, compliance assistance, and enforcement program. Seek funding, and/or explore ways to use existing staff and budgets to establish the Watershed Team. Work out necessary legalities, Memorandums of Understanding, and agreements (regarding permitting authority), and shared funding mechanisms. **Year 3 –** Based on the resources and agreements secured, initiate hiring, or shift staff into the Watershed Team. Establish a physical office. Create a two-year work plan that includes implementing the site development review, tracking, compliance assistance, and enforcement program, and helps address each of the benchmarks in Tools 4.3(C)2 through (C) 6, below. **Years 4-5** – Implement work plan; secure funding and extend work plan to support ongoing operations.
(C) 2 – Assess the need for additional construction site (temporary) runoff controls and implement as needed. <u>Lead Entity</u> *Mat-Su Borough* <u>Partners</u> *ADOT* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*1. Analyze APDES CGP controls and determine whether they are adequate for the region, particularly in protecting fish stocks and freshwater streams.* *2. As needed, adopt and enforce locally appropriate limits on pollutants from construction activities that protect fish stocks and water resources.*	**Years 1-2 –** Convene public works staff from the City of Wasilla, City of Palmer, and Borough to review and refine existing construction site runoff control mechanisms to be consistent and locally-appropriate for the region's MS4 area. Develop criteria for construction site monitoring tied to a system to review and approve construction site runoff control mechanisms that protect streams, wetlands, and other water resources. Seek funding to initiate monitoring to assess the effectiveness of controls. **Years 3 - 4** – Continue to refine construction site runoff control mechanisms with input from construction site operators as needed to conduct monitoring of construction site runoff to assess APDES CGP control performance. **Year 5 –** Summarize the construction site runoff data; evaluate the effectiveness of construction site runoff control mechanisms and the site development review, tracking, compliance assistance, and enforcement program. Develop new policies and ordinances to set and enforce new limits on pollutants from construction activities to supplement APDES CGP controls, as needed.
(C) 3 – Adopt permanent site run-off control and enforcement. <u>Lead Entity</u> *Mat-Su Borough* <u>Partners</u> *ADOT* *City of Wasilla* *City of Palmer* *Non-profit and private sector support*	*1. Develop regionally appropriate drainage calculation tools.* *2. Analyze local precipitation and runoff data; adopt tools to help designers (e.g., local rainfall frequency spectrum, design snowmelt volume, recommended plants for vegetative practices).* *3. Establish and enforce regionally-appropriate permanent site runoff controls that protect fish stocks and water resources.*	**Years 1-2 –** Seek funding and begin collecting, compiling, and analyzing precipitation data at representative sites in the MS4 area. Convene public works staff from the City of Wasilla, City of Palmer, and Borough to develop, review, and adopt initial unified drainage design criteria to apply within the MS4 area. **Year 3** – Continue precipitation data analyses and enact necessary ordinances/code changes to enforce regionally-appropriate illicit discharge detection and elimination and permanent site runoff controls based on the application of the initial unified drainage design criteria. Evaluate the need to enact ordinances/code changes that provide a framework for tracking, reviewing, and permitting/approving permanent site runoff controls on development projects. **Years 4-5** – Convene a panel of water scientists and agencies to assess the acquired precipitation and snowmelt data. Refine, adopt, and enforce regionally-appropriate permanent site runoff controls based on the application of the revised unified drainage design criteria.

4.3(C) Site Runoff Control Tools (continued)

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(C) 4 – Anticipate build-out and plan for regional drainage needs. *Lead Entity* *Mat-Su Borough* *Partners:* *City of Wasilla* *City of Palmer*	*At the regional level:* *1. Develop spatial analysis tools for drainage management.* *2. Conduct stormwater basin studies.* *3. Develop a framework for setting aside strategic infiltration sites and/or public drainage easements.*	**Years 1-3** – Develop spatial analysis tools to support planning for stormwater and drainage management at both the regional and site levels. As data becomes useful, make it easily available to developers, other partners, and the public. **Year 4 –** Conduct a stormwater basins and sub-basins study to analyze long term regional stormwater collection and processing needs, and probable locations. Determine if/where drainage easements will be required during development planning phases of a project. **Year 5** – Create and begin to implement a 10-year plan for setting aside strategic regional infiltration sites.
(C) 5 – Investigate Borough incentives for land owners who retain or enhance vegetation that provides for stormwater filtering and infiltration. *Agency Specific Effort* *Mat-Su Borough*	*At the Borough level:* *1. Explore incentives for land owners to protect or enhance vegetation and promote water quality.* *2. Retain natural drainage patterns that promote localized stormwater filtering and infiltration as the region grows.*	**Year 1 –** Convene a working group to look at costs, benefits, and options specific to providing incentives for landowners who promote water quality. Consider and analyze a range of alternatives: • The Kenai Peninsula Borough's Habitat Protection Tax Credit Program. • Property tax moratoriums in exchange for permanent conservation easements. • Watershed Protection Districts that limit impervious coverage and permanently lower the tax valuations of the protected land. **Year 2** – Develop a white paper and present the options, costs, and benefits explored. Provide to the Borough's revenue and legal departments for comment and seek state-enabling legislation. **Year 3 –** Reconvene working group with revenue and legal department representation to draft an ordinance. **Year 4 –** Release the draft ordinance for public comments. **Year 5** – Finalize draft ordinance, and bring forward to the Borough Assembly.
(C) 6 – When selling, leasing, or developing Borough lands and resources, retain vegetative buffers along all streams, waterways, and wetlands. *Agency Specific Effort* *Mat-Su Borough*	*At the Borough level:* *1. Establish buffer criteria and setback standards based on specific site characteristics.* *2. Retain Borough vegetative buffer easements along streams, waterways, and wetlands.* *3. Promote the protection of fish stocks and water quality over the long term.*	**Year 1** – Develop a white paper analyzing vegetative buffer best practices and their applicability to Mat-Su's existing fish stocks. Recommend buffer criteria and setback standards (e.g., slowing and filtering runoff into water bodies, retention of fish spawning and habitat areas, and shading and thermal protection for coldwater salmonids) for different regional stream classifications. **Year 2 –** Work with the Borough's legal department to develop buffer easement language consistent with white paper findings aimed at protecting regional fish stock values. **Year 3** – Create a handout explaining the buffer easement highlighting vegetative buffer practices and values that support fish stocks. **Years 4-5** – As Borough parcels are nominated and/or prepared for sale, seek to retain waterway and water body buffer easements to help support fish stocks and water quality.

Mat-Su Borough Watershed Team

The Stormwater Advisory Group participants who helped develop this plan were unified in requesting that the **Borough step forward to lead** the region in dealing with regional stormwater, drainage, and water quality issues, particularly relating to permitting and technical issues.

In their view, the Borough has a broad jurisdiction and mandate which positions it to serve as the leader on stormwater and watershed stewardship. For example, the Borough can make development-related stormwater permitting more streamlined, lead permit-required oversight, and help safeguard regional resources such as drinking water, fish stocks, water bodies, and transportation systems (roads, bridges, etc.).

Based on the goals and criteria for stormwater-related action already presented, and consistent with the Borough's jurisdiction and mission, the idea of a regional Watershed Team was well-received, with the Borough's Department of Public Works initially providing the leadership. A public-serving office in the Borough was envisioned, with potential options of providing services from Wasilla's City Hall one or more days a week.

Although many details will need to be worked out, the Watershed Team was conceived as a cost-effective and efficient way to provide regional support on drainage and water quality issues, and to lead MS4 implementation. Some functions and tasks identified are presented on page 44.

Many entities dealing with stormwater issues have limited powers and jurisdictions. For example, this culvert is in the City of Wasilla, in an ADOT right-of-way, and is collecting drainage from a mix of public roads and private parcels.

Mat-Su Borough Watershed Team (continued)

Potential functions and tasks identified by the Stormwater Advisory Committee:

a) Construction NOI filing, plan review, inspections, and erosion controls (e.g. contour grading and construction phasing) as well as sediment controls (e.g. perimeter diversions, either berms or silt fences and sediment traps/basins, noting that these can often become the locations of permanent stormwater BMP features).

b) Support APDES CGP coordination and compliance related to SWPPPs.

c) Online clearinghouse for construction and permanent BMP-related activities (forms, templates, checklists, manuals, specifications, and other resources, including reviews of local codes to ensure that they clearly define the authority and responsibilities).

d) Provide BMPs that slow down, spread out, and soak in stormwater on-site (i.e., green infrastructure).

e) Review homeowner association covenants to ensure they contain adequate language on stormwater maintenance responsibilities, including right of access, and charge-backs for emergency repairs.

f) Educate homeowner associations about common maintenance needs for stormwater practices.

g) Consider launching an adopt-a lake and/or adopt-a-watershed program, working with community councils and other organizations.

h) Create an emergency contact list and distribute so water quality problems, erosion control problems, and emergency stormwater maintenance needs can be quickly reported.

i) Waterway buffer protection assistance and recommendations.

j) Cross-train field personnel in all Public Works Departments, emergency services, and Road Service Area contractors to recognize signs of pollution problems and clarify appropriate responses and lines of communication for addressing problems when identified.

k) Initiate or ensure that illicit discharge detection and compliance with local water quality ordinances is performed.

l) Assist in drainage easement reservation and documentation.

m) Mapping of constructed BMPs, municipal storm sewer outfalls, soils, watersheds, impaired waters, total maximum daily loads (TMDL), anadromous streams, and public wells. Provide site planning tools with user interface that includes maintenance status of drainage and stormwater management infrastructure.

n) BMP criteria, technical support, cold-climate best practices, and local BMP performance review.

o) Runoff/snowmelt management strategies and work to develop reasonable target snowmelt volumes and rates for design.

p) Coordination on snow storage/ disposal and O&M practices that impact stormwater volumes, drainage, and water quality.

q) Routinely inspect erosion and sediment controls to determine their function and performance and offer technical assistance before taking enforcement action.

4.3(D) Public Sector Operations

Possible regional costs for implementation: 0.1¢ to 0.53¢ per household per year

Source: Study of 26 U.S. communities (EPA)

The daily actions of public employees and municipal contractors can exert a strong influence on the quality of stormwater runoff in any watershed. When public servants implement pollution prevention and stormwater management practices, they help to limit taxpayers' risk exposure and reduce infrastructure costs over the long term. Public employees are also the front-line for public outreach and education, and are instrumental in setting a good example.

Maintenance can help reduce stormwater and groundwater pollution through practices such as street sweeping, covered storage for items that can leach and spill (chemicals, detergents, and oil) or be distributed by wind (sand piles), containment for hazardous liquids, and recycling of used chemicals and lubricants. The routine cleaning of streets and storm drains can help reduce pollutants delivered to local waters and improve aesthetics. Also, anticipating major flood event pollution risks can allow actions to be taken to protect water supplies.

Good housekeeping and pollution prevention are especially valuable for public facilities that may generate and handle larger quantities of pollutants. Simple pollution prevention practices can reduce pollutant loading and lessen the frequency of spills, leaks, and illicit discharges.

Additionally, the Borough, cities, and State are often major developers of public parking lots, roads, and public facilities, and can "lead by example" by using practices that prevent stormwater pollution. These practices can include the use of effective green infrastructure site design techniques that reduce stormwater runoff, and practices such as regular sweeping, or keeping potential pollutants away from precipitation. Finally, the Borough, State, and cities can guide basic land development practices by providing design criteria and educating contractors and developers on best stormwater management practices.

Tools in this section:

(D) 1 – Create a water/drainage maintenance Standard Operating Procedure (SOP) for each public facility.

(D) 2 – Undertake coordinated cleaning operations and activities, and review for effectiveness.

(D) 3 – O&M internal education, with cross training and professional development for key individuals.

(D) 4 – Verify that SWPPPs are in place for Borough and city-owned industrial facilities (e.g. airports, port, wastewater treatment facilities, landfills).

(D) 5 – Flood management water quality assessment.

4.3(D) Public Sector Operations Tools

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(D) 1 – Create a water/ drainage/snow management maintenance Standard Operating Procedure (SOP) for each public facility. *Agency Specific Efforts* *Mat-Su Borough* *City of Wasilla* *City of Palmer* *ADOT*	*At the city, Borough and ADOT levels:* *1. Adopt and implement SOPs that help protect water supplies and water bodies.* *2. Integrate pollution prevention into public employees' and contractors' day to day operations as a responsibility and point of community pride.* *3. Develop internal pollution prevention teams to assess sites for possible water quality threats and generate site-specific strategies for pollution prevention.*	**Years 1-2** – Review other agencies' and model SOPs (suggested sources include ADOT and US pollution prevention regulations). Internally discuss options and costs. **Year 2** – Draft SOPs. Work internally to develop the institutional support and funding required to implement. **Year 3** – Formally adopt draft SOPs; work with staff to incrementally incorporate into everyday activities. For each public facility and operational area, establish a pollution prevention team and conduct an in-house site walk to consider possible water quality threats, and to generate site-specific strategies for pollution prevention. Post a memo on-site highlighting site-specific threats and strategies. **Year 4** – Reassess and refine SOPs to work effectively within day-to-day operations. Fully train all staff to implement SOPs. Prepare a publicly-available fact sheet, to be uploaded to public works' website, documenting efforts taken by public works staff to prevent and reduce pollutant runoff. Repeat pollution prevention team efforts from year three. **Year 5** – Hold occasional staff discussions on SOP successes and challenges. Hold one lunch seminar for O&M staff with a presenter who can highlight the positive link between SOP practices and local and regional water quality. Repeat pollution prevention team efforts from year three.
(D) 2 – Undertake cleaning operation activities, and review for effectiveness. *Agency Specific Efforts* *Mat-Su Borough* *City of Wasilla* *City of Palmer* *ADOT*	*At the city, Borough and ADOT levels:* *1. Document cleaning needs.* *2. Obtain the resources to undertake cleaning activities.* *3. Coordinate maintenance efforts.* *4. Quantify outcomes and effectiveness.*	**Year 1** – Generate an inventory/map of sites where maintenance and/or clean-ups could benefit water quality (e.g., snow storage sites, storm drainage infrastructure, right-of-way trash control, illegal dump sites on public land, trash near water bodies). **Year 2** – For each site on the clean-up list, take a photograph of the issues. Create a work plan, schedule, and prioritized master list of one-time and recurring clean up needs. Address imminent threats to water quality and any active illicit discharges immediately. **Years 3 – 4** – Seek funding and complete clean-up projects on a priority basis. **Year 5** – Re-visit clean-up sites and gather new data and/or photographs. Update inventory/map and priority lists. Discuss clean-up effectiveness at a staff meeting, and consider ways to improve and continue efforts.



Stormwater infrastructure requires some maintenance to keep it draining and filtering properly.

4.3(D) Public Sector Operations Tools (continued)

Tool	Desired Outcomes	Possible Timelines/Measurable Benchmarks
(D) 3 – O&M internal education, with cross training and professional development for key individuals. *Agency Specific Efforts* *Mat-Su Borough* *City of Wasilla* *City of Palmer* *ADOT*	*At the city, Borough and State levels:* *1. Educate O&M staff and contractors about pollution prevention and prepare them to address problems and implement SOPs.* *2. Public facilities demonstrate exemplary pollution prevention practices, and pollutants are prevented or reduced in runoff from public facility operations.*	**Years 1-2** – Develop a training program with appropriate partners. **Year 3** – Deliver basic stormwater training to O&M employees (e.g. Alaska Certified Erosion and Sediment Control Lead [AK-CESCL] certification). Coordinate training events with other regional entities for cost savings. Incorporate training requirements into procurement requirements for contractors, and offer online technical information and local examples of innovative projects and effective practices. Document training activities. **Years 4 -5** – Repeat year three; add recognition for internal successes, including during staff performance reviews. Also, provide more detailed and technical training opportunities for key personnel whose activities could adversely affect stormwater quality.
(D) 4 – Verify that SWPPPs are in place for Borough and city-owned industrial facilities. *Lead Entity* *Mat-Su Borough* *Partners* *ADOT* *City of Wasilla* *City of Palmer*	*At the city, Borough and State levels:* *1. Prepare a list of major public facilities requiring SWPPPs.* *2. Coordinate regionally on SWPPP development, implementation, and documentation.*	**Year 1** – Review EPA's Industrial Fact Sheet series and make a list of public facilities in the region where SWPPPs are required. **Year 2** – Obtain copies of current SWPPPs for public facilities and update the list to reflect SWPPP status. **Year 3** – Work with entities to complete or enhance site specific SWPPPs, and get copies of updated/new SWPPPs. Update the list and ensure SWPPP procedures are disseminated to facility staff. **Year 4-5** – Repeat year three.
(D) 5 – Flood management water quality assessment. *Agency Specific Efforts* *Mat-Su Borough* *City of Wasilla* *City of Palmer* *ADOT*	*At the city, Borough and State levels:* *1. Assess likely water quality threats during a 100-year flood event.* *2. Risk reduction through emergency response and flood management infrastructure.*	**Years 1** – Using Federal Emergency Management Agency (FEMA) and Borough GIS, create a map of risks and opportunities related to flooding and water quality. **Year 2** – Inventory 25% of the identified sites and gather supporting documentation. Begin implementation, as possible, on priority risk reduction measures and opportunities. Ensure that flood control projects include a water quality component where possible. **Years 3-5** – Repeat year two.

Investments in stormwater management can provide measurable benefit to a region's fish stocks and water quality.

Cottonwood Creek (above) is considered an impaired water body by the State of Alaska due to storm water runoff from adjacent impervious areas. Fish stocks have declined in the creek over many years.

Chapter 5

Implementation

5.1 Regional Strategies

Implementation Considerations

Many participants in the SMP process voiced recognition that over the next few decades, coordinated water quality and stormwater management efforts will be needed in the Mat-Su Region. Moreover, MS4 regulatory requirements (as described on page 1) are not the only impetus for regional stormwater efforts. Retaining salmon populations, protecting groundwater and safe drinking water supplies, and preventing costly drainage and flooding problems are all emerging as regional concerns.

Even so, SMP implementation will be uniquely challenging as investments in stormwater management are balanced against competing community priorities. Realistically, in the public arena, accepting the need to fund a stormwater management program can prove to be a hard sell—even with a public that drinks well water, likes salmon, hates potholes, and would rather spend pennies to save a dollar. Some of the reasons include:

- Stormwater is a complex issue with problems and costs that are invisible to most taxpayers.
- Stormwater solutions can require engineering and capital investments that have limited public understanding or appeal. For example, when Machetanz Elementary School construction costs over-ran, a subsurface stormwater connection was not installed to save money, while more visible facility elements like parking lots were fully constructed. The site now has drainage problems that rain gardens have been installed to address.
- Stormwater is a multi-jurisdictional issue that can appear to be everyone's problem but no-one entity's specific responsibility; For example, if property owners direct all their drainage off-site (to the roadway or a neighbor) they simply move along the impacts and costs.
- Effective stormwater management requires well-coordinated efforts between technical disciplines and across multiple departments, including departments of Public Works, O&M, Planning, Waste Management, GIS Mapping, etc.
- Prevention outcomes and cost savings are hard to quantify.

This final chapter seeks to provide some guidance given these and other considerations specific to SMP implementation. Initially the chapter provides general strategies for working across jurisdictions in the near future given the uncertainty (at the time of SMP publication) of MS4 designation. Next, the chapter provides an overview of what the Mat-Su Region can expect under an MS4 permit so implementers can anticipate process-specific issues and learning curves. This is followed by a discussion of potential MS4 implementation resources, ranging from the typical Alaskan model where co-permittees annually share costs over the life of the permit from their general fund, to diverse approaches that have been tried or applied in other U.S. communities.

Working Across Jurisdictions

Moving into the implementation phase, it will be important to strengthen and enhance working relationships across local, regional, and state jurisdictions. Chapter 4's Water Quality and Drainage Toolbox (pages 24-47) provides a road map for collaboration on specific tasks.

At the same time, the SMP also proposes firmly putting the Borough in the driver's seat on MS4 oversight and regional coordination. This

approach was taken at the specific, unanimous request of regional interests and stakeholders involved in the SMP effort. In their view, the Borough has a broad jurisdiction and mandate, and is uniquely positioned to take on key roles:

- ***The Borough as a Clearinghouse:*** Stakeholders want the Borough to be the go-to entity for all permit-related recordkeeping, forms, and checklists, and to serve as a local depository where copies of developer-required records (NOIs, SWPPPs, etc.) are permanently held on file.
- ***The Borough as a Resource:*** Stakeholders requested that the Borough make development-related stormwater permitting more streamlined by providing a suite of resources (online and through a help desk) for both internal Borough use and to support everyone in achieving compliance. This could include GIS and maps, BMP libraries (including a list of the Borough's green and gray stormwater infrastructure), useful publications, and service-oriented staff who can especially help developers who are not up to speed on current requirements.
- ***The Borough as a Leader:*** Key interests in the region believe that the Borough needs to step up to the plate and proactively bring together partners and community interests in two respects:
  1) To lead all permit-required oversight, with support for co-permitees, to include the urbanized cities (Wasilla and Palmer), and the ADOT.
  2) To guard public safety and regional resources. This includes protecting salmon, waterways, transportation systems (roads, bridges, etc.), and upholding enforcement functions for protecting drinking water.

The proposed SMP Watershed Team (page 43) seeks to give the Borough the capacity to cost-effectively fill all of these roles. It also provides coordinated Mat-Su MS4 permit oversight and helps co-permittees avoid risk exposure associated with non-compliance (significant fines, project delays, and loss of federal funding).

SMP Implementation

At the time of SMP publication, timetables for a Mat-Su MS4 designation are not yet clear. Because the SMP was designed with an uncertain timetable in mind, it can be used flexibly over an extended timeline for informal and need-based implementation. At the same time, it can also can be used to jump start near-term permit compliance (the SMP Toolbox is consistent with MS4 first five-year permit term requirements).

There are benefits to adopting and beginning to implement portions of the SMP before an official MS4 designation. Getting started now builds on the positive momentum of the SMP effort. It also enhances the region's capacity to stay ahead of MS4 requirements, and incrementally move forward a locally-developed approach. Finally, it enhances water quality and drainage outcomes while reducing liabilities and future costs for a region that is projected to continue to grow.

Relatively cost-effective strategies for moving forward in the near-term include:

1) **Initially take baby steps and build capacity for years 2-5:** The SMP intentionally focuses first year actions on easy first steps, including, in many cases, securing program funding for years 2-5. Take advantage of this timeline by working toward building capacity and laying the groundwork for an efficient and functional "Borough Watershed Team" (see page 43).
2) **Tap internal talent:** As the MS4 starts up, existing staff at the Borough will be asked to take on the responsibility of getting things up and running. Up-front evaluations of key areas of responsibility and available staff resources are a critical initial step. As the Borough determines what the program needs are for engineering and capital improvements, planning, O&M, and GIS mapping, they can then look for ways to tap existing internal talent, and then identify strategies for filling gaps.
3) **Consider the low hanging fruit:** Before targeting the general fund, explore creative resource allocation approaches and diversified funding sources. For example, identify program elements that can be

achieved at little additional cost because existing programs and staff resources can be re-programmed to include stormwater program responsibility. Or look to regional organizations already doing public outreach and clean water advocacy who could economically expand their efforts to cover SMP elements.

4) **Modify local programs:** The first step in the resourcing analysis is to look at the current local program and see what is being done that might be applicable for use in the Stormwater Program. Potentially, up to approximately 25% of a typical Phase II program is already being done to some extent by current staff, or similar things are being done. With suitable adjustment and refocus, some responsibilities can be covered by current staff as part of, or with a redefinition of their current duties. In some cases it will take little effort to redefine or describe current practices.

5) **Cost sharing:** The Borough, the cities of Palmer and Wasilla, and ADOT can undertake the program more cheaply by sharing the cost of certain program elements. After determining what can be done in-house, or offered to others, the next step is to see what others can offer to you. There are various types of relationships that can be formed for sharing. Costs can be shared for all activities that each community has to do in a similar fashion, including a number of items for each of the minimum control measures including things like models, joints, and bulks:
   - **"Models"** – model brochures, ordinances, bill stuffers, checklists, instruction manuals, white papers, curriculum, etc.
   - **"Joints"** – joint design criteria, videos, billboards, procedure manuals, brochures, websites, advertising, etc.
   - **"Bulks"** – Bulk orders for printing, stencils, placards, public relations materials, manual printing, etc.

6) **Combine and pool resources** – Regional collaboration is envisioned between the Borough, the two cities, and ADOT as a way to pool resources. Sharing between the co-permittees is a way to utilize information and ensure the most efficient expenditures of resources. This approach could also extend to Road Service Areas and potentially volunteers and community organizations, whose activities might be considered in-kind services.

During an initial MS4 permit, many communities find that staff are already doing 25% of what is required.

7) **Test and refine tools:** Undertake incremental, low-cost implementation of some Toolbox elements, as practicable, taking advantage of existing staff resources and the support of community partners. Document efforts and outcomes in anticipation of an eventual permit.

8) **Build relationships:** Initiate implementation on priority efforts that can bring regional interests together in a constructive working relationship. Learn about each other's strengths so that implementation efforts are cost- and staff-effective.

9) **Lay groundwork:** Seek to lay strategic groundwork in anticipation of longer-term requirements, such as incremental drainage system mapping, and initiation of rainfall and water quality data studies.

10) **Tap available funding sources:** Seek grants to support work with partners on priority efforts. Note that once an MS4 is designated, regions are ineligible for many grants.

11) **Focus on regionally significant priorities:** Some elements in the Toolbox have higher visibility and broad public support, which can help build a positive track-record supporting the message that investing in stormwater management has positive outcomes.

5.2 What to Expect as an MS4

Although there is a learning curve to complying with an MS4 permit, the requirements are generally straightforward. Key activities include annual reporting and monitoring, and making measurable progress on BMPs (as specified in the SMP Toolbox). More challenging aspects of compliance include becoming familiar with the acronyms and legal concepts associated with the permit, and effectively implementing BMPs to attain the intended outcome of the U.S. Clean Water Act: retaining or attaining "fishable and swimmable water" as communities grow and urbanize. Guidance specific to these challenges, along with lessons learned from other Alaskan MS4s, are presented in this section to help the Mat-Su Region as it undertakes the transition to being an MS4 operator.

MS4 Designation

MS4 permits are governed under the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) legislation. Permit requirements are triggered when populations reach specific population density criteria. Municipal separate storm sewer systems (MS4s) include designated public entities, such as cities, boroughs, state departments of transportation, and federal entities that collect and convey more urbanized stormwater into waters of the United States.

Permit Oversight: Phase II and Alaska Primacy

Once listed as an MS4, entities must obtain authorization to discharge pollutants under an NPDES permit, and also must take specific measures called BMPs to reduce stormwater pollution. MS4s requirements are phased, based on population:

- **Phase I** regulations, released in 1990, address stormwater discharges in large and medium-sized municipalities.
- **Phase II** regulations, released in 1999, address stormwater discharges in small municipalities and urbanized areas and serving a population of fewer than 100,000.

The intended outcome of the U.S. Clean Water Act is retaining or attaining "fishable and swimmable water."

As a smaller region, Mat-Su would have a Phase II NPDES MS4 permit. This would be administered by the ADEC. On October 31, 2008, EPA formally approved Alaska's NPDES primacy application and the approved state program is called APDES. Authority for MS4 Phase II Stormwater permitting transferred to ADEC on October 31, 2009.

MS4 Permit Requirements

MS4 permits focus on preventing pollution discharges into U.S. streams and lakes (also called "receiving waters"). Rather than a one-size-fits-all approach, permits require permittees to use adaptive management approaches, or six MCMs, consisting of BMPs with measurable timelines and actions, so that there is some flexibility in targeting solutions to meet local needs and conditions. Currently in Alaska, APDES regulates several MS4 operators: City of Fairbanks, City of North Pole, Fairbanks North Star Borough and the University of Alaska Fairbanks, Municipality of Anchorage, and the Port of Anchorage.

The two fundamental MS4 permit requirements are that only stormwater enters the stormwater drainage system, and a mandate to reduce pollutants to the Maximum Extent Practicable (MEP). The MEP standard essentially requires preventing and mitigating pollutants entering the drainage system using a mix of BMPs and measurable goals to achieve pollutant reductions that will attain water quality standards. This was described in EPA's final stormwater Phase II rule

(Dec. 8, 1999) as follows:

> *The pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each permittee will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process. EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards. If, after implementing the six minimum control measures there is still water quality impairment associated with discharges from the MS4, after successive permit terms the permittee will need to expand or better tailor its BMPs within the scope of the six minimum control measures for each subsequent permit. EPA envisions that this process may take two to three permit terms.*

Thus, MEP really depends on the consideration of several things and implementation relies on an iterative, adaptive management approach over time. Language throughout the preamble to the rule describing the permit language (and in the congressional record) describing the MEP definition also contains the term "cost-effective" when describing BMP programs. The term "cost-effective" has not been clearly defined, but cost and funding can be used as a discriminator when selecting BMPs and the goals of the stormwater quality program. Clearly, cost should and can be considered when developing an MEP program, when balanced with other considerations. It seems fairly clear that the MEP standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects.

If the Borough and co-permittees adopt and implement this SMP, which contains BMPs for the six MCMs with measurable goals and an implementation schedule, they will fulfill the primary MS4 permit requirements. Having a permit in place, however, does not mean that all water quality issues are resolved. Adopting a program is simply the beginning of a continued, ongoing effort that improves local water quality.

Under an MS4 permit, regional waterbodies with a TMDL may have additional requirements specified in the TMDL to control additional pollutant loads if the pollutants causing the impairment are related to stormwater. Annual reports of program implementation are used by EPA and ADEC to evaluate progress toward meeting water quality goals and limiting pollutants in municipal stormwater discharges to the maximum extent practicable.

Alaskan MS4s – Lessons Learned

The Mat-Su Region has been preceded by a number of Alaskan entities in establishing and complying with an MS4 permit. Some advice was provided to the Mat Su from those who have worked through the paperwork, and have found new synergies from working at a regional level on water quality and drainage issues. In Fairbanks, co-permittees have found that each participating entity has its own strengths and capacities. By using the University's communication and public involvement talent, and ADOT's practical on-the-ground staff, for example, credits were easily gained without adding extra positions. The Municipality of Anchorage has learned that it is important to help support the development community in compliance with data-supported standards, and adopted manuals and tools, so that procedures are clear and fair. ADOT offered a suite of forms, checklists, and resources that they have developed to comply with permits, so that the Mat-Su does not have to reinvent the wheel.

A final few lessons were offered from a watershed scientist working throughout the state who attended several Stormwater Advisory Meetings and has worked with Alaska's MS4s. He cautioned that "effective" does not always mean "more expensive" in Alaska where we still have a lot of undeveloped land. Something as simple as leaving a vegetated buffer by a stream (i.e., green infrastructure)

will be significantly more effective in cost and outcome in most cases than a constructed engineered feature. He also noted that once an Alaskan waterbody is impaired, chances are poor for regaining a full recovery without a lot of time and money. As the Mat-Su has an abundance of healthy waterways, it is worth proactively protecting them for future generations.

5.3 Potential Costs and Resources

MS4 Cost Parameters

Implementation of this SMP includes establishing a program to effectively operate and maintain the MS4. This requires a substantial commitment and expense, especially when Phase II regulatory requirements, flooding concerns, water quality issues (including TMDLs) and population growth are considered. Stormwater Advisory Committee participants and potential co-permittees recognize that because of new costs, there will be a need to create new dedicated resource streams to fund stormwater-related activities under an MS4 permit. Although there was agreement during the SMP process that a shared, co-funded approach made sense, more specific details and cost negotiations need to be worked out under the Borough's leadership.

To address the question of resources for supporting an MS4, this final section lists some of the expected costs, and MS4 program funding options, ranging from more typical approaches to some innovative models that have been tried in the lower 48. Rather than recommend a specific approach, a range of options is provided for discussion and further study. Note that once an MS4 is designated, permitees are no longer eligible to apply for certain EPA and federal grants and programs.

Although MS4 compliance incurs substantial costs, some existing activities like drainage maintenance and remedial repairs are included in cost estimates.

Typical MS4 program elements for which cost estimates are often made include drainage maintenance, remedial repairs, capital projects for gray infrastructure and for green infrastructure, and for billing, collections and customer service. Potential cost drivers of the Mat-Su's Borough's stormwater management program include:

- Unique characteristics of the Mat-Su Region (e.g., climate and geology).
- Preferences of the ADEC permit writer and specific requirements of the State.
- Status/maturity of current stormwater program (i.e., ability to receive credit from ADEC for what is already being done).
- Stream quality and improvement needs.
- Ability to share costs with others.

An initial estimate of program costs can be determined by establishing a logical order of the necessary actions prior to and during the initial five-year permit cycle, which should include:

- Evaluate technical engineering O&M aspects and ensure the legal authority to carry out the program is attainable.
- Develop a sound program plan that relies on a "proven" approach, using structural or non-structural BMPs that are locally effective.
- Determine how baseline activities fit into the plan (take credit for what is being done).
- Estimate service costs by studying causation and categorizing costs; then determine if procedures, policies, staff, and equipment are appropriate for program described.
- Select a rate structure with dedicated and sufficient funding to support the program.
- Estimate rates; consider funding sources and other possible resources, and finalize.

When best stormwater practices are used, such as this snowstorage treatment swale, it can reduce public costs from offsite drainage and water quality problems.

Typical MS4 Funding Mechanisms

Property Taxes/General Fund

A number of communities have funded stormwater management from property taxes paid into their general funds. However, there is great competition for municipal general fund dollars from other worthy municipal programs. Stormwater management improvements typically have a low priority, unless the municipality is reacting to a recent major storm or regulatory action. The total cost of stormwater management is not readily apparent when these costs are sprinkled among general fund departmental budgets.

As stormwater management costs increase, general fund budgets are often not increased to meet those needs. In addition, tax-exempt properties do not support any of the cost, even though it can be shown that many of them, such as governmental properties, schools, colleges, and universities are major contributors of stormwater runoff. Finally, property taxes are based on assessed property value. The cost of stormwater service to individual properties bears no relationship to the assessed value of the property. Therefore, this method of recovering stormwater management costs might not be equitable.

Special Assessment Districts

If a stormwater construction project benefits only a portion of a municipality, it can be funded by fees assessed only to those properties within that area, which is called a special assessment district.

System Development Charges

System Development Charges (also known as connection fees or tie-in charges) are one-time fees. These are commonly charged to new customers connecting to a water or sanitary sewer system to buy into the infrastructure that has already been built for them. It ensures that users pay their fair share of the infrastructure expansion necessary to serve them. The amount of a new customer's charge is typically calculated on the basis of the potential water demand that the new customer will place on the system. Stormwater system development charges can also be developed with the amount of a customer's stormwater charge tied to the area of the resident's property.

Alternative Funding Approaches

Grants and Low-Interest Loans

Stormwater management grants might be available for various types of projects, and the Clean Water Alaska State Revolving Fund is available for low interest rate loans to fund stormwater quality-related capital or improvement projects (not management costs).

Environmental Tax Shifting

Environmental Tax Shifting is a concept that has been proposed by advocates to redirect tax code incentives in a direction that would support energy conservation and sustain the environment. It features two proposals to change state tax policy to enhance stormwater management. One is a "pay-to-pave" tax that would be levied "on newly-paved surfaces on a per-square foot basis." The second eliminates tax exemptions for pesticide and fertilizer. Companion approaches might include a stormwater tax credit program for reducing flow from a site or for retaining stream buffers.

Service Fees (including stormwater utilities)

Some communities include stormwater management costs as line items within their water or sanitary sewer enterprise system budgets. Water and sanitary sewer utilities charge customers fees for services rendered. Furthermore, many communities are now adopting stormwater service fees by implementing a stormwater utility to raise dedicated revenue for stormwater

infrastructure, regulatory compliance, planning, maintenance, capital improvements, repair, and replacement. Stormwater fees are charged to taxpaying and tax-exempt properties. Costs typically take into account the property area and its percentage of imperviousness.

There are more than 500 stormwater utilities in operation across the country. The average quarterly fee for a single family home is $11 (2008 dollars), which usually covers regulatory and O&M costs. Some communities charge as little as $2 per quarter, while others charge more than $40 per quarter for a single family home.

Life Cycle Cost Savings

Although this is not a direct funding mechanism, it is worth recognizing that both the cities of Wasilla and Palmer, and the Borough's O&M Staff are already experiencing significant costs due to ongoing stormwater and drainage issues associated with specific roads, subdivisions, and land development practices.

In their view, fixing fundamental problems, or designing things right in the first place saves taxpayer dollars. Although they do not like the price tag associated with permit compliance, they do see opportunities with the MS4 to change regional investment and maintenance cost attitudes and models to create a more cost-effective approach, especially for Road Service Areas. By investing pennies in better stormwater management and comprehensive drainage solutions in the short run, the region and its government entities can save dollars over the life cycle of roads and facilities in the long run.

Public education activities at the 2012 Mat-Su Transportation Fair helped to raise awareness about the SMP planning effort and regional stormwater issues.