

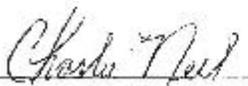
U.S. ARMY  
INSTALLATION MANAGEMENT COMMAND  
and  
FORT LEONARD WOOD

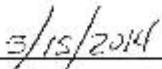


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**STORMWATER MANAGEMENT PLAN**

In Support of Municipal Separate Storm Sewer System  
Permit No. MO RO40088

  
Charlie E. Neel, Chief  
Environmental Division

  
Date



DEPARTMENT OF THE ARMY  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT LEONARD WOOD  
320 MANSCEN LOOP STE 120  
FORT LEONARD WOOD, MISSOURI 65473-8828

REPLY TO  
ATTENTION OF

15 MAY 2014

Environmental Office

Ms. Ruth Wallace  
Municipal Storm Water Program Coordinator  
Lewis & Clark State Office Building  
Missouri Department of Natural Resources  
1101 E. Riverside Drive  
Jefferson City, MO 65101

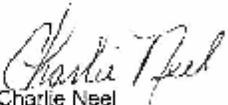
Dear Ms. Wallace:

Enclosed is the revised version of the Storm Water Management Plan IAW Permit MO-RO40088. This plan was originally written and submitted to MDNR in July of 2013. Please include this amended plan with application forms M and K in lieu of the original plan. Please send the permit using the owner address below:

ATTN: Charlie Neel  
1334 First Street, Building 2222  
DPW Environmental Division  
Fort Leonard Wood, MO 65473

If there are any questions, please contact Dee Lloyd at the Fort Leonard Wood Environmental Office at (573) 596-0882.

Sincerely,

  
Charlie Neel  
Environmental Division Chief

Enclosures

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## Acronyms and Abbreviations

AAR	After-action Review
ACS	Army Community Services
AR	Army Regulation
AR 200-1	Environmental Protection and Enhancement, Army Regulation 200-1
AR 210-20	Real Property Master Planning for Army Installations, Army Regulation 210-20
AR 350-19	The Army Sustainable Range Program, Army Regulation 350-19
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CWA	Clean Water Act
CMOM	Capacity, Management, Operations, and Maintenance
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
DPTM	Directorate of Plans, Training, and Mobilization
DPW	Directorate of Public Works
ECO	Environmental Compliance Officer
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EO 11988	Executive Order 11988 (Floodplain Management)
EPA	Environmental Protection Agency
EPAS	Environmental Performance Assessment Systems
EQCC	Environmental Quality Control Committee
FMWR	Family Morale Welfare and Recreation
FLW	Fort Leonard Wood
GIS	Geographical Information System
HUC	Hydraulic Unit Code
I&I	Inflow and Infiltration
ICE	Interactive Customer Evaluation
IDDE	Illicit Discharge Detection and Elimination
ISSP	Installation Strategic Sustainability Plan
ITAM	Integrated Training Area Management
LID	Low Impact Development
MSCoE	United States Army Maneuver Support Center of Excellence
MARC	Mid-America Regional Council
MCM	Minimum Control Measure
MDNR	Missouri Department of Natural Resources
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OIP	Organizational Inspection Program
POC	Point of Contact

RCRA	Resource Conservation and Recovery Act
SPRP	Spill Prevention and Response Plan
SSO	Sanitary Sewer Overflow
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UFC	United Facilities Criteria
US	United States
USACE	US Army Corps of Engineers
USGS	US Geological Survey
USFWS	US Fish and Wildlife Service

## 1 Authorized Representative Contact Information

Below is a list of authorized representatives for Fort Leonard Wood's stormwater program.

- **Mr. Bobby N. Rakes, Jr.** (573) 596-0840  
Director, Directorate of Public Works, Fort Leonard Wood
- **Mr. Charlie Neel** (573) 596-0882  
Division Chief, DPW Environmental, Fort Leonard Wood
- **Mr. Dee Lloyd** (573) 596-0882  
Branch Chief, DPW Environmental, Fort Leonard Wood
- **Mr. Dee Lloyd** (573) 596-0882  
Stormwater Program, DPW Environmental, Fort Leonard Wood

The Stormwater Management Program is staffed with full-time personnel to ensure the SWMP is followed as planned in this document. Other programs under the Directorate of Public Works (DPW) further support Fort Leonard Wood's Stormwater Management Program.

## **2 Installation Setting**

### **2.1 Installation Location**

Fort Leonard Wood is in the south central Missouri Ozarks, covering more than 61,411 acres. Fort Leonard Wood is predominantly in Pulaski County, which, according to the 2010 Census has a population over 53,000. Fort Leonard Wood's population is 35,480 according to the 2012 Installation Status Report. Bordering the installation to the north are the towns of Waynesville and St. Robert, with an approximate combined population of 9,300. The post is two miles south of Interstate 44.

The United States (US) Army Maneuver Support Center of Excellence (MSCoE) and Fort Leonard Wood are where chemical, engineer, military police, transportation soldiers, marines, airmen, sailors, and international students from allied nations receive training.

### **2.2 Installation History**

Groundbreaking ceremonies for the establishment of the Seventh Corps Area Training Center, later designated as Fort Leonard Wood, took place on December 3, 1940. The installation was officially designated Fort Leonard Wood in early January 1941. The post is named in honor of Major General Leonard Wood, a distinguished soldier who served the US for 40 years.

Fort Leonard Wood's original designation was a training home base of the 6th Infantry Division. Later, the 8th, 70th, 75th, and 90th Infantry Divisions were also trained at the installation. Additionally, many other non-divisional units trained at the post. More than 300,000 soldiers trained at Fort Leonard Wood during World War II on their way to serve in various capacities.

An Engineer Replacement Training Center began to form at Fort Leonard Wood in March 1941, due to the growing size of the Engineer force and limited training facilities at Fort Belvoir, Virginia. With the end of World War II in 1945, training declined at the post and ceased completely in the spring of 1946. The post was placed on the inactive list until 1950, during which time a small caretaker unit maintained some of the facilities used for summer training by National Guard units.

The Army announced that Fort Leonard Wood was to reopen on August 1, 1950, to provide basic and engineer training for soldiers slated to serve in Korea. In 1956, following the end of the Korean War, the installation was designated as the US Army Training Center Engineer, officially designating Fort Leonard Wood as a permanent post. In light of this designation, the post received substantial funding to replace its wooden facilities with permanent brick structures. Construction during the 1950s and 1960s allowed the post to handle the substantial increase in training workload brought on by the Vietnam War. Fort Leonard Wood trained more than 120,000 soldiers in 1967 in such skills as basic training and engineer training, and such specialties as clerks, cooks, bakers, wiremen, mechanics, and motor vehicle operators.

By the mid-1970s, construction equipment operators for the US Marine Corps and the US Air Force were trained at the post. Engineer training to other nations also began at this time. In 1982, the 4th Training Brigade trained engineers from 15 foreign countries. In the early 1990s, the US Army Engineer School in Fort Belvoir, Virginia moved to Fort Leonard Wood due to lack of training space. For the first time in nearly 50 years, all military engineer training would take place at the same location.

As a response to the closure of Fort McClellan Army Base in 1995, Fort Leonard Wood accommodated Fort McClellan's Military Police and Chemical Schools by the year 2000. The two schools would join Fort Leonard Wood's Engineer School under a combined command (MScOE) with a mission to provide the nation with individuals having strong values, skills in leadership and basic combat, and individual skills in chemical, engineering, military police, and transportation disciplines.

### **3 Installation Physical Characteristics**

#### **3.1 Climate**

Fort Leonard Wood has hot humid summers and cold winters, receiving cold air moving south from Canada and warm, moist air moving north from the Gulf of Mexico, classifying its climate as continental. Temperatures range from below 0°F in winter to above 100°F in summer. Winters are generally mild with occasional snow accumulation of less than 20 inches per year. Fort Leonard Wood averages about 45 inches of rainfall a year.

#### **3.2 Topography**

Fort Leonard Wood is within the Salem Plateau of the Ozark Plateaus Physiographic Province. The area is characterized by rugged terrain of thin soils and narrow steep-walled valleys. Most of Fort Leonard Wood is on a broad upland ridge between the northerly flowing Big Piney River to the east and the northerly flowing Roubidoux Creek to the west. Tributary streams to Big Piney River and Roubidoux Creek drain the upland areas, which are deeply incised into the sides of the ridges. Area relief generally is the result of gradual uplift of the Ozark Dome in southern Missouri and erosion of the uplifted rocks by precipitation runoff and stream flow. The regional ground surface elevation ranges from 1,150 feet above mean sea level along the central ridge to 750 feet at the Big Piney River near the northeastern corner of Fort Leonard Wood.

#### **3.3 Regional Geology**

Fort Leonard Wood lies on the western flank of the Ozark Uplift of Southern Missouri. The Ozark Uplift is part of a large Precambrian rhyolite-granite basement complex. Through a series of depositional and erosional cycles extending from Cambrian through Pennsylvanian time, progressively younger geologic formations crop out in roughly concentric rings around the core of Precambrian rocks.

Bedrock exposed at Fort Leonard Wood is part of the Ozark Aquifer. The Ozark Aquifer is underlain by the St. Francois confining unit and St. Francois aquifer. The St. Francois confining unit impedes the vertical movement of groundwater between the Ozark and St. Francois aquifers. The basement-confining unit, which is composed of Precambrian-age igneous and metamorphic rocks, underlies the St. Francois aquifer. Bedrock units of Early Ordovician age including the Jefferson City Dolomite, Roubidoux Formation, and Gasconade Dolomite are the only bedrock units exposed at Fort Leonard Wood.

The Gasconade Dolomite is predominantly a cherty dolomite commonly exposed as bluffs along the Big Piney River and Roubidoux Creek valleys. The unit is approximately 300 feet thick, which can be broken up into an upper unit (30 to 50 feet thick) and lower unit (250 feet thick) based on the percent of chert and the bedding characteristics.

The overlying Roubidoux Formation consists of nearly pure quartzose sandstone, dolomitic sandstone, and cherty dolomite. The amount of sandstone ranges from 10 to 25 percent throughout most of the Fort Leonard Wood area. The pre-erosional thickness of the Roubidoux Formation ranges from 100 to 200 feet. The Roubidoux Formation crops out across most of the upland areas and hillsides in the western, northern, and eastern portions of Fort Leonard Wood. Dissolution of inter-bedded dolomite in the lower Roubidoux Formation has resulted in the collapse of the overlying sandstone-rich beds. Most sinkholes occurring in the upland areas of Fort Leonard Wood are formed in the Roubidoux Formation.

The Jefferson City Dolomite crops out extensively in upland areas on the southern part of Fort Leonard Wood. These outcrops may be up to 180 feet thick. This unit is not present in the northern and eastern parts of the installation. The formation consists of finely crystalline argillaceous dolomite that contains shale partings and brecciated chert. A massive bed of gray, finely crystalline argillaceous dolomite informally referred to as the Quarry Ledge, because of its resistance to erosion, occurs about 30 feet above the base of the unit.

Residuum consisting of clayey chert and cherty clay derived from the weathering of dolomite is present across upland areas of the Fort Leonard Wood area. The clay may be inter-bedded with layers of sand or weathered sandstone where the Roubidoux Formation crops out. The thickness of residuum varies across the installation, which has likely been altered in areas where historic and current operations have been conducted. Thicker deposits of residuum on the upland areas may be associated with collapse features such as filled sinkholes. A variable thickness of alluvium is present along the Big Piney River, Roubidoux Creek, and tributaries to both. The alluvium consists of sorted and unsorted sands, silt, gravel, and clay, and is generally less than 30 feet thick.

### **3.4 Karst Features and Fracture Patterns**

The permeability of bedrock units within the Fort Leonard Wood area has been greatly increased through the dissolution of dolomitic bedrock units. Karst features at Fort Leonard Wood are commonly well developed which includes sinkholes, springs, losing streams, and caves. These features are more common in the central and northern parts of the site, where the Roubidoux Formation and Gasconade Dolomite crop out.

Many of the sinkholes in the north-central part of Fort Leonard Wood are distributed along a one-mile-wide linear band trending northeast to southwest. The major axis of the band is parallel to a 1.5-mile linear segment of Roubidoux Creek within a reach characterized by a sequence of near right-angle shifts in flow direction and complete flow loss. The axis intersects Hurd Hollow Stream at the point of flow loss. The occurrence of abrupt changes in stream channel directions, linear stream segments, flow loss in two streams, and a linear band of sinkholes oriented along a common axis strongly indicates an area of substantial hydrogeologic control by fractures. Two narrower bands of sinkholes with major axes oriented northwest to southeast are also evident and

intersect the main northeast to southwest alignment of sinkholes. Extensions of the major axes of these two bands intersect near-linear segments of Roubidoux Creek northwest of Fort Leonard Wood. One of the bands also intersects a near linear one-mile reach of Smith Branch. These features indicate fracture control.

### **3.5 Regional Hydrogeology**

The regional groundwater table generally occurs within the lower Roubidoux Formation or upper Gasconade Dolomite within the Fort Leonard Wood area. Both geologic units are productive, water-bearing units with well yields ranging from several tens to several hundreds of gallons per minute. The underlying Potosi Dolomite is the most productive water-bearing unit in the Ozark Aquifer, with well yields ranging from several hundred to as much as 1,000 gallons per minute. The Gasconade Dolomite and Potosi Dolomite are separated by the Eminence Dolomite, which forms a weak hydraulic barrier between the two geologic units.

Recharge to groundwater at Fort Leonard Wood occurs through percolation of rainfall through permeable residuum and bedrock. Groundwater flow patterns at Fort Leonard Wood are the result of a complex combination of diffuse flow through porous residual material and bedrock and conduit flow through solution-enlarged openings along bedding planes and interconnected fractures. Depths to groundwater may range from 130 to 300 feet below ground surface in the upland areas, and less than 25 feet in the Big Piney River or Roubidoux Creek valleys. Groundwater levels and groundwater flow directions are similar under conditions of high base flow and low base flow.

A north-trending groundwater divide occurs in Fort Leonard Wood with groundwater flowing away from the uplands along the axis of this divide east towards Big Piney River or west towards Roubidoux Creek. Karst features alter the movement of groundwater from flow patterns commonly associated with rock of more uniform permeability. Lateral separation between the groundwater and topographic divides in the central and northern parts of Fort Leonard Wood (between Bloodland Lake and the north part of the cantonment area) indicate larger bedrock permeability in the east central rather than the west central part of the installation. Groundwater that would normally flow west to Roubidoux Creek has been captured by a zone of large secondary permeability and redirected east toward the Big Piney River. Vertical groundwater flow generally is downward from the Gasconade Dolomite to Potosi Dolomite, but it may be upward in areas of highly permeable karst terrain where groundwater levels in the Roubidoux Formation and Gasconade Dolomite are lowered because of rapid flow of groundwater through conduits to nearby springs.

### **3.6 Spring Recharge Basins**

US Geological Survey (USGS) studies have identified a connection between sinkholes and losing streams at Fort Leonard Wood with four known perennial springs including Miller Spring, Sandstone Spring, Roubidoux Spring, and Shanghai Spring. A recharge area for Roubidoux

Spring has not been defined; however, dye-trace tests and spring discharge measurements show that Roubidoux Spring receives surface runoff from western portions of Fort Leonard Wood. The boundary between the recharge basins of the other three springs may overlap with each other or encompass a larger area within or outside the installation boundary.

Shanghai Spring flows along the Big Piney River about 2.5 miles northeast of the northern installation boundary. The Shanghai Spring recharge basin is 27 square miles in area and encompasses a substantial part of the north-central and northeastern parts of Fort Leonard Wood. The estimated average base-flow discharge of Shanghai Spring is 18 cubic feet per second. Previous USGS dye-trace tests have indicated a subsurface connection between losing streams within the Fort Leonard Wood/St. Robert area and Shanghai Spring.

Because of this connection, the water quality of the spring has been influenced by activities within the town and military installation. Dye-trace tests have confirmed the subsurface connection between Shanghai Spring and the point where treated effluent from the Fort Leonard Wood Wastewater Treatment Plant is discharged to Dry Creek on the northern part of the installation. A dye test conducted in 1996 indicated groundwater migration at a travel rate of approximately 0.2 mile per day between the point of water loss in Dry Creek downstream of the Wastewater Treatment Plant and Shanghai Spring (2.8 miles).

Miller and Sandstone Springs receive groundwater from much of the east-central part of Fort Leonard Wood. The Sandstone Spring recharge basin is about three square miles in area, and the Miller Spring recharge basin about 17 square miles.

### **3.7 Surface Water Hydrology**

Surface water drainage within Fort Leonard Wood is predominantly through small ephemeral streams whose flow direction is influenced by a topographic ridge that divides the eastern and western parts of the installation. Ephemeral streams exist only for a few days following a precipitation event and are above the groundwater table year-round. Precipitation rather than groundwater is the source of recharge for these streams. Drainage systems on the eastern part of Fort Leonard Wood discharge water to the Big Piney River, and drainage system on the western part discharge water to Roubidoux Creek. Big Piney River, a perennial stream, and Roubidoux Creek, an intermittent stream along the western boundary of Fort Leonard Wood, flow northward and discharge water into the Gasconade River. Several fabricated ponds and lakes have been constructed near topographic ridges south of Forney Army Airfield. Most impoundments are constructed in the headwater areas of these small ephemeral streams.

Roubidoux Creek is not as deeply incised, nor does it have as large a flow as the Big Piney River. Base-flow along the Roubidoux Creek fluctuates dramatically near Fort Leonard Wood. Except during high-flow conditions caused by large amounts of runoff, a seven- to eight-mile reach of Roubidoux Creek along the western boundary of Fort Leonard Wood is dry. The reach

where most flow-loss occurs is near the intersections of Roubidoux Creek, the County line Fault, and Hurd Hollow Fault. .

Larger springs present in the Big Piney River Basin near the eastern border of Fort Leonard Wood include Miller Spring and Sandstone Spring. Shanghai Spring is downstream of Fort Leonard Wood in the Big Piney River Basin, and Roubidoux Spring is downstream of the installation within the Roubidoux Creek Basin. Several smaller perennial and wet-weather springs, such as Ballard Hollow, Fort Leonard Wood (FLW) Road 32, and several unnamed springs, discharge from solution-enlarged bedrock contacts and fractures throughout Fort Leonard Wood.

### **3.8 Groundwater Use**

Although the Ozark aquifer is used extensively for domestic and public water supply, Fort Leonard Wood obtains 98 percent of its drinking water from a pumping station on the Big Piney River near Sandstone Spring.

A smaller quantity of groundwater is supplied from eight public water-supply wells at Fort Leonard Wood. A public water-supply well, DW-015, also known as Indiana Avenue well, is on the northern part of the installation and used only during peak demand. The remaining wells, supply drinking water to training facilities scattered across the installation. These wells provide a much smaller quantity of water than the DW-015. Pumping records for these wells are not maintained.

## 4 Land Use

Fort Leonard Wood is an Army Post in the south-central Missouri, 130 miles southwest of St. Louis and 93 miles northeast of Springfield. Most of the installation is within Pulaski County, with small parts extending into Texas County. It is composed of 61,411 acres of land, of which 58,436 acres are unimproved. Fort Leonard Wood is bordered on the east, south, and west by the Houston-Rolla Unit of the Mark Twain National Forest, on the east by the Big Piney River, and on the west by Roubidoux Creek.

Fort Leonard Wood has established a cantonment area in the north-central part of the installation. The area is highly developed containing most of the buildings and structures within the facility. Areas outside the cantonment are operational ranges for small arms training, vehicle maneuvers, heavy equipment training, aerial strafing, and bombardment training.

## 5 Ecology

Fort Leonard Wood is in the Osage/Gasconade Hills section of the Ozark Highlands ecoregion of the Eastern Temperate Forest. Major habitat types found onsite are forests, grasslands, and wetlands/riparian zones. The following descriptions of the habitats and biota found at Fort Leonard Wood have been largely adapted from the 2007 Integrated Natural Resources Management Plan and Environmental Assessment for Fort Leonard Wood.

### 5.1 Habitats

Forest habitats are the principal vegetative type of Fort Leonard Wood, covering about 75 percent of the installation. A variety of forest types are found depending on the location. The predominant type is the oak-hickory association, but the sycamore-elm association is found on creek and river bottomlands. North-facing slopes generally are forested in black (*Quercus velutina*), red (*Q. rubra*), and white oak (*Q. alba*) with a scattered understory of flowering dogwood (*Cornus florida*), serviceberry (*Amelanchier arborea*), and Carolina buckthorn (*Frangula caroliniana*). Tree species common on south-facing slopes include post oak (*Q. stellata*), blackjack oak (*Q. marilandica*), and black hickory (*Carya texana*). Due to cessation of historic burning regimes, eastern red cedar (*Juniperus virginiana*) has spread throughout former glade areas, old farm fields, and other highly disturbed sites. Shortleaf pine (*Pinus echinata*), Missouri's only native species of pine, occurs naturally in small isolated stands. Central Missouri is the extreme northern range of the species. Shortleaf pine was also historically planted on plantations at Fort Leonard Wood.

Old field and grassland habitats occupy about 15 percent of Fort Leonard Wood. Many of these sites, on the upland occurrence, were part of the original pre-settlement post oak savanna habitat. These sites are covered with a mix of herbaceous and woody, invasive species. Common vegetation in old field areas are annual grasses; broom sedge (*Andropogon virginicus*); a mix of legumes, and composites; Kentucky bluegrass (*Poa pratensis*) and tall fescue (*Festuca arundinacea*) (both introduced); and tall, native, warm season perennial grasses, including Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and switchgrass (*Panicum virgatum*). Shrub species are composed of blackberry (*Rubus* spp.), coralberry (*Symphoricarpos orbiculatus*), rose (*Rosa* spp.), and sumac (*Rhus* spp.). Common trees species encroaching in these habitats include sassafras (*Sassafras albidum*), persimmon (*Diospyros virginiana*), post oak, blackjack oak, black hickory, and eastern red cedar.

Riparian bluffs and waterway corridor habitats consist of streams and streambeds, floodplains up to the 100-year flood line, river terraces, rock cliffs and bluffs, short steep gradient tributaries, and ends of flat and narrow ridge tops. Wetlands are dispersed throughout Fort Leonard Wood and are primarily associated with the Big Piney River and Roubidoux Creek. However, wetlands are also associated with perennial streams, small springs, seeps, and sinkholes.

A wetland inventory in 1995 identified 1,552 acres of potential jurisdictional wetlands on Fort Leonard Wood. The largest sites occur in the Roubidoux Creek (848 acres), Big Piney River (530 acres), and Falls Hollow floodplains (30 acres). Collectively, these three drainages support 90 percent of the total wetland acreage identified for Fort Leonard Wood. The wetlands inventory identified the following eight wetland types on Fort Leonard Wood, in order of decreasing abundance: bottomland hardwood, shallow marsh, shrub swamp, shrub flat, wet meadow, gravel bar, deep marsh, and spring-associated wetlands. The bottomland hardwood and shallow marsh types collectively comprise about 97 percent of wetlands mapped.

## 5.2 Biota

Habitats of Fort Leonard Wood support diverse plant and animal communities. Approximately 765 taxa of herbaceous and woody plants are known or thought to occur on the installation. Various inventories have confirmed the occurrence of 53 mammal, 211 bird, 75 fish, 37 reptile, and 22 amphibian species on Fort Leonard Wood.

Mammals commonly occurring on Fort Leonard Wood include the white-tailed deer (*Odocoileus virginianus*), eastern gray squirrel (*Sciurus carolinensis*), eastern fox squirrel (*S. niger*), eastern cottontail rabbit (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), beaver (*Castor canadensis*), Virginia opossum (*Didelphis virginiana*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and pipistrelles (*Perimyotis subflavus*).

The largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), bluegill (*Lepomis macrochirus*), green sunfish (*L. cyanellus*), bleeding shiner (*Luxilus zonatus*), channel catfish (*Ictalurus punctatus*), rock bass (*Ambloplites rupestris*), and rainbow trout (*Oncorhynchus mykiss*) are common fish species found in streams and ponds on Fort Leonard Wood. Several species of game fish are stocked in Bloodland Lake to support sport-fishing opportunities. Channel catfish are stocked annually in impoundments across Fort Leonard Wood. The number stocked per pond is dependent upon pond characteristics. Stocking of largemouth bass and bluegill is based on individual impoundment fisheries surveys. Fingerling largemouth bass, channel catfish, and bluegill are stocked in newly developed ponds. For approximately 30 years, trout have been stocked at the Stone Mill Spring Branch. The Stone Mill Spring Branch became the property of the US Forest Service in 2001 as part of the land transfer between Fort Leonard Wood and the US Forest Service. The Forest Service, Missouri Department of Conservation, and Fort Leonard Wood co-manage this property.

Reptiles and amphibians commonly occurring in Fort Leonard Wood include the common map turtle (*Graptemys geographica*), common musk turtle (*Sternotherus odoratus*), three-toed box turtle (*Terrapene caroliniana*), bull frog (*Rana catesbeiana*), pickerel frog (*R. palustris*), green frog (*R. clamitans*), eastern gray treefrog (*Hyla versicolor*), southern redback salamander (*Plethodon serratus*), northern fence lizard (*Sceloporus undulatus hyacinthinus*), ground skink

(*Scincella lateralis*), five-lined skink (*Eumeces fasciatus*), southern coal skink (*E. anthracinus pluvialis*), western worm snake (*Carphophis vermis*), black rat snake (*Elaphe obsoleta*), and eastern garter snake (*Thamnophis sirtalis*). In 1998, 21 amphibian species and 30 reptile species were documented on Fort Leonard Wood.

Twenty-seven species of mussel, including the introduced Asiatic clam, are known to occur in the Big Piney River and Roubidoux Creek within Fort Leonard Wood. Two species of crayfish, golden crayfish (*Orconectes luteus*), and spothanded crayfish (*O. punctimanus*), are known to commonly occur in the waters of Fort Leonard Wood.

### 5.3 Status of Listed Species

Three federally listed endangered species have been recorded on Fort Leonard Wood: the Indiana bat (*Myotis sodalis*), Spectaclecase mussel, (*Cumberlandia monodonta*) and the gray bat (*M. grisescens*).

The US Fish and Wildlife Service (USFWS) listed the Indiana bat as endangered on March 11, 1967. The 2011 range-wide estimate was about 425,000 individuals (USFWS 2011), which represents about half of the estimated population of 1960. The Indiana bat is a “tree bat” in summer and a “cave bat” in winter. The Indiana bat primarily uses the caves of Fort Leonard Wood for winter hibernacula, although small maternity colonies or bachelor colonies are likely to utilize riparian and forested habitats throughout the summer. The current winter population on or adjacent to the installation is estimated at 500 individuals.

In March 2012, the Spectacle case mussel was listed in the Federal Register as an endangered species under the Endangered Species Act of 1973. In Missouri, this freshwater mussel can be found in tributaries of the Missouri and Mississippi Rivers, its population is concentrated mostly in the Meramec and Gasconade rivers including the Big Piney River. Although vulnerable, it has been surveyed in multiple locations on the Big Piney River both on and off Fort Leonard Wood by Missouri Department of Conservation staff in 1994, and 2005, and by Fort Leonard Wood natural resource staff in 2012.

The gray bat was listed endangered on April 28, 1976. Range-wide, the gray bat population has seen a 62 percent increase over the last 20 years. Gray bats are true “cave bats” requiring caves for winter hibernation and summer roosting. Missouri contains about 20 percent of the total population of gray bats. Most known gray bat caves are south of the Missouri River, particularly in the Ozarks. Gray bats in Missouri have been recorded from at least 219 caves, about 3.5 percent of Missouri’s caves (Elliott 2007). Of these, 49 are maternity caves, 13 are hibernacula, 125 are transient and/or bachelor sites, and 32 are abandoned. Fort Leonard Wood is near the center of the species range in Missouri. One maternity colony of gray bats occurs on Fort Leonard Wood.

The bald eagle (*Haliaeetus leucocephalus*), which was recently removed from federal listing, is now protected under the Bald and Golden Eagle Protection Act. Bald eagles are found year-round at Fort Leonard Wood. Fort Leonard Wood contains an active bald eagle nest on the Big Piney River. Wintering bald eagles occur on Fort Leonard Wood from November through March. The highest concentration of eagles occurs in the southwestern part of the installation.

Over 20 species known to or suspected to occur on Fort Leonard Wood are state-listed as species of concern in the state of Missouri. Mammal species of concern include the golden mouse (*Ochrotomys nuttalli*) and long-tailed weasel (*Mustela frenata*), which were last captured in 1994. The bluestripe darter (*Percina cymatotaenia*) was documented during fish surveys in the Big Piney River in 2004. Six rare plant species have been documented on Fort Leonard Wood. The state-listed species are the narrowleaf rushfoil (*Croton michauxii*), which has a state rank of S1 (critically imperiled in the state), Blacknose shiner and Plains topminnow sampled in the Roubidoux in 2005 along with the Black Sandshell, Northern broken-ray and the Elktoe. Narrowleaf rushfoil has only been identified once in 1932 on the western side of Roubidoux Creek, south of Cookville. Subsequent surveys have failed to detect any further occurrences.

The eastern hellbender (*Cryptobranchus a. alleganiensis*), listed as state endangered in Missouri, is known from the Big Piney River near Fort Leonard Wood. The Ozark hellbender (*Cryptobranchus a. bishop*), a federally listed endangered species, is not known from Pulaski County. The Elephant ear (freshwater Mussel) is also a state endangered species.

## 6 Stormwater Management Plan Overview

Fort Leonard Wood develops, implements, and enforces a Stormwater Management Program designed to reduce the discharge of pollutants from Fort Leonard Wood's regulated Small Municipal Separate Storm Sewer System (MS4) to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Missouri Clean Water Law. This Stormwater Management Plan (SWMP) includes Best Management Practices (BMPs), which correlate to Section 4.2 of Missouri State Operating Permit MO-RO040088. The SWMP describes the accomplishments and challenges of the first (years 1–4) permit cycle, and the goals of the second (years 5–9) permit cycle. This document shall guide the installation's Municipal Stormwater Management Program, and address current regulatory requirements for managing stormwater runoff and allowable non-stormwater discharge. Since stormwater affects many aspects of daily activities at Fort Leonard Wood, the Municipal Stormwater Management Program coordinates with several interrelated programs under the DPW to achieve this common goal.

By following this SWMP, Fort Leonard Wood strives to meet the intention of the state permit within the allowable guidelines established by the Department of Defense (DOD). As stated in section 4.1.12 of the General Permit, each Minimum Control Measure (MCM) should be fully implemented within five years of receipt of its first MS4 permit. With each reissuance of the MS4 Permit, the permittee shall comply with new or revised standards as soon as practicable but no later than 5 years from the date of reissuance. As stated in Section 4.4.1 and 5.3.4 of the permit, Fort Leonard Wood must review the SWMP and submit annual reports documenting Fort Leonard Wood's stormwater activities, any proposed changes to the SWMP, and any proposed changes to the measurable goals.

Fort Leonard Wood addresses these regulatory requirements and environmental programs based on a watershed approach. Sustainable solutions such as implementation of green infrastructure, stormwater BMPs, and conventional source reduction techniques play significant roles in a successful Stormwater Management Program. By using these techniques, Fort Leonard Wood is aligned with and complying with the following federal regulations:

- 1) LD: 40 Code of Federal Regulations (CFR) 122, 123, and 124 National Pollution Discharge Elimination System.
- 2) Energy Independence and Security Act of 2007 (EISA 07), Section 438.
- 3) Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (Federal Register, Vol. 65, No. 202, October 18, 2000).
- 4) Environmental Protection and Enhancement, Army Regulation 200-1 December 2007 (AR 200-1).
- 5) Executive Order 11988, Floodplain Management, May 1977 (EO 11988)

## 7 Stormwater Management Plan Using Minimum Control Measures

Minimum Control Measure (MCM) is the term used by the Environmental Protection Agency (EPA) and the state of Missouri to describe six MS4 program elements, listed below, designed to improve water quality through the National Pollutant Discharge Elimination System (NPDES) MS4 Phase II Program:

- MCM 1 – Public Education and Outreach on Stormwater Impacts
- MCM 2 – Public Involvement/Participation
- MCM 3 – Illicit Discharge Detection and Elimination
- MCM 4 – Construction Site Stormwater Runoff Control
- MCM 5 – Post-Construction Stormwater Management in New Development and Redevelopment
- MCM 6 – Pollution Prevention/Good Housekeeping for Municipal Operations

BMPs include effective management procedures, treatment controls, operating procedures and practices to control site runoff, control spills and leaks, waste disposal methods, and drainage controls focused on material storage. BMPs are implemented using measurable goals that provide specific procedures and timeframes to guide the program over the course of the permit cycle, and a means to track the relative success of the BMP and the control measure as a whole. BMPs will be updated as appropriate to comply with additions or changes to NPDES permit requirements, or when the BMP is not functioning as designed. The responsible party for the BMPs listed in this SWMP is the Stormwater Program Manager of the DPW Environmental Division. The following sections discuss the six MCMs. Each MCM section will utilize the same format to describe Fort Leonard Wood's implementation strategy for the respective measure. The structure for each MCM section is described below.

### 7.1 General Overview and Objectives

The overview and objectives sections describe and explain the MCMs. The description includes typical items the MCMs may include, as well as, how they relate to stormwater pollution prevention.

### 7.2 Applicability

The Fort Leonard Wood municipality is diverse in that it supports various groups of people (military, contractor, civilian, etc.) and various types of activities (military, commercial, residential, etc.). Accordingly, control measures may be, in part or in whole, applicable to these various groups and activities. This section discusses the applicability of the permit requirements and the MCM's components regarding particular target-groups or activities.

### **7.3 Regulatory Requirements**

Fort Leonard Wood's MS4 Permit prescribes the requirements for this SWMP. This section discusses regulatory requirements specific to the MCM, including a table summary of the MS4 permit requirements and references to the SWMP section(s) that meets the requirements.

### **7.4 Policy and Enforcement**

Regulatory mechanisms and enforcement procedures are fundamentally different for an Army installation like Fort Leonard Wood as compared to a typical municipality; consequently, the implementation of related MS4 Permit requirements is sometimes executed differently. Fort Leonard Wood is governed through the command of the Garrison Commander and falls under the directive of the US Army chain of command, ultimately receiving direction from the Joint Chiefs of Staff in Washington D.C. This governing regime is fundamentally different from a city council and mayor of a typical city, therefore, Fort Leonard Wood does not have the capability or the need to enact or enforce local ordinances per MS4 requirements. Unlike typical municipalities however, the US Army abides by Army Regulations (ARs), policies, orders, acts, and other requirements that have been developed to encourage and sustain environmental stewardship in the federal government and DOD. Many of these requirements directly and indirectly relate to stormwater management and provide similar levels of regulation and enforcement capabilities as compared to local ordinances or enforcement mechanisms associated with a typical municipality.

### **7.5 Program Details**

Programs are summarized with a discussion of the existing program resources, accomplishments, areas for improvement, and the new permit cycle approach. Many non-stormwater-related programs provide collateral benefit toward achievement of the stormwater goals of the MS4 Permit; these programs are discussed as applicable in the respective MCM sections.

### **7.6 Future Permit Cycle Approach (BMPs and Measurable Goals)**

This section describes proposed BMPs and measurable goals. Fort Leonard Wood is required to evaluate the proposed BMP each year to determine its effectiveness and its validity towards meeting the goals of the permit. If a BMP is not working effectively, revisions to BMPs and/or measurable goals and/or additional BMPs and/or measurable goals may be suggested to the State at any time during the permit. These are typically included in the annual report.

The current permit cycle objectives are to build on the success of the existing program resources and accomplishments, and to strengthen the areas identified for improvement.

The following sections describe the six MCMs in detail.

## **8 MCM 1 – Public Education and Outreach on Stormwater Impacts**

### **8.1 MCM 1 General Overview and Objectives**

The goal of this MCM is to implement a Public Education and Outreach Program designed to train and/or distribute educational materials to residents, students, contractors, business owners and onsite civilian and military personnel (collectively referred to as “target audiences”), about the impacts of stormwater discharges on water bodies. Training, educational materials and/or outreach activities will include common pollutants, pollution prevention and good housekeeping techniques that each target audience can implement to reduce pollutant runoff.

### **8.2 MCM 1 Applicability**

MCM 1 is applicable to all target audiences on Fort Leonard Wood; however, due to the various activities conducted by each target audience and the unique potential of each activity to affect stormwater differently, the training, distribution methods and outreach techniques are tailored to ensure optimum efficiency. All MCMs in the FLW SWMP have training components that are applicable to one or more target audiences. An MCM applicable to a target audience is outlined in a Training, Education, and Outreach (TEO) Plan uniquely designed for that audience. The TEO Plans are discussed in length in section 8.5 of this plan.

### **8.3 MCM 1 Regulatory Requirements**

Section 4.2.1 of the Fort Leonard Wood MS4 Permit outlines the Public Education and Outreach requirements for this SWMP. These permit requirements are being met through existing established programs as well as new requirements outlined in this SWMP. The MS4 Permit requirements as well as a reference to where each of these permit requirements are discussed in the SWMP, are shown in Table 8-1 of this plan.

**Table 8-1. MCM 1 Permit Requirement References.**

Permit Reference	SWMP Citation
4.2.1.1 - <i>Permit requirement.</i> The permittee shall implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and steps the public can take to reduce pollutants in stormwater runoff. As part of the SWMP, the public education and outreach program shall include the following information, at a minimum:	8.5
4.2.1.1.1 - The target pollutant sources the permittee's public education program is designed to address;	8.5, BMP 1A, TEO Plans
4.2.1.1.2 - Identification of target audiences for the permittee's education program who are likely to have significant stormwater impacts (including commercial, industrial and institutional entities);	8.2, 8.5, BMP 1A, TEO Plans
4.2.1.1.3 - A plan to inform individuals and households about steps they can take to reduce stormwater pollution;	8.5, BMP 1A, TEO Plans
4.2.1.1.4 - A plan to inform individuals and groups on how to become involved in the SWMP (with activities such as local stream and lake restoration activities);	8.5, BMP 1A, TEO Plans
4.2.1.1.5 - The permittee's outreach strategy, including the mechanisms (e.g., printed brochures, newspapers, media, workshops, etc.) to reach target audiences, and how many people expected to be reached over the permit term; and	8.5, BMP 1A, TEO Plans
4.2.1.1.6 - A plan to evaluate the success of this MCM.	BMP 1B

#### **8.4 MCM 1 Policy and Enforcement**

Army Regulation (AR) 200-1, Environmental Protection and Enhancement (2007) require Army installations to implement a program that conforms to the International Standardization Organization (ISO) 14001, Environmental Management System (EMS) - Requirements with guidance for use. The Fort Leonard Wood Garrison Command Policy #2014-3 – Environmental Policy, conforms to AR 200-1 and ISO 14001 requirements.

#### **8.5 MCM 1 Public Education and Outreach Program**

As discussed in Sections 8.1 and 8.2 of this plan, the goal of the Fort Leonard Wood Public Education and Outreach Program is to distribute educational materials and conduct MS4 related training/outreach activities to each target audience. This goal is achieved by developing and implementing Training, Education, and Outreach (TEO) Plans for each target audience and their associated pollutant sources. Target audiences currently include the Directorate of Public Works (DPW) Base Maintenance Contractors, range control personnel, FLW residents, environmental compliance officers (ECOs), Logistics Readiness Command (LRC), construction contractors, businesses and school age students. Pollutant sources currently include hazardous materials, hazardous waste, sediment, pesticides, fertilizers and litter. As new target audiences are identified, a TEO plan specific to that audience and the associated pollutant source(s) is created.

The TEO Plan is a document that outlines the goals and methods to educate each target audience on the steps they can take to reduce stormwater pollution. . TEO Plans include relevant pollutant sources, education and outreach strategies, relevant MCMs to be addressed, training resources and training delivery/ distribution mechanisms that will be used to reach each audience. TEO Plans will be reviewed on an annual basis for accuracy and effectiveness and revised as deemed necessary. TEO Plans will be submitted to MDNR as attachments to the Annual Report in July of each year.

Education and Outreach activities, (e.g. ECO training, Newcomer Informational Fair, residential move-in packets and Stream Team events), will be tracked on a Training, Education, and Outreach Tracking Spreadsheet as activities occur. The Training, Education, and Outreach Tracking Spreadsheet will document the name of each activity, the target audience addressed, the number of participants at each event, name and number of educational materials distributed and an effectiveness evaluation of the event. The goal of the Fort Leonard Wood Public Education and Outreach Program is to reach every target audience during the five -year permit cycle.

#### **8.6 MCM 1 Future Permit Cycle Approach (BMPs)**

BMPs and measurable goals designed to meet the intent of Fort Leonard Wood's Public Education and Outreach program are presented in Tables 8-2 and 8-3 of this plan.

**Table 8-2. BMP # 1A: Implement the Stormwater Education Program.**

<p><b>Permit Section(s) Compliance Reference:</b> 4.2.1.1.1, 4.2.1.1.2, 4.2.1.1.3, 4.2.1.1.4, 4.2.1.1.5, 4.2.3.1.3, 4.2.3.1.3.5, 4.2.4.1.4, 4.2.5.1.5, 4.2.5.1.5.3, 4.2.6.1.7</p>
<p><b>BMP Description:</b> The various target audiences on post have the potential to influence stormwater quality differently, and accordingly public education and outreach efforts have been targeted to each specific group. The education and outreach efforts are implemented through procedures and target audiences that were defined in the TEO Plan (described in Section 8.5 of this SWMP). Periodic review and potential update of the TEO Plan will ensure materials are up-to date and appropriate.</p>
<p><b>Measurable Goals/ (Implementation Timeline):</b></p> <ol style="list-style-type: none"> <li>1) Implement TEO Plans for 25% of target audiences annually.</li> <li>2) Conduct an annual review of target audiences within FLW; create TEO Plans for newly identified targeted audiences.</li> <li>3) Conduct an annual review of TEO Plans to include pollutant sources, distribution methods, outreach strategies and training materials. Update as deemed necessary.</li> </ol>

**Table 8-3. BMP # 1B: Evaluate Success of Stormwater Education Program.**

<p><b>Permit Section(s) Compliance Reference:</b> 4.2.1.1.6</p>
<p><b>BMP Description:</b> As part of the permit requirements, Fort Leonard Wood must evaluate the success of each MCM. The success of the Public Education and Outreach Program will mainly be measured through responses from targeted audience relating to educational efforts for pollutant source reduction. For example, behavioral changes, positive responses to surveys, attendance at various educational events, and adherence to policies and procedures will all be positive results indicating a successful education and outreach effort.</p>
<p><b>Measurable Goals/ (Implementation Timeline):</b></p> <ol style="list-style-type: none"> <li>1) Conduct an annual analysis of education and outreach events that have occurred during each reporting year to determine if measurable goals have been met. Summarize findings and make recommendations for corrective actions for deficiencies and ideas for strategies for continual improvement.</li> </ol>

## **9 MCM 2 – Public Involvement/Participation**

### **9.1 MCM 2 General Overview and Objectives**

The goal of this MCM is to implement a public involvement and participation program that complies with State and local public notice requirements, and involves the public in the development and oversight of the SWMP as well as applicable policies and procedures. The public involvement and participation requirements are incorporated into the TEO Plans, as discussed in MCM 1.

### **9.2 MCM 2 Applicability**

Similar to MCM 1, public involvement and participation is applicable to all audiences on post to some degree. Various target audiences have the potential to affect stormwater quality differently, and therefore are addressed differently. All audiences (discussed in MCM 1 of this plan) are encouraged to participate in stormwater activities and programs.

### **9.3 MCM 2 Regulatory Requirements**

The public involvement/participation requirements for this SWMP are discussed in Section 4.2.2 of the Fort Leonard Wood MS4 Permit and shown in Table 9-1 of this plan. These permit requirements are already being met through existing established programs but are supplemented with new requirements outlined in this SWMP.

**Table 9-1. MCM 2 Permit Requirement References.**

Permit Reference	SWMP Section
4.2.2.1 - <i>Permit requirement.</i> The permittee shall implement a public involvement/participation program that complies with State and local public notice requirements, and involve the public in the development and oversight of the SWMP, policies and procedures. As part of the SWMP document, the public involvement/participation program shall include the following information, at a minimum:	9
4.2.2.1.1 - How the permittee has involved the public in the development and submittal of the application and SWMP document;	9.5, BMP 2A
4.2.2.1.2 - The target audiences for the permittee's public involvement program, including a description of the types of ethnic and economic groups engaged. The permittee is encouraged to actively involve all potentially affected stakeholder groups, including commercial and industrial businesses, trade associations, environmental groups, homeowners associations, and educational organizations, among others; and	9.5, BMP 2A, TEO Plans
4.2.2.1.3 - The types of public involvement activities included in the permittee's program. Where appropriate, the permittee must consider the following types of public involvement activities:	9.5, BMP 2A, TEO Plans
4.2.2.1.3.1 - Citizen representatives on a stormwater management panel;	
4.2.2.1.3.2 - Public hearings;	9.5
4.2.2.1.3.3 - Working with citizen volunteers willing to educate others about the program; and	9.5, TEO Plans
4.2.2.1.3.4 - Volunteer monitoring or stream/lake clean-up activities	9.5, BMP 2A
4.2.2.1.4 - The permittee's plan to actively involve the public in the development and implementation of their program; and	9.5, BMP 2A, TEO Plan
4.2.2.1.5 - The method for evaluating success of this minimum control measure	BMP 2B

#### **9.4 MCM 2 Policy and Enforcement**

Fort Leonard Wood adheres to the State and local Public notice requirements by informing all FLW Patrons via newspaper articles, the FLW Stormwater website and meetings about the Stormwater Management Program and soliciting comments in the development of the program and participation in volunteer programs.

#### **9.5 MCM 2 Public Involvement/Participation Program**

In addition to the Public Education and Outreach Program discussed in Section 8, Fort Leonard Wood is engaged with public involvement activities to encourage active participation in the development and implementation of this SWMP as well as stormwater improvements on post. MCM 1 and MCM 2 are complementary to each other due to the interrelatedness of education/outreach and involvement/participation

MS4 Permit requirement 4.2.2.1.2 requires that a description of the types of ethnic and economic groups that are engaged in the public involvement/participation program be included in the SWMP. Fort Leonard Wood is a military installation, and therefore, different from other municipalities as the economic and ethnic groups will continuously change. All ethnic and economic groups are provided with the same opportunities to participate in stormwater related events, review the SWMP and provide comments for the development of the SWMP.

The Fort Leonard Wood Stormwater Management Plan is written every five (5) years to correlate with the issuance of a new MS4 Permit. During the planning and writing process of the SWMP, all target audiences will be encouraged to submit ideas, review draft, and final versions of the document. Notifications will be made via the Fort Leonard Wood newspaper, Stormwater website, public meetings and educational events.

River clean ups, trash pickup events, and storm drain stenciling/marketing events are a few examples of activities that are generally performed throughout the year. Similar activities are planned for the new permit cycle. Activities are coordinated with Family Morale Welfare and Recreation (FMWR) office and Army Community Services (ACS). The FMWR is a division whose goal is to enhance the lives of soldiers, civilians, families, and retirees through support staff and programs (such as youth and family services, recreation activities, business initiatives, and others). ACS is a similar group that provides soldier and family services, volunteer services, and financial services among others. Public involvement is an inherent function of the FMWR, ACS, and the Fort Leonard Wood Environmental Office.

The FLW Facebook page, the Environmental Division webpage, the local newspaper, and the installation marquee are examples of how information and messages are commonly conveyed to the general public. The Environmental Division web page contains an updated copy of the SWMP as well as other relevant stormwater permit documents.

## **9.6 MCM 2 Future Permit Cycle Approach (BMPs)**

BMPs and measurable goals designed to meet the intent of Fort Leonard Wood's Public Involvement and Participation MCM are presented in Tables 9-2 and 9-3 of this plan.

**Table 9-2. BMP # 2A: Public Involvement in the Stormwater Program.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.2.1.1, 4.2.2.1.2, 4.2.2.1.3, 4.2.2.1.3.4, 4.2.2.1.4
<b>BMP Description:</b> Public involvement activities and events raise stormwater awareness, involve the community in stormwater program, and provide an opportunity to improve water quality in their watershed. The following measurable goals are designed to involve the public in Fort Leonard Wood Stormwater Program.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Plan and conduct, at minimum, one (1) Public Involvement/Participation event a year.</li> <li>2) Prepare and distribute an annual Stormwater Program Brief, in areas accessible to all FLW Patrons that summarizes program goals, successes and areas for improvement.</li> <li>3) Conduct an annual meeting with EQCC Members to discuss the Stormwater Program and solicit ideas for program and plan development and improvement.</li> <li>4) Establish a Stormwater Committee in the 2<sup>nd</sup> reporting year that consists of volunteers from units, businesses and residents that will meet semi-annually and discuss the stormwater program.</li> </ol>
<b>Specific Components and Notes:</b> Volunteer opportunities will be supported in conjunction with the Stormwater Education Program (BMP 1A).

**Table 9-3. BMP # 2B: Evaluate Success of Public Involvement/Participation Activities.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.2.1.5
<b>BMP Description:</b> As part of the permit requirements, Fort Leonard Wood must evaluate the success of each MCM. The success of the Public Involvement/Participation MCM will primarily be measured through interest and participation levels from targeted audiences. Interest and participation levels will be measured for stormwater-related meetings, events, trainings, workshops, etc.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Conduct an annual review of stormwater related Public Involvement and Participation activities that have occurred throughout the reporting year. Review should include the type of events held, participator's comments on the event, and the outcome of the event (e.g. # of bags of trash collected, # of storm drain medallions installed). Summarize findings, recommended corrective actions, and opportunities for improvement.</li> </ol>

## **10 MCM 3 – Illicit Discharge Detection and Elimination**

### **10.1 MCM 3 General Overview and Objectives**

The goal of MCM 3 is to develop, implement, and enforce an Illicit Discharge Detection and Elimination (IDDE) Program to detect and eliminate illicit discharges (as defined in 10 CSR 20-6.200) into the permittee's regulated small MS4. Illicit discharges are any discharge to a MS4 that are not entirely composed of stormwater. Exception include discharges authorized under an NPDES Permit, or non-stormwater discharges that have been identified as not significant and therefore, been deemed allowable. (Allowable non-stormwater discharges as well as a table outlining them are in Section 10.2 of this plan).

### **10.2 MCM 3 Applicability**

All Fort Leonard Wood Personnel have the potential to discharge pollutants into the MS4 and consequently create an illicit discharge; therefore, MCM 3 is applicable to all FLW Personnel.

### **10.3 MCM 3 Regulatory Requirements**

The IDDE requirements for this SWMP are discussed in Section 4.2.3 of the Fort Leonard Wood MS4 Permit. Many of the permit requirements are being met through existing established programs and are supplemented with new requirements outlined in this SWMP. A reference to where each of these permit requirements are discussed is shown in Table 10—1 of this plan.

**Table 10-1. MCM 3 Permit Requirement References.**

Permit Reference	SWMP Section
4.2.3.1 – <i>Permit requirement.</i> The permittee shall develop, implement and enforce a program to detect and eliminate illicit discharges (as defined in 10 CSR 20-6.200) into the permittee's regulated small MS4. As part of the SWMP document, the permittee's illicit discharge detection and elimination program shall include the development and implementation of, at a minimum;	10
4.2.3.1.1 – A storm sewer map showing the location of all outfalls and the names and location of all receiving waters of the state that receive discharges from those outfalls. The permittee shall describe the sources of information used for the map(s), and how the permittee plans to verify the outfall locations with field surveys. If already completed, the permittee shall describe how the map was developed and how the map will be regularly updated. The permittee shall make the map information available to the department upon request;	10.5.8, BMP 3A, Appendix A - Stormwater Map
4.2.3.1.2 – To the extent allowable under State, or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-stormwater discharges into the permittee's storm sewer system and implement appropriate enforcement procedures and actions. The permittee shall identify the mechanism (ordinance or other regulatory mechanism) the permittee will use to effectively prohibit illicit discharges into the MS4. If the permittee needs to develop this mechanism, describe the permittee's plan and implementation schedule. If the permittee's ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the permittee's program; and	10.4
4.2.3.1.3 – A plan and implementation schedule to detect and address non-stormwater discharges, including discharges from illegal dumping and spills, to the permittee's system. The permittee's plan shall include dry weather field screening for non-stormwater flows and field tests of selected chemical parameters as indicators of discharge sources. The plan shall also address on-site sewage disposal systems that flow into the permittee's storm drainage system. The permittee's description shall address the following, at a minimum:	7.4, 10.4, 10.5.6, 10.5.10.1, 10.5.10.2-5, 13.5.3, BMP 1A, BMP 3B, BMP 3C
4.2.3.1.3.1 – Procedures for locating priority areas which include areas with higher likelihood of illicit connections (e.g., areas with older sanitary sewer lines, for example) or ambient sampling to locate impacted reaches;	10.5.5, 10.5.10.1, BMP 3B
4.2.3.1.3.2 – Procedures for tracing the source of an illicit discharge, including the specific techniques the permittee will use to detect the location of the source;	10.5.10.3, BMP 3B
4.2.3.1.3.3 – Procedures for removing the source of the illicit discharge;	10.5.6, 10.5.10.4, BMP 3B

**Table 10-1. MCM 3 Permit Requirement References.**

Permit Reference	SWMP Section
4.2.3.1.3.4 – A plan to ensure through appropriate enforcement procedures, including fines, and actions that the permittee's illicit discharge ordinance (or other regulatory mechanism) is implemented;	7.4, 10.4
4.2.3.1.3.5 – A plan to inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste. The permittee shall describe how this plan will coordinate with their public education minimum measure and the pollution prevention/good housekeeping minimum measure programs;	10.5.10.5, 13.5.3, BMP 1A, BMP 3B
4.2.3.1.3.6 – Procedures for program evaluation and assessment of this minimum control measure.	BMP 3C
4.2.3.1.4 – Address the following categories of non-stormwater discharges or flows (i.e., illicit discharges) only if the permittee identifies them as significant contributors of pollutants to the permittee's regulated small MS4: landscape irrigation, rising ground waters, uncontaminated ground water infiltration (as defined in 10 CSR 20-6 .200), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, springs, water from crawl space pumps, footing drains, lawn watering, flows from riparian habitats and wetlands, and street wash water (discharges or flows from emergency fire fighting activities are excluded from the effective prohibition against non-stormwater and need only be addressed where they are significant sources of pollutants to waters of the state).	10.5.9, BMP 3B
4.2.3.1.5 – The permittee may also develop a list of other similar occasional incidental non-stormwater discharges (e.g. noncommercial or charity car washes, etc.) that will not be addressed as illicit discharges. These non-stormwater discharges shall not be reasonably expected (based on information available to the permittees) to be significant sources of pollutants to the MS4, because of either the nature of the discharges or conditions the permittee has established for allowing these discharges to the permittee's MS4 (e.g., a charity car wash with appropriate controls on frequency, proximity to sensitive water bodies, BMPs on the wash water, etc.). The permittee shall document in their SWMP any local controls or conditions placed on the discharges. The permittee shall include a provision prohibiting any individual non-stormwater discharge that is determined to be contributing significant amounts of pollutants to the permittee's MS4.	10.5.9, BMP 3C
4.2.3.1.6 – The permittee should inventory, inspect, and have enforcement authority for industries and commercial enterprises within their boundary that may contribute pollutants via stormwater to the MS4.	10.4, 13.5.1, Table 13-2, 13.5.2, BMP 6A

## 10.4 MCM 3 Policy and Enforcement

Army Regulation 200-1, *Environmental Protection and Enhancement*, states the following requirements, which coincide with MCM 3 requirements:

- Comply with Clean Water Act (CWA). CWA states it is unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained.
- Develop and implement a Spill Prevention, Control, and Countermeasures Plan as required.
- Tenants of Army facilities must immediately report spills or releases of hazardous substances, and are responsible for paying (or reimbursing) costs associated with cleanup.
- Unit commanders must report noncompliance and spills through appropriate channels up to the garrison commander.
- Appropriate facilities will establish and maintain procedures to identify environmental aspects of their operations and set environmental objectives at all appropriate organizational levels relating to the discharge and disposal, spills, or other releases to soil or ground and/or surface waters; including sewage, sediment, or solid, hazardous, and other wastes.

Enforcement and regulatory requirements at Fort Leonard Wood are different from typical MS4s. Military installations routinely inspect facilities through institutionalized controls and existing military programs and procedures. These procedures and inspections are accountable to the chain of command.

## 10.5 Illicit Discharge Detection and Elimination Program

Through existing and complementary Army programs and policies, a majority of the IDDE permit requirements are addressed. By implementing the proposed BMPs and measurable goals, a fully functional program will be in place to detect and eliminate illicit discharges.

Because of the strict environmental policies and regulations on a military installation, Fort Leonard Wood has many existing programs that provide both direct and indirect assistance to the detection and elimination of illicit discharges and general support to the Stormwater Program. The following sections discuss the complementary Fort Leonard Wood Programs, which support the IDDE Program.

### 10.5.1 National Pollutant Discharge Elimination System Permitted Facilities

Fort Leonard Wood has 13 outfalls permitted under a NPDES general permit within Standard Industrial Classification code 9711 (National Security). Activities within these drainage areas include training areas/facilities/ranges, an airfield, defense reutilization and marketing office, fuel storage, a rock quarry, landfills, and oil/water separators. Discharges from these facilities are permitted under the NPDES program and therefore are not considered illicit discharges.

Inspections, routine monitoring, and a Stormwater Pollution Prevention Plan (SWPPP), provide control measures and best management practices to reduce pollutants from these areas.

### **10.5.2 Land Disturbance Permitted Facilities**

New development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale that discharge into the FLW MS4 are permitted under individual Land Disturbance Permits. Stormwater discharges associated with these activities are permitted and are not considered illicit discharges by definition providing they are in compliance with the permit and individual construction site SWPPP conditions. Inspections, monitoring, and SWPPP implementation, provide control measures to reduce pollutants in stormwater runoff from these areas. Frequent inspections under this program provide opportunities to identify unallowable non-stormwater or illicit discharges from these sites.

### **10.5.3 Installation Restoration Program Landfill Monitoring**

Fort Leonard Wood's Installation Restoration Program (IRP) manages closed landfills and remediation sites at Fort Leonard Wood. This program includes routine monitoring (which may include groundwater, soil vapor, and/or soil samples) and visual site inspections. Annual inspections determine if leachate and/or other seepage from these sites could potentially become an illicit discharge.

### **10.5.4 Wastewater Program Components**

The Fort Leonard Wood DPW manages the sanitary sewer system. Normal discharges are allowed through their wastewater treatment plant under the existing NPDES wastewater treatment permit. The Capacity, Management, Operations, and Maintenance (CMOM) Plan is a guide for the wastewater program to ensure buried utility systems are operating properly and are serviced in accordance with all regulatory requirements. The CMOM Plan specifies several components relevant to the Stormwater Program, and the IDDE effort in particular. These components include the following: establishing a protocol for the reporting and response of sanitary sewer overflows (SSOs) including notification and sampling procedures, flow monitoring, inflow and infiltration (I&I) modeling, emergency response procedures, inspection procedures, and yearly review.

### **10.5.5 Spill Prevention and Response Plan**

Fort Leonard Wood has a Spill Prevention and Response Plan (SPRP) which has been designed to meet the requirements of 40 CFR Part 112. The establishment and implementation of this plan supports the prevention and elimination of illicit discharges at Fort Leonard Wood by providing training and awareness for staff regarding preventing spills, structural control measures for potential spill materials and their containers, and response procedures for reacting to a spill. Spills are investigated immediately upon report. The SPRP is found online through the Spill Prevention and Response Website at <http://www.wood.army.mil/dpwenv>. Spills

reported under the jurisdiction of the SPRP are reported to the Stormwater Program Manager for tracking purposes. The SPRP applies to all areas and industries on the installation.

#### **10.5.6 Base Maintenance**

Operations and maintenance of a military installation, as it relates to water quality, is performed primarily by the Directorate of Public Works (DPW) Base Maintenance Contract. The DPW Base Maintenance Contractor plans for, constructs, maintains, and repairs military property including buildings, roads, utilities, and grounds. DPW provides environmental and natural resource management services, performs preventive maintenance management, master planning, utility operations (including drinking water, wastewater and stormwater), municipal services (custodial, solid waste, refuse removal, snow removal, and ground maintenance), and pest management.

Fort Leonard Wood has mechanisms in place to track and clean up illegal dumpsites. Community members who observe an illegal dump can call the Environmental Division directly to report it. The contact phone number is listed on the Stormwater Program's website. These sites are restored and tracked by DPW.

#### **10.5.7 Other Field Personnel**

The Natural Resource Branch (managing fisheries, wildlife, cultural etc.) has staff that is constantly in the field, providing additional eyes and ears for detecting and reporting potential illicit discharges.

#### **10.5.8 Storm Sewer System Map**

A storm sewer system map was created for Fort Leonard Wood as a goal during the first small MS4 Permit cycle. This storm sewer map is utilized in the IDDE site survey to locate priority areas and to cross check outlets observed in the field. This map includes representative boundary outfalls, receiving waters of the State, NPDES monitoring points, drinking water intakes, open land disturbance permit sites, springs, watershed boundaries, oil water separators, above ground storage tanks, wash racks, drainages, ditches, pipelines, streams, wetlands, lakes, ponds, and sediment basins. The map was developed using existing base data created from construction designs, as-built drawings, field surveys and existing Geographical Information System (GIS) data. This map has been included as Appendix A. The map and GIS layers are continually updated as the data becomes available. At a minimum, the storm sewer map is reviewed annually and updated per BMP 3A, Measurable goal 1. The updated storm sewer system map will be included as an attachment to the Annual Report that will be submitted to MDNR in July of each year.

#### **10.5.9 Allowable Non-Stormwater Discharges**

Certain categories of typical non-stormwater discharges are allowed under Fort Leonard Wood's MS4 Permit, as determined by Missouri Department of Natural Resources (MDNR), unless they

become a significant source of pollution. Currently, there are no known allowable non-stormwater discharges that have been determined to be a significant source of pollutants to the FLW MS4. Continual evaluations of non-stormwater discharges will be conducted to ensure they can remain as an allowable non-stormwater discharge.

Categories of non-stormwater discharges or flows have been investigated and identified as not having a significant contribution of pollutants to Fort Leonard Wood's MS4. These discharges are outlined in Table 10-2 of this plan.

**Table 10-2. Allowable Non-Stormwater Discharges.**

- Landscape and irrigation water
- Uncontaminated groundwater (construction dewatering, crawlspace sumps, and other non-impacted groundwater)
- Springs
- Discharges from potable water sources (water line and fire hydrant flushing)
- Air conditioning condensate
- Flows from riparian habitats, wetlands, and other natural surface water features
- Street washing (non-chemically treated)
- Swimming pool discharges with chlorine level of less than 4 milligrams per liter (mg/L)
- Non commercial car washing
- Emergency fire fighting activities
- Emergency discharge to prevent imminent threat to human health and property

Chlorinated swimming pool discharge, other super-chlorinated water municipal pipe testing, and community-based, fund raising car wash events are examples of discharges that are allowable with proper pollution prevention controls in place prior to discharge. The Fort Leonard Wood stormwater manager or other responsible representative determines these controls upon coordination with the event organizer. Controls have been put in place to ensure discharges from chlorinated water sources have a chlorine concentration less than 4 mg/L. Periodic testing will be conducted to ensure compliance.

#### **10.5.10 Illicit Discharge Detection and Elimination Plan**

The IDDE program has many components of the plan currently in place with others that are still under development during the second permit cycle. The stormwater program achieved the goals for the IDDE Plan that was set during the previous permit cycle. The goals previously achieved include the following:

- Development of a list of existing information of illicit connection tests previously performed
- Retention and documentation of records of illicit discharges identified, enforcement

procedures, and corrective actions taken

- Development of a reporting procedure
- Training of staff/targeted audiences for illicit discharge detection
- Conducted field tests for illicit discharge and connections for existing storm system

The IDDE Plan related goals for the new permit cycle will build off the existing procedures and lessons learned from previous work to develop an IDDE Plan that is fully developed during the second permit cycle. The IDDE plan will address the following:

- Prioritizing areas for field screening
- Field screening
- Indicator evaluation, and source investigation
- Fixing the illicit discharge
- Prevention (Training and Outreach)

A copy of the plan will be maintained in the Stormwater Office.

#### **10.5.10.1 Prioritizing Areas**

Dry Creek and Smith Branch Watersheds were previously defined as the prioritized areas in the first permit cycle, and were the focus of IDDE activities. Ongoing and upcoming work will focus on specifying particular areas that have a higher likelihood of illicit connections.

Prioritizing areas for field screening will be accomplished by detailing procedures to systematically prioritize areas, outlets, and outfalls of the highest likelihood for having illicit discharges. Outfalls are point sources, as defined by 40 CFR 122.2, where a MS4 discharges to waters of the US, and does not include open conveyances connecting to MS4s, pipes, tunnels, or other conveyances which connect segments of the same stream of other waters of the US and are used to convey waters of the US. These areas in practice, maybe located up gradient of the physical border for ease of access and other practicality purposes.

Prioritizing criteria will include, but are not limited to, oil water separators, outlets draining to sensitive water bodies, infrastructure age, drainage area land use, areas reported to have obvious physical indicators such as staining, abnormal vegetation (either excessive or lack of), and/or discharge points flowing during dry periods that would not normally produce runoff. The priority rankings shall be reviewed and revised (if necessary) annually as areas are inspected to ensure the list is up to date and accurate.

#### **10.5.10.2 Field Screening**

Fort Leonard Wood developed an Illicit Discharge Field Inspection Procedure in 2012 with the purpose of outlining the systematic procedures for field inspection in accordance with federal, state, and local guidelines. A printed copy of the procedure is kept at the Stormwater Program Manager's office for reference. Field screening preparation, security and access requirements, dry weather field screening, field investigation steps, and post survey documentation tasks are

detailed in this procedure. Future work for this will be based upon the results of prioritizing areas.

**10.5.10.3 Indicator Evaluation and Source Investigation**

Field procedures described in the Illicit Discharge Field Inspection Procedure include mapping guidance and simple indicator monitoring to aid in the determination of the source of the suspected illicit discharge. Fort Leonard Wood developed an Illicit Discharge Corrective Action Procedure in 2012 to establish and implement procedures for locating, documenting, isolating, and correcting the source of the illicit discharge. A copy of this procedure is kept in the Stormwater Program Manager’s office for reference. The Illicit Discharge Corrective Action Procedure describes specific procedures for tracing the source of the illicit discharge, investigating/analyzing indicator parameters, and correcting/preventing illicit discharges. An annual review and update (if necessary) to the Illicit Discharge Corrective Action Procedures will account for any potential improvements or lessons learned.

**10.5.10.4 Fixing the Illicit Discharge**

The Corrective Action Procedure describes specific procedures to fix an illicit discharge. Procedures such as initial response, sampling guidance, upstream activity surveying procedures, interview procedures, and specific instructions to isolate and/or fix the discharge depending on the source. This guidance ensures the removal of the illicit discharge source. An annual review and update (if necessary) will account for any potential improvements or lessons learned.

**10.5.10.5. Prevention (Training and Outreach)**

As discussed in Section 8.0, Public Education and Outreach Program, training is an essential aspect of increasing program awareness and promoting best management practices that will minimize pollutant runoff. TEO Plans address the education and outreach strategies that have been determined to be the most effective for each target audience. Education and Outreach strategies that have proven to be the most effective include site assistance visits, classroom training and on the job training. The goal of IDDE training is to inform target audiences on the hazards associated with illegal discharges and improper disposal of hazardous waste as well as encourage best management practices, to include pollution prevention/good housekeeping techniques that will minimize pollutant runoff from day to day activities.

**10.6 Future Permit Cycle Approach (BMPs)**

Fort Leonard Wood’s Stormwater Program has designed BMPs and goals to meet the intent of the Illicit Discharge MCM. These are presented in Tables 10-3, 10-4, 10-5 and 10-of this plan.

**Table 10-3. BMP # 3A: Storm Sewer System Map.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.3.1.1
<b>BMP Description:</b> Fort Leonard Wood has developed an installation storm sewer system

**Table 10-3. BMP # 3A: Storm Sewer System Map.**

<p>inventory map, which will require periodic updates. The map contains the following information:</p> <ul style="list-style-type: none"> <li>• Hydraulic unit code (HUC) 8 Watershed Boundaries.</li> <li>• Pipes and conveyances.</li> <li>• Drainage ways, ponds, sediment basins, springs, and wetlands.</li> <li>• Structural pollution control devices (such as grit chambers, separators, etc.).</li> <li>• Outfalls regulated under MS4 Permit.</li> </ul>
<p><b>Measurable Goals/ (Implementation Timeline):</b></p> <ol style="list-style-type: none"> <li>1) Conduct a semi-annual review of the Storm Sewer System Map; Update the map as appropriate.</li> </ol>

**Table 10-3. BMP # 3B: Illicit Discharge Detection and Elimination Plan.**

<p><b>Permit Section(s) Compliance Reference:</b> 4.2.3.1.3, 4.2.3.1.3.1, 4.2.3.1.3.2, 4.2.3.1.3.3</p>
<p><b>BMP Description:</b> Continue to develop and implement the IDDE program to detect and eliminate illegal and/or improper connections to storm drainage system. Specific illicit discharge connections will be evaluated, identified, and screened by stormwater personnel using the specific components that are listed below. After the detection of an illicit discharge site, appropriate work orders and/or enforcement procedures will be implemented as appropriate to correct the action.</p>
<p><b>Measurable Goals/ (Implementation Timeline):</b></p> <ol style="list-style-type: none"> <li>1) Finalize the formal IDDE Plan during the first reporting year, review and update as needed on an annual basis.</li> <li>2) Investigate and document illicit discharges that have been reported by FLW Patrons and/or identified during field inspections or smoke testing of sanitary sewer lines.</li> <li>3) Perform and document annual dry weather screenings of 100% of representative boundary outfalls.</li> <li>4) Conduct and document IDDE training for 25% of target audiences annually.</li> <li>5) Conduct a review during the first reporting year to determine priority areas and schedule priority area field screenings for Reporting years 2 – 5.</li> <li>6) Perform and document dry weather screenings of 25% of prioritized areas annually beginning the 2<sup>nd</sup> reporting year.</li> </ol>

**Table 10-4. BMP # 3C: Identification of Non-Stormwater Discharges and Flows.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.3.1.4, 4.2.3.1.5
<b>BMP Description:</b> Fort Leonard Wood will continue to evaluate whether any of the following categories of allowable non-stormwater discharges become a significant contributor of pollutants to the stormwater system: i.e. groundwater, landscape irrigation, potable water sources, incidental non-stormwater sources, and/or other sources that may arise.
<p><b>Measurable Goals/ (Implementation Timeline):</b></p> <ol style="list-style-type: none"> <li>1) Conduct review of new water quality data from allowable non-stormwater discharge sources to determine if they become a significant source of pollution to the Fort Leonard Wood MS4. Update table 10-2 of the SWMP as appropriate.</li> <li>2) Conduct annual reviews of impacts from incidental non-stormwater sources to determine if additional BMPs should be implemented and/or if the source should be removed from the allowable non-stormwater discharge table; update table 10-2 in the SWMP as appropriate.</li> </ol>
<p><b>Specific Components and Notes:</b></p> <p>Changes to allowable, non-stormwater discharges will be documented in the Master Copy of the SWMP along with the official websites copy of the SWMP as applicable Changes will be noted in the Annual Report and incorporated into the SWMP during the next Cycle Update.</p>

**Table 10-5. BMP # 3D: Evaluate the Illicit Discharge Detection and Elimination Program.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.3.1.3, 4.2.3.1.3.6
<b>BMP Description:</b> As part of the permit requirements, Fort Leonard Wood must evaluate the success of each MCM. The success of the IDDE MCM will be measured through the completion of the measurable goals outlined in each of the identified BMPs, addressing the detection, reporting, enforcement, and elimination of illicit discharges into the installation's stormwater system.
<p><b>Measurable Goals/ (Implementation Timeline):</b></p> <ol style="list-style-type: none"> <li>1) Conduct an annual analysis of the IDDE Program to include a review of field screenings, illicit discharge investigations and training outcomes. Summarize findings to include recommended corrective actions and areas for improvement.</li> </ol>

## **11 MCM 4 – Construction Site Stormwater Runoff Control**

### **11.1 MCM 4 General Overview and Objectives**

The goal of this MCM is to develop, implement, and enforce a program to reduce pollutants in stormwater runoff into the regulated small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of stormwater discharges from construction activity disturbing less than one acre shall be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

The land disturbance process associated with construction inherently carries risk of polluting stormwater, as exposed, unprotected soil is susceptible to erosion. Proper planning for site controls, successful installation, proper maintenance, and inspections are required to ensure effectiveness, and continued performance.

### **11.2 MCM 4 Applicability**

The construction site stormwater runoff controls discussed in MCM 4 of this SWMP are applicable to individuals involved in the construction activity that disturb one acre or more, or from activity disturbing less than one acre if it is part of a larger common plan of development or sale that would disturb one acre or more. Third party contractors performing site construction hold the majority of the land disturbance permits. The installation holds the remaining land disturbance permits.

### **11.3 MCM 4 Regulatory Requirements**

The construction site runoff control requirements for this SWMP are discussed in Section 4.2.4 of the Fort Leonard Wood MS4 Permit. These permit requirements are already being met through existing established programs but are supplemented with new requirements outlined in this SWMP. A reference to where each of these permit requirements is shown in Table 11-1 of this plan.

**Table 11-1. MCM 4 Permit Requirement References.**

Permit Reference	SWMP Citation
4.2.4.1 – <i>Permit requirement.</i> The permittee shall develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to their regulated small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of stormwater discharges from construction activity disturbing less than one acre shall be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. As part of the SWMP, the permittee's construction site stormwater runoff control program shall include the development and implementation of, at a minimum:	11
4.2.4.1.1 – An ordinance or other regulatory mechanism:	7.4, 11.4, 11.5.1, BMP 4A, BMP 4B, BMP 4C
4.2.4.1.1.1 – To require operators to implement erosion and sediment control BMPs at construction sites;	7.4, 11.4, 11.5.1, BMP 4A, BMP 4B
4.2.4.1.1.2 – To include sanctions to ensure compliance, to the extent allowable under State or local law; and	7.4, 11.4, BMP 4B
4.2.4.1.1.3 – If the permittee needs to develop this mechanism, the permittee shall describe the plan and scheduled implementation. If the permittee's ordinance or regulatory mechanism is already developed, the permittee shall include a copy of the relevant sections with the permittee's SWMP.	7.4, 11.4, BMP 4C
4.2.4.1.2 – Requirements for construction site operators to control construction-site waste that may cause adverse impacts to water quality, such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste;	11.5.1, BMP 4A
4.2.4.1.3 – Procedures for the permittee to consider and review all preconstruction site plans for potential water quality impacts.	11.5.1, BMP 4A
4.2.4.1.4 – Procedures for the permittee to receive and consider information submitted by the public, including coordination with the permittee's public education program;	11.5.2 , BMP 1A, BMP 4B, TEO Plan
4.2.4.1.5 – Procedures for the permittee to inspect sites and enforce control measures, including prioritization of site inspections;	11.5.1, BMP 4B

**Table 11-1. MCM 4 Permit Requirement References.**

Permit Reference	SWMP Citation
4.2.4.1.6 – A plan to ensure compliance with the permittee's erosion and sediment control regulatory mechanism, including the sanctions and enforcement mechanisms the permittee will use to ensure compliance and procedures for when certain sanctions will be used. Possible sanctions include non-monetary penalties (such a stop work orders), fines, bonding requirements, and/or permit denials for noncompliance; and	7.4, 11.4, 11.5.1, BMP 4A, BMP 4B, BMP 4C
4.2.4.1.7 – A description of how the permittee will evaluate the success of this MCM.	BMP 4D

### 11.4 Policy and Enforcement

Army Regulation 200-1 (AR 200-1) addresses construction site runoff by specifying requirements that prevent or minimize erosion and sedimentation. AR 200-1 requires the following:

- Control erosion in accordance with federal, state, and local requirements.
- Keep soil erosion from water within tolerance limits as defined by US Department of Agriculture, Natural Resource Conservation Service, or other applicable authority.
- Keep soil sediment, as a pollutant in wetlands and waterways, within compliance limits.
- Minimize the impact of land uses on soil erosion and sedimentation when and where possible.

To ensure permit compliance, FLW has established an enforcement protocol that includes all Land Disturbance Permits. The enforcement protocol is a tiered approach that allows seven business days to remedy noncompliance between each tier. Continued non-compliance can result in a mandatory referral to the Missouri Department of Natural Resources.

Site deficiencies are typically identified during scheduled inspections (discussed in Section 11.5.1). The enforcement protocol is a notification process that escalates up the chain of command. Specific issues along with the action(s) needed to correct the deficiency are outlined in an initial email from the site inspector. This initial notification is generally successful as construction site operators are responsive to Stormwater Program requests. Complaints to higher levels of the chain of command would put a poor mark on the contractor, and would influence their ability to conduct work on Post in the future.

In addition, a Corrective Action Request may be initiated that prompts creation of Corrective and Preventive Action Plans. The Corrective Action Request describes actions needed to correct deficiencies and when they were or will be completed. If the violations cannot be resolved by the required date, the action plans must include interim tasks/milestones. Corrective Action Requests are reviewed in DPW and EQCC meetings and responsible personnel will receive

automated “alerts” until the issue is resolved. The Environmental Division schedules follow-up inspections to assist and monitor efforts to comply.

If the initial email and/or Corrective Action Request are not successful, a Warning Notice signed by the Environmental Compliance Branch Chief is sent to the Construction Site person of contact (POC). If after seven (7) business days, the issue(s) is still unresolved, a Non-Compliance Notice signed by Environmental Division Chief is sent. If the problems are still not addressed, the non-compliance will continue to elevate to higher authorities ultimately to include the Garrison Commander and the Missouri Department of Natural Resources.

These escalation procedures are in place to ensure compliance in the unlikely situation that the operator is unresponsive. Should the escalation procedures remain unsuccessful in resolving the deficiency, the Environmental Division will submit a work order(s) to have site controls put in place to correct the deficiency and meet the permitted requirements.

## **11.5 Construction Site Stormwater Runoff Control Program**

Compliance is achieved for MCM 4 through the regulatory mechanisms described above, through the SWPPP requirements and procedures, and through public input to the program. The following sections describe SWPPP requirements, procedures, and public input to the program.

### **11.5.1 Stormwater Pollution Prevention Plan Requirements and Procedures**

Construction sites greater than one acre (or a project of less than one acre that is part of a larger common plan greater than one acre) are required to obtain a land disturbance permit from the state of Missouri. This state requirement supports Fort Leonard Wood’s MS4 requirements under MCM 4 for erosion and sediment control, and sanctions to ensure compliance with these requirements. The primary requirement of the land disturbance permit is the development and implementation of a SWPPP, which incorporates site-specific controls to best minimize the soil exposure, soil erosion, and the discharge of pollutants. Land disturbance SWPPPs typically describe the site, the nature and sequence of the construction activity, compliance with other federal requirements (endangered species, historic properties, Safe Drinking Water Act, etc.), construction site waste controls (e.g. erosion and sediment controls, pollution prevention standards, etc.), inspection responsibilities and delegations, corrective action procedures, stabilization procedures, and training requirements.

The Fort Leonard Wood Environmental Office communicates requirements and expectations, of the State’s Land Disturbance Permittee, by reviewing and commenting on SWPPPs and required meeting (referred to as the ‘permit issuance’ meeting). This allows Fort Leonard Wood to ensure compliance with the state’s permit conditions, the terms and conditions of the Land Disturbance Permit, input to site-specific BMPs and to strengthen controls if necessary prior to the commencement of work. A standardized permit-issuance-meeting checklist ensures applicable topics are covered.

Construction site inspections are conducted by the land disturbance permittee to ensure compliance with the site-specific land disturbance SWPPP. Directorate of Public Works staff or environmental support contractors may also conduct secondary quality assurance inspections. Inspectors are trained regarding the stormwater related requirements, expectations, and recordkeeping responsibilities. Construction site inspections help ensure compliance with the erosion and sediment control requirements.

A spreadsheet maintained by the program tracks construction permits and site inspections. This allows the Stormwater Program to track the site location, contractor, the specific Land Disturbance Permit number, site status (active/inactive), and notes on inspection results. The spreadsheet tracker also prioritizes sites and determines the frequency of inspection. The initial inspection frequency is weekly to ensure the contractor complies with applicable requirements. Inspections continue on a weekly frequency until the inspector deems the site's controls adequate and effective, at which point the inspection frequency is reduced to monthly. Sites with ongoing issues will be inspected weekly until deficiencies are corrected. Noncompliant sites, or sites reported as a concern by the public (as discussed below) will have follow up inspections as soon as practicable until the issue is resolved. Inactive sites are generally inspected monthly, unless additional inspections are warranted.

Construction site inspections have been historically successful in both recognizing compliant sites and identifying problems in need of corrective actions.

### **11.5.2 Public Input**

Several mechanisms are in place to encourage public involvement by providing the opportunity to voice concerns regarding construction site's pollution prevention performance including the Interactive Customer Evaluation (ICE) system, the Fort Leonard Wood Facebook page, and the DPW reporting hotline. The ICE system is a web-based tool that collects feedback on services provided by various organizations throughout the DOD. It allows for anonymous reports for quality of performance on various services, including construction. Facebook is a web-based social media platform that allows users to communicate with Fort Leonard Wood, and post questions and/or concerns. The DPW hotline is a tip-line that directs concerns or complaints directly to the DPW office. Contact information for the hotline is available on the Stormwater Program website.

These various feedback avenues provide opportunities for the public involvement in stormwater pollution prevention and for the identification of potential problems to the stormwater program.

### **11.6 MCM 4 Future Permit Cycle Approach (BMPs)**

Fort Leonard Wood's Stormwater Program has developed BMPs and measurable goals to meet the intent of the Construction Site Stormwater Runoff Control Minimum Control Measure. These are presented in Tables 11-2, 11-3, 11-4 and 11-5 of this plan.

**Table 11-2. BMP # 4A: Preconstruction Review and Control.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.4.1.1, 4.2.4.1.1.1, 4.2.4.1.2, 4.2.4.1.3, 4.2.4.1.6
<b>BMP Description:</b> Preconstruction controls include a SWPPP review, a preconstruction meeting with contractors, and the retention and maintenance of permits and records. These controls, prior to ground disturbance, provide a head start to managing construction sites and their runoff controls.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Complete SWPPP reviews for 100% of construction projects greater than one acre (or a project of less than one acre if it is a part of a larger common plan that is greater than one acre in total) to ensure compliance with SWPPP conditions and other applicable requirements</li> <li>2) Conduct Land Disturbance Permit Issuance Meeting with construction contractors prior to work commencing.</li> <li>3) Maintain and track copies of 100% of Land Disturbance Permits that are greater than one acre or are part of a larger common plan that is greater than one acre for projects at Fort Leonard Wood (ongoing).</li> </ol>

**Table 11-3. BMP # 4B: Construction Site Inspections.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.4.1.1, 4.2.4.1.1.1, 4.2.4.1.1.2, 4.2.4.1.4, 4.2.4.1.5, 4.2.4.1.6
<b>BMP Description:</b> Fort Leonard Wood will conduct construction site inspections to document compliance with pollution prevention controls and identify unacceptable erosion and sediment control conditions.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Conduct and document monthly inspections of 100% of permitted land disturbance sites to ensure compliance. Maintain and track inspection records.</li> <li>2) Inspect permitted land disturbance sites based on public complaints within 7 days of receipt of complaint. Maintain and track inspection records.</li> </ol>

**Table 11-4. BMP # 4C: Noncompliance and Enforcement.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.4.1.1, 4.2.4.1.1.3, 4.2.4.1.6
<b>BMP Description:</b> Noncompliant sites will be tracked to ensure resolution through verbal and written communications and/or contract enforcements as described in Section 11.4 of this SWMP.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Submit and track corrective action requests IAW the FLW continuum of enforcement. (ongoing)</li> <li>2) Draft enforcement protocol incorporating state and AR into a Fort Leonard Wood Regulation for Garrison Command approval, and determine feasibility of enactment. (year 2016–2017)</li> <li>3) Enact Fort Leonard Wood Regulation, if deemed feasible. (2018)</li> </ol>

**Table 11-5. BMP # 4D: Evaluate the Success of Construction Site Stormwater Runoff Control.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.4.1.7
<b>BMP Description:</b> Fort Leonard Wood must evaluate the success of each MCM as part of the permit requirements. The success of the Construction Site Stormwater Runoff Control Measure will be measured through the success of control measures put in place to reduce pollutants in runoff from construction sites. This will be evaluated through the observations and inspections specified in BMPs 4A-C.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Conduct an annual review of the Construction Run-off Control Program. Review should include an analysis of inspection procedures, inspection results, enforcement actions and training effectiveness. Summarize analysis to include findings, recommended corrective actions and opportunities for improvement.</li> </ol>

## **12 MCM 5 – Post-Construction Runoff Control**

### **12.1 MCM 5 General Overview and Objectives**

The goal of this MCM is to develop, implement, and enforce a program, which addresses the quality of long-term stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre (including projects less than one acre that are part of a larger common plan of development or sale) and discharge into the permittee's regulated small MS4. The program shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts by reasonably mimicking preconstruction runoff conditions on all affected new development projects and by effectively utilizing water quality strategies and technologies on all affected redevelopment projects, to the maximum extent practicable. The program shall assess site characteristics at the beginning of the design phase to ensure adequate planning for stormwater program compliance. The purpose for this approach is to arrive at designs and practices that provide for most effective water quality treatment through infiltration, flow rates and similar site-design opportunities (e.g. conservation of natural land and permeable areas, permeable pavers, rooftop runoff infiltration galleries, and/or mechanical storm drain filters).

### **12.2 MCM 5 Applicability**

Requirements for the post-construction runoff control MCM are applicable to permanent, new, and redevelopment projects that disturb one acre or more, including projects less than one acre that are part of a larger common plan.

### **12.3 MCM 5 Regulatory Requirements**

The post-construction stormwater control requirements are discussed in Section 4.2.5 of the Fort Leonard Wood Permit. These permit requirements are already being met through existing established programs but are supplemented with new requirements outlined in this SWMP. A reference to where each of these permit requirements are discussed is shown in Table 12-1 of this plan.

**Table 12-1. MCM 5 Permit Requirement References.**

Permit Reference	SWMP Citation
<p>4.2.5.1 – <i>Permit requirement.</i> The permittee shall develop, implement, and enforce a program to address the quality of long-term stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the permittee's regulated small MS4. The permittee's program shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts by reasonably mimicking preconstruction runoff conditions on all affected new development projects and by effectively utilizing water quality strategies and technologies on all affected redevelopment projects, to the maximum extent practicable. The permittee shall assess site characteristics at the beginning of the construction design phase to ensure adequate planning for stormwater program compliance. The purpose for this approach is to arrive at designs and practices that provide for most effective water quality treatment through infiltration, flow rates and similar site-design opportunities. As part of the SWMP document, the post-construction runoff control program shall include the following information, at a minimum:</p>	12
<p>4.2.5.1.1 – A strategy to minimize water quality impacts, by reasonably mimicking preconstruction runoff conditions in affected new development and incorporating water quality protection in affected redevelopment projects to the maximum extent practicable, and include a combination of structural and/or non-structural BMPs appropriate for the permittee's community;</p>	12.4, 12.5.1, 12.5.2, 12.5.3, BMP 5B, BMP 5C
<p>4.2.5.1.2 – An ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, or local law. If the permittee needs to develop a mechanism, the permittee shall describe the plan and a schedule for implementation. If the permittee's ordinance or regulatory mechanism is already developed, the permittee shall include a copy of the relevant sections with the SWMP document;</p>	7.4, 12.4, 12.5.3
<p>4.2.5.1.3 – A plan to ensure adequate long-term O&amp;M of selected BMPs, including types of agreements between the permittee and other parties such as the post-development landowners or regional authorities;</p>	12.5.4, BMP 5A
<p>4.2.5.1.4 – Specific priority areas for this program; and</p>	12.5, 12.6

**Table 12-1. MCM 5 Permit Requirement References.**

Permit Reference	SWMP Citation
4.2.5.1.5 – Any non-structural BMPs in the permittee's program, including, as appropriate:	10.5.6, 12.4, 12.5.1, 12.5.2, 12.5.3, 12.5.5, 13.5, BMP 1A, BMP 5B, BMP 5C, TEO Plan
4.2.5.1.5.1 – Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation;	12.4, 12.5.1, 12.5.2, BMP 5B, BMP 5C
4.2.5.1.5.2 – Policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure, and redevelopment of Brownfield sites or grayfields which may include abandoned malls or similar properties;	12.4, 12.5.1, 12.5.2, BMP 5B, BMP 5C
4.2.5.1.5.3 – Education programs for developers and the public about project designs that minimize water quality impacts; and	12.5.5, BMP 1A, BMP 5C, TEO Plan
4.2.5.1.5.4 – Other measures such as minimization of the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, site designs that provide for integration of a variety of infiltration practices and source control measures often thought of as good housekeeping, preventive maintenance and spill prevention.	10.5.6, 12.5.3, 13.5, BMP 5B, BMP 5C
4.2.5.1.6 – Any structural BMPs in the permittee's program, including, as appropriate:	12.4, 12.5.1, 12.5.2, 12.5.3, BMP 5B, BMP 5C
4.2.5.1.6.1 – Practices that provide infiltration, evapotranspiration or re-use such as grassed swales, bioretention cells, cisterns and green roofs; and	12.4, 12.5.1, 12.5.2, 12.5.3, BMP 5B, BMP 5C
4.2.5.1.6.2 – Redevelopment practices such as planter boxes, street retrofits, parking-lot infiltration and green roofs.	12.4, 12.5.1, 12.5.2, 12.5.3, BMP 5B, BMP 5C
4.2.5.1.7 – How the permittee will evaluate the success of this minimum measure.	BMP 5D

## 12.4 MCM 5 Policy and Enforcement

Several policies serve as the regulatory framework for the post-construction runoff control requirements of this section. These policies include:

- Section 438 of the Energy Independence & Security Act 2007 (EISA07),
- EPA Fact Sheet for Technical Guidance on Section 438 of EISA 2007 (2007),
- DOD Memorandum on the Implementation of Section 438 of EISA 2007 (2007),
- Department of the Army Memorandum on Low Impact Development (LID),
- AR 350-19 The Army Sustainable Range Program (2005),
- AR 210-20 Real Part Master Planning for Army Installations (16 May 2005)
- Garrison Command Policy 200-1 Environmental Quality Control Committee Policy (8 Sept 2009)

The Energy Independence & Security Act of 2007 states that “the sponsor of any development or redevelopment project that exceeds 5,000 square feet to use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property regarding the temperature, rate, volume, and duration of flow”. The implementation of EISA07 is achieved with low impact development (LID) structural and non-structural BMPs, which are discussed in more detail in subsequent sections. The EPA Fact Sheet for Technical Guidance on Section 438 of EISA 2007 gives guidance pertaining to the implementation of predevelopment hydrology. The DOD Memorandum “Implementation of Section 438 of EISA” instructs implementation of stormwater management using LID. The DOD Memorandum also requires Fort Leonard Wood to implement LID procedures early in the planning stages of development and design.

Army installations are not able to develop ordinances, like most municipalities. Instead, Fort Leonard Wood falls under the direction of Army Regulations and Garrison Command policy that guide environmental land management. Army Regulation 350-19 provides guidance for the sustainable land management for Army ranges and training lands. This AR prescribes coordination with the Integrated Training Area Management (ITAM) Program. The ITAM Program provides the capability to manage and maintain training and testing land by integrating mission requirements with environmental regulations and sound land management practices.

AR 350-19 and the ITAM program implement sustainable range management procedures, in part with the Army Small Arms Training Range Environmental BMP Manual. This manual is a reference guide in maintaining the long-term sustainability of operational small arms ranges and range areas. The manual provides guidance for site evaluation, tools for BMP selection and implementation, and information on BMP performance, monitoring, and inspection. The primary focus of the manual is to provide controls against soil erosion and metal transport; however, the suggested BMPs provide a collateral benefit to stormwater hydrology that aligns with the goals of this SWMP.

Stormwater BMPs discussed in the manual include non-structural BMPs such as range rotation schedules (to allow for vegetative recovery), preserving natural vegetation, aerial seeding of inaccessible impact areas, the use of riparian buffer zones; and structural BMPs such as grass channels, grass filter strips, swales, erosion control matting, check dams, turn-outs, level spreaders, and riprap aprons. These BMPs improve infiltration, slow runoff velocities, and/or reduce runoff volumes in addition to their primary function of reducing soil erosion and metal transport.

AR 210-20 requires master plans to incorporate sustainable concepts as a driver for the planning of non-structural BMPs. The Master Plan serves in part as a mechanism to meet the planning requirements associated with the MS4 Permit.

Garrison Command Policy 2014-03 requires environmental stewardship and installation-wide implementation of Environmental Management System (EMS). The use of post-construction runoff controls meets this order by returning predevelopment hydrology to Fort Leonard Wood.

## **12.5 Post-Construction Runoff Control Program**

As previously discussed, Fort Leonard Wood is subject to federal requirements and a multitude of Army and DOD policies that all require LID. To implement these requirements, Fort Leonard Wood has made short-term changes that have had an immediate effect, made changes to the long-term strategic planning for the installation, and made efforts that will have a long-term effect in the permanent design and enforcement of controls. In the future, an inventory and inspection system will supplement this to ensure the management of O&M needs.

The following sections discuss the current state of short-term planning, long-term planning, design, construction, long-term O&M, enforcement, and training as it relates to this MCM.

### **12.5.1 Short-Term Changes with an Immediate Effect**

The implementation of post-construction runoff controls is not possible without planning during the design phase of a project. Several changes have already been made that allow the stormwater program to review and influence projects for post-construction runoff controls long before the groundbreaking of a project. These changes include review and comments of modifications to the project planning and design review process, and modification to the NEPA review process.

The planning and design review process is a formal process that occurs for every major military project. It begins with the planning stage, continues through design, and consists of an internet-based review and commenting system. Preliminary project planning documents and designs are available to various DPW programs (including Stormwater) through an internet-based SharePoint site. This process allows the Environmental Office to review the project design for post-construction runoff controls, and comment on the design if deemed unsatisfactory. The contractor is contractually obligated to respond to comments received.

National Environmental Policy Act reviews are required for all federal projects, and could include various levels of review such as a Record of Environmental Consideration, an Environmental Assessment, or an Environmental Impact Statement depending on the level of potential impact. These various NEPA reviews consider environmental components, including potential stormwater impacts, during the evaluation process. Due to new post-construction runoff control requirements, the NEPA review and documentation that the FLW Environmental Division performs now addresses this.

### **12.5.2 Long-Term Strategic Planning**

The facility's Master Plan governs the development at Fort Leonard Wood and serves as a comprehensive guide to the future growth of the facility. Army Regulation 210-20 directs the development of a master plan, and requires master plans to incorporate sustainable concepts. Guidance by the AR for stormwater management limits disruption of natural water flows by minimizing stormwater runoff, increasing onsite infiltration, and reducing contaminants. Guidance on installation redevelopment directs development to installation cantonment areas with existing infrastructure, protect green fields, and preserve habitat and natural resources. EO 11988 supports this AR, as it requires federal facilities to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

Other applicable sustainable factors of AR 201-20 include environmental accountability, community-driven strategic planning, collaborative regional planning, and natural resource management. Army Regulation 210-20 requires master plans to undergo NEPA considerations, which incorporate reviews for stormwater considerations. The master planning process provides the framework and opportunity to effectively plan for post-runoff controls on a large scale, however the current Master Plan was developed without meeting these requirements. Development of a new Master Plan is expected during the next permit cycle with the post-construction runoff requirements addressed.

Beginning in fall of 2010, Fort Leonard Wood began implementing the Installation Strategic Sustainability Plan (ISSP). This is a 25-year plan that addresses aspects of sustainability, including infrastructure. Low Impact Development was integrated into this document in 2012, which will help institutionalize the MS4 MCM 5 requirements for the future.

### **12.5.3 Design, Construction and Enforcement**

In order to make a lasting effect on the design and construction of projects for years to come, it is necessary to institutionalize LID. This relates to determining proper designs for Fort Leonard Wood, and enforcing design changes.

All construction and most design work are performed by contractors. The process for changing contractual documents has begun and is well underway. The design guide for FLW has been re-

written to include the new requirements, which is a major step toward achieving these requirements.

Due to the nature of the soils at Fort Leonard Wood, designs for LID have proven challenging, due to the nature of the soils at Fort Leonard Wood. The highly erodible clays make infiltration techniques very difficult and often uneconomical. Many of the LID controls and techniques require significant maintenance to keep them functioning for their life span. Fort Leonard Wood has made progress towards effective structural and non-structural LID practices that are efficient, economical, and appropriate for the environment; and continues to strive towards their further implementation.

Enforcement of the new requirements is also an issue. One of the things that Fort Leonard Wood has implemented to streamline the level of effort needed to meet requirements, is the adoption of the Mid-America Regional Council (MARC) Manual of BMPs (2012). The MARC Manual is a comprehensive guide to stormwater quality BMPs, and includes sections on BMP selection criteria, minimum practices, hydrology (BMP sizing and design) methods, and general guidance for both structural and non-structural BMPs. BMPs discussed in this manual, such as bioretention basins, infiltration techniques, and filter media among others, generally promote the goal of returning stormwater runoff to pre-development conditions. The Stormwater Program has begun the development of standard specifications and details for structural BMPs for designers to ensure standard design criteria, and to ensure that post-construction controls meet the intent of this MCM.

Coordination with the US Army Corps of Engineers (USACE) ensures that military construction designs incorporate sustainable design requirements including:

- Army Sustainable Design and Development Policy,
- Unified Facility Criteria (UFC) 3-210-10 LID,
- EPA Publication 84-B-09-001,
- EISA 2007, Section 438,
- MARC Manual of BMPs for Stormwater Quality, Aug 2009,
- Fort Leonard Wood MS4 Permit.

Other mechanisms have helped the implementation of the post-construction runoff control requirement such as the UFC setback requirements for new buildings relating to security and antiterrorism protection. The UFC requires that the minimum building setback distances range from 12–18 feet from a perimeter fence, which depends on several factors such as building material and security risk level. This building setback requirement results in more undeveloped, open space, which is typically covered with grass or other vegetation. Reduced impervious area associated with this open space promotes infiltration, reduces runoff flow rates, and helps return stormwater runoff to predevelopment conditions.

These combined efforts demonstrate that Fort Leonard Wood is well on its way to effective implementation of LID.

**12.5.4 Long-term Operation and Maintenance**

Long-term O&M activities are critical to the effective implementation of LID and similar BMPs. Although Fort Leonard Wood currently does not have a process set up for long-term O&M, it is a measurable goal for the second permit cycle. Over the course of the next permit cycle, Fort Leonard Wood will be completing (and continually updating) an inventory of all post-construction BMPs on post, developing maintenance requirements for each type of BMP identified, and developing a maintenance schedule.

**12.5.5 Training**

As with any military installation, training and defined procedures are essential. Personnel involved in the above programs receive training from several sources as a requirement of their job. Individual programs conduct many training opportunities throughout the year, which are tracked through the individual programs. Many are required training courses whereas others are voluntary. These training and education programs are continually updated to reflect the need of the post. The stormwater program is committed to support these training needs in an effort to educate personnel in ways to support these MCMs and help improve water quality at Fort Leonard Wood. As stated in MCM 1, target audiences, their target pollutant sources, and the particular education and outreach strategy, is discussed in the TEO Plan. A copy of the plan is kept in the stormwater manager’s office.

**12.6 MCM 5 Future Permit Cycle Approach (BMPs)**

Fort Leonard Wood’s Stormwater Program has developed BMPs and measurable goals to meet the intent of the Post-Construction Runoff Control Minimum Control Measure. These goals are directed toward new and redevelopment projects within the cantonment area. The cantonment area has been identified as the highest priority area for this program as this is the most likely area for new developments with pervious areas. Post-construction runoff controls will be integrated into areas outside the cantonment whenever possible as well. The BMPs and goals are presented in Tables 12-2, 12-3, 12-4 and 12-5 of this plan.

**Table 12-2. BMP # 5A: Long-term Operation/Maintenance of BMPs.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.5.1.3
<b>BMP Description:</b> Long-term O&M is currently achieved by reacting to potential problems via a DPW work order as they are identified. The goals associated with this BMP aim to add routine components to the O&M creating a more proactive program.
<b>Measurable Goals/ (Implementation Timeline):</b> 1) Conduct and document a semi-annual inventory of post-construction BMPs. Update inventory as needed.

- 2) Develop inspection schedule for post-construction BMPs during first reporting year. Inspect per the schedule during reporting years 2 – 5. Track required maintenance performed on post-construction BMPs during reporting years 2 – 5.

**Table 12-3. BMP # 5B: Design, Short-term Implementation, and Enforcement.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.5.1.1, 4.2.5.1.5, 4.2.5.1.5.1, 4.2.5.1.5.2, 4.2.5.1.5.4, 4.2.5.1.6, 4.2.5.1.6.1, 4.2.5.1.6.2
<b>BMP Description:</b> Design a project review processes that allows the Stormwater Program to ensure the integration, implementation, and enforcement of post-construction runoff requirements into project designs.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"><li>1) Continue coordination and project reviews with design/construction contractors to ensure the integration of structural BMPs during project design reviews. Track projects reviewed.</li><li>2) Continue to evaluate applicable BMP designs for effective and economical integration into future project design (ongoing).</li><li>3) Continue NEPA reviews to ensure their inclusion of requirements in NEPA language and documentation.</li></ol>

**Table 12-4. BMP # 5C: Long-term Institutionalization and Planning.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.5.1.1, 4.2.5.1.5 , 4.2.5.1.5.1, 4.2.5.1.5.2, 4.2.5.1.5.3, 4.2.5.1.5.4, 4.2.5.1.6 , 4.2.5.1.6.1, 4.2.5.1.6.2
<b>BMP Description:</b> Long-term planning ensures structural and non-structural post-construction BMPs will be institutionalized in the planning philosophy and future project designs at Fort Leonard Wood.
<b>Measurable Goals/ (Implementation Timeline):</b>
<ol style="list-style-type: none"> <li>1) Continue coordination with planning department to ensure the incorporation of post-construction requirements in the upcoming master plan. (ongoing until the Master Plan is finalized)</li> <li>2) Coordinate with ITAM to integrate appropriate post-construction runoff BMPs into training areas. Coordinate with Range Operations to integrate appropriate post-construction runoff BMPs into ranges.</li> <li>3) Continue to ensure that contract language is up to date to reflect current stormwater BMP requirements.</li> </ol>

**Table 12-5. BMP # 5D: Evaluate the Success of Post-Construction Runoff Controls.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.5.1.7
<b>BMP Description:</b> As part of the permit requirements, Fort Leonard Wood must evaluate the success of each MCM. The success of the Post-Construction Runoff Control Measure will be measured through the continued implementation of post-construction runoff controls and maintenance program insuring the BMP is functioning as designed to remove pollution and/or to promote natural hydrology conditions.
<b>Measurable Goals/ (Implementation Timeline):</b>
<ol style="list-style-type: none"> <li>1) Conduct an annual review of the Post Construction Run-off Control Program. Review should include an analysis of inspection procedures, inspection results, and training effectiveness. Summarize analysis to include findings, recommended corrective actions and opportunities for improvement.</li> </ol>

## 13 MCM 6 – Pollution Prevention/Good Housekeeping

### 13.1 MCM 6 General Overview and Objectives

As required by the MS4 Permit, the SWMP shall develop and implement an O&M program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. The Pollution Prevention/Good Housekeeping MCM addresses potential pollutants from streets, parking lots, open spaces, maintenance and storage yards, and other typical municipal operations.

### 13.2 MCM 6 Applicability

Municipal operations are conducted primarily by the Directorate of Public Works Base Maintenance Contractors and the Logistics Readiness Command (LRC) as described in MCM 3, however, pollution prevention and good housekeeping practices are appropriate for all target audiences, including residents, construction contractors, , and range control personnel, as discussed in MCM 1 and MCM 2.

### 13.3 MCM 6 Regulatory Requirements

Fort Leonard Wood’s MS4 Permit prescribes the requirements for the SWMP. This section discusses the regulatory requirements specific to the MCMs discussed in Section 4.2.6 of the MS4 Permit. These permit requirements are already being met through existing established programs but are supplemented with new requirements outlined in this SWMP. A reference to where each of these permit requirements are discussed is shown in Table 13-1 of this plan.

**Table 13-1. MCM 6 Permit Requirement References.**

Permit References	SWMP Citation
4.2.6.1 – <i>Permit requirement.</i> The permittee shall develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. As part of the SWMP, the pollution prevention/good housekeeping program shall include the following information, at a minimum:	13
4.2.6.1.1 – A list of all municipal operations that are impacted by this operation and maintenance program. The permittee shall also include a list of industrial facilities the permittee owns or operates that are subject to NPDES permits for discharges of stormwater associated with industrial activity that ultimately discharge to the permittee's MS4. The permittee shall include the permit number or a copy of the industrial application form for each facility;	13.5.1, BMP 6A, BMP 6B
4.2.6.1.2 – Maintenance BMPs, maintenance schedules, and long-term	BMP 6A, BMP 6B

**Table 13-1. MCM 6 Permit Requirement References.**

Permit References	SWMP Citation
inspection procedures for controls to reduce floatables and other pollutants to the permittee's regulated small MS4;	
4.2.6.1.3 – Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas the permittee operates;	13.5.1.3, BMP 6B
4.2.6.1.4 – Controls described in Sections 4.1.5 through 4.1.8 of this permit;	10.5.1.3, 10.5.1.5, 13.5.1, 13.5.2, BMP 6B
4.1.5 – For facilities under the control of the permittee good housekeeping practices shall be maintained to keep solid waste from entry into waters of the state to the maximum extent practicable;	13.5.1., BMP 6B
4.1.6 – All fueling facilities under the control of the permittee shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers, including spill prevention, control and counter measures;	13.5.1.2, 10.5.5
4.1.7 – Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that are transported, stored, or used for maintenance, cleaning or repair by the permittee shall be managed according to the provisions of RCRA and CERCLA;	13.5.1, BMP 6B
4.1.8 – All paint, solvents, petroleum products and petroleum waste products (except fuels) under the control of the permittee shall be stored so that these materials are not exposed to stormwater. Sufficient practices of spill prevention, control, and/or management shall be provided to prevent any spills of these pollutants from entering a water of the state. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall also prevent the contamination of groundwater;	13.5.1, 10.5.5
4.2.6.1.5 – Procedures for the proper disposal of waste removed from the permittee's MS4 and area of jurisdiction, including dredged material, accumulated sediments, floatables, and other debris;	13.5.1
4.2.6.1.6 – 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;	7.4, 12.5.3
4.2.6.1.7 – A government employee training program to prevent and reduce stormwater pollution from activities such as park and open	13.5.3, BMP 1A,

**Table 13-1. MCM 6 Permit Requirement References.**

Permit References	SWMP Citation
space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance. The permittee shall describe any existing, available materials the permittee plans to use such as those available from EPA, State or other organizations. The permittee shall describe how this training program will be coordinated with the outreach programs developed for the public information minimum measure and the illicit discharge minimum measure; and	
4.2.6.1.8 – How the permittee will evaluate the success of this minimum control measure.	BMP 6C

### **13.4 MCM 6 Policy and Enforcement**

There is no applicable policy or enforcement relating to pollution prevention/good housekeeping.

### **13.5 Pollution Prevention/Good Housekeeping Program**

Municipal operations, as it relates to water quality, are not achieved by one dedicated department or program at Fort Leonard Wood. Municipal operations are achieved by many programs, with the environmental staff orchestrating and reporting on activities base-wide. Fort Leonard Wood has several existing programs in place that aid in the achievement of MS4 Permit requirements. In addition to the municipal operations and maintenance activities, military inspections and controls, and training, are all working towards this common goal. These are discussed in the following sections.

#### **13.5.1 Supporting Environmental Programs**

Fort Leonard Wood is its own entity unlike a typical small MS4, and as such, is responsible for various programs that provide both direct and indirect assistance to the pollution prevention/good housekeeping efforts in support of the Stormwater Program as discussed in previous sections. These programs include various types of waste controls (solid, hazardous, and recyclable wastes), the DERP program, spill prevention and response procedures, non-MS4 stormwater permits, and operation and maintenance staff contributions. These sections discuss these supporting programs in the context of pollution prevention/good housekeeping.

Waste controls at Fort Leonard Wood include solid, hazardous, and recyclable wastes. A private contractor collects solid waste from Fort Leonard Wood and transfers it to an off-site facility for proper disposal. There are no operational landfills within Fort Leonard Wood’s MS4. A collection program in near-by Rolla and St. Robert is available for the disposal of household hazardous wastes.

Hazardous waste accumulation sites (also known as Satellite Accumulation Point (SAP) sites) have been established post-wide in accordance with the Resource Conservation and Recovery Act (RCRA), to properly store hazardous wastes and stormwater from protect pollutant runoff. Typical accumulation points may be within Conex boxes, flammable resistant storage cabinet, inside warehouses/maintenance areas, rifle bore patch collection containers, and/or brass collections buckets to minimize stormwater from coming in contact with known hazardous materials. SAP Site operators are trained on the hazards of improper disposal of waste and proper SAP site maintenance. Training is conducted upon appointment and annually thereafter.

The Fort Leonard Wood Recycling Program consists of the recycling of plastic, aluminum, tin cans, glass, cardboard, newspaper and white paper. Recycling bins are located in military, government, and business facilities on FLW as needed or deemed appropriate. Occupants of the facilities are required to bring the bins to the Recycling Center once they are full. Brush and stumps that are generated by FLW residents and Military Units are brought to the FLW compost site on, chipped and used on post as mulch and/or soil amendments. With the combination of these recycling programs, floatable waste have been reduced significantly from trash and yard waste, providing an overall improvement of water quality in Fort Leonard Woods waterways.

The Installation Restoration Program (IRP) manages closed landfills and clean-up sites at Fort Leonard Wood. Routine monitoring of the landfill cap for erosion and/or seepage is completed by trained personnel as a part of this program. Procedures within IRP are in place to rectify any problems noted. No active, CERCLA or RCRA sites are present within the boundaries of Fort Leonard Wood.

Fort Leonard Wood maintains a Spill Prevention and Response Plan (SPRP), in accordance with (IAW) the requirements of 40 CFR Part 112. This plan requires all operators of fueling facilities, above ground storage tanks and underground storage tanks to adhere to state and federal regulatory requirement in regards to the maintenance, handling and dispense of fuel and POLs. The establishment and implementation of this plan supports pollution prevention/good housekeeping by providing training and awareness for staff regarding preventing spills, structural control measures for potential spill materials and their containers, and response procedures for reacting to a spill. Spill kits have been placed where spills are likely to occur and site personnel have been trained on the use of these kits, providing a quick response to control the spill and possible impacts to the environment. Standard operating procedures are in place for the containment and collection of spilled materials and the proper disposal of the items and the contents utilized from the spill kits. Drip pans are placed under vehicles with known leaks to contain and minimize pollutants from entering the storm drain system.

Adherences to other non-MS4 stormwater permits contribute to MS4 Permit compliance. In addition to the MS4 Permit, Fort Leonard Wood is regulated by land disturbance permits as discussed in MCM 4, and by the Stormwater Industrial Operating Permit, MO-0117251. This

permit regulates Fort Leonard Wood industrial activities using a watershed approach. Specific monitoring requirements are associated with this permit and are carried out by Fort Leonard Wood. This permit is available publicly on both the MDNR and the Fort Leonard Wood websites. MDNR has established permit exceedance limits at 13 monitoring points that monitor and regulate all the industrial activities. The industrial operating permit requires development and adherence to a SWPPP, which is discussed in Section 11 of this SWMP.

MS4 Permit section 4.2.6.1.1 requires Fort Leonard Wood to include a list of facilities that are subject to NPDES permits for discharges of stormwater associated with industrial activity that ultimately discharge to the FLW MS4. The four permitted facilities that meet this requirement are outlined in Table 13-2 of this plan. Industrial facilities will be reviewed on an annual basis and the Table will be updated as deemed necessary and applicable.

**Table 13-2. Industrial Facilities**

Facility Name	Permit #	Outfall #
Waste Water Treatment Plant	MO-0029742, Waste Water Treatment Plan Permit	001
Bulk Fuel Storage; DRMO	MO-0117251, Industrial Permit	004
Water Treatment Plant Setting Basin	MO-0058068 , Water Treatment Plant Permit	001
Christopher “Kit” Bond Army Aviation Support Facility (AASF)	MO-RO80F034, De-icing Permit	001, 002

In addition to all the environmental staff and programs, Fort Leonard Wood’s operations and maintenance staff also contributes to stormwater compliance. The Directorate of Public Works (DPW) performs operations and maintenance on a military installation, as it relates to water quality. MS4 Permit paragraph 4.2.6.1.1 requires Fort Leonard Wood to have a list of all municipal operations that are impacted by the Operation and Maintenance Program. This list is included on the Fort Leonard Wood Directorate of Public Works Master Schedule. The Master Schedule is a living document and subject to change. This document is located on the Fort Leonard Wood T: Drive and is included as an attachment to the Fort Leonard Wood MS4

Pollution Prevention/Good Housekeeping Plan. The Pollution Prevention/Good Housekeeping Plan will be included as an attachment to the Annual Report that is submitted to MDNR July of every reporting year.

DPW plans for, constructs, maintains, and repairs military property including buildings, roads, utilities, and grounds. DPW provides environmental and natural resource management services, performs preventive maintenance management, master planning, utility operations (including drinking water, wastewater and storm water), municipal services (custodial, solid waste, refuse removal, snow removal, and ground maintenance), and pest management. BMPs have been put in place to ensure that municipal operations are conducted in a manner that will minimize pollutant runoff to the maximum extent practicable,

These organizations are governed by extensive rules and regulations, which are committed to sustainability. This team conducts base-wide maintenance of the facilities with scheduled maintenance procedures and non-scheduled items. The scheduled inspections and services are documented on the Fort Leonard Wood Directorate of Public Works Master Schedule. The Master Schedule is a task list that includes best management practices for municipal operations. The municipal operations outlined in the Master Schedule include, but are not limited to, oil water separator inspections and service, snow removal, maintenance of salt storage areas, and street sweeping. Non-scheduled items are received as work orders, which are submitted by facility persons of contact as deemed necessary. Work orders can be submitted for a number of reasons to include oil water separator deficiencies, facility repair, storm drain repairs, etc.

Mechanisms are in place for maintenance and cleaning of surface water ditches, stormwater inlets, and culverts. Clean sediment may be reused as fill, whereas accumulated floatables and sediment are collected and transported to a municipal facility as solid waste. This team is also in charge of routine street sweeping, snow removal, and storage of salt. Fort Leonard Wood salt storage is maintained in a manner preventing exposure to precipitation.

The Logistics Readiness Center (LRC), formally known as the Directorate of Logistics (DOL) is primarily responsible for vehicle/fleet maintenance and transportation. The FLW fleet is a major aspect of the FLW mission and there is significant risk of pollutant runoff without proper pollution prevention/good housekeeping BMPs in place. The FLW Environmental Compliance Branch conducts reviews/updates of Facility's Stormwater Pollution Prevention Plan (SWPPP) and site assistance visits of motor pools and transportation storage areas ensure that BMPs are in place.

### **13.5.2 Inspections and Other Military Controls**

As discussed in MCM 3, Fort Leonard Wood is different from other municipalities, due to the Army regulations (ARs), policies, and oversight programs by which the post is bound. The Army is committed to environmental stewardship and minimizing environmental compliance risk. The Army has numerous established inspection and oversight programs that contribute to

the overall environmental compliance at Fort Leonard Wood. A few of these programs are listed below:

Environmental Performance Assessment Systems, (EPAS) program performs external and internal multi-media assessments that assist Army commanders in attaining, sustaining, and monitoring compliance with Federal, State, and local environmental laws and regulations, as well as DOD and Army compliance and performance requirements.

Organizational Inspection Program, (OIP): The Organizational Inspection Program is a comprehensive, written plan that addresses all inspections and audits conducted by the command and its subordinate elements, including the mandatory environmental inspections. The control measure helps ensure that proper procedures are being adhered to and that deficiencies are corrected.

Environmental Management System (EMS): The EMS is the part of the overall management system that integrates environmental concerns and issues in the organizations management processes. EMS addresses organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining environmental policy. Due to the Army's commitment to implementation of EMS at all installations, installations are subject to additional second party inspections (performed by Army employees that do not work at FLW), which provide an additional layer of controls.

Environmental Quality Control Committee (EQCC): Army Regulation 200-1, Army Environmental Protection and Enhancement, requires that installations establish an EQCC to advise the installation commander on environmental priorities, policies, strategies, and programs.

### **13.5.3 Training**

As with any military installation, training and defined procedures are essential. Personnel involved in the above programs receive training from several sources as a requirement of their job. Individual programs conduct many training opportunities throughout the year, which are tracked through the individual programs. Many are required training courses whereas others are voluntary. These training and education programs are continually updated to reflect the need of the post. The stormwater program is committed to support these training needs in an effort to educate personnel in ways to support these MCMs and help improve water quality at Fort Leonard Wood. As stated in MCM 1, target audiences, their target pollutant sources, and the particular education and outreach strategy are outlined in TEO Plans for each target audience.

### 13.6 MCM 6 Future Permit Cycle Approach (BMPs)

Compliance is partially achieved through existing program resources and accomplishments. Fort Leonard Wood is aware of areas that need to meet the full intent of the permit. Areas of improvement are planned through BMPs; goals that will be completed over the permit cycle are listed in Tables 13-2, 13-3 and 13-4 below:

**Table 13-3. BMP # 6A: Industrial Facilities.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.3.1.6, 4.2.6.1.1, 4.2.6.1.2
<b>BMP Description:</b> Maintain a list of Industrial Facilities that discharge into Fort Leonard Wood MS4 and determine what best management practices are in place to mitigate pollutant runoff.
<b>Measurable Goals/ (Implementation Timeline):</b> 1) Conduct an annual review of Industrial facilities that discharge into Fort Leonard Wood’s MS4; update inventory as needed. Coordinate with the operators of Industrial facilities that discharge into Fort Leonard Wood’s MS4 to ensure that BMPs are put in place and maintained as required.

**Table 13-4. BMP # 6B: Municipal Operations and Maintenance.**

<b>Permit Section(s) Compliance Reference:</b> 4.1.5, 4.1.7, 4.2.3.1.6, 4.2.6.1.2, 4.2.6.1.3, 4.2.6.1.4
<b>BMP Description:</b> Verification that O&M procedures are in place and that the prescribed schedule developed in 6A is functioning to minimize pollution from municipal and industrial operations that discharge into Fort Leonard Wood MS4.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Conduct annual interviews/program reviews with Program Managers of supporting environmental programs to ensure that programs are in place and comply with MS4 permitted requirements.</li> <li>2) Conduct and document annual Pollution Prevention/Good Housekeeping training for Operations and Maintenance Personnel.</li> <li>3) Conduct Pollution Prevention/Good Housekeeping training for target audiences in accordance with the guidelines stipulated in BMP 1A, Measurable Goal 1.</li> <li>4) Conduct site assistance visits at facilities to ensure that pollution prevention/good housekeeping techniques are in place.</li> </ol>

**Table 13-5. BMP # 6C: Evaluate the Success of Pollution Prevention/Good Housekeeping.**

<b>Permit Section(s) Compliance Reference:</b> 4.2.6.1.8
<b>BMP Description:</b> Fort Leonard Wood must evaluate the success of each MCM as part of the permit requirements. The success of the Pollution Prevention/Good Housekeeping MCM will be measured by the implementation of the BMPs listed above, and through observable changes in the maintenance requests made on Post.
<b>Measurable Goals/ (Implementation Timeline):</b> <ol style="list-style-type: none"> <li>1) Conduct an annual evaluation of the Pollution Prevention/Good Housekeeping Program to include the Operations and Maintenance Program, training programs, inspection program and industrial permit programs. Summarize findings to include corrective actions for deficiencies and opportunities for continual improvement.</li> </ol>

## **14 Reporting and Record Requirements**

### **14.1 General Overview and Objectives**

An important part of any municipal stormwater program is to document and track information on activities undertaken to comply with the permit requirements. Several sections of the MS4 permit contain requirements pertaining to the recordkeeping and reporting requirements of Fort Leonard Wood. Each of the minimum measures should integrate tracking. As part of this recordkeeping process, an annual report must be submitted to the state each year that summarizes the effectiveness of the stormwater program and MS4 compliance with the permit. Not all goals need submission to the state but should be available to the state or concerned party that requests this information. The annual report also provides an opportunity for the post to submit proposed changes to the plan's BMPs and goals for the following reporting cycle. Fort Leonard Wood submits an annual report utilizing the state's form with descriptions of goals achieved and a self-assessment of the compliance with the MS4 Permit by July 28th of each year.

As part of this requirement, Fort Leonard Wood must develop and maintain a tracking system to monitor the progress of its various programs to document compliance with the permit. The tracking system should allow the stormwater manager to monitor each program's compliance, ensuring the overall compliance of the permit. An adequate tracking system will aid in the simplification of generating reports about the program progress, not only to the state but also to the post command for future planning and funding.

Additional requirements for sampling are presented for MS4s that discharge to a waterway that has an accepted total maximum daily load (TMDL) of pollutants. This requirement is not applicable to Fort Leonard Wood since they do not discharge to a TMDL waterway.

### **14.2 Previous Recordkeeping**

The stormwater program has been successfully developing annual permit summary reports utilizing the state's annual report form. These reports include a self-assessment of the permits compliance addressing each of the six (6) MCMs, how they have been met, or how Fort Leonard Wood is working through difficulties that might have been encountered. With the exception of this updated SWMP, there have not been proposed changes to Fort Leonard Wood's SWMP. Several of the MCMs have goals that include recording and tracking information that is maintained in the stormwater office. All records are maintained for at least 5 years. These records are available during site inspections or through a written request.

Fort Leonard Wood is operating as a single entity and does not rely on other adjoining municipalities to meet its MS4 requirements or obligations.

Below is a list of what records are retained for each of the MCMs.

#### **14.2.1 Public Education and Outreach on Stormwater Impacts**

The annual report documented the following information relating to public education and outreach. This information is retained and accessible through Fort Leonard Wood's stormwater manager:

- A description of the methods, frequency, type, and target audience of stormwater outreach performed during the permit term
- A copy or representation of public outreach materials provided to the target audience(s)
- Educational materials, lesson plans, or presentations provided to school age students and other target audience(s) regarding stormwater runoff and water quality issues
- Estimated number of people expected to be reached by the program over each year of the permit term
- The name or title of the person(s) responsible for coordination and implementation of the stormwater public education and outreach program

#### **14.2.2 Public Involvement/Participation**

The annual report documented the following information relating to public involvement/participation. Records are retained and accessible through Fort Leonard Wood's stormwater manager:

- Documentation of events or other activities to clean up MS4 receiving waters
- Documentation of volunteer activities conducted to help actively engage residents and personnel at Fort Leonard Wood in understanding water resources and how their activities can affect water quality
- The name or title of the person(s) responsible for coordination and implementation of the stormwater public education and outreach program

#### **14.2.3 Illicit Discharge Detection and Elimination**

The annual report documented the following information relating to IDDE. Records are retained and accessible through Fort Leonard Wood's stormwater manager:

- A description of the program used to detect and eliminate illicit discharges into the MS4s, including procedures for detection, identification of sources, and removal of non-stormwater discharges from the storm sewer system
- A description of the location and method of dry weather screening performed
- A description of illicit discharges located and all actions taken to eliminate sources of illicit discharges
- A description of training materials used and the frequency at which training was provided to the target audience(s) on how to respond to reports of illicit discharges

- A copy or excerpt from the information management system used to track illicit discharges
- A description of non-stormwater discharges evaluated as potentially significant contributors of pollutants to the MS4 and any local controls placed on these discharges
- A description of incidental non-stormwater discharges and controls placed on these discharges
- An inventory of industrial facilities that discharge into the MS4. This inventory includes the location of the activity, the location of its outfall and corresponding receiving water, and the NPDES permit status for its stormwater discharge

#### **14.2.4 Construction Site Stormwater Runoff Control**

The annual report documented the following information relating to construction site stormwater runoff control. Records are retained and accessible through Fort Leonard Wood's stormwater manager:

- A description of "regulated construction activities" which occurred at Fort Leonard Wood during the term of this permit
- A description or citation of the established ordinance or other regulatory mechanism used to require erosion and sediment controls
- A description of the sanctions and enforcement mechanisms Fort Leonard Wood uses to ensure that all "regulated construction activities" are in compliance with the terms of the Construction General Permit
- A description of the procedures for site plan review, including the review of preconstruction site plans, which incorporate consideration of potential water quality impacts and applicable contract language
- A description of the procedures for receipt and consideration of information submitted by the public
- A description of the procedures for site inspection, including how sites will be prioritized for inspection, including documentation of the frequency of site inspections and methods for prioritizing site inspections
- The name or title of the person(s) responsible for coordination and implementation of the construction site runoff control program

#### **14.2.5 Post-Construction Stormwater Management**

The annual report documented the following information relating to construction site stormwater runoff control. Records are retained and accessible through Fort Leonard Wood's stormwater manager:

- A description of the program to ensure that the pre-development hydrology is met for new development and redevelopment projects as required and the mechanism used to review the adequacy of post-construction BMPs
- A description of the ordinance or other regulatory ordinance used to require the

installation and maintenance of post-construction stormwater controls

- A description of the program, which ensures the long-term operation, and maintenance of post-construction BMPs, including an excerpt from any data management system that includes maintenance requirements and schedules for post-construction BMPs installed during the year
- A description of the process used to ensure that all DPW contracts initiated after the effective date of the permit contain language, which requires the installation of post-construction stormwater controls and an excerpt of applicable contract language
- The name or title of the person(s) responsible for coordination and implementation of the post-construction stormwater management program

#### **14.2.6 Pollution Prevention/Good Housekeeping**

The annual report documented the following information relating to pollution prevention/good housekeeping for municipal operations:

- A description of the O&M program intended to prevent or reduce pollutant runoff from municipal operations including a list of each of the activities evaluated under this program and a description of the controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, snow disposal areas, and salt/sand storage locations
- A description of the contents and frequency of the training program for municipal personnel and a list of the personnel or positions trained during the term of the permit
- A description of the evaluation performed on the street cleaning operations, catch basin cleaning operations, and street sanding/salt practices and any measures taken as a result of the evaluation to minimize negative impacts to water quality

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# Appendix A

## Stormwater Map



