Municipal Separate Storm Sewer System (MS4)

Storm Water Management Plan

U.S. ARMY GARRISON ALASKA

FORT WAINWRIGHT, ALASKA

MARCH 2021

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LIST OF ACRONYMS

AAC	Alaska Administrative Code
AAFES	Army and Air Force Exchange Service
ACGP	Alaska Construction General Permit
ADEC	Alaska Department of Environmental Conservation
APDES	Alaska Pollutant Discharge Elimination System
BLM	Bureau of Land Management
BMP	Best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
CGCD	Construction Guidance Compact Disc
CHPP	Central Heat and Power Plant
CSCE	Comprehensive Site Compliance Evaluation
CWA	Clean Water Act
DLA	Defense Logistics Agency
DMR	Discharge Monitoring Report
DPW	Directorate of Public Works
EPA	U.S. Environmental Protection Agency
ESCP	Erosion and Sediment Control Plan
FWA	Fort Wainwright
HM	Hazardous materials

HW	Hazardous waste
IDDEP	Illicit Discharge Detection and Elimination Plan
LEED	Leadership in Energy and Environmental Design
LID	Low impact development
MCM	Minimum control measure
MPP	Monitoring Program Plan
MS4	Municipal Separate Storm Sewer Systems
MSGP	Multi-Sector General Permit
NOD	Notice of Disposal
NOI	Notice of Intent

LIST OF ACRONYMS (continued)

NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
OWS	Oil/water separator
P2	Pollution Prevention
POL	Petroleum, oil, and lubricants
PWE	Directorate of Public Works Environmental Resources Group
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
SPCC	Spill Prevention, Control and Countermeasure Plan
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan

U.S.C.	United State Code
UA	Urbanized area
USACE	U.S. Army Corps of Engineers
USAG FWA	U.S. Army Garrison, Fort Wainwright, Alaska
USARAK	U.S. Army, Alaska
UST	Underground storage tank
WQS	Water Quality Standards

APPLICABILITY

1.0 Introduction

This Storm Water Management Plan (SWMP) has been prepared to satisfy the requirements of the U.S. Army Garrison Alaska (USAG Alaska) facility's small municipal separate storm sewer system (MS4) permit for the city of Fort Wainwright, Alaska (FWA). As a regulated small MS4, USAG Alaska is required to design, implement, and enforce a storm water management program to reduce the discharge of pollutants to its storm sewer system to the maximum extent practicable for the protection of waters of the United States.

In October 2009, the U.S. Environmental Protection Agency (EPA) granted the State of Alaska primacy over the National Pollutant Discharge Elimination System (NPDES) program in Alaska. The NPDES program in Alaska at this time was renamed the Alaska Pollutant Discharge Elimination System (APDES), and the Alaska Department of Environmental Conservation (ADEC) became the NPDES permitting authority for Alaska. The FWA MS4 Permit was issued by ADEC on September 26, 2016, and took effect on November 1, 2016. This SWMP is the primary document that will be used by the installation to comply with provisions of the MS4 Permit. Commitments in this plan apply to military facilities and personnel, residents, businesses and contractors operating at FWA, Department of Defense (DoD) and non-DoD tenants, and privatized services contractors.

This SWMP describes the actions and activities FWA has already implemented and those that the installation intends to implement to meet its compliance under the MS4 Permit. This plan is organized according to the MS4 Permit and includes the following sections:

- Section 1: Applicability
- Section 2: Storm Water Management Program Requirements
- Section 3: Minimum Control Measures (MCMs)
- Section 4: Monitoring, Evaluation, Reporting, and Record Keeping
- Section 5: Compliance Responsibilities

Regulatory Overview

In November 1990, EPA promulgated the NPDES Phase I storm water regulations under the authority of the Clean Water Act (CWA) to protect waters of the United States from pollutants transported by storm water runoff. Phase I required NPDES storm water discharge permits for

medium population (≥100,000 ≤250,000) and large populations (≥250,000) MS4s in urbanized areas (UAs), facility operators of 11 industrial categories, and operators of construction sites disturbing greater than or equal to five acres of land.

NDPES Phase II storm water regulations, promulgated in 1999, addressed runoff from regulated small MS4 (population <100,000), storm water discharges from certain industrial activities and construction activities that disturb greater than or equal to one acre of land. The Phase I and Phase II NPDES regulations established the minimum requirements for storm water pollution prevention (P2) nationwide. All NPDES/APDES permits (Phase I, Phase II, and construction) require the permittee to use best management practices (BMPs), also called control measures, to reduce the pollutant content in storm water discharges. A BMP or control measure can be a technique, process, activity, or structure.

Relationship to Other Storm Water Permits

The FWA storm sewer system is the infrastructure that manages storm water runoff on the installation. EPA's NPDES regulations originally defined this infrastructure to be a small, regulated MS4. As such, USAG Alaska was required to obtain an MS4 Permit and operate under an SWMP. The MS4 Permit covers all USAG Alaska and FWA activities, facilities, roads, airfield, etc., with the potential to drain within, or to, FWA's storm sewer system that lies within the UA. Storm water discharges covered by other permits, such as industrial activities under the Multi-Sector General Permit (MSGP) or construction activities addresses under ADEC's Alaska Construction General Permit (ACGP), will be subject to compliance with FWA's MS4 Permit. Therefore, in some cases, the installation's MS4 Permit would provide an additional level of regulation for such industrial and construction activities.

Figure 1 depicts the relationship among the different storm water discharge permits at FWA. Most facilities covered by FWA's industrial storm water permit drain to the storm sewer system[1] and must meet the requirements of that permit and associated industrial Storm Water Pollution Prevention Plan (SWPPP), as well as the requirements of the MS4 Permit and associated SWMP. Construction projects that drain to the MS4 must meet the requirements of the applicable construction storm water discharge permit and this SWMP (Construction projects that do not drain to the storm sewer system must only meet the requirements of the

[1] Fort Wainwright's rock quarries that do not drain to the storm sewer system are covered by the industrial SWPPP but not the SWMP.

applicable construction storm water permit and associated SWPPP). Compliance with the MS4 Permit and SWMP is not limited to facilities and activities subject to industrial and construction storm water discharge permits. All facilities and activities that drain to FWA's MS4 within the UA must meet the requirements of this SWMP. The SWMP then can be viewed as the "umbrella" plan for minimizing storm water pollution from all facilities and activities discharging to the FWA MS4. This SWMP provides a comprehensive approach to storm water pollution prevention at FWA.

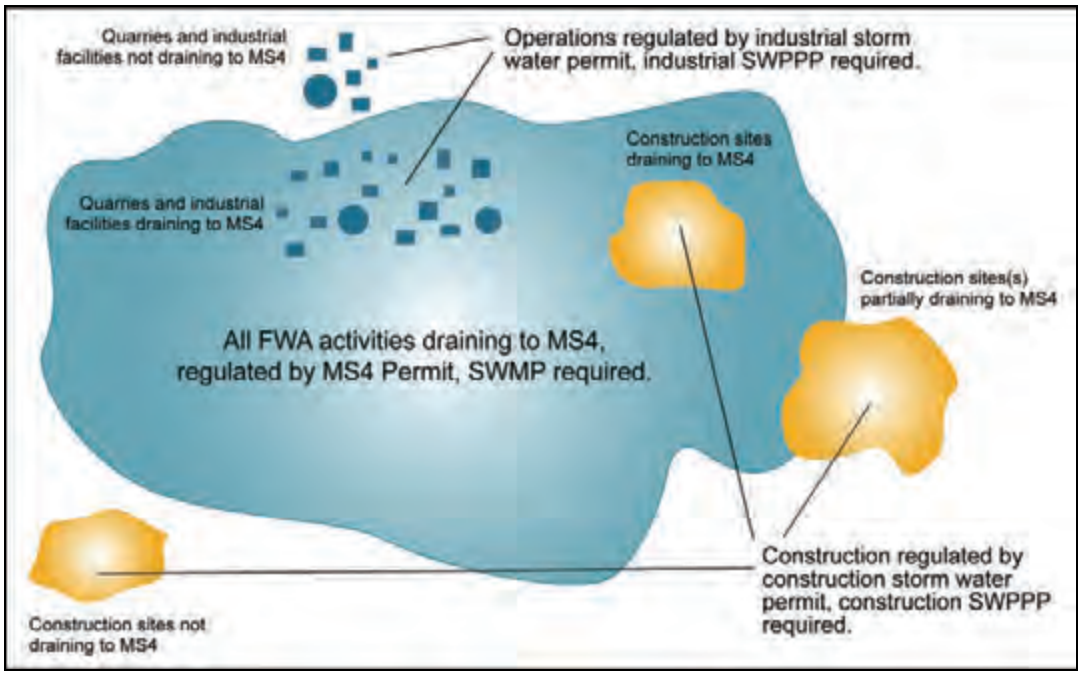


Figure 1. Applicability of Fort Wainwright Storm Water Permits.

Storm Water Discharges Associated with Industrial Activity

Facilities currently operating at FWA that meet the regulatory definition of 'industrial' are Sector P facilities that support vehicle maintenance and repairs, as well as Sector P facilities that support airfield operations at Ladd Army Airfield. Other industrial facilities include airfield support activities (Sector S), the installation's rock quarries (Sector J), and a landfill (Sector L).

The coal-fired Central Heat and Power Plant (CHPP) is now privately owned and operated on Fort Wainwright property by Doyon Utilities. Doyon is currently responsible for environmental compliance for this facility and other utility buildings and infrastructure on post. On August 11, 2016, Doyon was issued permit number AKR06AE33 from ADEC for storm water discharges for MSGP activity at the CHPP.

Industrial facilities at FWA are listed in Table 1. Due to the dynamic nature of operations on base, the industrial building list is reviewed annually and updated as necessary.

Table 1. Industrial Buildings on FWA.

Building No.	Description	Sector
1191	Directorate of Public Works (DPW) Landfill	L
1500	BLM Maintenance Shop	S / P
1510	BLM Bulk Fuel Issue and HM/HW Management Storage	S / P
1535	BLM Small Engine Repair Shop	S
1537	BLM Transportation Building and Fuel Pump	S / P
1544	BLM Fire Cache Warehouse	S / P
1550 & 1553	BLM Fire Retardant Storage and Issue	S
1557	Hangar 1	S
1565	Fueling and POL	S
2077 E	Hangar 8 (AK ARNG and D CO 70th BEB)	S
2077 W	Hangar 7 (1-52 AVN D CO and URS Contractor)	S
2078	Aviation Re-fueling Facility	S
2088	Hangar 6 (1-52 AVN C CO)	S
2116 & 2120	Alert Holding Area	P
2118	Deployment Support Branch	P
2132	Hangar 5 (1-52 ARB AVN)	S
2295 North	Vehicle/Equipment Maintenance Facility (539th CTCO)	P
2295 South	Vehicle/Equipment Maintenance Facility (574 QM)	P
2297	Vehicle/Equipment Maintenance Facility Brigade Motor Pool (1-52 AVN E CO and 3-159 AVN E CO)	P
2400	Railhead Operations (Added to MSGP in 2019)	S
3007	Hangar 4 (1-52 AVN A, B, and D COs)	S
3015	Roads and Grounds Maintenance and Salt Storage Facility	S
3380	Tactical Vehicle Wash	P
3485	Vehicle/Equipment Maintenance Facility Motor Pool (5-1 CAV D Troop)	P
3425	Vehicle/Equipment Maintenance Facility Motor Pool (2-8 F CO)	P
3480	Vehicle/Equipment Maintenance Facility Motor Pool (1-25 ARB)	P

3487	Former Brigade Warehouse (currently empty)	P
3489	PWE Waste Turn-in Facility	P
3490	DOL Installation Maintenance Division	P
3492 North	Vehicle/Equipment Maintenance Facility Motor Pool (1-5 In G CO)	P
3492 South	Vehicle/Equipment Maintenance Facility Motor Pool (3-21 FSC)	P
3494 North	Vehicle/Equipment Maintenance Facility Motor Pool (70th BEB E CO FSC)	P
3494 South	Vehicle/Equipment Maintenance Facility Motor Pool (1-24 Inf)	P
3496	Vehicle/Equipment Maintenance Facility Motor Pool (70 BEB E CO FSC)	P
3498	Consolidated Brigade Motor Pool (25th BSB)	P
5010	Brigade Warehouse (AC 25 BSB SSA) (formerly) DLA Disposition Services Complex	P
5109	Range Control Maintenance Facility	P
Badger Pit	FWA Quarry at Badger Pit	J

After considering the Army Environmental Command's publication, *Industrial Stormwater: A guide to Industrial Stormwater Permitting, March 2016, Final*, DPW Environmental at USAG Alaska has concluded that multiple facilities at the installation that are currently managed under the industrial SWPPP are not defined by SIC Codes identified as requiring coverage under the MSGP. Therefore, the facilities listed in Table 2 will be removed from the installation's industrial SWPPP and will instead be managed under Fort Wainwright's MS4 Permit and this SWMP. The MCM 6 Operations and Maintenance Program has been expanded to include these facilities. Notification of these changes has been provided in past MSGP Annual Reports.

Table 2. Buildings on FWA removed from Industrial List.

Building No.	Description	Reasoning
1185	Birch Hill Ski Area Maintenance	Falls under automotive repair shop (SIC

	Facility	7538/NAICS 811111)
2095 & 2096	Chena Bend Golf Course Maintenance Facilities	Falls under automotive repair shop (SIC 7538)
3018	DPW Contractor Maintenance Shop	Provides support to dwellings and exterior support (NAICS 561709)
3026	Pest Management Shop	No industrial scale mixing or blending occurs at this location (NAICS 561710)
3467	Vehicle/Equipment Light Maintenance Facility	Falls under either automotive repair shop (SIC 7538) or industrial truck repair (SIC 7699)
3470	Vehicle/Equipment Maintenance Facility Army Reserve Center (1984 USAH and 297th EN CO DET1)	Falls under either automotive repair shop (SIC 7538) or industrial truck repair (SIC 7699)
3484	Defense Fuel Supply Point (Bulk Fuel Issue)	Falls under gasoline service station (SIC 5541)
3562	Maintenance Facility (Quick Lube)	Falls under automotive repair shop (SIC 7538/ NAICS 811198)
3730	Automotive Skills Center and Car Wash (MWR)	Falls under automotive repair shop (SIC 7538/NAICS 811198)
4050	Outdoor Recreation Equipment Issue Shop (MWR)	Falls under automotive repair shop (SIC 7538)
4058	Army and Air Force Exchange Service (AAFES) Express Fueling Station	Falls under gasoline service station (SIC 5541)

Discharges Associated with Construction Activity

Construction activities at FWA must comply with APDES construction storm water permitting requirements. When construction activities occur within the boundaries of the FWA MS4, the installation is required to ensure that construction and post-construction measures for erosion and sediment control BMPs are met. Projects smaller than the minimum area threshold for ACGP coverage must still address storm water concerns. To tackle these concerns and facilitate compliance, FWA will develop and implement a Garrison Policy letter specifically addressing storm water management on the installation. Copies of the finalized Garrison Policy letter will be kept with this SWMP.

Storm water management requirements, recommendations, and suggestions for all construction activities at FWA are included in Sections 3.4, Construction Site Storm Water Runoff Control, and 3.5, Post-Construction Storm Water Management in New Development and Redevelopment.

Permit Coverage Area

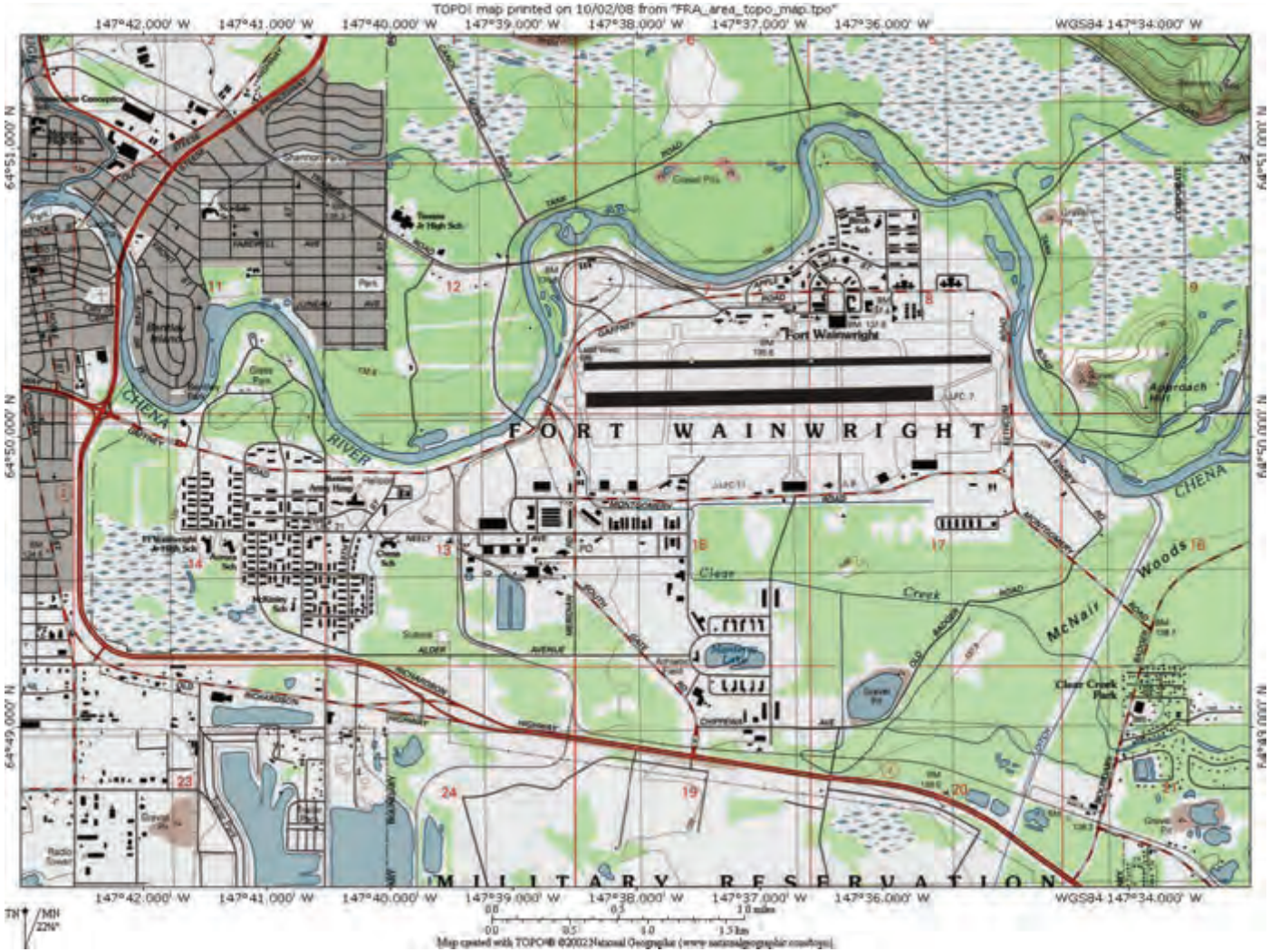
The location of the FWA MS4 is described in this section. Also provided is a discussion of the surface drainage networks of FWA.

FWA MS4 Location

FWA is a 916,000-acre military reservation in central Alaska, located east of Fairbanks in the Chena River drainage basin. The post location is shown on Figure 2. The reservation consists of the cantonment area and contiguous and non-contiguous training and maneuver areas. Facilities regulated under the MSGP are located in the cantonment area, which includes Ladd Army Airfield. The Chena River discharges into the Tanana River west of Fairbanks city limits. The Tanana River, a major tributary of the Yukon River, flows south of Fairbanks city limits.

The requirement to obtain an NPDES MS4 Permit applies to owners and operators of municipal storm sewer systems within UAs as defined by the U.S. Bureau of the Census. Only a portion of the FWA installation is included within the Fairbanks UA. This portion consists mainly of the developed area of FWA known as the cantonment area (Figure 3). The cantonment is centrally located and comprised of troop and family housing, administrative facilities, industrial and industrial-like facilities, and community facilities. The topography of the cantonment area is generally flat, except for Birch Hill in the northern part of the

cantonment area. Much of the cantonment area is unpaved, except for roads, parking areas, airfield runways and ramps.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FORT WAINWRIGHT
MILITARY RESERVATION
CHENA RIVER
Clear Creek
McNair Woods
Fort Wainwright
Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

Figure 2. Fort Wainwright Cantonment and Vicinity.

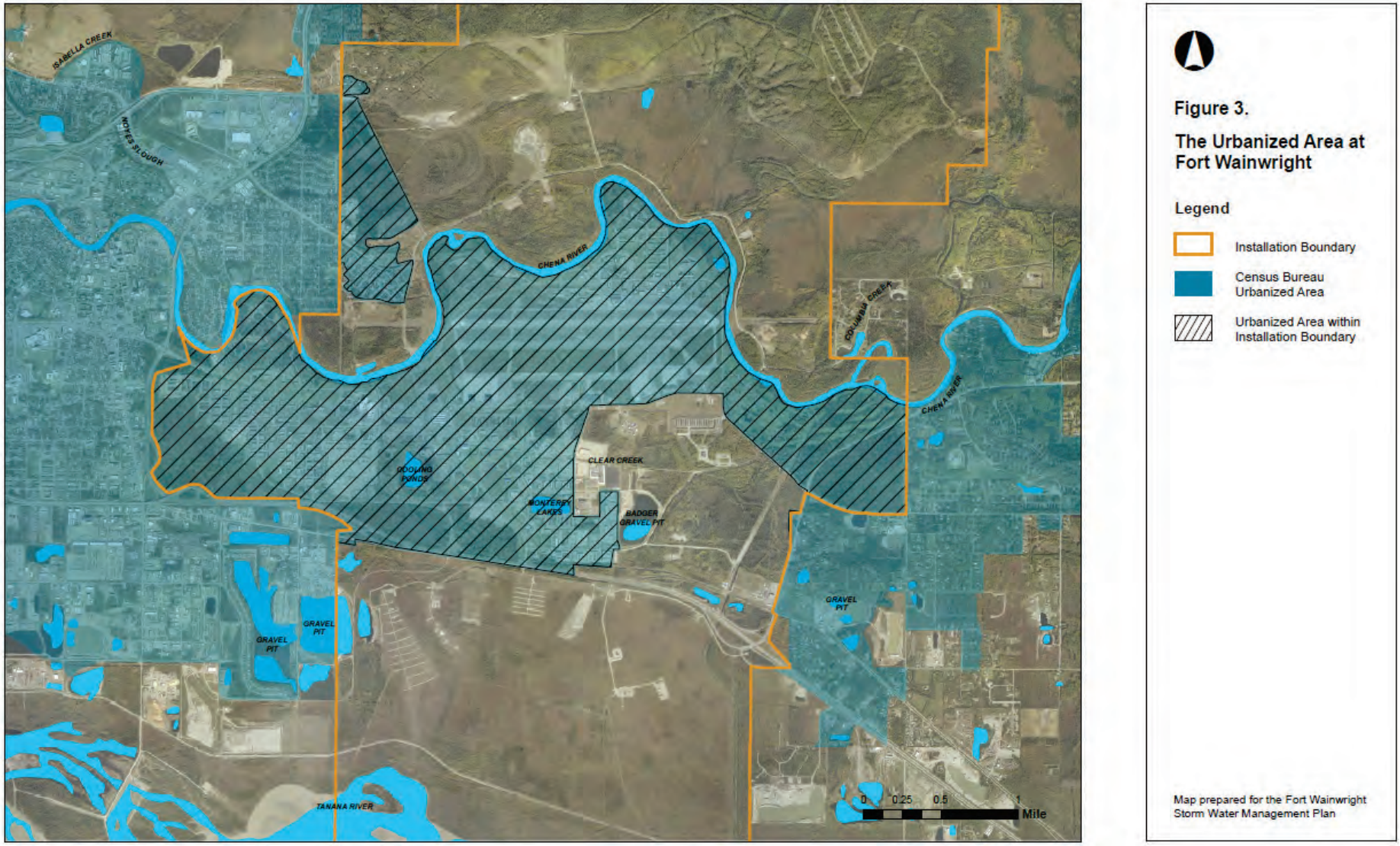

Figure 3. The Urbanized Area at Fort Wainwright.

Fort Wainwright's Drainage Network

The hydrologic setting and storm water drainage relevant to the permit coverage area is described in detail in the FWA industrial SWPPP. The cantonment storm sewer system that comprises the installation's MS4 is summarized in this section.

The surface water drainage system at FWA is almost entirely comprised of grass-covered surface channels. Nine outfalls are recognized for storm water discharges from industrial and industrial-like facilities at FWA. These 9 outfalls are included in FWA's SWPPP for compliance with the MSGP. In addition to these outfalls, another 17 outfalls that drain storm water from non-industrial areas of the installation have been tentatively identified. Attachment 1 depicts the industrial and non-industrial outfalls at FWA.

The general drainage area of the developed portion of FWA and its interior drainage system is presented in Attachment 1. Below, the identification of industrial and non-industrial outfalls identified in the system are described. In addition to discharging to the outfalls, storm water and runoff and snowmelt may infiltrate into the ground and/or evaporate or enter the Chena River as sheet flow.

Most of the outfalls draining storm water from industrial facilities (FWA-001 thru FWA-009) at FWA discharge directly to the Chena River at a pipe or defined channel. Former outfalls FWA-010 and FWA-011, located at a pond created by gravel and sand mining operations, have been removed from this list as the U.S. Army Corps of Engineers Regulator Division made a Jurisdictional Determination that this gravel pit is not a water of the United States. Water from this gravel pit does not drain into the MS4.

Channel B occasionally receives storm water runoff from the golf course. Since the golf course uses fertilizers and pesticides approved by the state, these pollutants may be in runoff going into this channel. Channel B is a part of the original Chena River Flood Control Project that drains the low-lying area downstream from the main diversion dam. The water in the channel flows into the Chena River upstream of all outfalls and will be used as the Background outfall of water.

Outfall FWA-A is the furthest downstream outfall on base and discharges into the Chena River. Most of the area draining to Outfall FWA-A is residential and contains paved roads, parking lots and the installation gate area. There is a relatively low potential for storm water pollution from this area because of limited industrial activities. In addition, an open drainage ditch

borders the area, so a large portion of runoff will infiltrate the soil within the ditch on its way to Outfall FWA-001.

Outfall FWA-B is the next outfall upstream discharging into the Chena River. It receives water from the Denali Village, Northern Lights, and part of the Bear Paw family housing neighborhoods, with similar conditions to FWA-A. Between these neighborhoods and the outfall, there is at least 1000 feet of open channel with native vegetation and depressions where much of the water infiltrates.

Outfall FWA-C is located approximated 850 feet downstream of Outfall FWA-001. It primarily drains a residential area with few industrial inputs, making the potential for storm water pollution low. The likelihood of fecal matter from illegal dumping of pet waste (majority of drainage area is residential) is probable.

Outfall FWA-001 is located directly north of the hospital off Gaffney Road. Limited industrial activities associated with the hospital and grounds-keeping and landscaping are conducted in this drainage area. Most of the area draining to Outfall FWA-001 is residential and includes paved roads and parking lots. Construction of a new hospital on FWA required the Army to create a new flow pattern to Outfall FWA-001. The new design runs between the planned new parking lot and the older hospital support facilities, south of Gaffney Road. There is a relatively low potential of storm water pollution from this area because of limited industrial activities and few impervious areas. This outfall also receives water from the residential neighborhoods of Tanana Trails, Taku Gardens, Southern Cross, and part of Bear Paw.

Outfall FWA-D is located approximately 650 feet upstream of FWA-001 and predominantly discharges water from the field next to the outfall.

Outfall FWA-002, located approximately 900 feet upstream of FWA-001, discharges to the Chena River east of 10th Street along Gaffney Road. The drainage area contributing runoff to Outfall 2 is relatively small and mostly covered by grass. The area contains Building 3030 and the storage yard associated with this building.

Outfall FWA-003 discharges to the Chena River approximately 400 feet upstream of Outfall 2. The relatively small drainage area contributing runoff to this outfall consists mostly of a grass-covered landscaped area. The area contains several industrial facilities, including Building 3015 (DPW and Contractor Maintenance Facility), and associated grounds.

Outfall FWA-004 discharges to the Chena River, a short distance east of the River Road Bridge and approximately 500 feet upstream of Outfall FWA-003. Outfall FWA-004 is the primary industrial storm water outfall for FWA. A large grass-covered channel connects to the Chena River via a 72-inch diameter culvert under Gaffney Road. This channel receives runoff from the west end of the runway, parts of the North Post and most of the industrial facilities on the south side of the runway. Outfall FWA-004 is considered the most significant industrial outfall at FWA in terms of potential volume of runoff and potential pollutant sources.

Outfall FWA-005 discharges to the Chena River approximately 1000 feet upriver from FWA-004. It drains approximately 131 acres of the northwest quadrant of the airfield and the grassy areas along Gaffney Road.

Outfall FWA-006 discharges to the Chena River north of the intersection between Gaffney Road and Apple Street, in the North Post area. This relatively small drainage area previously contained several industrial-like facilities, which have since been demolished. The potential for storm water pollution from this area is considered very low, due to the lack of industrial presence and the generally pervious nature of soil in the basin.

Outfall FWA-E discharges to the Chena River approximately 500 feet upstream of Outfall FWA-006. This is a very small drainage area, which no longer contains industrial buildings. The potential for storm water pollution from this drainage area is very low, due to the lack of industrial facilities in the basin.

Outfalls FWA-F, FWA-G, FWA-H, FWA-I, FWA-J, FWA-K, FWA-L, and FWA-M all discharge to the Chena River and receive water from relatively small non-industrial and residential areas in the North Town and Chena Bend neighborhoods. These drainages are comprised of a combination of open drainage ditches and underground pipes.

Outfall FWA-007 discharges to the Chena River just east of 103rd Avenue in the North Post. Outfall FWA-007 receives runoff from a large portion of the north part of the runway and from several industrial facilities located in the North Post area. These facilities include Building 1557 (Hanger 1), Building 1565 (POL) and several Bureau of Land Management facilities that conduct maintenance, fueling and hazardous material handling. Runoff from these areas commingles with runoff from the residential area west of 103rd Street prior to reaching Outfall FWA-007. Outfall FWA-004 and Outfall FWA-007 have the greatest potential for receiving storm water pollutants due to the number and type of activities present within the drainage area. The potential pollutants of primary concern are petroleum products associated with fuels and lubricants.

Outfall FWA-N discharges to the Chena River, approximately 400 feet downstream of FWA-008. Its associated drainage basin is comprised of barracks, parking lots, paved and gravel roads, and sports fields.

Outfall FWA-008 discharges to the Chena River at the east end of the runway. Outfall FWA-008 receives runoff from portions of the east end of the runway operated by the Bureau of Land Management Alaska Fire Service, including the helipad. Potential pollutants from this area are associated with spills or leaks of petroleum products that could occur during flight operations and fire retardants used in wildland firefighting. The potential for such pollution is minimized by an aggressive spill response program. Water runs to drainage ditches, to 12-inch culvert passing under Ketcham Road, then through a grassy area before reaching the river.

Outfall FWA-O drains a tiny area of grass along Ketcham Road along the east end of the airfield and empties into the Chena River.

Outfall FWA-009 discharges directly to the Chena River and is located to the south of the main runway. Sheet flow from the southeast side of the runway and hangers along the runway is conveyed to the outfall via underground conduit. This conduit discharges directly to the bank of the river, and is sometimes inaccessible during periods of high water or icy conditions.

Outfall FWA-P drains a small area of grass along Ketcham Road along the southeast end of the airfield and Golf Course, and empties into the Chena River.

Outfall FWA-Q was added to the Fort Wainwright MS4 in 2020. It is specifically sourced from the Birchwood Homes subdivision and collects water in a series of underground conduits that lead to a single wide-diameter corrugated metal pipe. This subdivision is leased by a private business from the U.S. Army Garrison Alaska and is located outside of the controlled gate. Much of the Birchwood Homes subdivision consists of impervious surfaces of paved roads, buildings, and paved walking/bicycle paths. The discharge point is within the installation's fence line, and releases to the Chena River approximately 1000 feet upriver from FWA-005, on the opposite bank of the river.

Former Outfalls FWA-010 and FWA-011 drain into Badger pit, a gravel pit determined not to be a Water of the United States in the spring of 2020. As such, they have been removed from the Fort Wainwright MS4.

Interior Drainage Channel B, constructed as part of the Chena Flood Control Project drains the low-lying area in North Pole, downstream from the main diversion dam. The water in the

channel flows into the Chena River. This channel occasionally receives storm water runoff from the golf course, however this contribution is minimal compared to the total amount of water. The point where Channel B meets the Chena River is used as a Background outfall for comparison with Fort Wainwright's MS4 outfalls.

STORM WATER MANAGEMENT PROGRAM REQUIREMENTS

Public Education and Outreach

FWA has one year from the effective date of the installation's MS4 Permit date to review and revise written documentation of the storm water management program (i.e., this SWMP) implemented within the jurisdiction of the FWA MS4. The MS4 Permit stipulates that this document must be organized according to the program components in Parts 3.0 (Minimum Control Measures) and 4.0 (Monitoring, Evaluation, Reporting, and Record Keeping Requirements) of the permit and, at a minimum, include the following information:

- Ordinances or other regulatory mechanisms that provide the legal authority necessary to implement and enforce the requirements of this permit.
- A written outline describing how FWA will implement the requirements of Parts 3.0 and 4.0 of the permit.

FWA intends to implement a Garrison Policy that will require all base tenants to adhere to applicable requirements of this SWMP. Once finalized, copies of the Garrison Policy letter will be distributed to the FWA population and will be kept with this SWMP. Section 3 of this document addresses minimum control measures (MCMs), and Section 4 addresses monitoring, program evaluation, reporting, and record keeping. Each respective section explains how FWA intends to comply with the identified provisions of the MS4 Permit.

Storm Water Management Plan Overview

The key elements of this plan are the MCMs mandated by the MS4 Permit. The MCM sections of the SWMP describe BMPs, determined by FWA to address the six MCMs identified by ADEC, in a practicable and cost-effective manner.

The six MCMs include:

- MCM 1: Public Education and Outreach
- MCM 2: Public Involvement and Participation
- MCM 3: Illicit Discharge Detection and Elimination

- MCM 4: Construction Site Storm Water Runoff Control
- MCM 5: Post-Construction Storm Water Management in New Development and Redevelopment
- MCM 6: Pollution Prevention and Good Housekeeping for Base Operations

Each MCM is presented in Section 3 with a discussion explaining the purpose of the MCM, applicability of the MCM to FWA, the specific requirements of the MCM, and BMPs FWA has and intends to implement to address the requirements. After each MCM requirement, a measurable goal is stated by which FWA and the permitting authority can gauge progress and/or completion of the action(s) that will satisfy the requirement.

This SWMP will be posted to FWA's storm water web page, as required. A hard copy of this SWMP will be maintained by the DPW Environmental Compliance storm water program manager and made available to the general public upon request.

General Requirements

The following is a summary of general requirements identified in FWA's MS4 Permit:

- SWMP Preparation – FWA must develop, implement, and enforce an SWMP designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the CWA. The SWMP must address the EPA's six MCMs and include BMPs, control techniques, system design, engineering methods, and other provisions appropriate to control and minimize pollutants in discharges from the MS4.
- This SWMP covers the term of FWA's MS4 Permit as issued by ADEC. The SWMP must be updated as necessary and/or as required by ADEC to ensure compliance with Section 402(p)(3)(B) of the CWA, 33 U.S.C. § 1342(p)(3)(B). SWMP updates must be made in accordance with Section 2.3 of the MS4 Permit. All components and requirements of the SWMP are enforceable as conditions of the MS4 Permit.
- FWA must submit plan revisions or documents that require review and approval by ADEC to the address listed in Appendix A of the MS4 Permit and in accordance with Section 4.0 of the permit. ADEC has the right to disapprove such submissions or require plan or document revisions within 60 days of receipt.

- FWA's SWMP must include BMPs that are selected, implemented, maintained and updated to ensure that storm water discharges do not cause or contribute to an exceedance of applicable numeric or narrative water quality standards (WQS) and adversely impact measurable goals and interim milestones for each BMP.

- Implementation of one or more MCMs may be shared with another entity that is not subject to FWA's MS4 Permit, or the entity may take over the measure, if the other entity effectively implements the control measure, the control measure or its components are at least as stringent as the corresponding permit requirement, and the other entity agrees to implement the control measure on behalf of FWA. This requires a written, legally binding acceptance of the obligation(s) that must be maintained with the SWMP. If the entity agrees to report on the measure, FWA must provide the entity with applicable reporting requirements in Section 4.0 of the MS4 Permit. FWA remains responsible for complying with permit obligations.

Reviewing and Updating the SWMP

As part of the preparation required for the MS4 Annual Report, FWA must annually review the SWMP. FWA may request changes to any action or activity specified in the MS4 Permit according to the following procedures:

Changes to delete or replace an action or activity specifically identified in the SWMP with an alternate action or activity may be requested at any time. Modification requests to ADEC must include:

- An analysis of why the original action or activity is ineffective, infeasible, or cost prohibitive.

- Expectations on the effectiveness of the replacement action or activity.

- An analysis of why the replacement action or activity is expected to better achieve the SWMP requirements.

Change requests or notifications must be made in writing and signed by FWA in accordance with Section 4.0 of the MS4 Permit. FWA must submit documentation of the actions or activities required by the SWMP to ADEC upon request. ADEC may subsequently notify FWA that changes to the SWMP are necessary to:

- Address discharges from the MS4 that are causing or contributing to water quality impacts.
- Include more stringent requirements necessary to comply with new federal or state statutory or regulatory requirements.
- Include other conditions deemed necessary by ADEC to comply with WQS and/or other goals and requirements of the CWA.
- Address the SWMP requirements of the permit should ADEC determine that FWA's SWMP does not meet the MS4 Permit requirements.

Should ADEC notify FWA that changes are necessary, the notification will include an opportunity to propose alternative program changes to meet the objectives of the requested modification. Following this opportunity, FWA must implement any required changes according to the schedule established by ADEC.

Transfer of Ownership, Operational Authority, or Responsibility for SWMP Implementation

Transfer of ownership, operational authority, or responsibility for SWMP implementation requires submittal of all corrected documentation to ADEC for a 60-day review prior to implementation of transfer. FWA must implement the SWMP in all new areas added or transferred to the FWA MS4 (or for which FWA becomes responsible for implementation of storm water quality controls) as expeditiously as practicable, within one year from the date when the new areas were added. Such additions and schedules for implementation must be documented in the next Annual Report following the transfer.

3.0 MINIMUM CONTROL MEASURES (MCMs)

The EPA established six MCMs with which MS4 Permit holders must comply by selecting and committing to BMPs appropriate to the permit holder's storm sewer system, the water body or bodies receiving the discharge from the storm sewer system, and the potential pollutants from areas served by the system. Once the permittee has selected BMPs, measurable goals for monitoring the BMPs must be identified, and a program for implementation and accountability established. This section describes the BMPs that are already in effect at FWA and/or will be implemented during the MS4 Permit term.

3.1 MCM 1: Public Education and Outreach

Description of MCM

The objective of the public education and outreach MCM is to educate FWA's residents, tenants, and employees about the negative impacts that polluted storm water discharges have on local water bodies. Many common behaviors such as littering, waste disposal, pet waste, automobile washing, vehicle maintenance, and lawn care have the potential to contaminate storm water. Efforts to control storm water pollution must therefore consider individual, household, and public behaviors. Through informing and educating, this MCM aims to make FWA's public aware of and concerned about the importance of individual and group behavior. More importantly, this measure gives the public clear guidance on steps and specific actions that it should and, in some cases, must take to reduce its storm water pollution potential. The degree to which MCMs 2 through 6 are effective largely depends on how well FWA's public is informed of, understands, and embraces the relationship between its actions and potential storm water pollution.

Applicability to FWA

Given the diversity of FWA's public, it is important to ensure that the storm water pollution prevention (P2) messages and goals reach all on-site Army units, tenant organizations, and civilian and contractor personnel who work in industrial facilities. Additionally, FWA's public includes enlisted personnel and their dependents, many of whom reside in base housing, as well as employees whose work is not industrial in nature.

As part of this MCM, the Directorate of Public Works, Environmental Resources Group (PWE) intends to partner with the following base entities for the development and distribution of educational materials on storm water P2:

- Army and Air Force Exchange Services (AAFES)
- Food service entities at AAFES and elsewhere on base (e.g., Burger King, Anthony's Pizza, Popeye's, Starbucks, etc.)
- Army Reserve
- Fort Wainwright Family and Morale, Welfare, and Recreation (FMWR) Program
- Fairbanks School District (elementary schools on post)
- FWA Public Affairs Office
- Bureau of Land Management (BLM)
- RCI/North Haven Housing
- Utilities privatization contractor (Doyon)

3.1.1 MS4 Permit Requirements for MCM 1

Public Education and Outreach Program Components

Permit Requirement

FWA must include the following topics in its public education and outreach program:

- 3.1.1.1 Appropriate storm water management practices for commercial, industrial, food service, carpet cleaners, home-based or mobile businesses, and automotive activities
- 3.1.1.2 Appropriate yard care techniques for protecting water quality, including proper timing and use of fertilizers
- 3.1.1.3 Proper pet waste management
- 3.1.1.4 Appropriate spill prevention practices for industrial, commercial, construction, and residential settings
- 3.1.1.5 Proper use, storage and disposal of household hazardous waste
- 3.1.1.6 Proper recycling
- 3.1.1.7 Proper management of street, parking lot, sidewalk, and building wash water
- 3.1.1.8 Proper methods for using water for dust control

- 3.1.1.9 Impact of illicit discharges and how to report them

Goal	3.1.1.1 business	3.1.1.2 Yard care	3.1.1.3 Pet waste	3.1.1.4 Spills	3.1.1.5 HHW	3.1.1.6 Recycling	3.1.1.7 Wash water	3.1.1.8 Dust Control	3.1.1.9 Illicit Discharges
Article					**X**				
Brochure/flyer	**X**		**X**	**x**		**X**	**x**	**x**	**x**
Housing tenant materials		**TO DO**	**x**		**X**				**TO DO**
Signs			**X**	**x**			**x**		**x**
Lawn care brochure		**TO DO**							
HHW brochure					**X**	**X**			
Website	**X**		**X**		**X**	**x**			

Measurable Goal

Through the use of such tools as news articles, brochures, flyers, and signs, FWA will raise awareness and educate the public about the nature of urban storm water pollution, what can be done to solve existing problems, and how to prevent issues from occurring in the future. FWA will ensure all the topics listed above are incorporated into the installation's ongoing public education and outreach program.

Spill Prevention Posters

In preparation for the MS4 implementation and to support ongoing storm water efforts, the PWE team designed posters that display BMPs for spill prevention at industrial facilities. The posters have been distributed to maintenance facilities throughout FWA and have been displayed at key locations inside the buildings.

BMPs displayed on the posters include the following:

- Drip pan use
- Spill response procedures and contact information
- Proper procedures for the storage and disposal of hazardous materials and waste

- Spill kit maintenance and requirements
- Proper disposal for Stryker belly sludge

Educating Base Housing Occupants

Newcomers to base housing receive a briefing that outlines requirements for all FWA residents. All housing at FWA is owned and operated by a privatized housing contractor.
Housing residents are required to adhere to the following rules:

- Dogs and cats must be registered at FWA's veterinary services, and pet waste must be cleaned up on a daily basis.
- No major vehicle maintenance (including oil and/or transmission fluid changes) may be performed in housing areas. Vehicles must be parked directly on paved areas (no jacks/blocks). Vehicle washing is discouraged in resident housing areas. Parking areas should be kept free of petroleum, oil, and lubricants (POL) stains.
- Hazardous materials and waste must be properly disposed of. Batteries, automotive waste and POLs, tires, pesticides, herbicides, fluorescent bulbs, pest control products, propane canisters, non-latex paint, and many common household chemicals are not allowed in base dumpsters or in the drainage system.
- POL spills are to be reported immediately by calling 911.
- Residential yards and adjacent areas should be kept free of loose trash.

Ongoing Public Education Program

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must develop, implement, and evaluate an ongoing public education program to educate the community about the impacts of storm water discharges on water bodies. The program must include the steps that the FWA population can take to reduce pollutants in storm water runoff. The following groups must be included in this outreach:

- Residents
- Employees
- Contractors
- Tenants

- Visitors

Measurable Goal

As demonstrated by multiple BMPs and measurable goals described in this section and subsequent MCM sections, FWA has and will continue to engage multiple groups on the installation in various aspects of storm water P2 education. As required, FWA will formalize these efforts into an ongoing public education program by the end of the second MS4 Permit year. This program will be periodically evaluated by PWE to ensure its scope and objectives are being adequately addressed and implemented.

Public Education and Outreach Activities

At a minimum, FWA's public education and outreach program must implement the following tasks:

Storm Water Pollution Prevention Articles:

Permit Requirement

Publish storm water pollution prevention (P2) articles in a local newspaper or installation website within six months of the effective date of the MS4 Permit.

Measurable Goals

PWE will coordinate articles to be written about SWPP topics in Section 3.1.4.1 of this document. Initial articles might focus on regulations and general information of the storm sewer system on base. Later articles could explore specific BMPs that could prove helpful to specific user groups at FWA. The articles will be submitted to local publications and/or the FWA storm water P2 web page for publishing. The first article will be submitted for publication within six months of the effective permit date.

Storm Water Pollution Prevention Brochures:

Permit Requirement

Within the first year of the MS4 Permit term, PWE will initiate a program to provide major tenant groups with printed educational materials regarding storm water P2. Flyers and/or brochures will be created that target specific groups on base (e.g., housing, eateries, BLM, etc.). Storm water BMPs and issues specific to their activities will be displayed and distributed accordingly. A storm water P2 brochure targeting housing residents is currently being developed and will be made available to the privatized housing contractor for review and approval prior to distribution.

Ideas for storm water brochure/flyer distribution include the following:

- Distribution of materials at Earth Day events
- Household chemical minimization, use, and disposal
- BMPs to prevent and address spills and leaks
- Pet waste BMPs

Military Housing Tenant Handbook:

Permit Requirement

Within one year of the effective MS4 Permit date and annually thereafter, PWE will develop (and subsequently update) storm water P2 materials for military housing tenants.

Measurable Goal

Within the first year of the MS4 Permit term, PWE will submit pertinent information regarding storm water P2 to the FWA privatized housing contractor to incorporate into the next Tenant Handbook update, as well as to the FWA Public Affairs to incorporate into the next Newcomer's Guide. A description of the MS4 and relevant elements of this SWMP will be included. In addition to other BMPs, a brief explanation of fecal coliform and E. coli contamination will be recommended as additional information to include in the guide and handbook (and to the pet policy at FWA's veterinary services). These policies will be reviewed annually and updated as conditions warrant.

Storm Water Pollution Prevention Signage:

Permit Requirement

Within two years of the effective MS4 Permit date, PWE will develop and install signs describing storm water P2 and pet waste management BMPs in the following key areas:

- Memorial Park
- Glass Park
- Chena Cove Recreation Area
- Engineer Park
- Other sensitive areas

Signs have been developed and installed in the two locations along the Chena River walking/bike trail. In addition, one sign was installed near the Trainor Gate and Siku Basin neighborhood. A percentage of storm drains have been marked informing the viewer that water in the drain flows directly to the Chena River. Signs placed near outfalls instruct people to call the PWE storm water program manager if an illicit discharge is detected and the fire department if the discharge involves a POL spill. Signs and trash cans are present along the Chena River, in base recreation parks, and in other sensitive areas informing viewers how to appropriately handle pet waste.

Measurable Goal

In Year 5 of the Permit, signs will be designed, produced, and placed at the four parks/recreation areas to better educate the public of storm water concerns.

Lawn Chemicals and Household Waste:

Permit Requirement

Within two year of the effective MS4 Permit date and annually thereafter, FWA will create or purchase and distribute a brochure on the proper use and disposal of lawn chemicals and household hazardous products and distribute to key audiences.

A brochure about Household Hazardous Waste has already been produced and distributed.

Measurable Goal

A brochure regarding lawn and garden care will be distributed during Year 5 of FWA's MS4 Permit.

Storm Water Pollution Prevention Website:

Permit Requirement

Within one year of the effective MS4 Permit date, FWA must develop and make available to base personnel a website with information about storm water management within the MS4 and update the website at least semi-annually.

Measurable Goal

Information regarding storm water management within the FWA MS4 isposted to the installation's storm water web page. This information will be updated semi-annually, as required. The web address is:

https://home.army.mil/alaska/index.php/fort-wainwright/storm-water

Annual Report Requirements for MCM 1

Annual Report requirements specific to MCM 1 (Public Education and Outreach) are presented in SWMP Annual Reporting section.

MCM 2: Public Involvement and Participation

1.1.1 Description of MCM

The objective of the Public Involvement and Participation MCM is to seek out, encourage, and elicit public participation in storm water P2 activities. By organizing and empowering base personnel to participate in interactive programs and help spread the message, the overall ability of FWA to reduce potential contaminants in storm water runoff is greatly enhanced.

Applicability to FWA

Informed and involved citizens are crucial for reducing potential pollutants from entering the storm drainage system. It is important to ensure that public involvement comes from the many diverse user groups at FWA. Participation, partnership, and the combined efforts of FWA's residents, tenants, and employees all working toward the same goal of reducing polluted storm water runoff into the Chena River is far more effective than a single entity responsible for achieving this goal. Because they live and/or work on base, residents and employees can often identify and address potential problems long before an inspector might visit the area.

FWA's public involvement will be sought from entities including the Army units, tenants and resident organizations, the privatized military housing contractor, youth groups, AAFES, Directorate of Logistics, civilian and contractor employees, the Fairbanks School District, and the utilities privatization contractor (Doyon).

This MCM is closely related to MCM 1 (Public Education and Outreach), but MCM 2 emphasizes two-way communication and the active involvement of base employees and residents.

MS4 Permit Requirements for MCM 2

FWA must comply with all applicable State of Alaska and local public notice requirements when implementing a public involvement/participation program. The following are permit requirements under MCM 2.

Permit Requirement

Within one year from the effective MS4 Permit date and ongoing thereafter, FWA must make the SWMP and all respective Annual Reports available to the public by posting them to the installation's storm water web page.

Measurable Goal

FWA will continue to post this SWMP to the installation's storm water web page, annually as required. Following their submittal to ADEC, FWA will publish subsequent SWMP Annual Reports under the MS4 program to the same web page.

Annual Community Cleanup

Permit Requirement

Within one year from the effective MS4 Permit date and ongoing thereafter, FWA must host a community event aimed at litter removal or similar cleanup within the MS4, including areas adjacent to the Chena River.

Measurable Goal

FWA will continue to conduct an annual cleanup week to collect and properly dispose of loose trash on the installation. Various Army units and organizations are assigned to this responsibility. Areas for this activity will focus on roadside ditches, Clear Creek, along the Chena River corridor (within the MS4), and other sensitive areas on base.

Attitude Survey

Permit Requirement

Within three years from the effective MS4 Permit date and biennially thereafter, FWA must develop and conduct a survey of public knowledge and attitudes related to storm water management within the MS4. The first attitude survey has been completed during Years 3 and 4 of the Permit. The survey focused on determining residents' current level of knowledge of and commitment to storm water P2 practices.

Measurable Goal

During Permit Year 5, the attitude survey will be updated and distributed to installation housing residents, employees, and other FWA audiences. Completed surveys will be reviewed by PWE personnel. Information gleaned from the survey will be compared to data collected during the first survey and used to identify any additional steps necessary to refine or enhance storm water P2 messages and educational materials on the installation that could improve compliance.

Storm Drain Stenciling

Permit Requirement

Within one year from the effective MS4 Permit date, FWA must develop and implement a storm drain-stenciling program by hosting a design contest in base schools. In two years, 50% of the storm drain inlets must be stenciled, with 100% stenciled in four years.

Students voted on a storm drain inlet decal design and these markers have been placed on most storm drain inlets on Post.

Measurable Goal

During Permit Year 5, the storm drain decal will be placed on the remaining inlets in Year 5 of the Permit.

Storm Water Steering Committee

Permit Requirement

Within six months from the effective MS4 Permit date and at least quarterly thereafter, FWA must convene a Storm Water Steering Committee to coordinate and accomplish the goals of the SWMP. The meeting schedule must be made known to the public and ADEC through direct mail or email notification or other locally appropriate means.

Measurable Goal

FWA's Storm Water Steering Committee will continue to meet quarterly to discuss general storm water management at FWA, including notifications, spill prevention and response, future construction, and how such activities affect storm water runoff. Also discussed are the roles and responsibilities of committee members. Members include PWE staff, DPW staff responsible for base operations contractor, Airfield personnel, the privatized military housing contractor, privatized utilities contractor, BLM, and other tenants. Issues and examples of success and progress with storm water programs can be raised and discussed at steering meetings. This can provide an essential communication tool between on-base and local entities, where information that would otherwise be unknown or difficult to convey can be more easily shared.

Annual Report Requirements for MCM 2

Annual Report requirements specific to MCM 2 (Public Involvement and Participation) are presented in this SWMP, Annual Reporting section.

MCM 3: Illicit Discharge Detection and Elimination

1.1.1 Description of MCM

The objective of this minimum control measure is to detect and eliminate illicit discharges to FWA's MS4. An illicit discharge is defined as any discharge to the MS4 that is not composed entirely of storm water, excluding certain non-storm water sources such as permitted Alaska Pollutant Discharge Elimination System (APDES) discharges, water-line flushing, irrigation water, air conditioner condensate, diverted stream flows, street wash water (without detergent), water from crawlspace dewatering and footer drains, de-chlorinated swimming pool water, and water from firefighting activities.

The EPA identifies the following as common types of potential illicit discharges:

- Sanitary wastewater
- Effluent from septic tanks
- Car wash wastewaters
- Improper oil disposal
- Radiator flushing disposal
- Laundry wastewater
- Spills from roadway accidents
- Improper disposal of auto and household toxics

All discharges to FWA's MS4 should be uncontaminated storm water runoff, without the presence of pollutants from the above or other sources. This MCM details FWA's plan to help ensure that this goal is realized.

1.1.2 Applicability to FWA

Like most military installations, there are multiple activities conducted at FWA that could potentially result in illicit discharges to the MS4. Most personnel engaging in industrial and construction activities on base are trained or otherwise informed of this potential threat. However, a large portion of the base population does not hear about storm water P2 in their day-to-day activities. These people may include new personnel, installation employees, family

members, etc. Implementation of the Illicit Discharge Detection and Elimination Plan (IDDEP) must reach the entire FWA population to prove effective. The BMPs to address this MCM have been tailored to ensure all installation occupants are informed of their roles and responsibilities in preventing the discharge of contaminants to FWA's MS4.

1.1.3 MS4 Permit Requirements for MCM 3

Industrial Facility Inventory

Permit Requirement

Within one year of the effective MS4 Permit date, FWA must inventory and map the locations of industrial facilities to include in the storm sewer system map. FWA has developed a map that shows the location of industrial facilities in relation to drainage areas and their associated outfalls. Installation and UA boundaries are also displayed (see Figure 3).

Measurable Goal

The map of industrial facilities is updated each year through a geographic information systems (GIS) database. This map will continue to be updated as changes occur.

Illicit Discharge Detection and Elimination Plan

Permit Requirement

Within two years of the effective MS4 Permit date, FWA must develop and implement a plan to detect and address illicit discharges to the MS4. FWA developed and continues to implement an IDDEP. This plan describes the process that will be utilized by the installation to locate and eliminate illicit discharges.

Measurable Goal

The IDDEP will continue to be followed with annual training, tracking and investigation of illicit discharges, and modifications made to the plan as necessary.

Wet and Dry Weather Outfall Inspections

Permit Requirement

Within one year of the effective MS4 Permit date and annually thereafter, FWA must conduct the following inspections:

- Wet weather outfall inspections to identify and investigate any illicit, inappropriate, or undocumented non-storm water discharge to the MS4.

- Dry weather outfall inspections to identify and investigate any illicit, inappropriate, or undocumented non-storm water discharge to the MS4.

Measurable Goal

FWA conducts quarterly storm water outfall inspections at significant outfalls as part of the installation's Multi-Sector General Permit (MSGP) program. Within the first MS4 Permit year and annually throughout the permit term thereafter, FWA will continue to ensure that outfalls are inspected during both wet and dry weather. If any illicit discharges are discovered during these inspections, PWE will take appropriate actions to address the discharge and prevent any future occurrence.

Oil/Water Separator Survey

Permit Requirement

Within two year from the effective MS4 Permit date, FWA must survey and inspect oil/water separators (OWSs) within the MS4 to ensure proper connection to the sanitary sewer system, if legally permissible.

FWA has conducted a survey and inspection of all OWS units within the MS4 and at least annually receives maintenance logs for OWSs.

Measurable Goal

FWA continues to monitor OWS maintenance and will update the OWS inventory as new devices are installed, removed, or replaced.

Hydrologic Study of Roadway Drainage Structures

Permit Requirement

Within three years from the effective MS4 Permit date, FWA must conduct or revise an existing hydrologic study of all roadway drainage structures within the MS4 to determine whether flows from those structures drain to waters of the United States. Results from this study must be reported to ADEC in the following Annual Report and must be incorporated into the MS4 map required in Part 3.3.9 of the MS4 Permit. FWA has conducted extensive storm water drainage assessments of several sections of the installation's sub-catchment delineation.

PWE combined this data with data from other assessments to produce the Flow Direction Mapbook. This data is stored within a GIS database.

Measurable Goal

FWA will continue to update the storm water system database at least annually as new construction modifies the landscape and flow patterns.

Illicit Discharge Detection and Elimination Program

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must develop and implement a program to detect and eliminate illicit discharges. The program must specifically incorporate detection, identification of the source, and removal of non-storm water discharges, including illegal dumping, into the MS4. As part of this activity, FWA must develop an information management system to track illicit discharges.

Measurable Goal

See the IDDEP for detail regarding specific components of the program.

Regulatory Mechanism to Prohibit Non-Storm Water Discharges

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must effectively prohibit non-storm water discharges into the MS4 through an ordinance or another regulatory mechanism, such as a Garrison Policy, to the extent allowable under federal, state, and local law. FWA must implement appropriate enforcement procedures and actions, including enforcement escalation procedures for recalcitrant or repeat offenders.

This regulatory mechanism has been achieved via Garrison Policy #35.

Measurable Goal

Garrison Policy #35 will be reviewed each year updated as needed to meet other permit requirements.

Prohibition of Non-Storm Water Discharge

Permit Requirement

FWA must prohibit any non-storm water flows listed in Part 1.4.1 of the MS4 Permit through an ordinance or other regulatory mechanism, if such flows are identified by ADEC or FWA as a source of pollutants to the MS4. FWA must document any existing local controls or conditions placed on such discharges. Through the distribution and enforcement of the Garrison Policy letter described in the previous section, FWA will prohibit non-storm water discharges on the installation.

Measurable Goal

Garrison Policy #35 will be reviewed each year updated as needed to meet other permit requirements. FWA will continue to track and document all instances of non-storm water discharges discovered and/or reported by the public.

Illicit Discharge Outreach

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must inform users of the storm water conveyance system and the general public of hazards associated with illegal discharges and improper disposal of waste and provide educational outreach materials.

Outreach is achieved through annual training for key personnel, distribution of flyers and brochures (Household Hazardous Waste, Pet Waste, Storm Water Compliance at Maintenance Facilities), newspaper articles and Facebook posts, and the Environmental Handbook which distributed to newcomers to Fort Wainwright. The privatized housing contractor's Tenant Handbook contains some information regarding spills and pollution prevention. The handbook also prohibits automobile maintenance in the housing area and explains where automobile washing and maintenance should occur at FWA.

Measurable Goal

Outreach material will continue to be reviewed at least annually. In Year 5 of the MS4 Permit, a brochure specifically targeting lawn and garden care will be distributed to FWA residents.

Storm Sewer System Map

Permit Requirement

Within three years from the effective MS4 Permit date, FWA must develop a comprehensive storm sewer system map. At a minimum, the map must show jurisdictional boundaries, the location of all inlets and outfalls, names and locations of all waters that receive discharges from those outfalls, and locations of all base-operated facilities, including snow disposal sites. FWA must submit a copy of the completed map to ADEC as part of the corresponding Annual Report.

Measurable Goal

FWA has developed a storm water routing map (Attachment 1) that depict junctions (inlets/manholes/cross sections), open channels, closed conduits, and detention/storage areas. Figure 3 (see Section 1.2.1) depicts jurisdictional boundaries, outfalls, waters that receive discharges from these outfalls, drainage areas associated with the outfalls, industrial facilities

identified in the MSGP program, and the portion of FWA that lies within the Fairbanks North Star Borough UA.

FWA will continue to update these maps as they are amended.

Dry Weather Field Screening

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must initiate dry weather field screening for non-storm water flows from all outfalls. By the end of the permit term, all of FWA's outfalls within the MS4 must be screened for dry weather flows. The screening should include field tests of selected chemical parameters as indicators of discharge sources. Screening-level tests may utilize less expensive field test kits using test methods not approved by EPA under 40 CFR Part 136, provided the manufactures' published detection ranges are adequate for the illicit discharge detection purposes. FWA must investigate any illicit discharge within 15 days of its detection and must take action to eliminate the source of the discharge within 45 days of its detection.

Measurable Goal

As described in this SWMP, PWE will perform dry weather outfall inspections as part of the MS4 program. All outfalls within the MS4 will be inspected for dry weather flows by the end of the permit term. Field screening techniques and strategies for dry weather flows will be incorporated into the Storm Water Outfall Monitoring Program Plan required by Part 3.3.3 of the MS4 Permit.

Additional Measures FWA has Implemented to Address this MCM

Industrial SWPPP Requirements

The FWA industrial SWPPP describes the measures that have been implemented at FWA to address illicit discharges that are not construction-related. Annual training in storm water P2 is complemented by a regular inspection schedule to help ensure illicit discharges from industrial facilities do not occur on the installation. Hazardous material and waste handling and spill response training at these facilities further ensure that if illicit discharges do occur, they are addressed efficiently and effectively.

Monitoring requirements under the MSGP include visual outfall inspections conducted by PWE staff and/or contractors during or immediately after storms. These inspections would likely reveal illicit discharges if they were to reach an outfall. Facility inspections conducted by personnel at industrial facilities identify contaminants closer to the source and allow them to be addressed prior to discharging to the MS4.

In addition to facility-level inspections and outfall inspections, formal, quarterly facility inspections are conducted as required by the MSGP. One quarter's inspection typically coincides with annual storm water training for storm water coordinators, and a separate quarter's inspection also serves as the annual Comprehensive Site Compliance Evaluation (CSCE). The CSCE includes inspections of each facility covered by the MSGP, associated outfalls and other components of the installation-wide storm water management system, and evaluates the overall effectiveness of FWA's industrial SWPPP. These inspections are further discussed in MCM 6: Pollution Prevention and Good Housekeeping for Installation Operations.

For full details of these measures, refer to FWA's industrial SWPPP, maintained by the PWE storm water program manager.

Construction General Permit Requirements

All construction activities disturbing one acre of more on the installation operate under ADEC's Alaska Construction General Permit (ACGP), as required by APDES. Measures to prevent and eliminate illicit discharges from construction sites include inspections and additional BMPs required under the ACGP. All construction activities disturbing less than one acre, but that have the potential to discharge storm water to the FWA MS4 or waters of the United States, are required to operate under an Erosion and Sediment Control Plan (ESCP), developed and implemented by the construction site operator. A sample ESCP is provided in Attachment 4. MCMs 4 and 5 (see Sections 3.4 and 3.5, respectively) of this SWMP detail BMPs addressing permitted construction activities at FWA and are not duplicated further in this section.

Annual Report Requirements for MCM 3

Annual Report requirements specific to MCM 3 (Illicit Discharge Detection and Elimination) are presented in SWMP Annual Reporting section.

MCM 4: Construction Site Storm Water Runoff Control

1.1.1 Description of MCM

The objective of this MCM is to reduce the pollutant load in storm water runoff from construction activities to the FWA MS4. Sediment is often the primary pollutant in construction runoff. Inadequate erosion control measures, poor project phasing, and off-site tracking are common sources of sediment in storm water runoff from construction sites. This section describes measures that FWA has implemented and/or will implement to address sediment and other sources of potential pollutants from entering runoff from construction sites.

1.1.2 Applicability to FWA

There is a dynamic nature to the structural topography of FWA. Construction and demolition often occur on base to accommodate the fluctuating base population or to replace outdated structures. Due to this level of activity, it is especially important that contractors, contracting officers, and department personnel are well versed in storm water P2 regarding these activities. As a regulated small MS4, FWA will ensure that all APDES requirements for construction activities are effectively implemented for applicable development, redevelopment, and demolition projects on the installation.

1.1.3 MS4 Permit Requirements for MCM 4

Construction Site Runoff Control Program

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must develop, implement, and enforce a program to reduce pollutants in storm water runoff to the MS4 from construction activities disturbing one or more acres. This complies with the MS4 Permit and the current version of the APDES General Permit for Storm Water Discharges from Large and Small Construction Activities in Alaska Permit AKR100000 (ACGP). FWA's program must also address storm water discharges from construction activity disturbing less than one acre if that construction activity is part of a larger common plan of development or sale that would disturb one or more acres. FWA must include any revisions, planned improvements, and interim implementation schedules related to this program in the MS4 Annual Report.

Measurable Goal

Within the Annual Report for FWA's fourth MS4 Permit year, the requirements specific to FWA construction activity will be summarized. Information below explains how construction

activities at FWA are managed to reduce the potential of storm water contamination resulting from those activities.

Construction General Permit

All construction sites disturbing one or more acres at FWA are required to have coverage under an APDES construction storm water permit. This is usually accomplished by using the ACGP. The party or parties requiring permit coverage must officially notify ADEC of the project by submitting Notices of Intent (NOIs) for coverage under the ACGP, along with payment for a plan review. The major provision of the ACGP is to develop and implement a SWPPP that describes the BMPs that will effectively prevent pollutants from leaving the project site and entering storm water runoff.

Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original design of a facility does not require coverage under the ACGP. In order to qualify as a routine maintenance activity, the land disturbance should not go beyond the footprint of the preexisting structure. Re-paving a road surface with new asphalt, for example, is not considered a construction activity unless the activity exposes soil outside the original road prism to storm water. However, the development, submittal, and implementation of an ESCP are still required.

Construction SWPPPs for the ACGP are required to document the following information.

- The permittee for the site and any subcontractors that may work on the site, including the areas where the subcontractors may be or are expected to conduct activities covered by the ACGP.
- Qualified person(s) responsible for:
    - Storm water lead (duties)
    - SWPPP updates
    - Inspections
    - Monitoring (if applicable)
    - Operating an active treatment system (if applicable)

- Brief description of the existing site-specific conditions, including mean annual precipitation, site conditions, and receiving waters, such as impaired waters or waters listed in the Alaska Department of Fish and Game Anadromous Waters Catalog.

- Brief description of the nature of the construction activity, including the function of the project, intended sequence and timing of activities that disturb soils at the site, size of the property, and the total area expected to be disturbed by excavation, grading, or other construction activities (in acres), including support activities, a general location map (e.g., U.S. Geological Survey quadrangle map, a portion of a city or county map, or other map) with enough detail to identify the location of the construction site and waters of the United States within one mile of the site, and identification of all potential sources of pollutants that may reasonably be expected to affect the quality of the storm water discharges from the site.

- A legible site map (or set of maps for large projects) showing the entire site and identifying site-specific information.

- Description of control measures that will be installed and maintained to meet the requirements for each major activity identified in the project description; the SWPPP must clearly document the type and location of control measure(s) to be installed and maintained, the general sequence during the construction process in which the control measures will be installed and made operational, as well as the manufacturer's specifications for installation, the general sequence of stabilization practices that will be used to achieve temporary or final stabilization on exposed portions of the site, the type of treatment chemical used, information submitted to ADEC for an active treatment system, good housekeeping measures, a description of spill prevention and response measures, and a description, including location, of all permanent storm water management controls that will be installed at the site.

    - For projects that expect a winter shutdown, the SWPPP must provide a description of anticipated dates of fall freeze-up and spring thaw, methods the permittee will use to address winter considerations, a description of maintenance procedures for control measures, a description of training relevant to the construction activity and control measures used at the site, the type of construction and waste materials expected to be stored at the site with updates, and description of the measures for handling and disposal of all wastes generated at the site, including clearing and demolition debris or other waste

soils removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste.

- The location of any storm water discharge associated with support activities, including storm water discharges from dedicated asphalt plants and dedicated concrete plants that are covered by the ACGP.

- All authorized sources of non-storm water discharges listed in Part 1.4.1 of the MS4 Permit, except for flows from fire-fighting activities that are combined with storm water discharges associated with construction activity at the site.

- Description of good housekeeping measures used to control or reduce non-storm water discharges.

Overview of ACGP Coverage

The prime contractor and organization with direct management ability to direct changes to the prime contractor must submit their construction plans to PWE for review, allowing enough lead time for requested changes to be incorporated into the design. Contractors submit their SWPPP to the United States Army Corps of Engineers (USACE) concurrent with submitting their NOI to ADEC. USACE, in turn, provides a copy of the SWPPP to the PWE storm water program manager for review.

Construction site operators are responsible for conducting regular inspections of their project site(s) to ensure effective implementation of the BMPs they chose and for overall compliance with their SWPPP. Contractors must inspect their project sites according to one of the following routines: (1) at least every 14 days *and* within 24 hours of storm events, or (2) at least every seven days. The regiment they choose must be specified in the SWPPP. They must maintain required documentation for all inspections. Contractors must remedy any deviance from provisions of the permit and/or SWPPP as required.

At the end of the project, PWE personnel inspect the site to ensure final stabilization measures have been adequately implemented. Prior to submitting the Notice of Termination (NOT), final stabilization must occur, or the responsibility for final stabilization must be accepted by another entity, usually in the form of a NOI. Occasionally, the contractor will complete final stabilization at a later date than originally planned, or the installation will assume that responsibility. This usually occurs when mission dictates changes to the project schedule. Once the site is approved for closure, the contractor and sponsoring entity submit their NOTs,

and the project site reverts back to FWA ownership. FWA is then responsible for post-construction maintenance of the site.

Throughout the construction process, PWE makes great effort to support contractors and ensure the operation progresses as smoothly and compliantly as possible. The ACGP and supporting guidance documents can be found at the following website:

http://www.dec.state.ak.us/watewr/wnpspc/stormwater/Index.htm

State of Alaska Construction Related Permits

Discharges from construction sites that are not specifically covered under the ACGP and could potentially threaten State of Alaska water quality standards (WQS) must be addressed through the state permitting process. Excavation resulting in production of water and sites that require containment of water for treatment and/or disposal may require separate permits from ADEC. Contractors must determine which permits they are required to obtain. PWE and/or USACE can assist contractors in this process.

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Excavation Dewatering

Construction excavation in Alaska that generates water for disposal requires ADEC's current Wastewater Disposal General Permit for Excavation Dewatering. The following waste disposals are covered under the dewatering general permit:

- A wastewater disposal from excavations on sites located less than one mile from a contaminated site; eligible projects may include earthwork activity such as culvert placement; gravel extraction; pipeline installation, inspection or repair; and other similar projects.

- A wastewater disposal from excavations located more than one mile from a contaminated site and not eligible for coverage under the MSGP or ACGP.

The following waste disposals are not covered by ADEC's dewatering general permit:

- A wastewater disposal from excavations located more than one mile from a contaminated site, if authorized under the MSGP or ACGP.

- A wastewater disposal to waters listed by the state as impaired where the impairment is wholly or partially caused by a pollutant contained within the proposed discharge.

- A wastewater disposal approved by ADEC as part of the cleanup at a contaminated site.

Regardless of the area disturbed by construction, dewatering activities generating greater than or equal to 250,000 gallons require the operator to submit a Notice of Disposal (NOD) to ADEC. If the dewatering occurs within one mile of a contaminated site, ADEC requires the operator to obtain coverage under the dewatering general permit. If less than 250,000 gallons of water is generated, operators do not need to submit a NOD but must still follow provisions of the dewatering general permit.

If the wastewater disposal does not meet the eligibility criteria of the dewatering general permit, contributes to pollution, or causes or has the potential to cause adverse impacts on public health or water quality, ADEC will require an individual permit to be obtained. The dewatering general permit and individual permits are in addition to, not substitutes for, coverage under the ACGP, MSGP, or any other NPDES permit(s) for storm water.

Additional requirements, such as monitoring, management practices, reporting, are required for compliance with the dewatering general permit. Complete descriptions of requirements are explained in the permit. A copy of ADEC's dewatering general permit is available on ADEC's website or by contacting the ADEC Division of Water, along with a decision tree that can assist contractors in determining whether or not they need to obtain the permit and a schedule of permit fees.

Contained Water Disposal

Alaska's Waste Disposal General Permit for Contained Water applies to the disposal of water including but not limited to hydrostatic test water or chlorinated water from tanks, pipelines, swimming pools, and other containers that meet Alaska WQS in 18 AAC 70. Contained water disposal is uncommon at construction sites at FWA; thus, it is not detailed in this SWMP. However, it is highlighted here for operators who may find it applicable and would have otherwise not been aware of the existence of such requirements. A copy of ADEC's current contained water permit is available on ADEC's website or by contacting the ADEC Division of Water.

Construction Disturbing Less than One Acre

Erosion and Sediment Control Plan (ESCP)

Construction sites that disturb less than one acre are not required to have APDES construction permit coverage unless they are part of a larger common plan of development that, combined, disturbs one acre or more. ADEC may require a permit if there is potential for the project to violate Alaska WQS. In most cases, a construction permit is not required for projects under one acre. However, all construction projects that have the potential to impact waters of the United States and/or FWA MS4, regardless of size, must develop and implement an ESCP for their projects. The ESCP plan must be submitted to the PWE storm water program manager for approval before any construction activity begins. This requirement also applies to any tree clearing and grubbing operations within the UA. A sample ESCP is provided in Attachment 4.

ADEC Waiver for Small Construction Activity

Permit Requirement

FWA is not required to develop, implement, and/or enforce a program to reduce pollutant discharges from a specific small construction activity (i.e., a single project) if ADEC waives the permit requirements for storm water discharges associated with that activity, in accordance with 40 CFR 122.26(b)(15)(i)(A) or (B).

Measurable Goal

There is no measurable goal for this requirement. However, at a minimum, FWA requires that all construction projects with the potential to discharge to waters of the United States develop and submit to PWE an ESCP prior to breaking ground. In that way, there is management and oversight of all construction activity at FWA with the potential to contaminate storm water discharges.

Regulatory Mechanism for Construction Activity

Permit Requirement

Within one year from the effective MS4 Permit date, FWA must adopt an ordinance or other regulatory mechanism, such as a Garrison Policy letter, to the extent allowable under federal, state or local law, which requires construction site operators to practice appropriate erosion, sediment and waste control. This ordinance or regulatory mechanism must include sanctions to ensure compliance. If such a mechanism did not previously exist, development and adoption of a mechanism is required. FWA must evaluate all existing procedures, policies, and authorities pertaining to activities that occur on the installation, which may be used to assist in

the development of the required regulatory mechanism. Garrison Policy #35 meets this requirement.

Measurable Goal

PWE will continue to document, track, and consider all reports of improper runoff from construction sites reported by the public. If PWE determines the BMPs chosen by a construction site operator are not being properly implemented or are inadequate, PWE will work with the operator and/or sponsoring entity to address the situation. Should a conflict arise, PWE will implement an escalating enforcement matrix that may include written warnings, stop work orders, and an "up-chain" process, whereby individuals with increasing authority will engage in mediation until the conflict is resolved.

Construction Outreach

Permit Requirement

Within one year from the effective MS4 Permit date, FWA must publish and distribute requirements for construction site operators to implement appropriate erosion and sediment control BMPs and to control waste such as discarded building materials, concrete truck washout, chemicals, litter and sanitary waste at the construction site that may cause adverse impacts to water quality. One training event has occurred during the MS4 Permit cycle.

Measurable Goal

FWA has made and will continue to make efforts to educate all personnel associated with construction activities in storm water P2. Public education and outreach is the cornerstone of storm water awareness. The more educated FWA personnel and contractors are, the more efficient and compliant the projects become. Therefore, PWE believes it is in everyone's best interest to engage in continuing education whenever possible.

PWE has published a brochure for small construction sites regarding BMPs and messages for common construction site activities that have the potential to contaminate storm water. Topics include erosion prevention and sediment control, proper management of discarded construction materials, hazardous material disposal, and SWPPP requirements under the ACGP. The brochure is provided to USACE and the contractors for distribution, and published to the installation's storm water web page.

An additional training is planned during Year 4 of the MS4 Permit.

Construction Site Plan Review

Permit Requirement

Within one year from the effective MS4 Permit date, FWA must develop procedures for reviewing all site plans for potential water quality impacts, including erosion and sediment control, control of other wastes, and any other impacts that must be examined according to the requirements of the law, ordinance, or other enforceable mechanism of Part 3.4.3 of the MS4 Permit. These procedures must include provisions for receipt and consideration of information submitted by the public.

Measurable Goal

PWE will continue to review all storm water plans for projects on the installation. Many potential issues that arise during the construction phase of a project can be prevented during the plan review stage. Standard language is inserted in all construction contracts at FWA requiring contractors to submit their plans for review with enough lead time for necessary changes to be made before ground is broken. Identifying and addressing potential water quality impacts ahead of time is expected to result in more effective and efficient project management for USACE, FWA personnel and the contractor.

Site plan review will focus on the following aspects of the project:

- Erosion and sediment control selection
- Storm water management control selection
- Proximity of project site to surface water features and contaminated sites
- Locations of storm water controls on the site map
- Management strategy for construction waste
- Inspection and BMP maintenance plans
- Final stabilization measures

PWE's objective is to provide the regulatory framework, requirements, guidance, and helpful resources for a contractor to efficiently comply with all storm water regulations for construction activity at FWA. Completing initial construction plan review will streamline the entire process and help ensure greater compliance further into the project. Within the first MS4 Permit year, FWA will ensure there are protocols in place for the receipt and consideration of information submitted by the public.

Construction Contract Language

Permit Requirement

Within one year from the effective MS4 Permit date, FWA must develop standard language for inclusion in FWA construction contracts defining contractor roles and responsibilities for erosion and sediment control.

Measurable Goal

A wide variety of linear and vertical construction projects regularly occur at FWA. These projects can range from minor road extensions and repair to large-scale, vertical construction of consolidated motor pools, hangars, barracks, etc. Due to this variation, it would be impractical to detail construction specifications in boilerplate contract language. However, FWA has included provisions in all construction contracts that specifically require all contractors to familiarize themselves with and comply with all applicable State of Alaska and federal environmental regulations. Contractor compliance with construction storm water requirements is further facilitated by BMPs that have been and will be implemented to make these requirements and guidance assistance for them easily accessible to contractors.

Construction Site Inspections and Enforcement

Permit Requirement

Within one year from the effective MS4 Permit date, FWA must develop and implement procedures for site inspection and enforcement of control measures established as required in Parts 3.4.3 and 3.4.4 of the MS4 Permit, including enforcement escalation procedures for recalcitrant or repeat offenders. FWA must inspect all construction sites in the regulated MS4 for appropriate erosion/sediment control at least once per year.

Measurable Goal

All construction activities are inspected by PWE staff to ensure that they are in compliance with respective storm water permits and/or the ESCP. Construction activity that occurs for more than a year will be inspected once per year, at a minimum. An MS4 inspection form is used. Enforcement escalation procedures are established in the Garrison Policy #35.

Construction Storm Water Training

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must develop and conduct at least one training session for the local construction/design/engineering audience related to the construction ordinance and BMP requirements referenced in Parts 3.4.3 and 3.4.4 of the MS4 Permit.

Measurable Goal

One construction training has been held. An addition training is scheduled for Year 5 of the Permit and will include education on the scope of the construction Garrison Policy letter and implementation of the Army's *Low Impact Development Technical User Guide*.

Annual Report Requirements for MCM 4

Annual Report requirements specific to MCM 4 (Construction Site Storm Water Control) are presented in SWMP Annual Reporting section.

MCM 5: Post-Construction Storm Water Management in New Development and Redevelopment

1.1.1 Description of MCM

Construction and land development typically increase impervious surfaces, compact soil, and reduce tree and vegetation cover. The addition of impervious surfaces, such as roads, parking areas, sidewalks, and rooftops, increase runoff volume and velocity and can alter drainage patterns. Runoff from these areas can also contain contaminants such as sediment, nutrients, road salts, heavy metals, bacteria, and petroleum hydrocarbons. Increased runoff, runoff velocity, and pollutant loading can have deleterious effects on the storm water management system and the aquatic systems they flow to. This MCM details the process and procedures FWA has implemented, and will implement in the future, to address these concerns and reduce post-construction impacts to the maximum extent practicable.

Applicability to FWA

As FWA owns and operates a regulated small MS4, it is subject to APDES post-construction storm water management requirements. Projects disturbing one acre or more must adhere to the requirements detailed in this MCM. When project coordinators consider potential sites and designs for their construction projects, they must consider how the development will affect the original hydrology of the area. Potential impacts of proposed construction activities on water quality must be evaluated and addressed prior to project approval.

In terms of storm water management, the most successful projects are those that do not increase runoff volume, velocity, and content. The basic goal is to reduce post-construction storm water runoff to pre-development levels while reducing the potential for pollutant loading. Though this goal cannot always be fully realized, there are many effective BMPs that, if implemented, result in well-managed post-construction runoff.

MS4 Permit Requirements for MCM 5

Post-Construction Storm Water Management Program

Permit Requirement

Within three years from the effective MS4 Permit date, FWA must develop, implement, and enforce a program to address post-construction storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre and discharge into the MS4, including projects less than one acre that are part of a larger plan of development or sale that exceed one acre.

Measurable Goal

FWA intends to adopt the post-construction program detailed in the *Army Low Impact Development Technical User Guide* and associated BMP manuals that the letter will adopt. Within the third MS4 Permit year, this letter will include language that is specific to post-construction activity at FWA. A Garrison Policy letter will be drafted and implemented to enforce compliance in the FWA MS4 with the management strategies outlined in the *Army Low Impact Development Technical User Guide* and this SWMP. The guide highlights BMPs that are most effective for common development and redevelopment activities at FWA.

Provided below is an overview of how post-construction activities at FWA are/will be managed to reduce the potential of storm water contamination resulting from those activities. These activities include the construction of barracks, administrative buildings, maintenance facilities, parking lots, and new family housing developments. Alaska's harsh climate often dictates which BMPs are practical and effective for these projects and which are not. BMP guidance included in the *Army Low Impact Development Technical User Guide* will consist of protocols and practices that have proven effective locally. A regime of structural and non-structural BMPs will be presented, including source control and treatment BMPs.

The following are examples of source control BMPs:

- Site selection: Do not develop near environmentally sensitive areas such as wetlands, riparian corridors, threatened or endangered species habitat, surface water bodies, etc.
- Landscape architecture: Create permeable, vegetated buffers around impervious features to filter contaminants and allow greater infiltration of runoff.
- Green building: Utilize elements of green building such as bio-retention swales, lower volatility organic compounds ("low VOC") and less toxic products.
- Low Impact Development (LID): Utilize LID applications such as native landscaping, innovative bio-retention and infiltration techniques to restore the natural, pre-developed ability of a site to absorb storm water.
- On-lot controls: Install on-lot treatment devices to reduce the total volume and rate of runoff from standard roofing systems.

The following are examples of treatment BMPs:

- Buffers:

- Water pollution hazard setbacks – Reduce the pollution potential to waterways by maintaining reasonable distances between them and development.
- Vegetated buffer – Designed to slow runoff velocity, allow sediment and other pollutants to settle, and water to infiltrate.
- Engineered buffers – Specifically designed to treat storm water before it enters streams, lakes, or wetlands.

- Vegetated swales: Relatively shallow, vegetated channels can trap particulates (suspended solids and trace metals), promote water infiltration, and reduce runoff flow velocity.
- Infiltration islands: Landscaped islands in parking lots can reduce storm water runoff from impervious portions of the lot, trap contaminants, and improve aesthetics.
- Storm water wetlands: Construct storm water wetlands for bio-filtration of pollutants in roof and parking lot runoff.

One of the most effective BMP strategies for addressing runoff volume, velocity, and impurity is the use of vegetative buffers. Strategic landscaping is relatively inexpensive to implement, can be very effective in lowering volume and velocity, and tends to be aesthetically pleasing. Furthermore, contaminants can be filtered through and captured by vegetative buffers. This can be especially effective at FWA, where runoff often travels long distances through ditches and swales prior to reaching an outfall. Keeping the majority of runoff above grade results in less mechanical sewer infrastructure to install and maintain and allows for easier illicit discharge detection.

Post-Construction Program Overview

PWE works with contractors, contracting officers, and personnel from other departments at project inception, to ensure that necessary permitting is obtained and requirements are satisfied. PWE water program staff review site plans to ensure effective BMPs are chosen for post-construction storm water management. Successful post-construction management often hinges on appropriate and effective construction project planning and implementation of BMPs during construction. Thus, the water program staff reviews the project SWPPP for appropriate controls throughout the project. The project is evaluated during and after construction to verify BMPs are in place and operating as intended, to ensure protection of

the storm sewer system and prevention of polluted storm water drainage to waters of the United States.

Developing and implementing a project SWPPP is the main provision of the ACGP. Coverage of the ACGP terminates with submission of the NOT. However, provisions of the ACGP require the SWPPP to address permanent stabilization practices for the site, including a schedule of when the practices will be implemented. The water program staff utilizes plan review sessions to address potentially flawed designs and/or BMP selection. Plan review may result in the contracting officer requesting more or different specifications from the contractor regarding post-construction attributes.

At the end of the project, the PWE storm water program manager inspects the site to ensure final stabilization measures have been effectively implemented. The storm water program manager then conveys key aspects of post-construction BMP inspection and maintenance to the personnel responsible for those activities. Inspection and maintenance of post-construction BMPs is discussed in further detail in SWMP Section 3.5.3.4.

Snow Stockpiles

Snow is stockpiled in multiple locations at FWA. Most stockpiles are on vegetated, permeable ground, such as a grassy field, or located such that melt water drains to vegetated and/or permeable ground that is at least 100 feet from a storm water conveyance. Stockpiled snow is removed from base facilities with impervious surfaces or facilities that are adjacent to surface water bodies or storm water conveyances. Personnel at facilities with permeable ground, away from conveyances, often clear their own snow.

Snow cleared from construction sites must adhere to the above practices. Upon request and available space, contractors are able to utilize alternative snow stockpile locations. Inspection of these sites is a BMP that satisfies provisions of the MSGP. Stockpile locations are inspected to ensure that melt water cannot reach storm water conveyances and that trash melted out of them is reported for collection and proper disposal. The locations of FWA's snow stockpiles change periodically due to land use changes and development activity. The designated locations at the time this SWMP was prepared are presented in FWA's MSGP SWPPP.

FWA's MS4 Permit specifically prohibits the disposal of snow directly to waters of the United States or to the FWA MS4.

Septic Systems

No new septic systems are installed at FWA. However, there are several pre-existing operational septic systems on the installation. The sanitary sewer is plumbed to all new construction within the UA.

Parking Lots

Parking lots are often installed to accompany non-residential construction at FWA. Due to the nature of business, large capacity for vehicle and equipment storage must be available. Additionally, military vehicles are larger and heavier than standard automobiles. Often, the types of vehicles and/or equipment to be stored dictate lot design and surface material used.

Earlier in this section, BMPs that can be utilized to reduce runoff volume, velocity, and pollutant content from impervious features such as paved parking lots were discussed. FWA is dedicated to considering green alternatives where possible. Ultimately, however, mission dictates the product. The *Army Low Impact Development Technical User Guide* will detail alternatives for parking lot construction and post-construction BMPs as appropriate.

Post-Construction Plan Review Process

It is the construction site operator's responsibility to implement post-construction BMPs. However, once the NOT is filed and the project site reverts back to FWA ownership, it is the installation's responsibility to maintain the BMPs and ensure their effectiveness. Thus, post-construction plan review is an essential step in projecting future compliance efforts at construction sites. This upfront work will save time and money down the road for both the construction site operator and the installation. More importantly, it will help ensure that WQS are not compromised during or after the project.

A successful strategy for post-construction storm water management begins with a thorough review of the site plans. During this time, reviewers should focus on pre-development hydrology, local conditions and weather trends, the project scope, and environmentally sensitive areas near the site. Project reviewers should be familiar with a wide range of post-construction BMPs, local conditions, and have previous project experience in the area.

EPA recommends the following be incorporated into post-construction plan review:

- Education and training on LID and post-construction BMPs
- Pre-submittal meetings with developers/engineers
- Review of conceptual and design plans

LID and Post-Construction BMPs

In an effort to reduce energy consumption and optimize life cycle performance, all military vertical building construction projects must now achieve the Silver Level of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. This is Army-wide policy that applies to all new construction projects, regardless of funding source. The LEED system is modeled after the following six construction and design principles:

- Optimizing site potential
- Optimizing energy use
- Protecting and conserving water
- Using environmentally preferable products
- Enhancing indoor environmental quality
- Optimizing operational and maintenance practices

LID is discussed in the *Army Low Impact Development Technical User Guide*, accompanied by references for additional guidance and continuing education on the subject. BMPs that contractors can choose from when planning future projects on base will be referenced. Additionally, PWE will incorporate these topics in its construction forums, when appropriate, and emphasize the importance of considering port-construction BMPs in initial project planning.

Pre-Submittal Meetings with Developers/Engineers

Construction site operators, contracting officers, and other applicable personnel are encouraged to meet with PWE water program staff prior to submitting/approving final plans for development. The following items should be reviewed during these meetings:

- Pre- and post-development hydrologic analysis
- LID opportunities

- Pollutant(s) of concern
- Pollution prevention measures
- Source and treatment controls
- Long-term operation and maintenance of controls

The goal of this process is to address issues on paper before they occur at the project site, when they become more difficult, time-consuming, and expensive to correct. PWE makes efforts to emphasize its supportive role for contractors throughout this process.

Review of Conceptual and Design Plans

Even conceptual plans should convey basic post-construction storm water management BMPs. Preserving natural areas, minimizing impervious surfaces, LID measures, and on-site infiltration utilizing vegetative buffers are examples. The final plan must have a detailed representation of the project's comprehensive strategy for maintaining as close to pre-development hydrology as practicable. Reviewers must be well trained in post-construction storm water management techniques and have experience evaluating the effectiveness of proposed plans.

Regulatory Mechanism for Post-Construction Activity

Permit Requirement

Within three years from the effective MS4 Permit date, FWA must adopt an ordinance or other regulatory mechanism, such as a Garrison Policy letter, to the extent allowable under state or local law to address post-construction runoff from new development and redevelopment projects. If such a mechanism does not exist, development and adoption of a mechanism must be part of the program. FWA must evaluate existing procedure, policies, and authorities pertaining to activities occurring within the MS4 that may be used to assist in the development of the required regulatory mechanism.

Measurable Goal

The Garrison Policy #35 instructs the FWA population and construction contractors that they must comply with all applicable provisions of the MS4 Permit and this SWMP.

Post-Construction Activity Manual

Permit Requirement

Within four years from the effective MS4 Permit date, FWA must adopt or develop and then distribute a BMP design manual for post-construction storm water management, which includes a list of strategies reflecting a combination of structural and/or non-structural BMPs

appropriate to the MS4. This design manual must include but is not limited to requirements for the appropriate design and construction of snow disposal sites, LID methods, and parking lots.

Measurable Goal

As previously discussed in this SWMP, FWA intends to adopt the *Army Low Impact Development Technical User Guide* to address construction and post-construction requirements on the installation. The guide incorporates multiple BMP manuals that address construction, post-construction, Green Infrastructure (GI)/LID and other pertinent construction practices that may be implemented within the FWA MS4. The guide will be posted on FWA's storm water web page and will be distributed to contractors by the contracting office or PWE.

Post-Construction Site Inspections and Maintenance

Permit Requirement

Within four years from the effective MS4 Permit date, FWA must develop and implement an inspection schedule and a long-term operation and maintenance plan for post-construction BMPs.

Measurable Goal

Post-construction site inspection criteria and schedule will be described in the *Army Low Impact Development Technical User Guide*. Preventive maintenance of FWA's storm water management system occurs during the spring, summer, and fall. This is primarily conducted by the installation's infrastructure maintenance personnel.

PWE staff will develop an inspection program specifically for post-construction BMPs. The program will outline the criteria and schedule for inspections, how they will be documented, responsible parties, and how action items will be addressed. An inspection checklist will be developed for use by BMP inspectors. Maintenance requirements for each type of BMP will be listed on the checklist to help inspectors determine if the maintenance schedule for the BMP is adequate. Checklists may include minimum performance expectations, design criteria, structural specifications, dates of implementation, and expected life span of each BMP type. Inspections of vegetative and other infiltration BMPs will occur after storms, following the expected drawdown period for the BMP. This will allow the inspector to see whether detention and infiltration devices are draining correctly or if they require maintenance.

FWA's general population can be an asset to PWE in keeping an eye on base-wide storm water runoff. Education and outreach are the cornerstone of this SWMP. Thus, it is expected that the majority of the population on the installation will be educated enough throughout the

implementation of this SWMP to recognize properly functioning BMPs and call attention to areas requiring improvement. All reports made to PWE by the public regarding inadequate BMP operation or contaminated runoff will be documented and investigated. If the reports have merit, action will be taken to address the issue(s) by appropriate parties, as soon as practicable.

Post-Construction Storm Water Training

Permit Requirement

Within four years from the effective MS4 Permit date, FWA must develop and conduct at least one training for base developers, engineers, tenants, and the public regarding requirements of the Garrison Policy letter and the BMP design manual for post-construction storm water management referenced in Parts 3.5.2 and 3.5.3 of the MS4 Permit. Training was not perfomed during the first four permit years.

Measurable Goal

FWA will develop or adopt a training program that educates relevant members of the installation's construction community, and provide the training to them during Year 5 of the MS4 Permi. The training will include education on the scope of the Garrison Policy letter and the implementation of the *Army Low Impact Development Technical User Guide*, relevant to post-construction BMPs.

Written Strategy Green Infrastructure/Low Impact Development

Permit Requirement

Within four years from the effective MS4 Permit date, FWA must develop a written strategy for planning, constructing, and evaluating GI/LID projects within FWA. The strategy is to be included in the fourth year Annual Report. The strategy will evaluate the effectiveness of individual LID techniques: green roofs, rain gardens, rain barrels, bio-swales, permeable piping, drywells, and permeable pavement that mimic natural processes and direct storm water to areas where it can be infiltrated, evapotranspirated, or reused. The strategy must discuss the benefits and costs of such techniques and provide guidance to the base on how to implement them.

Measurable Goal

FWA will provide ADEC with a written strategy for planning, constructing, and evaluating GI/LID projects within the FWA MS4 in the fourth Annual Report.

Annual Report Requirement for MCM 5

Annual Report requirements specific to MCM 5 (Post-Construction Storm Water Management in New Development and Redevelopment) are presented in SWMP Annual Reporting section.

MCM 6: Pollution Prevention and Good Housekeeping for Base Operations

1.1.1 Description of MCM

The objective of the Pollution Prevention and Good Housekeeping MCM is to develop and implement an operation and maintenance program at FWA with the goal of preventing and reducing pollutant runoff into the storm drainage system. This MCM requires that FWA examine its pollution prevention (P2) practices and influence employee and resident behavior to reduce or eliminate the potential for pollutant to collect on streets, parking lots and open spaces, storage, vehicle and aircraft maintenance/washing areas, and other areas where storm water could transport the pollutants to the Chena River. In addition to routine good housekeeping practices, this measure extends to include review and modification of practices that result in environmentally damaging land development, poor flood management, and/or inadequate maintenance of the storm drainage system.

Applicability to FWA

Military and civilian personnel employed at FWA who work in industrial facilities, such as maintenance facilities and fueling points, are most likely to engage in activities where pollutants could be released into the storm drainage system. Residents of installation housing also have the potential to contribute to storm water pollution as they perform typical household activities such as lawn maintenance, solid waste (trash) management, and pet care. Employees who work on base restaurants and dining halls or are responsible for grounds maintenance have the potential to contribute to storm water pollution through activities such as improper waste disposal and excessive use of chemicals. By following BMPs related to good housekeeping and P2, each of these user groups is expected to have an active role in preventing contaminants from being discharged to the MS4 and waters of the United States.

FWA's environmental P2 element is charged with ensuring the installation prevents future pollution by reducing the use of hazardous materials and the release of pollutants into the environment to as near zero as feasible. This is achieved by process changes and hazardous material substitutions and minimizations by FWA personnel.

MS4 Permit Requirements for MCM 6

Storm Water Pollution Prevention Inspections

Permit Requirements

Within one year from the effective MS4 Permit date and annually thereafter, FWA must conduct storm water P2 inspections that include the following:

- Wet-weather outfall inspections (100% each year)
- Snow disposal areas (100% each year)
- Catch basins (50% each year)

Measurable Goal

FWA will continue to conduct additional storm water P2 inspections as required by the MS4 Permit provision above. FWA's industrial SWPPP contains description of storm water inspections already being implemented at FWA.

Operation and Maintenance Program

Permit Requirement

Within two years from the effective MS4 Permit date, FWA must develop and implement an operation and maintenance program intended to prevent or reduce pollutant runoff from base operations. This program must address current base activities that have the potential for negative storm water-related water quality impacts, including:

- The use of sand/gravel and road deicers
- Fleet maintenance and vehicle washing operations
- Street sweeping, cleaning, and maintenance
- Grounds/park, golf course, and open space maintenance operations
- Building maintenance
- Solid waste transfer activities
- Water treatment plant operations
- Storm water system maintenance
- Snow disposal site operation and maintenance

In addition, FWA must address the following:

- Material storage
- Hazardous material storage
- Used oil recycling
- Spill control and prevention measures for refueling facilities
- New construction and land disturbances on base
- Snow removal practices

Measurable Goal

The FWA Operations and Maintenance Program is intended to prevent or reduce pollutant runoff from base operations. The program document addresses the applicable activities listed above for each responsible party. A key component of the program will be outreach to appropriate base audiences. For example, educational materials, as described in MCM 1 (Section 3.1), will be provided to base housing residents. These materials will provide P2 guidance for the resident areas, discuss the proper disposal of household chemicals; proper storage, application, and disposal of pesticides, herbicides, and fertilizers; and procedures for vehicle maintenance and washing and pet waste management.

Provided below is a discussion of P2 measures that are/will be implemented at FWA to reduce the likelihood of storm water contamination.

Spill Prevention and Response

Currently, FWA has an active and effective spill prevention, control, and response program. A Spill Prevention, Control, and Countermeasure Plan (SPCC) exists for all required operations on the installation and details methods implemented to prevent POLs from reaching waters of the United States in the event of a spill or leak. This SPCC is reviewed and amended once every five years, as required. Spill prevention and response is a component of the installation's storm water P2 trainings and part of the job duties of many base employees. Facilities where a potential spill could occur have spill kits on site and trained personnel on call to respond in the event of a spill. The FWA fire department is notified of and responds to significant spills or leaks, including POL spills.

Road Maintenance, Salt Use, Snow Removal

Streets are swept and the installation's storm drainage system is cleaned on a regular basis with particular emphasis on thorough spring sweeping and cleaning. During the winter

months, a mixture of magnesium chloride and gravel/sand is applied to base roads. The magnesium chloride is used to prevent the gravel/sand from freezing to the walls of the spreader trucks and allows a more even application on roadways. In most cases, plowed snow is stockpiled in areas a minimum of 100 feet from the storm water drainage system and on pervious surfaces where it is expected that snow melt will infiltrate rather than flow into storm drains. A vacuum truck is used during the spring road sweeping to collect residual gravel/sand, thus significantly reducing the sediment load discharge into the storm drainage system. If sweeper trucks are used on base roads, a water truck first dampens the road surface to prevent or greatly reduce fugitive dust from the activity.

Storm drainage structures at FWA are washed on a rotating schedule with a high-pressure jet washer. Jet-washing operations clean drainage pipes, manholes pits, catch basins, and culverts of obstructions and accumulated silt.

Residential Facilities

Newly assigned residents in base housing receive a briefing when they sign their lease that includes information on many P2 and good housekeeping practices. Residents are directed to clean up pet waste daily. Guidance for vehicle maintenance and washing activities is provided. Residents are expected to dispose of all hazardous materials and waste properly. The privatized military housing contractor's Tenant Handbook gives housing residents general guidance on environmental topics and instructs residents to report all spills and to keep parking spaces free of POL residue. Following these practices is mandatory for continued residency on base.

Recreational Facilities

The Golf Course on FWA is operated and maintained by FMWR. Golf Course staff work with PWE to review and determine best management practices for their facility.

Study of Street Cleaning Operations

Permit Requirement

Within five years from the effective MS4 Permit date, FWA must complete a study of the effectiveness of current street cleaning operations, storm drain cleaning operations, and other base activities with potential for storm water impacts. This study must also examine the existing practices for the disposal of waste removed from the MS4 and MS4 operations.

Measurable Goal

FWA will conduct this study within the first MS4 Permit term, as required.

Employee Training

Permit Requirement

Within two years from the effective MS4 Permit date and annually thereafter, FWA must develop and conduct appropriate training for appropriate base personnel related to optimum maintenance practices for the protection of water quality.

Measurable Goal

FWA has made and continues to make multiple efforts to train appropriate base personnel in storm water P2. Storm water coordinators at industrial facilities at FWA receive required annual training. Training topics covered include the components and goals of the MSGP and associated SWPPP, basic BMPs, activity-specific BMPs if applicable, and include a facility inspection. Storm water training sessions occur at most industrial facilities on the installation. Typically, the unit environmental coordinator and/or hazardous material/hazardous waste primary and alternate receive annual storm water training. However, it is at the discretion of PWE and/or the facility supervisor to determine the most suitable employees to be trained. When possible, all facility personnel attend this training. When this is not practical, materials are provided for in-house training of additional personnel at a later time. Trained storm water coordinators are tasked with conducting in-house training annually and for new employees. The annual training is documented and maintained in the individual's training records.

Personnel responsible for FWA infrastructure maintenance such as roads and grounds, the airfield, associated equipment repair, and fueling operations whose activities are designated industrial, also participate in required annual storm water training.

FWA will continue to train relevant groups on the installation in storm water P2 and will diversify the training audience as necessary and appropriate to meet compliance objectives. For example, PWE will offer additional storm water P2 guidance, training, and courtesy inspections to personnel working at support facilities at FWA who have the potential to contaminate storm water. Such personnel include food service and BLM employees. Some road and ground personnel at FWA participate in industrial storm water P2 training, where BMPs that are useful to them are discussed, such as spill prevention and response procedures, and hazardous material management. Future training for these personnel will emphasize BMPs specific to roads and grounds tasks, such as a discussion of proper street sweeping, snow removal, salt usage, and basic storm drainage system maintenance.

Additional Measures FWA has/will Implement to Address this MCM

Industrial Facility Management

A key component of this MCM involves training personnel to incorporate P2 and good housekeeping techniques in base operations. Facilities classified under the MSGP as industrial currently participate in storm water P2 training and inspections. One or more of the following activities commonly occur at industrial facilities and are therefore discussed during training events (as applicable):

- Fueling
- POL storage in aboveground storage tanks
- Vehicles, aircraft, and equipment washing
- Vehicle, aircraft, and equipment maintenance
- Loading and unloading materials
- Industrial waste management
- Outside materials storage
- Outside vehicle and equipment storage
- Gravel/sand and salt storage

The following is a summary of storm water P2 BMP categories that are currently implemented at industrial facilities at FWA:

- Good housekeeping
- Eliminating and minimizing exposure
- Proper loading/unloading practices
- Preventive maintenance
- Spill prevention and response procedures
- Fuel training, including fuel transfer procedures
- Routine facility inspections

- Employee training
- Record keeping
- Erosion and sedimentation controls and runoff management
- Snow stockpiling
- Maintenance of structural BMPs

Storm Water Pollution Prevention Inspections

The PWE staff conducts formal, quarterly inspections, as required by the MSGP. One quarter's inspection typically coincides with annual storm water training for facility coordinators. Another quarter's inspection serves as the annual Comprehensive Site Compliance Evaluation (CSCE). The CSCE includes inspections of each facility and associated grounds covered by the MSGP, portions of the installation-wide storm water management system and outfalls, and evaluates the overall effectiveness of FWA's industrial SWPPP.

The following areas are emphasized during routine storm water inspections where materials and/or industrial activities are potentially exposed to storm water.

- Vehicles/equipment parking and outdoor storage areas
- All locations for the use and storage of hazardous material/hazardous waste
- Areas where maintenance occurs
- Fueling areas
- Bulk fuel and deicing areas
- Vehicle, aircraft, and equipment wash areas
- Loading/unloading areas
- Facility perimeter and storm water drainage features

The PWE staff (or contractor) also conducts wet-weather outfall inspections to identify and investigate any illicit, inappropriate, or undocumented non-storm water discharges to the storm water sewer system. If illicit discharges are discovered, they are immediately addressed (see MCM 3).

Annual Reporting Requirements for MCM 6

Annual Report requirements specific to MCM 6 (Pollution Prevention and Good Housekeeping for Base Operations) are presented in SWMP Annual Reporting section.

MONITORING, EVALUATION, REPORTING, AND RECORD KEEPING REQUIREMENTS

Compliance with MS4 Permit requirements depends on the permittee's monitoring to confirm the effectiveness of the BMPs, keeping records of activities undertaken by the permittee to meet the commitments in the SWMP, and mandatory reporting to the permitting authority.

Monitoring Program Plan

FWA must develop, implement, and revise as necessary a comprehensive Monitoring Program Plan (MPP). A description of the MPP must be included in this SWMP. The MPP must be designed to assess compliance with the MS4 Permit and achieve the following:

- Measure the effectiveness of this SWMP
- Measure the chemical, physical, and biological impacts to the receiving waters resulting from storm water discharges
- Characterize storm water discharges
- Identify sources of specific pollutants
- Detect and eliminate illicit discharges and illegal connections to the MS4

Water Quality Monitoring

FWA must comply with the following provisions when conducting water quality monitoring:

- All samples and measurements must be representative of the monitored activity.
- Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless otherwise specified.
- FWA must conduct a storm water discharge monitoring program which meets the following minimum requirements:
    - Within two years from the effective MS4 Permit date, FWA must develop a Storm Water Outfall Monitoring Plan consistent with the monitoring objectives described above. The outfalls selected by FWA in the Storm Water Outfall Monitoring Plan must be representative of major land uses at FWA.

- Within three years from the effective MS4 Permit date, FWA must begin monitoring the storm water outfalls indicated in the Storm Water Outfall Monitoring Plan during wet weather events, at least four times per year. The specific monitoring requirements are outlined in Part 4.1.2.5 and Table 4-1 (Outfall Monitoring Requirements) of the MS4 Permit.

- Monitoring results must be recorded on a Discharge Monitoring Report (DMR) form (EPA No. 3320-1) or equivalent and submitted annually for the previous 12-month period along with the Annual Report required in Part 4.3 of the MS4 Permit.

- Within two years of the effective MS4 Permit date, FWA must develop an MPP that includes a Quality Assurance Project Plan (QAPP) for all analytical monitoring to be conducted, including but not limited to the activities described in Part 3.0 of the MS4 Permit. Prior to beginning any analytical monitoring, FWA must submit the plan to ADEC at the address provided.

- The following requirements pertain to the QAPP required by the FWA MS4 Permit:

  - The QAPP must be designed to assist in planning for the collection and analysis of water samples in support of the SWMP.

  - FWA must use the EPA-approved Quality Assurance/Quality Control (QA/QC) and chain-of-custody procedures described in *Requirements for Quality Assurance Project Plans* (EPS/QA/R-5), *Guidance for Quality Assurance Project Plans* (EPA/QA/G-5), and ADEC's *Quality Assurance Plan Checklist* for all sample collection and analysis activities. The QAPP must be formatted as specified in these documents.

- At a minimum, the QAPP must include the following:

  - Details on the number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantification limits for each target compound; type and number of quality assurance field samples; precision and accuracy requirements; sample preparation requirements; sample shipping methods; and laboratory data delivery requirements.

  - Map(s) indicating the location(s) of each sampling point.

- Qualification and training of personnel.
- Name(s), address(es) and telephone number(s) of the laboratories used by or proposed to be used by FWA.

- FWA must review the QAPP annually for adequacy based on permit compliance activities and sampling results. Whenever there is modification in the sample collection, sample analysis, or other conditions or requirements of the plan, FWA must amend the MPP and QAPP accordingly.
- Copies of the MPP and QAPP must be made available to ADEC upon request.
- Records of monitoring information must include:
  - The date, exact place, and time the samples or measurements were taken
  - The name(s) of the individual(s) who performed the sampling or measurements
  - The date(s) when analysis of each sample was performed
  - The name(s) of the individual(s) who performed each analysis
  - The analytical techniques or methods used
  - The results of each analysis
- If FWA monitors more frequently than required by the MS4 Permit, using test procedures approved under 40 CFR Part 136 (adopted by reference at 18 AAC 83.010) or as otherwise specified by the MS4 Permit, FWA must include the results of such monitoring with the data submitted as part of the Annual Report.

As required by the MS4 Permit provisions described above, FWA will develop an MPP within the first two MS4 Permit years. FWA's MPP will address all monitoring, methodology, and sampling locations required of the plan, and include a QAPP. Once finalized, the MPP will be included in this SWMP in Attachment 6.

Evaluation of Overall Program Effectiveness

At least annually, FWA must evaluate its compliance with conditions of the MS4 Permit. As part of this exercise, FWA must consider the appropriateness of BMPs identified in this SWMP,

as well as the progress toward achieving identified measurable goals for each of the six MCMs. This evaluation of program compliance must be included in the Annual Report. As part of the evaluation, FWA must implement the following requirements.

- FWA must use the monitoring data described in Part 4.1 of the MS4 Permit to specifically assess the effectiveness of each of the following:
    - Each significant activity/control measure of type of activity/control measure implemented
    - Implementation of each MCM
    - Implementation of the SWMP as a whole
- FWA must identify and use measurable goals, assessment indicators, and assessment methods for each of the three items listed above.
- FWA must document its compliance with MS4 Permit conditions.
- Based on the results of the effectiveness assessment, FWA must annually review activities or control measures to identify modifications and improvements needed to maximize SWMP effectiveness, as necessary to achieve permit compliance. FWA must develop and implement a plan and schedule to address the identified modifications and improvements. Ineffective BMPs must be replaced by more effective, comparable BMPs/control measures.

Annual Reports

1.1.1 Submission Deadlines

FWA must submit an Annual Report for the previous 12 months to ADEC at the address listed in the MS4 Permit. Annual Reports must be submitted according to Table 4-2 of the MS4 Permit, provided below (Table 2). The Annual Report must clearly refer to permit requirements and describe, in quantifiable terms, FWA's status in implementing activities to comply with each provision of the MS4 Permit. Copies of Annual Reports must be made available to the public through FWA's website or other easily accessible location.

Table 3. Submission Deadlines for Annual Reports.

Reporting Period	Submission Deadline
1st year Annual Report (permit issuance date – December 2017)	February 15, 2018
2nd year Annual Report (January 1, 2018 – December 31, 2018)	February 15, 2019
3rd year Annual Report (January 1, 2019 – December 31, 2019)	February 15, 2020
4th year Annual Report (January 1, 2020 – December 31, 2020)	February 15, 2021
5th year Annual Report (January 1 2021 – permit expiration date)	February 15, 2022
Note 1: Unless the permit is extended to or past February 315, 2020; in that case, use February 15, 2022. Subsequent reporting periods will follow similar format for the calendar year with submission deadline of February 15th of the following year.	

Summary Annual Report

Each year, FWA must document a summary of the past year's activities using the *MS4-Summary Annual Report* template found in Appendix D of the MS4 Permit. ADEC requires all of the information on the form to be submitted.

Detailed Annual Report

In addition to the Summary Annual Report, FWA must prepare and submit a detailed Annual Report that addresses the activities described in this SWMP as required by Part 4.3.3 of the MS4 Permit. At a minimum, the following must be included in the Annual Report:

- An updated SWMP as required by Part [insert permit section] of the MS4 Permit.
- A description of the effectiveness of each SWMP program component or activity (MS4 Permit Part 4.2).
- Planned activities and changes for the next reporting period for each SWMP program component or activity.

- An evaluation of compliance with the requirements of the MS4 permit, the appropriateness of identified BMPs, and progress toward achieving measurable goals identified in the SWMP for each MCM.

- Results of any information collected and analyzed during the previous 12-month reporting period, including monitoring data used to assess the success of the program at reducing the discharge of pollutants to the maximum extent practicable.

- A summary of the activities FWA plans to undertake during the next reporting cycle (including an implementation schedule) for each MCM.

- Proposed changes and completed changes to the SWMP, including changes to any BMPs or any identified measurable goals for any MCM.

- Description and schedule for implementation of additional BMPs that may be necessary, based on monitoring results, to ensure compliance with applicable WQS.

- If applicable, a notice that FWA intends to have another entity satisfy a permit obligation.

Annual Report Requirements for MCM 1

FWA must include the following information in each Annual Report regarding MCM 1: Public Education and Outreach (see Part 3.1 of the MS4 Permit).

In the Annual Report, FWA must:

- Describe the public education program and outreach activities accomplished during the previous calendar year and submit at least one copy of each educational material distributed.

- Describe the methods and frequency of disseminating information.

- Describe the target audience and pollutant/source that are addressed by the program and how they were selected.

- Estimate the number of people reached by the program over the previous 12-month period.

- List the measurable goals for the public education and outreach program over the next 12-month period.

- List the dates by which the measurable goals will be achieved.
- Identify the person(s) responsible for implementing and coordinating the education activities.

Annual Report Requirements for MCM 2

FWA must include the following information in each Annual Report regarding MCM 2: Public Involvement and Participation (see Part 3.2 of the MS4 Permit).

In the Annual Report, FWA must:

- In the first Annual Report only, describe the state or local requirements for public involvement, including how the public was involved in the development of the SWMP submitted with the permit application.
- Describe the activities and target audiences for public involvement that the program focused on for the preceding 12-month period, including any monitoring and/or survey results, number of storm drains stenciled, etc.
- Describe the procedure(s) for receiving and reviewing public comments.
- Describe the measurable goals for the public involvement/participation program over the next 12-month period.
- List the dates by which FWA will accomplish each of the upcoming measurable goals.
- Identify the person(s) responsible for implementing and coordinating the public involvement/participation activities.

Annual Report Requirements for MCM 3

FWA must include the following information in each Annual Report regarding MCM 3: Illicit Discharge Detection and Elimination (see Part 3.3 of the MS4 Permit).

Within two years from the effective MS4 Permit date and annually thereafter, FWA must include the following in the Annual Reports:

- A description of the criteria used to prioritize investigations in areas suspected of having illicit discharges; for example, targeting older areas of the base, areas of high public complaints, and areas of high recreational value or high environmental value, such as parks, golf courses, and drinking water sources.

- A description of procedures used to locate and remove illicit discharges, including detection methods.

- A summary of all dry-weather testing conducted to date and actions taken by FWA to remove any illicit discharge(s) identified (if any).

- A copy of the established ordinance or other regulatory mechanism used to prohibit illicit discharges in the MS4. If FWA has yet to develop this local requirement, describe the plan and schedule for doing so and progress toward implementation.

- A description of enforcement policy and jurisdiction. The program must include procedures for coordination with adjacent municipalities and/or state or federal regulatory agencies to address situations when investigations indicate the illicit discharge originates outside FWA jurisdiction. When FWA lacks legal authority to establish enforceable rules or if an illicit discharge fails to comply with procedures or policies established by FWA, the program must include procedures for notifying ADEC for assistance in enforcement of this permit provision.

- A description of the methods used over the previous 12-month period to inform the public and/or train employees and tenants about illicit discharges and the improper disposal of waste.

- A list of measurable goals for the illicit discharge detection and elimination program for the next 12-month period and the dates by which FWA will achieve each of the measurable goals.

- The name and title of the person(s) responsible for coordinating and implementing the illicit discharge detection and elimination program.

Annual Report Requirement for MCM 4

FWA must include the following information in each Annual Report regarding MCM 4: Construction Site Storm Water Runoff Control (see Part 3.4 of the MS4 Permit).

In the Annual Report, FWA must include:

- A copy of the ordinance or other regulatory mechanism used to require erosion, sediment, and waste controls at construction sites. If FWA has yet to develop the required regulatory mechanism, a plan and schedule for implementation must be included.

- A summary of the number of sanctions and enforcement actions taken by FWA to ensure compliance with the construction site ordinance during the previous 12-month period. To the extent allowable under FWA's legal authority, sanctions may include both monetary and non-monetary penalties.

- A copy of the written requirements for appropriate erosion, sediment, and waste control BMPs at construction sites.

- A summary of the procedures for receipt and consideration of information submitted by the public.

- A summary of the number of sites inspected during the previous 12-month period, including a description of the site inspection procedures, how sites are prioritized for inspection, and when and how often sites are inspected.

- A list of measurable goals for the construction site runoff control program, including dates by which FWA will achieve each of the measurable goals.

- The name and title of the person(s) responsible for coordination and implementation of the construction site runoff control program.

Annual Report Requirements for MCM 5

FWA must include the following in each Annual Report regarding MCM 5: Post Construction Storm Water Management in New Development and Redevelopment (see Part 3.5 of the MS4 Permit).

In the Annual Report, FWA must include:

- A copy of the BMP design manual containing structural and non-structural BMPs that will be used to manage post-construction runoff from new development and redevelopment projects within the MS4. Include any specific priority areas for this program.

- An explanation of the design and performance features of the chosen BMPs intended to minimize water quality impacts.

- A copy of the established ordinance or other regulatory mechanism used to address post-construction runoff control. If FWA has yet to develop the required regulatory mechanism, a plan and schedule for implementation must be included.

- A description of how long-term operation and maintenance of the selected BMPs will be ensured, including the organization responsible and its expected operation and maintenance schedule.

- A description of the plans to inform and educate developers and the public about appropriate project designs to minimize water quality impacts.

- A list of measurable goals for the post-construction runoff control program, including dates by which FWA will achieve each of the measurable goals.

- The name and/or title of the person(s) responsible for coordinating and implementing the post-construction storm water management program.

Annual Report Requirement for MCM 6

FWA must include the following information in each Annual Report regarding MCM 6: Pollution Prevention and Good Housekeeping for Base Operations (see Part 3.6 of the MS4 Permit).

The Annual Report must document FWA's efforts to prevent or reduce pollutant runoff from base operations through the installation's operations and maintenance program by providing:

- A description of the activities, maintenance schedule, and long-term inspection procedures for controls to reduce floatables and other pollutants to the MS4.

- A description of the employee training program used to prevent and reduce storm water pollution including the targeted department personnel, frequency of such training, and a copy of training materials.

- A summary description of the controls for reducing or eliminating the discharge of pollutants from areas owned or operated by FWA, including but not limited to streets, roads, and highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, salt/gravel/sand storage locations, and snow disposal sites operated by FWA.

- A description of procedures to ensure proper disposal of waste removed from the MS4 and MS4 operations, including dredge soil, accumulated sediments, floatables, and other debris.

- A description of procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices.

- A list of all industrial facilities owned or operated by FWA that discharge to the MS4, including industrial facilities that are subject to the APDES MSGP or individual APDES permits for discharges of storm water associated with industrial activity and/or facilities as identified as part of the inventory required by Part 3.3.1 of the MS4 Permit. FWA must include the permit tracking number(s) or a copy of the NOI9S) for each facility, as appropriate.

- A list of measurable goals for the pollution prevention and good housekeeping program, including dates by which FWA will achieve each of the measurable goals.

- The name and title of the person(s) responsible for coordinating and implementing the pollution prevention and good housekeeping program.

Record Keeping

1.1.1 Retention of Records

FWA must retain records of all information used in the development of the storm water management program, all monitoring data, copies of all reports, and all data used in the development of FWA's MS4 Permit, for a period of at least five years from the date of the sample, measurement, report or application, or for the term of the MS4 Permit, whichever is longer. These records must include the following:

- Monitoring records (and copies)
- Calibration records (and copies)
- Maintenance records (and copies)
- All original strip chart recording for any continuous monitoring instrumentation
- Copies of all reports required by the MS4 Permit
- Copies of DMRs
- A copy of the MS4 Permit

- Records of all data used by FWA to complete the application for the MS4 Permit

ADEC reserves the right to extend the period for required record keeping under the MS4 Permit at any time.

Availability of Records

FWA must retain and make available this SWMP, a copy of the MS4 Permit, and all Annual Reports at a location accessible to ADEC. FWA must also make associated records, including the MS4 Permit application and this SWMP, available to the public, if requested to do so, in writing, during normal business hours. FWA may charge the public a reasonable fee for copying charges if copies are requested. This SWMP, FWA's MS4 Permit, and subsequent Annual Reports generated for compliance with the MS4 Permit are/will be maintained by the PWE water program manager.

Address

Compliance submittals required by the MS4 Permit must be made to the following address:

State of Alaska
Department of Environmental Conservation
Division of Water
Compliance and Enforcement Program
555 Cordova Street
Anchorage, Alaska 99501
Telephone Nationwide (877) 569-4114
Anchorage Area / International (907) 269-4114
Fax (907) 269-4604
Email: dec-wqreporting@alaska.gov

FWA MS4 Permit Compliance Schedule

Table 3 below summarizes major MS4 Permit requirements. For each requirement, the MS4 Permit citation is provided, as is the respective section of this SWMP where the requirement is discussed and the measurable goal(s) stated. The compliance date for each major requirement and the party/parties responsible for implementing measures to address them are also presented in the table.

Table 4. Schedule for Implementation and Compliance.

Part of Permit	SWMP Section	MS4 Permit Requirement	Compliance Date	Responsible Party
General Requirements				
2.1	3 & 4	Submit to ADEC a written description of how Storm Water Management Program activities control the discharge of sediment, petroleum products and debris to waters of the U.S. from the MS4	Within one year of effective permit date	PWE
4.3	4.2 & 4.3	Conduct an annual review of the SWMP implementation and submit an Annual Report to ADEC	Within one year of effective permit date; annually thereafter	PWE
4.1.2.5	4.1	Submit an MPP including Quality Assurance Requirements	Within two years of effective permit date	PWE
Public Education and Outreach				
3.1.2	3.1.3.2	Develop, implement and evaluate an ongoing public education program to educate the community about the ways to reduce impacts to storm water quality	Within two years of effective permit date; annually thereafter	PWE
3.1.3.1	3.1.3.3	Publish articles in a local newspaper or base website regarding storm water pollution prevention	Within six months of effective permit date; once annually	PWE

			thereafter	
3.1.3.2	3.1.3.3	Create or purchase storm water pollution prevention materials for key audiences and distribution at annual base event	Within one year of effective permit date; update annually thereafter	PWE
3.1.3.3	3.1.3.3	Update base housing tenant materials to include storm water-related materials	Within one year of effective permit date; update annually thereafter	PWE; Housing Contractor
3.1.3.4	3.1.3.3	Develop and install signs on storm water pollution prevention and pet waste management in key areas	Within two years of effective permit date	PWE
3.1.3.5	3.1.3.3	Purchase or develop brochure on use of lawn chemicals and household hazardous products and distribute to key audiences	Within two years of effective permit date; annually thereafter	PWE
3.1.3.6	3.1.3.3	Develop and make available to base personnel a web page with information about storm water management	Within one year of effective permit date; update semi-annually thereafter	PWE
4.3.3	4.3.3.1	Implement Annual Report requirements for MCM 1	Annually	PWE
Public Involvement and Participation				
3.2.2	3.2.3.1	Publish SWMP and Annual Reports to FWA's storm water web page	Within one year of effective	PWE

			permit date	
3.2.3	3.2.3.2	Plan and host community litter cleanup activities with the MS4, to include areas adjacent to the Chena River	Within one year of effective permit date; annually thereafter	PWE
3.2.4	3.2.3.3	Create and distribute an attitude survey to measure resident and worker knowledge of storm water pollution prevention and solicit feedback to improve effectiveness of MS4 Program	Within three years of effective permit date; biennially thereafter	PWE
3.2.5	3.2.3.4	Conduct storm drain stencil contest among base school children and apply stencil to FWA storm drains	Hold contest within one year; stencil 50% of storm drain inlets within two years; stencil 100% of storm drain inlets within four years of effective permit date	Elementary schools on base; PWE; infrastructure support personnel
3.2.6	3.2.3.5	Establish and maintain a Storm Water Steering Committee representing multiple base organizations or units that meet quarterly	Within six months of effective permit date; quarterly thereafter	Steering Committee
4.3.3	4.3.3.2	Implement Annual Report requirements of MCM 2	Annually	PWE
Illicit Discharge Detection and Elimination				
3.3.1	3.3.3.1	Inventory and map industrial facilities to include in storm sewer system map	Within one year of effective	PWE

			permit date	
3.3.2	3.3.3.2	Develop and implement an IDDEP for the MS4	Within two years of effective permit date	PWE
3.3.3.1	3.3.3.3	Conduct wet weather outfall inspections	Within one year of effective permit date; annually thereafter	PWE
3.3.3.2	3.3.3.3	Conduct dry weather inspections of storm water discharge locations to identify illicit discharges	Within one year of effective permit date; annually thereafter	PWE
3.3.4	3.3.3.4	Survey and inspect OWSs to ensure proper connection to sanitary sewer system	Within two years of effective permit date	PWE
3.3.9	3.3.3.5	Conduct or revise an existing hydrologic study of all roadway structures within the MS4	Within three years of effective permit date	PWE
3.3.2	3.3.3.6	Develop and implement a system for tracking information on illicit discharge detection and response	Within two years of effective permit date	PWE
3.3.5 & 3.3.6	3.3.3.7	Develop and implement a Garrison Policy letter or other control measure to prohibit illicit discharges to the MS4; prohibit any specific non-storm water discharges, if necessary	Within two years of effective permit date	PWE, USAKGC

3.3.7	3.3.3.9	Conduct education on hazards associated with illegal discharge	Within two years of effective permit date	PWE
3.3.10	3.3.3.10	Develop a storm sewer system map(s) and incorporate into FWA GIS network	Within three years of effective permit date	PWE; USACE
3.3.8	3.3.3.11	Conduct dry weather screening from all outfalls	Within two years of effective permit date	PWE
4.3.3	4.3.3.3	Implement Annual Report requirements for MCM 3	Annually	PWE
Construction Site Storm Water Runoff Control				
3.4.1	3.4.3.1	Develop and implement a construction site runoff control program	Within two years of effective permit date; ongoing thereafter	PWE
3.4.3	3.4.3.3	Develop and implement a Garrison Policy letter to require appropriate management of construction site storm water runoff to ensure compliance with the SWMP and ACGP	Within one year of effective permit date	PWE; USAKGC
3.4.4	3.4.3.1	Develop and implement an ESCP for all construction projects	Within one year of effective permit date	PWE
3.4.5	3.4.3.5	Develop and implement plan review procedures for reviewing construction plans and project SWPPPs	Within one year of effective permit date	PWE

3.4.6	3.4.3.6	Develop standard language for inclusion in FWA construction contracts	Within one year of effective permit date	PWE; FWA legal
3.4.7	3.4.3.7	Develop and implement procedures for site inspection and enforcement of control measures	Within one year of effective permit date	PWE; USAKGC
3.4.9	3.4.3.8	Develop and control at least one training related to the construction requirements and BMPs outlined in the Garrison Policy letter	Within two years of effective permit date	PWE
4.3	4.3.3.4	Implement Annual Report requirements for MCM 4	Annually	PWE
Post-Construction Storm Water Management in New Development and Redevelopment				
3.5.1	3.5.3.1	Develop, implement, and enforce a post-construction site runoff control program	Within three years of effective permit date	PWE; USAKGC
3.5.2	3.5.3.2	Develop and implement a Garrison Policy letter to require appropriate management of post-construction site storm water runoff to ensure compliance with the SWMP and ACGP	Within three years of effective permit date	PWE; USAKGC
3.5.3	3.5.3.3	Adopt or develop and distribute a BMP design manual for post-construction	Within four years of effective permit date	PWE; contractors
3.5.4	3.5.3.4	Develop and implement an inspection schedule and long-term Post-Construction Operation and Maintenance Plan for post-construction BMPs	Within four years of effective permit date	PWE

3.5.5	3.5.3.5	Develop and conduct at least one training for local contractors, engineers, and tenants regarding the requirements of the Post-Construction Operation and Maintenance Plan and the GI/LID strategy	Within four years of effective permit date	PWE
3.5.6	3.5.3.6	Develop a strategy for evaluating GI/LID projects	Within four years of effective permit date	PWE
4.3	4.3.3.5	Implement Annual Report requirements for MCM 5	Annually	PWE
Pollution Prevention and Good Housekeeping for Base Operations				
3.6.1	3.6.3.1	Conduct storm water pollution prevention inspections	Within one year of effective permit date; annually thereafter	PWE
3.6.2	3.6.3.2	Develop and implement maintenance standards for storm water facilities	Within two years of effective permit date; annually thereafter	PWE
3.6.3	3.6.3.3	Complete a study of the effectiveness of current street sweeping operations, storm drain cleaning operations and other base activities with potential for storm water impacts	Within five years of effective permit date	PWE
3.6.4	3.6.3.4	Conduct training for employees or contractors whose job functions may impact storm water quality	Within two years of effective permit date; annually thereafter	PWE

3.6.5	3.6.3.5	Ensure that new flood management projects are assessed for impacts on water quality	Within two years of effective permit date	PWE; USACE
4.3	4.3.3.6	Implement Annual Report requirements for MCM 6	Annually	PWE

COMPLIANCE RESPONSIBILITIES

FWA's storm water pollution prevention team was initially established to obtain and assure compliance with the installation's NPDES Phase I industrial storm water permit, the MSGP, and the associated industrial SWPPP. This team is experienced in preventing storm water pollution from industrial and construction activity throughout the installation and will be expanded as necessary to implement this SWMP.

Responsibilities for the BMPs selected in support of the different MCMs are presented in Table 3 of this SWMP. The following sections provide an overview of storm water P2 responsibilities at FWA.

Installation Storm Water Discharge Permit Responsibilities

The U.S. Army Garrison Alaska Commander has ultimate responsibility for all regulatory compliance at FWA, and the FWA chain of command below the Commander has compliance responsibilities as dictated by their positions. The FWA storm water program manager has direct responsibility for day-to-day compliance with the industrial MSGP and SWPPP and the MS4 Permit and SWMP. Other members of the storm water team are responsible for compliance within their areas of responsibility and/or job description.

Tenant Storm Water Discharge Permit Responsibilities

Tenants of FWA include government and contractor owned and operated operations, privatized utility and service providers, installation businesses, and residents. FWA is responsible for ensuring that all tenants of FWA comply with the SWMP, as applicable and appropriate. This may be achieved by a variety of means, including general cooperation, memorandums of agreement, lease agreements, contract terms, and policy letters.

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ATTACHMENTS

Attachment 1: Storm Water Routing Map

Attachment 2: Storm Water Infrastructure and Sub-catchment Basins

Attachment 3: Garrison Policy Letter

Attachment 4: Sample Erosion and Sediment Control Plan

Attachment 5: Department of the Army memorandum, *Army Storm Water Management Using Low Impact Development*, 21 September 2015

Attachment 6: Army Low Impact Development Technical User Guide