APPENDIX C

ALABAMA NONPOINT SOURCE MANAGEMENT PROGRAM

URBAN DEVELOPMENT AND CONSTRUCTION

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TABLE OF CONTENTS

URBAN DEVELOPMENT AND CONSTRUCTION NONPOINT SOURCE POLLUTION

Section C.1 Introduction

a. Overview

The 2012 U.S. Census estimates places Alabama's population at over 4.8 M, an increase from 4.47 M in 2002. The cities of Birmingham, Huntsville, Montgomery, Mobile, and their surrounding suburbs contain approximately half of Alabama's population. In terms of land area and land uses, Alabama is considered by many to be a rural state. Over 95% of the state's 51,609 sq. miles are rural and land uses rank high in agricultural production (e.g., poultry, swine, livestock, forest, and field and row crops). If based upon population density, Alabama may also be regarded as an urbanized state (59% of citizens live in urban areas versus 41% residing in rural areas). Increases in urban growth in the state's sixty-seven (67) counties continue to be heavily influenced by economic drivers and employment opportunities relative to government administration, institutions of higher learning, recreation, agriculture, and commercial, industrial, manufacturing and transportation (e.g. wood and paper, metals, chemicals, mining, technology, healthcare, aerospace, automobile and other commerce). Urbanized areas in Alabama are generally located along a major waterway or on the coast. The Alabama Great Seal (**Fig A.1.1**) recognizes the significance of the state's water resources by incorporation of the major river drainage systems in its design.

Figure A.1.1
Alabama Great Seal

Although urbanized and developing fringe areas (e.g. core areas with ≥1,000 people/sq. mile and characterized as ≥30% asphalt, concrete and buildings) cover relatively small areas of the total land surface of Alabama; however, the impacts of urban development and construction activities on water quality protection and restoration can be significant. In addition, increasing urban development and population growth can present challenging environmental and public health and safety concerns and issues. As population density increases (**Fig A.1.2**), corresponding increases in pollution from anthropogenic (human-caused) activities are likely to emerge. Stormwater runoff from urbanized areas can present significant environmental and economic impacts on the state level and contribute to serious impacts to rural cultural, social, and historical "sense-of-place." Rural/urban interface conflicts are usually associated with pre-development land uses (e.g. conventional rural practices relative to animal husbandry, pesticide use/drift, animal manure disposal, forest impacts and prescribed burning, etc.). As urban development and sprawl increases (e.g., housing, roadways, shopping malls, acres of parking lots, etc.), tensions over community identity, lifestyle preferences, and public works and services tend to intensify (e.g. traffic and congestion, noise, manufacturing / industry, revenue enhancement, infrastructure, ordinances, smog, litter and illegal dumps; loss of natural resources, open space; biodiversity and fish and wildlife habitat, recreation, etc.).

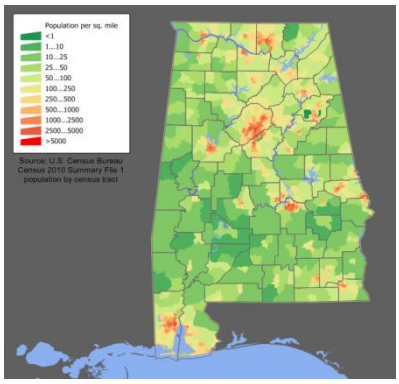

Figure A.1.2
Population Densities in Alabama

Urban sprawl (**Figure A.1.3**) can appreciably threaten and degrade water quality. Planning and implementation of the states' nonpoint source (NPS) management program to mitigate the causes of urban stormwater runoff is not a luxury - it is a community-based environmental, economic, social, and quality-of-life necessity. Continued public and private sector cooperation, communication, coordination and collaboration are essential. The AL NPS Management Program endorses voluntary pollution mitigation activities and partnerships as primary nonpoint source stormwater runoff pollution control strategies; however, regulatory "back-up" authorities and approaches are also considered essential holistic management program components. Addressing site-specific, community-level or other placed-based surface water and groundwater issues in Alabama may require a specific state legislative authority. Each of Alabama's 67 counties has their own elected legislative branch with executive authority (e.g., county commissions); however, all but seven counties (Jefferson, Lee, Mobile, Madison, Montgomery, Shelby, and Tuscaloosa) have little to no local home rule statutory (autonomous adoption, alteration, or repeal flexibilities) authority The Alabama Constitution (1901) requires most counties to seek state legislator and statewide voter approval to address relatively ordinary locally-based matters (e.g. waste collection and disposal, dead farm animals,

public nuisance and aesthetic issues, mosquito control). As of 2012, about 90 percent of the Alabama Constitution's length comes from its 856 amendments. About 75 percent of those amendments cover a single county or city; oftentimes resulting in the convoluted application of NPS pollution resolutions, inefficient opportunities to build and sustain local community character, and hampering other local NPS issue-based decision-making and fiscal planning based efforts upon inclusive and local mutual interests, cooperation and partnerships. In addition, water *quantity* is administered as a distinct lead state-agency programmatic issue and is therefore not generally presented herein as a primary NPS water *quality* management discussion topic.

Urban development and construction is generally regarded by EPA as a major "Category" nonpoint source of pollution. Nonpoint source pollution does not originate from a distinctly-identifiable "point" source (e.g., a regulated municipal or industrial "end-of-pipe" discharge), and when transported by stormwater runoff, some pollutants are not always visible to the naked eye. Even water that appears to be clean may contain dissolved or attached particles, substances, and chemicals that can threaten or cause major environmental, economic and public health impacts. Urban rainfall runoff can alter the physical, chemical, and biological characteristics of receiving waters, degrade aquatic habitat; make coastal and inland beaches and rivers and reservoirs unsightly or unsafe to human health, and impair beneficial uses (e.g. water recreation, swimming, fishing, tourism, economic vitality) and fosters the loss of personal and community social and economic benefits, connections and values. Urban stormwater runoff pollutants and stressors can present significant and complex water quality protection and restoration challenges to Alabama's rivers, streams, wetlands, lakes, and estuarine watersheds (e.g., increase municipal and industrial drinking water resource protection and treatment costs; contaminate wells and aquifers; increase flooding, degrade aquatic habitat, etc). With increasingly limited availability of human and financial capital, adequate resources needed to identify and properly mitigate many and varied NPS causes and stressors, protect and restore water quality, and meet state water quality standards is problematic.

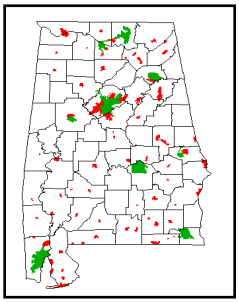

Figure A.1.3: Highly urban (green) and lesser urbanized (red)

When rain falls on urban areas and construction sites, it either infiltrates into the ground, is captured where it eventually transpires or evaporates, or flows down hill as stormwater runoff on its journey to the Gulf of Mexico. A cooperative and coordinated NPS management approach is required to reduce polluted stormwater runoff from threatening and degrading waters of the state. Management decisions require the participation and resources of a multitude of federal and state agencies, officials, planners, developers, organizations, and private citizens. Technology transfer, technical assistance, education and outreach, and resources leveraging are also integral components and iterative voluntary implementation efforts should be facilitated whenever and wherever practicable.

The AL NPS Management Program recognizes that there are often site-specific and project-level constraints; funding and manpower issues, as well as state agency, regional, and national variability relative to the design, selection, and maintenance of appropriate (e.g. technical sound, environmentally protective, and economically sensible) urban best management practices (BMPs). Nonpoint source BMP decisions should be made at the local level and incorporate a voluntary, citizen-led, watershed-based planning and implementation approach. Local "buy-in" is essential for BMP effectiveness and statewide NPS programmatic implementation success. In order to best protect and restore water resources and expeditiously meet state water quality standards; urban environmental protection and sustainability plans, thoughts, beliefs, values, and ideas should be incorporated into a holistic watershed-based management plan. Sustained public and private sector communication, coordination, collaboration and cooperation are essential during all phases of BMP planning and implementation. The AL NPS Management Program highly recommends that urban development and construction BMPs and other NPS pollution control activities be addressed in a holistic watershed-based management plan prior to project implementation.

b. Water Quality Impacts

Nonpoint source pollution from urban development and construction activities can impair water quality through direct runoff to surface waters can alter stream flow rate, concentration, direction, and velocity. Impacts to water surface water and groundwater quality and hydrology can occur any time natural or anthropogenic (human-caused) activities disturb natural watershed topography, soils, and natural land covers. Rainfall runoff picks up NPS pollutants such as pathogens, sediment, nitrogen and phosphorus, chemicals, oil and grease, and trash and debris, and transports them directly to receiving waters. Storm drain systems in Alabama do not treat water that flows through them, nor are piping systems tied into municipal wastewater treatment facilities. Pollutants picked by

rainfall runoff can directly flow untreated and unrestricted into waterbodies the public uses for swimming, fishing, and drinking water, contributing to public health and safety concerns. Implementation of effective best management practices to prevent and control the amount, volume, velocity, and pollutant composition of stormwater runoff is critically important.

Sediment, nutrients, and pathogens are primary components of urban stormwater pollution runoff. Erosion and sedimentation comprise the largest portion of NPS pollutant loadings from construction activities. Nutrient and pathogen sources include fertilizers, leaves, grass clippings, pet wastes, litter and solid materials, and onsite septage treatment and disposal systems. Other causes may include roof, driveway and parking lot sealants, and oil, grease, gasoline and other fluids from automobiles, parking lots, and roadways. In addition, increases in impervious surfaces (e.g. rooftops; paved roads, parking lots and sidewalks, etc.), land grading, and hard-scaped drainage conveyances can contribute to alterations in natural hydrologic patterns and processes and may result in diminished ground infiltrative capacity, degraded streambanks and aquatic habitat, and potential flooding problems.

Alabama's 2010 Water Quality Inventory Report indicates that sediment, pathogens, organic enrichment/dissolved oxygen depletion, and nutrients are the probable leading causes of impaired water quality.

➢ **Principal Impairments to *River and Streams***	**Miles**
• Urban runoff and storm sewers	614.6
• Site clearance/Land development/Re-development	297
• Residential districts	56.6
• Highways, roads, bridges, infrastructure	56.4
• Wet-weather discharges	4.6

➢ **Principal Threats to *Lakes and Reservoirs***	**Acres**
• Urban runoff/storm sewers	22,499.2
• Spills from trucks and trains	3412.5

➢ **Impairments to *Bay and Estuaries***	**Acres** (generally linked to pathogens)
• Urban runoff/storm sewers	376.3
• On-site/decentralized treatment systems	138.8

According to the state's CWA Section 303(d) List (2010), the primary NPS pollutant causes and number of listings include:

➢ **Pollutant**	**No. of Listings**
• Sediment	63
• Organic Enrichment/Dissolved Oxygen Depletion	59
• Pathogens	35
• Nutrients	29

Most water quality impacts from urban development and construction activities are preventable or relatively easy to minimize. Nonpoint source problems in Alabama are generally contributable to:

- Non-existent, insufficient, ineffective, or inadequately installed or maintained BMPs
- Limited citizen knowledge and awareness relative to the characterization and mitigation of the causes of NPS pollution and associated impacts on watershed health and water quality protection and restoration
- Inadequate pre-project environmental protection planning
- Deficient project staging to meet changing site, weather, social, and economic conditions
- Limited BMP inspections and compliance monitoring

c. Water Quality Protection and Restoration

The variable, convoluted and diffuse causes of NPS pollution; a diverse complex of corporate and individual interests and actions, and often inadequate and inconsistent investments of financial and human capital to address it, continues to influence water quality protection and restoration efforts in Alabama. It will require several years sustained stakeholder support, funding, and other resources to adequately address and achieve all AL NPS Management Program goals and objectives and meet state water quality standards using a voluntary, regulatory, or a

combination of these approaches. The AL NPS Management Program will continue to promote locally-facilitated planning and implementation of NPS pollution measures and seek to support a management framework that targets voluntary incentives, practices and processes supported by Federal and State regulatory back-up authorities. This Appendix suggests strategies to identify, prioritize, and implement NPS best management measures and practices to protect surface waters and ground waters; but in particular, restore NPS impaired waters. It is highly suggested that water quality protection and restoration decisions be based on early and sustained input received from inclusive and diverse audiences. Implementation of measures and practices should be prioritized, site-specific, geographically-defined, driven by clearly-defined environmental and public health goal, objectives, strong science and data, and coordinated using defined processes. Indicators and measures of success should consider stakeholder interests, human and financial resource availability, BMP effectiveness monitoring, and NPS programmatic and project-specific transparency and accountability to the public.

Urban and construction stormwater runoff controls presented herein are designed to effectively, efficiently, and expeditiously achieve statewide NPS programmatic goals and objectives. Partners continue to work together to coordinate and leverage resources to restore designated uses of waters where elevated levels of NPS pollutants have been documented (e.g. Section 303(d) listed waters) using science-based water quality monitoring and assessment protocols. It is highly recommended that partners cooperatively dedicate available NPS management funds and resources to proactively protect threatened and unimpaired waterbodies (i.e., Outstanding Alabama Waters, Outstanding National Resource Waters, and Treasured Alabama Lakes) to prevent them from becoming impaired. In addition, the environmental and economic benefits of point source and NPS water quality pollutant credit "trading" should continue to be considered as a component of the state's holistic NPS pollution management approach. The AL NPS Management Program and Section 319 grant program will continue to particularly support community-based NPS pollution management, pollutant load reductions, and water quality protection and restoration efforts where equitable resources have not been historically targeted (i.e., environmental justice) to underserved low income or under represented racial / ethnic minorities to maximize local urban water resource management benefits.

The state will continue to address urban development and construction stormwater runoff issues by leveraging federal, state and local resources, supporting networks of community-based actions, and instituting regulatory and non-regulatory water quality protection and restoration programs. A complementary voluntary and regulatory approach will continue to be instituted to align national, regional, and state NPS programs and priorities with local community-based actions. The AL NPS Management Program and Section 319 grant funds continue to help the state meet water quality standards and ensure beneficial uses of water resources by:

- Strategically focusing a mix of NPS funds and resources on specific water quality based NPS programmatic goals and objectives so that impaired waters meet state water quality standards and unimpaired or threatened state waters continue to be protected
- Clearly articulating project goals and developing NPS management plans to advance those goals
- Reflecting a balance between statewide planning and local project implementation to deliver measurable water quality protection and restoration results
- Leveraging resources to align and set priorities that make the best use of available resources to control NPS pollution
- Tracking and reporting results to demonstrate incremental progress and success outcomes that achieve priority NPS pollutant load reductions and meet state water quality standards and beneficial uses

This Appendix provides environmentally-protective and economically-sensible means to mitigate nonpoint sources of pollution using a targeted, flexible, and iterative BMP planning and implementation approach. The ***Strategies*** and ***Action Items*** presented in Attachment 1 recognizes that intertwined and sometimes contentious relationships exist among various sectors of society and conflicts relevant to water quality protection and urban population and economic growth do emerge. It is also acknowledged that reasonable and mutually-beneficial NPS management programmatic solutions are best achievable through sustained public and private sector partner communication, collaboration, coordination, and cooperative; and effective integration and leveraging of a wide array of programs and their resources to support education and outreach, research, training, and technology transfer and technical assistance.

d. Water Quality Monitoring

Water quality monitoring and assessments are crucial to demonstrating and documenting urban and construction BMP implementation effectiveness. The Alabama Department of Environmental Management (ADEM) continues to use its long-established 5-year rotational river basin monitoring and assessment approach to ascertain NPS pollution impacts to surface waters and groundwaters of the state. The ADEM integrated monitoring strategy is scientifically designed to deliver water quality data needed to identify issues and problems and prioritize stormwater runoff management opportunities needed to protect and restore water quality. The strategy provides definitive quality assured/quality controlled and fact-based data and information to both the public and private sectors based upon tangible watershed health and water quality measures and indicators to substantiate or repudiate perceived water quality and human health impairments, conditions, or threats.

Water quality data is reported by ADEM biennially in the CWA Section 305(b) Integrated Report to Congress and is also used to update the ADEM compiled CWA Section (303) d List of Impaired Waters, as applicable. Each major river basin monitoring iteration uses standardized field collection and laboratory analyses methods approved by EPA to gather unbiased estimates of the condition of the state's rivers and streams, lakes, wetlands, and coastal waters. This approach provides scientifically-valid water quality data to help evaluate the:

- Extent of state waters that support healthy biological, physical, and chemical aquatic habitat conditions; and/or recreational, drinking water, and fish consumption conditions
- Investments of limited resources to protect and restore water quality and natural resources
- Status of whether state waters are healthy or are incrementally achieving state water quality standards
- Trends or changes in water quality over time including "water quality limited segments" under Section 303(d)
- Scope and scale of NPS impacts on watersheds and surface water and groundwater quality

As additional water quality data and information is collected and evaluated, intertwined relationships relative to human activities and urban environment impacts continue to be better understood. The collection of reliable water quality data and heightened citizen environmental knowledge and awareness are critical to NPS decision-making processes (e.g. identification, prioritization, and targeting of human resources and financial capital to address rainfall runoff pollution problems). Water quality data and information may be collected concurrently or independently of Section 319 grant-funded projects to help the state evaluate the effectiveness of BMP implementation associated with Phase II municipal separate storm sewer system (MS4) permitted communities.

The Section 319 grant program continues to sustain ADEM efforts to collect and analyze urban development and construction water quality data. The information is evaluated and used to document the causes of NPS pollution, assess pollutant load reduction, leverage and target resources to mitigate problems, and support AL NPS Management Program implementation efficiencies and accountability, including but not limited to the following:

- Protect and restore urban waters impaired by a nonpoint source pollutant, mixed pollutant sources, concentrations, and waters for which TMDLs have been developed
- Bring together technical experts, program managers, policy makers, community leaders, and citizens at the federal, state, and local levels to leverage and integrate resources and prevent duplication of efforts
- Present to both the public and private sector audiences at workshops/conferences to enhance NPS knowledge and awareness relative to water quality, public and aquatic health protection, BMP implementation and maintenance, and watershed management
- Fill in data gaps, support research and technology, and advance monitoring quality assurance/control protocols
- Provide information to public and private entities to evaluate and utilize relative to water quality protection and restoration and personal and community-based social and economic needs, character, and context and community resiliency and sustainability.

Given that Alabama does not have a dedicated source of sustainable funding to manage NPS pollution, impaired waters of the state cannot realistically be expected to be expeditiously restored. The AL NPS Management Program continues to emphasize the establishment of sustained, inclusive partnerships to deliver careful and cooperative planning, prioritization, and implementation decisions and strategies. To achieve the best bang for the nonpoint source mitigation buck, urban development and construction pollution runoff mitigation scenarios will continue to

be designed to leverage and integrate all available resources, strategically focus on improving water quality, set priorities and clearly articulate goals and objectives, and track progress and success. Water quality monitoring and assessments conducted by ADEM will continue to be coordinated with the public and private sector and target:

- Waters with unique, valuable, or threatened species or critical aquatic habitats and species
- Surface waters and groundwaters that serve as drinking water supply or require continued assessment
- High quality waters and resources of the state
- Waters near geographic areas where rapid land use development is occurring
- Waters where data trends indicate increasing water quality degradation
- Effectiveness and maintenance of BMPs
- Sites contributing high NPS pollution loads to downstream waters.

Section C.2 Urban Development and Construction Nonpoint Source Pollutants

a. Overview

Unlike pollution from "point sources" such as industrial and sewage treatment facilities, NPS pollution can originate from many and varied dispersed sources. Stormwater runoff, also known as wet-weather flows or "pointless pollution" is a significant contributor of impaired water quality to waters of the state. It is generally associated with pollutants on the surface of the ground that are picked up by precipitate (rainfall, snow) runoff drainage and seepage and transported to receiving waters; although atmospheric deposition can also contribute to water quality impairment. Stormwater runoff from paved streets, parking lots, rooftops, driveways, construction and industrial sites, and lawns can pick up trash and debris, fertilizers, soil particles, chemicals, pathogens, pesticides, oil and grease, and other pollutants and transport them to rivers, lakes, and streams or to groundwaters. According to EPAs Urban Nonpoint Source Fact Sheet (EPA 841-F-03-003), a typical city block of impervious surfaces (pavement and rooftops) can generate more than 5 times more runoff than a woodland area of the same size. As little as 10 percent impervious cover in a watershed can result in stream degradation. Increased impervious surfaces prevent rainwater from soaking into the ground which in turn may lead to increased amounts and velocity of rainwater flowing to streams and rivers. This increased volume and speed of water can erode stream banks, increase stream turbidity and water temperature, increase litter and trash deposition, and adversely impair affect aquatic organism survival and habitats, cause flooding, or result in other environmental, economic and human health problems. In addition, drinking water supplies can be diminished in many areas of Alabama that rely on rainwater soaking into the ground to replenish source water aquifers. The loss of trees and shading due to development can result in changes in stream water temperature. Many aquatic plant and animals are sensitive to changes in water temperature.

Inadequate or improper selection, implementation and maintenance of urban and construction BMPs may negate NPS treatment expectations for success and may even accelerate impairments to surface waters and groundwaters. Identifying with certainty and mitigating a particular NPS pollutant in an urbanized watershed with limited resources can be a relatively intensive, expensive and time consuming endeavor. In most instances, it is more efficient and effectual to implement a "train" of BMPs to treat multiple nonpoint sources concurrently and holistically. This approach often helps to mimic or restore natural drainage patterns to near pre-development conditions and can efficiently, effectively and expeditiously reduce NPS pollutants in rainfall runoff and water quality impairments (i.e., reduce the runoff flow volume and velocity and you reduce pollutant runoff problems). The following topics are brief summations of several common causes of NPS pollution, where it comes from, how it can harm aquatic life and human health, and suggests steps that entities can take to reduce NPS pollutant loadings and protect and restore water quality while ensuring economic sustainability and competitiveness.

b. Nutrients

Excessive nutrient enrichment of waters of the state is usually associated with excess amounts of Nitrogen (N) and Phosphorus (P). Nutrient enriched waters can create foul tastes and odors in drinking water; kill fish, shellfish and other aquatic life by producing toxins and depleting dissolved oxygen, and restrict other quality of life benefits such as recreational opportunities and aesthetic qualities. Nonpoint sources of nitrogen can enter surface waters and groundwaters from land applications of chemical fertilizers and animal wastes, failing onsite septage and treatment

systems, and atmospheric deposition. Excess levels of nitrates and ammonia in drinking waters can contribute to human health issues (e.g., methemoglobinemia or "blue baby" syndrome) if ingested. Ammonia can also play a significant role in water quality impairment. Ammonia occurs naturally in water in trace amounts and is used in small amounts by plants for normal growth. Too much ammonia associated with excess fertilizer runoff or sewage and other waste discharges can threaten aquatic life, especially when water temperature and pH (a measure to determine whether waters are basic or acidic) levels are also elevated. Ammonia is a common cause of fish kills and can produce harmful algal growths, create foul odors, deplete water oxygen levels, and interfere with beneficial water uses such as fishing and swimming. The AL NPS Management Program recommends sustained education and outreach activities to increase citizen awareness and knowledge that nutrient pollution can be reduced by implementing pollution prevention practices at or near the cause, such as applying the correct amount of fertilizer on lawns and not applying it before rain events, picking up and disposing of pet waste in the trash, regularly pumping out septic tanks, and using marina pump-out facilities.

Nitrogen and phosphorus nutrient over-enrichment are likely causes of harmful algae blooms (eutrophication) in fresh and marine waters, particularly during periods of sunny days, warm water temperatures and low currents. A small percentage of algae can produce biotoxins that cause illness or death of pets, fish, livestock, and birds, or result in shellfish harvesting and consumption advisories for the state's marine/estuarine waters. Runoff from over-fertilized lawns and gardens, failing septic systems, and pet wastes can also contribute to algal bloom problems. Economic concerns include increased drinking water treatment costs, loss of recreational and tourism income; loss of shellfish and fisheries jobs and food products; and fish, pet and livestock sickness and death. Hypoxia (large areas of low DO that can't support most aquatic life) in the Gulf of Mexico has also been associated with nutrient over-enrichment. The AL NPS Management Program recommends sustained education and outreach activities to increase citizen awareness that NPS nutrient runoff is usually preventable and that it can be reduced by not applying lawn fertilizers before a rainfall event and having soils tested, properly maintaining onsite septage disposal and treatment systems, never dumping plant or animal waste in a waterway or down a storm drainage system, properly disposing of pet waste in the trash, using low phosphorus detergents and commercial lawn fertilizer products, using marina pump-out facilities to dispose of septage from boats, and establishing or maintaining natural vegetative buffers along waterbodies to filter polluted runoff.

Increasing Organic Enrichment (OE) and low levels of Dissolved Oxygen (DO) in a body of water can severely impact aquatic life health, reproduction, and survival. Although DO levels fluctuate naturally (daily, hourly, seasonably), severe or prolonged depletions are usually the result of human activities that increase the amount of plant, animal, and human matter or waste in the water. As organic material decays, it can lower or deplete DO levels in the water and sediment and may degrade aquatic life, create foul odors, and impair recreational or other beneficial uses and opportunities. Stormwater runoff pollutants, a consequence of human activities relative to urban development (stormwater drain system overflows, golf courses), agriculture (animal wastes; sod farms), and business and industry productivity and activities (commerce, services, trades) contribute to OE/DO problems. In addition, decomposing organic matter from malfunctioning onsite septage and treatment systems, fertilizers, chemicals, and pet and wildlife waste can also diminish DO levels. Higher temperatures (warm waters hold less DO than colder waters), turbidity associated with erosion and sedimentation, and obstructions to natural stream flow (human; beaver dams) can also reduce DO levels. The AL NPS Management Program recommends sustained education and outreach activities to increase citizen knowledge and awareness; particularly stressing the point that most OE and low DO problems are preventable (e.g. never dump plant or animal waste in a waterway, apply the correct amount of fertilizer on lawns and never before storms, dispose of pet waste in the trash, pump out septic tanks regularly, and use on-shore marina pump-out facilities for boat septage).

c. Erosion and Siltation (Sedimentation)

As runoff from precipitation events flows over the landscape, it often picks up and transports soil particles, nutrients, pesticides, pathogens and other pollutants to streams, rivers, or lakes. Sediment itself is generally harmless to human health or safety, but can result in environmental and health problems when nitrogen, phosphorus, chemicals and other NPS pollutants attach to soil particles and washed into receiving waters. Too much sediment in a waterbody can smother aquatic organisms, destroy or degrade aquatic habitat, clog fish gills, or alter dissolved oxygen levels

and temperatures resulting in fish kills or fish and shellfish consumption advisories. Increased sediment deposition from site-clearing and grading may clog storm drains, degrade drinking water sources; impede navigation which can lead to expensive dredging; increase flooding events, impair wetlands and recreational resources; and create public nuisance and property owner liabilities. Suspended solids such as silt, clays, organic matter, microbes, and algae can cause receiving waters to become murky, muddy or cloudy (turbid). Turbidity is a measure of water clarity and is a useful indicator of the effectiveness of BMPs in preventing, reducing, and treating stormwater runoff from urban development and construction sites. High turbidity levels may suggest a potential for higher levels of pathogens that can cause nausea, cramps, and diarrhea in humans. The AL NPS Management Program recommendations to prevent or reduce siltation, sedimentation and turbidity problems include sustained education and outreach activities to increase citizen awareness and the implementation of BMPs to moderate the volume and velocity of stormwater runoff to prevent excess sediment runoff (e.g. keeping soils on-site and in-place as much as practicable; installing detention and retention areas, establishing and maintaining vegetative buffers along waterbodies to act as natural filters, etc.). Erosion and sedimentation problems are best prevented and minimized by properly planning, implementing and maintaining BMPs (e.g. maintaining and planting native plants along stream edges, not disturbing soil or natural vegetation near ditches or waterways during site preparation and clearing, and allowing rainwater to gradually infiltrate into the ground rather than flow untreated and unimpeded to a storm water sewer system or directly to a receiving water) at or near the cause.

d. Pathogens

Urban stormwater runoff can contribute to pathogen (disease-causing bacteria and viruses) problems in both surface waters and groundwaters. Elevated levels of pathogens can make waters unsafe for human body contact and ingestion. Pathogen water quality problems are generally of human (e.g., failing or absence of onsite septage disposal and treatment systems, improper septage disposal from boats; litter and garbage; food processing and improper disposal), and animal (e.g., pet waste, wildlife such as ducks, geese, beaver and deer, etc.) nonpoint source origins. Pathogens mitigation may increase drinking-water treatment costs, impact beneficial uses (e.g., swimming, boating, beaches, and ecotourism); diminish shellfish and fishery economies, and contribute to pet health problems or mortality. The type, extent, magnitude, and human health risks posed by pathogens is related to the cause, composition, timing, and amount of NPS runoff. The AL NPS Management Program recommends sustained, proactive education and outreach activities to increase citizen awareness and the implementation of best management practices at or near the cause to prevent off-site transport. Concurrent implementation of BMPs to control sediment and pathogen runoff (e.g. establishing or maintaining natural vegetative buffers along waterbodies to filter polluted runoff) and sustained citizen education and outreach activities to increase citizen awareness can be very effective.

e. Pesticides

Insecticides, herbicides, and fungicides can pollute surface waters and groundwaters through direct application, runoff, or atmospheric transport. Misuse of pesticides can cause human illness and mortalities (e.g. rash, headache, nausea, respiratory failure, cancer, neural, and reproductive effects), contaminate food sources, damage or kill flora and fauna, and destroy protective cover and habitat for wildlife. Leaching of pesticides via percolation, fractures, sinkholes, and solution channels may render groundwaters unfit for drinking and other beneficial uses. Water pollution problems are best mitigated through proper application, storage, and disposal techniques. The primary best management practice strategies include proactive prevention of problems through sustained training and education and outreach in order to increase citizen awareness and knowledge. Pesticide distribution, sale, supervision, and use must be consistent with labeling and regulatory rules and regulations of the Alabama Department of Agriculture and Industries and the Alabama Department of Environmental Management. Human and environmental health and safety precautions should be understood by the applicator prior to use since some chemicals can persist for long periods of time in the environment and clean-up of spills or misuse can be technically challenging and expensive. Additional restricted-use pesticide management measures include proper application timing, amounts, mixing and handling of pesticides and pesticide containers, preventing excess irrigation water beyond the root zone, and preventing drift from air-borne applications and

establishing or maintaining natural vegetative buffers along waterbodies to filter polluted runoff. Cautions are advised in areas where soils are highly permeable, ground water levels are near the surface, or runoff may discharge to sensitive areas (e.g., drinking water supplies, wetlands, critical plant and animal habitat, etc.). The state NPS Management Program endorses Integrated Pest Management (IPM) techniques as applicable and practicable. The primary sources of information, recommendations and practices endorsed by the AL NPS Management Program to protect surface and groundwaters are those presented in the current editions and future updates of the Alabama Pest Management Handbook: Volume 1 (2013) and Volume 2 (2011) (Alabama Cooperative Extension System Publications: ANR-0500-A and ANR-0500-B).

f. pH

The pH of a waterbody is a measure of its acidity or alkalinity. Basic (alkaline of high pH) and caustic (acidic or low pH) water quality conditions outside a certain range can release NPS pollutants from sediments, increase the toxicity of certain metals (e.g. copper and aluminum) and a toxic aquatic form of nitrogen (ammonia), and reduce sustainable aquatic organism population and growth and reproduce. The pH of a waterbody can be significantly influenced by local geology (e.g., minerals, rocks and soils), plant decomposition (e.g. wetlands), and human sources (e.g. stormwater runoff from mining; oil and gas production, discarded/leaking batteries, asphalt, fertilizers; emissions from vehicles and coal-fired power plants that can lead to acid rain and ocean acidification). The AL NPS Management Program supports continued education and outreach activities to increase public awareness and knowledge and recommends the application of lawn and garden fertilizers only in proper amounts (have soils tested); proper disposal of household chemicals and cleaners, and never dumping any NPS pollutants into waterways, ditches, or storm drains. Vegetative buffers using native species should be protected, installed and maintained along waterbodies to act as natural polluted runoff filters.

g. Metals

Metals occur naturally in soils and rocks and form, type, characteristics, and concentrations will vary according to a watershed's geology. Common metals that may occur in water are arsenic, cadmium, chromium, copper, lead, nickel, selenium, zinc, and mercury. Although some metals are essential to normal aquatic animal and human health and survival; at high biologically available levels, all metals can be toxic. Metals can be eroded naturally and transported by air and water or concentrations may be strengthened and dispersed by human activities. Nonpoint sources can enter waterbodies from urban stormwater runoff, mines and smelters, illegal dumps and junkyards, firing ranges, and land development activities. Impacts to water quality and aquatic life and human health may be chronic (occur slowly over time) or acute (shorter time frames such as storm events and flooding) and at toxic concentrations can effect survival, reproduction, and behavior. There may be no human sensory (e.g. taste, sight, smell) evidence that a waterbody is contaminated by metals; although some runoff from coal mining usually imparts a distinctive orange/yellow color to streambeds. The AL NPS Management Program best management practices to control metal pollutant sources include sustained education and outreach to increase public awareness and knowledge; reduction, reuse, and recycling as practicable, and the proper disposal of substances, appliances, electronics, and other metal-containing products that can' t be reused or recycled in approved landfills.

The EPA tracks and regulates mercury releases in the environment separately from other metals. Mercury occurs naturally in rocks. Spills and improper treatment and disposal associated with urban/industrial/mining site stormwater runoff, landfills, illegal dumps and junkyards; burning hazardous wastes; and chlorine production are other sources that may release harmful levels of mercury into the environment. Coal-fired power facilities can contribute to atmospheric releases and transport. Some forms of mercury can build up in fish tissue (methyl mercury) and pose health risks (e.g., nervous system, brain, heart, kidneys, lungs, and immune system) to people and animals that eat fish or shellfish. Fish consumption warnings are compiled annually by the state. AL NPS Management Program best management practices to mitigate the atmospheric and water transport and deposition of mercury is to continue education and outreach activities to increase awareness and knowledge and promote the use of mercury-free products (e.g. thermometers, switches, and some light bulbs); reduce, reuse, and recycle as practicable, promote clean energy sources, and appropriately dispose of products that contain mercury in an approved landfill. Atmospheric transport of mercury and its ultimate deposition upon land and water resources is not only a NPS problem in Alabama per the state's Section 303(d) lists; but is also an interstate, national and international quandary. Holistic management solutions for mercury water quality impairment is generally beyond the voluntary citizen-based NPS management approach supported herein; however, education and outreach to increase public should continue.

h. Dissolved Solids

Dissolved solids (e.g. sodium, chloride, calcium, magnesium, sulfate, iron, bicarbonate, potassium, etc.) can be toxic to freshwater aquatic life and animals and can make water sources unusable or expensive to treat for human consumption, irrigation, livestock watering, manufacturing and other beneficial uses. Minerals and salts occur naturally in the environment and are essential to life and generally tolerated by plants and animals in specific ionic strengths. In many instances, measures of concentration (conductivity) indicate an overall water quality impact rather than a specific NPS pollutant cause. Groundwater withdrawals, municipal and industrial NPS stormwater runoff, application of fertilizer and lime, mining, oil or gas brines, corrosion, weathering of cement in urban areas, and salt-water intrusion into drinking water supplies can contribute to increases in dissolved solids. Some dissolved solids and their compounds introduced by human activities can be difficult and expensive to remove. Education and outreach to increase public awareness and knowledge and proactively preventing NPS elements from entering waters of the state are primary AL NPS Management Program best management strategy recommendations that address human causes and releases.

i. Temperature

Many fish and other aquatic animals are sensitive to rapid or prolonged increases in water temperature. Waters can become too warm as a result of rainfall running off hot, impervious surfaces (rooftops, parking lots, etc.), municipal and industrial discharges, streambank and riparian zone vegetation removal, and low flows that causes waters to heat up more rapidly on sunny days. Temperature ranges that are outside of the normal ecological and physiological range or requirements of an aquatic organism for too long can increase risks of disease and mortality. Warmer waters may increase the toxicity of some NPS pollutants (chemicals, pesticides, ammonia) and encourage an abundance of noxious aquatic plants and algae blooms. The AL NPS Management Program recommends education and outreach to increase public awareness and knowledge and the implementation of best management practices such as not disturbing or removing overstory (trees) along streambanks, maintaining groundcovers and natural vegetative landscaping features; and directing urban stormwater that falls on hot impervious surfaces to infiltrate into the ground or into stabilization basins instead of discharging directly to streams or stormwater drainage systems.

j. Trash, Litter, Debris, and Discarded Solid Waste

Garbage or refuse thrown or dumped in waterways or along streambanks, on the urban landscape (e.g. sidewalks, streets, yards, etc.), and along roadside pull-offs is a common and unsightly NPS pollution problem in Alabama. Discarded household solid waste (e.g. paper and cardboard, furniture, containers and packing such as glass bottles, metal cans, and plastics; construction/building products and wastage, grass yard trimmings, etc.) usually indicates that a nearby waterway may be polluted. Human sources cause the appearance and quality of waterways that provide recreation, drinking water, and other benefits to be quickly degraded. Litter and trash may be transported by wind or stormwater runoff to storm drains that discharge directly to waterways. Once it enters a waterway, trash can float (e.g. food and beverage containers, plastic jugs and bottles, etc), sink (glass and metal containers), or become suspended in the water column (plastic six-pack yolks and grocery bags). It can degrade the habitat and health of aquatic plants and animals depending on the pollutant size, ability to float, and rate of deterioration. Marine trash or debris originates from ocean dumping, beach recreational uses, river and stream discharges, and stormwater drainage system outlets and can restrict the use of beaches and degrade fisheries. Discarded items can be contaminated by toxins, chemicals and pathogens (e.g., medical waste/medical sharps, dead animals, pet waste, etc.); harm animals and birds if they ingest or become entangled in it; threaten the health or safety of people who come in contact with it; and is objectionable to look at or smell. In addition, it can contaminate stream sediment; exacerbate stream erosion and contribute to fish passageway problems. Discarded containers and scrap tires can hold water, thereby increasing mosquito and vermin problems. Nonpoint source best management practices include never using waterways, streambanks, dirt roads, sidewalks, streets gutters, or storm drains as dump sites (e.g. appliances, batteries, tires, vehicle parts, construction debris, leaves and yard litter, etc.) in any amount; properly disposing of plastic six-pack yolks and bags, food wrappers, beverage containers, styrofoam, cleaning products, paints and solvents, chemicals, pharmaceuticals and personal care products, pesticides, needles, etc.), not littering (cigarette butts; food and beverage containers/packaging, etc.); preventing trash from being blown from trash cans, cars, and boats; not flushing hazardous (toxic, flammable, or corrosive) products, plastics, or waste down a drain, and picking up litter along roadways and waterways. It is also recommended that "household" trash be

burned only under controlled conditions and regulations and that the residual ash be properly disposed of (may contain hazardous waste that could be transported by rainfall to waterbodies). The AL NPS Management Program continues to recommend sustained education and outreach activities to increase public awareness and knowledge, composting/mulching, source controls (reduce, reuse and recycle), and storm drain stenciling as effective best management practices.

k. Toxic Substances, Leachate and Spills

As stormwater runoff flows over the landscape it can pick-up NPS pollutants along with other relatively benign materials such as soil particles and transport them to receiving waters. While toxic substances and chemicals are regulated, accidental releases or spills can contribute to urban NPS stormwater runoff water quality problems. Many factors can influence the impact that toxic substances from nonpoint sources may impart have on water quality, water resources, and water quality protection and restoration efforts (e.g. sporadic rainfall amount and duration, diffuse sources, pollutant potency/strength and composition, areal extent and volume of the receiving water, etc.). Water quality impairment and treatment options can also be significantly influenced by pollutant synergistic effects (the toxicity of two or more blended chemicals is greater than the sum of their individual effects). Examples of toxic substances associated with urban development and re-development include coal-tar parking lot sealants, oil spills, historical/legacy chemicals (e.g. PCBs, dioxins, mercury), pesticides, hazardous waste, household hazardous waste, spills, landfills, illegal dumping, and disinfection and algae control (e.g. pools, fountains). Releases and spills of NPS pollutants and exposures to aquatic life and terrestrial life and human health may be chronic (impairment occurs slowly over time) or acute (shorter time frames such as soon after a rainfall runoff event). Known and unspecified toxic substances and chemicals from NPS runoff may produce odors and sheens and/or cause corrosive, reactive, or ignitable conditions to receiving waters. Adverse human and aquatic life health effects can be influenced by the type of pollutant transport media (e.g. air, water, soil erosion); strength (potency), magnitude and length of contact, and the health condition of the exposed organism. Abrupt changes in commonly measured water quality parameters (e.g. pH, conductivity, alkalinity, hardness, and dissolved oxygen) or significant changes are noted in aquatic species richness, abundance, behavior, and mortalities (e.g. deformities, tumors, disease and parasites), should trigger immediate actions to evaluate potential for toxic releases and spills of anthropogenic (human caused) origin.

The AL NPS Management Program recommends sustained education and outreach to increase public awareness and knowledge and implementation of hazardous waste best management practices; pollution prevention (reduction, reuse and recycling) and using alterative products as practicable.

l. Oil and Grease

Oil and grease pollutants include petroleum-based (e.g. home heating fuel, diesel fuel, lubricants, gasoline, etc.) and non-petroleum based (vegetable oil; animal fats) products. Although fats, oils and grease discharges from homes, food services establishments, and industrial sources are regulated by federal (40 CFR 403) and state laws and local municipal ordinances, nonpoint source problems can occur through accidental spills, leaks, and improper disposal. Excessive discharges of oil and grease can contaminate fish, shellfish, and plants and drinking waters used for human consumption, and degrade recreational opportunities and aesthetic benefits. Greases and fats may also solidify and form blockages in septage disposal systems resulting in reduced conveyance capacity and septic system treatment effectiveness, and increased sewer overflows and sewage backups in homes and businesses. Even in small amounts, oil and grease can smother aquatic life and degrade aquatic habitats as it sinks, floats, or forms slicks. Nonpoint source pollution problems generally occur when homeowners, businesses, hotels, hospitals, school kitchens, and other food service establishments do not properly store or dispose of used cooking oil and grease. Water quality problems can also occur when rainfall runoff washes over the landscape and picks up fats, oils and grease contaminates from road ways, parking lots, driveways, and storage tank collection areas and carrying them untreated to waters of the state.

Large petroleum-based spills are usually widely publicized; however, the cumulative effects of many and diverse smaller spills, leaks and improper disposal practices can significantly degrade water quality and beneficial uses. Smaller leaks and spills can be discharged by boats, jet skies, and from docks and marinas.

The AL NPS Management Program promotes continued education and outreach to increase public awareness and implementation of best management practices designed to reduce, reuse and recycle petroleum-based and synthetic oils; installing "*Do not dump down storm drain*" stenciling and "*No oil or grease*" or similar-type signage and postings in appropriate locations; installing and maintaining catch basins around waste storage facilities to contain spills and to prevent rainfall overflow events; preventing leaks from storage bins and tanks, and installing and maintaining native vegetative buffers along waterbodies to act as filters of stormwater runoff. Citizens and businesses should never dump oils and grease down a stormwater drain or pour onto the ground. Leaks from motorized vehicles (e.g. engine oil, transmission, power steering, brake fluids, antifreeze, etc.) and other NPS sources (e.g., metal working fluids, compressor and refrigeration oils, hydraulic fluids, solvents and cleaning agents, buoyants, etc.) should be cleaned up with sorbent materials and towels instead of hosing the spill the street.

m. Color, Taste, and Odor

Characteristics such as color, taste and odor (i.e., "organoleptic" or perceived by the senses) can impact the public's general perceptions about a waterbody may cause a water source to be rejected for drinking or other beneficial uses, or necessitate expensive clean-up treatments. Aesthetic qualities, whose perceptual concepts, indicators and measures can and do vary, can diminish beneficial use expectations and result in economic losses (e.g. swimming, fishing, tourist attractions and other uses). In addition, while some exceptional conditions may not cause actual harm to human or environmental health; a variety of undesirable and even toxic NPS contaminates could be dissolved in the water. A body of water may appear to be, "clear, clean and refreshing" but in fact may not be safe for human body contact or consumption if it receives stormwater runoff from urban development and construction areas. Color may be indicative of dissolved organic/plant material (tannins) and soil and water chemistry interactions, the presence of dissolved metals (iron and manganese), and siltation (turbid and muddy waters) from erosion and sedimentation processes. Objectionable odor and taste problems can result from the presence of hydrogen sulfides (pulp and paper mills; high iron and low pH), spills (chemicals, gasoline, nutrients), methane (oil/gas fields; landfills, dump sites), chlorine (pathogen treatment), natural organic matter, cadmium/galvanized pipes, and fertilizers fishy/earthy smell), and failing septic tanks and field lines. Primary AL NPS Management Program best management practices include sustained education and outreach to increase public awareness and knowledge, never disposing of anthropogenic wastes into or close to a waterbody (regardless of its location or use), and installing and maintaining vegetative buffers to act as filters of NPS pollutant runoff.

n. Stream, Riparian Area, and Aquatic Habitat Modification

- Habitat alteration is listed as a Section 303(d) water quality concern. All urban watersheds (hydrologic unit codes) in Alabama have undergone some type of human-caused activity that has disturbed or impaired a river, stream, or estuarine waterbody located therein. Land disturbance (development and construction) activities can significantly alter stream order and conditions. Stream flow characteristics vary widely in an urbanized environment and are a function of the landscape, variable rainfall runoff amounts and patterns, vegetative areas and impervious surfaces, geology, and other watershed characteristics. Human activities may change the amount, timing, and velocity of water reaching a stream, divert flow through manmade channels, and alter the shape and location of streams. Changes in water quality (and quantity) may benefit some aquatic biota and habitats while harming others. Most natural streams provide cover, substrate, and hydraulic conditions to meet the reproduction and survival needs of a diverse population of fish and macroinvertebrates. Degraded physical and chemical (e.g., flows, sediment, temperature, clarity, ambient light, dissolved oxygen, evapotranspiration, infiltration, etc.) and biological processes and conditions (e.g. abundance, richness, diversity of fish and benthic macroinvertebrates; algal biomass) are classical indicators of an impaired urban stream (urban stream syndrome).

  The presence of man-made dams or weirs, levees, walls, and submerged structures; armored (e.g. concrete, rip rap) streambanks; stream banks lacking vegetation; excessive streambank erosion and sedimentation; scouring and incision; extreme width to depth ratios; increased areal extent of flooding, and the exclusion of normal stream-floodplain interactions are symptomatic of stream channel and aquatic habitat degradation. Stream channel alterations related to channelization, bridges, dredging, pipeline crossings, gravel mining and culvert and ditch discharges can also disturb benthic substrates, increase erosion and sedimentation, and degrade

habitat. The AL NPS Management Program promotes continued education and outreach to increase public awareness and implementation of NPS pollution controls associated with alteration of normal steam flow (hydromodification) as prescribed by EPA (EPA 841-B-07-002, July 2007).

- Riparian areas play an important role in urban stream form, structure and function. Anthropogenic (human caused) alterations in the riparian zone (e.g., installation of levees, rip-rap, concrete channels, dams, bridges, culverts, etc.) can change natural stream structure and processes. Depending on stream geomorphology and hydrology and other factors, riparian areas can hold stream overflows, capture and store sediment, nutrients, chemicals, pathogens, metals, and other NPS pollutants; help stabilize stream banks by and preventing stream bank failures and erosion (vegetative roots), and provide food and habitat to support diverse species and populations of aquatic organisms. Riparian area protection, causes and symptoms of degradation, and nonpoint source protection and restoration are best addressed proactively as a component of a broad-based, in-place, holistic watershed management plan. Riparian protection is an important NPS pollution control strategy in Alabama and restoration will continue as practicable and as local conditions allow (e.g. financial resources, available land area; landowner/user willingness).

- Dams affect water quality by disrupting the quantity and timing of hydraulic residence times (i.e. the length of time water is stored and NPS pollutants may settle out) and downstream flows. Pooled waters can accumulate excess sediment, nutrients, and chemicals behind the dam. Increased turbulence and velocity of water released downstream of the dam can significantly erode stream banks and scour stream beds and channels. In addition, aquatic species composition, populations, migration and habitat can be drastically altered both upstream and downstream of the obstruction. Alabama currently has no dam safety legislation, formal dam safety program, nor a funding program to assist owners with dam repairs, abandonment, or removal. The AL NPS Management Program promotes NPS pollution control measures associated with dam siting, construction, operation, maintenance, and removal as prescribed by EPA (EPA 841-B-07-002, July 2007) to ensure state water quality standards are met.

- Channelization (mechanically straightening or deepening of natural stream channels) often results in direct alterations of a stream's physical characteristics. It has been used to encourage development, increase land uses, and to control flooding. As a result, many wetland and stream ecosystem functions and values have been lost (e.g. sediment and nutrient transport, stormwater treatment, food and habitat for aquatic life, recreational benefits, aesthetics, etc.). Stream drainage systems and wetland areas in or near urban areas may be drained or devoid of any semblance of pre-development conditions. In addition, urban stream channels may have been lined or covered (e.g. engineered armoring structures and materials such as rip-rap, culverts, pipes, etc.), or may have been re-located. Urban water quality, flows, and stream channel degradation as a result of past channelization activities can be so severe that the stream is no longer ecologically or functionally integrated (physically, chemically or biologically) with its setting. The AL NPS Management Program promotes continued education and outreach to increase public awareness and the implementation and maintenance of best management practices to restore, enhance or mitigate upland and coastal aquatic resources, streambanks, wetlands, drainage channels and riparian areas to approximate pre-development hydrology and watershed conditions.

o. Smart Growth, Low Impact Development, and Green Design

Smart growth, low impact development, and green design principles are strongly recommended by the AL NPS Management Program, as applicable, to protect and restore waters of the state. Residential and commercial development plans often fail to envision the cumulative or long-term environmental, economic, and social impacts of sustainable watershed health and water quality protection. Impervious surfaces can significantly increase the volume, velocity, and duration of NPS stormwater runoff, particularly after an intense storm event. This increased magnitude and frequency of stormwater runoff can exacerbate streambank erosion and lead to widening of streams, alter stream channels, and contribute to the loss of aquatic species and habitats. Streams impacted by much impervious surfaces are usually recognizable by an increased use of rip-rap (layers of large loose stones placed on embankments to prevent erosion), gabions (wire mesh cages containing rocks), concrete-lined (armored) stream channels, and

premature failure of infrastructure (e.g. public utility and intermodal conduits) that border or intersect streams modified by development and construction activities. Water quality degradation in an urban area generally correlates with poor design, implementation and maintenance of best management practices. Smart growth principals (e.g. collaborative environmentally protective and economically sensible land use, building design, open space, transportation, and social sense-of-place choices and decisions) and green infrastructure (e.g. using natural vegetation and soils instead of engineered "gray" structures) designs provide communities and municipalities with sustainable, resilient and economical solutions to address stormwater runoff and water quality protection. If a total maximum daily load (TMDL) has been developed, it should be implemented concurrently with a holistic watershed-based management plan that incorporates, as applicable; sustainable design principals. These approaches will help to ensure that state and federal surface and drinking water quality regulations are met.

The AL NPS Management Program endorses the, Alabama Low Impact Development Handbook (Alabama Cooperative Extension System) as a primary technical guidance for all statewide and Coastal NPS Program (CZARA) urban construction and development activities. In addition, Section 319 grant-funded projects and activities must be consistent with the aforementioned "LID" manual as applicable and practicable. In addition, the goals and objectives designed to help communities build capacity, implement and evaluate green infrastructure as presented in the, Green Infrastructure Strategic Agenda (EPA 2013, and as updated); the "Barrier Busters Fact Sheet Series (EPA) that expounds the multiple environmental and economic benefits of LID; and the EPA Region 4 funded, Sustainable Design and Green Building Toolkit for Local Governments (EPA 904B10001, June 2010), are also highly recommended NPS programmatic and Section 319 grant-funded project planning resources.

- Impervious surfaces (e.g. paved roads, parking lots, rooftops, sidewalks, driveways, compacted soils, etc.) can increase the volume of stormwater runoff, reduce infiltration and groundwater recharge, and alter flow delivery pathways to receiving waters. As areas of impervious surfaces increase in a watershed and water moves more quickly off the urban landscape, NPS pollutant runoff becomes more capricious, streams tend to become increasingly physically altered, and degradation of aquatic species, abundance and habitat intensifies. Nonpoint source stormwater runoff from impervious surfaces can be mitigated using detention basins and retention ponds, pervious pavement, filter strips and borders, grade stabilization structures, terraces, buffers or set-backs for sensitive areas, balancing and mixing developed areas with open green spaces, increasing mass transit and pedestrian thoroughfares, etc.).

- Brownfields are abandoned, idled, or underused industrial and commercial sites where previous land uses or activities has contaminated the property; thus, making redevelopment more challenging. Cleaning up brownfield sites can mitigate NPS pollutant runoff, protect water quality, conserve open space, promote smart growth, and minimize developmental pressure at the urban/farm land interface (urban sprawl). Federal Brownfield grant funds are available from ADEM to encourage communities to redevelop and return brownfields to clean and environmentally-protective and economically sustainable and beneficial uses.

p. Urban Trees and Forest

Urban development requires land to be cleared of natural vegetative cover and graded to create a suitable surface for construction. This can result in exposed soils that are particularly susceptible to erosion. The removal of trees can alter natural stormwater drainage patterns, significantly impact stream geomorphology and stream bank integrity (increasing susceptibility to erosion and streambank failure) and contribute to the degradation of wetlands and other sensitive areas. Allowing urban forests to remain in-place and replanting trees during urban development or redevelopment can provide several environmental protection benefits. Entities involved in urban development and construction are strongly encouraged to protect trees to the maximum extent as practicable. Well managed urban forest can provide significant water quality, public health and quality-of life benefits; alter community economic dynamics; and help to ensure resiliency and sustainability of towns, communities and neighborhoods for present and future generations. In addition, the sustained natural input of organic material (vegetation and woody debris) into a waterbody is important because it provides food and habitat for aquatic organisms. The loss of natural cover can adversely affect aquatic diversity and abundance and promote the spread of invasive species. In addition to providing shade and moderating local micro-climates, urban trees and forests help to mitigate the quantity and quality of NPS stormwater runoff. Urban trees may also enhance community economic conditions, improve air quality by filtering airborne pollutants, enhance urban wildlife diversity, habitat and travel corridors, and provide

aesthetic and social benefits (e.g. soften impervious surfaces on the landscape, separate divergent land uses, reduce noise pollution, enhance recreation opportunities, and bolster community-based quality-of-life interactions and corporal connections to the environment).

The AL NPS Management Program and Section 319 grant program will continue to support the art, science, and technology of managing trees and forests systems in and around cities, towns, suburbs (urban/rural interface) to protect waters of the state from nonpoint sources of pollution. It is highly recommended that urban stormwater control entities (e.g. urban planners, designers, agencies, municipalities, businesses, contractors, builders, organizations, citizen groups, etc.) integrate trees in urban development plans and projects. All tree and forest management issues and efforts should be closely coordinated with the appropriate state agency, group, or academic institution. Technical, financial, research, and education and outreach assistance should consider, but is not limited to stormwater treatment, shading, and phytoremediation. The AL NPS Management Program and Section 319 grant program endorses, as applicable to urban development and construction, Alabama's Best Management Practices for Forestry to address NPS water quality issues. The goals, actions and resources prescribed by the congressionally-designated USDA Advisory Council to the U.S. Forest Service (National Urban and Community Forestry Advisory Council) and the associated Action Plan (as updated), are also highly recommended to help protect and restore Alabama's urban and community forests resources.

q. Nuisance Aquatic Weeds

Aquatic plants include native (natural locally occurring), non-native (brought in from somewhere else), non-invasive (not harmful) and invasive (harmful) species. Some aquatic species (as well as animals, fish, or microbes) that are not native to Alabama have entered state waters and continue to vigorously spread by accidental releases or intentional processes. While native aquatic plants perform important ecological functions in a waterbody; an infestation of "invasive" non-native plants can often interfere with beneficial water resource uses. Excess growth and spread of aquatic plants can affect dissolved oxygen levels; threaten the survival of native fauna and flora that live in or near a waterbody; degrade areas around shorelines, beaches, piers and docks; diminish social and economic values and impacts (e.g. subsistence, recreational and commercial fishing, swimming, marinas and boating, fish and shellfish consumption, aesthetics), and reduce waterfront property values. Urban stormwater runoff can carry excess fertilizers and nutrients (e.g. nitrogen and phosphorus) to a waterbody. An excess of nutrient enrichment can greatly influence aquatic plant and algal growth and is likely to result in increasing and expensive herbicidal treatments or mechanical-removal costs.

Urban entities should be cognizant of development and construction activities and practices that may release non-native aquatic species into waters of the state. The AL NPS Management Program will continue to support public and private sector initiatives to mitigate harmful effects of noxious aquatic plant species and plant growth by implementing nonpoint source BMPs designed to reduce nutrient over-enrichment of state lakes, rivers, and streams (e.g. use lawn fertilizers sparingly and never before rain events, properly maintain on-site septage and disposal systems, never dump plant or animal waste in a waterway or down storm drains, properly disposing of pet waste in the trash, using marina pump-out facilities to dispose of boat wastes, and installing and maintaining native vegetated buffers along waterbodies to filter NPS stormwater runoff). It is also recommended that planners and developers communicate and coordinate land development activities with the USDA National Invasive Species Information Center (State Resources - Alabama) pre- and post-construction to help prevent the establishment and spread of nuisance aquatic species. The Alabama Department of Conservation and Natural Resource - Outdoor Alabama website also provides useful invasive aquatic species information and preventative measures.

Section C.3 Management of Urban Development and Construction Stormwater from Nonpoint Sources

a. Overview

Significant human and financial capital, new and enhanced technologies, innovations, public outreach and other resources are required to restore NPS impaired waters and protect unimpaired and threatened waters of the state. Fortunately, numerous stormwater control measures, processes and activities are available to the citizen's of Alabama to mitigate nonpoint source pollution from urban development and construction activities. This section

focuses on water quality protection and restoration relative to achieving AL NPS Management Program goals and objectives. It promotes flexible, targeted, iterative, and broad-based strategies to address the causes and conditions of stormwater runoff and mitigation of NPS impacts and impairments so that waters expeditiously meet state water quality standards and achieve beneficial uses. Action items focus on BMP development and implementation, integration of cooperative partnerships, and leveraging of public and private funds and resources as authorized, permissible and practicable. Voluntary implementation of NPS best management practices presented herein do not supplant mandatory regulatory requirements of Stormwater Phase II or urban management measures specified by Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), but rather complements these programs whenever practicable. The AL NPS Management Program seeks to present effective measures, practices, principals and activities and promotes the concept that water quality protection extends pre- and post-urban construction and development (preferably incorporating smart growth, low impact development, and green building designs). The fundamental stormwater runoff management strategy presented herein promotes the leveraging of human and financial capital, supports a continuation of technology transfer, technical assistance, research and education and outreach, and encourages increased implementation of NPS pollution prevention and source controls (reduce, reuse and recycle) as practicable.

The AL NPS Management Program continues to support efforts to implement a holistic, integrated and inclusive partnership-based approach to systematically identify and mitigate nonpoint source pollution from urban development and construction activities. Identifying and strengthening NPS partnerships (coordination, collaboration, cooperation and communication) will continue as funding and other resources allow. Implmentation of proper BMPs will continue to be at the forefront of efforts to protect and restore water quality (i.e. mitigate sources of nutrients, chemicals, pesticides, metals, pathogens, toxins and other NPS pollutants that impairs waters of the state or negatively impacts human health, natural resources and aquatic life). The EPA, National Management Measures to Control Nonpoint Source Pollution from Urban Areas (EPA-841-B-05-004; Nov. 2005) is recommended by the AL NPS Management Program as a useful tool relative to presenting environmentally-protective and economically-sensible means of reducing urban NPS pollutant load reductions and protecting surface waters and groundwaters.

Section 319 grant resources continue to focus on Section 319 grant guidelines, procedures and measures to achieve TMDL and Coastal NPS pollutant load reductions, and the restoration of NPS impaired waters. Water quality monitoring, partnerships, and continued development and implementation of holistic watershed-based management plans are integral elements. Urban development and construction water quality data and information will continue to be collected, evaluated and shared by ADEM with the public and private sectors. In order for impaired waters to expeditiously meet state water quality standards, the ADEM will continue to present government officials, developers, designers and citizens with relevant education and outreach programs to help raise awareness relative to BMP design, planning, implementation and maintenance. Education and outreach activities may include, but are not limited to funding school projects that teach students about NPS pollution prevention, water quality protection and restoration; the targeting of specific nonpoint sources and causes (e.g. municipalities, service facilities, etc.) to control stormwater runoff, and storm drain stenciling programs to discourage people from dumping NPS pollutants directly into storm water drainage systems.

Urban stormwater measures presented herein are intended to protect and maintain natural ecological conditions and help re-establish hydrology to pre-development conditions as sensible and practicable. Modifications to urban topography can significantly alter the velocity and volume of rainfall runoff as it flows over the land surface. Stormwater control measures in urban areas should address unavoidable pollutant loadings as near to the source as possible to best protect water quality. Measures should ensure that pre-development rainfall runoff volumes and velocities are not significantly altered by new development or re-development activities (to the maximum extent practicable). Erosion should be controlled and urban stream channels and riparian zones and wetlands protected prior to and during development and restored post-development to ensure the protection of stream health and aquatic habitat.

Specifically, urban development and construction stormwater runoff best management practices, particularly those funded by CWA Section 319 grant funds, should be designed, implemented and maintained to:

- Protect and restore surface waters and groundwaters using a mix of environmentally-protective and economically-sensible practices and education and outreach options that ensure stakeholder buy-in, long term sustainability, and that meet NPS program goals and objectives
- Target high priority (e.g. Section 303(d) and TMDL pollutants of concern), special designated or outstanding waters of the state
- Enhance environmental, economic, social, and cultural benefits, and communal health and quality-of-life
- Protect, enhance and restore sensitive areas (e.g. drinking waters/sources, wetlands/estuaries, aquatic life/habitat, riparian areas, etc.)
- Abate or minimize NPS pollutant runoff (and potential flooding events) by mimicking or restoring developed areas to near pre-development hydrologic conditions
- Abate or minimize NPS pollutant loading impacts through pollution prevention and source reductions (e.g. reduce, reuse, and recycle)
- Treat NPS stormwater runoff pollutants as near to their cause as practicable during all phases of construction and development
- Mitigate unavoidable impacts to waters of the state
- Implement components of a watershed-based management plan and holistic watershed protection approach whenever possible

The AL NPS Management Program acknowledges that the design, type, and selection of appropriate stormwater control measures can be site-specific and that NPS pollutant load reduction effectiveness and project implementation success may be variable in duration, scope and scale. The measures or sets of measures presented herein are not all-inclusive. The design, types and benefits are expected to expand as NPS stormwater management practices continue to evolve and mature. It is reasonable to expect that the public and private sectors may apply new or enhanced NPS structural technologies as they are developed and become available; however, the selection of those measures or sets of measures should be diligently focused on achieving NPS pollutant load reductions and defined water quality protection and restoration goals. The AL NPS Management Program strongly endorses the, "Alabama Low Impact Development Handbook," (Alabama Cooperative Extension System) as definitive technical guidance for applicable CWA Section 319 grant-funded land disturbance activities in urban areas. Statewide and coastal (CZARA) nonpoint source program projects and activities funded by a Section 319 grant should also use the aforementioned "LID" manual as a structural measure reference source.

b. Non-Structural Stormwater Measures

Non-structural stormwater controls can effectively manage NPS runoff associated with urban development and construction activities and may be preferred (environmentally, economically, socially, and culturally) over structural measures. The primary non-structural control mechanism used in Alabama is education and outreach aimed at enhancing public awareness and knowledge of NPS issues and water quality protection. Key non-structural best management practices are effective cooperation, collaboration, coordination, and communication. Training, demonstrations, technical assistance, and technology transfer activities will continue to focus on:

- Strengthening partnerships and leveraging resources
- Water quality protection and restoration
- Total Maximum Daily Loads
- Watershed-based management planning and implementation
- NPS pollution prevention and minimization of anthropogenic (human caused) land disturbance impacts (coastal and statewide water quality and natural resource conservation and protection programs)
- Balancing urban sprawl while preserving open or "green" spaces
- Protecting and conserving coastal resources, wetlands, stream corridor function, form and hydrology, riparian areas, clean lakes, wellhead protection and groundwater recharge areas
- Community environmental and economic sustainability, resilience and quality-of life

The AL NPS Management Program and Section 319 grant program will continue to seek ways to strengthen urban development and construction partnerships and linkages among the public and private sectors. A variety of formal and informal mechanisms are used to form and sustain partnerships, including memoranda of agreement / understanding, letters of support, cooperative projects, leveraging of funds and other resources, and meetings to exchange NPS data, information, perspectives, and opinions. The ADEM continues to partner with a mix of NPS entities to facilitate implementation of urban development and construction stormwater runoff control measures. Interagency collaborative teams, NPS task forces, and representative advisory groups, and program coordination and outreach efforts are ongoing and are effective mechanisms for accomplishing these linkages. Involvement from federal, state, interstate, regional, and local entities, public interest groups, industries, academic institutions, landowners, developers, planners, concerned citizens and others as appropriate, helps to ensure that urban development and construction NPS pollution mitigation goals and objectives are well integrated with those for economic stability and other social and cultural goals. In addition, although primarily a voluntary program, the NPS pollution management program continues to incorporate regulatory authorities and is utilized when best suited to achieve and maintain water quality standards.

The AL NPS Management Program and Section 319 grant funds continues to employ the following non-structural management measures:

- Strategic planning to protect water quality and human health (e.g. watershed-based management plans, erosion and sedimentation, nutrient and pesticide plans; pollution prevention, urban trees/forest, reducing impervious surfaces, green space/low impact development, etc.)
- Public and private sector partnerships
- Television, radio, newspapers, newsletters, social media, signage
- Brochures, billboards, posters, floor and table top displays and models, stormwater drain stencils
- Research, conference, meeting, and training workshops
- Incentives, recognition programs and awards
- Monitoring data and information collection and distribution
- Permitting, inspections and enforcement; licensing and certification
- Easements, set-backs and buffer requirements; ordinances
- Programmatic, project, and site-specific efficiency and effectiveness; accountability and auditing

Non-structural NPS stormwater control measures should:

- Be incorporated in a stormwater pollution prevention plan and closely coordinated in a holistic watershed-based management plan
- Enhance citizen environmental protection and restoration awareness and knowledge that hopefully lead to positive, quantifiable changes in personal and corporate attitudes and behaviors
- Address pollution prevention and BMP maintenance
- Consider pollution composition, management goals, citizen interest, project scope and scale, sustainable pollutant removal efficiency and effectiveness, relevant social acceptance and values, economic practicality and conditions, and potential for success
- Target and sustain management efforts designed to protect and restore natural watershed characteristics and systems (e.g. riparian areas, hydrology, sensitive areas, open/green spaces, surface waters, wellhead protection and groundwater recharge, etc.)
- Support efforts to mitigate NPS pollutant causes at or as close to the impaired site or pollutant source as possible (e.g. using natural processes to mimic infiltration and evapotranspiration or reuse where it is generated)
- Strengthen integrated management approaches to mitigate NPS pollution and water quality and quantity problems (disconnect, decentralize and redistribute to reduce discharge volume and velocity)
- Coordinate with strategic planning authorities and academic institutional research and resources
- Leverage human and financial resources of federal, state and local governments, organizations, and agencies

c. Structural Stormwater Measures

The AL NPS Management Program and Section 319 grant program continues to support the implementation of effective structural measures designed to mitigate NPS pollutant composition, volume and velocity/peak flows; infiltrate near the source, achieve pollutant load reductions, and protect and restore water quality. Several practices and technologies have been suggested by EPA to mitigate stormwater runoff from construction sites and NPS runoff associated with regulated Phase II Municipal separate storm sewer systems (MS4). Those same measures support the voluntary NPS management approach communicated throughout this document. The implementation of some structural stormwater management and treatment measures are neither practicable nor cost-effective after development has already occurred (i.e., land availability in "built-out" areas can severely restrict options). The design of urban drainage infrastructure also generally contradicts natural rainfall runoff or watershed hydrology; typically reducing natural streams to underground piped systems or armored channels. Most structural or "armored" drainage systems are designed to rapidly transport stormwater runoff, with little or no regard for NPS pollutant removal efficiencies and benefits or impacts to receiving waters (i.e. get it off site and get it off site quickly). Impervious structures can also greatly inhibit natural infiltration to the ground and perpetuation of aquifer levels.

There are many structural urban development and construction stormwater control practices from which the public and private sectors in Alabama may choose to mitigate NPS stormwater runoff quality, volume, velocity, and peak flows. The AL NPS Management Program endorses measures presented in the, "Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas" (March 2009, and as updated). The NRCSs National Handbook of Conservation Practices and Alabama-specific Field Office Technical Guide are also highly recommended. The stormwater runoff control measures presented in the, "Alabama Low Impact Development Handbook," (Alabama Cooperative Extension System) should be used as a technical guidance for CWA Section 319 grant-funded land disturbance projects. The Alabama Smart Yard program (Alabama A&M and Auburn Universities; ANR-1359) document is a high quality science-based resource for environmentally-protective and sustainable landscape practices. In addition, the Controlling Nonpoint Source Runoff Pollution from Roads, Highways and Bridges (EPA-841-F-95-008a) document provides useful water quality protection and NPS management information.

Structural low impact development (LID) stormwater control measures typically endorsed by the AL NPS Management Program (and most commonly implemented in the southeastern U.S.) include, but are not limited to:

- Green (vegetated) roofs
- Bioretention
- Constructed Wetlands
- Vegetated filter strips
- Vegetated swales
- Level spreaders
- Riparian buffers
- Permeable, pervious, and porous pavement

Recommended alternative and retrofit structural stormwater control measures for urban development and construction sites to stabilize surfaces, convey NPS runoff, and protect water quality include but are not limited to:

- Rain gardens
- Detention basins
- Infiltration basins, Trenches, Ditches, Step pools
- Curb cuts; Elimination of Curb and Gutters
- Flow diversions, deflectors, inlet Protection
- Organic or Inorganic Screens and Filters
- Phytoremediation
- Xeriscaping and Planting native trees, shrubs, and other vegetation; Sodding, Seeding
- Above and below ground Tree Planters
- Permeable, Pervious and Porous Pavement, Green Parking Areas
- Land Contouring, Grading; Surface Roughening
- Composting and Mulching
- Topsoiling, Soil Amendments, Soil Stabilizers
- Rock Filters, Dikes, Flumes, Check Dams
- Fabric Silt Fences; Hay/straw bales
- Floodplain and Riparian Zone Restoration to Near Pre-development Conditions
- Downspout disconnection (ground infiltration)
- Armoring (rip-rap, retaining walls, barriers, breakwaters, gabions)
- Rain Barrels and Cisterns
- Block and Gravel Drop Inlets
- Solid Waste Collection Systems
- Oil and Grease Trap Devices
- Permanent and Temporary Stream Crossings
- Clustered Onsite Wastewater and Treatment Systems

The importance of proper planning, design, implementation and maintenance of NPS stormwater management measures cannot be overly stated. It is imperative that all NPS mitigation structural measures be appropriately monitored pre-, during and post-construction in order to assess site-specific effectiveness (e.g. NPS pollutant load reduction efficacy and project success). Installed measures must be replaced or retrofitted if water quality does not appear to be improving, protected, or restored. Often, minimizing the extent and duration of land disturbance activities offers the best NPS pollutant runoff migration solution. In general, it is highly recommended that hydrologic and hydraulic "treatment train" systems and processes be implemented to synergistically mitigate urban and development and construction NPS pollutant runoff. As practicable, strategies should address NPS runoff holistically (i.e. relative to the many and varied causes, sources and types of pollutants, areal extent, synergistic effects of multiple stressors or control practices, and the costs associated with treatment). It is acknowledged that multiple and unknown causes, historical loadings, often-changing land uses, and other anthropogenic alterations to pollutant composition and stream flows rates, velocity, and volumes may exacerbate efforts to definitively quantify NPS pollutant load reductions and program/project implementation effectiveness over time. The AL NPS Management Program and Section 319 grant program highly recommends that structural decision-making processes methodically and deliberately incorporate the following concepts:

- Feasibility (is it the right measure/practice or system of measures and practices at the right time and in the right place)
- Effectiveness (will the measure/practice achieve the intended project goal and NPS pollutant load reduction target)

- Costs (will the environmental benefits justify the funding; is there an effective retrofit or less costly alternative or system of practices, what are the long-term maintenance issues)
- Partnerships (is there adequate local "buy-in" and is human and financial capital leveraged).

d. Success Measures and Indicators

The ADEM continues to generate positive NPS programmatic results in terms of water quality restoration. Examples of NPS water quality improvements continue to be summarized as EPA Section 319 success stories and input to EPA's Grants Reporting and Tracking System (GRTS) database. Water quality data is compiled by ADEM and is uses for enforcement actions, or as applicable, publicly accessible in the CWA Section 305(b) Integrated Water Quality Report to Congress, ADEM Water Quality Reports, and Section 319 Grant Annual Reports. Section 319 project successes are directly related to partnerships at multiple public and private sector levels. The AL NPS Management Program continues to identify, build, and sustain voluntary cooperative partnerships; and as a result, substantial improvements in NPS pollutant load reductions and water quality protection are expected to continue.

Section C.3.1 Voluntary Approach

a. Overview

The Alabama NPS Management Program promotes implementation of voluntary measures and practices (e.g., incentives, technology transfer and technical assistance, education and outreach, etc.) to protect and restore water quality whenever practicable and cost-effective. Nonpoint source water quality impairments from urban development and construction activities can seriously impact state and community-based environmental, economic, and societal perceptions, conditions and aspirations. The Clean Water Act (CWA) Section 319 nonpoint source grant program is designed to ensure impaired waters meet state water quality standards as expeditiously as possible. The state's voluntary approach continues to advocate partnerships and leveraging of public and private sector resources to plan, implement, and maintain environmentally-protective best management practices. Efforts continue to achieve priority NPS pollutant load reduction (e.g. nitrogen, phosphorus, and sediment) success in accordance with CWA Section 319 grant guidelines. Priority NPS Total Daily Load pollutants of concern (e.g. nutrients, metals, pH, siltation, habitat alteration, pathogens, etc.) are best targeted by developing EPA 9-key element watershed-based management plans and leveraging stakeholder resources to implement relevant water quality restoration programs, projects, and activities.

Implementation of measures to protect water quality, riparian areas, wetlands, and other sensitive areas from NPS impacts associated with ***new*** construction and development is relatively straightforward (i.e., prevent or reduce the volume and velocity of NPS runoff as near to the cause as possible). Proactive planning and implementation of low impact development, green infrastructure, structural controls and pollution prevention strategies should be used to conserve natural hydrology and mitigate NPS stormwater runoff threats. Controlling the impacts of NPS pollution runoff from ***existing*** developed areas is often complicated and costly and best achieved by implementing measures that provide multiple environmental, economic, social, and safety benefits (e.g. wetland protection, filter strips, open space, street sweeping). The AL NPS Management Program highly recommends that efforts to address both new and existing NPS measures incorporate effective and sustained cooperation, coordination, coordination and communication among many and varied partners (e.g. agencies, governments, developers, planners, organizations, landowners, and citizens). Supporting education and outreach opportunities to enhance citizen awareness and knowledge is an important AL NPS Management Program and Section 319 grant-funded project component, and will continue. Agencies and government officials continue to work with the private sector (citizens, groups, businesses) to identify, prioritize, and clean-up NPS impaired urban sites. Control measures should continue to address water quality restoration, priority pollutant load reductions, and community sustainability and resiliency to protect both environmental and human health. A combination of measures may be used, including but not limited to signage, storm drain stenciling, pollution prevention (recycle, restore, and reuse promotions), source controls, and structural BMP retrofit strategies. Additional strategies are presented in **Table C.3.1.a**, below.

The resources needed to implement an efficient, effective and holistic statewide NPS management program far exceeds funding support provided at the state level. A strategic priority of the AL NPS Management Program is to leverage statewide, watershed, community-based, and site-specific NPS mitigation programs, processes and practices to meet state water quality standards; however, the primary limiting factor is continues to relate to inadequate state program funding. The primary source of funding to address NPS pollution in Alabama is federal dollars appropriated to EPA by Congress under CWA Section 319. The Alabama Department of Environmental Management (ADEM) then obligates Section 319 funds to implement the AL NPS Management Program in order that impaired waters meet state water quality standards. Section 319 funds may be used to manage and treat nonpoint sources of urban and construction stormwater runoff; but generally, only as a component of a watershed-based management plan designed to restore Impaired Waters (primary funding use) or to protect designated Special, Outstanding, and Public Water Supply waters of the state (secondary funding priority). Section 319 funded projects resources are but only one component of the state's broad-based NPS strategy to mitigate a wide range of NPS impairments and threats to waters of the state.

Table C.3.1.a Voluntary Strategies to Protect and Restore Urban Waters

In addition to strategies expressed above, the AL NPS Management Program will continue to implement (s*ubject to the availability of human and financial capital)* a voluntary NPS pollution management approach to protect and restore water of the state as follows:

a) Help urban, suburban, and urban/rural interface areas to connect or re-connect environmentally, economically, and socially with their rivers, streams, reservoirs, and other waterbodies, and work to protect and restore them the Partnership will particularly focus on revitalizing communities that are, or have been (particularly in disproportionately underserved or economically distressed areas such as the Alabama Black Belt region). Efforts will continue to be made to develop and enhance environmentally protective green spaces and expand education and outreach opportunities that will lead to progressive improvements in welfare, safety, and "livability" intangibles such as personal and corporate prosperity, comfort and satisfaction.

b) Identify, establish, enhance and maintain strong and effective community-based partnerships. Several public and private sector resources are available in Alabama to help communities prevent or reverse neglect, energize partnerships, and programs to restore and protect surface waters and groundwaters.

c) Enhance opportunities to communicate programs; coordinate technology transfer, innovations, and technical assistance; and provide incentives and other beneficial actions to local citizens and organizations. Collaboration, cooperation, and leveraging of federal and state resources with local commitment, interests, and assets are important to success and will promote early citizen interest and sustained actions.

d) Protect and restore the environmental health and economic importance of urban waters and their watersheds. The primary aspiration of the AL NPS Management Program is to protect and restore water quality and mitigate NPS pollutant loadings; however, it is recognized that local historical, social aesthetical, economic and recreational significances must also be acknowledged in order to ensure watershed, community and ecosystem health and sustainability.

e) Address the physical, chemical and biological challenges of NPS degraded urban waters using a holistic watershed-based management approach, whenever and wherever doable and practicable. Incentives and education and outreach efforts will continue to be provided, leveraged, and coordinated to help the public and private sectors protect and restore urban water quality (and quantity resources).

f) Promote water conservation and efficient use of waters in urban areas to control NPS pollutant runoff. Programmatic efforts include continuing to provide incentives, education and outreach, targeting infrastructure needs (including BMP retrofits), especially where aging and inefficient stormwater infrastructure may cause significant NPS pollution problems (e.g. sewer overflows; flooding, erosion and sedimentation; nutrient, pathogen and chemical runoff, etc.), technology transfer, innovations, and technical assistance. Nonpoint source partnerships and leveraging of water quality and water quantity funding and resources are essential to program sustainability and success and these efforts will continue.

g) Protect and restore water quality and healthy ecosystems to support economic competitiveness, revitalize businesses and create jobs. Section 319 funded resources, as allowable, will continue to be integrated with community-level urban development priorities and water delivery and treatment system programs. Water-related environmental improvements can be achieved over time by continually demonstrating urgency for clean and safe waters and fully integrating urban resources and programs at multiple levels and across multiple sectors (local, state, regional, and national).

h) Sustaining strong and active NPS partnerships is essential. Urban development and construction plans and priorities should be systematically and mutually agreed upon; implementation resources aligned, and consideration given to problems that may emerge as a result of shifts in population and urban sprawl.

i) A primary focus of the AL NPS Management Program is to increase, document, and evaluate statewide program performance and accountability. Voluntary urban development and construction NPS pollution progress and success indicators and measures are designed to provide meaningful outcomes (e.g. coordinate projects and activities, design and implement the best solutions, focus BMPs and monitoring resources to priority NPS needs and sites, etc.). Examples of measures and indicators that will continue to be used include:

- Measures of water improvements from NPS controls
- Interim progress toward restoring water quality and hydrology
- Protection of high quality waters
- NPS pollutant load reductions, implementation of NPS controls
- Public education, awareness, and actions
- Programmatic measures such as watershed-based management plan development and tracking and reporting

j) It is essential that strategies to engage the public and private sectors (and implement the AL NPS Management Program) be clear, on target, and achieves local "buy-in." Watershed and water quality protection and restoration does not usually lend itself to a one-size-fits-all (sustainable and systemic) implementation approach. In addition, principals, standards, and ideals of local urban audiences may differ from

one area to another; therefore, effective communication is essential and will continue to be an important NPS programmatic implementation component.

b) State Revolving Fund (SRF)

A potential voluntary program designed to protect urban water quality, achieve NPS pollutant load reductions, and to particularly implement "green infrastructure" in Alabama is to use the resources of the State Revolving Fund (SRF) loan program [(i.e., Clean Water State Revolving Fund (CWSRF); Drinking Water State Revolving Fund (DWSRF)]. Loans for NPS management projects may be provided for pre-approved projects by ADEM at below market interest rates to town and county governmental units such as water boards and authorities. Potential SRF projects must be included on an annual priority list and are selected on the basis of a priority ranking formula. Some NPS activities that may be eligible for funding include rural and urban stormwater runoff control, green roofs, permeable pavements, rain gardens and stormwater infiltration practices, water conservation and reuse, and water quality-based education and outreach. Projects should strengthen implementation and compliance with federal and state environmental and public health protection regulations. Some SRF loan/project activities may be eligible for use as CWA 319(h) grant non-federal match.

Section C.3.1 Regulatory Approach

a. Overview

Section 301(a) of the Clean Water Act (33 U.S.C. Section 1311) prohibits the discharge of pollutants by any person; excepting compliance with Sections 302, 306, 307, 318, 402, and 404. Section 402 (33 U.S.C. Section 1342) established the National Pollutant Discharge Elimination System (NPDES) permit program. Facilities that discharge or have the potential to discharge stormwater to a municipal separate storm sewer system (MS4) or directly to waters of the state are required to obtain an NPDES permit issued from ADEM or EPA. Implementation of "Phase I" NPDES stormwater discharge regulations have been in-place since 1990 (55 FR 47990, November 1990). In 1999, EPA promulgated "Phase II" regulations under Section 402(p)(6) which expanded the Phase I stormwater program to include smaller urban areas and construction sites to obtain an NPDES construction stormwater permit.

Implementation of the AL NPS Management Program primarily uses a voluntary management approach. If NPS pollution mitigation strategies do not appear to be capable or effectual, as indicated by science-based water quality monitoring and assessment data, regulatory mechanisms are in-place that provides ADEM with enforceable back-up authorities to ensure clean and safe waters. The State of Alabama is authorized by EPA to administer enforceable federal environmental laws and compliance mechanisms at the state level. State oversight is consistent with legislative intent of Alabama statutes that created ADEM. In addition to enforcing Alabama Environmental Regulations and Laws aimed at protecting and enhancing environmental and public health, the ADEM administers several federal programs aimed at preventing, diminishing, or abating stormwater runoff from nonpoint sources. Integration of voluntary and regulatory approaches relative to the CWA Section 303(d), TMDL, Drinking Water, and Groundwater, and State Revolving Fund programs is essential and will continue. Coordination of regulatory compliance inspection, enforcement and corrective action programs (e.g. UST, RCRA, CERCLA, and UIC Programs and the National Pollutant Discharge Elimination System (NPDES) permitting process) continues to strengthen the effectiveness of the NPS management voluntary approach. EPA retains authority for construction general permits and multi-sector general permit coverage on federally recognized Indian tribal lands in Alabama.

The EPA partnered with other federal agencies to establish a mutual commitment to reduce stormwater runoff from federal development and redevelopment facilities. Federal building projects must install infiltration, evaporation, transpiration, and re-use practices to be in compliance with Section 438 of the Energy Independence and Security Act of 2007. Specifically, Section 438 requires federal developments that exceed 5,000 square feet to maintain or restore pre-development hydrology by installing green infrastructure or low impact development measures such as vegetative practices, porous pavements, cisterns or green roofs. The AL NPS Management Program and Section 319 grant program advocates the concept and intent of the Act and encourages the same consideration for non-federal facilities. The ADEM will continue to work with federal facility planners, developers, agencies, officials, and others in Alabama to address Section 438 issues and foster compliance.

b. Federal and State Stormwater Runoff Regulatory Programs

The EPA's National Pollutant Discharge Elimination System (NPDES) permit program is the primary mechanism by which the quality of urban and construction stormwater runoff a "point source" is addressed. The EPA approved

Alabama's NPDES Permit, Federal Facility, and Pre-Treatment Programs in 1979. The General Permit Program was approved in 1991. The state does not have an EPA-approved Biosolids (sludge) program. The ADEM enforces applicable provisions of the NPDES permit program to control both point source and nonpoint sources of pollution to surface waters and ground waters. For example, NPS runoff from diffuse sources that is channeled into a storm drain system becomes a point source discharge at the end of the pipe, can be regulated by EPA and ADEM as a point source, and will require an NPDES stormwater discharge permit. In addition, individual homes that are connected to a municipal wastewater treatment system or use an onsite wastewater treatment and disposal system do not need an NPDES permit; however, industrial, municipal, and other facilities are required to obtain wastewater discharge permits. An NPDES permit may be required for any development and construction project to control stormwater runoff.

To reduce the potential for harmful pollutants to be washed or dumped into waters of the state, defined urban population centers must obtain a Municipal Separate Storm Sewer System (MS4) NPDES permit and develop a stormwater management program. In general, an MS4 is a publicly-owned system of storm drains, pipes, and ditches that collect or convey stormwater runoff to waters of the state (or the U.S.), not to a sewage treatment facility. Phase I stormwater rules relative to the NPDES permit program were promulgated by EPA in 1990 (55 FR 47990 November 1990) under CWA Section 402(p). for certain medium and large cities and counties that generally serve populations of 100,000 or greater. Phase II rules were established in 1999 under Section 402(p)(6) and extended stormwater permit coverage to all areas not covered by a Phase I permit. The ADEM Municipal Branch issues a General Permit for certain industrial and construction-related stormwater discharges that require a Phase I permit; however, municipalities must obtain an Individual Permit for their entire storm drain system. In general, Phase I areas are covered by Individual Permits and Phase II areas are covered by a General Permit. All MS4 stormwater permits require the implementation of structural and nonstructural control measures to reduce pollutant loads from industrial, commercial, and residential to the maximum extent practicable to protect water quality. **Table C.3.2.a** and **Table C.3.2.b,** below lists municipalities and jurisdictions in Alabama regulated under Phase I and Phase II NPDES stormwater permits (as of Nov. 2013).

A General Permit requires a Storm Water Pollution Prevention Plan (SWPPP) be developed and implemented to prohibit illicit discharges and be designed to implement appropriate BMPs to reduce polluted stormwater runoff. The ADEM construction stormwater General Permit requires the development and implementation of a Construction Best Management Practices Plan (CBMPP) in accordance with the latest updates of the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas. The AL NPS Management Program highly recommends the coordination and integration of applicable components of a SWMPP with the development and implementation of a 9-key element watershed-based management plan as required by Section 319 grant guidelines; and as applicable, CZARA (CWA Section 6217) NPS management measures prescribed in Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002 January 1993). An overview of environmental requirements, self-audit checklists, and resources helpful to the regulated MS4 community is presented in Managing Your Environmental Responsibilities: A Planning Guide for Construction and Development (EPA/305-B-04-003, EPA Office of Compliance. April 2005).

The Alabama NPS Management Program and Section 319 grant program supports a comprehensive and coordinated approach to controlling stormwater runoff and protecting water quality. The intent is to implement a holistic NPS management process that addresses all phases of urban development and construction including:

- Pre- and post-development conditions and hydrology on both site-specific and watershed scope and scales
- Site selection, development or re-development
- Planning, design, implementation, operation and maintenance of structural controls
- Planning and implementation of sustained nonstructural water quality protection measures
- Retrofitting existing BMPs
- Evaluating the performance of structural BMPs and implementation of nonstructural measures
- Assessing the effectiveness in protecting water quality and achieving NPS pollutant load reductions
- Establishing quantifiable environmental and economic indicators and measures of success
- Ensuring program and project accountability in terms of on-the-ground actions and water quality improvements

The MS4 Phase II stormwater program requires owners of small regulated MS4s in urbanized areas (in general, cities and towns with populations between 10,000 and 100,000 and construction sites 1 acre or larger including smaller sites that are part of a larger common plan of development) to address the following 6 minimum control measures:

1) Public Education - to inform individuals and households about ways to reduce stormwater pollution
2) Public Involvement - engages the public in the development, implementation, and review of their stormwater management program
3) Illicit Discharge Detection and Elimination - identifies illegal discharges and spills to storm drain systems
4) Construction - addresses stormwater runoff from active construction sites
5) Post-construction - addresses stormwater runoff after construction activities have been completed
6) Pollution Prevention/Good Housekeeping - addresses MS4-owned facilities and activities

A holistic regulatory/voluntary management approach is particularly appropriate for land disturbance activities from which NPS runoff may discharge to waters listed as impaired on CWA Section 303(d) lists, impacts TMDL implementation, threatens Outstanding Alabama Waters (ADEM Administrative Code r. 335-6-10-.09)or any water of the state assigned a special designation in accordance with ADEM Administrative Code r. 335-6-10-.10.

The AL NPS Management Program and the Section 319 grant program in Alabama endorses EPAs National Menu of Stormwater Best Management Practices to help urban development and construction entities develop and implement the 6 required minimum control measures listed above. Additional recommend measures are presented in the National Management Measures to Control Nonpoint Source Pollution from Urban Areas (EPA-841-B-05-004, Nov 2005), and as applicable, CZARA (CWA Section 6217) management measures prescribed in Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002 January 1993).

Table C.3.2.a Phase I Stormwater Regulated Communities in Alabama (as of Nov. 2013)

Alabama Dept. of Transportation	City of Fairfield	City of Lipscomb
Alabama State Parks Division	City of Gardendale	City of Madison
City of Adamsville	City of Helena	Town of Maytown
City of Alabaster	City of Homewood	City of Midfield
City of Bessemer	City of Hoover	City of Mobile
City of Birmingham	City of Hueytown	City of Montgomery
Town of Brighton	City of Huntsville	City of Moody
City of Brookside	City of Indian Springs	City of Mountain Brook
City of Chickasaw	City of Irondale	Town of Mulga
City of Creola	City of Leeds	City of Pelham
City of Pleasant Grove	City of Satsuma	City of Vestavia Hills
City of Prichard	City of Tarrant	Jefferson County Commission
City of Saraland	City of Trussville	Mobile County Commission
Shelby County		

Table C.3.2.b Phase II Stormwater Regulated Communities in Alabama (as of Nov. 2013)

Tuscaloosa County	City of Florence	City of Muscle Shoals	Auburn University
City of Holt	City of Hokes Bluff	City of Northport	University of Alabama
City of Coker	City of Rainbow City	City of Opelika	Redstone Arsenal
ALDOT-Statewide	City of Attalla	Phenix City	City of Bayou La Bayou
City of Auburn	City of Glencoe	City of Sheffield	Maxwell Air Force Base
Calhoun County	City of Reece City	City of Tuscaloosa	City of Smiths Station
Anniston	City of Gadsden	City of Tuscumbia	City of Fultondale
Jacksonville	City of Southside	Russell County	City of Daphne
Oxford	Lee County	Ladonia	City of Fairhope
City of Decatur	Madison County	Maxwell/Gunter Annex	City of Spanish Fort
City of Dothan	Baldwin County		

c. Local Ordinances and Permitting

In addition to federal and state NPDES Phase I and II stormwater program elements, some municipalities in Alabama have developed locally enforceable requirements for new, existing, or re-development projects. Locally specific development and construction regulations to address NPS pollution include:

- **Ordinances and Permitting -** to manage peak flows and volume and to reduce NPS pollutant composition, concentration, or toxicity. Management measures include but are not limited to: installation of pervious surfaces or porous pavement, open or green spaces, bioretention, wet detention ponds, or constructed wetlands.
- **Subdivision development ordinances** - to balance commercial and residential land use, extent, and site design. Measures may involve limitations on impervious surfaces or "build out" to ensure open/green spaces and to protect riparian areas, vegetative buffers, or setbacks for streambank, beach, and other sensitive areas. Due to land area limitations inherent to developed areas, equivalent *off-site* creation, restoration, or enhancement of constructed wetlands (e.g. mitigation banks) and riparian areas may be appropriate.

The AL NPS Management Program endorses EPAs model ordinance language and templates to help regulated communities make locally-relevant environmental and human health protection and safety decisions regarding stormwater, stormwater control operation and maintenance, protect water quality, prevent pollution, aquatic buffers, erosion and sediment control, open-space development, illicit (illegal) discharges, or post-construction measures. Municipalities in Alabama are encouraged to develop their own language and local processes.

d. Section 319 Grant Funds to Control Urban Development and Construction Stormwater Runoff

The EPA and ADEM both recognize the benefits of integrating Section 319 grant watershed protection resources and planning and implementation of Phase II MS4 stormwater management activities. Section 319 grant funds may be applied to measures and activities that do not directly implement a final Phase II MS4 permit (e.g., not explicitly required by, or that go above and beyond NPDES permit or associated stormwater management plan required by the permit). Section 319 cannot be used to resolve an enforcement action relevant to permitted stormwater discharges regulated under Phase I (Clean Water Act Section 402(p) of Phase II (CWA Section 402(p) (6)). Targeting Section 319 grant funding for demonstration-site purposes (such as to capturing stormwater in urban areas and then infiltrating, evapotranspiring, or using for beneficial purposes) does not *directly* implement the regulatory requirements of an MS4 stormwater permit.

Section 319 funds will continue to be used to support implementation of EPAs integrated Healthy Watersheds Initiative - A National Framework and Action Plan (2011 and as updated) aimed at voluntarily addressing Phase II nonpoint source stormwater runoff challenges. Both EPA and ADEM recognize the importance of low impact development, green infrastructure, and smart growth in managing NPS stormwater runoff and will try to be flexible in funding urban development activities with Section grant funds where legally permissible, practicable and appropriate. Urban development and construction measures designed to demonstrate the proper management of NPS runoff that **May** be eligible for Section 319 funding in urban areas include, but is not limited to:

- Green roofs
- Infiltration retention areas and detention basins
- Curb cuts
- Landscaped swales
- Constructed wetlands
- Impervious to pervious surface retrofits
- Wetland, riparian and other ecologically sensitive area protection and restoration

Urban development and construction stormwater runoff activities that **May** be eligible for Section 319 funding include, but are not limited to:

- Technical assistance provided to state and local NPS stormwater runoff control entities
- Monitoring needed to design and evaluate BMP implementation effectiveness
- Planning and design of BMPs for pollution prevention or source reductions (except as required by an NPDES permit)
- Outreach and education outside of the required scope of an NPDES permit
- Technology transfer
- Development of regulations and local ordinances to address NPS runoff in areas covered by NPDES permits provided that they also apply to non-permitted areas

Section 319 funds **Can Not** be used to meet or implement NPDES permit requirements such as:

- Mapping stormwater systems

- Identifying illicit connections
- Characterizing stormwater discharges or monitoring required by permits
- BMPs for "end of pipe" treatments which are required as part of a NPDES permit

Publicly owned treatment works, methods or systems for preventing, abating, reducing, storing, treating, separating or disposing of stormwater runoff may be eligible to receive financial assistance from the Clean Water State Revolving Fund (SRF) program administered by ADEM. As regulated stormwater implementation processes continue to evolve, greater voluntary NPS management program coordination is expected. ADEM will continue to consult with EPA Region-4 on a case-by-case basis to determine if a specific nonpoint source BMP is eligible for SRF or Section 319 grant funding. Research activities are **not** fundable using Section 319 grant funds.

e. Supplemental Environmental Projects

The Supplemental Environmental Project (SEP) program as administered by ADEM is designed to enhance environmental quality and increase environmental protection awareness. It provides an opportunity for a respondent in an enforcement action to negotiate an SEP in return for a reduction in an administrative penalty. Selected projects must minimize risks and improve public health and the environment beyond that which is required by being compliance with applicable statutes. In addition, there must be a relationship between the underlying enforcement action and the human health or environmental benefits that will result. Key project categories that may qualify as a SEP includes pollution prevention and reduction, planning, and preparedness (see **Table C.3.2.a**) and may be narrowly focused or include a mix of practices.

Table C.3.2.a SEP Activities that Support AL NPS Management Program Goals and Objectives

- Purchase monitoring kits or replenish supplies for volunteer water quality monitoring programs and opportunities for citizens to receive certification training
- Daylight an urban stream to restore natural stream function and hydrology, water quality, aquatic habitat, and watershed social vitality, economic health and other benefits
- Install or retrofit parking lots, drive ways, or sidewalks using permeable materials to reduce rainfall runoff velocity and volume and to help infiltrated to and recharge groundwaters
- Use vegetation to restore an impaired streambank to help reduce erosion and bank sloughing/failures and to enhance aquatic species population, diversity and habitat
- Purchase, donate, develop or restore land for public parks and natural green space areas to help treat stormwater runoff
- Remove litter, garbage and solid waste from local streams, along roadsides, and environmentally sensitive areas
- Develop, restore or enhance constructed wetlands, bioretention facilities, vegetated rooftops, rain gardens, rain barrels, etc, to collect and treat stormwater runoff
- Provide water quality protection and restoration classroom materials and training for teachers and students
- Assist schools in properly disposing of laboratory chemicals and other institutional toxic substances
- Develop or enhance school outdoor environmental study areas and learning centers
- Fund teacher/student field trips to recycling businesses, landfills, wetlands, or water and wastewater treatment facilities
- Fund environmental workshops or camps for various NPS audiences
- Sponsor reuse, restore and recycling training and events
- Provide funds, protective clothing, or equipment for hazardous material safety, use, and spill training
- Provide funding to increase public awareness and knowledge of environmental laws, regulations, rules, and programs
- Sponsor a program to publically recognize outstanding environmental protection and restoration efforts and projects
- Clean-up illegal dump sites along streams and roadways
- Provide resources in public areas to mitigate pet waste
- Conduct community-based household chemical, pesticide, pharmaceutical and other hazardous waste collection events
- Conduct electronic device collections events for recycling
- Help restore a "brownfields" site
- Sponsor used petroleum, vegetable, and synthetic-based waste oils; paints, solvents, household cleaners, etc., collection, disposal, and recycling efforts
- Sponsor mercury, fluorescent fixture, unknown hazardous waste education and outreach, training, and collection and disposal events

Section C.3.2.1 Nonpoint Source Management in Coastal Areas

The Coastal Nonpoint Pollution Control Program describes *enforceable* polices and mechanisms to implement NPS pollution controls. The program was established by Congress in 1990 under the Coastal Nonpoint Pollution Control Program (Section 6217). It is jointly administered by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA). The Alabama Coastal Area Management Program is jointly administered by ADEM and the Alabama Department of Conservation and Natural Resources (State Lands Division - Coastal Section) to mitigate NPS pollution impacts to estuaries, beaches, the Gulf of Mexico, and marine

resources along coastal Alabama (Baldwin and Mobile counties). Section 6217 requires states and territories with approved Coastal Area Management Programs to develop state Coastal Nonpoint Pollution Control Programs. Coastal NPS pollution management measures must conform to those illustrated in EPA Guidance (EPA 840-B-92-002 January 1993) and must address agriculture, forestry, urban areas, marinas, hydromodification (shoreline and stream channel modification), and loss of wetlands and riparian areas. Implementation of NPS management measures include permitting programs, zoning, enforceable water quality standards, and other general environmental laws and regulations. Voluntary measures must be backed up by appropriate regulations.

The Alabama Coastal Area Management Program (ACAMP) was approved and has been in effect since 1979. It is designed to comprehensively promote, improve and safeguard coastal zone lands and waters while preserving, enhancing, and developing coastal natural resources. The enforceable policies of the program are used to regulate various activities on coastal lands and waters seaward of the contiguous 10-foot contour in Baldwin and Mobile Counties. The ACAMP is a joint effort of the Alabama Department of Conservation and Natural Resources - State Lands Division (ADCNR-SLD) and the ADEM Coastal Programs. The ADCNR-SLD is responsible for planning and policy development and ADEM is responsible for permitting, monitoring and enforcement activities (ADEM Division 8 Coastal Programs Rules: ADEM Admin. Code R 335-8). A primary function of ADEMs coastal program includes issuing state water quantity certifications and ascertaining federal coastal consistency for projects and activities which require federal permits for dredge and fill/disposal projects (including wetlands), infrastructure such as highways, dams and levees; sand and gravel mining, etc.). The U.S. Army Corps of Engineers (Mobile District) and EPA (Region 4) may also prohibit deny, or restrict coastal permits (e.g. CWA Section 404). In addition, ADEMs Coastal Program rules require review and permitting for coastal zone construction and development activities including:

- Beach and dune construction projects
- Developments and subdivision of properties greater than five (5) acres in size
- Dredging and filling of state water bottoms and wetlands
- Drilling and operation of groundwater wells with a capacity of 50 gpm or greater
- Siting of energy facilities
- Other activities which may have an impact on coastal resources

The Coastal NPS Program is inextricably linked to the statewide Alabama NPS Management Program and the state's CWA Section 319 nonpoint source grant program. As applicable to local conditions and needs, coastal NPS management measures and programmatic activities are equivalent to those endorsed by the AL NPS Management Program. Efforts are mutually coordinated and leveraged by ADEM staff to ensure programmatic coordination, sustain partnerships, and to implement NPS control measures. Enforceable authorities to implement the CZARA 6217 coastal program are provided by ADEM Coastal Area Management Program (Division 8) rules. In addition, a variety of voluntary management program strategies are used to indicate progress and success, including but not limited to: watershed-based management plan development and implementation, agency and private sector partnerships, volunteer groups and programs, education and outreach, pollution prevention, financial incentives, environmental monitoring and tracking, and local regulations and ordinances.

While different legal authorities may apply to different situations, the goals of the NPDES Phase II stormwater and CZARA programs are complementary. Many of the urban management measures and practices are mutually applicable, even though the programs do not work identically. If an urban area is covered by a NPDES Stormwater Permit (Phase I or Phase II), it may be excluded from explicit CZARA requirements provided the NPDES permit adequately addresses stormwater runoff with management measures and enforceable policies consistent with both the NPDES permit and the CZARA requirements.

Local, state, and federal coastal zone entities continue to partner together to enhance the ecological and economic health of the Gulf of Mexico. Multi-state and multi-agency coastal NPS management partners include EPA's Healthy Watersheds Initiative (within the framework as coordinated by the Mobile Bay National Estuary Program),the Gulf of Mexico Alliance, and the Gulf of Mexico Initiative. Section 319 funded statewide and coastal NPS management efforts benefit from these programs by leveraging resources needed to effectively plan, implement

and assess coastal water quality protection and restoration goals, objectives and practices. Adaptable, integrated, and system-based approaches help to ensure that NPS control practices will be appropriately installed and maintained. Integral to long-term NPS programmatic implementation success is continued and effective communication, coordination, collaboration, and cooperation. Establishing and maintaining inclusive public and private sector partnerships, achieving priority pollutant load reductions, and meeting state water quality standards will continue to serve as measurable indicators of long-term statewide and coastal NPS programmatic implementation success.

Section C.4 Nonpoint Source Best Management Practices and Measures

a. Overview

Many citizen's in Alabama only think about pollution when problems are identified by "the media" such as large scope and scale environmental impacts or easily identifiable targets such as industrial end-of pipe discharges, toxic waste, leaking landfills, and oil spills. People may be unaware or often forget that the vast majority of water pollution problems originate from "pointless" sources – i.e., discrete and smaller scope and scale sources of pollution resulting from one's own daily living routines and activities. While one careless or uninformed person might contribute only a minor amount of NPS pollution, the combined effect of an entire block, neighborhood, or community can have significant water quality degradation consequences (e.g. eutrophication, sedimentation, drinking water contamination, human health risks, impaired aquatic habitats, etc).The AL NPS Management Program and Section 319 grant program continues to endorse a sustained, voluntary, and iterative approach to implementation of appropriate management measures and practices and efforts to enhance public and private sector education and outreach to prevent and control NPS pollution from urban development and construction and activities.

Urban stormwater runoff management is required by EPA to protect water quality and prevent flooding caused by increased runoff (mostly as a result of increases in impervious surfaces in the watershed). The National Management Measures to Control Nonpoint Source Pollution from Urban Areas provides effective management techniques that can help urban stormwater runoff entities protect and restore water quality and provide an informational resource to municipalities that are implementing relevant best management practices required by a Phase II stormwater permit. For optimum water quality protection and restoration effectiveness, NPS management practice planning, design, implementation, and maintenance should be proactively communicated with relevant resource agencies and the public and private sectors at the state, watershed, community, and site-specific levels to gain pre-development and construction buy-in.

Section 319 grant funds may be available on a limited basis to demonstrate proper structural NPS pollution management techniques as well as nonstructural practices such as education and outreach. Rainfall runoff from urban and development and construction activities can result in different NPS pollutant composition, toxicity, flows, velocity, and patterns of stormwater runoff. Specific BMPs to address NPS pollution should be selected on a case-by-case basis depending on the particular activity, site conditions, economics, and effectiveness. The topics presented are environmentally-protective recommendations and housekeeping measures designed to control NPS runoff before it enters surface water or groundwater resources. In general, the most practicable and cost-effective NPS management approach for the majority of the pollutant causes listed below is pollution prevention. Prevention practices are generally much more cost effective to implement when compare to mechanical, biological, chemical or physical treatment of NPS impaired waters.

b. Construction Stormwater

Entities involved in urban development activities must be knowledgeable of the applicability and effectiveness of construction stormwater runoff control measures (i.e. the conditions under which BMPS will be implemented). Continued training of elected official, inspectors, engineers, and workers in all aspects of planning, and pre- and post-BMP implementation and maintenance is highly recommended. The ADEM issues an NPDES General Permit for stormwater discharges associated with a regulated construction activity that will result in a land disturbance equal to or greater than one acre or construction activities involving less than one acre and which are part of a common plan of development or sale equal to or greater than one acre. Construction entities seeking coverage under the General Permit must submit a Notice of Intent (NOI) and implement and maintain erosion and sediment controls in accordance with a Construction Best Management Practices Plan (CBMPP) prepared and

certified by a Qualified Credentialed Professional (QCP). The CBMPP and NOI are submitted to ADEM for review for priority construction sites. Priority sites include any site that discharges to (1) a waterbody which is identified on Section 303(d) lists of impaired waters for turbidity, siltation, or sedimentation, (2) any waterbody for which a TMDL has been finalized or approved by EPA for turbidity, siltation, or sedimentation, (3) any waterbody assigned the Outstanding Alabama Water use classification (ADEM Admin. Code Chapter 335-6-10-.09), and (4) any waterbody assigned a Special Designation (ADEM Administrative Code Chapter 335-6-10-.10). Under ADEM Administrative Code Chapter 335-6-12-.02, a QCP or Qualified Credentialed Inspector (QCI) must conduct regular inspections of regulated construction activities to ensure erosion and sediment controls are effective and maintained. In certain circumstances, the QCI or QCP must also monitor construction site discharges for turbidity. The ADEM recognizes Qualified Credentialed Inspector (QCI) training programs offered by the Homebuilders Association of Alabama and Thompson Engineering, Inc. (as of Oct. 2013).

Construction sites that discharge directly to waters of the state are required to submit a CBMPP with any request for permit coverage. For waters where only the stream segment is identified, ADEM may, on a case-by-case, designate sites within the surrounding watershed as Priority Construction Sites. On December 1, 2009, the U.S. Environmental Protection Agency (EPA) published effluent limit guidelines (ELGs) and new source performance standards (NSPS) for regulated construction sites. The regulation was effective on February 1, 2010, and all permits issued by EPA or ADEM incorporate the final rule requirements including non-numeric effluent limits promulgated by EPA. The EPA National Menu of Best Management Practices for Stormwater Phase II is not all-inclusive, but it does provide effective development and construction measures that can be implemented to successfully mitigate NPS pollutants and stormwater runoff that originate from a single source or a multitude of sources. Endorsed by the AL NPS Management Program to help prevent, reduce or abate NPS pollutant load reductions, the aforementioned "national menu" does not preclude urban development and construction entities from implementing other environmentally-protective, cost-effective, or technically sound state water quality protection and restoration measures and practices.

c. Household and Residential

The NPS best management practices presented below are effective and environmentally-responsible housekeeping measures that can be implemented with relatively low effort and costs.

Examples of management practices for controlling NPS pollutant runoff from household and residential areas include but are not limited to the following:

- Never dump anything down storm drains or into streams
- Collect and/or treat rainwater using low impact practices such as rain barrels, rain gardens, grass swales, or vegetated filter strips.
- Compost grass, leaves, pine straw and other yard waste and use as mulch and to stabilize eroding sites. Use of native lawn grasses, landscape plantings, and appropriate compost and mulches to establish or replace high maintenance lawns
- Use the least toxic pesticide or herbicide and only use and apply according to its federally approved label
- Use biodegradable and nontoxic solvents, cleaners and other products; according to their directions, in the least amount needed, and properly store to avoid accidental spills and leaks
- Use fertilizers sparingly and sweep up overages on driveways, sidewalks, and gutters. Use Integrated Pest Management (IPM) to reduce dependence on pesticides. Do not apply lawn fertilizer if an intense rain event is forecast.
- Direct downspouts away from paved surfaces and consider installing a rain garden to capture runoff
- Pick up and properly dispose of pet waste to reduce pathogen and nutrient runoff
- Use, store, and properly dispose of personal care products and pharmaceuticals
- Check vehicles, machinery, and equipment for fluid leaks and repair as resource allow. Recycle used motor oil.
- Wash vehicles on porous surfaces or vegetated areas so that the wash water infiltrates to the ground, or use car wash facilities that do not generate NPS pollutant runoff.
- Dispose of swimming pool and spa waters down a sanitary sewer whenever possible. Dechlorinate before discharging to a drainage ditch, stream or lawn. Properly cover and store pool and spa chemicals to prevent leaks and spills.
- Use a non-coal tar based sealant to seal asphalt driveways
- Limit paved surfaces. Use native turf grasses and vegetative ground covers, wooden decks, gravel, sand, or permeable brick paver substitutes instead of concrete patios, driveways, and walkways and/or install or retrofit impervious driveways and sidewalks using permeable, porous or pervious substrates
- Regularly inspect and also pump-out onsite disposal and treatment systems (septic tanks) every 3 to 5 years. Conserve water by using water efficient kitchen, bathroom, and laundry fixtures to help extend the life of the septic system. Disposal of solvents, antifreeze, pesticides, oil, paint, diapers, paper towels, and cat litter down a toilet or a garage/shop floor drain can clog the system and reduce treatment efficiencies.
- Volunteer to become involved in local roadside and stream clean-up and restoration efforts
- Stencil storm drains with "don't dump" messages to help prevent household cleaners, grease, oil, plastics, food and paper products from being flushed down the storm drain or along the street gutter or roadway ditch
- Landscape with nature to prevent NPS runoff volume and velocity. Minimize altering the natural contour of the site and plant/replant with native plant species - use proper mulching to decrease erosion and xeriscaping as a framework to reduce water use, and chemical and fertilizer runoff

d. Municipal

A primary function of municipal stormwater programs is to prevent, reduce, treat, or eliminate pollutant runoff to storm drain systems. Wastewater discharges and illicit deposition of solid materials can cause significant NPS problems to surface water and groundwater resources. Because of variable quality, quantity, intermittent nature, and source (mobility) of the discharge, urban NPS pollution runoff can be difficult to manage. Effective controls should incorporate both non-structural and structural measures. Structural or physical improvements are generally difficult to implement (retrofit) at existing "built-out" sites and are best considered for new or developing sites. Non-structural practices can be more effective as structural measures and may include pollution prevention / source controls and education and outreach to increase citizen knowledge and awareness.

Municipal NPS pollutants can originate and be transported from impervious areas such as paved streets, parking lots, sidewalks, and rooftops. Nonpoint source pollutants can also be discharged from urban landscapes, golf courses, swimming pools, corporate and municipal facilities and buildings, catchment and treatment ponds, basins, and lagoons, street medians, and as a result of poorly designed and maintained practices. Other NPS pollutants can originate from pressure washers used to clean sidewalks, driveways, parking areas, and building exteriors; and discharges associated with janitorial services, auto detailers, carpet cleaning and window washing. Municipal stormwater runoff can contain NPS pollutants (e.g. hydrocarbons, metals, nutrients, pesticides, pathogens, chemicals, sediment, trash and debris, etc.) and significantly impair receiving water quality. Thermal pollution from paved surfaces and rooftops can significantly alter water quality and aquatic organism survival. Stormwater discharges from municipalities are generally regulated under the EPA and ADEM Phase I and Phase II stormwater NPDES permit programs.

Examples of management practices appropriate for controlling NPS pollutant runoff from municipal development and construction site activities include but are not are not limited to the following:

- Regularly sweep and clean paved streets and parking areas
- Post "Do Not Litter" signage, install litter, trash, and debris receptacles; enforce local littering/dumping laws
- Implement a storm drain (Do Not Dump - Drains to River) stenciling program
- Do not place clippings, pruning waste, or tree trimmings in gutters. Do not blow or rake leaves and other yard waste into the street
- Provide electronic, hazardous material, oil, paints, glass, paper, metal, etc., collection and recycling centers
- Maintain or increase vegetative areas using native species to prevent erosion, increase infiltration rates, and reduce NPS polluted rainfall velocity and amounts
- Reduce or retrofit impervious surfaces to percolate/infiltrate rainfall runoff and to decrease rainfall runoff volume and velocity (e.g., permeable, porous, and pervious surfaces for sidewalks, parking areas, roadways/streets, park pathways, etc.)
- Compost pruning, clippings, and other vegetation and use to stabilize exposed soils
- Use pesticide and herbicides sparingly, only as needed (not on a regular preventive schedule) and least toxic
- Inspect and maintain rainfall runoff catch basins, storm drain inlets and outlets, and piping systems
- Cover stockpiled patching, resurfacing, sealants and cleaning materials. Protect from wind and rain. Store away from storm drains and waterbodies. Install spill containment berms.
- Ensure double containment of bulk fluids (gas, chemicals, fertilizers) and keep storage areas clean
- Do not allow concrete truck mix wash-out to be disposed of down drains or near or into waterbodies
- Train employees to implement and maintain best management practices to reduce NPS pollutant runoff and protect water quality including training to implement spill response plans
- Provide training and education to vendors and material providers
- Increase citizen knowledge and awareness relative to Phase I and Phase II stormwater regulations
- Reduce, reuse, and recycle

The AL NPS Management Program and Section 319 grant program supports the expansion of municipal planning and design precepts to proactively diminish or prevent NPS pollution runoff in urban areas (e.g. dense, walkable communities, mixed-use buildings, street design, increased green spaces, etc.). A collaborative education and outreach delivery and training program (e.g., webinars, websites) to serve a mix of city and regional urban development and transportation planners, designers, architects, developers, project managers, resource agencies, government officials, academic institutions, environmental protection and community organizations, and others should be developed and sustained to enhance knowledge and awareness about all aspects of urban NPS pollution, water quality protection, conservation/preservation, sprawl, human health, quality-of-life, and community sustainability. In order to ensure that NPS pollution runoff is proactively and effectively targeted during all phases of project design and development (and not as an afterthought), training (and perhaps accreditation/certification) is recommended for public and private sector design firms doing capital construction /redevelopment work.

Separate sanitary sewer systems collect and transport domestic, industrial, and commercial sewage for treatment prior to its discharge to a receiving water. Unintentional discharges of raw sewage do occasionally occur in almost every system due to increased infiltration after severe rain events, improper system maintenance, and vandalism. Local MS4s should encouraged public education efforts such as signage, storm drain marking, pollution prevention and partnerships with citizen groups, organizations, and businesses to reduce NPS pollutant sources and causes and illicit connections. Examples of best management practices that can help reduce or eliminate overflows and resultant NPS water quality problems include:

- Regular sewer system clean out and maintenance
- Reducing infiltration by promptly repairing broken or leaking service lines
- Upgrading or retrofitting piping systems
- Providing green design storage and treatment structures and facilities to capture and/or treat occasional overflows following rain events

e. Industrial

Nonpoint source discharges from industrial sources often contain elevated levels of pollutants associated with activities involving material handling, storage and exposure to the weather. Nonpoint sources pollutants may include heavy metals, trash, debris, and hydrocarbons. As rainfall runoff flows over or through the facility or site, it can pick up NPS pollutants and transport them directly to storm drains and ultimately to streams, rivers, lakes, and estuarine and marine waters. Increased velocity and volume, especially from impervious surfaces can degrade aquatic habitats, increase downstream erosion and sedimentation, cause flooding, and alter watershed hydrologic processes. Industrial NPS pollution runoff can also impair drinking and commercial use water sources. Prevention practices are generally very cost effective to implement compared to treatment of NPS polluted waters.

Examples of management practices appropriate for controlling stormwater discharges from industrial sources include but are not limited to the following:

- Provide training and education to employees, vendors and raw material providers
- Reduce or eliminate the amount of NPS pollution runoff by controlling the amount of waste generated. Establish a waste reduction program (e.g. production planning, sequencing, raw material substitutions, better housekeeping and loss prevention, waste product segregation and separation , closed loop recycling, and employee training)
- Eliminate illicit connections to storm drain systems
- Establish and implement effective emergency spill response clean up plans and prevention controls
- Establish and maintain good building and grounds housekeeping practices (e.g. sweeping, berms, drip pans, roofed covers, keeping lids closed on dumpsters, etc.) to keep exposed areas free of NPS pollutants and reduce the potential for stormwater runoff to transport spills and other pollutants to receiving waters.
- Use non-caustic, nontoxic or less toxic solvents, cleaners, detergents, and degreasers. Do not dump used or leftover solutions, automobile fluids, and solvents down stormwater drains or into ditches; dispose of as hazardous waste and recycle batteries.
- Ensure that area raw materials are stored in a contained area with overhead cover, berms, or other secondary containment and do not have the potential to contribute to stormwater pollution.
- Store single-wall chemical containers using secondary containment structures, berms or dikes, or cover to prevent stormwater contamination from an accidental release. Solid materials with the potential to release NPS pollutants (e.g. drums, drip pans, batteries, scrap material, engines and wrecked vehicles) should be stored using secondary containment.
- Cover temporary waste piles with tarpaulins, plastic or other impervious materials to prevent contamination of rainfall runoff
- If waste material has the potential to contaminate stormwater, store it in a contained or controlled area. Evaluate the facility "bone-yard" and scrap all equipment that is out-of-date and not intended to be reused.
- Segregate and securely store incompatible or reactive materials and chemical should spills or inadvertent mixing occur
- Continue to look for evidence of stormwater discharges by inspecting stormwater outfalls where NPS pollutant discharges leave the facility.
- Repair or replace worn or ineffective NPS control measures as soon as possible and before the next forecasted precipitation event.
- Use native vegetative covers, mulch, and compost in the landscape, on non-vehicle traffic areas, and to stabilize exposed soils
- Leave native trees or shrubs in place during and after site clearing as much as is practicable.
- Install NPS pollution barriers such as a silt fences, hay bales, berms, settling basins, or other containment and filter structures as needed.
- Minimize off-site tracking of raw, final or waste materials and disturbed soils by stabilizing and protecting construction roads and entrances with small stones and fines (crusher run). Install a wash site or pad to clean vehicles prior to their leaving the site to reduce conveyance of materials and sediment from the site.
- Protect areas where vegetation cannot be established using spray-on chemical soil treatments such as anionic asphalt emulsion, latex emulsion, and resin/water emulsions. Conduct soil test to determine appropriateness for using dust control palliatives. Before application, determine whether the chemical is biodegradable or water-soluble and what effect its application may have on water quality, aquatic organisms and wildlife.
- Ensure proper repair, maintenance, of washing/cleaning facilities.
- Establish fueling station protocols and install oil/water separators to reduce hydrocarbon amounts in stormwater runoff

The NPDES program includes an industrial stormwater permitting component that covers 10 categories of industrial activities that require discharge authorization under an NPDES industrial stormwater permit. Federal regulations [40 CFR 122.26(b)(14)(i)-(xi)], identify 11 categories of stormwater discharges associated with industrial activities that are required to be covered under an NPDES permit (unless otherwise excluded). These activities can also minimize the impact of NPS pollution discharges from industrial facilities. Specific industrial pollution sources include:

- Category One (i): Facilities subject to federal stormwater effluent discharge standards in 40 CFR Parts 405-471
- Category Two (ii): Heavy manufacturing (for example, paper mills, chemical plants, petroleum refineries, and steel mills and foundries)
- Category Three (iii): Coal and mineral mining and oil and gas exploration and processing
- Category Four (iv): Hazardous waste treatment, storage, or disposal facilities
- Category Five (v): Landfills, land application sites, and open dumps with industrial wastes
- Category Six (vi): Metal scrap yards, salvage yards, automobile junkyards, and battery reclaimers
- Category Seven (vii): Steam electric power generating plants
- Category Eight (viii): Transportation facilities that have vehicle maintenance, equipment cleaning, or airport deicing operations
- Category Nine (ix): Treatment works treating domestic sewage with a design flow of 1 million gallons a day or more
- Category 10 (x) pertains to construction sites that disturb five acres or more is permitted separately
- Category Eleven (xi): Light manufacturing (food processing, printing and publishing, electronic and other electrical equipment manufacturing, and public warehousing and storage).

The EPA Multi-Sector General Permit (MSGP) addresses stormwater discharges from 29 sectors of industrial activity. The North American Industry Classification System (NAICS) provides a general description of each of the 29 industrial sectors and activities. The U.S. Census Bureau has a conversion table to bridge the older Standard Industrial Classification (SIC) codes with the newer NAICS codes (see Industrial Fact Sheet Series for Activities Covered by EPAs MSGP). In addition, the U.S. Coast Guard requirements (33 Code of Federal Rules (CFR) Titles 153, 154, and 155) should be followed for marine vessel spill prevention and responses at marine facilities.

Industrial nonpoint source pollutants can affect both air quality and water quality. For example, although smokestacks are permitted point sources; some pollutant releases can be transported in the atmosphere over long distances. A pollutant from a single source may combine and interact in the atmosphere with pollutants released from other sources (considered now as nonpoint sources) to be ultimately deposited in receiving waters. Pollutant deposition from atmospheric transport and deposition can degrade waters (change waterbody pH, cause human health issues, result in fish and shellfish consumption advisories). The ADEM Air Division regulates air pollution and emissions in Alabama; however, some air emission solutions will take the concerted efforts of interstate, national and international partnerships to protect water quality and is beyond the scope of this document (e.g. mercury). Specific air pollutants, causes and potential solutions to protect environmental and human health relative to the Clean Air Act are administered as national EPA programs and targeted in Alabama by the ADEM ambient air monitoring plan (as annually updated).

f. Transportation (Roadways and Bridges)

Stormwater runoff associated with the construction and maintenance of roadways and bridges can have major impacts on water quality. Nonpoint source pollutants associated with transportation corridors include, but are not limited to erosion (dust and sediment); rubber and metal from tire wear; and vehicle fuel, oil, grease and other fluid leaks. Incidental pollutants include litter and debris (e.g. food containers, household waste, tire scraps); spills (chemicals, solid and hazardous waste); and fertilizers, pesticides, and herbicides. These nonpoint sources of pollution can significantly impact human and aquatic life and make stream, reservoir, groundwater, wetlands, estuary and marine water quality difficult to protect and restore. Sedimentation of streams, iridescence (rainbow colors associated with petroleum product leaks and spills) in runoff water and receiving waters, changes in stream bank stability, stream sandbar formation or relocation, and turbid (muddy) water may be signs of roadway construction and maintenance problems.

The Office of Environmental Coordination of the Alabama Department of Transportation (ALDOT) places major emphases on mitigating environmental responses associated with road, highway, and bridge construction and maintenance in Alabama (pre-construction, construction, post-construction, emergency response). The ALDOT and ADEM established a *Memorandum of Understanding* to efficiently mitigate citizen environmental complaints.

Construction sites where disturbed areas are considered point sources of pollution require a National Pollutant Discharge Elimination System (NPDES) construction storm water permit under CWA Section 402. The ALDOT is also required to implement Six Minimum Control Measures included in its MS4 permit. Extreme water quality protection cautions must be taken for road, highway, and bridge construction and maintenance activities that require CWA Section 404 or 401 water quality certifications and where NPS pollutant runoff may impact priority state waters as identified by ADEM. Construction sites discharging directly to priority waters, and those within any identified watershed areas, are required to submit a Construction Best Management Practices Plan (CBMPP) when requesting NPDES permit coverage.

Roadway projects should continue to consider potential NPS environmental and economic health effects relative to urban sprawl, other infrastructure, and quality-of-life issues. It is highly recommended that pollution prevention and source reduction strategies be in-place (and maintained) throughout all phases of roadway and bridge construction to ensure NPS runoff problems are prevented and surface waters and groundwaters are adequately protected. Education, outreach and training and water quality monitoring must be continued to ensure that natural resources are adequately protected from NPS stormwater runoff events as well as from potentially hazardous waste spills. These NPS pollution management efforts can help the transportation community:

- Identify, build and maintain partnerships
- Align priorities and leverage resources
- Transfer knowledge and awareness
- Demonstrate and apply new and innovative practices and technologies
- Protect infrastructure
- Reduce costs
- Helps the regulatory community remain in compliance with applicable federal and state environmental laws, rules, and regulations

The AL NPS Management Program and Section 319 grant program (as applicable and allowable) will continue to support efforts by ALDOT to implement applicable water quality protection regulations relevant to the Clean Water Act, Alabama Environmental Regulations and Laws, U.S. Department of Transportation - Federal Highway Administration, Federal Insecticide, Fungicide, and Rodenticide Act (herbicides/pesticides; invasive species), Occupational Safety and Health Administration (hazardous materials and spills), and U.S. Army Corps of Engineers (dredge and fill) for all state roadway and bridge construction and maintenance activities. In addition, ADEM Coastal Area Management Program (Division 8 rules) includes enforceable authorities to implement stringent management measures relative to the CZARA 6217 coastal program.

The Alabama NPS Management Program and Section 319 grant program continues to support efforts by ALDOT to enhance stakeholder involvement and collaboration provisions relative to transportation planning and development processes. The ADEM will continue to partner with ALDOT to use federal transportation enhancement program funding to prevent or control NPS polluted runoff from reaching waters of the state (e.g., Intermodal Surface Transportation Efficiency Act of 1991, TEA -21, and related/similar reauthorizations).

Priority CZARA 6217 management measures for roadways and bridges should be designed to:

- Protect water quality benefits and areas that are particularly susceptible to erosion
- Limit clearing and grading and cut fill to reduce erosion and sedimentation
- Limit disturbance of natural hydrology and vegetation
- Place roadways and bridges so that sensitive aquatic ecosystems are protected
- Ensure proper storage and disposal of toxic chemicals and materials
- Incorporate pollution prevention into operation and maintenance procedures
- Implement stormwater runoff controls for existing road systems to reduce pollutant concentrations and volumes

Best management practices to address NPS pollutant runoff from roadway and bridge construction and maintenance activities may include, but are not limited to the following:

- Install permanent storm water retention/detention ponds, slope protection, or grass strips to treat rainfall runoff
- Install temporary sediment traps, silt fences, or diversion trenches
- Make provisions for washing off dirt and mud from tires, wheel wells and undercarriage before vehicles leave the construction site
- Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss
- Limit land disturbance such as clearing and grading and cut fill to reduce erosion and sediment loss
- Limit disturbance of natural drainage features and vegetation
- Place bridge structures so that sensitive and valuable aquatic ecosystems are protected
- Prepare and implement an approved erosion control plan
- Ensure proper storage and disposal of toxic material
- Incorporate pollution prevention into operation and maintenance procedures to reduce pollutant loadings to surface runoff
- Develop and implement runoff pollution controls for existing road systems to reduce pollutant concentrations and volumes

The Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas is highly recommended by the AL NPS Management Program for NPDES permit and other transportation construction site purposes and activities as applicable. The AL NPS Management Program and Section 319 grant program also endorses the, Recommend Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads" for "dirt road" nonpoint sources of pollution. It is highly recommended that erosion and sediment control workshops and training for "dirt road" maintenance continue to be provided to local, county, regional and state level public works staff, contractors, engineers, developers, municipal officials, and other audiences to increase skills and/or NPS pollution and water quality protection knowledge and awareness. The EPA document, Controlling Nonpoint Source Runoff Pollution from Roads, Highways and Bridges (EPA-841-F-95-008a, August 1995), and Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Chapter 4 (EPA-840-B-92-002, January 1993) are also endorses as effective NPS pollution control reference resources.

g. Vehicles and Automotive Facilities

Vehicle service facilities (e.g. repair, body and paint shops, car washes, oil change facilities, fuel dispensing sites, etc.,) can discharge NPS pollutants such as heavy metals (copper, zinc, chromium, nickel, and lead), hydrocarbons, and various cleaners and solvents. The NPS best management practices listed below are examples of good housekeeping measures that can prevent or reduce oil, fluids, engine cleaners, radiator flush, wash waters, solvents, body repair and paint, and vehicle fuels from impacting water quality. Structural measures are generally not recommended for existing facilities but should be implemented for new facilities and renovations. Prevention is generally more cost effective to implement compared to the costs to contain, collect, treat, and dispose of NPS pollutants and spills. Frequent equipment inspections, process reviews, signage, a good spill prevention and response plan, and employee education and training can effectively prevent or reduce NPS pollution runoff and impacts to water quality.

Examples of vehicle and automotive facilities management practices to address NPS pollutant runoff include but are not limited to the following:

- Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater. Immediately clean up spills and properly dispose of cleanup materials. Some may be considered as hazardous waste.
- Uncovered fueling stations allow spills to be washed into storm drains. Provide roofs or canopies over fueling stations. Design or retrofit facilities to contain spills.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into storm drains and local waterbodies.
- Install and maintain oil/water separators at storm drain inlets.
- Place drip pans or absorbent materials under vehicles to capture leaking fluids
- Regularly sweep or vacuum shop floors and paved surfaces as an alternative to hosing down work areas. Use dry cleanup methods if practicable by sweeping the floor using absorbents.
- Do not pour antifreeze, waste oil, cleaning fluids, or mop water on paved areas, streets, gutters, outside storm water drains, toilets, or floor drains. Use self-contained sinks and tanks when working with solvents, keep covered when not in use, and check often for leaks and repair promptly.
- Collect all metal filings, brake pad and other dust, and paint chips from grinding, shaving, and sanding, and dispose of the waste properly. Never discharge these wastes to the storm drain or sanitary sewer.
- Label storm water drains with "No Dumping - Discharges to River" stencils. Post instructional signs above sink and drains prohibiting dumping of vehicle fluids and hazardous waste.
- Store hazardous materials and wastes in secondary containment areas and away from storm drains, protect from rain, and have an emergency spill prevention and response plan in place to keep pollutants from reaching a storm water drain. Label store and dispose of all hazardous wastes according to federal and state hazardous waste regulations.
- Designate a dedicated vehicle washing area or pad, preferably under a canopy to reduce rainfall runoff to a storm water drain or waterway. Use berms to contain polluted runoff such as wheel cleaners, detergents, and engine degreasers.

- Keep lids on waste receptacles and store them on an impervious surface and under cover to reduce exposure to rain and runoff of leachate
- Reuse parts cleaning, testing, and flushing solvents and waters. Dispose of hazardous waste when reuse is no longer possible.
- Store new batteries on an impervious shelf to contain an accidental acid spill and recycle old batteries.
- Keep wastes types separate in order to increase waste recycling options and to reduce treatment and disposal costs
- Never mix waste oil with waste fuel, antifreeze, cleaning waste water, or solvents
- Conduct regular inspections so that leaks and spills are detected and resolved as soon as possible. Use dry cleanup methods with absorbents whenever possible before using water to wash down the spill area. Do not allow untreated wash water to go down storm water drains.
- Train employees about NPS pollution including chemical management (proper use, handling and disposal), storm water, and water quality protection.

h. Food Service Facilities

Food establishments (e.g. food drive-through, restaurants, grocery stores, bakeries, etc,) can contribute to NPS water quality problems by activities associated with cleaning, disinfecting, cooking, solid waste disposal, and parking lot and grounds maintenance. Some NPS pollutants and runoff can affect human health and be toxic to aquatic organisms. Spills, leaks, and trash collected on these sites during dry spells can significantly impact to water quality, especially when carried to receiving waters by the first flows of a rainfall event. In general, the public does not realize of forgets that storm drains in Alabama flow directly to streams, lakes, estuaries and marine without undergoing some type of pollutant removal or treatment process. Education and outreach and training of employees can effectively reduce the potential for NPS pollution runoff from food service facilities. It is more environmentally-friendly and cost-effective to employ pollution prevention practices than to clean up and dispose of contaminated materials and wastewaters after the fact.

Examples of management practices for food service facilities to address NPS pollutant runoff include but are not limited to the following:

Measures and practices to mitigate the discharge of NPS waste materials and pollutant runoff from food service facilities include:

- Use nontoxic and biodegradable products to clean preparation surfaces, equipment, and floors. Use a designated sink and floor drain connected to a sanitary sewer. Do not dump product or wastewater down a storm drain.
- Do not dump cleaning waters, disinfectants, bleach, cigarette butts, food waste, oil and grease and other products onto the street, parking lot, or sidewalks.
- Use biodegradable packaging
- Use proper oil and grease handling and disposal techniques including timely clean out of grease traps. Collect used vegetable-based oils and grease for reprocessing, whenever practicable.
- Develop response plans and provide training for staff to use indoor and outdoor chemical and other spill containment and cleanup stations
- Maintain areas around dumpsters and loading docks and do not allow rainfall runoff, trash and litter to discharge to storm water drain systems. Keep dumpster lids locked or closed to prevent rainwater from entering and pollutants from draining out, and to prevent the illegal dumping of potentially toxic chemicals and materials. Use berms or buffers to prevent untreated runoff from leaving the site.
- Use xeriscaping practices and native species plantings for landscaping to reduce chemical and nutrient runoff
- Maintain buildings and grounds using environmentally friendly products
- Install pervious surfaces or porous pavements for parking lots and walkways as practicable
- Train all employees on chemical management, proper material handling, disposal of waste and wastewaters, and regulations concerning Phase II stormwater requirements.

i. Erosion and Sedimentation

Many urban development and construction sites have areas of exposed soils that are subject to erosion. Erosive actions of water or wind on the landscape can loosen and displace soil particles (sedimentation) and deposit them into receiving waterbodies (siltation). Increased siltation can make waterbodies cloudy or “muddy” (turbid), interfere with photosynthesis (dissolved oxygen levels), smother aquatic habitat, impair fish and macroinvertebrate survival and reproduction, and increase the cost to treat drinking water used for human consumption. Both erosion and sediment control best management practices may be required to prevent water quality problems. Erosion control:

- Is more effective than sediment control
- Less subject to failure due to increased rainfall runoff flow velocity and volume
- Requires less maintenance
- Less costly (natural resource sustainability / economically sensible)

The selection of urban development and construction best management practices for a particular site must consider the intended use(s), degree of slope (steepness), soil type, sensitive areas (wetlands and reservoir water quality), soil stockpiles, and human and vehicular traffic. Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be picked up by stormwater runoff and deposited into a stormwater drainage system and ultimately to a receiving waterbody. Urban land development/disturbance activities generally require MS4 Phase II general stormwater NPDES permits. Regular inspections and prompt BMP maintenance and retrofits, if needed, are critical.

Municipalities should consider implementing a mix of the following NPS best management practices to protect water quality and prevent or reduce stream degradation:

- Develop community ordinances and have trained staff and necessary resources to inspect construction/development sites and enforce erosion and sediment control regulations
- Provide erosion and sediment control technical guidelines and manuals
- Provide education, outreach and training to public work staff, contractors, engineers, and designers relative to erosion and sediment BMP selection, implementation and maintenance (e.g., Clear Water Alabama - Alabama Chapter of the Soil and Water Conservation Society; Nonpoint Source Education for Municipal Officials - Alabama Cooperative Extension System; Low Impact Development - EPA, etc.)
- Divert stormwater away from exposed areas or sensitive areas (e.g. turn-outs, cross drain culverts, broad based dips, water bars, etc.)
- Minimize the areal extent of disturbed areas and promptly cover (and maintain) exposed sites with vegetation /seed and mulch
- Preserve and recreate natural landscape features
- Enhance source controls by reducing impervious covers
- Increasing drainage flow paths
- Enhance retention, detention and infiltration to reduce rainfall runoff volume, intensity and flow rates

Urban erosion and sedimentation projects and practices funded by a Section 319 grant, as administered by ADEM, should integrate the design, selection, application, and maintenance of BMPs presented by the resources listed below:

- Alabama-specific, agricultural standards, specifications, technical information and requirements presented in the USDA-NRCS Field Office Technical Guides (FOTG) Sections 1-5: General References, Soil and Site Information, Conservation Management Systems, Practice Standards and Specifications, and Conservation Effects

- Alabama Agricultural and Conservation Development Commission Program: Board-approved practices presented in the Alabama Agricultural and Conservation Development Commission Program Rules and Regulations Handbook Part I, and the Alabama Agricultural and Conservation Development Commission Policies and Approved Conservation Practices, Handbook Part II, as recommended and approved by the State Technical Committee for use by Soil and Water Conservation District (County) field offices.

- The "Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas" (March 2009, and as updated). This Handbook provides guidance for preventing and minimizing urban development and construction erosion, sedimentation and related stormwater quality problems. It can help users meet environmental and regulatory objectives and can be tailored for site-specific conditions and objectives. It is designed to aid land users, including developers, contractors, consultants, and city, county and state planners and planning boards, other governmental officials, and homeowners to adequately address problems associated with non-agricultural land disturbance activities. A companion "Field Guide" is available to homebuilders, general contractors, road builders, BMP installers, erosion and sediment control planners and designers, plan reviewers, inspectors and others as a quick reference resource. The Guide presents 26 of the most commonly used erosion and sediment control practices contained in the "Alabama Handbook."

- The AL NPS Management Program and Section 319 grant program as administered by ADEM also recommends Alabama-specific erosion and sediment control best management practices presented in Recommended Practices Manual - A Guideline for Maintenance and Service of Unpaved Roads (Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority, Feb. 2000) to protect water quality from "dirt road" nonpoint source of pollution.

j. Wildlife Sources

Wildlife such as ducks and geese can present a direct and significant source of pathogens and nutrients to waterbodies in or near developed areas. Steams, ponds, parks, nature centers, source water reservoirs, and other public common use areas can be impacted. Waterfowl and other wildlife are often hard to control, but their impact, alone or in synergy with other nonpoint sources of pollution can significantly influence receiving water quality. Pollution associated with pet and wildlife populations can sometimes become unsustainable (e.g., creating public health, safety, recreational, and nuisance problems; disrupting unique ecological systems, causing in local economic losses, etc.). Beaver dams can disrupt normal stream hydrology, cause silt and other NPS pollutants that normally are transported downstream to settle out and concentrate in the dam "back water" area, or may cause local riparian area flooding. Nonpoint source water quality protection measures targeting wildlife must be coordinated with appropriate wildlife management agencies including the Alabama Department of Conservation and Natural Resources and the U.S. Fish and Wildlife Service.

Section C.4.1 Low Impact Development, Green Design, and Smart Growth

An increasing number of construction sites in Alabama are addressing water quality protection and restoration by implementing Low Impact Development (LID) practices that try to mimic pre-development hydrologic site conditions. New development, re-development and retrofit best management practices such as bioretention, rain gardens, vegetated rooftops, rain barrels and cisterns, grassed swales, soil amendments, tree box filters, and permeable pavements should be used to manage NPS pollutants in stormwater runoff as close to its origin as practicable. Integrated site-design techniques and practices to prevent or reduce urban development and construction water quality impacts and restore watershed hydrology and ecological functions include storm water infiltration, evaporation, transpiration, and storage and reuse. In addition to the economic benefits provided to developers and communities, the implementation of LID practices may enhance property values, improve aquatic habitat, and improve aesthetic qualities and communal well-being and quality-of-life. Practices can be effectively and economically installed in low and high density residential areas; commercial, industrial and institutional (offices, shopping malls, hotels/motels, parking areas, etc.); and transportation corridors (e.g. bus stops, street round-abouts, shopping malls, etc.)

Green Design refers to a system of practices designed to treat storm water runoff from where it originates by mimicking the natural movement of rainfall runoff. Green design practices infiltrates, evapotranspirates, and reuses stormwater runoff instead of allowing it to wash into streets and storm water drains or overwhelming the stormwater drainage system or waterway and causing flooded streets, yards, businesses, homes and basements. Green infrastructure can have a value-added benefit of beautifying homes and neighborhoods, increasing property values, reducing heating and cooling utility costs, increasing wildlife and aquatic habitat, and mitigating urban "heat island" effects. The AL NPS Management Program endorses applicable components of the "Purpose Statement" of the cooperative Green Infrastructure - Statement of Intent entered into by EPA, National Association of Clean Water Agencies, Natural Resources Defense Council, the Low Impact Development Center, and the Association of State and Interstate Water Pollution Control Administrators to, "… promote the benefits of using green infrastructure in protecting drinking water supplies and public health, mitigating overflows from combined and separate sewers and reducing stormwater pollution, and to encourage the use of green infrastructure by cities and wastewater treatment plants as a prominent component of their Combined and Separate Sewer Overflow (CSO and SSO) and municipal stormwater (MS4) programs. Green infrastructure practices in Alabama generally include pervious, porous and permeable pavements (green parking areas), bioretention cells/rain gardens, bioswales, green roofs, rain barrels/cisterns, planter boxes, pocket wetlands, and vegetated swales and riparian areas. The AL NPS Management Program and Section 319 grant program as administered by ADEM endorses applicable NPS education and outreach efforts of EPAs National Enforcement Initiatives (2011-2013 and future years) to assist cities in implementing solutions to municipal stormwater sewer overflows, including increased use of green infrastructure and other innovative approaches. The EPA - National Stormwater Calculator is recommended as a desktop planning tool to help urban planners, landscape architects, developers, and property owners assess the load reduction benefits of green infrastructure on specific sites.

The AL NPS Management Program continues to support public and private sector efforts to enhance green infrastructure education and outreach and financial resources, including but not limited to:

- Leveraging Clean Water State Revolving Fund resources relative to controlling NPS runoff
- Innovative or incentive-based programs for staff, management, technology transfer, and technical assistance
- Complementary regulatory and voluntary processes and perspectives
- Exploring urban and construction BMP plans, strategies, guidelines, and technologies
- Measuring pollutant removal performance and efficiencies relative to NPS pollution source, site conditions, areal extent, implementation constraints and maintenance aspects
- Examining relative economic costs compared to expected water quality protection benefits
- Human health, aquatic organism and habitat, and surface water and groundwater (drinking) source protection
- Stormwater runoff monitoring, reporting, and data and information sharing including GIS and BMP databases

Smart Growth seeks to protect environmental and public health and enhance community quality of life by linking traditional stormwater runoff management practices with LID and green infrastructure water quality protection strategies. Smart growth planning focuses on population growth and urban sprawl. Implementation seeks to balance social, civic, and physical activities with sustainable protection of natural resources and economic competiveness. Population growth and urban sprawl is mutually accommodated in ways that are environmentally-protective and make good, sustainable, economic growth-sense to officials, developers, and citizens. Community planning and land use decisions should be a collaborative process and consider mixed land uses, compact housing design and developments, open spaces, public health, protection of sensitive ecosystems, environmental justice, social diversity and inclusiveness, and community services, transportation, and other amenities. The AL NPS Management Program endorses applicable NPS smart growth management principles of the Partnership for Sustainable Communities, facilitated by the U.S.EPA, U.S. Department of Housing and Urban Development, and the U. S. Department of Transportation, and designed to improve urban housing and transportation while protecting the environment.

The AL NPS Management Program and the Section 319 grant program as administered by ADEM endorses the Nonpoint Source Education for Municipal Officials (NEMO) outreach program as administered in Alabama by the Alabama Cooperative Extension System to help site developers, landscape architects, urban planners, homeowners and others reduce urban and construction NPS pollution impacts to waters of the state. Additional NPS management recommendations include Take Action for Clean Water, Water Festivals, Storm Drain Stenciling, Stream Walk, and Alabama Envirothon.

Section C.4.2 Onsite Wastewater Treatment and Disposal Systems

About 30% of the citizen's of Alabama use onsite systems to treat and dispose of household wastewater (primarily septic tanks). The release of NPS pollutants such as nutrients and pathogens (bacteria and viruses) from leaking and poorly maintained onsite and decentralized systems to nearby waterbodies can cause significant public health concerns and water quality impairments. The Alabama Department of Public Health - Division of Community Environmental Protection is the lead state agency (in cooperation with local county health departments) that is responsible for establishing and enforcing state requirements for the design, permitting, installation, approval, and use of onsite sewage treatment and disposal systems. Rules governing onsite sewage treatment and disposal are presented in the, Rules of the State Board of Health Bureau of Environmental Services; Division of Community Environmental Protection, Chapter 420-3-1, Onsite Sewage Treatment and Disposal (Effective March 19, 2006 and amended Nov. 23, 2006 and April 19, 2010). Conventional and engineered system owners in Alabama must follow statutory requirements therein. Any entity receiving Section 319 grant funding to design, install, improve, maintain, repair, retrofit or pump-out household waste water treatment systems must ensure compliance with all applicable state and county health department laws, rules, regulations and requirements. Coordination with the ADPH Soils and Onsite Sewage Branch is highly recommended.

Provisions of the Safe Drinking Water Act (1974) established the Underground Injection Control (UIC) program to increase ground water protection. Ground water is a major source of drinking water in Alabama. The federal UIC program, administered by ADEM, is designed to prevent contamination of underground sources of drinking water

relevant to the operation of injection wells. There are many different types of injection wells, but all are similar in their basic function. Most injection wells regulated by ADEM use gravity-flow field lines similar to those used to dispose of domestic wastewater from a home. Underground injection wells are commonly used to discharge wastewater from car washes and laundromats that are not located in an area where a public wastewater sewer system is available. Other uses include small residential wastewater collection and treatment systems and treated waters from groundwater cleanup. When properly sited, constructed, and operated, UIC wells can be an effective and environmentally safe means of to dispose of wastewaters.

The National Pollutant Discharge Elimination System (NPDES) permit program is used to regulate point source pollution discharges to waters of the United States. Individual homes that are connected to a municipal system, use an onsite septic treatment and disposal system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if they have direct end-of-pipe discharges.

Conventional on-site wastewater disposal and treatment systems (OSDS) such as septic tanks and drain fields and mound systems are very common in Alabama and can be effective in treating household wastewater; however, onsite systems are prone to fail due to:

- Improper siting and/or site evaluation
- Improper system selection and design
- Poor installation practices
- Insufficient operation and maintenance

The AL NPS Management Program supports efforts to install decentralized wastewater treatment systems for two or more homes or businesses, but not entire communities, in both rural and suburban areas in accordance with established ADPH and ADEM rules and regulations. This technology can be very cost-effective and appropriate for a variety of site and soil conditions including shallow water tables, bedrock, and small lot sizes. The Clean Water State Revolving Fund (CWSRF) as administered by ADEM may provide loans to protect public health and the environment at below market interest rates to fund decentralized wastewater treatment systems. Limited Section 319 grant funds administered by ADEM may be used to design, install, maintain, or retrofit decentralized systems as a component of an acceptable watershed-based management plan in watersheds with priority impaired waters; and, if the decentralized system has established or designated a responsible certified financially-viable entity to solely operate and maintain the decentralized treatment system. Acceptable decentralized system management entities include city or county governments or quasi-governmental units (water/wastewater boards or systems) and public or private utilities, corporations, and nonprofit organizations.

The Alabama Coastal Nonpoint Pollution Control Program administers applicable urban NPS components defined in Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) including specific conditions (Chapter 4 Section 5A and 5B) relevant to onsite wastewater treatment systems. Enforceable septage disposal management measures, to the extent practicable, must address nutrients and pathogens from failing or improperly sited systems to protect coastal surface water and groundwater quality. The ADEM and Alabama Department of Conservation and Natural Resources continue to partner with coastal entities to implement the Alabama Coastal Program and to ensure that program requirements for NOAA and EPA approval of the coastal program are met, and that implementation of, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002; January 1993) continues.

To minimize the adverse effects of disposal of sewage on human health and the environment, the AL NPS Management Program and Section 319 program administered by ADEM endorses EPA information, guidelines, technical information, webcast, case studies, handbook, and related programs to help local communities develop, improve, and manage decentralized wastewater treatment systems. In addition, Section 319 grant funds will continue to target the development and distribution of state-specific NPS resources, information and technical guidelines relative to onsite system design, installation and maintenance (e.g. septic tank pump-out program funded in impaired watersheds by Section 319). The AL NPS Management Program and Section 319 grant program endorse onsite septage treatment and disposal system BMPs as recommended or required by the ADPH Soils and Onsite Sewage Branch to protect water quality from NPS pollution runoff. The BMPs provide both water quality protection and economic benefits, and typically include but are not limited to:

- Installing systems away from open waters and sensitive areas such as wetlands and floodplains

- Avoiding soil compaction of the ground above drain lines to ensure optimum pollutant filtration and treatment
- Locating systems away from trees to prevent roots from obstructing the flow of wastewater through drain lines
- Pumping out septic tanks at regular intervals (3-5 years) to prevent excessive system discharges and overflows
- Inspecting systems at regular time intervals and promptly repairing malfunctions
- Using water efficient fixtures (e.g. showerheads, faucets, and toilets) to limit wastewater to the system
- Never pour household chemicals, hazardous waste and pharmaceuticals down the drain since they can hinder natural chemical and biological breakdown of the wastes in the septic tank

Section C.4.3 Brownfields and Redevelopment

Brownfield sites include real property of which the expansion, redevelopment, or reuse may be complicated by the presence or potential existence of a hazardous substance, pollutant, or contaminant. The ADEM administers the Alabama Brownfields Program utilizing a grant awarded from EPA under Section 128(a) of the federal Small Business Liability Relief and Brownfields Revitalization Act. The Brownfields Program provides grant funding and resources to assist local governments and non-profit organizations with assessment, cleanup and redevelopment of brownfield sites. ADEM may perform no-cost site assessments and offer assistance to the entity applying for funding. A Directory of Brownfields Sites is available from ADEM that provides details of sites that are ready for redevelopment. The AL NPS Management Program endorses EPAs Implementing Stormwater Infiltration Practices at Vacant Parcels and Brownfield Sites (EPA 905F13001, July 2013) as a reference guide to help brownfield land owners/operators determine appropriate stormwater runoff management strategies for a specific site. General background explanations and examples are provided by Design Principles for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas (EPA-560-F-07-231, April 2008). Strategies are also presented in Case Studies for Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas (EPA-560-F-07-232, April 2008).

Section C.4.4 Drinking Water, Groundwater and Well Head Protection

Many people in urban areas assume that adequate supplies of high quality drinking and commercial use waters are always available. Drinking water supplies and their recharge areas (e.g. surface waters, groundwater aquifers, and private wells) are susceptible to NPS pollution from anthropogenic (human-caused) activities, and therefore, must be diligently protected to maintain public health and population and economic growth and development. The AL NPS Management Program and the Section 319 grant program share common water quality protection goals with the ADEM Drinking Water and Groundwater programs. The Clean Water State Revolving Fund (CWSRF), including the Drinking Water State Revolving Fund as administered by ADEM may provide loans at below market interest rates to address source water protection. Examples of fundable CWSRF water quality projects include mitigation of nonpoint sources of pollution (e.g. decentralized wastewater systems, urban and agricultural runoff); brownfield contamination cleanup; protection and restoration of sensitive ecological areas (wetlands and estuaries), and traditional municipal wastewater treatment systems. In addition, the EPA also encourages states to consider the effects of climate change on drinking water quality and availability. The EPA Office of Ground Water and Drinking Water and associated websites and links are recommended sources of information regarding drinking water protection.

Section C.5 Resources for Section 319 Project-Specific Best Management Practices

Section 319(b) (2) of the CWA requires states to include a list of BMPs in their NPS Management Programs that:

a) Will be implemented to reduce NPS pollutant loads from each NPS category and sub-category; and,
b) Contributes significant NPS loads to navigable waters or prevents waters from meeting water quality standards and goals of the Clean Water Act.

The ADEM obligates Section 319 grant funding to implement measures and practices to restore impaired waters of the state to state water quality standards, use classifications, and beneficial uses. Projects may apply one or more structural or non-structural control practices relative to NPS pollutant cause, site location, site condition, type of land disturbance, pollutant load reduction and water quality restoration and economic benefits. Typical implementation in

urban areas includes pervious pavement, low impact development /green designs, attenuation of runoff velocity and volumes, and demonstration of new and improved technologies. Best management practices installed using established procedures presented below, ensures that the:

- ✓ Chemical, physical and biological integrity of waters of the state will be protected, restored and maintained, and
- ✓ Programmatic goals and objectives of the *voluntary-based* statewide AL NPS Management and *regulatory-based* Coastal NPS Management programs are effectively, efficiently, and economically achieved.

Urban, construction and development resources listed below are presented to help citizens and municipalities with NPS polluted runoff planning, installation, and maintenance techniques needed to protect waters of the state. These resources present scientifically-sound strategies and practices that may also be relevant to Phase II storm water permit program requirements. Note that mention of trade names, products, or services does not convey official EPA or ADEM approval, endorsement, or recommendation.

Urban construction and development projects and practices funded by Section 319 grant funds should be implemented, as applicable and practicable, in accordance these same principles and techniques.

- National Management Measures to Control Nonpoint Source Pollution from Urban Areas (EPA)
  Field Office Technical Guides (FOTG) Sections 1-5: General References, Soil and Site Information, Conservation Management Systems, Practice Standards and Specifications, and Conservation Effects (USDA-NRCS/Alabama)
- Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas (Soil and Water Conservation Committee)
- Alabama Low Impact Development Manual (Alabama Cooperative Extension System)
- National Management Measures to Control Nonpoint Source Pollution from Urban Areas (EPA 841-B-05-0004; Nov 2005);
- Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002; January 1993)
- Alabama's Best Management Practices for Forestry (Alabama Forestry Commission)
- Nonpoint Education for Municipal Officials (NEMO) (University of Connecticut - Center for Land Use Education and Research)

The following general education and outreach and training resources are useful to effective and efficient planning, installation, and maintenance of applicable Section 319 grant-funded urban, construction and development projects.

- National Stormwater Calculator - a desktop tool that estimates the annual amount of rainfall from a specific site based on local site conditions, slope, land cover and historical rainfall record
- CWA Section 6217 - Coastal Zone Act Reauthorization Amendments (CZARA), Alabama Coastal Programs (ADEM), Coastal Area Management Program (Alabama Dept. of Conservation and Natural Resources)
- Economic Benefits of Runoff Controls – presents information relative to increased property values and rental prices when properly designed runoff control facilities are used as aesthetic amenities (EPA 841-S-95-002, Sept 1995)
- Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters - Chapter 4 - describes urban BMP measure performance expectations for the coastal zone management program. This chapter addresses management measures prescribed by Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (EPA 840-B-92-002, January 1993)
- Stormwater to Street Trees - Engineering Urban Forests for Stormwater Management - illustrates proper tree planting and maintenance techniques and technologies to improve urban stormwater runoff management (EPA 841-B-13-001)
- Rainwater Harvesting: Conservation, Credit, Codes, and Cost Literature Review and Case Studies - a technical guidance document that describes emerging rainwater harvesting BMPs to supplement water supplies, manage stormwater and provide other productive environmental benefits (EPA-841-R-13-002; Jan 2013)
- Model Ordinances to Protect Local Resources - presents model ordinance templates for decisions relative to urban growth, NPS pollution and environmental protection
- Polluted Runoff - Publications and Information Sources: Urban - presents NPS documents that the Nonpoint Source Control Branch at EPA headquarters has found to be particularly informative and useful
- Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures - Urban - guidance to assist in tracking the implementation of urban NPS best management practices (EPA 841-B-00-007; Jan 2001)
- Onsite Wastewater Treatment Systems Manual - cost-effective and environmentally-protective onsite wastewater treatment system siting, design, installation, maintenance and replacement information for suburban and rural areas (EPA 625-R-00-008; Feb 2002).
- Guidance for Municipal Stormwater Funding - possible approaches to funding stormwater programs with a focus on service, user, and utility fees (Jan 2006)
- Stormwater Manager's Resource Center - created and maintained by the Center for Watershed Protection, this website provides local government officials and others with technical assistance relative to stormwater management
- Smart Growth - this website is designed to support environmentally-protective and economically-sustainable communities
- Low Impact Development (LID) - provides reports, studies, manuals, tools, and documents LID practice effectiveness
- The International Stormwater Best Management Practices (BMP) Database - a database of stormwater BMP performance data developed by the Urban Water Resources Research Council of the ASCE under a cooperative agreement with EPA
- Urban and Community Conservation - a National Association of Conservation Districts website that provides urban and community conservation resources and gives conservation districts and their partners a place to gather information and exchange ideas about urban and community conservation activities
- National Stormwater BMP Database - an American Society of Civil Engineers website dedicated to BMP effectiveness information

- Center for Watershed Protection, American Society of Civil Engineers, and the American Water Resources Association provide objective and scientifically-sound urban BMP information relative to water resources management, and research and education
- Water Quality Research - this EPA website presents water quality BMP research and development technologies and systems

Section C.6 Urban Development and Construction Partners and Resources

Several public and private sector urban development and construction programs and practices continue to provide technical assistance, technology transfer, education/extension, and financial resources to mitigate the causes of NPS pollution and protect and restore water quality and natural resources in Alabama. The urban development and construction goals, objectives and annual milestones of the Alabama NPS Management Program will continue to be targeted and achieved by:

a) Leveraging mutually beneficial program and project resources and efforts
b) Supporting local conservation and watershed management activities
c) Improving collaboration, coordination, cooperation, and communication with other programs, agencies, and organizations
d) Improving the connection between planning and implementation
e) Utilizing adaptive management to achieve mutual goals and objectives
f) Concentrating program resources into "focus areas" based on multiple criteria
g) Enhancing public and private accessibility, input, comments, participation and interest

To help assure that urban development and construction NPS water quality problems are addressed in a cost-effective and timely manner, ADEM will continue to leverage available human and financial capital to:

- Develop and integrate processes for identifying priority NPS water quality impairment causes and problems
- Deploy available resources in a timely fashion to address those priorities, including treatment and protection of drinking water supplies and critical areas
- Employ appropriate programmatic and financial systems that ensure that NPS mitigation dollars are used efficiently and consistently with its legal obligations to maximize water quality benefits
- Target Section 319 grant funding to complement technical and financial assistance available from other federal, state, and local sources.

Section C.6.1 State Agency Partners and Programs

State agencies continue to partner together to leverage urban development and construction program resources. Cooperative efforts include planning, design, implementation and maintenance of best management measures and practices to prevent or reduce NPS pollutant runoff, ensure clean and safe drinking water, protect human health, promote and sustain environmental, economic, social and other communal quality-of-life benefits, and enhance aquatic habitats. The Alabama NPS Management Program and Section 319 grant program promotes a flexible, targeted, and iterative voluntary management approach whenever and wherever practicable to best ensure that state water quality standards and water quality benefits are effectively and expeditiously met and as resources allow. Nonpoint source state agency partners and programmatic resources include:

C.6.1.1 Alabama Department of Environmental Management (ADEM)

- Protect and improve the quality of Alabama's environment and the health of all its citizens.
- Protect and restore natural resources which provide significant social, economic, and environmental benefits and opportunities for the citizens of Alabama.
- Develops air, water, and land environmental policy, permits, administrative orders and variances and enforces environmental rules and regulations
- Administers the CWA Section 319 grant and facilitates implementation of the statewide AL NPS Management Program
- Administers CZARA Section 6217 and State Coastal NPS Management Programs

C.6.1.2 State Revolving Fund (SRF) (ADEM)

Clean Water State Revolving Fund (CWSRF) program provisions authorizes low-interest loans to fund a variety of water quality protection and restoration projects including nonpoint source, wetlands, estuary, and watershed projects, as well as NPDES permitted MS4 "point source" wastewater treatment systems. The ADEM administers

and disburses these funds. Federal and state contributions are provided by project or program set-up capital and then those assets are used to make low-interest loans to protect water quality. Loan repayments are then recycled to fund other water quality protection projects. Community groups, individuals, nonprofit and other entities are eligible to apply to ADEM for CWSRF loan consideration.

C.6.2 Agricultural and Conservation Development Commission (ACDC)

- Established in 1985 by Alabama Act 85-123 for the purpose of making available General Fund cost-share grant money through the State Soil and Water Conservation Committee to each Soil and Water Conservation District
- The only agricultural assistance appropriation provided by the State of Alabama
- Funding is provided to encourage soil conservation and water quality and forest improvement practices

C.6.2.a State of Alabama Soil and Water Conservation Committee (SWCD)

- Created in 1939 by the State Soil and Water Conservation District Act to carry out the administrative functions of the state's 67 District (county) programs
- Assists and advises District supervisors, disseminates information between SWCDs and partners with state and federal resource agencies and other public and private sector partners
- Provides statewide rural/urban BMP implementation expertise

C.6.2.b Soil and Water Conservation Districts (SWCD)

- Focuses soil and water protection and conservation decision-making at the local level
- Coordinates NPS technology, education, and funding to address soil erosion, water quality, flood control, drainage, recreation, fish and wildlife, and open land preservation
- Provides county-level rural/urban BMP implementation expertise and coordination
- Administrative resources are provided by the SWCC and local units of governments

C.6.3 Alabama Department of Agriculture and Industries (ADAI)

- Administers federal and state laws and regulations for products, businesses, goods and services
- Partners with state and federal resource agencies to protect human, economic and environmental health
- Manages statewide animal and plant health and pesticide programs
- Conducts food inspection and safety programs to protect public health

C.6.4 Alabama Department of Conservation and Natural Resources (ADCNR)

- Acquires and manages state lands, parks, lakes, stream beds, and other state-owned properties
- Administers natural resource grants and conducts research
- Partners with federal agencies such as NOAA, EPA,USDI, USFWS, Commerce, and Homeland Security to promote wise stewardship of the state's natural resources
- Partners with the USFWS to implement the Endangered Species Act (Traditional Section 6) conservation projects for listed and at-risk species
- Partners with ADEM and ADCNR to implement the Alabama Clean Water Initiative (Clean Boating and Clean Vessel Act of Alabama)
- Partners with ADEM to implement the CWA CZARA 6217 coastal nonpoint source program
- Provides partial oversight of project's to restore coastal resources from injuries sustained by the *Deepwater Horizon* oil spill.

C.6.5 Alabama Department of Public Health (ADPH)

- Partners with ADEM to monitor selected swimming beaches along the Gulf of Mexico for the presence of fecal coliform or Enterococcus pathogens
- Fosters, promotes and provides information on seafood and shellfish sanitation by partnering with state and federal agency, shellfish industry, and academic institutions
- Provides technical assistance, permits, investigations and enforcement of solid waste, unauthorized dump, and vector control programs including land application of septage
- Permits and enforces the proper design, installation, and use of onsite sewage treatment and disposal systems

- Encourages approximately 800,000 people (about 20% of the state population who obtain drinking water from a private water well) to protect source water to ensure their drinking water is clean and safe
- Develops and enforces human safety and food sanitation rules and regulations

C.6.6 Geological Survey of Alabama (GSA)

- Gathers geological, hydrological, and biological science-based data and information to best manage, develop, and conserve state water resources
- Provides surface and groundwater quantity and water quality assessment information, metrics and data to provide resource managers and community planners with information to balance sustainable growth with natural resource protection
- Conducts water quality, biological, coastal, and aquatic resource research

C.6.7 Alabama Department of Economic and Community Affairs (ADECA) / Alabama Office of Water Resources (OWR)

- Administers the Alabama Water Use Reporting Program that details surface and ground water use and trends
- Administers programs to assess and manage river basins; develop and conserve water resource supplies; provide data and information regarding instream flows, prepares flood maps, and conducts research and education and outreach
- Partners with agencies and the private sector on major water resource economic and quality of life issues
- Recommends policies and legislation to protect the state's intra and interstate water resource interests

C.6.8 Alabama Department of Transportation (ALDOT)

- Establishes and manages state intermodal environmental programs and strategies to protect air, land and water resources
- Implements NPS pollution management measures and provides highway and bridge construction and maintenance site pollution prevention planning and response mechanisms
- Provides support, assistance, and expertise to preserve natural resources and enhance environmentally-protective and economically-supportive intermodal systems in Alabama

C.6.9 Alabama Rural Water Association (ARWA)

- Provides community and town water and wastewater systems with technical, financial, administrative, management, education and outreach, and training assistance
- Helps protect drinking water sources by providing assistance to develop local wellhead and groundwater (aquifer) protection plans
- Partners with ADEM, ADECA, Emergency Management Agency, Department of Homeland Secretary, and the USDA - Farm Service Agency regarding water and wastewater issues

C.6.10 Alabama Forestry Commission (AFC)

- Provides resources and technical assistance to establish, re-establish, conserve, and sustain urban trees and forest resources and benefits
- Partners with ADEM to implement Alabama's Best Management Practice for Forestry to help protect air quality, surface water and groundwater quality, mitigate soil erosion, and stream siltation, and filter NPS runoff from multiple pollutant causes
- Partners with the public and private sector to address urban sprawl, urban forest management, phytoremediation, recreation, invasive species, greenhouse gases, carbon storage, easements and land trusts, and general urban quality-of-life issues
- Facilitates research, training, and education and outreach designed to increase public awareness and involvement in finding the right balance between urban sprawl and urban forest protection and sustainability

Section C.7 Academia Institutions Partners and Programs

Several university-based academic programs provide instruction, research, technical assistance and technology transfer expertise to address environmental and human health protection issues. Enhancing citizen knowledge and awareness about watershed health and water protection and restoration is a fundamental and critical component of

the state's NPS pollution management efforts. Academia partners and resources to address nonpoint sources of pollution include:

C.7.1 Alabama Cooperative Extension System (ACES)

- Delivers Alabama land grant institution (Alabama A&M and Auburn University) research-based technical assistance, technology transfer, and education and outreach to the public
- Partners with municipalities, resource agencies, and the public and private sectors to help them make informed environmental protection and NPS management decisions
- Provides urban-based economic, social, and cultural outreach programs

C.7.2 Auburn University Water Resources Center (Alabama Agricultural Experiment Station)

- Brings together faculty and resources from several academic departments and programs to address a myriad of complex water resource problems and issues
- Facilitates opportunities to enhance public and private sector communication, cooperation, and collaboration
- Enhances water-related instruction, research and outreach efforts to protect and restore waters of the state

C.7.3 Alabama Water Resources Research Institute (Auburn University)

- An interdisciplinary research, education and outreach, and training program based at Auburn University
- Seeks solutions to on-going water quality and quantity problems and issues and emerging threats
- Coordinates, provides grant funding, and implements a broad spectrum of natural resource protection programs

C.7.4 Auburn University Environmental Institute (Auburn University)

- Facilitates an integrated and cohesive environmental instruction, research, and extension strategy to promote coordination, collaboration and communication between the university's inter-disciplinary programs
- Provides resources and implements programs and activities to address local, state and national environmental education and outreach, leadership, and research issues and needs

C.7.5 Center(s) of Excellence for Watershed Management (Auburn University and Alabama A&M)

- An interagency and interdisciplinary project planning and implementation program
- Provides university research-based outreach and assistance to communities to resolve strategic water quality and water availability issues
- Assist ADEM in developing and implementing watershed-based management plans that meet Clean Water Act Section 319 grant guidelines

C.7.6 Center for Environmental Research and Services (CERS) (Troy University)

- Facilitates and conducts natural resource research, education and stewardship services
- Partners with academic institutions, resource agencies, and the private sector including the Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority, Wiregrass RC&D Council, and Alabama Water Watch. Helped establish a recycling program in the City of Troy.
- Influenced the establishment of the Environmental Education Association of Alabama, the Alabama Water Watch Program and the Alabama Water Watch Association.
- Partnered with ADEM to design the EPA-recognized and nationally-innovative Alabama Revolving Loan Fund for water and wastewater infrastructure

Section C.8 Federal Partners and Programs

Federal partners help state agencies, non-governmental groups, non-profit organizations, and other NPS entities identify and resolve NPS pollution problems and protect and restore water quality. Programmatic resources and financial incentives provide for research, education and outreach, and enforcement of rules and regulations. Federal

partners providing resources to help mitigate nonpoint sources of pollution from urban development and construction activities include:

C.8.1. U.S. Environmental Protection Agency (EPA)

- Protects human and environmental health by developing and enforcing rules and regulations based on laws passed by Congress
- Provides funds and partners with the public and private sectors to make communities environmentally sustainable and economically productive
- Provides annual appropriations of CWA Section 319 grant funds to ADEM to implement statewide, coastal zone program, and urban NPS management measures to restore water quality
- Partners with NOAA to implement urban NPS management components of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA Section 6217).

C.8.2 National Oceanic and Atmospheric Administration (NOAA)

- Co-federal lead (with EPA) to assure urban NPS management program conformance with Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) and Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA. 840-B-92-002 January1993)
- Requires the state to develop coastal nonpoint pollution control programs that ensures the implementation of urban management measures in the coastal management area, reflects circumstances relevant to differing inland conditions, and provides current technical information to the public and private sectors
- Provides agencies, private sector groups, and individuals with guidance and information to apply measures to mitigate urban NPS pollution in accordance with the Coastal Management Act (1972, as amended)

C.8.3 National Estuary Program - Mobile Bay (NEP)

- Administered through and funded by the EPA to respond to environmental challenges to the Mobile Estuary through implementation of a Comprehensive Conservation Management Plan (CCMP).
- Conducts assessments, identifies stressors and promotes protection and restoration of coastal water quality
- Uses a non-regulatory programmatic approach to partner with federal, state, interstate, and local agencies; municipalities, businesses, environmental organizations; and academic institutions to address air and water quality, wetlands, stormwater runoff, population growth and land uses, and floral and faunal habitat
- Provides municipalities with science-based education and outreach to enhance environmental, communal, social, cultural, and economic well-being and to provide citizens with local sense-of-ownership

C.8.4 United States Department of Agriculture (USDA)

Conservation provisions of the 2008 Food, Conservation, and Energy Act (a.k.a. "Farm Bill" as amended or revised in future years) may provide opportunities to address mutual rural/urban environmental protection goals. Several USDA conservation initiatives and special emphases programs are designed to target water quality, water supplies, and flooding issues. The USDA also facilitates several natural resource assessment strategies and policies applicable to urban communities. These efforts provide the public and private sectors with technical resources and information to make informed environmental stewardship decisions.

C.8.4.a Natural Resources Conservation Service (NRCS - Alabama)

- The technical agency of the U.S. Department of Agriculture (USDA) responsible for conserving and protecting natural resources
- Administers land-use programs and provides technical assistance to the public to protect and conserve soil, water, and air resources, protect wetlands, prevent flooding, and enhance urban forest and green infrastructure
- Partners with USACOE through joint guidance to conduct wetland determinations applicable to the Food Security Act of 1985 and Section 404 of the Clean Water Act

- Works in close partnership with the State Soil and Water Conservation Districts and the USDA - Farm Service Agency in Alabama to control erosion and sedimentation, protect and restore drinking water quality and resources, and protect the environment

C.8.4.b NRCS Technical, Planning, and Financial Assistance Programs in Alabama:

- **Emergency Watershed Protection (EWP):** Provides funding to address emergencies as a result of natural disasters and to mitigate hazards to life and property from floods and erosion created by sudden impairments. Funding may be used to protect roads and bridge abutments, remove debris from streams, and control gullies that threaten infrastructures such as homes, gas and power lines, and road ways.

C.8.4.c Gulf of Mexico Initiative (GoMI)

- Provides financial and easement assistance along the Gulf Coast (e.g., Alabama, Florida, Louisiana, Mississippi, and Texas) to improve water quality
- Promotes sustainable management systems to mitigate nitrogen, phosphorus, and sediment runoff and transport to coastal waters and to prevent saltwater intrusion into drinking water supplies and sensitive natural resource areas
- Focuses multi-agency partnership efforts on reducing soil erosion and improving water quality in the Weeks Bay (Fish River) and Escambia River watersheds in Alabama (and Florida)

C.8.4.d "StrikeForce" Initiative (USDA)

- A partnership of USDA agencies (NRCS, FSA, and Rural Development), local and state governments, and organizations to rebuild and revitalize communities in targeted areas
- Leverages resources in persistent-poverty communities to promote economic development and job creation

C.8.5 Resource Conservation & Development Program and Councils (RC&D)

- Administered by the USDA-NRCS and governed by a multi-county, membership-based nonprofit RC&D Council
- Promotes environmental protection and economic sustainability in designated areas through collaborative strategic planning processes and partnerships
- Identifies, plans, develops, and implements conservation and economic projects through wise and efficient use of human and financial capital and natural resources
- Promotes voluntary community-based approaches

C.8.6 U.S. Fish and Wildlife Service (USFWS) / Ecological Service Field Office, Daphne, Alabama

- Conserves, restores, and protects fish, wildlife, and plant habitat and populations by enforcing federal natural resource laws
- Conducts environmental investigations and provides technical support to protect and restore natural resources
- Promotes healthy rural and urban community environments for people, fish, and wildlife

C.8.7 U.S. Army Corps of Engineers (USACOE) / USACOE -Mobile District

- Constructs, maintains and operates water resource infrastructure to enhance economic and environmental health and human safety and quality of life
- Partners with ADEM to issue nationwide (Section 401) dredge and fill (Section 404) permits
- Provides planning and other environmental services to analyze, formulate, justify and document hydrologic and natural resource protection and restoration projects
- Promotes environmentally sustainable designs, engineering, and construction protocols
- Assesses, plans, and implements water supply, storage, withdrawal and release, and flood control and drought contingency operations and projects
- Develops and reviews environmental assessments, environmental impact statements, and project plans to protect and balance the many purposes and demands placed on natural resources by urban development and construction activities

C.8.8 U.S. Geological Survey (USGS) / Alabama Water Science Center

- Partners with ADEM, ADOT, GSA, USACE, Homeland Security, communities, industry and others to collect and disseminate stream flow, reservoir level, water quality, water quantity, and groundwater resource monitoring and assessment data and information
- Develops natural resource and watershed management plans to enhance environmental and economic benefits
- Provides high resolution imagery for mapping and develops standardized methods to map and evaluate coastal community environmental health and resources

C.8.9 Tennessee Valley Authority (TVA)

- Promotes environmental and economic development and sustainability to improve quality of life and economic prosperity
- Partners with other federal and state and local entities to strengthen relationships; expand collaboration; improve communication; and provide education to many and varied audiences
- Assesses, protects, improves, restores and manages natural resources in order to meet state and federal regulations and standards; uses an integrated river system management process to assesses reservoir and land-uses; provides for public land recreational opportunities, assesses environmental conditions and problems, and facilitates the implementation of relevant management strategies
- Uses an integrated environmental management system approach to strengthen policies and programs to manage and enhance air, land and water quality and other natural resources, protect public health, discourage wasteful consumption, and proactively prevent pollution problems from occurring

C.8.10 U.S. Department of Transportation (USDOT)

- Develops and coordinates mechanisms to support the national transportation system with due regard for need, the environment, and national defense
- Administers policies and programs to protect and enhance the nation's transportation systems, security, and services
- Provide funding to the state to enhance quality of life, environmental protection and economic sustainability

C.8.11 EPA Office of Homeland Security

The Alabama Nonpoint Source Management Program and CWA Section 319 grant program endorses reasonable and practicable science-based technical measures to protect surface waters and groundwaters from nonpoint sources of pollution. Dedicated and stable sources of funding are needed to proactively address real and potential environmental and human health, economic, and social threats and challenges. Examples of NPS management impacts include drinking water safety and security, human health issues and medical emergencies, disease transmittal, pesticides, and chemical releases and spills.

Section C.9 Non-Governmental Organization (NGO) Partnerships

Several NGO associations and groups continue to partner with federal and state resource agencies to protect, conserve, and restore water quality in Alabama. Their input and cooperation provide a critical link for efforts to voluntarily deliver BMP information, technology and technical assistance to address nonpoint source pollution from urban development and construction activities in Alabama. Non-governmental partners and resources to address nonpoint sources of pollution and protect and restore water quality in Alabama include:

C.9.1 Alabama Clean Water Partnership (CWP)

- Partners with ADEM to protect and restore water quality and develop and implement watershed-based management plans
- Links federal and state, and local agencies, communities, and watershed stakeholders to put best management practices "on-the-ground"
- Provides a neutral, targeted, and iterative forum to identify environmental problems and tries to find cooperative solutions to mitigate those challenges
- Promotes improved communication, coordination and collaborative decision-making processes to protect and restore water quality using a voluntary (non-regulatory) management approach

C.9.2 Alabama Water Watch (AWW)

- A statewide water quality monitoring program composed of trained and certified citizen-volunteers who test certain physical, chemical, and biological conditions of waterbodies using standardized EPA-approved monitoring protocols
- Combines the resources and expertise of citizen groups, a university-based program, and a non-profit association to collect credible water quality data and information
- Provides training and certification to help volunteers collect, analyze, and understand their water quality data
- Identifies pollutant sources and tracks long-term trends to improve water quality and water policy

C.92.a Alabama Water Watch Association (AWWA)

- A 501(c)(3) tax-exempt organization that supports AWW efforts to help communities identify, monitor, and seek solutions to impaired water quality problems and to protect unimpaired waters
- Provides training, education and outreach, and motivation to improve water quality through citizen-based monitoring and water policy actions

C.9.3 Alabama Natural Heritage Program (ALNHP)

- A conservation action and stewardship program of the Environmental Institute (Auburn University)
- Provides science-based biological diversity information to resource agencies and the private sector to protect sensitive flora and fauna and to ensure sound stewardship of land and water resources
- Identifies plants, animals, and natural communities of concern for protection and consolidates that information into a comprehensive database
- Promotes sound natural resource protection and conservation actions within the state and also throughout the Southeast.

C.9.4 The Nature Conservancy (TNC) / TNC - Alabama

- Works to preserve, protect and restore natural resources and areas in Alabama
- Administers projects to conserve and improve species biodiversity; create, protect and restore upland and aquatic habitats; mitigate invasive species, and protect rare and declining species
- Promotes and provides environmental research, education and outreach, and hands-on field experiences to increase citizen awareness and knowledge relative to environmental sustainability and economic growth

C.9.6 Cooperative Ecosystem Study Units (CESU) Network (Auburn University - Office of Vice President for Research)

- A collaborative and interdisciplinary national consortium composed of federal agencies, academic institutions, state and local governments, nongovernmental conservation organizations, and other partners
- Works to support informed public trust and stewardship of natural resources for varied bio-geographical regional levels (i.e., Piedmont, South Atlantic Coast and Gulf Coast)
- Provides contemporary biological, physical, social, and cultural sciences and resource management research
- Provides technical assistance, education and outreach, and capacity building for long-standing priorities.

Section C.10 Regulatory Partnerships and Programs

The Alabama NPS Management Program supports a flexible, targeted, iterative, and voluntary incentive-based approach to reduce NPS pollution loadings and protect and restore water quality. If the voluntary NPS management approach does not appear to be environmentally protective (as determined by science-based water quality monitoring and assessment analyses), the state implements enforceable "back-up" provisions of the Clean Water Act (CWA) and the Alabama Water Pollution Control Act (AWPCA)(Code of Alabama 1975; Chapter 22A-22.x; as amended), and ADEM regulatory measures as embodied in Alabama Environmental Regulations and Laws to ensure state water quality standards and water quality benefits are met and sustained. Regulatory partners and resources to address nonpoint sources of pollution include:

C.10.1 Coastal Nonpoint Source Management (EPA and NOAA)

The U.S. Congress passed the Coastal Zone Management Act (CZMA) in 1972. The Act provided for managing the nation's coastal resources while balancing economic development with environmental conservation. A national policy objective of the CZMA is, "*to preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone*." [(U.S.C Section 1452. Congressional declaration of policy (Section 303)] Congress later established a Coastal Nonpoint Pollution Control Program to address NPS pollution in 1990 under Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA). The federal CZARA program is jointly administered by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA).

The Alabama Coastal Area Management Program (Baldwin and Mobile Counties) is jointly administered by ADEM and the Alabama Department of Conservation and Natural Resources (State Lands Division - Coastal Section. Section 6217 of the CWA requires states and territories with approved Coastal Area Management Programs such as Alabama to develop Coastal Nonpoint Pollution Control Programs to address NPS pollution impacts on estuaries, beaches, marine resources and ocean waters. The CZARA program also requires the state to describe enforceable policies and mechanisms it will use to implement NPS pollution control measures. Coastal zone measures address agriculture, forestry, urban areas, marinas, hydromodification (shoreline and stream channel modification), and loss of wetlands and riparian areas. Measures must also conform to those illustrated by EPA in the, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002 January 1993).

The ADEM Coastal Zone Management Programs, which falls under Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA), are inextricably linked to the statewide AL Nonpoint Source Management Program and the state's CWA Section 319 grant funding program. Available resources are coordinated and leveraged by ADEM to improve coordination, sustain partnerships, and to proactively implement NPS pollution management measures and practices. A variety of mutual programmatic accountability measures are used to indicate implementation progress and success; including but not limited to: laws, rules, regulations, ordinances, watershed-based management approach, sustained partnerships, voluntary approaches, public and private sector education and outreach, pollution prevention, financial incentives, and environmental health monitoring and tracking. As applicable to local conditions and needs, coastal NPS management measures and practices are planned and implemented in partnership with statewide NPS Management Program measures and practices. In addition, ADEM Coastal Area Management Program (Division 8) rules provide regulatory back-up authorities in conjunction with implementation of the CZARA 6217 coastal program.

C.10.2 Urban Development and Construction-related Water Quality and Environmental Protection Authorities and Programs

- Alabama Administrative Code
  - Alabama Environmental Regulations and Laws
  - ADEM Enforcement and Compliance Information
  - Enforcement and Compliance
  - Water Programs (TMDLs, Stormwater / NPDES, State Revolving Fund, etc.)
  - Drinking Water, Groundwater Rule, and Wellhead Protection Program
- CWA Section 404 (dredge and fill) and CWA Section 401 Water Quality Certification
- State Forestry (urban trees and forests)
- Pesticides: ADEM - Pesticide General Permit, ADAI - Commercial Pesticide Sell, Use, Supervision, and Applications, and Federal laws and regulations
- Public Health (e.g. On-site Septage and Disposal Systems; Fish and Seafood and Shellfish consumption advisories; Zoonoses/Arboviruses, etc.)

APPENDIX C
URBAN DEVELOPMENT AND CONSTUCTION
NONPOINT SOURCE POLLUTION MANAGEMENT

ATTACHMENT C-1: SECTION 319 GRANT PROJECT-SPECIFIC STRATEGIES AND ACTION ITEMS

Overview:
Project-specific Strategies and Action Items are essential and fundamental NPS pollution management tools to demonstrate reasonable CWA Section 319 grant progress toward achieving Programmatic Goals and Objectives of the Alabama NPS Management Program. The following adaptive NPS management mechanisms provide *project-level guidance* to plan and implement focused water quality protection and restoration activities using a collaborative, cooperative and coherent public and private sector partnership approach.

Structural best management practices and non-structural (e.g., education and outreach) activities presented herein:
- Are outcome-based, as applicable and practicable
- Places an emphasis on achieving S. 319 grant priority and EPA Grants Reporting and Tracking System (GRTS) reportable NPS pollutant load reductions (e.g., Nitrogen, Phosphorus, and Sediment) and priority Total Maximum Daily Load (TMDL) pollutants of concern
- Supports statewide efforts to expeditiously meet state water quality standards and sustain water quality benefits
- Integrates and leverages human and financial capital of national, regional, state and local programs and projects
- Aligns multiple project planning and implementing processes using a holistic NPS management approach
- Enhances local "ownership," project implementation transparency and funding accountability
- Supports a flexible, targeted, iterative, and holistic approach
- Enhances motivation, causes and opportunities for entities to mutually reach a consensus and achieve a desired NPS management goal, objective and outcome

The following Strategies present a coherent and accessible means to help the urban entities effectively, efficiently, and expeditiously achieve state water quality standards and maximize water quality benefits. Action Items are elemental strategic-support components that address single, multiple, or mixed NPS pollution causes, conditions and pollution mitigation needs regardless as to whether the outcome is statewide, community, or site specific.

Strategy C.1 **Achieve State Water Quality Standards, Use Classifications and Other Beneficial Uses.**

Action Item C.1.1 **Continue to enhance water quality and watershed health as agency and community authorities, guidelines, criteria, and resources allow:**

- Implement the NPS components of a TMDL to accelerate restoration of Section 303(d) listed impaired waters
- Develop, update and revise monitoring protocols to best determine how urban development and construction stormwater control projects and programs improve water quality and meet targeted NPS reductions in Section 319 pollutant loads and TMDL pollutants of concern
- Bring together technical experts, program managers, policy makers, community leaders, and citizens at the federal, state, and local levels to advance the science of an integrated urban water quality assessment approach aimed at protecting surface waters and groundwaters, particularly to ensure safe drinking water sources
- Continue to collect data to characterize urban development and construction site water quality trends over time, identify emerging problems, prioritize and direct BMP efforts, assess programmatic, project and site-specific BMP effectiveness, and respond to urgent situations such as floods and spills and threats to human health
- Target workshops/conferences composed of both public and private sector audiences to enhance NPS knowledge and awareness relative to water quality, aquatic health and habitat protection, BMP implementation, holistic NPS pollution control management, and community resilience and sustainability
- Document urban water quality improvements by measuring reductions in sediment, nutrients, and metals and other NPS pollutants
- Continue to document NPS control management efforts to help protect water quality, aquatic species and stream habitat, and riparian, wetlands and other sensitive areas in urban areas supported by science-based water chemistry, hydrology, and land use data and information

- Partner with communities and individuals to protect groundwaters and drinking water sources (e.g. public water systems; water supply, wellhead capture zones, private drinking water wells)
- Focus available resources to protect high quality and unimpaired waters (e.g., Outstanding Alabama Waters, Outstanding National Resource Waters, Treasured Alabama Lake, or future designations)
- Support and leverage resources and efforts of the Gulf of Mexico Alliance, Gulf of Mexico Initiative, CWA S. 6217, and other multi-state and multi-agency pollution management programs to protect coastal water quality from urban nonpoint sources
- Facilitate the compensation of "unavoidable" development activities with wetland and stream restoration "mitigation banks" (e.g. ADOT, ADCNR, state-approved private sector efforts)
- Promote voluntary NPS pollution programmatic approaches but apply statutory, regulatory and administrative "back-up" authorities and interventions to achieve state water quality standards when voluntary BMP implementation efforts, strategies, and incentives do not appear to be working as determined by science-based water quality monitoring analyses and assessment evaluations
- Assess setback requirements to protect and restore priority waters, sensitive areas, wetlands and public health
- Engage federal, state and local partners to continuously deliberate frameworks and metrics to best measure water quality restoration and protection and beneficial use success
- Coordinate with resource agencies, governmental officials, municipalities, developers, designers, engineers, local water quality protection organizations, and others to cooperatively develop and implement EPAs nine (9) element Section 319 watershed-based management plans to expeditiously protect and restore surface water and groundwater quality

Strategy C.2 Implement Management Measures to Protect and Restore Surface Waters, Groundwaters, and Natural Resources

Action Item C.2.1 Continue to holistically integrate programs, financial incentives, technology transfer, and technical assistance with a focus on consensus to meet the desired environmental outcome:

- Facilitate urban development and construction sector partnerships to develop and implement comprehensive watershed-based management plans
- Facilitate partnerships with federal and state agencies; land-grant universities, and others to align, leverage, and deliver environmentally-protective and economically-sensible measures to mitigate anthropogenic impacts
- Mutually prioritize NPS projects to best leverage Section 319 grant funds with other urban restoration programs
- Research and promulgate new or improved BMP technologies, guidelines, standards, and practices
- Enhance greater collaboration with a full spectrum of partners to accelerate research, innovation and new technologies to address NPS pollution challenges and to restore impaired water resources.
- Develop and implement watershed-based management plans that address EPAs 9-key elements
- Target resources to address NPS pollution on a HUC-12 subwatershed level as feasible and practicable
- Coordinate federal and state programs that provide landowners and producers with incentives to voluntarily install NPS pollution management measures
- Target NPS pollution management measures based on homeowner or landowner interests, site-specific conditions and location, land-use, extent, economics, effectiveness, and maintenance considerations.
- Consider both environmental and economic sustainability aspects when designing, retrofitting, or implementing structural solutions, singularly and in combination, in order to get the "best bang for the NPS buck"
- Leverage NPS mitigation resources to best address site-specific pollutant causes and extent (e.g. Section 319 pollutant load reductions, TMDL pollutants of greatest concern; concentration, proximity, etc.,)
- Target Section 319 grant guideline and NPS programmatic priority pollutant load reductions (e.g. nitrogen, phosphorus, and sediment/siltation) and nonpoint source TMDL pollutants of concern
- Devise alternative control strategies and criteria that emphasize flow (volume) reductions and restoration of natural drainage patterns to reduce NPS stormwater pollution (i.e. reduced flows equal reduced problems)
- Facilitate incentives and opportunities to improve productivity and strengthen urban environmental, cultural, social and economic conditions - especially in disenfranchised and disadvantaged communities
- Coordinate efforts to minimize or abate nutrient, fertilizer and pesticide surface water runoff and leaching to groundwaters (e.g., drinking water sources, recreational use waters, outstanding resource water, etc.)
- Coordinate NPS partnerships to minimize or abate soil erosion and sedimentation of waters of the state

- Continue to facilitate opportunities to leverage public and private sector resources to protect water quality from development, transportation, and infrastructure nonpoint sources
- Coordinate urban development and construction NPS pollution control efforts to protect and enhance public health, aquatic species and habitat, riparian areas, and other critical areas of concern
- Coordinate urban stormwater runoff control efforts to prevent or help diminish atmospheric transport of certain NPS pollutants (e.g., mercury; particulates)
- Coordinate urban development and construction stormwater runoff control efforts to prevent or restrain the spread of invasive species to preclude detrimental impacts to environmental and economic health and sustainability

Strategy C.3 Achieve Nonpoint Source Pollutant Load Reductions

Action Item C.3.1 Continue to monitor and assess on-the-ground best management practices designed to address NPS pollution management challenges:

- Target priority waterbodies, watersheds, and site-specific project areas (e.g. CWA Section 319, 303(d), and CZARA Section 6217/coastal NPS programs; TMDLs, etc.) for NPS pollutant stormwater controls
- Continue to collect valid, science-based water quality and pollutant loading data and information using federal and state agency-approved quality assurance project plans and monitoring protocols
- Evaluate current data and historical water quality trends to target stormwater control BMPs needed to protect, restore, and conserve waters of the state
- Estimate urban NPS pollutant load reductions using science-based water quality monitoring protocols and computer-modeled (STEPL) data.
- Partner with the Alabama Water Watch Program, Alabama Clean Water Partnership, government agencies and academic institutions to monitor water quality to help identify NPS impaired sites and pollutant sources; implement BMPs to protect and restore water quality, and evaluate pollutant load reduction and stormwater runoff control project implementation success
- Track and report Section 319 watershed project results to illustrate improvements in land, water, and air quality
- Report both pre- and post-project urban development and construction results to the public using federal and state websites, databases, and other programmatic and project-specific media outreach options
- Coordinate interagency reporting and input of NPS data and information on pilot projects, planned and constructed projects, research, costs, and qualitative and quantitative success indicators and measures
- Promote the development of local municipal ordinances that incorporate NPS stormwater runoff BMP planning, design, construction, maintenance and effectiveness monitoring requirements (pre-, during, and post-construction and development phases)
- As allowable, practicable or as required by the MS4 permit program, continue to promote low impact development, green design, smart growth practices whenever and wherever practicable
- Promote and monitor statewide, community, and site-specific NPS pollutant source reductions and pollution prevention strategies to document water quality protection and restoration success
- In reporting management measures and pollutant loading information, do not compromise citizen privacy issues

Strategy C.4 Provide and Enhance NPS Pollution and Water Quality Education and Outreach (E&O)

Action Item C.4.1 Continue to facilitate the production and distribution of environmentally-protective and economically-sensible information to the public and private sectors:

- Leverage agency resources to effectively and efficiently deliver land, water, and air E&O to resource agencies, governmental entities, developers, planners, landowners, volunteers, etc.
- Develop, update and revise and disseminate relevant NPS guidelines, plans, reports, and manuals to reflect new or changing regulatory program requirements and voluntary BMP strategies and technologies relative to stormwater runoff control, community "green vs. gray" design and infrastructure, vegetation and aesthetics, smart growth, and ecological and global climate changes and concepts
- Ensure that programs, services, and incentives are accessible to a diverse mix of citizens and targeted audiences
- Partner together to develop and revise NPS manuals, practices, standards, guidelines, etc., to enhance stormwater runoff E&O delivery and leadership
- Partner with various entities to increase the number of Qualified Credentialed Professionals to enhance delivery of programs and services

- Advance efforts to protect and restore urban waters by combining art with science to address NPS challenges (rain barrel painting contest, videos, websites/activities/animations, painting /coloring/drawing contest, character cartoon impersonations (Ruby Rain Drop), sketches, skits and shows (Steve Trash-magician), etc.,
- Continue to engage urban communities and enhance development and construction partnerships by facilitating delivery of NPS pollution control training, technology transfer, and technical assistance using various venues; including but not limited to the Annual Alabama NPS Conference, Business Partners for Clean Water, Clear Water Blues, Groundwater Festivals, Alabama Clean Water Partnerships, EPAs Campus RainWorks Challenge on college campuses, Habitat for Humanity, NEMO, NEP, CZARA, and other BMP demonstrations, tours, roundtables, websites, and desktop tools etc.
- Use available EPA resources to increase public and private sector urban development and construction stormwater runoff control knowledge and awareness
- Develop and implement protocols to scientifically quantify citizen NPS interests, perceptions, and responses
- Implement E&O activities designed to best prevent, compensate, ameliorate or adapt to climate change and any potential effects on urban water quality and stormwater runoff from nonpoint sources
- Integrate the resources of a variety of federal, state, and local E&O agencies and programs to enhance NPS management program communication, collaboration, coordination, and cooperation
- Incorporate various presentation formats to achieve effective broad based distribution of resources (e.g. newspaper articles, magazines, television, radio, websites, signage, videos, posters/displays, fact sheets, newsletters, brochures, conferences, meetings, seminars, training, tours, festivals, advisory committees, work groups, etc)
- Develop and publish pollutant load reduction "success-stories" to characterize project implementation success
- Facilitate competitions and events to characterize the ecological and economic benefits, capabilities, and performance of traditional, innovative or unique NPS urban development and construction water quality protection approaches (structural or non-structural) at the project scope and scale or individual BMP design levels. Compile results as adaptable Alabama-specific case studies, guides, and decision-making tools.
- Recognize exemplary industry, municipal, and citizen-based stormwater management activities (e.g., recognition awards and incentives)
- Enhance minority, low income, and/or non-English speaking stakeholder resources and outreach efforts
- Continue to address NPS water quality issues relative to carbon emissions and global climate change

Strategy C.5: Develop and Sustain Public and Private Sector NPS Pollution Management Partnerships

Action Item C.5.1 Continue to improve coordination with governmental agencies, private sector interests, and citizen groups at the state and watershed level:

- Integrate and align resource programs and project implementation plans to expeditiously make the best use of limited NPS resources (i.e., prevent, compensate, mitigate, and adapt to potential threat and real problems)
- Clearly articulate programmatic goals and continue to develop mechanisms and implement projects to achieve them
- Engage the public and private sector through regular outreach meetings and using incentives
- Ensure that all NPS projects and services are meaningful, publicly accessible, and targets a specific achievable water quality protection outcome
- Engage NPS stormwater runoff control partners early-on in the planning phase to help build trust and encourage long-term implementation interest and participation
- Increase participation, services, incentives, and benefits to under-served communities and individuals
- Facilitate the development and use of institutional decision-making tools to target water quality, socio-economic factors, personal/corporate behaviors, etc.
- Partner with academic institutions to educate and train knowledgeable and enthusiastic proponents of LID, green infrastructure to produce professionals and community leaders to develop, advocate for, and implement sustainable communities
- Partner with voluntary citizen monitoring groups, with EPA-approved quality assurance and control monitoring protocols, to identify potential NPS pollution threats and to focus stormwater runoff BMP priorities
- Partner with rural stakeholders to develop and implement a 9-key element watershed management plan (e.g. EPA Section 319 grant guidelines) to holistically address urban challenges posed by NPS pollution

- Balance NPS program and project staffing, partnership resources, and planning and implementation actions to deliver measurable water quality protection and restoration results and more environmentally protective /greener, resilient and sustainable communities
- Collaborate with other federal agencies acting or preparing to act on potential environmental, economic, and public health/humanitarian risks posed by climate change
- Develop and update applicable Memorandum of Agreement or Memorandum of Understanding
- Conduct surveys and interviews to assess citizen NPS knowledge, awareness and attitudes relative to urban development and construction issues and water quality protection and restoration
- Advance efforts to protect and restore urban waters from NPS pollution through community engagement, scientific processes and principles, research and technology to ensure clean and healthy waters or enhance other economic and environmental quality of life for residents
- Develop and enhance voluntary NPS management strategies and techniques depending on the unique character, perspectives, needs, and requests of the particular urban or suburban community

Strategy C.6 Target Specific Programmatic Goals and Objectives of the Alabama NPS Management Program

Action Item C.6.1 As resources allows and to the maximum extent feasible and practicable, leverage Section 319 resources to protect and restore water quality and maintain beneficial uses of state waters:

- Continue to coordinate, cooperate, communicate, and collaborate with state resource agency and local community partners and their associated projects and programs to protect and restore surface waters and groundwaters (e.g. Alabama Clean Water Partnership, advisory groups, citizen groups, etc.)
- Continue to leverage NPS resources of federal programs on a national, regional, interstate, state, river basin or other NPS management level scale to holistically address urban and construction stormwater runoff
- Continue to cooperatively identify and prioritize waters impaired by NPS stormwater runoff and in need of restoration (e.g. TMDLs, drinking water supplies /source water protection, wetlands, etc.), as well as priority unimpaired waters for protection (e.g., Outstanding Natural Resource Waters, Outstanding Alabama Waters, Treasured Alabama Lake, etc.)
- Continue to refine processes used to assign and progressively address stormwater BMP planning, design, implementation, and maintenance priorities
- Continue to examine new and innovative ways to increase public awareness by using effective BMP planning, design, and implementation approaches that promote partnerships, cooperation and resource leveraging
- Continue to develop Alabama-specific environmental monitoring and data reporting protocols to characterize the performance of urban development and construction BMPs
- Develop and maintain a comprehensive clearinghouse and website/database for Alabama-specific urban BMP information; particularly field scale design, performance, and cost comparison data
- Develop and implement urban components of EPAs 9-key element watershed-based management plans as practicable and as resources allow to address stormwater runoff
- Continue to periodically (minimum every 5 years) revise Strategies and Action Items as necessary to reflect progress or problems encountered in achieving AL NPS Management Program goals and objectives
- Continue to adopt iterative, adaptive NPS management approaches to meet and maintain state water quality standards and water quality benefits as expeditiously as practicable
- Continue to incorporate a variety of formal and informal mechanisms to sustain partnerships (e.g. memorandum of agreement, letters of support, cooperative projects, leveraged funds, meetings to share information and ideas)
- Continue to ensure that the goals and objectives AL NPS Management Program are well integrated with the economic stability and social and cultural goals at the state, county, and local community levels
- Continue to make strong sustained efforts to coordinate, integrate and leverage the significant resources of the CWSRF loan program for eligible NPS management program activities
- Continue to review, update and achieve urban category applicable annual milestones of the AL NPS Management Program and communicate efforts in annual reports and the EPA-GRTS database as applicable