

2012 ANNUAL REPORT

APDES Permit No. AKS-052558

Document No. WMP PMr12001

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Municipality of Anchorage



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February 1, 2013

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Acronyms

ADEC	Alaska Department of Environmental Conservation
AMC	Anchorage Municipal Code
APDES	Alaska Pollutant Discharge Elimination System
ADOT&PF/DOT	Alaska Department of Transportation and Public Facilities
ARDSA	Anchorage Road and Drainage Service Area
AWC	Anchorage Waterways Council
CBERRRSA	Chugiak Birchwood Eagle River Rural Road Service Area
CESL	Certified Erosion and Sediment Control Lead
DCM	Design Criteria Manual
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Global positioning system
HGDB	Hydrogeodatabase
LID	Low Impact Development
M&O	ADOT&PF Central Region Division Maintenance and Operation
MASS	Municipality of Anchorage Standard Specifications
MOA	Municipality of Anchorage
MS4	Municipal separate storm sewer system
MS4GDB	MS4 geodatabase
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OGS	Oil and grit or oil and grease separator
ROW	Municipal Rights of Way
SOP	Standard Operating Procedures
SWPPP	Storm Water Pollution Prevention Plan
SWTPRGM	Storm Water Treatment Plan Review Guidance Manual
WMS	Watershed Management Services

Introduction

The Municipality of Anchorage (Municipality) and the State of Alaska, Department of Transportation and Public Facilities (ADOT&PF), submit this Report in fulfillment of the annual reporting requirements of APDES Permit No. AKS 05255-8, *“Authorization to Discharge Under the National Pollutant Discharge Elimination System”* (Permit), effective date February 1, 2010. This report satisfies the criteria set forth in Permit Section IV.C and is organized by program to demonstrate compliance with the *“Storm Water Management Program - Schedule for Implementation and Compliance”* presented in Section III of the Permit. Documents produced in compliance with this Report are included in associated Appendices A through H.

The permittees responsibilities are both joint and individual; they are laid out in their Inter-jurisdictional Agreement describing their respective roles and responsibilities related to this Permit. Coordination between groups within the permittees organizations are laid out in their Program Coordination Plans.

Responsibilities for certain requirements have been shared with the Anchorage Waterways Council based on interests expressed during the public comment period associated with the draft Permit. The delegated activities are in the area of Public Education for General Audiences located in Permit Part II.B.6.

1 Program Coordination

1.1 Annual Meeting

The 2012 Annual Meeting provided information to participants about the third term of the Municipal Separate Storm Sewer System (MS4) Permit. The meeting was held the morning of March 29th at the BP Energy Center and attended by 115 people with an interest in stormwater management. It covered the activities of the second year of the Permit and overviewed the upcoming year with focus on the half inch retention requirement, low impact development pilot projects, ADOT construction site erosion sediment control, OGS and sedimentation basin evaluation, asset tracking, and monitoring. The power point slides, agenda, program, and survey results summary are available in Appendix A1.

1.2 Quarterly Meetings

Quarterly Meetings between the permittees and ADEC continued through the third permit year to provide a forum of discussion regarding permit activities and issues. These meeting summaries are available in Appendix A2.

1.3 SWMP

The Storm Water Management Plan (SWMP) action and activities, defined in the Permit, are intended to reduce the discharge of pollutants from the MS4 into receiving waters to the maximum extent practicable (MEP). With this core goal in mind the permittees have implemented the prescribed best management practices (BMP) including control measures, system design, engineering methods, and other provisions appropriate to the control and minimization of pollutants and addressed the Permit requirements as described in our compliance reports. The compliance measures taken in 2012 are identified in their appropriate program summaries along with results of information collected, summaries of activities, and appendix references and web-links to associated supporting materials. Also in each program section are self-assessments of performance and summaries of planned activities for future reporting cycles. The permittees believe all third year Permit requirements were met with the following exception. The

Municipality was unable to complete approximately twenty percent of its fall sweep due to catastrophic wind storms that uprooted hundreds of trees onto roads and greenbelts. Crews worked exclusively to open rights of ways and eliminate hazards throughout the identified timeframe. During this time, freeze-up eliminated further sweeping opportunities.

Significant parts of this permit year were implemented by primary coordinating groups. They have provided 2012 MS4 Summaries for their areas of permit compliance. These are provided in Appendix A3.

The permittees have broken their program costs into two functional categories: Operations & Maintenance and Program Management/Project Administration. The 2012 costs are presented in Table 1.1.

Table 1.1 2012 SWMP Program Costs

	ADOT&PF	Municipality	CBERRRSA	Total
Maintenance & Operations	\$3.5M	\$ 2.3M	\$0.80M	\$6.6M
Program Management/ Administration	\$0.5M	\$1.3M	-	\$1.8M
	\$4.0M	\$3.6M	\$0.80M	\$8.4M

1.4 Storm Water Website

In 2012 the permittees provided access to their website found at www.AnchorageWatershed.com or www.AnchorageStormwater.com. This homepage, redesigned in 2011, was evaluated and improved during 2012 to ensure it successfully acts as the repository for all program information including project reports, data, map products, forms, permit applications, construction stormwater pollution prevention (SWPPP) guidance, and watershed plans. This site is accessible additionally through the Municipal website: http://www.muni.org/Departments/works/project_management/WM/Pages/Default.aspx.

1.5 Watershed Planning

The permittees are required to complete two watershed plans before the end of the second term of the Permit. The Little Campbell Creek Watershed Plan was developed under the guidance of a working group composed of diverse agency interests and supported by staff from Watershed Management Services (WMS), U.S. Fish and Wildlife Service, and the Anchorage Waterways Council. The report is available on the WMS website.

The second watershed plan, currently under way, is the update of the draft Chester Creek Watershed Plan. A working group composed similarly to the Little Campbell Creek Plan began meeting in 2011 to define this project's activities including the incorporation of information on invasive species, fish passage, wildlife management, and an implementation plan for achieving desired goals. As part of this effort, the Municipality contracted the development of a *Chester Creek Watershed Subbasin Prioritization for LID Stormwater Projects* in 2012 (Appendix A4). The projects identified will be incorporated into the implementation plan as the work group moves toward completion of the plan in 2013.

2 Construction Site Management

2.1 Regulatory Mechanism and Standards

Ordinance and/or Regulatory Mechanism

ADOT&PF Projects ADOT&PF regulates construction site management of its projects through Section 641 of its standard specifications. These were updated in 2010. These standard specifications are contractually enforced. ADOT&PF provides guidance on contract administration to its project staff through Chapter 9.9 of the Alaska Construction Manual which outlines procedures for implementing and monitoring construction SWPPPs. These documents were provided in the 2010 Annual Report

Private Development The Municipality regulates stormwater management at private construction sites Anchorage Municipal Code (AMC) Title 21. The Municipal ordinance 2010-81, adopted on December 7, 2010, amends Title 21 to require a permit, entailing plan review and approval, for ground disturbing activities. This ordinance adds a new section, AMC 21.67.09, to Municipal code. A copy of the pertinent portion of ordinance 2010-81 (Section 47) was provided in the 2010 Annual Report

Municipal Projects The Municipality regulates stormwater management during construction of its own (public) projects through Division 20 (MASS Section 20.02) of its Municipality of Anchorage Standard Specifications (MASS). These standard specifications are contractually enforced. In 2012, MASS Section 20.02 was updated to incorporate requirements of Alaska's 2011 Construction General Permit. A link to the MASS is found at http://www.muni.org/Departments/works/project_management/Pages/MASS.aspx.

Construction Storm Water Manual

ADOT&PF Projects ADOT&PF revised its Alaska SWPPP Guide in March 2011. The revised guide is available on the ADOT&PF web site. A link to the manual is found at: http://www.dot.state.ak.us/stwddes/desenviron/pop_swppp.shtml

Private and Municipal Projects The Municipality updated its Storm Water Plan Review and Treatment Guidance Manual in September, 2010, to reflect the 2010 Alaska Construction General Permit and to include new items, such as a requirement for submittal of record drawings (as-builts) and to specify new inspection requirements. The manual is referenced both from AMC 21.67 (applicable to private projects) and from the Municipal Design Criteria Manual Chapter 2 (applicable to Municipal projects; see Section 3.1). A link to the manual is found at http://www.muni.org/Departments/works/project_management/Pages/StormWaterTreatmentPlanReview.aspx

Between 2012 and 2014, the manual is scheduled to be revised again for greater clarity and for the purposes of consolidating and streamlining the various Municipal regulatory documents related to construction and new development.

2.2 Plan Review and Approval

ADOT&PF Projects ADOT&PF reviewed and approved SWPPPs for 8 new projects contracted and administered by ADOT&PF. A list is provided in Appendix B1. ADOT&PF is a co-operator on these projects with the Construction Contractor performing the work.

Private and Municipal Projects The Municipal Watershed Management Services (WMS) continues to review construction SWPPPs for projects conducting ground disturbance greater than 500 square feet. The types of projects reviewed include any work requiring a building permit, utility work, new subdivisions and road projects. On July 1, 2011, WMS began regulatory review of all Municipal projects 1 acre and greater. The reviews encompass construction erosion control measures and permanent stormwater management practices.

In 2011, WMS reviewed, approved, and inspected approximately 273 new single family dwellings, 36 duplexes, 40 multi-family dwellings, 29 commercial buildings, and a number of residential, commercial and government building additions. WMS also conducted Storm Water Pollution Prevention Plan reviews of 15 Municipal Projects.

The Municipal Development Services Division implemented a computer-based building permit administration system to track and document plan reviews and approvals in 2010. WMS continues to pursue applicable program updates in compliance with conditions of the MS4 Permit. For 2013, the Municipality is working to automate identification of projects subject to the common plan of development as well as projects proposed in sensitive sites constituting a threat to water quality. This will enable a reduction of building permits needing further review for project areas less than 10,000s.f. and help streamline the stormwater review process.

2.3 Construction Site Inspections and Enforcement

2.3.1 Inspection and Enforcement Tracking

A summary of inspection activities reveals that 244 commercial site inspections and 438 residential site inspections were conducted during 2012 including 18 construction related inspections from the illicit discharge reporting website located at:

<http://www.muni.org/Departments/OCPD/development/BSD/Pages/CodeEnforcement.aspx> For each of these inspections the SWPPP or other site documentation was reviewed and a physical inspection of the site was performed to confirm there were no illicit discharges. At the conclusion of the visit an inspection report of findings and any required corrections was given to the site representative. Where corrections were indicated a re-inspection was scheduled to confirm compliance. When compliance isn't achieved within the specified period of time a stop work order is issued until compliance is achieved. In 2012 no stop work orders were given. The records for site inspections along with associated compliance follow-up are available for review at WMS.

2.3.2 Enforcement Response Policy

ADOT&PF ADOT&PF provides guidance on enforcement and corrective action implementation to its project staff through Chapter 9.9 of the Alaska Construction Manual. A link to this manual can be found at http://www.dot.state.ak.us/stwddes/dcsconsti/pop_constman.shtml.

Municipal The Municipality updated its escalating enforcement policy during the second year of the Permit. It was provided with the second annual report.

2.3.3 Construction General Permit Violation Referrals

ADOT&PF ADOT&PF provides guidance to its project staff on reporting noncompliance in Chapter 9.9 of the Alaska Construction Manual. A link to this manual can be found at http://www.dot.state.ak.us/stwddes/dcsconsti/pop_constman.shtml

Municipal The permit requires the Municipality to report to ADEC when they find projects which failed to comply with the Construction General Permit prior to breaking ground. In 2012 MOA did not file any reports of non-compliance to the ADEC.

2.4 Construction Program Education and Training

Agreement was reached by agencies and interest groups for a standardized training course targeted for construction site owners and operators and their key personnel. In 2009, a Memorandum of Understanding to establish Certified Erosion and Sediment Control Leads in Alaska (AK-CESCL) was signed by eight governing members comprised of the Alaska Department of Environmental Conservation, the Alaska Department of Natural Resources, ADOT&PF, the Alaska Railroad Corporation, the Associated General Contractors, the Municipality, the US Army Corp of Engineers, and the Associated Builders and Contractors Alaska. The agreement, training requirements, and course elements for the AK-CESCL program were provided in the 2010 Annual Report.

ADOT&PF ADOT&PF conducted the following trainings (outlines and sign-in sheets in Appendix B2):

Spring Fling: 4-3-12 and 4-4-12. CR Construction Annual Training. A portion of this training always deals with environmental issues and emphasizes things that have changed in the last year or things that ADOT&PF had problems with during the last year.

Environmental Expo: 3-22-12. This day-long information seminar incorporates a variety of speakers and topics related to all aspects of construction topics.

AK CESCL: 4-16-11. Alaska Certified Erosion and Sediment Control Lead (AK CESL) is a 2 day course. Per ADOT&PF's Consent Decree with the EPA all Project Engineers and SWPPP Inspectors must be AK CESCL certified or an approved equal. This program requires recertification every 3 years.

CISEC: 4-9-12. Certified Inspector of Sediment and Erosion Control. This is a nationwide certification program for Storm Water Inspectors. This program requires the inspector to earn at least 12 Continuing Development Hours per year to maintain their certification.

Appendix R Project Reviews: In addition to the inspections required under the permit, ADOT&PF's Quality Assurance Staff performs in-depth SWPPP reviews and field inspections on select projects. These reviews provide stormwater training to both the Construction Contractor and ADOT&PF project staff.

Municipal The Municipality conducted the following training:

AK CESCL: The Municipality ARDSA recertified its construction project staff through the AK CESCL training program on April 27-28, 2011 for three years. The Chugiak Birchwood Eagle River Rural Road Service Area (CBERRRSA) staff recertified in 2012. The course elements for this training were provided in the 2010 annual report.

3 Storm Water Management for Areas of New and Redevelopment

3.1 Regulatory Mechanisms and Standards

3.1.1 Ordinance and/or Regulatory Mechanism

ADOT&PF ADOT&PF regulates project development through the Preconstruction Manual, SWPPP manual, most recently updated in February 2011, and the Alaska Highway Drainage Manual. These manuals are backed by Alaska State law. Chapter 11 of the Preconstruction Manual dictates highway

design criteria. Manuals are periodically updated to reflect new requirements. In addition, project or region-specific requirements are disseminated by the Preconstruction Engineer or Division Director. This Permit requirement is being met through periodic manual updates. In addition, the newest APDES Construction General Permit has been issued, effective July 1, 2011 through January 31, 2016.

Municipal Projects The Municipality regulates permanent stormwater controls on its own projects through the Municipal Design Criteria Manual (DCM). This Permit requirement has been met by changes to the DCM prior to the Permit expiration date, as described in section 3.1.2.

Private Projects The Municipality regulates permanent stormwater controls through the Anchorage Municipal Code Title 21, which refers to the DCM. This Permit requirement will be made by changes to DCM prior to the Permit expiration date, as described in section 3.1.2.

3.1.2 Storm Water Design Criteria Manual

ADOT&PF Projects ADOT&PF Projects The DOT&PF continues to use the Alaska Highway Preconstruction Manual, Chapter 1120 (Elements of Design), Section 1120.5 (Drainage), and the Alaska Highway Drainage Manual as basic guidance documents. Central Region Design Division does not have the authority to update or modify Department-wide manuals. ADOT&PF's Division of Statewide Design & Engineering Services is responsible for and working on updating the Alaska Highway Drainage Manual to incorporate additional Storm Water Design Criteria. However, Central Region-specific modifications are made to standard specifications and design criteria as required to comply with the permit. The ADOT&PF Central Region Design Division has two updates to report this year. Standard specification section 641 (Erosion, Sediment, and Pollution Control), was most recently modified/updated on May 8, 2012. In addition, Central Region's standard modification to specification section 619 (Soil Stabilization) was modified/updated on October 4, 2012 to include three new BMPs for onsite soil stabilization for erosion control. Central Region Designers also use the Municipality's Drainage Design Guidelines, the Low Impact Development Design Guidance Manual, and the Storm Water Treatment Plan Review Guidance Manual (SWTPRGM) as needed to supplement the Alaska Highway Drainage Manual to comply with the MS4 Design Criteria.

Private and Municipal Projects The Municipality establishes design criteria for permanent stormwater controls through Chapter 2 of its DCM, which is referenced from AMC Title 21. The DCM provides policy and incorporates by reference associated manuals, including the Drainage Design Guidelines, the Low Impact Development Design Guidance Manual, and the SWTPRGM. These manuals have all been updated between 2008 and 2010 to reflect current regulations and stormwater management practices; they may be found on the Municipal website.

With the requirement to retain a portion of stormwater runoff on site, the Municipality began a process to update and consolidate their various manuals into two comprehensive manuals incorporating related regulation, site-based practices, and operations and maintenance procedures. An internal review draft of the new DCM, and its companion the Anchorage Stormwater Manual, were completed in 2012. In 2013 the current and proposed DCM and accompanying draft Stormwater Manual are scheduled to be reviewed through a volunteer public review process to ensure the final product accommodates community needs to the maximum extent while also complying with the requirements and compliance schedule specified in the Permit.

3.2 LOW IMPACT DEVELOPMENT STRATEGY AND PILOT PROJECTS

3.2.1 LID Strategy

The Municipality continues to sponsor an incentive program for rain gardens supported by a grant from the United States Fish and Wildlife Service. In 2012, this program sponsored all types of vegetated Low Impact Development (LID) techniques and offers a larger financial incentive for bigger and more varied rain garden projects; Rain gardens with contributing areas greater than 2,000 sqft qualify for a reimbursement of up to \$5,000. In 2012, the program supported the construction of 14 rain gardens throughout Anchorage. Incentive support includes, but is not limited to, financial cost sharing, technical guidance, and ongoing maintenance for public and school rain gardens. Other assistance is provided in the form of manuals, brochures, websites, tours, hands-on workshops, private consultations, and ongoing classroom support. More information on the Anchorage Rain Garden Program can be found on the website www.AnchorageRainGardens.com. A map and more details on the constructed rain gardens can be found in Figure 3.1 and Table 3.1 below.

Figure 3.1: Map of Rain Gardens Constructed in 2012

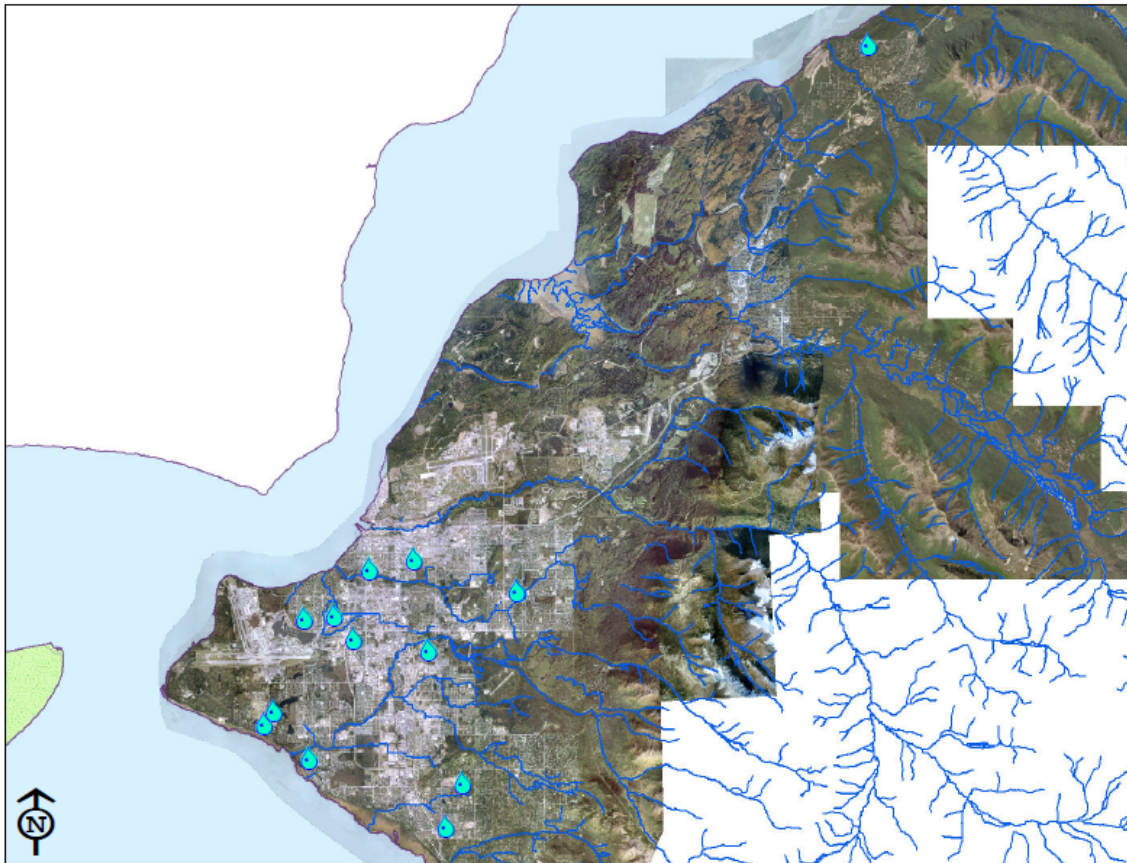


Table 3.1 Rain Gardens Incentivized in 2012

Type (Commercial, Residential)	Project Name	Impervious Contributing Area (sqft)	Final Garden Size (sqft)	In-kind Labor (hr)	Reimbursement	In-Kind Materials (\$)	Total Garden Cost
R	Residential	941	270	25	\$750.00	\$750.00	\$1,500.00
R	Residential	300	36	20	\$750.00	\$1,359.42	\$2,109.42
R	Residential	825	78	42	\$269.20	\$269.20	\$538.40
R	Residential	315	15	32	\$200.70	\$200.71	\$401.41
R	Residential	2488	186	38	\$674.16	\$900.00	\$1,348.32
R	Residential	800	160	155	\$603.62	\$603.63	\$1,207.25
R	Residential	805	245	25	\$750.00	\$750.00	\$1,500.00
R	Residential	469	62	27	\$190.26	\$190.27	\$380.53
R	Residential	609	87	78	\$407.92	\$407.92	\$815.84
R	Residential	1166	130	50	345.99	345.99	691.98
R	Residential	923	234	16	\$579.64	\$579.64	\$1,159.28
R	Residential	1250	52	7	82.64	82.64	165.28
R	Residential	675	78.5	18	\$750.00	\$1,148.50	\$1,898.50
C	Boys and Girls Club	30000	1300	25	\$5,619.18	\$4,720.23	\$10,339.41
Total	14 Rain Gardens	41566	2933.5	558	\$11,973.31	\$12,308.15	\$24,055.62

The 2,934 square feet of rain gardens constructed in 2012 capture and treat runoff from roughly 41,566 square feet of impervious surface. For a single half inch rain event, the rain gardens would collectively pool and infiltrate approximately 13,000 gallons of stormwater throughout the Municipality, relieving the slightest pressure from the MS4. With 558 hours of in-kind labor, those who build rain gardens learn much about Low Impact Development.

3.2.2 Pilot projects

This Permit requirement is due in 2013. The ADOT&PF and the Municipality began selection of projects for incorporation of LID. The Municipality will conduct the hydrologic performance evaluations upon each project's completion. The monitoring plan for evaluation of LID pilot projects is included in the Quality Assurance Project Plan, Municipality of Anchorage Monitoring Program, provided in the 2010 Annual Report, available on the Municipal website. Results of the evaluation may be used to revise the design criteria described in Section 3.2. The need for criteria revision will be assessed, and if necessary, completed by the Permit expiration date.

ADOT&PF Projects ADOT&PF Central Region's three pilot projects include West Dowling Phase I and II, the Seward Highway Tudor to Dowling project, and the AMATS Muldoon Road pedestrian & landscaping, Phase III project. Meetings were conducted between Municipality and ADOT&PF representatives to discuss LID methods and pre-construction monitoring efforts have been completed. West Dowling Phase I is approximately 90% complete and in winter shutdown. The only remaining work includes paving the top lift and a few minor tasks, which will be completed by July 2013. Seward Highway Tudor to Dowling is 40% complete. Work continues through the winter to complete bridge work. Work will shut down February-March and restart in spring 2013. This project is scheduled for completion mid-2014. Construction of the Muldoon Road landscaping project is 100% complete and LID monitoring has begun.

Municipal Projects In 2011, the Municipality began identifying potential projects that could incorporate LID techniques. The Rain Garden at Taku Park, built in 2007 in anticipation of the new permit, was confirmed to be consistent with the pilot project requirement, and in 2012 a monitoring station was set up to track its performance. Also in 2012, the Municipality designed and constructed a LID project at the Russian Jack Springs Park ballfield where site redevelopment was under way. The site parking lot incorporated a subsurface site runoff infiltration gallery as well as a cold climate trial of pervious asphalt over a portion of the parking surface. Project descriptions for both LID projects are provided in Appendix C1. The Municipality will monitor the performance of both sites in 2013 and provide results in the 2013 annual report.

3.2.3 Rain Gardens

This Permit requirement is due in 2013 and is included in the LID Strategy and pilot projects discussed above.

3.2.4 Riparian Zone Management

This Permit requirement is due in 2014. In 2010 and 2011, the Municipality began evaluating outfalls as candidates for outfall disconnection. Two existing outfall projects were considered and rejected for disconnection for reasons related to drainage area size or ground water depth. The Municipality has project funding in place and will make an outfall selection in 2013.

3.2.5 Parking Lot Retrofit

This Permit requirement is due in 2013 and is included in the LID Strategy and pilot projects discussed above.

3.2.6 Street and Parking Lot Repair

This Permit requirement is due in 2013 and will be addressed by the maintenance and operations agencies within the ADOT&PF and the Municipality.

3.3 Permanent Storm Water Controls Plan Review and Approval

ADOT&PF Projects ADOT&PF continues to review all projects during 3 phases of development. Reviews are conducted at the local review (30% completion), plans in hand review (65% completion), and pre-Plan Specification and Estimation (PS&E) review (95% completion). In addition, on larger projects, an Erosion and Sediment Control Plan (ESCP) focused review occurs after the pre-PS&E review to ensure stormwater issues are addressed. Plan reviews are conducted by design and environmental staff, as well as the Central Region Hydrologist.

Private Development The Municipality continues to review all work requiring building permits and new subdivisions for permanent stormwater runoff practices. Issuance of a building or stormwater permit will serve as written approval as specified by the APDES MS4 Permit. The Municipality will continue to review and approve permanent stormwater controls in 2013.

Municipal Projects On July 1, 2011, WMS began regulatory review of all Municipal projects 1 acre and greater. These reviews are part of our MS4 Permit requirement under part II.B.2.d)i and the ADEC Construction General Permit. The reviews encompass construction erosion control measures and permanent stormwater management practices. The Municipality will continue to coordinate with ADEC to insure our projects meet the ADEC waste water regulations.

3.4 Permanent Storm Water Management Controls Tracking and Enforcement

3.4.1 Inventory and Tracking

Private Storm Water Controls In 2010, WMS began developing a database schema for the required information. In 2011, the database was built and populated to approximately 20% completion with information from archived building permits (dated 1999 to 2010). In 2012, this effort achieved approximately 50% completion. As-built drawings of private stormwater controls, certified by a Professional Engineer, are required prior to closing a Municipal Building Permit for new and redeveloped properties. These as-builts are scanned and recorded into the database.

Public (ADOT&PF and Municipal) Storm Water Controls In 2010, the Municipal Street Maintenance Division acquired and began implementing an asset management database that will be used to inventory and track municipally- and state-owned stormwater controls. In 2011, the Street Maintenance Division began mapping stormwater controls using GPS instruments and populating the asset management database. GPS mapping continued in 2012. This inventory and tracking database will allow Street Maintenance to access information about the condition and maintenance requirements of the stormwater controls owned by the Municipality. O&M Agreements

Beginning in 2011, as part of its review and approval process, as described in the SWTPRGM, the Municipality began requiring submittal of an Operations and Maintenance (O&M) Manual for private stormwater controls. This was a first step toward alerting property owners of their responsibilities in maintaining stormwater controls.

3.4.2 O&M Agreements

Beginning in 2013, WMS will require a legally enforceable and transferable O&M agreement for private stormwater controls on new and redeveloped properties. While this component was not required until year five of the permit, WMS elected to initiate it earlier to more effectively conduct inspection and enforcement. These O&M agreements will be scanned and entered into the tracking database.

3.4.3 Inspection and Enforcement

ADOT&PF and Municipal Storm Water Infrastructure See Section 5 for details on inspection and maintenance of ADOT&PF and Municipal stormwater management controls and infrastructure.

Private Storm Water Management Controls Under the updated SWTPRGM, and as part of a Permit requirement described in an earlier section, the Municipality now requires as-built drawings of all constructed stormwater controls that were approved under a Municipal permit. This as built is scanned and entered into the tracking database described above. A final stormwater inspection is required prior to receiving a certificate of occupancy. High priority sites, requiring, annual inspection, will be identified and prioritized using Checklist #3 of Building Safety Handout AG 21. This checklist is included as Appendix C2.

3.5 Permanent Storm Water Controls Training

ADOT&PF ADOT&PF conducts quarterly design meetings for all design and environmental staff, including topics related to permanent stormwater controls. In addition, ADOT&PF technology transfer staff (T2) set up annual training schedules with some courses specifically focused on storm water and drainage issues.

Municipality As part of an ongoing discussion about oil and grit separator design, installation, and maintenance the Municipality hosted a training session for design and maintenance staff conducted by

Stormceptor in June 2012. Issues discussed included treatment capability and access for maintenance. Additionally, review and project review and inspection staff received training on LID through the Green Infrastructure Webcast Series available on the EPA website, http://cfpub.epa.gov/npdes/outreach.cfm?program_id=0&otype=1.

4 Industrial and Commercial Discharge Management

4.1 Inventory of Industrial and Commercial Facilities

An inventory and map of facilities discharging to the MS4 has been updated. It contains the industrial sectors currently tracked as well as all industrial sectors listed in 40 CFR 122.26(b)(14), and a number of commercial locations including vehicle or equipment wash systems and animal facilities with the potential of negatively impacting the MS4. The inventory and map are provided in Appendix D1.

4.2 Snow Disposal Sites

Part II.B.3.b) requires permittees, within one year of the Permit effective date, to "...inventory and map locations of all permittee-owned and privately owned snow disposal sites that discharge directly to the MS4 or to receiving waters.." with mapping updates performed annually thereafter. In 2012, the permittees have no changes to the map and list of all permittee-owned and all known privately-owned snow disposal sites submitted in the 2011 annual report.

Based on the inventory and information collected over several past permit years a decision was made to place additional regulation on snow disposal sites as part of the Anchorage Municipal Code Title 21 revision of December 2010 and the larger Title 21 Land Use Code re-write expected to be adopted in February of 2013. This project summary of considerations and resulting regulatory updates was submitted in 2011. Upon final adoption of the Anchorage Municipal Code Title 21 the regulatory updates will be reconfirmed.

4.3 Animal Facilities

The Municipality evaluated whether to further regulate commercial animal facilities through ordinance or other regulatory mechanism to prevent animal waste from entering the MS4 and protect water quality. While this project is due in year three, the Municipality completed it ahead of schedule. The report, submitted in the 2011 annual report summarizes the decisions and actions taken by the Municipality to further regulate through performance standards the animal facilities in Anchorage.

5 Stormwater Infrastructure and Street Management

5.1 Storm Sewer System Inventory and Mapping

Under Permit part II.B.4.a) permittees "...must update current records to develop a comprehensive inventory and map of the MS4s.." within three years of the effective date of the Permit. Inventory and maps must cover the entire MS4 and provide location, attribute and spatial reference information at minimum for all of the following MS4 features:

- Pipe systems
- Inlets, catchbasins and outfalls
- Structural stormwater treatment controls

- Receiving waters of the MS4
- Subbasin of each outfall
- MS4 roads and parking lots, and
- MS4 maintenance and storage facilities

The Permit requires that the mapping be sufficiently complete and connected to establish relative spatial relationships. For example, outfalls must be associated with receiving waters (requiring outfalls and receiving waters to be mapped and spatially referenced to each other). Similarly, drainage systems must be spatially related to outfalls and sufficiently complete (include enough connecting information, including pipes, ditches, and natural drainage features) to allow mapping the entire area (subbasin) that contributes to its associated outfall. Finally, the Permit also requires mapping of all MS4 permittee-owned roads and parking lots as they relate to the Anchorage MS4.

These maps showing the combined ADOT&PF and MOA infrastructure, are updated and available at: <http://www.anchoragestormwater.com/maps.html>

5.2 Catch Basin and Inlet Inspections and Maintenance

In compliance with Permit part II.B.4.b) the permittees were required to “..initiate an inspection program to inspect all permittee-owned or operated catch basins and inlets at least annually and take appropriate maintenance action based on these inspections..” within two years of the effective date of the Permit. All the principle MS4 maintenance agencies of the permittees have taken preparatory steps in development of such an inspection and maintenance program and, in fact, began implementation of select inspections and maintenance activities in 2010 as part of those program development efforts.

Central Region Division’s Maintenance & Operations (M&O), the maintenance arm for ADOT&PF’s Anchorage MS4 jurisdiction, is continuing mapping efforts to correct existing ADOT&PF pipe mapping as well as capture new pipe features for inclusion in maintenance mapping sets. In 2012, ADOT&PF inspected 3,721 structures and cleaned 1,550 catchbasins. In addition, they inspected and cleaned 49 oil-grit separators (OGS).

The Municipality’s authorized MS4 maintenance agency for the CBERRRSA was also able to implement a comprehensive catch basin and inlet inspection and maintenance program in 2010. Like M&O, CBERRRSA improved pipe and structure mapping within its operational area in 2011. In 2012, 1,000 structures were inspected, and 997 catchbasins and 6 OGS were cleaned.

The Municipality’s Anchorage Road and Drainage Service Area (ARDSA) comprising most roads in Anchorage not maintained by road service areas or owned by ADOT&PF continued its ongoing OGS and catchbasin inspection and maintenance program. During 2012, 9,299 controls were inspected, and 221 OGS units and 1,880 catchbasins and inlets were cleaned.

5.3 Street and Road Maintenance

5.3.1 Standard operating procedures

Standard Operating Procedures were reviewed in 2012 for Municipal and ADOT&PF street maintenance agencies. No changes were made. Existing practices will be updated as needed in future reports to reflect changes.

5.3.2 Inventory of materials

Part II.B.4.c)(ii) of the Permit requires permittees to “..maintain an inventory of street/road maintenance material, including use of sand and salt..” and report the inventory in the annual report. Road maintenance materials used by all Anchorage MS4 operators include primarily winter traction enhancing materials. The types of materials used vary somewhat from agency to agency and from street to street but mostly include application of traction-enhancing sands and a variety of deicers and anti-icers. The bulk of deicers are added to the sand prior to its application to the road surface to maintain sand fluidity in sanding vehicles and to help embed the sand particles in road ice. Sand gradations vary by agency with ADOT&PF operators typically using a somewhat finer gradation for their mostly higher speed roads than Municipal operators both for safety reasons and to improve stability of the sand on the road surface. Inventory tables of these materials are summarized in Table 5.1 below.

Table 5.1 Anchorage MS4 Street Materials Inventory, 2012

Item	Type	Units	Amt. Stored 12/31/2012	Amt. Ordered 2012	Amt. Used 2012	Storage Location
ADOT						
Sand	M&O spec.	ton	11,000	25,004	20,000	Anchorage
Sand	M&O spec.	ton	1,500	5,980	5,000	Birchwood
Sand	M&O spec.	ton	2,000	8,011	6,500	Girdwood
NaCl	granular	ton	700	1,610	1,300	Anchorage
NaCl	granular	ton	100	403	350	Birchwood
NaCl	granular	ton	175	801	650	Girdwood
MOA-CBERRRSA						
Sand	ARDSA spec.	ton	18,000	10,000	8,463	Hiland
NaCl	granular	ton	35	440	400	Hiland
MgCl ²	brine	gal.	4,500	an	26,249	Hiland
MOA-ARDSA						
Sand	ARDSA spec.	ton		10,000		Anchorage
MgCl ²	brine	gal.		24,905		Anchorage

an = as needed

5.3.3 Covered Sand Storage

Part II.B.4.c)(iii) of the Permit requires permittees to “..build covered storage facilities [‘sand sheds’] at each of their primary materials storage locations..” within four years of the effective date of the Permit. All principle Anchorage MS4 operators have made substantive progress toward this goal, with one operator already having met this goal.

ADOT&PF Design was completed for three sand storage facilities using an initial appropriation of \$1.4 Million. Funding for construction in the amount of \$3.4 Million was allocated for the Girdwood sand storage facility and construction is currently under way. Additional facilities will be constructed as funding becomes available.

MOA-CBERRRSA Design for sand storage buildings is complete. Funding through State appropriations has been received for construction in 2013 of a primary storage unit located at CBERRRSA’s Eagle River, Highland Sand Storage Facility. A secondary storage unit may be built in Chugiak as funding allows.

MOA-ARDSA ARDSA completed design of its heated sand shed in 2005 and completed construction at its main Kloop Station in late 2006. The facility has been fully operational since that time and features conveyor truck loading and automated liquid deicer application, reducing total salt loading on winter sand by about a factor of 5. This operational structure brings MOA-ARDSA into full compliance with this Permit requirement.

5.4 Street and Road Sweeping

5.4.1 Sweeping Assessment

Part II.B.4.d)(v) requires the permittees to “..perform annual assessments of street sweeping effectiveness to minimize pollutant discharges to storm drains and creeks..” on the basis of the performance factors to be reported under the Permit. To help in this assessment the permittees completed additional sampling of street sweeping activities in 2011 and reviewed sampling efforts and studies performed under earlier Anchorage MS4 permit terms, in addition to reviewing report elements required under the Permit. The WMS document “Anchorage MS4 Street Sweeping Performance and Assessment Report”, Appendix E1, presents a full discussion of these efforts and includes maps of operational areas, streets designated for sweeping, and detailed sweeping records as required at Part II.B.4.d)(v). Excerpts from this report are provided in Table 5.2 summarizing permittees’ sweeping performance and effectiveness, below.

Table 5.2 Anchorage 2012 MS4 Sweeping Summary for Spring, Summer and Fall

Spring 2012						
	EPA Category	Drainage Type	Street Miles	Curb/PickUp Miles	Total Volume* (cyds)	Unit Volume* (cyds/mile)
DOT	Arterial	OC	8.3	10.7	130.0	12.1
		CG	36.8	98.1	3476.0	35.4
		Mixed	43.2	118.1	2964.0	25.1
	Residential	OC	53.3	106.6	736.0	6.9
		CG	4.1	12.0	282.0	23.6
		Mixed	30.3	62.9	766.0	12.2
ARDSA	Arterial	OC	0.0			
		CG	40.8	131.8	2688.1	20.4
		Mixed			113.8	
	Residential	OC	112.5		43.3	
		CG	464.7	837.7	1227.5	15.4 ¹
		Mixed			9367.8	
CBERRRSA	Residential	OC	166.0	98.9	576	5.8
		CG	26.7	53.4	567	10.6
		Mixed	8.3	16.6	42	2.5

Summer 2012						
	EPA Category	Drainage Type	Street Miles	Curb/PickUp Miles	Total Volume* (cyds)	Unit Volume* (cyds/mile)
DOT	Arterial	OC	8.3	10.7	37.0	3.5
		CG	36.8	98.1	462.0	4.7
		Mixed	43.2	118.1	358.0	3.0
	Residential	OC	53.3	106.6	262.0	2.5
		CG	4.1	12.0	52.0	4.3
		Mixed	30.3	62.9	196.0	3.1
ARDSA	Arterial	OC	0.0			
		CG	40.8	131.8	533.8	4.1
		Mixed			16.3	
	Residential	OC	112.5		0.5	
		CG	464.7	837.7	208.0	2.6 ¹
		Mixed			1884.4	
CBERRRSA	Residential	OC	156.1	77.9	117	1.5
		CG	22.2	44.3	144	3.3
		Mixed	22.6	45.2	36	0.8

Fall 2012						
	EPA Category	Drainage Type	Street Miles	Curb/PickUp Miles	Total Volume* (cyds)	Unit Volume* (cyds/mile)
DOT	Arterial	OC	8.3	10.7	37	3.5
		CG	36.8	98.1	668	6.8
		Mixed	43.2	118.1	618	5.2
	Residential	OC	53.3	106.6	367	3.4
		CG	4.1	12.0	51	4.3
		Mixed	30.3	62.9	246	3.9
ARDSA	Arterial	OC	0.0			
		CG	40.8	131.8	371.9	2.8
		Mixed			13.0	
	Residential	OC	112.5		1.9	
		CG	464.7	837.7	569.3	7.2 ¹
		Mixed			2407.7	
CBERRRSA	Residential	OC	153.3	74.3	60	0.8
		CG	19.5	39.1	78	2.0
		Mixed	26.5	53.0	42	0.8

1. Inferred results: values shown are based on analysis of reported data values

* Volumes represent only swept materials collected along reported/estimated Curb/PickUp Miles

Estimated volumes will sum to less than reported 'mixed' volume

OC = Open Channel Drainage

CG = Curb and Gutter Drainage

5.5 Pesticide, Herbicide, and Fertilizer Applications

The Municipal pesticide code is located in Title 15.75, available at:

<http://library.municode.com/index.aspx?clientId=12717>. It has been updated to strengthen application restrictions, notifications, and certification requirements. These code requirements are enforced at Municipal facilities and an applications log is maintained.

5.6 Storm Water Pollution Prevention Plans

Stormwater Pollution Prevention Plans for certain permittee-owned activities are required within three years of the Permit effective date. Permittees have developed plans for their material storage facilities, maintenance yards, and snow disposal sites on schedule with the Permit. They are available at the italicized facilities for each owner in Table 5.3 and where practical at each facility site.

Table 5.3 MS4 Facilities with Storm Water Pollution Prevention Plans

Facility	Location	Activities
ADOT&PF		
Birchwood Maintenance	20651 Birchwood Spur Rd., Birchwood	Equipment & Materials Storage
Girdwood Maintenance	MP 90 Seward Hwy., Girdwood	Equipment & Materials Storage, Maintenance
Anchorage Maintenance	5300 E. Tudor Rd., Anchorage	Equipment & Materials Storage, Maintenance
O'Malley Snow Disposal	NE corner O'Malley and Old Seward Hwy., Anchorage	Snow Storage
Tudor Snow Disposal	Tudor Road, Anchorage	Snow Storage
Hiland Road Snow Disposal	Hiland Road, Eagle River	Snow Storage
CBERRRSA		
Eagle River Maintenance	8501 Hesterberg Ln, Eagle River	Equipment & Materials Storage
Chugiak Maintenance Facility	19200 Kerbow Ln., Chugiak	Equipment & Materials Storage
ARDSA		
Kloep Maintenance Facility	5701 Northwood Drive, Anchorage	Equipment Maintenance, Materials Storage & Snow Storage
Muldoon Maintenance & Storage Facility	7909 Boundary Ave., Anchorage	Equipment Maintenance & Materials Storage
Native Heritage Snow Disposal	8902 Heritage Center Drive, Anchorage	Snow Storage
Northwood Snow Disposal Site	Northwood Drive, Anchorage	Snow Storage
Commercial Dr. Snow Disposal	Commercial Drive, Anchorage	Snow Storage
Mountain View Snow Disposal	Mountain View Drive, Anchorage	Snow Storage
Sitka Street Snow Disposal	Sitka Street, Anchorage	Snow Storage
Tudor Snow Disposal	Tudor Road, Anchorage	Snow Storage
C Street Snow Disposal	C Street, Anchorage	Snow Storage
Dowling Snow Disposal Site	Dowling Road, Anchorage	Snow Storage

5.7 Training

The Municipality and ADOT&PF met regularly during 2011 to coordinate their respective activities and discuss operational issues. Municipal and ADOT&PF Maintenance crews were given information regarding APDES Permit requirements in a variety of presentations and staff meetings during 2012 to assist their understanding, decisions, and record-keeping about activities associated with Permit compliance. A summary of Municipal training meetings is included in the operators report in Appendix A3. ADOT&PF training activities are summarized in Section 2.4.

6 Illicit Discharge Management

6.1 Illicit Discharge Regulatory Strategy

The Municipal regulatory authority for water pollution control is founded on Title 21.67, <http://library.municode.com/index.aspx?clientId=12717>. This code provides the basis for managing discharges to the storm sewer and waters of the U.S. It was updated effective January 2011 to conform to the latest MS4 Permit requirements, provide a stormwater permit for discharges not covered under building permits, and accommodate Alaska Construction Permit (CGP) review authorities.

6.2 Illicit Discharge Reporting and Response

The Pollution Hotline, 343-4141, continues to operate with staff taking calls during regular business hours and retrieving messages from callers with complaints during non-business times. These hotline complaints are recorded into the Municipality's Hansen Complaint Management System and forwarded to the appropriate department for response.

The Hansen System is also available to community members on the Municipal Development Services Building Safety Land Use Code Enforcement website <http://www.muni.org/Departments/OCPD/development/BSD/Pages/CodeEnforcement.aspx> for on-line complaint recording and tracking.

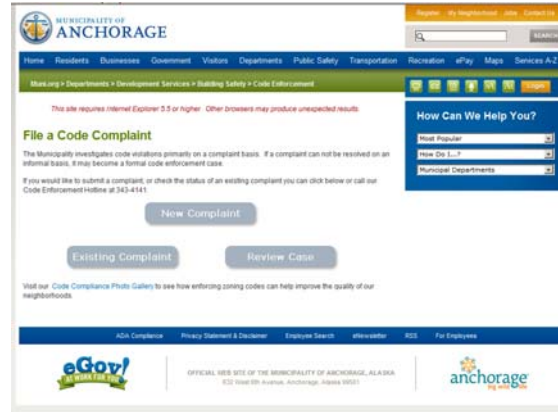


Table 6.1 (below) tallies complaints recorded through the on-line tracking system. Complaints were followed up within two working days, and resolved within a week. *Stormwater – construction* complaints were handled with the inspections in the Construction Site Management Program. *Prohibited discharges* complaints were handled as illicit discharge complaints.

Table 6.1 Service Requests by Complaint Type, 2012

Department	Complaint Type	Number of Requests	Number Resolved
WMS	Stormwater – Construction	18	18
WMS	Prohibited Discharges – Private property	10	10
ROW	Prohibited Discharges – ROW	8	8

Illicit Discharge mapping

Appendix F1 contains a location map of 2012 Anchorage prohibited discharge complaints. Inspectors visited all sites and, where appropriate, initiated clean-up. There were no recurrences associated with any of the discharges.

6.3 Dry Weather Screening

In 2012 the permittees continued to implement the re-designed dry weather screening program in compliance with new Permit requirements. The 2012 report is provided in Appendix F2.

Dry Weather Screening results prompted follow-up for one parameter on an outfall at Ship Creek. Fecal coliform was retested at the outfall and at an up-gradient point in the storm sewer system and eliminated as a recurring illicit discharge at that site. The details of the follow-up are included in the discussion of the 2012 Dry Weather Screening Report.

6.4 Spill Prevention and Response

The permittees must prevent, respond to, contain and clean up all sewage and other spills that may discharge into the MS4. To meet this requirement the permittees convened a group of interested participants and mapped out current Anchorage response. The information that came from these discussions was drafted into two documents. The Intra-agency and Inter-agency Agreements for the Enforcement of Spill Response were provided in the 2011 annual report. The working group will continue to coordinate the spill response program during 2013 with a review and update of the activities and related documents.

2012 Spill Response

In 2012 the ADOT&PF M&O responded to a number of minor roadway spills. These are summarized in Table 6.2.

Table 6.2 2012 ADOT &PF Spill Response

Date	Location	Pollutant	Action
5/21/2012	Raspberry Rd	Hydraulic Fluid from Roller	Absorbent Pads and Clean-up by owner
5/22/2012	C Street and Dowling	Hydraulic Fluid	Absorbent Pads and Clean up by M&O
6/23/2012	International/Fairbanks	Traffic Paint	Sand and Sweep by M&O
7/12/2012	Raspberry & Jewel Lake	CRS2-P	Sand and Sweep by M&O
12/6/2012	Northern Lights & Muldoon	Diesel	Absorbent Material and Sweep by M&O

In July 2012 the Municipality responded to a report of an orange plume in Chester Creek near or around A/C Streets. An investigation was unable to determine the specific source of the plume which did not re-occur in that area. A similar report was given to the Municipality in December for a plume in Fish Creek,

although a specific location was not provided. Follow-up again did not reveal a specific source. However, we believe these plumes were due to the disturbance of iron oxides in sediments as a result of activities such as maintenance and construction in or around aging culverts. The Municipality plans to continue looking for associations between plume reports and identifiable activities, but it also is reviewing internal maintenance practices and planning a community education project focused on private practices to reduce these types of sediment releases.

6.5 Used Oil and Toxic Materials

The permittees have an ongoing program for accepting hazardous materials including used oil and toxic waste at the Anchorage Regional Landfill and Central Transfer Station. Those locations will accept up to five gallons of household hazardous waste for free. Information and public education materials for this program are found on the Municipal Solid Waste Services homepage at <http://www.muni.org/departments/sws/pages/default.aspx>

6.6 Training

Training for identifying and eliminating illicit discharges, spills, and illicit connections to the MS4 was performed with the implementation of the Dry Weather Screening Monitoring as outlined in the Monitoring Plan.

Staff training was supported by an employee training presentation on illicit discharge detection & elimination titled *IDDE, a grate concern*, from EXCAL Visual.

7 Public Education and Involvement

Education and training for the public and for permittee staff is discussed in this section. For Permit requirements addressing the webpage and annual and quarterly meetings, see Section 1 of this Annual Report.

7.1 Ongoing Education and Public Involvement

The Municipality, on behalf of the permittees, entered into an agreement with the Anchorage Waterways Council (AWC) to conduct the ongoing public education required by the Permit. A copy of the scope of work for this sole-source agreement was provided in the 2010 Annual Report. A full account of education activities for 2012 is provided in Appendix G1 and summarized below.

In 2012, AWC continued to work with schools, neighborhoods, property managers, residents, businesses, and local citizens to educate and improve environmental stewardship in the community. The Scoop the Poop committee is a special group solely focused on reducing fecal coliform in local waterways. "Creeks as Classrooms" is a program that AWC brings to the Anchorage School District (ASD) and other youth groups year-round for students to learn about creek stewardship, water quality monitoring, recycling, and the science of life in the creeks. A target neighborhood has received quarterly stormwater newsletters and has been observed regularly for measurable positive changes in behavior. Through Scoop the Poop, Creeks as Classrooms, target neighborhood observations, publications, and events, AWC continues to further stormwater education in the Municipality of Anchorage.

- This year, Scoop the Poop held 3 clean up events at off-leash dog parks, distributed another 1,400 door hangers around the community, collected over 200 signed responsible pet owner pledges, installed 13 additional informational signs along local trails, and replenished brochures in several of

the original twenty five local pet services. Scoop the Poop bus signage was placed on the rear of five Anchorage buses in early fall for seven weeks. Over 35 letters to pet-friendly hotels/motels were sent out with information to assist managers and guests properly dispose of pet waste. Through a variety of events approximately 3,500 people were provided information directly on Scoop the Poop issues. Scoop the Poop deliverables are in Appendix G1.

- Garden runoff, car washing, invasive plants, and hazardous fluid management were addressed again through a variety of tabling and educational events, with over 4100 participants. *Anchorage Daily News'* garden columnist, Jeff Lowenfels, provided two opportunities to speak on his Saturday radio show about pet and yard waste issues, and has put water-related issues in his weekly column several times.
- Three separate mailings to over 1600 businesses (4800 total) covered proper snowmelt product usage, keeping storm drains clear of debris, and the value of clean creeks to tourism and other local economies.
- The annual Creek Clean-Up Day in May was, again, well attended. Approximately 650 volunteers cleared tons of debris from creeks, and after there was a celebration with educational tables and a bar-be-cue.
- The AWC annual meeting in October focused on the impact of plastics as trash from local watersheds, their chemical breakdown in local waterways before they reach the ocean, and the toxicity of cigarette butt waste to marine and freshwater fish. Other invited talks that were given the past year which focused on stormwater, were "Creeks 101" at REI, Department of Natural Resource's "Urban Forests for Tomorrow", and the Alaska Rural Water Association Annual Meeting and Training.
- Stormwater medallions were permanently placed on 18 storm drains before the weather turned too cold to complete the first batch of 100. (Stenciling has not proven to be practical.)
- AWC has completed its one year observation of the 100 homes in the Bancroft neighborhood adjacent to Campbell Creek. Educational materials were sent out quarterly, and written surveys and visual observations have shown at least a 10% improvement just in the number of homes who have changed their rain gutters from driveways to their yards and into rain gardens. Other improvements will be detailed in the formal report.
- Interaction with ASD students totaled over 2900 from a variety of programs and schools.
- A card handout was developed with tips for businesses that rent equipment to residents that will guide them with some "do's" and "don'ts" to help protect waterways.
- Five TV newstories were aired on KTUU and KTVA this past year that covered water issues.

For the coming year AWC will continue Scoop the Poop, Creeks as Classrooms, tabling events, mailouts, and public service announcements. Materials are evaluated every year for improvement or change based on past experience. The variety of education efforts will continue to expand, especially due to grants from other entities such as ConocoPhillips who are generously supporting outreach to students.

7.2 Targeted Education and Training

See the following sections of this Annual Report regarding targeted training for permittee staff:

- Construction - Section 2.4
- New and Redevelopment - Section 3.6
- Stormwater Infrastructure - Section 5.7
- Illicit Discharge - Section 6.6

8 Monitoring and Assessment

8.1 Discharges to Water Quality Impaired Waters

As listed in the Permit, pollutants of concern in Anchorage receiving waters include fecal coliform, petroleum products, and, for one lake, dissolved oxygen. The Municipality, acting on behalf of the permittees, will measure and evaluate the effectiveness of activities to control these pollutants of concern through the following means:

- Stormwater outfall monitoring
- Structural controls effectiveness monitoring
- Dry weather screening and follow-up
- Public education and involvement program

8.2 Monitoring Plan

The permittees have updated the Quality Assurance Plan, submitted originally in January, 2011 to reflect final project sites selection and monitoring details. In January, 2011, the Municipality, on behalf of the permittees, finalized the "Quality Assurance Project Plan - Municipality of Anchorage Monitoring Program for APDES Permit Number AKS-052558," which was included in the 2010 Annual Report. The Municipality, on behalf of the permittees, conducts monitoring for various purposes as summarized in Table 8.1.

Table 8.1 Storm and Surface Water Monitoring Program Schedule

Monitoring Program Component	Proposed Sampling Dates			
	2011	2012	2013	2014
Pesticide Screening	June-Aug	None	June-Aug	none
Dry Weather Screening	May-July	May-July	May-July	May-July
Structural Controls*	April-Dec	April-Dec	April-Dec	April-Dec
Snow Storage Site Retrofits	None	Mar-May	Mar-May	none
Stormwater Outfalls	Apr-Oct	Apr-Oct	Apr-Oct	Apr-Oct
LID Monitoring	None	None	None	May-Oct

*Structural Controls include sediment basins and- oil and grit separator devices

8.2.1 Pesticide Screening

This sampling program was conducted in 2011 and included in the 2011 annual report. Sampling will be conducted again in 2013.

8.2.2 Existing Structural Controls - OGS and Sedimentation Basin Evaluation

The Municipality and ADOT&PF are required under their joint APDES stormwater permit to evaluate the performance of OGS and sedimentation basins within the AnchorageMS4 and to report results in the third year of the permit term (IV.A.8., p. 39). The permittees set as assessment goals:

- Evaluation of Anchorage OGS and sedimentation basins in context with local headwater environmental and water quality control conditions, and
- Development of new design guidance from a system perspective.

Field work and data analysis for the evaluation project was completed by WMS in 2012, including monitoring and sampling at three Anchorage sedimentation basins and four hydrodynamic oil grit separators (OGS_h), and full-scale benchtop analysis of an OGS_h model commonly applied at Anchorage. Controls performance was assessed for a range of pollutant types, but focused on particulates.

Headwater Performance Factors

Given their typical 'downline' locations on drainage systems, performance of OGS and sedimentation basins is sharply constrained by headwater conditions and controls. Primary factors are precipitation and runoff characteristics, particulate and other pollutant loading, and presence and quality of headwater storm water controls. The first factor, precipitation and runoff, is reflected in the occurrence of two distinct seasonal stormwater events at Anchorage: snowmelt runoff and rainfall runoff. Synoptic analysis of Anchorage National Weather Service (NWS) historical data and 2012 project rainfall and runoff records shows both event types to be marked by very low intensities. Analysis of historic and project storm data indicate that Anchorage seasonal runoff events are ideally suited for application of settlement controls using either an annualized 90th percentile rainfall intensity (for Anchorage, 0.12 inches per hour, in/hr), or the median seasonal rainfall storm intensity (0.03 in/hr), as adjusted for orographic effect.

Local pollutant characteristics and loading are also critical to performance of downline controls. Street sediment loading at the Anchorage snowmelt runoff event reflects a very large particulate load (50,000 to 115,000 pounds per curb mile, #/cmile) resulting from winter-long sanding accumulations. Nevertheless project data indicates only a small fraction of this is mobilized in snowmelt runoff, likely because of uniform distribution of dirt across street surfaces and armoring provided by larger particles not yet removed by sweeping. Anchorage summer street sediment loading is smaller but less certain. Street maintenance sweeping inventories suggest average loading at the end of each 60-day summer sweeping interval on the order of 15,000 #/cmile. Project analysis suggests a much smaller seasonal (120-day) load of about 4000 #/cmile. Some of this discrepancy may be due to a high bias in sweeping inventory estimates, but the differences remain significant and are scheduled to be tested and resolved in focused sweeping performance analyses to be completed by the permittees in 2013. For this project, a total summer washoff load of 8000 #/cmile is used (4000 #/cmile from streets and 4000#/cmile from larger parking lots). Summer washoff is significantly larger than that of snowmelt as a result of sediment fining and concentration of sediments along the gutter pan by summer sweeping processes.

Headwater controls are the last critical factor in determining the pollutant load transmitted to OGS and sedimentation basins. These controls typically include LID practices (including open channel drainages), on-site controls (including on-site catch basins, OGS, and water quality/detention basins), and all off-line street inlet catch basins (on-line catch basins, including 'manhole' catch basins, are ineffective). Because of the low-intensity rainfall at Anchorage, properly designed and maintained off-line catch basins can result in a 40% reduction in the total transmitted stormwater mineral particulate load (but with a significantly finer particle size distribution (PSD) than the original street sediments). Adjustments in OGS design criteria are recommended to reflect the number and efficiency of headwater controls.

OGS_n and Sedimentation Basin Performance

This project evaluated OGS_n and sedimentation basin performance in context with the headwater conditions outlined above. Project field inspections and sampling of hydrodynamic separators (those incorporating a dynamic element through introduction of an angular or vertical flow component to the influent) and benchtop testing of a select OGS_n model showed these devices as practicable and effective at Anchorage when designed to site-specific conditions. Project inspections emphasized the effects that high variability in headwater pollutant loading and organic content (as high as 20% by weight) can have on Anchorage OGS performance and efficiency. The large organic loading (from comminuted leaves) may be difficult to remove through settlement treatment and may cause performance and maintenance problems, particularly for screened OGS_n. Inspections also underscored the importance of locating devices off-line (through use of gated, momentum-type bypasses). Nevertheless, project analyses suggest hydrodynamic separators can practicably remove about 40% of mineral particles 20 microns in size at an annualized 90th percentile rainfall intensity.

Project performance assessment of sedimentation basins at Anchorage showed these devices are strongly affected by headwater conditions as well, including treatment imposed on stormwater flow by any upgradient OGS. Detailed 2012 monitoring of three Anchorage sedimentation basins showed performance is also dependent upon a range of critical basin design factors, including surface area, basin shape, length:width ratio, runoff volume:basin volume ratio, inlet/outlet character and aspect, and presence and geometry of constructed wetlands. The effects of these factors were synergistic, with the most notable being: the significant effect of headwater controls on the size of the total seasonal influent loads, differences in total influent particulate loads between snowmelt and rainfall runoff seasons, and the significant differences in performance affected by critical basin geometries. The especially large influent loads measured in 2012 likely reflect the lack of any operating OGS upgradient of the tested basins contributing areas. Differences in seasonal influent particulate load to the sedimentation basins were large with total influent loads ranging from 5,000 to 30,000 pounds for the snowmelt season and 28,000 to 61,000 pounds for 2012 rainfall runoff. Treatment performance varied significantly between basins, but was generally poorer during snowmelt runoff (16 to 45%) than for the rainfall season (20 to 66%). Poorer snowmelt runoff performance appears to be related to the effects of ice cover and to the reduction in effectiveness of treatment wetlands. Key factors in 2012 rainfall runoff performance are not as easily resolved, but may be most influenced by basin geometry (including relative runoff/basin volumes and available surface treatment area), and by loss of constructed wetlands treatment function as a result of erosional development of preferential low-flow channels through the wetlands. Design recommendations from this project address each of these elements. However, the need to dedicate large land area for basin construction may limit practicability of these structures to locations where receiving water sensitivity warrants the high marginal cost necessary to achieve increased performance.

Application and Design Recommendations

This project has resulted in recommendations for significant changes in current application and design practices for OGS_h and sedimentation basins in Anchorage. These recommendations include changes to standard design storms, parameters, and elements. At the core, recommendations call for two basic design methodologies developed around a standard stormwater quality treatment strategy of low-flow treatment and peak-flow bypass. These include application of design approaches to achieve: (a) a seasonal sum-of-loads removal over the full range of particle size fractions calculated over the variation of the mean annual rainfall rate for storage treatment devices (EPA probabilistic, or volume capture, method), or (b) a flow rate-based removal at a threshold particle size calculated at the median annual 90th percentile rainfall rate for dynamic treatment devices (90th percentile, or dynamic capture, method), each summarized as follows:

- Probabilistic (Volume Capture) Method (storage performance measure):
 - Apply adjusted mean and variation of mean rainfall rate over a seasonal period to design sum-of-loads removal for devices with significant storage.
 - Calculate for both dynamic and quiescent performance under Anchorage conditions.
 - Design device to achieve a total percent removal of spherical, non-charged mineral particles of: a) 90% of all particles 20 microns in diameter, and b) 75% of all particles 5 micron in diameter.
 - Provide waste storage in concert with a long-term maintenance schedule, adjusted for basin-specific headwater conditions.
- 90th Percentile (Dynamic Capture) Method (flow performance measure):
 - Use the adjusted median annualized 90th percentile rainfall rate to design dynamic particle removal for treatment devices having no significant storage.
 - Calculate for dynamic performance under Anchorage conditions.
 - Design device to achieve a total percent dynamic capture of spherical, non-charged mineral particles of: a) 90% of all particles 100 microns in diameter, and b) 40% for all particles 20 microns in diameter.
 - Provide waste storage in concert with an annual maintenance schedule, adjusted for basin-specific headwater conditions, but having a capacity not less than 1.2 times the estimated mean annual wash-off volume of treatable particles.

The full report associated with this project is available in Appendix H1.

8.2.3 Snow Storage Site Retrofits

The APDES stormwater discharge permit AKS-052558 for the Anchorage MS4 requires retrofit and evaluation of at least two public snow storage sites relative to criteria already developed and published by the WMS regarding siting, design and operation of these types of facilities.

The permittees completed one retrofit at the Tudor Road Municipal snow disposal site prior to February 1, 2012, and repaired a weak point in the runoff channel during the summer/fall of 2012. Currently this site is in operation. A second design for the Spruce Street Municipal snow disposal site was constructed in the spring of 2012. The second site (Spruce Street) was put into operation in fall 2012 and will have been operating for one full winter by spring, 2013. Both sites will be tested for water quality performance in spring, 2013, with results reported in the 2013 annual report.

Generally, initial testing will include development of mass balance data including measurement of total snow mass present on site at the end of the winter season in 2012 and sampling for density and particulate and chloride concentrations of in-place snow. In addition, during the 2012 spring melt period, water quality measurements will be made at representative points of discharge from the snow storage pad and the measurements used to estimate total seasonal particulate and chloride load released.

8.2.4 Storm Water Outfall Monitoring

The Storm Water Outfall Monitoring Plan was implemented after ADEC review and approval during the summer of 2011. The second year results are provided in the 2012 Stormwater Outfall Monitoring Report in Appendix H2.

8.2.5 Quality Assurance Plan

The Quality Assurance Plan (QAP) for specified permit monitoring activities was completed in 2010, and revised and finalized after review by the ADEC. The currently applicable QAP, updated to reflect 2012 project activities is provided in Appendix H3.