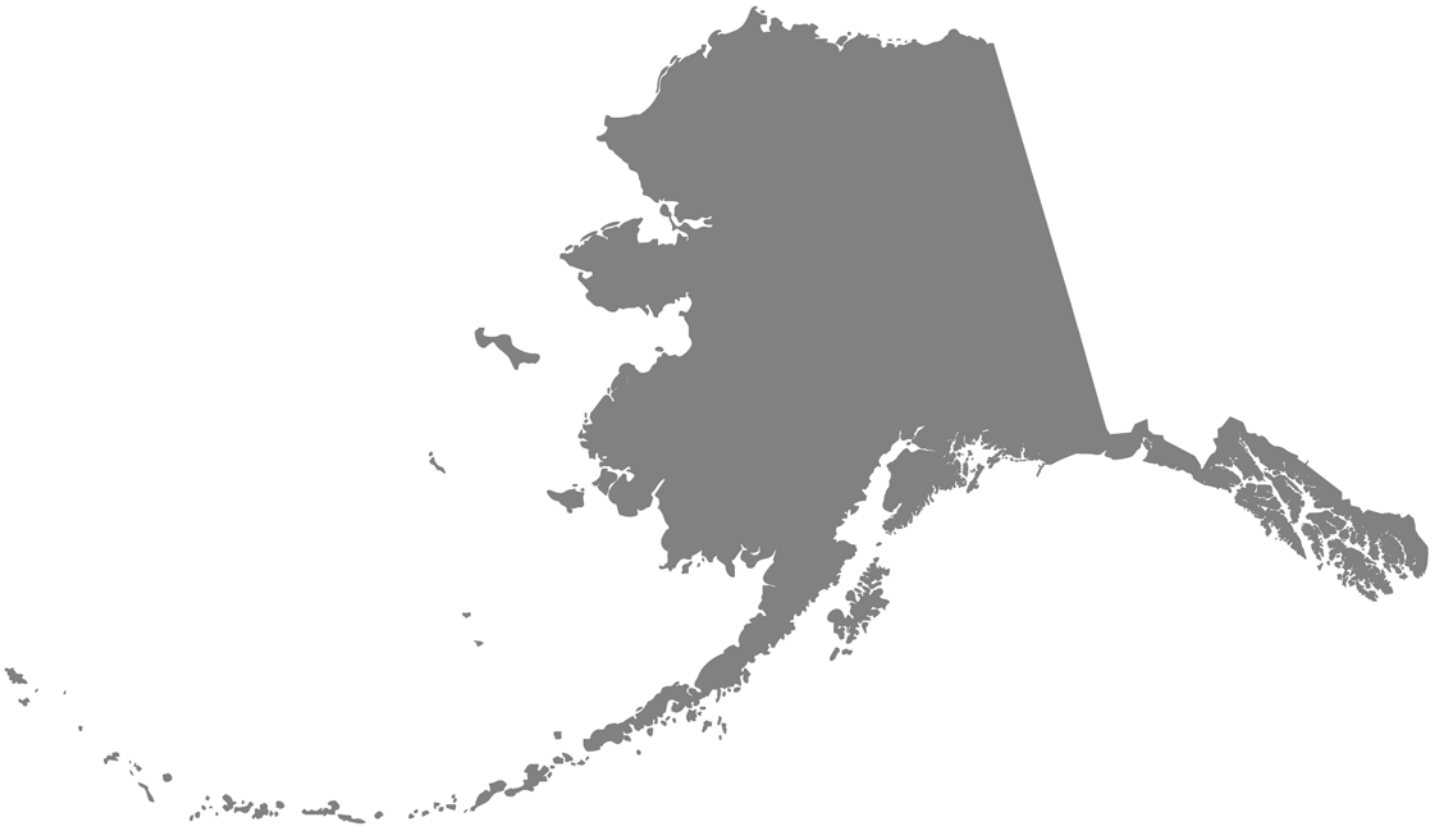

Alaska

Storm Water Guide

Alaska Department of Environmental Conservation
Division of Water
555 Cordova Street
Anchorage, Alaska 99501

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Preface

This Guide was developed with support of a technical workgroup under the direction of the Alaska Department of Environmental Conservation. A list of contributors and participants in the process appears in the Acknowledgements section. During the development of the Guide, care was taken to focus on the goal of producing a useful document that helps contractors and storm water practitioners better manage storm water under the unique conditions that are encountered in Alaska. In addition to proving useful information about storm water regulated under the National Pollutant Discharge Elimination System, the Guide partially fulfills Alaska's requirements toward gaining approval of the New Development Management Measure under its Coastal Nonpoint Pollution Control Program.

Many states and communities nationwide have adopted urban storm water quality requirements, resulting in the need to implement storm water best management practices under many different physical and climatic conditions. The public and the engineering community have rightfully expressed some concern over how such structures perform in Alaska. The Guide tries to address some of the unique challenges posed by the diversity of Alaska's geography, geology and climate and makes some generalized recommendations about the design and selection of storm water best management practices in an effort to optimize their effectiveness.

The Guide takes advantage of many additional tools created over the years and provides links to some of the most useful information. It does not address in detail the requirements of non-storm water-related regulatory programs that can have an effect on storm water. The Guide tries to not duplicate the many good sources of information already available and often foregoes detailed explanation of a particular element and refers the reader directly to the original resource by means of a link or cited reference.

The Guide is intended to be flexible, easily updated and responsive to the needs of the Alaska storm water community. The concepts presented in this Guide are intended to be guidance for readers rather than stringent rules. The Guide embraces the concept that each storm water problem is different, so solutions will need to be customized to address this variability.

Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
APDES	Alaska Pollutant Discharge Elimination System
BMP	best management practice
BOD	biochemical oxygen demand
° C	Degrees Celsius
CFR	Code of Federal Regulations
CGP	construction general permit
CICEET	Cooperative Institute for Coastal and Estuarine Environmental Technology
CN	curve number
CNPCP	Coastal Nonpoint Pollution Control Program
CNP	Alaska Coastal Nonpoint Program
COE	United States Army Corps of Engineers
CWA	Clean Water Act
CWP	Center for Watershed Protection
CZARA	Coastal Zone Act Reauthorization Amendments
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DoD	Department of Defense
ED	extended detention

EPA	U.S. Environmental Protection Agency
ESC	Erosion and Sediment Control
° F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FNSB	Fairbanks North Star Borough
HEC	Hydrologic Engineering Center
HGM	Hydrogeomorphic approach
HSG	hydrologic soil group
IP	Infiltration prohibition
LID	low impact development
MOA	Municipality of Anchorage
MSGP	Multi-sector general permit
MS4	Municipal separate storm sewer system
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	U.S. Department of Agriculture, Natural Resource and Conservation Service (formerly the SCS Soil Conservation Service)
O&M	operation and maintenance
P	Phosphorus
RECP	Rolled erosion control product

SCP	Source Control Plan
SIC	Standard Industrial Classification
SMP	Sediment Management Plan
SPCP	Spill Prevention and Control Plan
STP	Storm water treatment practices
SWMP	Storm Water Management Program
SWPPP	storm water pollution prevention plan
TMDL	total maximum daily load
TP 47	Technical Publication 47 of the National Weather Service
TSS	total suspended solids
UAF	University of Alaska Fairbanks
UIC	Underground Injection Control
UNHSC	University of New Hampshire Stormwater Center
USDA	U.S. Department of Agriculture
USDW	Underground Source of Drinking Water
USGS	U.S. Geological Society
WMS	Watershed Management Services
WRCC	Western Region Climate Center
WQv	Water quality volume

Acknowledgements

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Contents

Chapter 1
Overview of Storm Water Regulations

1.0 Introduction

Storm water is the surface runoff that results from rain and snowmelt that flows over land or impervious surfaces. Urban development alters the land's natural retention and absorption capabilities, and human activity generates a host of pollutants (i.e., sediment, oil and grease, pesticides, or other toxics) that can accumulate on impervious surfaces, such as roofs, roads, sidewalks, and parking lots, which can be picked up by storm water runoff as it moves across these surfaces. Uncontrolled storm water discharges from urban, suburban, and industrial areas can negatively affect water quality and be detrimental to aquatic life, wildlife, habitat and human health.

This chapter presents background information on regulatory programs related to storm water runoff at the federal, state and local levels. This information addresses who is regulated, what to do to comply with requirements, where the regulated jurisdictions in Alaska are located and tips on how to obtain additional information.

1.1 Federal

In coordination with states, the regulated community and the public, the U.S. Environmental Protection Agency (EPA) implements the National Pollutant Discharge Elimination System (NPDES) permit program on the basis of statutory requirements in the federal Clean Water Act (CWA) to control discharges of pollutants to waters of the United States from point sources. Initial efforts to improve water quality using the NPDES program focused primarily on reducing pollutants from industrial process wastewater and municipal sewage discharges. In 1987 Congress amended the CWA to require, in two phases, a comprehensive national program for addressing storm water discharges from urban, industrial and construction activities using the NPDES permit program. For more details on the NPDES storm water permit program, see Section 1.1.1.

In 1990 Congress passed the Coastal Zone Act Reauthorization Amendments (CZARA) to address nonpoint source (NPS) pollution problems in coastal waters. To qualify for federal funding, coastal states such as Alaska must describe how they implement appropriate NPS pollution controls, known as management measures, within the coastal zone. For more information concerning these materials, see Section 1.1.2.

The federal Safe Drinking Water Act established the Underground Injection Control (UIC) Program to protect underground sources of drinking water (USDWs) by regulating the subsurface discharge of both hazardous and nonhazardous pollutants through injection wells. Storm water runoff that discharges to the ground may in some cases impact subsurface water resources. Section 1.1.3 has additional information on this subject. Information on CWA section 404 permitting is presented in Section 1.1.4.

EPA and other federal agencies have produced various recommendations and guidance materials for the management of storm water runoff. For example, the appropriate design and maintenance of roads, particularly gravel or unpaved roads, can protect water quality by limiting polluted discharges from road surfaces. Low impact development (LID) techniques emphasize the use of on-site retention of storm runoff in areas of new development and redevelopment. For more information about this information, see Section 1.1.5.

1.1.1 NPDES Storm Water Program (Municipal, Industrial and Construction)

As mentioned previously, most states are authorized to issue permits under the NPDES storm water program. Alaska is in the process of a phased transition to assume primacy for NPDES permitting and on October 31, 2008, the Alaska Department of Environmental Conservation (ADEC) received authorization from EPA to implement the Alaska Pollutant Discharge Elimination System (APDES) Program. Authority over the federal permitting and compliance and enforcement programs began to transfer to the ADEC over a 3-year period beginning at program approval. On October 31, 2009, ADEC became the storm water permitting authority in Alaska, although until authority over a specific facility transfers to ADEC, EPA will remain the permitting, compliance and enforcement authority for that facility. (For more information about ADEC's APDES delegation, see Section 1.5.)

The NPDES storm water permit requirements are based largely on a pollution-prevention approach. The most effective storm water management techniques emphasize preventing rain and snowmelt from coming into contact with pollutants, and preventing discharges directly to nearby receiving waters. APDES storm water permits require operators of permitted activities or systems to use best management practices (BMPs) designed to effectively protect water quality for their particular site conditions and activity.

The NPDES storm water permit program specifically regulates three types of storm water discharges: storm water from certain municipal separate storm sewer systems (MS4s), discharges of storm water associated with industrial activity, and storm water from construction sites disturbing one or more acres.

Municipal storm water permit requirements. Operators of MS4s that serve a certain size population must obtain authorization to discharge pollutants under an NPDES permit. An MS4 is a conveyance or system of conveyances that discharges to waters of the United States, which is

- designed or used for collecting or conveying storm water;
- owned by a state, city or other public body; and
- not part of a combined sewer system or publicly owned treatment works.

MS4s can therefore be owned or operated by municipalities, boroughs, state departments of transportation or federal entities. However, only those MS4s serving communities of a certain population size, according to the latest Decennial Census, are required to obtain NPDES permits. In general, regulated MS4s in areas with more than 100,000 people according to the 1990 Census, or in Urbanized Areas according to the 2000 Census, are subject to the NPDES permit program. At this time, only the greater Anchorage and Fairbanks areas are considered Urbanized Areas according to the U.S. Bureau of the Census. MS4s within these areas include the Municipality of Anchorage, Alaska Department of Transportation and Public Facilities (ADOT&PF), Cities of North Pole and Fairbanks, Fairbanks North Star Borough (FNSB), University of Alaska-Fairbanks (UAF), and Department of Defense (DoD) facilities (for more details, see Section 1.3).

Operators of regulated MS4s develop comprehensive storm water management programs (SWMPs) designed to control pollutants to the maximum extent practicable, prohibit non-storm water (i.e., illicit) discharges to their MS4, and protect water quality by controlling storm water discharges from construction activities, new development and redevelopment areas. Other than Anchorage, which is governed by the Phase I MS4 regulations, municipal SWMP requirements follow six minimum measures:

- Public education and outreach, to educate the community about the water quality;
- Public involvement program to engage the public in pollutant reduction strategies;
- Illicit discharge detection and elimination program, to specifically prohibit non-storm water discharges from entering the MS4;

- Construction site runoff control program, to create locally appropriate requirements for site plan review and using controls to limit erosion, sedimentation, and improper management of onsite construction materials;
- Post-construction runoff control program, to integrate storm water management techniques into land development planning/zoning procedures to provide long-term storm water management in areas of new development and redevelopment; and
- Pollution prevention/good housekeeping program, to ensure that municipal maintenance activities of streets, roads, parks, and so on, are not causing unintended water quality problems.

Detailed information about these requirements can be obtained from resources listed at the end of this chapter.

The operator of a regulated MS4 must define its water quality protection goals through the SWMP. EPA and ADEC use annual reports of program implementation to evaluate progress toward meeting water quality goals and limiting pollutants in municipal storm water discharges to the maximum extent practicable. Examples of appropriate water quality goals include pollution-prevention measures (reducing potential pollutants at the source), improvements in storm water outfall discharge quality, reducing pollutant loads to receiving waters, restoring aquatic resources (e.g., stream channel stabilization, fishery restoration), compliance with water quality standards, or restoring beneficial uses in the receiving water. Intermediate benchmarks that indicate incremental progress toward meeting water quality standards are important elements of successful, long-term SWMPs. Additional information about the NPDES MS4 program is at Link 1 in Appendix A.

Industrial storm water permit requirements. Industrial activities often involve the outdoor storage and handling of raw or finished materials, which are exposed to rain and snow. As runoff from rain or snowmelt comes into contact with such materials, it picks up pollutants and transports them to nearby storm sewer systems, rivers, lakes, or coastal waters. EPA regulations define 11 categories of industrial activities by Standard Industrial Classification (SIC) code Operators must obtain NPDES permit coverage to discharge storm water to an MS4 or directly to waters of the United States. The list below describes the types of industrial activities within each category.

- Category One (i): Facilities with effluent limitations
- Category Two (ii): Manufacturing
- Category Three (iii): Mineral, Metal, Oil and Gas
- Category Four (iv): Hazardous Waste, Treatment or Disposal Facilities

- Category Five (v): Landfills
- Category Six (vi): Recycling Facilities
- Category Seven (vii): Steam Electric Plants
- Category Eight (viii): Transportation Facilities
- Category Nine (ix): Treatment Works
- Category Ten (x): Construction Activity
- Category Eleven (xi): Light Industrial Activity

Note that Category Ten (x): Construction Activity, which disturbs 5 or more acres of land, is included in the definition of "storm water discharges associated with industrial activity." However, EPA opted to permit these types of activities separately from other industrial activities because of the significant difference in the nature of the activities. In addition, EPA requires permit coverage for small construction that disturbs from 1 to 5 acres of land.

NPDES permits for industrial storm water discharges generally require the development and implementation of a site-specific storm water pollution prevention plan (SWPPP) to define the control measures to be used at the facility to control sources of pollution and to eliminate pollution in storm water discharges to meet state water quality standards.

On September 29, 2008, EPA reissued the general permit for storm water discharges associated with industrial activity, also referred to as the 2008 Multi-Sector General Permit (MSGP) and is set to expire September 29, 2013. The previous version of the MSGP, the MSGP 2000, expired on October 30, 2005, and facilities that were previously covered by the MSGP 2000 have been covered by an administrative continuance, and will continue to be covered in this manner, until their authorization under the new permit. The 2008 MSGP divides the 11 categories into 29 different industrial sectors. The 2008 MSGP contains provisions that require industrial facilities in each industrial sector to submit a complete and accurate Notice of Intent (NOI) to be covered and certify in the NOI that they meet the requisite eligibility requirements of the permit, including the requirement to select, design and install control measures to comply with the technology- and water quality-based effluent limits and develop site-specific SWPPPs. Effective February 26, 2009, specific permit conditions (NPDES Permit No. AKR050000) that apply to industrial facilities in Alaska are in Part 9 of EPA's 2008 MSGP. ADEC will continue to use this permit until a new permit is reissued. Detailed information on the 2008 MSGP is on EPA's MSGP Web site (Link 2 in Appendix A).

EPA Region 10 has also issued other general permits authorizing storm water discharges for specific industrial categories of industry. For example, NPDES General Permit AKG-33-0000, which authorizes discharges of storm water for facilities related to oil and gas in the North Slope Borough. A general permit for log transfer facilities also authorizes the discharge of storm water and other process wastewater discharges. Details about these general permits are on EPA Region 10's Web site (Link 3 in Appendix A).

Construction storm water permit requirements. Storm water runoff from clearing, grading and excavation activities associated with construction can have a significant effect on water quality. As storm water flows over an active construction site, it picks up pollutants like sediment, debris and chemicals. Polluted storm water runoff from construction sites can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat, and high volumes of runoff can cause stream bank erosion. For these reasons, the NPDES storm water program requires operators of construction sites that disturb one or more acres of land (including smaller than one-acre sites that are part of a larger common plan of development or sale that itself is larger than one acre) to obtain authorization to discharge storm water under an NPDES construction storm water permit.

In July 2008, EPA issued its 2008 Construction General Permit (CGP) and then extended the term of the 2008 CGP by one year, making the 2008 EPA CGP a three-year permit that expired on June 30, 2011. As mentioned above, on October 31, 2009, ADEC became the storm water permitting authority in Alaska. On January 31, 2010, ADEC reissued the Alaska CGP which remained in effect until June 30, 2011. The 2010 CGP was issued for only a 1-year period during which ADEC developed an updated CGP that incorporates the provisions of the effluent limitations guidelines for the construction and development industry. ADEC issued the updated CGP to be effective July 1, 2011. The 2011 Alaska CGP authorizes storm water discharges from large and small construction activities that result in a total land disturbance of equal to or greater than one acre, where such discharges enter surface waters of the United States or an MS4 leading to surface waters of the United States.

Per the 2011 CGP, if you disturb equal to or greater than one acre or are part of a larger common plan of development or sale that disturbs at least one acre of land, you should do the following:

- Obtain and read the entire CGP before beginning your project.
- Develop an SWPPP. Development of an SWPPP and implementation of control measures at your construction site are the key conditions of the CGP
- Complete an endangered species determination for the project site

- Submit an original, signed Notice of Intent (NOI) to ADEC, at least 7 days before construction begins. The NOI can be filed through ADEC's electronic NOI system at Web Link 4 in Appendix A or by hard copy

For construction projects in Alaska that disturb at least one acre of land but less than 5 acres of land, the operator will submit the NOI to ADEC. If the construction project disturbs 5 acres or more and is outside the Municipality of Anchorage (MOA), the City of Fairbanks, the City of North Pole or FNSB or for certain publicly funded projects within the jurisdictions of the MOA or Fairbanks, the operator will have to provide a copy of the SWPPP to ADEC for review.

Public projects disturbing 1 or more acres within the Urbanized Area of the City of Fairbanks and the City of North Pole need to submit an NOI and SWPPP to ADEC (see Table 1-2 and the 2011 CGP). If a privately funded project disturbs one or more acres and is within the jurisdictions of the MOA, the City of Fairbanks, City of North Pole or the FNSB, the operator will have to provide a copy of the SWPPP to the municipality, along with any applicable fee. Note that the FNSB MS4 is defined very specifically as *storm water conveyance systems located within Road Service Areas in the Urbanized Area.* FNSB will review *both* public and private projects that disturb more than one acre of land and discharge storm water to the MS4 (i.e., storm water conveyance systems located *within a Road Service Area in the Urbanized Area*). Projects that do not meet these criteria will be referred to ADEC for review. Projects that are within the Fairbanks Urbanized Area boundary but outside the city limits for the City of Fairbanks and the City of North Pole are only regulated by the FNSB if the project impacts the municipal separate storm sewer system within a FNSB Road Service Area. Regulation would apply to both publicly- and privately-funded projects.

A permittee who disturbs more 20 acres and discharges to a water body listed on the CWA §303(d) list for turbidity or sediment must monitor storm water discharges to evaluate compliance with the water quality standard for turbidity.

Additional information about the 2011 CGP is on ADEC's Web site (see Link 5 in Appendix A).

If ADEC, MOA, the City of Fairbanks and FNSB reviews my SWPPP and has no objections to it, can I assume it is in compliance with the requirements in the CGP?

Not necessarily. Submittal of the SWPPP to MOA, the City of Fairbanks, FNSB or ADEC is a requirement of the CGP, but each of these agencies reviews the document with its own objectives in mind. ADEC reviews SWPPPs to make sure they contain each of the necessary elements outlined in the CGP, but it cannot evaluate the thoroughness of each SWPPP element, the appropriateness of selected storm water controls or whether the SWPPP is being kept up-to-date throughout the project. The MOA, the City of Fairbanks and FNSB review SWPPPs for compliance with local erosion and sediment control ordinances. In either case, it is possible for you to be in compliance with ADEC, MOA, City of Fairbanks or FNSB directives and to be found in violation of the SWPPP requirements in the CGP. For this reason, you should make sure that you have read the CGP carefully and understand the requirements before proceeding with your project.

Who conducts inspections and what are the objectives of each inspection?

ADEC, MOA, the City of Fairbanks, FNSB and EPA have the authority to conduct inspections at your construction site; however, the objective of each inspection depends on the agency. ADEC inspectors assess a facility's compliance with the CGP and Alaska Water Quality Standards; and MOA or City of Fairbanks and FNSB inspectors assess a facility's compliance with local ordinances. Some local erosion and sediment control ordinances might overlap with the requirements in ADEC's CGP; however, you should not assume that a directive from any of the local agencies will bring you into compliance with the requirements of the state.

If you have further questions about how to comply with requirements for construction sites in Alaska, contact the following representatives:			
Greg Drzewiecki ADEC Storm Water Coordinator 555 Cordova Street Anchorage, AK 99501 (907) 269-7692	**Steve Ellis** Municipality of Anchorage P.O. Box 196650 Anchorage, AK 99519 (907) 343-8078	**Jackson Fox** City of Fairbanks (also coordinating SWPPP reviews for the City of North Pole) 800 Cushman Street Fairbanks, AK 99701 (907) 459-6758	**Jennifer Schmetzer** Fairbanks North Star Borough, Department of Public Works P.O. Box 71267, Fairbanks, AK 99707 (907) 459-1327

1.1.2 Coastal Zone Act Reauthorization Amendments Section 6217

CZARA addresses a wide variety of coastal management issues and one of the significant changes in CZARA was a new section 6217, which established the Coastal Nonpoint

Pollution Control Program (CNPCP). This program was established to encourage better coordination between state coastal zone managers and water quality regulators to reduce polluted runoff in the coastal zone. Any state that chooses to participate in the voluntary national Coastal Zone Management (CZM) Program must develop a CNPCP. At the time CZARA was passed, only 29 states were participating in the national CZM program, but now there are 34, including Alaska.

The CNPCP is unique because it establishes a set of management measures for states to use in controlling polluted runoff from areas not subject to NPDES MS4 regulations. The measures are designed to control runoff from six main sources: forestry, agriculture, urban development, marinas, hydromodification (shoreline and stream channel modification), and protection of wetlands and riparian areas. These measures need to be backed by enforceable state policies and actions, i.e., state authorities that will ensure implementation of the program. EPA and the National Oceanic and Atmospheric Administration (NOAA) conditionally approved Alaska's CNPCP. For full approval, Alaska needs to address several remaining conditions, including the urban new development measure.

To be eligible for federal CZM funding, coastal states or territories were required to describe how they would implement NPS pollution controls, known as management measures that conformed to those described in the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (EPA 1993).

Additional information about the 6217 Program is at Link 6 in Appendix A.

Alaska's Coastal Nonpoint Program (CNP) boundary follows its CZM boundary, which extends from 2,000 feet to 250 miles inland along its entire coast. For details, see Link 7 in Appendix A. However, for the ***urban management measures***, specifically the new development measure that this manual most directly addresses, Alaska sufficiently demonstrated that NPS from new development activities is not a significant contributor to NPS in northern and western portions of the 6217 boundary and 18 small communities in southern Alaska. Therefore, NOAA and EPA agreed with the state's targeted approach, which would focus on implementing the new development measure within the 14 communities and census tracts listed below and shown in Figure 1-1 (the ones with larger population centers) would be acceptable. Alaska still has to implement other CNP management measures throughout its CNPCP boundary.

Bethel	Kalifornsky	Knik-Fairview	Meadow-Lakes	Tanaina
Homer	Kenai	Kodiak	Palmer	Wasilla
Juneau	Ketchikan	Lakes	Sitka	

The 14 affected Alaskan communities should have enforceable policies or mechanisms in place for implementing the following specific measures for roads, highways and bridges as well as new development during the planning and construction phases and afterwards.

1.1.2.1 New Development Management Measure

1. By design or performance
    a. After construction has been completed and the site is permanently stabilized, reduce the average annual total suspended solid (TSS) loadings by 80 percent. For the purposes of this measure, an 80 percent TSS reduction is to be determined on an average annual basis[1], or

    b. Reduce the post development loadings of TSS so that the average annual TSS loadings are not greater than predevelopment loadings, and

2. To the extent practicable, maintain post development peak runoff rate and average volume at levels that are similar to predevelopment levels.

Applicability: New development, redevelopment and new and relocated roads, highways and bridges.

[1] On the basis of the average annual TSS loadings from all storms less than or equal to the 2-year/24-hour storm. TSS loadings from storms greater than the 2-year/24-hour storm will not be included in the calculation of the average annual TSS loadings).

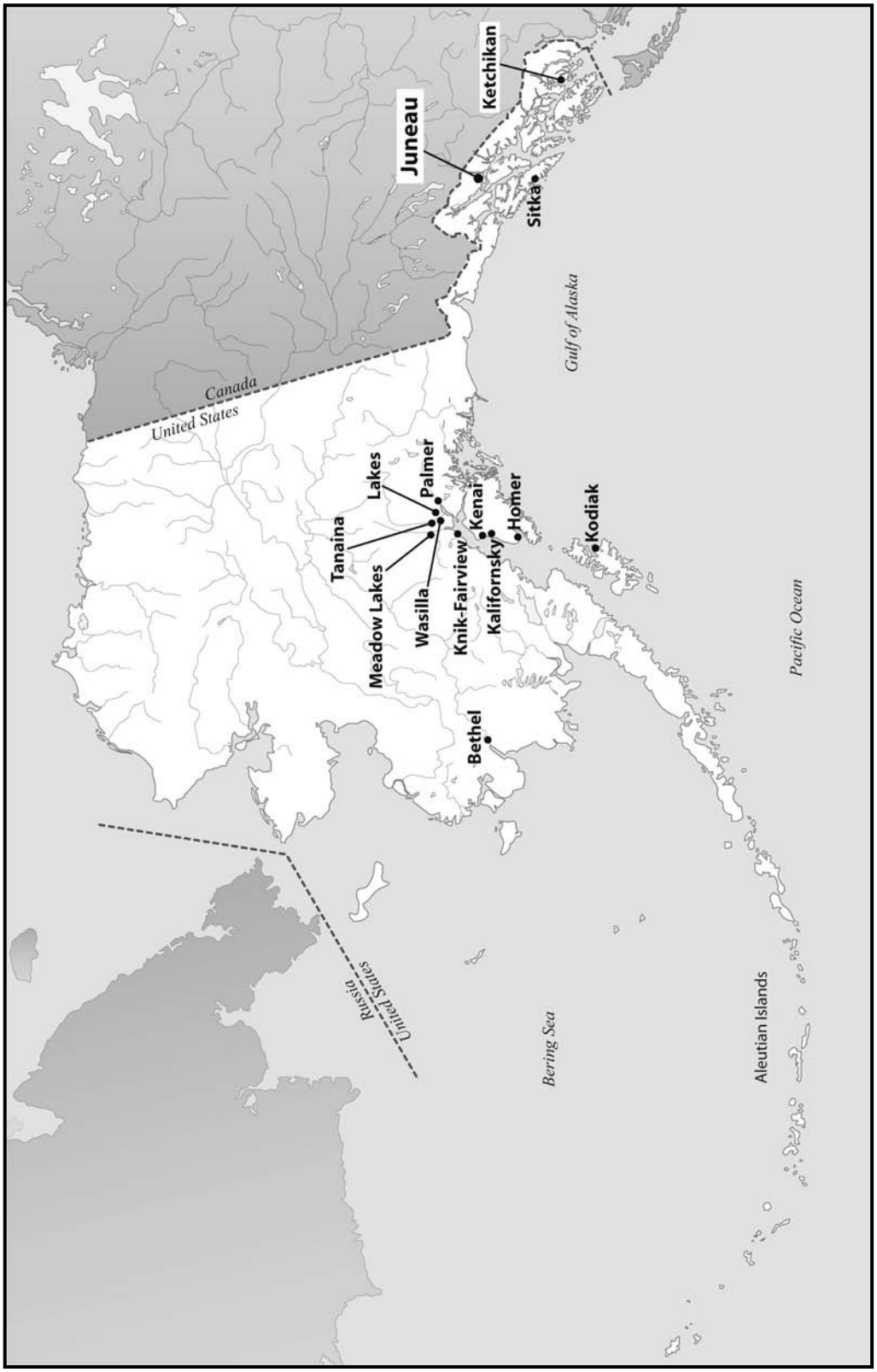

Figure 1-1. Coastal Zone Communities

1.1.2.2 Watershed Protection Management Measure

Develop a watershed protection program to

1. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;

2. Preserve areas that provide important water quality benefits or are necessary to maintain riparian and aquatic biota; and

3. Site development, including roads, highways and bridges, to protect the extent practicable the natural integrity of waterbodies and natural drainage systems.

Applicability: New development, redevelopment and new and relocated roads, highways and bridges.

1.1.2.3 Site Development Management Measure

Plan, design and develop sites to

1. Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;

2. Limit increases of impervious areas, except where necessary;

3. Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and

4. Limit disturbance of natural drainage features and vegetation.

Applicability: All site development activities including those associated with roads, highways and bridges.

1.1.2.4 Planning, Siting and Developing Roads and Highways Management Measure

1. Plan, site and develop roads and highways to

2. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;

3. Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and

4. Limit disturbance of natural drainage features and vegetation.

Applicability: All site development and land disturbing activities for new, relocated and reconstructed (widened) roads (including residential streets) and highways to reduce the generation of NPS pollutants and to mitigate the effects of urban runoff and associated pollutants from such activities.

1.1.2.5 Operation and Maintenance Management Measure

Incorporate pollution-prevention procedures into the operation and maintenance of roads, highways and bridges to reduce pollutant loadings to surface waters.

Applicability: Existing, restored and rehabilitated roads, highways and bridges.

1.1.2.6 Road, Highway and Bridge Runoff Systems Management Measure

Develop and implement runoff management systems for existing roads, highways and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

1. Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures); and

2. Establish schedules for implementing appropriate controls.

Applicability: Existing, resurfaced, restored and rehabilitated roads, highways and bridges that contribute to adverse effects in surface waters.

It is strongly recommended that local governments and contractors implement the practices described that will reduce TSS by 80 percent (or no greater than predevelopment rates) and maintain peak runoff to predevelopment levels. It is also strongly recommended that the 14 communities identified above work with ADEC and other states agencies, as appropriate, to revise their storm water ordinances to incorporate the section 6217 requirements.

1.1.2.7 Other Federal Guidance

Consideration of storm water issues related to linear projects, roads in particular, is an important topic for Alaska storm water managers and is included under the APDES MS4 and Construction programs as well as the CNPCP mentioned above. To this end, EPA has developed a maintenance and design manual for gravel roads with a major

emphasis on the maintenance of gravel roads, including some basic design elements. The purpose of the manual is to provide clear and helpful information for doing a better job of maintaining gravel roads. The manual is designed for the benefit of elected officials, managers and grader operators who are responsible for designing and maintaining gravel roads. The manual is at Web Link 8 in Appendix A.

1.1.3 UIC Program

The UIC (Underground Injection Control) Program is responsible for regulating the construction, operation, permitting and closure of injection wells that place fluids underground for storage or disposal. An injection well is a device that places fluid deep underground into porous rock formations, such as sandstone or limestone, or into or below the shallow soil layer. These fluids could be water, wastewater, brine (salt water), or water mixed with chemicals. Injection wells have a range of uses that include waste disposal, enhancing oil production, mining and preventing salt water intrusion. The UIC Program defines an injection well as a bored, drilled, or driven shaft; a dug hole that is deeper than it is wide; an improved sinkhole; or a subsurface fluid distribution system.

Most injection wells in Alaska are relatively simple devices used to emplace fluids into the shallow subsurface under the force of gravity. Examples include sumps, drywells and drainfields. The threat posed to ground water quality varies markedly and depends mostly upon the volume and nature of the fluids injected, well construction and the hydrogeologic setting. The federal UIC regulations and additional state requirements are based upon a protective performance standard.

Federal and state UIC regulatory programs are intended to ensure that owners and operators of injection wells safely operate injection wells to prevent contamination of underground drinking water resources. There are five classes of injection wells that are based on similarity in the fluids injected, activities, construction, injection depth, design and operating techniques. The categorization ensures that wells with common design and operating techniques are required to meet appropriate performance criteria for protecting USDWs. The five classes and what they are used for are

I Injection of hazardous wastes, industrial nonhazardous liquids, or municipal wastewater beneath the lowermost USDW

II Injection of brines and other fluids associated with oil and gas production, and hydrocarbons for storage beneath the lowermost USDW

III Injection of fluids associated with solution mining of minerals beneath the lowermost USDW

IV Injection of hazardous or radioactive wastes into or above USDWs (these wells are banned unless authorized under a federal or state groundwater remediation project)

V All injection wells not included in Classes I–IV

In general, Class V wells inject nonhazardous fluids into or above USDWs and are typically shallow, on-site disposal systems. However, there are some deep Class V wells that inject below USDWs. Class V injection wells may be regulated as part of the UIC Program, authorized by the federal Safe Drinking Water Act. Class V wells discharge fluids underground and include French drains, tile drains, infiltration sumps and percolation areas with vertical drainage. Class V storm water drainage wells manage surface water runoff (rainwater or snowmelt) by placing it below the ground surface. They are typically shallow disposal systems designed to infiltrate storm water runoff below the ground surface but do not include infiltration trenches filled with stone (with no piping), or excavated ponds, lagoons and ditches (lined or unlined, without piping or drain tile) with an open surface. EPA clarified which infiltration devices are regulated as Class V UIC wells in a June 2008 memo at Link 9 in Appendix A.

Storm water drainage wells can have a variety of designs and can be referred to by other names including dry wells, bored wells and infiltration galleries. The names can be misleading, so it is important to note that a Class V well, by definition, is any bored, drilled, or driven shaft; a dug hole that is deeper than its widest surface dimension; an improved sinkhole; or a subsurface fluid distribution system (an infiltration system with piping to enhance infiltration capabilities). Some types of infiltration systems do not meet the definition of Class V storm water drainage wells. In general, owners/operators of storm water drainage wells include state and local governments, public or private institutions, commercial or industrial facilities, community associations and private citizens.

Compliance with federal regulations could include submitting basic inventory information about the drainage wells to the state or EPA and complying with specific construction, operation, permitting and closure requirements. The Safe Drinking Water Act requires that EPA protect USDWs from injection activities, and EPA has set minimum standards to address the threats posed by all injection wells, including storm water drainage wells. Storm water injection is a concern because storm water can contain sediment, nutrients, metals, salts, microorganisms, fertilizers, pesticides, petroleum and other organic compounds that could harm USDWs.

Class V storm water drainage wells are *authorized by rule*, which means they may be operated without an individual permit so long as the injection does not endanger a USDW, and the owner or operator of the well submits basic inventory information about the well to

EPA Region 10. Inventory submission requirements include the facility name and location, name and address of a legal contact, ownership of property, nature and type of injection well(s), and operating status of the well(s). Owners/operators should contact EPA Region 10 before beginning construction of new storm water drainage wells in Alaska. To find out what is required for existing storm water drainage wells, contact EPA Region 10. In most cases, only an inventory form must be submitted.

Proper design and locating of storm water drainage wells minimizes the likelihood of accidental or routine contamination resulting from either poor operational practices or misuse. The five general categories of BMPs for storm water drainage wells that can be implemented alone or in combination are location; design; operation and maintenance; education and outreach; and proper closure, plugging and abandonment. The appropriateness and effectiveness of BMPs vary according to the type, design, setting and operation of the well. Additional information about these BMPs is at Web Link 10 in Appendix A.

General information regarding the UIC program is on EPA's Region 10 Web site (see Link 11 in Appendix A).

1.1.4 U.S. Army Corps of Engineers

For many parts of Alaska, construction is in or adjacent to wetlands that are considered to be *waters of the United States*. As a result, Alaska developers might need to obtain permits from the Corps of Engineers (COE) under its section 404 permit rules. Activities that result in the discharge of dredged or fill material into the waters of the United States require a written authorization (permit) from the COE. A description of the discharges that require permits, as well as those that do not, are at Title 33 of the *Code of Federal Regulations* (CFR) Part 323 (33 CFR 323). The COE, in reviewing section 404 permit applications, requires avoidance of impacts and minimization of unavoidable impacts. The COE and EPA promulgated a new federal mitigation rule in 2008 to clarify how to provide compensatory mitigation for unavoidable impacts to the nation's wetlands and streams. The rule enables the agencies to promote greater consistency, predictability and ecological success of mitigation projects under the CWA by encouraging watershed-based decisions and emphasizing the *mitigation sequence* requiring that proposed projects avoid and minimize potential effects on wetlands and streams before proceeding to compensatory mitigation. The rule will affect how mitigation of unavoidable impacts is addressed in some local jurisdictions such as Anchorage, Juneau or Fairbanks. In addition, a Water Quality Certification (or Waiver thereof) pursuant to CWA section 401 is required for section 404 permit actions.

The COE–Alaska District and EPA administers the CWA section 404 Permitting Program. More than 80 percent of all actions subject to section 404 are authorized by the COE via general permits, which authorize for small projects such activities as placement of outfall structures, road crossings, utility line backfill, boat ramps, farm buildings and minor discharges. If an activity has significant effects, it is not covered under the general permit and must undergo a more extensive regulatory review, including obtaining an individual permit. Additional information is on the COE wetlands Web site (Link 12 in Appendix A).

1.2 State

ADEC Division of Water's mission is to improve and protect water quality. In this role, ADEC

- Establishes standards for water cleanliness
- Regulates discharges to waters and wetlands
- Provides financial assistance for water and wastewater facility construction, and waterbody assessment and remediation
- Trains, certifies and assists water and wastewater system operators and monitors and reports on water quality

The goal of ADEC's Storm Water Program is to reduce or eliminate pollutants in storm waters so that pollutants do not reach land or waters of the state. Storm water discharges are generated by runoff from land and impervious areas such as paved streets, parking lots and building rooftops, during rainfall and snowmelt events. Storm water discharges often contain pollutants in quantities that could adversely affect water quality.

1.2.1 Regulations for Storm Water Disposal Plans

Any person who constructs, alters, installs or modifies any part of a storm water treatment works or disposal system must submit engineering plans to ADEC for review and approval per 18 AAC 72.600. To obtain approval in the form of a *letter of non-objection*, an applicant must submit a short project description containing the following information to ADEC:

- Project name
- Contact name, address, phone and fax numbers and e-mail address
- Project area (total and *soil disturbed*)
- Receiving waterbody and estimated distance from the project site
- Methods of runoff flow and treatment (down to the discharge point)
- Treatment system's maintenance procedures

- Snow storage/disposal
- Treatment system sizing estimation (e.g., swale: length, cross section, bank and longitudinal slopes, flow velocity, detention time)
- One set of drainage plans clearly showing drainage boundaries and flow directions

Runoff flow calculation is based on a 2-year, 6-hour rain event (before and after the project is completed). One of the design criteria for projects using oil and grit separators, is that to obtain an ADEC letter of non-objection for discharge to storm sewers, an applicant must demonstrate that the proposed oil and grit separator(s) has (have) the ability to remove at least 50 percent of TSS particles larger than 20 microns in size from storm water runoff during storms less than the 2–year, 6-hour rain event. A separate storm sewer is "a conveyance or system of conveyances (i.e., ditches, curbs, catch basins, underground pipes) that is designed or used for collecting or conveying storm water and that discharges to surface waters of the State."

All engineering design and calculations must be stamped by Alaska registered engineer as required by 18 AAC 72.600 and 18 AAC 72.990.(29).

ADEC has the authority to inspect facilities and require adherence to the approved plans.

1.2.2 Review of APDES Industrial and Construction SWPPP

ADEC has responsibility to review and approve industrial facility SWPPPs, as well as construction site SWPPPs for projects disturbing 5 or more acres outside MOA, City of Fairbanks or the FNSB and certain projects within the MOA and Fairbanks. As described above in section 1.1.1, construction site and industrial SWPPPs must be sent to ADEC for review.

1.2.3 Dewatering Permits

If wastewater discharge from a dewatering activity is not eligible to be covered under the CGP or the MSGP, operators must seek coverage under state general permit 2009DB0003 for your dewatering wastewater discharge. This eligibility is dependent on meeting the following:

1. The dewatering effluent must not be contaminated. One criterion for determining the probability of the discharge being contaminated is the dewatering project being more than a mile from a contaminated site. ADEC, Division of Water, Industrial Wastewater Permitting Program (907.269.7523) can help determine the proximity of the dewatering project to any known contaminated sites.

2. The discharge is to a surface waterbody.

3. For construction projects authorized by the CGP, the total area of disturbance is equal to or greater than one acre.

4. The intended receiving waterbody must not be included in the 303(d) list as being noncompliant because of an exceedance of a contaminant of the same kind as is suspected to be in the dewatering effluent.

5. The intended receiving water is already designated as a mixing zone for another wastewater contaminate of the same kind as is suspected to be in your dewatering effluent.

If conditions 1 and 2 are met, and conditions 3, 4 or 5, as applicable are met, dewatering discharges are authorized under the MSGP and CGP. Otherwise, a state permit is necessary.

The state General Permit 2009DB0003 requirements are as follows:

1. An NOI under section 1.1 must be completed and sent to the nearest ADEC office.

2. Dewatering projects expected to discharge under 250,000 gallons do not require the submittal of an NOI. The dischargers are required to follow general permit 2009DB0003 except for the monitoring and reporting requirements.

3. A hydrologist's report may be required if the dewatering project is within one mile of a known contaminated site. The report will predict the possibility of smearing the contamination because of the proposed dewatering activity.

4. An appropriate fee must be remitted to ADEC before an authorization to operate with coverage under general permit 2009DB0003.

An authorization will be written for all NOI submittals that anticipate more than 250,000 gallons of effluent from the dewatering project. The authorization will include a description of the project including responsible party, description of the discharge area, expected contaminants in the discharge, coverage dates, description of the treatment system, specific stipulations for the project, a disposal monitoring report form describing monitoring requirements, a blank spill reporting form and a blank exceedance reporting form.

1.2.4 Contained Water Discharge Permits

A waste disposal general permit (Permit Number 2009DB0004 is available for disposal of contained water that meets the eligibility criteria as *contained water*. Contained water is defined as water isolated from the environment in a manmade container or a lined impoundment structure. The contained water general permit applies to hydrostatic test water or chlorinated water from tanks, pipelines, swimming pools and other containers that meet both the state water quality standards in 18 AAC 70, and the effluent limitations contained in the permit. The general permit does not apply to the following:

- Contaminated groundwater where halogenated hydrocarbons are the primary contaminant of concern
- A discharge to waters listed by the state as impaired, where the impairment is wholly or partially caused by a pollutant in the proposed discharge
- A discharge from a sewage lagoon or other treatment works subject to a different state waste disposal permit
- A discharge permitted under NPDES storm water general permits
- A discharge to groundwater under a response action, a cleanup or a corrective action approved under 18 AAC 70.005; or a discharge of drainage water accumulations from secondary containment regulated under 18 AAC 75.075 (d)

A Notice of Disposal and prior written authorization from ADEC are required for one-time disposal (i.e., no more that one disposal per year) of a volume of water greater than or equal to 10,000 gallons through discharge to the land surface or to a surface waterbody. A Notice of Disposal is not required for the one-time disposal of a volume of water less than 10,000 gallons, however, all terms and conditions of the general permit, including the effluent limitations, still apply.

1.3 Local Requirements

As discussed in Section 1.1.1, as of June 2009, only the MOA, the Port of Anchorage, the ADOT&PF, the Cities of North Pole and Fairbanks, the FNSB, the UAF and the DoD facilities are required to have MS4 permits.

1.3.1 Municipality of Anchorage and Alaska Department of Transportation & Public Facilities

The MOA Watershed Management Services (WMS), a division of the Department of Project Management and Engineering, is responsible for administrating MOA's NPDES permit, municipal watershed management planning, storm water site plan reviews and Federal Emergency Management Agency (FEMA) flood hazard plan reviews. The ADOT&PF and MOA have an agreement whereby MOA provides the programs required by the permit on behalf of ADO&PF.

In addition, WMS is assigned specific municipal corporate responsibilities, including mapping MOA receiving waters and drainage systems, and research and development of design guidance for storm water runoff and drainage controls. WMS also maintains a number of continuing programs that support long-term storm water management business functions and obligations for MOA.

MOA and the ADOT&PF are jointly permitted to discharge storm water from their respective separate storm sewer system to waters of the United States under an EPA-administered NPDES MS4 permit (NPDES Permit #AKS052558) (see Web Link 13 in Appendix A). The first term permit was issued on January 5, 1999, so MOA and ADOT&PF are operating under an administratively extended permit.

The joint permittees are obligated to implement an SWMP that provides specific storm water systems information and meet particular performance constraints. WMS performs work to meet the permit requirements, or coordinates this work where it is performed by other agencies. Implementation of an SWMP is a required element of the NPDES municipal SWMP. Using a whole-system approach, MOA applies watershed, drainage and receiving waters information to planning and implementation of BMPs to control effects on receiving waters from storm water discharge.

MOA locally administers the FEMA flood insurance program that forms the foundation for the availability of nationally based community flood insurance in Anchorage. WMS performs work under this program to update and distribute flood hazard mapping information in a variety of formats and to review, regulate, track and report plans for construction in or near flood hazard zones.

WMS is also responsible for continuing research, assessment, development and selection of controls appropriate for cold regions urban storm water management. Technically defensible, effective and practicable system approaches to assessing and developing practices to manage the complete range of Anchorage storm water problems are best

assured when this work is integrated within a single WMS program. Control of storm water runoff from ongoing development and construction projects and application of sound post-construction storm water controls is a basic element in the MOA's NPDES MS4 SWMP.

The MOA requires the submission of site-specific plans for projects that may discharge storm water onto land, surface water or groundwater within the MOA. Any person, who constructs, alters, installs, modifies or operates a storm water treatment or disposal system must comply with plan requirements and reviews as specified in guidance documents established by MOA. Land developers are required to meet both EPA and ADEC storm water plan requirements. Table 1-1 presents detailed SWPPP submission instructions for MOA.

WMS administers and performs plan reviews, inspections and enforcement and provides educational services required to implement the program. WMS is required under its permitting structures to distribute information developed either under its management programs or through its general watershed mapping and BMP research to the public at large.

Table 1-1. MOA SWPPP submittal matrix

	ADEC			MOA		
If your construction project is	Notice of Intent	Copy of Type 3 SWPPP	Review Fee	Copy of Notice of Intent	Copy of Type 1, 2 or 3 SWPPP	Review Fee
1 or more acres; a publicly funded project	Yes	Yes	No	No (Unless a Building Permit is required)	No (Unless a Building Permit is required)	No
1 or more acres; a private project	Yes	No	No	Yes	Yes	Yes
Less than 1 acre as a public or private project	NA	No	No	NA	Type 1 or 2	Yes for private; No otherwise

Table 1-1. (continued)

Operators of construction projects disturbing one or more acres of land must submit a copy of the SWPPP to either ADEC or the MOA based on the project type and operator as shown in the following:

1. Operators of **publicly funded projects disturbing one or more acres** within the MOA must submit a copy of the Type 3 SWPPP and NOI for review by the ADEC at the address below, along with the State-required fee (18 AAC 72.995). Submittal of the Type 3 SWPPP and the NOI to the ADEC should be concurrent with the NOI submittal to EPA.

   Alaska Department of Environmental Conservation
   Water Quality Permitting / Storm Water
   555 Cordova Street

Anchorage, Alaska 99501

2. Submittal of a Type 3 SWPPP to the MOA is not required unless the work requires a Building Permit.
3. Operators of **privately funded construction projects and non-publicly funded transportation projects disturbing one acre or more** must submit a copy of the Type 3 SWPPP to the MOA at the address listed below.
4. Operators of **utility projects for which the utility is initiating the work disturbing one acre or more** must submit a copy of the Type 3 SWPPP to the MOA at the address listed below.
5. Operators of **work that requires a Building Permit disturbing one acre or more** must submit a copy of the Type 3 SWPPP to the MOA at the address listed below.
6. Operators of **private construction projects disturbing less than one acre** must submit a copy of the Type 1 or 2 SWPPP to the MOA at the address listed below.

Where required, submittal of the SWPPP to the MOA should be made before or at the same time the NOI is submitted to EPA and the ADEC, and must be accompanied by any MOA required fee (AMC 21). Copies of the SWPP must be submitted to the MOA at the following address

Municipality of Anchorage, Office of Planning Development and Public Works
4700 South Elmore Road
P.O. Box 196650
Anchorage, AK 99519-6650

Municipality of Anchorage

1. Type 1 SWPPPs—Operators of private single family residential projects disturbing less than 1 acre and private commercial and other projects disturbing less than 10,000 square feet must submit to WMS a completed, signed copy of Checklist #1 from Handout AG.21 to the address shown in Table 5-2 of the MOA document.
2. Type 2 SWPPPs—Operators of private projects **other than** single family residential projects disturbing between 10,000 square feet and less than one acre within the MOA must submit a Type 2 SWPPP and a signed copy of Checklist #2 from Handout AG.21 to the MOA at the address shown in Table 5-2 of the MOA document. The requirements for the Type 2 SWPPP are outlined in Table 5-1 of the MOA document
3. Type 3 SWPPPs—Operators of private construction projects disturbing one or more acres within the MOA must submit a copy of the SWPPP and NOI along with a signed copy of Checklist #2 form Handout AG.21 to the MOA at the address shown in Table 5-2 of the MOA document. Submittal of the SWPPP to the MOA should be made before or at the same time the NOI is submitted to EPA and ADEC, and it must be accompanied by any MOA-required fee.
4. For publicly funded projects of 5 or more acres, the NOI is not sent to the MOA unless a building permit is required.

WMS packages information (typically developed under other WMS programs and work efforts) and delivers it through a variety of media for use in training and public education. WMS has corporate responsibility for providing continuing mapping of all municipal hydrography, including base map and feature data required to support FEMA flood hazard mapping and general municipal drainage planning and design. Map views and published atlas products are also prepared as a client service to other WMS programs and for distribution to other MOA agencies and the public.

WMS also develops logical data structures integrated across all WMS and MOA business functions, sets standards for WMS data and document submittal and archive, and provides the underlying system infrastructure required to provide rapid, reliable and secure access to this information for WMS, other MOA agencies and the public.

Additional information about the MOA storm water program is at the WMS Web site (see Link 14 in Appendix A).

1.3.2 The City of Fairbanks, City of North Pole, University of Alaska Fairbanks and Alaska Department of Transportation & Public Facilities

In 2002 the U.S. Census Bureau designated portions of the City of Fairbanks and the City of North Pole as an Urban Area. A map of the urbanized area is at the Web Link 15 in Appendix A.

With the designation as an urbanized area, EPA developed two MS4 permits for the areas, which were effective on June 1, 2005. The four Fairbanks area political entities are covered by one of these two NPDES MS4 permits that outline how the communities must work together to protect water quality. The City of Fairbanks, City of North Pole, ADOT&PF, and UAF are partners on NPDES Permit Number AKS-053406. The storm water management programs contain the six minimum control measures previously mentioned in Section 1.1.1. The program is being phased in over the 5-year term of the NPDES permits. Table 1-2 presents detailed SWPPP submission instructions for the Fairbanks area.

Additional information on the individual programs is at Link 16 in Appendix A.

Table 1-2. Fairbanks area SWPPP submittal matrix

	ADEC			For a construction project within the urbanized area boundary and in *road service areas within* the political entity								
				City of Fairbanks			City of North Pole			Fairbanks North Star Borough		
If your construction project is	**Notice of Intent**	**Copy of SWPPP**	**Review Fee**	**Copy of Notice of Intent**	**Copy of SWPPP**	**Review Fee**	**Copy of Notice of Intent**	**Copy of SWPPP**	**Review Fee**	**Copy of Notice of Intent**	**Copy of SWPPP**	**Review Fee**
1 or more acres; a publicly funded project	Yes	Yes	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes
1 or more acres; a private project	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10,000 square feet – 1 acre, private projects	N/A	No	No	N/A	Yes, Erosion & Sediment Control Plan	Yes	N/A	No	No	N/A	No	Yes

1.3.3 Fairbanks North Star Borough

The Fairbanks North Star Borough has a separate permit, Permit Number AKS-053414. The permit is at the Web Link 17 in Appendix A.

1.3.4 Other Local Authorities

Note that local governments in Alaska can have storm water ordinances without MS4 authority. For the current list, see the Alaska DCED Web site at Link 18 in Appendix A.

1.3.5 Land Development Considerations for Storm Water Management

Whether through ordinances or incentive-based approaches, many local jurisdictions are beginning to apply better site design and LID techniques to all development and redevelopment. These techniques are most effective when implemented as part of a broader objective to reducing storm water runoff volumes and peak flows, increasing groundwater recharge, and increasing the preservation of undisturbed areas. To minimize the effects that new development and redevelopment projects can have on surface waters, some of or all following practices should be considered where they are not in conflict with land use compatibility objectives:

- Minimize the amount of impervious surface created
- Locate buildings on sites to minimize impervious cover associated with driveways and parking areas and to encourage tree preservation
- Where feasible, convey drainage from impervious areas into pervious areas
- Encourage cluster development when designed to maximize protection of ecologically valuable land
- Encourage the preservation of wooded areas and steep slopes adjacent to stream valleys or other sensitive waters

1.4 Water Quality

1.4.1 Standards and Criteria

Water quality standards are the foundation of the water quality-based control program mandated by the CWA. Alaska's water quality standards are described in 18 AAC 70 Water Quality Standards. Water quality standards define the goals for a waterbody by designating

its uses, setting criteria to protect those uses and establishing provisions to protect water quality from pollutants. The water quality standards consist of four basic elements:

- Designated uses of the waterbody (e.g., recreation, water supply, aquatic life, agriculture)
- Water quality criteria to protect designated uses (numeric pollutant concentrations and narrative requirements)
- Antidegradation policy to maintain and protect existing uses and high-quality waters
- General policies that address implementation issues (e.g., low flows, variances, mixing zones)

EPA has compiled state, territory and authorized tribal water quality standards that are EPA-approved or were effective before May 30, 2000. These state and tribal water quality standards constitute the baseline of water quality standards in effect for CWA purposes. EPA must approve any revisions determined to be less stringent before use in CWA programs such as APDES permits, Total Maximum Daily Load (TMDL) allocations and CWA section 303(d) impaired waterbody listings. A link to specific information for waters in Alaska is at Web Link 19 in Appendix A.

ADEC also provides a summary of the differences between 2006 Alaska water quality standards and the water quality standards effective for CWA purposes on its web site (Link 20 in Appendix A).

1.4.2 Pollutants of Concern

Urban storm water typically contains pollutants that can degrade water quality and contribute to public health problems and the loss of natural resources. The variety and magnitude of pollutants generated is determined by the types of land use or land cover because that dictates what is exposed to rainfall or snowmelt and gets washed away and entrained in the runoff. As development intensity increases, the concentrations and types of pollutants also generally increase. Left uncontrolled, urban storm water can cause the following impacts, which are also summarized in Table 1-3:

- Cloud the water and make it difficult or impossible for aquatic plants to grow
- Pollute drinking water sources, filling in reservoirs with silt and oxygen-robbing nutrients and contributing to drinking water emergencies
- Fill navigable waterways with sediment requiring increased dredging and spoil disposal costs
- Destroy aquatic habitats

- Close or reduce the productivity of lucrative fisheries because of chemical contamination, oxygen starvation or habitat loss
- Foul beaches and other recreational waters, causing losses in revenues from declines in boating, fishing, hunting and coastal tourism
- Scour smaller stream channels and alter natural gravel and silt loads, damaging fish and amphibian habitat
- Degrade or destroy small streams, springs and wetlands during development, which are key sources of clean water

In addition to water quality impacts, uncontrolled storm water can contribute to flooding that damages homes and businesses.

Table 1-3. Typical storm water pollutants

Storm water pollutant and sources	Impacts
Increased runoff Land alterations increase the rate and amount of runoff from the watershed entering the stream.	Carries pollutants, erodes stream channel and banks, destroys in-stream habitat and increases flood potential
Sediment Dirt and sand on roads, driveways and parking lots or eroded sediment from disturbed surfaces (e.g., construction sites) enters a stream with storm water runoff.	Smothers aquatic habitat, depletes oxygen, reduces water clarity, degrades aesthetics and carries nutrients and toxic contaminants
Nutrients Excess fertilizers on lawns or fields, failing septic systems, and animal waste	Stimulates excessive plant growth, lowers dissolved oxygen levels, degrades aesthetics and destroys native aquatic life
Temperature Warmer water caused by runoff from impervious surfaces, removal of streamside vegetation, and reduction in groundwater flows	Harmful to salmon and other cold water species, promotes spread of invasive species and excessive plant growth, reduces dissolved oxygen levels in water and increase disease in fish.

Table 1-3. (continued)

Storm water pollutant and sources	Impacts
Bacteria Potentially pathogenic microscopic organisms in failing septic systems, sewer overflows, and animal (including pet) waste	Harmful to humans; untreated waste can cause numerous diseases.
Toxic contaminants/heavy metals Heavy metals such as mercury, cleaning compounds, pesticides and herbicides, industrial by-products such as dioxin, and vehicle leakage of oil, gas, and such.	Harmful to humans and aquatic life at fairly low levels; many resist break down and some accumulate in fish and other animal tissues (including human), and can lead to mutations, disease or cancer

Source: Adapted from Lake Superior Duluth Streams Web site (see Link 21 in Appendix A) (Duluth Streams, 2008)

Sediments/Solids

Harmful effects: The accumulation of sediments and solids in water has significant negative effect on the environment. These negative effects include the following:

- A decrease in visibility and increase in turbidity for aquatic organisms, making it difficult for these organisms to capture prey
- A decrease in light availability for photosynthetic organisms
- Clogging of gills in fish and aquatic species
- Reduction in fish spawning and general survival
- Increase in the transportation of heavy metals, phosphorous and other pollutants through waterways as they attach to the sediment particles and harm water quality

Common sources of sediments and solids include the following:

- Sand/gravel storage
- Construction sites
- Unpaved areas
- Agriculture/livestock uses
- Inadequate snow storage

Nutrients

Harmful effects: Excess nitrogen and phosphorus promote toxic and nontoxic algal blooms, which harm aquatic life by depleting the amount of oxygen in the water and by decreasing light penetration for photosynthetic organisms, which can promote unwanted weed growth. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms cannot exist in water with low dissolved oxygen levels.

Common sources

- Decaying vegetation
- Organic matter
- Treated wastewater
- Biodegradable detergents
- Animal wastes
- Fertilizers

Metals

Harmful effects: Metals have toxic effects on aquatic plants and animals and can bioaccumulate in aquatic species, such as mussels, which can then have a dangerous impact all the way through the food chain.

Trace metals, such as arsenic, copper, cyanide, mercury, nickel, and lead can come from air emissions from far away factories. These metals are toxic to aquatic life and accumulate in the sediments of streams, lakes, and estuaries as well as in fish tissue. These metals may come from pesticides, industrial waste discharges, solid waste landfill leachate, agricultural waste, or corroding metal pipes and storage tanks.

Common sources

- Cadmium: burning fossil fuels, paint, batteries and electroplating
- Chromium: air-conditioning coolants, timber treating works, leather tanning works and electroplating
- Copper: vehicle brake pads, copper plumbing, irrigation water and pesticides
- Zinc: vehicle tires, motor oils, galvanizing works, corrosion from galvanized iron
- Lead: mainly car exhausts and engines
- Arsenic: brake linings, fluid leaks and vehicle emissions

Pathogenic Bacteria

Harmful effects: The accumulation of bacteria from wastes poses a serious threat to the environment and to public health, especially for waterways where contact recreational activities take place. From storm water, these bacteria make their way into streams and lakes, which can cause biochemical oxygen demand (BOD) and depleted oxygen concentrations, leading to closure of shellfish beds and swimming beaches.

Common sources

- Human or animal wastes
- Sediments from sources that have previously been contaminated by bacteria
- Fertilizers derived from animal wastes

pH

Harmful effects: Indicates an altered chemical balance in the water column, which can put certain aquatic plants and animals at risk.

Common sources

- Metal plating
- Printing/graphic industries
- Cement/concrete production
- Wash waters
- Groundwater (possibly also from heating, ventilation and air conditioning condensate)

Biochemical Oxygen Demand, Trace Organics and Litter

Harmful effects: When organic matter is broken down by bacteria, it exerts oxygen demand. Organic matter, such as leaves, grass and tree branches affect water quality because as it decomposes, it consumes oxygen in the water. Reduced oxygen has a detrimental effect on aquatic life, including fish, insects and plants. Trash (inorganic litter, including plastic debris) produces an obvious visual pollution that can physically damage aquatic animals and fish and can release substances poisonous to natural systems as it breaks down. Washed into waterbodies, litter can choke, suffocate or disable aquatic life, including ducks, fish and birds. Blocked culverts increase difficulty of fish passage.

Common sources

- Litter (packaging/trash/garbage/debris)—plastic bags, six-pack rings, bottles, cigarette butts and such
- Leaves, vegetation and yard waste
- Deicing chemicals

1.4.3 Additional Water Quality Considerations

Antidegradation. The CWA requires states to develop an antidegradation policy implementation plan. In 1996 Alaska adopted its antidegradation policy into the Water Quality Standards (18 AAC 70). The basic purpose of the antidegradation policy is to maintain and protect existing water quality. Many waterbodies have natural water quality that is better than the criteria set by the Water Quality Standards at 18 AAC 70. In such cases, a wastewater discharge might meet water quality standards but still cause some degradation of the waterbody. The antidegradation policy sets requirements that a discharge must meet to justify lowering the existing water quality. The CWA requires that the implementation plan specify the procedures and criteria used to determine the following:

- When waters are degraded by discharges or NPS pollution
- Whether there are cost-effective alternatives to the new or increased discharge
- What social and economic benefit to the state would be necessary to justify any degradation

The implementation plan must also have procedures for nominating and designating Outstanding National Resource Waters, which allows special protections for such designated waterbodies. ADEC plans to develop implementation guidance that will provide specific information and procedures necessary to ensure that the requirements of Alaska's antidegradation policy are met consistently and predictably. This guidance will be developed in collaboration with other state and federal agencies and public input. A Web link, Link 22, to additional information is in Appendix A.

Impaired Waterbodies. Section 303 of the CWA establishes the water quality standards and TMDL program. Section 303(d) requires states to identify waters that do not meet applicable water quality standards with technology-based controls alone. Waters affected by thermal discharges must be identified. After identifying and priority ranking their water quality-limited waters, states must develop TMDLs at a level necessary to achieve the applicable water quality standards. TMDLs are a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutants' sources. Storm water is a common transport

mechanism of pollutants to waterbodies. ADEC lists impaired waters requiring TMDLs in Category 5 of the Alaska Integrated Water Quality Monitoring and Assessment Report, which is known as the 303(d) list.

A TMDL is required for a polluted waterbody to be removed from the 303(d) list of impaired waters. A waterbody can also be removed if there are assurances that pollution controls are in place, or will be in place that will result in attainment of water quality standards. EPA must approve TMDLs. TMDLs are implemented through BMPs for nonpoint sources of pollutants and through APDES permits for point sources of pollution. These waters are shown in Category 4b of the Integrated Report. EPA approved TMDLs are available for viewing and printing in PDF format from the Web, see Link 23 in Appendix A.

Anadromous fish habitat. Alaska Statute AS 16.05.871 (the Anadromous Fish Act) requires that an individual or governmental agency provide prior notification and obtain approval from the Alaska Department of Fish & Game (ADF&G), "to construct a hydraulic project or use, divert, obstruct, pollute, or change the natural flow or bed" of a specified anadromous waterbody or "to use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed" of a specified anadromous waterbody. The ADF&G Division of Habitat is responsible for ensuring preservation of the state's fish and wildlife resources by protecting the habitat necessary for the organisms to complete their life cycles.

The Division of Habitat has specific statutory responsibility for protecting freshwater anadromous fish habitat and for providing free passage for anadromous and resident fish in freshwater waterbodies under the Fish Way Act (Alaska Statute AS 16.05.841). The Division of Habitat fulfills this responsibility by writing Fish Habitat Permits for activities and projects conducted by private individuals or other state or federal government agencies below the ordinary high water boundary of fish streams. Habitat biologists in the Division of Habitat conduct research and field surveys, review plans with permit applicants to help ensure that projects do not adversely impact fish habitat and monitor projects for compliance with permit standards.

In addition to permitting duties, the Division of Habitat coordinates with other agencies during plan reviews to provide expertise for protecting both important fish and wildlife habitat throughout the state. Examples of these reviews most relevant to storm water include working with the state Division of Forestry to review timber harvest plans, working with the Alaska Department of Natural Resources (ADNR) Office of Project Management and Permitting on major new projects and providing comments on projects under review for consistency with the Alaska Coastal Management Program. The Division of Habitat also works cooperatively within the ADF&G to maintain and revise the *Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes*, which lists

waterbodies that are known to be used by anadromous fish and gives these streams and lakes legal protection as important fish habitat.

1.5 Enforcement and NPDES Primacy

ADEC assumed the responsibility to issue and enforce the municipal, industrial and construction APDES storm water permits on October 31, 2009. Substantial changes are not anticipated to storm water permits during the transition because EPA has worked closely with ADEC in developing the existing NPDES permits; ADEC has certified that EPA permits will meet state water quality standards. ADEC also issues discharge permits under state authority for discharges that EPA is not authorized to permit. As described above in the local programs discussion, the Municipality of Anchorage conducts enforcement of dischargers to its MS4. The City of Fairbanks, the City of North Pole and the Fairbanks North Star Borough are developing ordinances that they will enforce through their MS4 storm water management programs.

Section 402 of the CWA requires that all discharges to surface waters be permitted under the NPDES permit program. The CWA intends for states to implement (to have *primacy* for) the NPDES program with EPA acting in an oversight role. As of October 2009, 46 states have primacy for the NPDES program. The four other states that do not have NPDES primacy are Idaho, New Mexico, New Hampshire and Massachusetts.

Senate Bill 110, signed into law August 27, 2005, authorizes and directs ADEC to pursue NPDES primacy from EPA. ADEC submitted an application for primacy to EPA in May 2008, and EPA authorized ADEC to begin a phased approach to transfer primacy from EPA to ADEC on October 31, 2008. NPDES primacy will allow Alaska to take over discharge permitting authority including responsibility for issuing and monitoring compliance with the permits. ADEC has requested responsibility for the following components of the NPDES permit program:

- NPDES Permitting, which includes developing, issuing, modifying and renewing the permits for all process wastewater from industrial facilities and municipal wastewater treatment plants that discharge to waters of the United States. This includes the permitting of storm water discharges from construction and industrial activities, as well storm water discharged by regulated MS4s. It also includes permitting discharges from federally owned facilities such as Department of Defense installations.
- Pretreatment Program, which consists of regulating highly toxic discharges into sewerage systems.

- Compliance and Enforcement, which includes monitoring compliance with permit terms and conditions and taking enforcement action when necessary.

The NPDES storm water program was transferred from EPA to ADEC on October 31, 2009. The storm water permits that were in effect at the time of transfer became APDES permits with no substantive changes to the EPA permits. As previously mentioned, local governments may also have authority under their specific charters to enact and enforce local storm water, pollution control, and erosion and sediment control regulations.