



2016
National
Capital
Planning
Commission

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Introduction to the Federal Environment Element

The federal government's goal is to promote the National Capital Region as a leader in environmental stewardship and sustainability. The federal government seeks to preserve and enhance the quality of the region's natural resources to ensure that their benefits are available for future generations to enjoy.

The National Capital Region's (NCR) natural resources have influenced development throughout its history, from agricultural beginnings and early port cities to the siting of the capital city at the confluence of the Potomac and Anacostia Rivers. The region's topography, forests, and waterways give the nation's capital a unique natural setting that has been respected and protected for generations. These natural resources remain valued, and the region has grown to become one of the nation's largest metropolitan areas in terms of population, jobs, and annual visitors. This growth requires conscious management and stewardship to maintain proper balance between the region's natural and built environments.

The Federal Environment Element identifies planning policies related to the maintenance, protection, and enhancement of the region's environment. This includes the natural and physical environments as well as the relationship of people with that environment. The element provides an overall framework for the Commission and others to evaluate the implications of federal projects to the environment, encourages improved low impact design and development practices, and facilitates coordinated management of resources among agencies. The element identifies several presidential executive orders, federal and local laws and regulations, and initiatives that encourage federal and local governments to work together and assume leadership roles in improving the environment.

The federal government has a significant influence and strong interest in protecting the region's environment:

- The federal government owns important environmental resources, including a large portion of the region's land and water bodies. The federal government is the region's single largest employer, tenant, and property owner. As a result, the government's environmental stewardship has a significant impact on the region's overall environmental quality.
- The federal government maintains a long-term perspective on the region's environmental quality as a permanent presence in the region.
- The nation and world look to the NCR as a symbol and model of leadership. Environmental policy in this region has an impact far beyond the area's immediate environment.
- The region is interconnected to environmental resources beyond its borders. As a result, environmental policies within the region affect other populations and ecosystems.
- As home to the government agencies that set national policies, the region often plays a role in testing innovative policies and demonstrating the benefits of sound environmental stewardship.



Flickr: MrTinDC

Legislative and Regulatory Framework

Federal agencies are individually responsible to comply with a number of environmental laws and executive orders that protect and conserve environmental resources. The U.S. Environmental Protection Agency (EPA) develops and sets national standards for topics such as clean air, water, and waste material and enforces regulations that implement many of these laws.

The primary environmental law that applies to all federal activities is the [National Environmental Policy Act](#)¹ (of 1969) (NEPA). Commonly referred as the ‘umbrella act,’ it requires federal agencies to evaluate the effect of their actions on the environment, and consider multiple laws, executive orders, and regulations before they make final decisions to ensure informed decision-making. Federal agencies must document the impacts of their potential actions on the environment as part of their decision-making process. The Council on Environmental Quality’s (CEQ) regulations further define aspects of environmental implementation and compliance.

The National Capital Planning Commission (NCPC) provides planning guidance to many agencies on how they can meet these requirements and contribute to environmental stewardship in the region. NCPC also reviews environmental documentation as part of its project review process. Together, NEPA and other environmental requirements help the Commission and submitting agencies evaluate and properly address impacts early in the master planning and project planning processes.

The extensive federal presence in the region makes it imperative that specific efforts be made by federal facilities to follow policies considered in NEPA, related laws, and executive orders. Agencies should involve NCPC early on in the NEPA and project planning process to ensure that environmental issues are properly identified and considered. Planning considerations addressed early in the decision-making process will help the federal government preserve and enhance the quality of the region’s natural resources.

The 17th Street Levee closure protects downtown Washington from river and storm surge flooding.

Environmental Issues

The broad environmental challenges of climate change; watershed and habitat protection; and air, water, and land protection must all be addressed within the Mid-Atlantic context of the region. Restoration of the Cheasapeake Bay includes hurricanes and extreme weather events and the specific impacts from regional growth patterns. Integrating resilience into federal planning and decision-making are important steps in addressing challenges facing the region.

The NCR has a complex economy fueled by millions of residents and visitors that work for, or interact with, federally related functions. As in any metropolitan area, it is a challenge to accommodate offices, housing, transportation, and other development with minimal disruption to the natural environment. To decrease potential disruptions, the element supports policies that direct development and encourage greater density to established areas and near transit. Sound planning recognizes the value of compact, efficient, and well-designed development as a necessary part of the protection and enhancement of existing natural resources.

The Federal Environment Element includes overarching goals and policies designed to reinforce the federal government’s role in sustainable development while considering potential impacts to the environment resulting from federal actions. The element provides a policy framework that supports a sustainable region using best planning practices, as well as thoughtful site planning and design solutions, to maintain and increase the region’s environmental resources. The element consists of fourteen policy areas that provide guidance on numerous environmental issues.



SECTION A: Policies Related To Climate Change

Climate change, a significant and lasting shift in weather patterns over periods ranging from decades to millions of years, is a critical issue for the region, the country, and the world. According to the U.S. Global Change Research Program, there is evidence from the top of the atmosphere to the depths of the oceans that the planet is warming. Over the last half century this warming was primarily driven by human activity, predominantly through the burning of fossil fuels.² Warming is causing glaciers and Arctic sea ice to melt, affecting ecosystems and contributing to sea level rise. Beyond warming, climate change affects the type, frequency, and intensity of weather events, including heat waves, significant storms, floods, and droughts. Recent U.S. and international climate change studies document that globally the average sea level rise was approximately 1.7 millimeters per year through the twentieth century, after a period of little change during the previous two thousand years.³ Ocean acidification, caused through the absorption of carbon, is affecting biodiversity and ecosystems around the world.⁴

While the global trend of warmer temperatures is clear, different regions can experience different impacts. For example, the Southwest United States should expect decreased winter and spring rainfall while the North, which includes Maryland and Washington, DC should expect greater precipitation.⁵ For this reason, it is important to localize climate projections to determine local impacts. Federal agencies should use the best available data and projections in planning and decision-making tools.



Climate Change In The Region

Various recent studies have explored regional climate change.

Increased Rainfall. The District of Columbia Department of Energy & Environment projected that by the 2080s the number of days with more than one inch of rainfall would increase from 10 to 13 days.⁶ This would result in more frequent flash-flooding that overwhelms the existing stormwater infrastructure, and poorer water quality flowing directly into the Potomac and Anacostia Rivers, as well as other water bodies.

Urban Heat Island Effect and Air Quality Impact. Days with temperatures over 95 degrees would increase to 7-9 days/year by 2020 and to 40-70 days/year by the 2080s⁷ This presents energy consumption challenges (such as increased cooling loads), as well as health and safety concerns for residents, workers, and visitors.

Increased Sea Level Rise. By the 2050s, the National Aeronautics and Space Administration (NASA) predicted a regional sea level rise between 7-28 inches with an average annual temperature increase of 3-5°F.⁸ Vulnerability to threats associated with rising sea levels is compounded by high population densities along coastal areas and rivers leading to major estuaries, such as the Chesapeake Bay. Low-lying areas in Washington, DC and locations along water bodies, including the Anacostia and Potomac Rivers, are affected by rising sea levels. Shorelines of the Chesapeake Bay and the Potomac River are among the region's most threatened resources from the effects of climate change. Even the rise of a few feet would exacerbate the effects of storms, tides, or floods and increase the risk of damage. There are significant numbers of federally-owned properties in these locations, including parkland, military installations, museums, and agency headquarters.

Climate change can increase the frequency and intensity of flooding in urban areas.

Mitigation and Adaptation

Federal and local agencies are focused on two important aspects of climate change: how to minimize further climate change from occurring (mitigation); and how to plan for, and address, the impacts of climate change (adaptation). The key to mitigation is reducing greenhouse gas (GHG) emissions. The use of fossil fuels such as coal, oil, and natural gas produce GHG emissions, which enter the Earth’s atmosphere and prevent heat from escaping into space. As a result, the planet grows warmer and is more susceptible to extreme weather events. The federal government administers a wide array of public-private partnerships to reduce GHG emissions in the United States, including energy efficiency, renewable energy, subsidizing alternative modes of transportation, and implementation of other technologies.

Greenhouse gases are categorized into three broad scopes:

- Scope 1 Emissions:** Direct emissions derived from sources that are owned or controlled by the reporting entity; for example fuel used for heating federal buildings or for entity vehicles.
- Scope 2 Emissions:** Indirect emissions derived from the consumption of purchased electricity, heat, or steam.
- Scope 3 Emissions:** Indirect emissions from sources not owned or directly controlled by the entity but related to the entity’s activities, such as employee travel and commuting.

In addition to reducing GHG emissions, the federal government is committed to planning for, and addressing, the impacts of climate change. Adaptation recognizes that even if global mitigation efforts are successful, there will still be impacts and consequences because of inaction over the last few decades. Adapting requires evaluation of how climate variability and change will affect assets, operations and service while planning and making decisions with these outcomes in mind. Both adaptation and mitigation have been a focus of legislative and procedural documents in federal and local agencies.

Resilience

Resilience is another form of adaptation that focuses not just on preparing for climate impacts, but also on a community’s ability to sustain shocks and bounce back from them. Climate resilient planning involves thinking about how to strengthen social and economic networks to increase a community’s adaptive capacity. The federal government has embraced climate resilience as a major planning effort through initiatives such as the [U.S. Climate Resilience Toolkit](#)⁹ and the U.S. Department of Housing and Urban Development’s National Disaster Resilience Competition.¹⁰ Federal agencies are encouraged to plan for resilience in the National Capital Region.

Federal Mitigation and Adaptation Efforts

Two executive orders focus on climate change and sustainability. [Executive Order 13693: Planning for Federal Sustainability in the Next Decade](#)¹¹ (2015) requires federal agencies to meet ambitious sustainability goals for their own operations and account for their direct and indirect environmental impacts. The primary goal of this Executive Order is for federal agencies to reduce GHG emissions. [Executive Order 13653: Preparing the United States for the Impacts of Climate Change](#)¹² (2013) instructs federal agencies to improve the location’s preparation and resiliency to the impacts of climate change by managing the associated climate risks to federal assets, operations, services and programs. Together these two executive orders make up the primary federal guidance for climate change mitigation and adaptation.

Within Washington’s monumental core is an unparalleled concentration of federal headquarters, buildings, military installations, national security facilities, and significant national cultural treasures. This clustering of federal resources and operations makes it imperative that federal agencies in the region prepare for climate change as the potential consequences are too high to ignore. NCPC is working to better understand how federal policy can shape regional development, bringing multiple federal agencies together to discuss climate change in the region and how they can work together to adapt.

Interagency efforts include NCPC’s Monumental Core Climate Adaptation Working Group. In 2013-2014, NCPC, U.S. General Services Administration (GSA), NASA, Metropolitan Washington Council of Governments (MWCOC), the U.S. Global Change Research Program, and the Smithsonian Institution sponsored the Building a Climate Resilient Region webinars and workshops to assist with climate adaptation planning and to help improve regional coordination. The workshops included new downscaled climate data provided by NASA, as well as opportunities to share climate information and a chance to brainstorm climate adaptation strategies tailored to the NCR. This project received the 2014 American Planning Association Federal Planning Division’s Outstanding Collaborative Planning Project Award.

The Federal Interagency Climate Change Adaptation Task Force’s 2010 Progress Report¹³ provided a set of implementing instructions for federal agencies to integrate climate change adaptation into their planning, operations, policies, and programs. The Office of Management and Budget’s annual Circular A-11 directs federal agencies to consider climate preparedness and resilience as part of their FY 2017 construction and maintenance budget requests.

A Cross-Cutting Issue

Climate change is a cross-cutting issue in this region that particularly affects stormwater (increased intensity and frequency of rain), flooding (rising sea levels and increased frequency and intensity of surge generating coastal storms), vegetation and wildlife (changes such as increased heat and ocean acidification result in loss of habitat and biodiversity, infrastructure (increased energy demand) and public health (increased heat and severe storms). Climate change serves as a force multiplier, increasing the severity and frequency of impacts. Climate change solutions are equally cross-cutting, and will have positive impacts on other environmental issues.

The federal government has the opportunity to play a major role in responding to climate change regionally, due to its large federal presence. The policies in this section address mitigation by reducing the amount of GHG emitted directly or indirectly by federal activities and adaptation by protecting federal assets from the impacts of climate change. Decreasing energy use in federally owned buildings and decreasing indirect emissions resulting from employee commutes are two primary ways to help reduce GHG emissions and mitigate climate change. Encouraging compact, transit-oriented development that reduces employee reliance on automobiles is another broad strategy for mitigation. Another important strategy is to share climate adaptation expertise and information across agencies and among local governments, so that the federal government can properly plan for future consequences. Armed with better information, federal agencies can make better decisions to protect federal assets from climate change impacts.

The federal government should:

- FE.A.1** Implement sustainable building design and transportation strategies to address the challenges of climate change and advance projects that will minimize fossil fuel consumption and reduce greenhouse gas emissions.
- FE.A.2** Establish compact, transit-oriented development to reduce greenhouse gas emissions.
- FE.A.3** Pursue opportunities with vendors and contractors to reduce greenhouse gas emissions (e.g., transportation options and supply chain activities).
- FE.A.4** Decrease, and where possible eliminate, the use of chemicals directly associated with greenhouse gas emissions.
- FE.A.5** Develop and implement innovative, agency-specific policies and practices to reduce Scope 3 greenhouse gas emissions in agency operations.
- FE.A.6** Design buildings to achieve energy, waste, and water net-zero use, where feasible.

- FE.A.7** Increase renewable energy and renewable energy generation on federal agency properties. Institute aggressive development of energy districts in federal project construction involving multiple buildings and/or other physical assets.
- FE.A.8** Address climate change impacts in long-range plans, site selection, and capital projects by considering, among others, the effects of:
 - 1. Risks of flooding (sea level rise, annual rainfall, intensity of rainfall)
 - 2. Pollutant levels in runoff
 - 3. Soil erosion
 - 4. Increased stormwater runoff
 - 5. Temperature extremes
 - 6. Increased number and severity of storms such as hurricanes
 - 7. Impact to tree viability and vegetation
 - 8. Critical services and infrastructure reliability
- FE.A.9** Assist in the development of regional climate adaptation and resilience plans to enable the National Capital Region and individual localities and utilities to prepare vulnerability assessments, conduct adaptation planning, and facilitate regional emergency preparedness.
- FE.A.10** Support local and regional analysis of impacts from climate change and associated risks to the region’s infrastructure, buildings, natural resources, populations, and, in particular, federal lands and facilities adjacent to the Potomac and Anacostia Rivers and their tributaries.
- FE.A.11** Develop federal plans and projects consistent with agency, local, and regional climate adaptation and mitigation plans by:
 - 1. Prioritizing capital investments that are climate resilient and will increase the region’s adaptive capacity.
 - 2. Coordinating climate adaptation actions with other federal, regional, and local agencies within the same geographic area (such as a drainage basin, shoreline community or coastal region).
 - 3. Ensuring that federal actions do not create greater climate change vulnerabilities in local communities or the region.
 - 4. Considering the long-term vulnerability of a community’s critical infrastructure to climate change risks during the site-selection process.

SECTION B: Policies Related to Air Quality

Population growth and related automobile use has made air quality one of the region's leading environmental concerns. In addition to detrimental effects on human health, air pollution degrades visibility to important viewsheds. Air pollution and the accompanying acid rain also cause the deterioration of materials in many historic federal buildings, memorials, and other susceptible structures.

Impacts of Poor Air Quality

Poor air quality has direct impacts to human health. Exposure to toxic air pollutants can cause serious health effects, including damage to the immune, neurological, reproductive, developmental, and respiratory systems, as well as other health problems.¹⁴ Humans and animals are exposed to air pollutants from breathing in air toxins and from ingesting air pollutants deposited in water sources or in the soil. Once in the water or soil, the pollutants are taken up by plants and ingested by other animals and wildlife, making their way up the food chain.¹⁵

Air pollution has other environmental consequences. Poor air quality can lead to vegetation damage: from the way trees and plants look, to impaired reproduction and growth, and to decreased crop yields (refer to Section G: Policies Related to Tree Canopy and Vegetation for more discussion about trees and how they can improve air quality). Air pollution contributes to acid rain, which causes damage to structures (especially marble and limestone). It is also destructive to fish and animal life when it makes its way to rivers and oceans. Air pollution contributes to regional haze and visibility, which can obstruct important viewsheds.¹⁶

Air pollutants can also impact indoor air quality. These pollutants include combustion sources, off-gassing building materials and furnishings, cleaning products, and outdoor sources brought inside. Air quality is highly regulated at the local, state, regional, and federal levels. Following the Clean Air Act of 1970, the National Ambient Air Quality Standards were established to regulate pollutants shown to threaten human health and public welfare. The Clean Air Act and the standards include six criteria pollutants set by the EPA. The criteria pollutants are carbon monoxide, lead, nitrogen oxide, ozone, particulate matter, and sulfur dioxide. Areas where a criteria pollutant level exceeds the standards are designated as non-attainment status.

The Washington region is in a non-attainment status for ozone and fine particulate matter. Exhaust from cars, trucks, and buses primarily cause high ozone levels. In order to improve air quality in non-attainment areas, the Clean Air Act requires states to develop long-term State Implementation Plans to identify measures to help the region meet air standards, including transportation control measures designed to offset auto emissions. Federal activities should apply measures identified in the long-term plans to help the region meet air quality standards.¹⁸

Sources of Air Pollution in the Region

Pollution is emitted by either stationary or mobile sources. Stationary sources include point sources such as individual facilities with smoke stacks as well as area sources such as gas stations, painting operations, and use of consumer products (not identified individually because they have only cumulative impacts). Mobile sources include “on-road” sources such as cars, trucks, and buses, and “non-road” sources such as aircraft, boats, construction equipment, and lawn and garden equipment.

Pollutants from mobile sources affect the entire region. In 2011, 28 percent of volatile organic compounds, 47 percent of nitrogen oxides, and 50 percent of carbon monoxide came from on-road sources.¹⁹ In the presence of sunlight, these pollutants chemically react to form ground level ozone. The impact of these pollutants, as well as others including particulate matter, are most dramatic within 600 feet of major highways and roads. Their effects can extend as far as 1.5 miles away.²⁰ Federal facilities located, or that plan to locate, within 600 feet of a highway should consider the hazardous pollutants emitted from mobile sources and the impact they may have on employee health and safety.

In addition to local pollution, interstate transport of pollutants is another source of pollutants. One EPA study estimated that nearly 75 percent of ozone pollution in the region is transported in the wind from other states.²¹ This includes long-range transport of pollutants from west of the Appalachians, medium-range transport from the southwest Mid-Atlantic, and local transport along the I-95 corridor. Pollutant transfer is an important reminder of the need for coordinated regional and national efforts, and that emissions generated in the region can harm public health and welfare in downwind jurisdictions.

The federal government’s activities directly impact regional air quality. Policies in the element support the reduction of pollution from mobile sources by reducing vehicle miles traveled, and from stationary sources by reducing the amount of energy consumed. Because point sources of pollution are already regulated, federal agencies will have the greatest impact in the region by reducing pollution emitted by mobile sources. Many federal employees use public transit; however, the federal government should increase its efforts to support transportation infrastructure needs and provide amenities that encourage public transportation use. Other federal activities contribute to air pollution, including facility emissions from heating and air conditioning systems, power generators, and waste incinerators. Many agencies are incorporating “green” building materials and systems, which can improve indoor air quality and minimize power generation requirements. Federal agencies and employees can also improve air quality by choosing low-polluting transportation modes, reducing vehicle trips and trip lengths, conserving energy, and using low-polluting energy sources for buildings.

The federal government should:

FE.B.1 Reduce mobile source air pollutants by:

1. Encouraging federal, state, and local governments, as well as private employers, to support improvements to, and use of, public transportation systems and enhance bicycle and pedestrian mobility.
2. Decreasing federal employee use of single-occupant vehicles and reducing the number and length of trips through operational policies, such as reduced parking ratios using Transportation Demand Management techniques and the location and design of workplace facilities. Transportation Demand Management techniques are defined in the Transportation Element.
3. Encouraging use of alternative clean fuels (e.g., electric, fuel cell, compressed natural gas, and “clean” diesel fuels) and promoting or increasing use of Alternative Fuel Vehicles. [Alternative fuels are defined by federal law.](#)²²
4. Establishing alternative fueling locations on federal property and assigning preferred parking spots for low emission vehicles.
5. Encouraging the use of aircraft that meet or exceed the current emission standards set by EPA.
6. Designing parking lots to support electric vehicle charging stations, where electricity sources are from renewable resources.

FE.B.2 Reduce stationary sources of air pollutants by:

1. Minimizing power generation requirements, such as by using best available green building systems and technologies.
2. Using less-polluting sources of energy like clean renewable energy (e.g., solar, geothermal, and wind).
3. Encouraging the development and use of alternative and distributed energy sources to reduce the reliance on fossil fuels.
4. Carefully controlling and reducing the incineration of waste materials, particularly those that may contain toxic substances.

FE.B.3 Use environmentally-friendly green building materials, construction methods, and building designs to promote safe indoor air quality.

FE.B.4 Take measures to temporarily reduce the generation of emissions that contribute to ozone formation in response to Ozone Action Days, when the highest ozone levels occur. Similar measures should be applied to long-term plans to reduce mobile and stationary sources.

FE.B.5 Protect employees from breathing pollutants produced from mobile sources, especially when located within 600 feet of a major highway.



Limited visibility due to poor air quality looking from the Washington Monument.

SECTION C: Policies Related to Water Resources and Stormwater Management

Water Supply

The Potomac River supplies about 80 percent of the region’s water.²³ The Washington Suburban Sanitary Commission’s Patuxent River Plan and Fairfax County Water Authority’s Occoquan River Plan provide the remaining balance. The region’s major water supply agencies coordinate operations in the Potomac watershed, essentially operating as a single entity in sharing water across the Potomac, Patuxent, and Occoquan basins during periods of low flow.

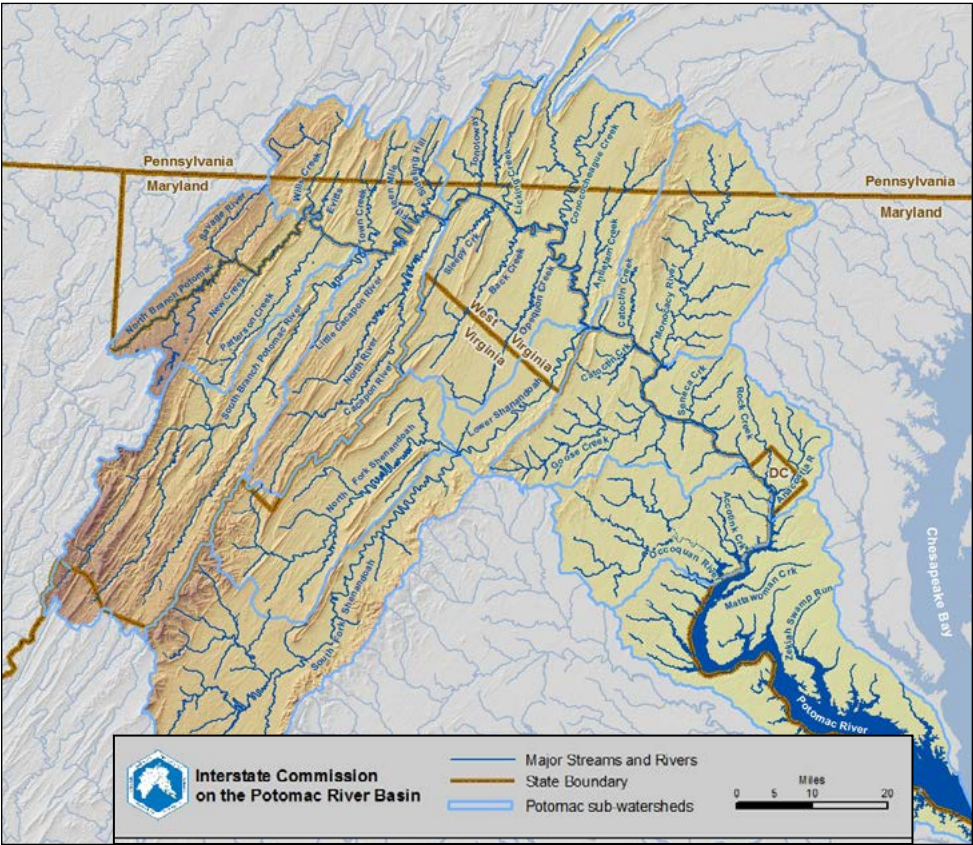
Despite occasional low flows in the Potomac River, and ongoing growth in the region, MWCOG projects that the region has sufficient water supply from its regional resources to accommodate expected future demand up to 2040. By the year 2040,²⁴ the existing system may have difficulty meeting demand during periods of drought without water use restrictions or the development of additional supply capabilities.

Federal government operations are dependent on the regional water supply system. As a result, it is important to retain and reuse stormwater as a resource in federal facilities to reduce the region’s water consumption. Greater infiltration rates across the region will help recharge the groundwater and aquifer system and help achieve higher stream flows during dry weather.²⁵ The federal government, along with state and local authorities, has a responsibility to help ensure that the region’s water supply is protected from contamination, and that the future water supply is adequate for federal facility operations, private sector activities, and general public consumption.

Water Quality

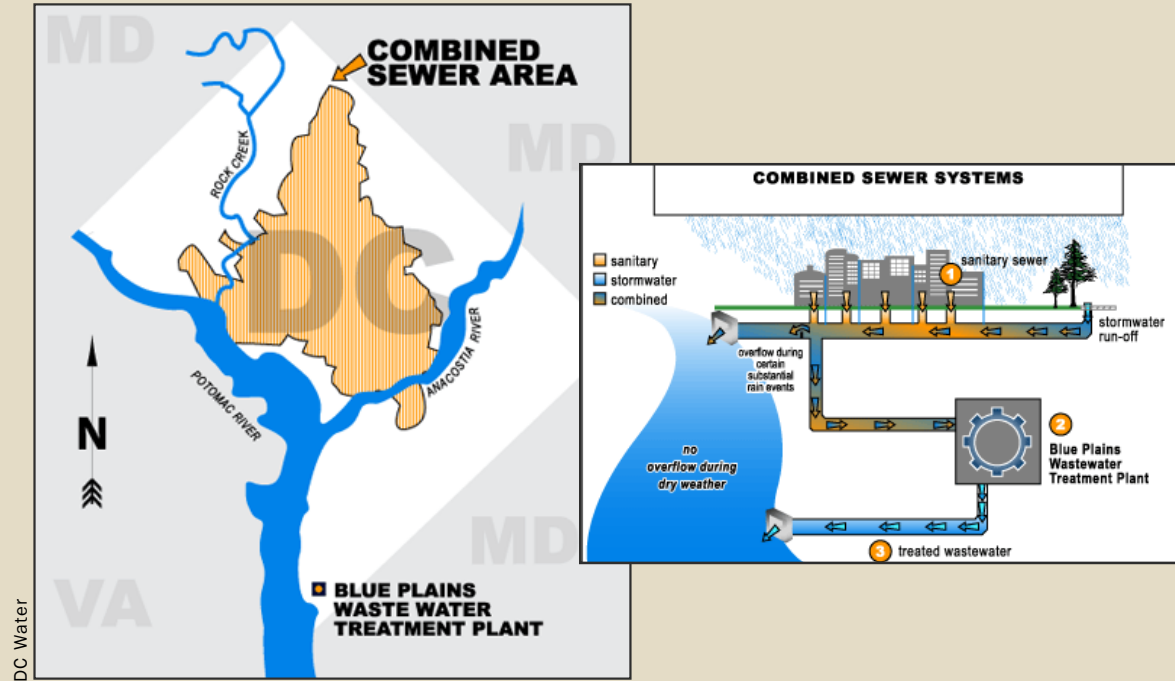
The region’s rivers, streams, and groundwater systems are critical natural features and support a diverse array of wildlife and flora. The quality of these features is important for human use and enjoyment, and a variety of sources contribute to them. In the Washington area, major point source pollution is discharged from the region’s sewage treatment plants and combined sewer overflows; and non-point source pollution is produced principally from stormwater and agricultural runoff.

Stormwater runoff occurs when precipitation does not infiltrate into the ground and instead flows over the land, accumulating debris and other pollutants.²⁶ Pollutants commonly include grease, oil, heavy metals from cars, fertilizers, pesticides, sediment from construction sites and agricultural areas, other loose soils, and bacteria from pet wastes. Eventually this polluted runoff is deposited into the rivers or streams. When the ground is no longer saturated, the polluted runoff can percolate into the ground water system. Once in the water supply, these pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe and unpleasant.²⁷ Municipalities that operate combined sewer systems also negatively affect water quality because raw sewage flows into the rivers during rainstorms.



Potomac River Watershed

DC Water Clean Rivers Project



When Washington's original sewer system was built in the 1800s, it was constructed as a combined sewer overflow (CSO) system that discharged sewage directly into the rivers during heavy rains. A 1994 EPA policy required all municipalities with CSOs to develop Long Term Control Plans to control CSO discharges into the nation's waters, which would be administered through the National Pollutant Discharge Elimination System permits. The District of Columbia, through DC Water (the city's water and sewer authority) began its LTCP process in 1998 and finalized it in 2002. The long term control plan was renamed the Clean Rivers Project in 2010.

The project calls for a 98 percent reduction of overflow events through the use of two large underground tunnel systems (a 30 million gallon Potomac River Tunnel and a 157 million gallon Anacostia River Tunnel system) to collect and send the diluted sewage during overflow events to the Blue Plains Water Treatment Plant. The plan was modified in 2015 to eliminate a planned tunnel for Rock Creek and instead build green infrastructure in the sewershed to help reduce the runoff generated during storms. The tunnels and green infrastructure will be completed in phases, allowing incremental benefits to water quality that will reach completion in 2030 when the project is finished.

Improving the Region's Water Quality

By the late twentieth century, the Potomac and Anacostia Rivers had suffered serious water quality deterioration. Officials banned fishing in many areas and discouraged direct human contact with the water. In response, federal and local agencies developed strategies to improve regional water quality. Several efforts are addressing these issues, including the [Chesapeake Bay Program](#),²⁸ multiple [Anacostia River initiatives](#),²⁹ and the [DC Water Clean Rivers Project](#).³⁰ The Chesapeake Bay Program is an initiative developed to protect, restore, and enhance the Chesapeake Bay and the natural resources that rely on the Bay's continued good health (see Section H: Policies Related to Wildlife). Some solutions involve careful and coordinated regulation of future land development and densities to minimize impervious surfaces, control runoff, and ensure appropriate buffer areas along rivers, streams, and other sensitive areas. Other solutions require costly modernization of sewer and stormwater management systems. The Clean Rivers Project is DC Water's ongoing program to reduce pollution from combined sewer overflows to Rock Creek and the Anacostia and Potomac Rivers.

Stormwater Management

The federal government controls a significant amount of shoreline and adjacent properties along the Anacostia and Potomac Rivers and related tributaries, particularly in Washington, DC. In order to protect the region's waterways and water resources for generations to come, the federal government should reduce the amount of stormwater that flows into the sewer system and rivers; clean the stormwater that does flow into streams and rivers; increase regional infiltration rates and aquifer recharge; and reduce water consumption by reusing stormwater.

Under the [Clean Water Act](#),³¹ (1972) EPA is responsible for developing and implementing the National Pollutant Discharge Elimination System (NPDES) Stormwater Program, which regulates stormwater discharges from three sources: municipal separate storm sewer systems, construction activities, and industrial activities. The act requires each state to identify impaired waters (those that do not meet water quality standards even after point sources of pollution have installed the minimum required levels of pollution control technology) and develop strategies to limit pollution in the waters to a Total Maximum Daily Load. There are multiple plans in place to address the region's impaired water bodies including the Potomac River, Anacostia River, and the Chesapeake Bay. Federal agencies have a shared responsibility to help restore these waters.

Under Section 438 of the Energy Independence and Security Act of 2007 (EISA), federal agencies are required to reduce stormwater runoff from federal development and redevelopment projects in order to protect water resources.³² Any development or redevelopment of a federal facility, with a footprint that exceeds 5,000 square feet, is required to use site planning, design, construction, and maintenance strategies to maintain or restore, to the maximum extent feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.

EPA has provided technical guidance on implementing EISA, focusing on retaining rainfall on-site through infiltration, evaporation/transpiration, and re-use of water resources to the same extent as occurred prior to development. Many federal facilities comply with federal, state, and local stormwater requirements using a variety of stormwater management practices including low impact development and best management practices and procedures.

The federal government should:

- FE.C.1** Develop stormwater management plans that:
 - 1. Encourage federal agencies and local jurisdictions to work together to develop stormwater management plans.
 - 2. Encourage stormwater management at a campus or district-level.
- FE.C.2** Strengthen stormwater management practices for federal facilities and federal land to meet federal and regional requirements, specifically to restore clean water, recover habitat, sustain fish and wildlife, and increase public access.
- FE.C.3** Upgrade water supply and sewage treatment systems, modernize storm and sanitary sewer systems, and integrate green infrastructure approaches to avoid the discharge of pollutants into waterways.
- FE.C.4** Avoid the use of pesticides, herbicides, fertilizers, chemicals, oil, salts, and other threats to prevent the pollution of groundwater and waterways.
- FE.C.5** Use pervious surfaces and bio-retention facilities, if appropriate to the site, to reduce stormwater runoff and impacts on off-site water quality.
- FE.C.6** Encourage the use of innovative and environmentally-friendly “Best Management Practices” in site and building design and construction practice, such as green roofs, bio-retention ponds, vegetated filtration strips, rain gardens, and permeable surface walkways, to reduce erosion and clean and capture stormwater on-site.

- FE.C.7** Use technical guidance provided by EPA, in addition to working with local jurisdictions, to meet both federal and local stormwater requirements.
- FE.C.8** Ensure that stormwater runoff does not impact neighboring properties.
- FE.C.9** Prevent unnecessary wastewater discharge and the potential for combined sewer overflow events. Require reduced wastewater output through conservation and reuse in all new federal buildings and major federal renovation projects consistent with the Energy Independence and Security Act of 2007 and all other applicable policies.
- FE.C.10** Participate in regional agreements and programs that improve water quality and address watershed issues.
- FE.C.11** Encourage the natural recharge of groundwater and aquifers by limiting the creation of impervious surfaces, avoiding disturbance to wetlands and floodplains, designing stormwater swales and collection basins on federal installations, and using pervious surfaces wherever possible.
- FE.C.12** Promote water conservation programs and the use of water-saving technologies including landscaping and irrigation strategies that conserve and monitor water consumption in all federal facilities.
- FE.C.13** Encourage the implementation of water reclamation programs at federal facilities for landscape irrigation purposes and other appropriate uses.
- FE.C.14** Reduce or eliminate the use of potable water (water that is safe for humans to drink) for landscaping or water features. Encourage the reuse of greywater.
- FE.C.15** Avoid sites that have high stormwater retention value, such as areas with soils that have high infiltration rates or discharge directly into wetlands or water bodies. Promote development on previously disturbed sites, especially those with impervious surfaces or compacted soil so that redevelopment can achieve better filtration.

SECTION D: Policies Related to Flooding

Flooding in the Region

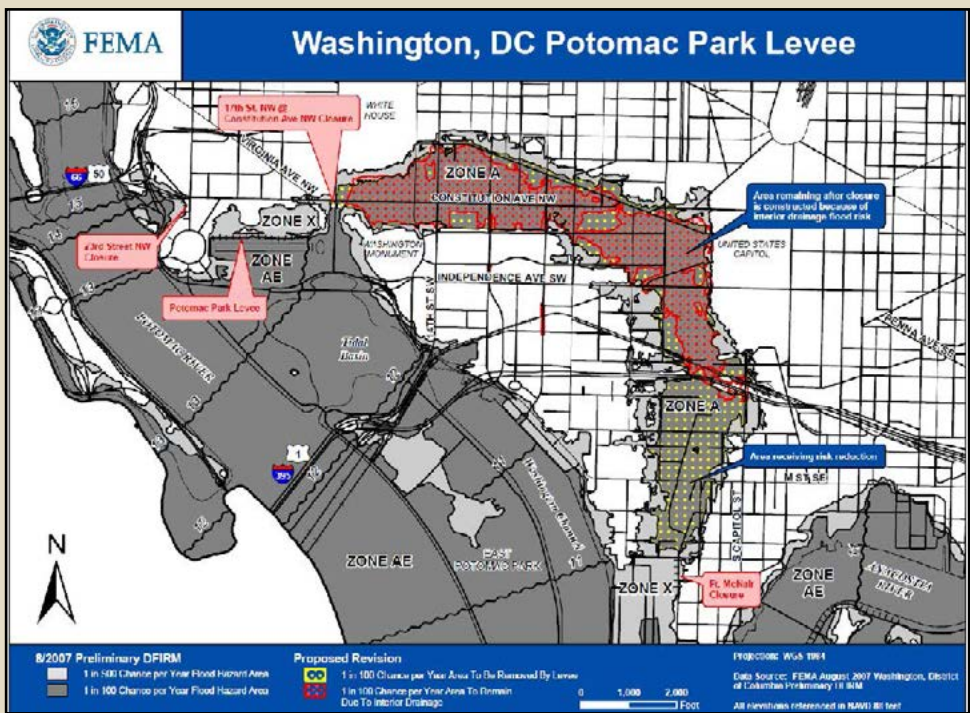
In the region, a significant number of federal properties and buildings, including agency headquarters, cultural institutions, and iconic monuments are located in areas at risk of flooding. The region is vulnerable to three types of flooding: riverine flooding, tidal/storm surge flooding, and interior flooding.

Riverine flooding is caused by heavy sustained rainfall or rapid snowmelt upstream in the Potomac River watershed that results in increased water flowing down the Potomac and Anacostia Rivers. Tidal and storm surge flooding occurs when coastal storms push water up the Potomac River from the Chesapeake Bay and Atlantic Ocean. In both riverine and storm surge flooding, the results are the same: water overflows the banks of the Potomac and Anacostia Rivers onto land. Insufficient stormwater management in the region can cause greater river flooding occurrences downstream on the Potomac River. The most vulnerable areas in the region are those that are at the lowest elevation points that are connected to the rivers.

Flooding can also occur when excess water enters a stormwater system (both natural and manmade). Urban areas have poor infiltration rates, requiring greater capacity in the stormwater sewer systems to handle excess runoff from impervious ground cover like streets and building roofs. Interior flooding occurs when rain overwhelms the stormwater system capacity and the ground's ability to infiltrate the water. As a result, stormwater ponds in streets and low-lying areas.

Impacts of Flooding

Floods have a variety of negative consequences, including direct impacts such as loss of life and damage to property, infrastructure, and natural systems. When infrastructure such as power stations, roads, and Metro stations are damaged by floods, there are further impacts to services and the local economy, as normal life is disrupted. Because of the high concentration of federal buildings, military installations, national security facilities, and significant national cultural treasures in the NCR, the federal government faces significant flood risks. The Federal Triangle Floods³⁴ in 2006 are one example of how the government can be impacted by floods. Heavy rains in Washington, DC resulted in over 20 feet of water inundating buildings and Metro tunnels in the Federal Triangle. Damage estimates show that GSA and the IRS expected to spend \$54 million in repairs, in addition to \$4 million associated with employee time lost.³⁵ Many of Washington's infrastructure (Metro and power facilities) are located underground and are vulnerable to flooding.



Historic floods led to the construction of the Potomac Park Levee system in the 1930s and the Anacostia Levee system in the 1950s, which protects the city from river and storm surge flooding (but not interior flooding). The Potomac Park Levee runs through the National Mall into Southwest Washington. The system today includes earthen berms on the north side of the Reflecting Pool and the 17th Street closure, which was reconstructed in 2014. While the new 17th Street Closure is built to withstand a 500-year flood with 0.2 percent chance or less of occurring in a single year, the adjoining earthen berm walls are not as high and as a result, the current levee system only protects against a flood event with a 0.5 percent chance of occurring. With future planned improvements to the earthen berm, the Potomac Park Levee will protect the city against 500-year flood events. [The Washington, DC Flood Insurance Rate Map](#)²⁶ will be revised to reflect flood risk reduction from the 17th Street closure improvements.

100-year flood: A flood event with one percent chance (or greater), of occurring in a single year.

500-year flood: A flood event with 0.2 percent chance of occurring in a single year.

Floodplains

One of the best ways to protect federal resources from the impacts of flooding is the preservation of floodplains. Floodplains perform important water management functions, including temporarily storing floodwaters to reduce peak flows; maintaining water quality; recharging groundwater; and preventing soil erosion. Floodplains provide habitat for wildlife, recreational opportunities, and aesthetic benefits. By preserving floodplains in the NCR and only allowing uses where occasional flooding is acceptable, the federal government can reduce its risks of flooding in areas downstream.

[Executive Order 11988: Floodplain Management](#),³⁶ (1977) and [Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input](#)³⁷ (2015), guide federal agencies to avoid development in floodplains where possible, and minimize potential impacts to ensure that development does not exacerbate possible flood impacts. In Executive Order 11988, the federal government defined floodplains as flood events with one percent annual chance or greater, of occurring in a single year. Executive Order 13690 asks agencies to consider the impacts of higher floods when planning federally funded projects (actions where federal funds are used for new construction, substantial improvements, or to address substantial damage to structures of facilities) and to apply one of three stricter floodplain standards when evaluating these projects. This Executive Order directs agencies to think critically about the level of flood risk they are willing to accept, and to plan with higher elevation floods in mind to account for uncertainties associated with climate change, increased heavy rain events, and sea level rise. NCPC encourages consideration of the most conservative floodplain definition when planning for critical facilities and the many significant cultural and historic resources.

The policies in this section aim to protect federal facilities from the risks of floods and protect floodplains as a resource.

The federal government should:

FE.D.1 Collaborate with federal and regional agencies on flood management plans and flood protection projects.

FE.D.2 Prohibit hazardous activities and critical actions in floodplain areas.

FE.D.3 Encourage modification of existing developments to remove or mitigate flood hazards, restore floodplain values, and improve water management. If the necessary modifications cannot be accomplished, the buildings should be removed when feasible to allow restoration of the floodplain and to correct flood hazards and restore floodplain values.

FE.D.4 Discourage investment in floodplain areas unless related to correcting flood hazards, restoring floodplain values, or supporting conservation, passive recreation, or memorial uses.

FE.D.5 If construction in a floodplain is necessary:

1. Preserve natural drainage where possible.
2. Elevate structures above base flood level.
3. Use best available flood proofing and protection measures.
4. Return the site as closely as possible to its natural contours.
5. Consider the cumulative impacts to the floodplain.
6. Consider long-term operational and capital costs associated with preparing and recovering from potential floods.

FE.D.6 Consider relocating outside of the floodplain when planning substantial improvements or repairs to an existing facility in a floodplain. If locating in a floodplain is necessary:

1. Elevate all equipment and assets from the ground level floor, where flooding might be expected.
2. Apply flood proofing and protection measures to existing infrastructure to ensure that critical operations will not be disrupted during flood events.



Anacostia Waterfront Initiative

The Anacostia Waterfront Initiative, launched in 2000, is a \$10 billion, 30-year program to restore the health of the Anacostia River and revitalize neighboring areas. It is led by the District of Columbia and endorsed by multiple regional and federal partners. The initiative includes innovative transportation improvements such as the Anacostia Riverwalk Trail that can spur economic development and help clean stormwater. It also includes environmental initiatives such as the River Smart Home program and the “catch basin trash screen” pilot program. Though a separate initiative, the DC Clean Rivers project (see page 9) will also greatly increase water quality in the Anacostia River.

SECTION E: Policies Related to Waterbodies and Wetlands

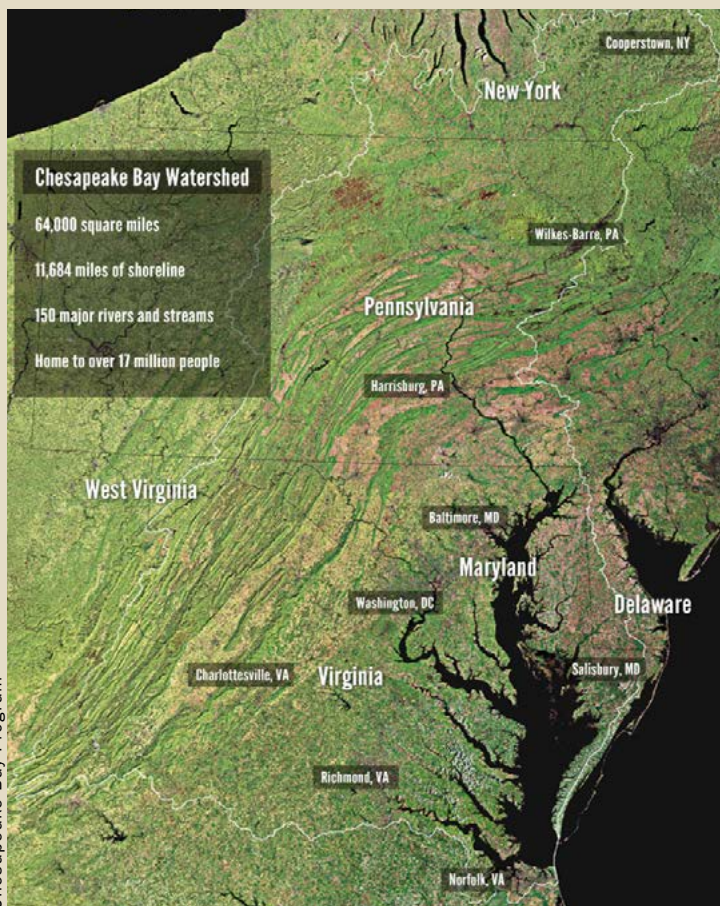
The protection of the region’s wetlands and waterbodies is important not only to maintain water quality for human use and enjoyment, but to protect the ecosystems that depend on them. Waterbodies in the region include rivers, streams, lakes, and wetlands. The impact of stormwater on water quality is further discussed in Section C of this element. Policies in this section aim to protect important waterbodies and wetland ecosystems as well as the recreational, navigational, and other services they provide.

Ecosystem Services

As directed in the Presidential Memorandum, [Incorporating Ecosystem Services into Federal Decision Making](#)³⁹ (2015), agencies shall develop policies to promote consideration of ecosystem service assessments within existing agency planning and decision frameworks. Ecosystem services are generally described as the benefits that flow from nature to people, such as nature’s ability to provide clean air and drinking water, habitat for wildlife and mitigating the effects of storms and floods. These services have immense value, but are often overlooked because of the difficulty in placing a monetary value to them. Recognizing that healthy ecosystems are essential to human welfare, security, and the health of social and economic systems, federal agencies incorporating ecosystem services into the planning and decision making process will effectively address the challenges facing the nation and ensure ecosystems are healthy for this and future generations.

Regional Waterbodies

The Potomac and Anacostia Rivers are the region’s two primary waterbodies, both of which are listed as impaired by the EPA. These rivers are fed by a number of tributaries. The Anacostia River has 13 major tributary creeks and streams and its watershed is a 176 square mile area of land that encompasses most of the eastern half of Washington, DC and large portions of Prince George’s and Montgomery Counties in Maryland. The Potomac River watershed is much bigger, covering 14,670 square miles across four states (West Virginia, Maryland, Virginia, and Pennsylvania) as well as Washington, DC. The NCR is also entirely within the Chesapeake Bay watershed, which means that the water quality and health of the Potomac and Anacostia Rivers directly translates to the health of the Chesapeake Bay. There are a number of regional initiatives that focus on enhancing the health of the region’s waterbodies, including the Anacostia Waterfront Initiative and the Chesapeake Bay Program.



Chesapeake Bay Program

After a Congressionally funded study in the late 1970s concluded that rapid loss of wildlife and aquatic life in the Chesapeake Bay was a result of excess nutrient pollution, the Chesapeake Bay Program was formed in 1983 as a means to restore the bay. The program was initially formed through the Chesapeake Bay Agreement of 1983 that was signed by the governors of Virginia, Maryland, and Pennsylvania, the mayor of the District of Columbia, and the EPA Administrator. Since then, the program has made new agreements and plans, and added Delaware, New York, and West Virginia as signatories. Plans include setting goals for reduction of phosphorous and nitrogen entering the bay as well as goals for land conservation and forest buffer restoration. [Executive Order: 13508 Chesapeake Bay Protection and Restoration](#)³⁸ (2009), further bolstered efforts to restore the bay and led to EPA’s Chesapeake Bay Total Maximum Daily Load requirements in 2010, which set mandatory limits on the amount of nutrients and sediment that can enter the Bay and its tidal rivers. In order to meet the requirements, each of the seven jurisdictions has created Watershed Implementation Plans outlining how they will meet the pollution reductions by 2025.

There are many streams and lakes throughout the region which are not as heavily monitored as the Potomac and Anacostia Rivers. High velocity stormwater, a common occurrence in urban rivers and streams, can also physically alter the course of these waterbodies, affecting the ecosystems that rely on them.

Shorelines

Growing recognition of the Potomac and Anacostia waterfronts as an amenity has increased competition for space along the water’s edge and in the water itself. Shorelines serve as vital habitat corridors and ecological resources that address water quality and quantity, and provide flood protection, in addition to being important recreation and industrial resources. The region’s shorelines are unique because of the many nationally significant cultural and historical resources located on the Potomac and Anacostia Rivers. They are also home to multiple federal facilities with unique missions and needs. The majority of the shorelines along the Potomac and Anacostia Rivers are controlled by the federal government, affording it great influence on how the region’s water bodies are accessed and used.

Wetlands

Wetlands are generally defined as lands that are wet for significant periods during the year, including marshes, swamps, and bogs. Wetlands are a significant part of the region’s ecosystem, providing fish and wildlife habitats, flood protection, erosion control, and maintenance of water quality. Human development often disturbs wetlands directly (by filling or constructing in wetlands) or indirectly (by altering an area’s hydrology). The steady conversion of undeveloped land to impervious surface is an ongoing threat to the region’s wetlands, resulting in increased stormwater runoff (causing erosion and pollution) and requires water treatment facilities. Sediments and pollutants enter wetlands and degrade its ability to provide ecological benefits.⁴⁰ The federal government protects wetlands through the Clean Water Act and state and local regulations that control activities in wetlands.

In 1791, the L’Enfant City was home to six swampy areas that covered a total area of 100 acres, or two percent of the planned city’s total area.⁴¹ Due to urbanization, the six original wetlands identified in 1791 are gone today. The District of Columbia Department of Energy and Environment conducted a field reconnaissance of wetlands in 1996 and identified 48 known wetland areas in the city, not including the Potomac and Anacostia Rivers.⁴²

There are important benefits of wetlands in the region and the federal government should enhance the function of existing wetlands and reduce the loss of wetlands in the future. Federal policies, including [Executive Order 11990: Protection of Wetlands](#)⁴³ (1977), discourage disturbances of wetlands and the general pattern of development

that alter their function in the natural ecosystem. The federal government is also striving to restore natural streams and to establish planted buffers along waterways. Combined with the policies in Section C, the following policies improve regional water quality and the health of the area’s shoreline and wetland ecosystems.

The federal government should:

- FE.E.1** Protect the physical and ecological functions of wetlands and riparian areas with priority in the following order:
 - 1. Avoid development of areas that contain wetlands, including isolated wetlands, or on sites that will impact the quality and health of nearby wetlands.
 - 2. Minimize the impacts to wetlands by reducing the area of disturbances. If construction in a wetland is necessary, utilize the highest standard in project development requirements to minimize adverse impacts.
 - 3. Replace wetlands that are lost or degraded as a result of site development.
- FE.E.2** Avoid any intensive land uses with high amounts of impervious surface or significant pollution discharges within or adjacent to wetlands and riparian areas.
- FE.E.3** Create vegetative and open space buffers around wetlands, waterways, or riparian areas when constructing near wetlands.
- FE.E.4** Coordinate wetland activities with federal, state, and local government programs and regulations, including the Chesapeake Bay Program. Support local and regional watershed implementation plans and regulations.
- FE.E.5** Design vegetated buffer strips around wetlands and waterbodies to capture and clean stormwater runoff. Encourage restoration of streams and stream banks that have been negatively impacted by runoff.
- FE.E.6** Protect wetlands and waterbodies from indirect impacts such as significant adverse hydrological modifications, excessive sedimentation, deposition of toxic substances in toxic amounts, nutrient imbalances, and other adverse anthropogenic impacts.
- FE.E.7** Promote improvement of degraded wetlands, especially during significant building or site improvements on federal property.
- FE.E.8** Promote shoreline uses that create public access, improve riparian conditions, and enhance water quality.



In 2011, the region experienced the Virginia earthquake, which led to damage to federal buildings and the Washington Monument. This earthquake prompted agencies to consider future seismic risks.

Agencies should consider native vegetation, since once established, native plants do not need fertilizers, herbicides, pesticides, or watering, thus benefiting the environment and reducing maintenance costs.



Native Plant Garden at the Smithsonian Museum of Natural History

SECTION F: Policies Related to Soils

Soils play a critical role in maintaining a healthy and viable ecosystem and can support clean water and air, productive forest, diverse wildlife, beautiful landscapes, as well as contribute to a diverse and productive environment. Healthy soils are defined as those that are able to sustain a living ecosystem, and do so through six essential functions: regulating water flow, nourishing plant and animal life, cycling important nutrients, filtering pollutants, mitigating climate change, and providing physical support to plants and infrastructure.⁴⁴

Soil qualities can vary naturally, including differing degrees of stability and nutrients. Soil quality is not easily altered. However, healthy soils can become compromised due to erosion, pollutants, harmful farming practices, and unprecedented urban growth.⁴⁵ Soil degradation then limits or halts the functions of a healthy soil environment causing impacts such as fewer resources for food, or poor water quality.⁴⁶ The activities of federal agencies can affect the quality of soil, resulting in impacts on the ecosystem as well as on the ability of the soil to support structures and activities of the federal government. Soils and sediments have an important relationship with the planning of stormwater management. The policies in this element support the enhancement of degraded soils when making significant building or site improvements on federal property.

The federal government should:

- FE.F.1** Discourage development in areas of identified high erosion potential, on slopes with a gradient of 15 percent and above, and on severely eroded soils. Avoid development on excessive slopes (25 percent and above).
- FE.F.2** Employ best management practices to reduce the potential for soil erosion and the transportation of sediment, consistent with state and local requirements.
- FE.F.3** Limit uses on highly unstable soils to passive recreation, conservation areas, and open space.
- FE.F.4** Locate and design buildings to be sensitive to natural groundwater flows. Avoid development in areas where mineral resources, such as diabase clay and shale, are located.
- FE.F.5** Identify and protect soil protection zones.
- FE.F.6** Create and implement an erosion and sedimentation control plan during construction to prevent damage or loss of critical soils.
- FE.F.7** Avoid soil compaction in design of landscape plans, during construction, and maintenance.
- FE.F.8** Minimize tree cutting and other vegetation removal to support soil structure (slope geometry, location and geologic content), reduce soil disturbance, and limit erosion. When tree removal is necessary, replace trees, shrubs, and other vegetation to prevent a net vegetation loss.
- FE.F.9** Encourage remediation and redevelopment of brownfield sites.
- FE.F.10** Enhance degraded soils during significant building or site improvements on federal property.

SECTION G: Policies Related to Tree Canopy and Vegetation

Tree canopy and vegetation provide numerous benefits to the urban framework. While they provide an aesthetic appeal, they also serve as food and habitat for wildlife, and enhance the well-being of communities and ecosystems, and provide biodiversity, making them an integral part of development and design. Vegetation provides root systems that help maintain soil integrity, function as natural aquifers, and recharge areas. It reduces erosion, particularly on steep slopes and areas adjacent to waterways.

Large trees, especially in groupings, are a particularly valuable environmental resource. The tree canopy in Washington, DC includes approximately 2.5 million trees with a tree cover of 36 percent.⁴⁷ Urban vegetation can directly and indirectly affect local and regional air quality by altering the built environment. Urban trees can improve air quality by:

- Reducing temperature and energy costs by providing shade and cover.
- Reducing ozone and other pollutant concentrations.
- Mitigating climate change by storing carbon.
- Enhancing water and soil quality through stormwater retention and reduction of soil erosion.

In addition to these environmental contributions, trees also shade buildings and homes, which reduces energy consumption and provides quality settings for habitation, contributing to the community's overall health. The benefits of tree canopy and vegetation highlight the need to protect and restore urban vegetation, including tree canopy, wherever possible.

Trees and Vegetation in the Region

The tree canopy coverage in Washington, DC has decreased since 1950. Increased urbanization and growth has reduced a 50 percent tree canopy coverage to a 36 percent tree canopy coverage in 2014.⁴⁸ The region is working to restore vegetation. In 2014, over 12,000 trees were planted around Washington. The District adopted the goal of 40 percent tree canopy coverage by 2032 to improve air and water quality in the [District of Columbia Urban Tree Canopy Plan](#)⁴⁹ (2013). Based on current estimates in the plan, the District, federal agencies, and private property owners will need to plant a total of 216,300 trees over the next 20 years. Federal agencies in Washington are encouraged to participate and meet this target.



Pennsylvania Avenue tree canopy



Invasive plant removal at Shepherd Parkway, SE

The federal government should:

- FE.G.1** Preserve existing vegetation, especially large stands of trees.
- FE.G.2** When tree removal is necessary, trees should be replaced to prevent a net tree loss to the project area, according to the following procedures:
 - 1. An evaluation of potential tree loss should be made prior to any removal. Trees shall be replaced according to the regulations of the local jurisdiction.
 - 2. Trees of 10 inch diameter or less will be replaced at a minimum of a one-to-one basis.
 - 3. Significant trees (diameter greater than 10 inch) will be replaced at a rate derived from a formula of the [International Society of Arboriculture](#),⁵⁰ or as established by the local jurisdiction's requirements for tree replacement.
 - 4. The replacement of trees should be located on-site, on adjacent properties, or in areas within the site's jurisdiction.
- FE.G.3** Enhance the environmental quality of the National Capital Region by replacing existing trees where they have died or where they have been removed due to development. Tree replacement should adhere to the standards and guidelines of the local jurisdiction, but at a minimum prevent a net tree loss in the development area.
- FE.G.4** Incorporate new trees and vegetation into plans and projects to absorb carbon dioxide, moderate temperatures, minimize energy consumption, reduce pollution, and mitigate stormwater runoff. This includes the use of vegetation in the design and development of green roof projects where feasible and consistent with local regulations.
- FE.G.5** Conserve plant communities native to the site's ecoregion (as defined by the [Council on Environmental Quality](#)).⁵¹ Protect and/or restore areas containing native plant communities, and provide habitat corridors connecting to off-site natural areas or buffers adjacent to off-site natural areas for migrating wildlife.
- FE.G.6** Maintain and preserve woodlands adjacent to waterways, especially to aid in the control of erosion, sediment, and thermal pollution.
- FE.G.7** Encourage the use of native plant species and remove invasive plants where appropriate.

- FE.G.8** Protect and preserve all vegetation designated as special status plants.⁵²
- FE.G.9** Use vegetation to minimize building heating and cooling requirements.
- FE.G.10** Use trees and other vegetation to offset emissions of greenhouse gases from operations. Plant and maintain trees and other vegetation to achieve long-term storage of carbon dioxide following accepted protocols that ensure offsets are permanent and verifiable.
- FE.G.11** Support sustainable practices in federal landscape development to include, but not be limited to, the following:
 - 1. Use of sustainable soil amendments.
 - 2. Reduced irrigation runoff.
 - 3. Reduced greenhouse gas emissions.
 - 4. Use of Integrated Pest Management practices.
 - 5. Reduced potable water consumption and recycling of all organic matter.
 - 6. Introduction of plants that support pollinator species.
 - 7. Selection of vegetation in the appropriate [U.S. Department of Agriculture Plant Hardiness Zone](#),⁵³ while accounting for regional changes in climate.
- FE.G.12** Use of grass species as lawn should be limited to recreational areas so that major reductions in water, chemicals, maintenance, energy, air and water pollution, and noise occur. Where turf grass is used, species and cultivar selection should reflect the local climate and growing conditions to minimize the need for irrigation and the use of chemicals for feeding, and controlling insects and disease.

SECTION H: Policies Related to Wildlife

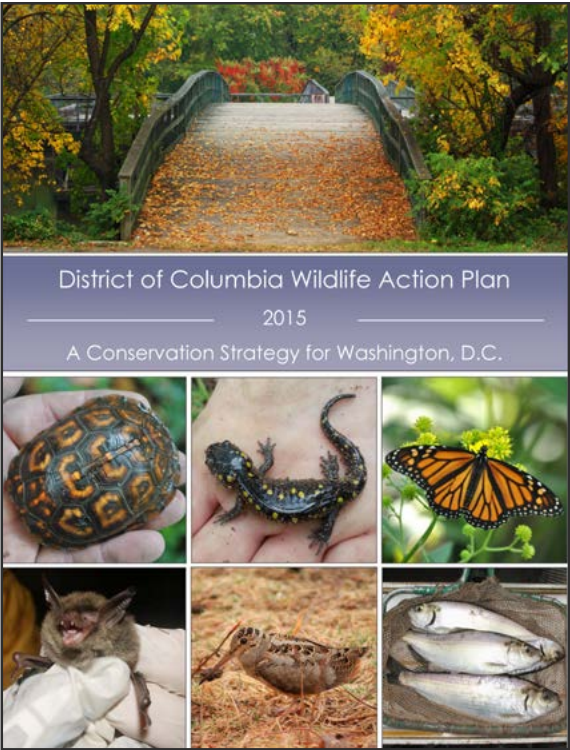
Wildlife habitats are important to ensure the biodiversity and environmental well-being of the region. They provide the necessities of food, water, and shelter for plants and animals but are also a critical factor in carrying out daily ecosystem functions. Conserving wildlife habitats enables biodiversity to thrive and serves many benefits. A biodiverse wildlife habitat provides an array of resources for food and improves the resiliency of communities and habitats from events such as natural disasters.⁵⁴

The [Endangered Species Act of 1973](#)⁵⁵ and the [Fish and Wildlife Coordination Act of 1934](#)⁵⁶ protect endangered animals and plants, their habitats, and wildlife population. Although declining, wildlife habitats and biodiversity prove to be vital to environmental and community well-being.⁵⁷ The reduction in natural habitats and biodiversity causes loss in animal and plant life, and a reduction in ecological functions. This can have negative impacts to the natural landscape and built environment. There are many underlying causes of habitat degradation, including deforestation, development, and other activities associated with outward urbanization and sprawl.⁵⁸ The District of Columbia, Maryland, and Virginia, each have developed a [State Wildlife Action Plan](#)⁵⁹ to prevent wildlife from becoming endangered. Together, these action plans reduce the cost of wildlife management in the NCR by decreasing the need for recovery projects for endangered species. Therefore, it is important for federal agencies to use the State Wildlife Action Plans as guides for conservation and preservation of wildlife habitat in future development and actions.

The federal government should:

- FE.H.1** Encourage facility design and landscaping practices that provide food and cover for native wildlife.
- FE.H.2** Discourage development or significant alteration of areas used by wildlife, including migratory wildlife.
- FE.H.3** Consider the impacts, including cumulative impacts, of environmental changes on wildlife habitats and the biodiversity of an ecosystem. Consideration should extend to non-protected areas, as well as areas protected by designations such as parks and wetlands.
- FE.H.4** Create and maintain inventories of species and natural resources and encourage regional cooperation to protect natural areas and species.

According to the [District of Columbia’s Wildlife Action Plan](#),⁶⁰ there are more than 6,700 acres of land protected as National Parks and 900 additional acres of District-owned park land. The forests, waters, meadows, and wetlands in the city provide habitat for approximately 240 species of birds, 78 fish, 32 mammals, 21 reptiles, 19 amphibians, and thousands of invertebrates.



District Department of Energy & Environment

- FE.H.5** Avoid actions that could have significant long-term adverse effects on aquatic habitats, such as dredging and filling operations that disrupt and destroy organisms.
- FE.H.6** When constructing in areas near wildlife habitat, consider the following:
 1. Use buffer areas to transition the intensity of uses (active uses, passive uses, and conservation areas) from development to wildlife functions.
 2. Design the site to avoid habitat fragmentation.
 3. When constructing barriers (such as roadways, railways, bridges, and fences) through areas of significant wildlife habitat, consider design methodologies that allows species movement through barriers.
 4. Ensure that lakes, rivers, and streams near the site provide adequate undisturbed habitat for species movement.
 5. Link new parks, open spaces, and conservation areas to existing natural vegetated corridors and other wildlife habitat.

SECTION I: Policies Related to Solid Waste and Hazardous Materials

Solid Waste

At the regional level, solid waste typically includes two major categories: ordinary trash from households or commercial activities, and sludge from wastewater treatment systems, such as the District of Columbia’s Blue Plains Advanced Waste Water Treatment Plant. Solid waste management involves three strategies: 1) reducing the amount of waste generated; 2) recycling waste material; and 3) effectively disposing of waste that cannot be recycled.

The [Pollution Prevention Act of 1990](#)⁶¹ established national policies related to waste: pollution should be prevented, whenever feasible; pollution that cannot be prevented should be recycled; pollution that cannot be prevented or recycled should be treated in an environmentally responsible manner; and disposal should be employed only as a last resort. Under Executive Order 13693: Planning for Federal Sustainability in the Next Decade (2015), the goals were expanded for federal agencies to encourage recycling through the procurement of [BioPreferred](#)⁶² and recycled products, as well as diverting at least 50 percent of non-hazardous solid waste. Recycling programs should comply with applicable federal, state, and local recycling requirements and should include cooperative programs with other federal facilities, state or local agencies, or non-profit organizations.

For the remaining solid waste, disposal can cause significant environmental problems. Two methods are commonly used: incineration at waste-to-energy facilities, and landfill. Incineration plants, if properly designed with pollution control technology, can be a valuable solution. Landfills must also be carefully designed, to avoid degradation of surface and ground water. The transportation of solid waste also typically requires the use of transfer facilities, to consolidate waste from local trucks into larger shipments. The location of these transfer facilities, as well as incineration and landfill facilities, causes public concern. The emphasis on reduced waste generation is a critical goal.

Hazardous Materials

Some federal facilities such as military bases and research labs handle hazardous materials that could pose risks to humans and to the environment if not managed properly. In some cases, these facilities are located in proximity to residential communities, businesses, and public recreation areas. An increased awareness of the potential for contamination has led to significant improvements in the safe transfer and disposal of hazardous materials, in accordance with local, state, and federal guidelines and procedures.

The proper management of hazardous materials is important to the regional economy and human health. The release of toxic chemicals from damaged or leaking underground storage tanks can lead to contamination of natural aquifers, estuaries, ground water resources, and the regional water supply. Without regular maintenance and monitoring, underground tanks could produce leaching of hazardous products, resulting in soil contamination that could leave

federal or nearby land unsuitable for federal, private, or public recreational use. Historic federal buildings may contain potentially hazardous materials, such as asbestos, that must be carefully controlled and or removed.

Entities that generate, treat, store, manage or dispose of hazardous waste are subject to federal regulations including the [Resource Conservation and Recovery Act](#)⁶³ (1976) and the [Comprehensive Environmental Response, Compensation, and Liability Act](#)⁶⁴ (1980). This act established requirements for closed and abandoned waste sites, and authorized long-term remedial response actions on hazardous waste sites listed on EPA’s National Priorities List. As of 2015, the NCR is home to three superfund sites: the Marine Corps Combat Development Command in Quantico, VA; the Beltsville Agricultural Research Center in Maryland; and the Washington Navy Yard.

While agencies have made significant improvements to the procedures supporting the safe transfer and disposal of hazardous materials, the topic remains a concern. In 2007, NCPC and the District Department of Transportation conducted the [Freight Railroad Realignment Feasibility Study](#)⁶⁵ to determine the feasibility of relocating the freight rail line in the monumental core as a long-term solution to address security concerns with the railroad carrying hazardous materials. The management of hazardous materials is particularly important in the region, where federal facilities are often located near highly-populated areas and sensitive habitats.

The federal government should:

- FE.I.1** Ensure that development projects reuse or recycle salvaged building and organic materials to conserve resources and divert materials from landfills and incinerators. Encourage procurements that increase the purchase and use of products containing recycled content.
- FE.I.2** Implement waste reduction measures that extend the life of waste disposal systems and reduce energy demand, including recycling programs, composting, and utilizing biodegradable products.
- FE.I.3** Avoid locating federal facilities that produce or manage hazardous waste and toxic materials in (or upstream or upwind of) heavily populated or environmentally sensitive areas (e.g., unstable ground, high-value groundwater recharge areas, floodplains, and wetlands).
- FE.I.4** Monitor and conduct periodic testing to detect and avoid leaks or spills from structures that hold hazardous materials (e.g. underground storage tanks, pipes, and retention areas), and remediate groundwater contaminations.
- FE.I.5** Manage and dispose of hazardous wastes and toxic substances in a safe manner in accordance with national, state, and local regulations.
- FE.I.6** Encourage federal facilities to develop and maintain an environmental management system to understand and manage the facility’s environmental risks and hazards.

SECTION J: Policies Related to Light Pollution

NCPC considers the effects of lighting on existing resources from both an aesthetic and an environmental perspective. For example, NCPC has reviewed several projects within the monumental core to ensure that views to and from important monuments and memorials were not adversely affected by the project’s lighting levels.

Light pollution is any adverse effect of artificial lighting including glare, light trespass, skyglow, energy waste, and impacts to the environment. Light pollution first became a concern in the 1970s when astronomers identified the increase in lighting associated with development as a contributing factor in the degradation of the night sky’s visibility. Recent studies suggest that lighting associated with air safety and buildings disorient migrating birds. Studies have also linked excessive exterior lighting to air pollution, according to a study by scientists at the National Oceanic and Atmospheric Administration and the Cooperative Institute for Research in Environmental Sciences at the University of Colorado.⁶⁶ EPA identified light pollution as a major concern in exterior lighting in its [2008 ENERGY STAR Building Upgrade Manual](#).⁶⁷ EPA recommends that agencies use outdoor lighting codes to encourage better-quality light fixtures that reduce glare, light trespass, and energy waste.

A subsequent EPA report noted these concerns as well as the visibility and safety benefits of artificial night-time lighting, and stated that it is relatively easy to tackle [light pollution] without needing to make significant trade-offs, simply by eliminating upward and horizontal spillage and turning off unnecessary lighting. In response to these environmental concerns, “dark sky” advocates promote changes in lighting design and technology.

This policy area provides guidance for federal agencies to incorporate exterior lighting in a manner that minimizes negative aesthetic and environmental impacts.

The federal government should:

- FE.J.1** Reduce levels of light pollution by:
1. Selecting the appropriate level of lighting to meet design needs, while minimizing excess light.

2. Designing light fixtures to eliminate upward and horizontal spillage.

3. Designing and providing appropriate controls to operate lighting only when needed, and at appropriate light levels.

4. Selecting lighting that minimizes maintenance, reduces energy use, and provides better visibility.

5. Selecting appropriate lighting technologies in a historic context.
- FE.J.2** Evaluate exterior lights for their effectiveness, maintenance requirements, and energy use.
- FE.J.3** Switch off all exterior lighting when not required.



Naval Observatory

In Washington, the Naval Support Facility Naval Observatory is adversely impacted by urban light pollution (specifically sky glow and light trespass), diminishing the Navy astronomer’s ability to conduct sensitive data collection of the dark skies. Light pollution is particularly problematic for the Naval Observatory due to its location at the center of a major metropolitan area.

A 2012 Naval Observatory lighting study analyzed the existing lighting conditions at the Naval Observatory and provided recommendations for improvements to enhance dark sky conditions and minimize light trespass from adjacent properties outside the installation.⁶⁸ The study recommended lighting design changes on the installation, replacement of light fixtures, and additional vegetation in particular locations, as well as the development of a vegetation plan. The study recommended several operational changes (occupancy sensors) that could be implemented to reduce light pollution.



SECTION K: Policies Related to Noise Pollution

Noise is an invisible pollution that affects general health and welfare. Noise pollution can lead to increased stress, hearing loss, a decline in productivity, higher health care costs, and reduced property values. Common sources of noise pollution include airplanes, automobiles, boats, construction, loading docks, industrial activities, training activities, and outdoor concerts and special events.

One of the most controversial noise issues in the region results from flight operations at military airfields and at commercial airports such as Ronald Reagan Washington National Airport. There are also noise impacts generated from helicopters and aircraft around populated areas. While modern technology has reduced noise levels produced by commercial aircraft, growth in air traffic may have offset some of these improvements. Federal agencies should also consider the accumulation of noise levels generated by mechanical equipment, loading docks, and operational activities. Noise from these types of activities can be mitigated through careful site planning and sound proofing technology.

Noise pollution will continue to be a concern in the absence of policies and technologies that can further mitigate noise levels. The federal government should reduce its contribution to noise pollution and coordinate with local governments to avoid proximity of noise generating activities to sensitive natural resources and land uses.

The federal government should:

- FE.K.1** Avoid locating activities that produce excessive noise near sensitive natural resources and land uses such as residential areas, hospitals, schools, and major public and civic destinations.
- FE.K.2** Locate, design, and construct improvements to roads, driveways, loading docks, and parking lots for federal facilities in a manner that is sensitive to existing adjacent land uses.
- FE.K.3** Ensure that construction activities comply with local noise ordinances, and coordinate with local governments and adjacent communities to establish limits on the intensity and hours of noise generation.
- FE.K.4** Use low noise equipment, sound proofing technology, or install noise barriers to reduce the impact of noise from mechanical equipment or from everyday operations and activities.

SECTION L: Policies Related to Energy

The majority of energy consumed in the NCR ultimately comes from nonrenewable fossil fuels such as coal, oil, and gas, which produces GHG emissions. As previously stated in the Climate Change section, the key to minimizing further climate change in the future is to reduce GHG emissions. This policy section considers the future operations of energy facilities, further use of renewable sources, and reduction of the overall energy consumption.

Energy Sources

In 2013, the U.S. Energy Information Administration estimated that nationwide federal facilities accounted for 38 percent of the federal government's energy usage, with vehicles and equipment accounting for the rest. The U.S. Department of Defense and the U.S. Postal Service together account for 94 percent of vehicles and equipment energy usage,⁶⁹ of which the vast majority comes from jet fuel.⁷⁰

Given the concentration of federal facilities in the region, energy use in federal buildings is a major contributor to GHG. While some federal buildings receive electricity and heating from federally-owned sources, most facilities are energized with electricity from the grid. According to Pepco, the electricity provider for all of Washington, DC and parts of Montgomery and Prince George's Counties in Maryland, the electricity they distribute comes from 45 percent coal, 16 percent natural gas, 33 percent nuclear, and six percent from renewable sources.⁷¹ Federal facilities can help reduce GHG emissions through energy conservation and by installing or requiring the use of renewable energy sources.



U.S. Department of Energy

Solar panels on top of the U.S. Department of Energy's Forrestal Building.

Renewable Energy

By 2025, 30 percent of all electricity consumed by the federal government will come from renewable resources in accordance with Executive Order 13693. Federal agencies can purchase renewable energy or generate renewable energy on federal sites. EPA defines renewable energy as energy produced from solar, wind, geothermal, biomass, biogas (landfill/wastewater gas), and low-impact hydroelectricity. Many of the federal properties located in Washington, DC are in urban areas, which limits opportunities for large-scale renewable energy generation. There are, however, opportunities for renewable energy generation on federal buildings through geothermal heat pumps and rooftop solar panels. The U.S. Department of Energy installed solar panels on the rooftop of its headquarters building in 2008 to generate 230,000 KWh of electricity per year.⁷³ In December of 2015, the GSA awarded a contract to design, construct and operate solar energy systems on the rooftop of 18 buildings in Washington, DC area through a power purchase agreement that is projected to save over \$5 million in utility costs over the contract.⁷³

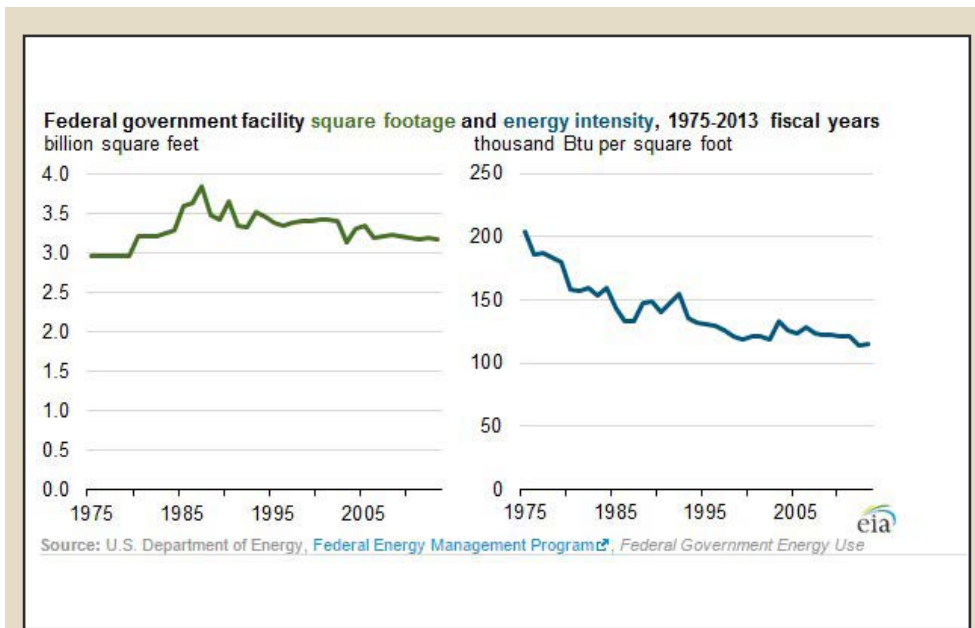
Energy Conservation

Energy conservation can provide significant cost and GHG savings to the federal government. It supports long-term environmental goals to reduce demand for energy, reduce GHG emissions, and be independent on energy source. Specific energy requirements are outlined in EISA and Executive Order 13693. One important component of Executive Order 13693 is the requirement of federal facilities that begin the design process in 2020 to be designed for net zero energy and achieve net zero energy by 2025. EISA requires agencies to upgrade existing heating, ventilation, and air conditioning systems at federal facilities to make them more energy-efficient. Over the past four decades, energy intensity in federal facilities have declined, a trend that will be further strengthened by recent guidance from executive orders.

Agencies may also explore improving environmental performance through the commissioning and recommissioning process of development. In new design and construction processes, commissioning begins at the onset of development, to ensure the systems under design meet specified performance requirements. Commissioning also ensures that the equipment is installed appropriately. Recommissioning is the process through which buildings are commissioned again after their initial completion, occupancy, and commissioning. Recommissioning is a check to ensure that building systems are still functioning as originally planned.

The federal government should:

- FE.L.1** Improve environmental performance and reduce costs in existing federal buildings through targeted energy improvements, such as:
 - 1. Optimizing the efficiency of heating, ventilation, and cooling systems with more efficient boilers, motors, and variable-speed drives.
 - 2. Reducing energy and maintenance costs by installing centralized energy management systems.
- FE.L.2** Reduce fossil fuel-generated energy consumption by 55 percent compared to an FY 2003 baseline for new and renovation projects. The required reduction under law is consistent with EISA, with designs for new buildings or major renovations begun in FY 2030.
- FE.L.3** At least 30 percent of hot water demand in new or renovated federal buildings should come from solar hot water heating if life-cycle cost-effective. Existing buildings with minor renovations must incorporate the most energy-efficient designs, equipment, and controls.
- FE.L.4** Locate and construct federal facilities to minimize energy loss in long-distance energy transmission.
- FE.L.5** Pursue energy conservation strategies at a multi-building or district-level.



Energy consumed in federal facilities has generally declined over the past four decades. The reduction stems from both the total square footage occupied by the federal government, which continues to fall from its peak in FY 1987, and from the energy consumed per square foot inside federal buildings, which has been declining since FY 1975.

**SECTION M: Policies Related To Radiofrequency
Radiation and Electromagnetic Fields**

The federal government has extensive requirements for antennas, telecommunication equipment, and facilities as part of the communication needs of government operations in the nation’s capital. In addition, widespread mobile phone use has resulted in the proliferation of new private-sector antenna and related towers throughout the region, resulting in a surge of requests for antenna and related towers on federal property. The cumulative effect of these antennas significantly impacts the visual quality of the nation’s capital and has the potential to impact human health.

While there can be health impacts when exposed to high levels of radiofrequency (RF) radiation, the general public is rarely exposed to these levels of radiation, even when working in a facility with cellular and personal communications service antennas mounted on rooftops.⁷⁴ Workers servicing these antennas, or in environments near high-powered RF sources, however, may be affected. In these cases, when humans are immediately adjacent to antennas, tissue damage could occur because of the body’s inability to cope with or dissipate the excessive heat, also known as thermal effect.⁷⁵ According to the Federal Communications Commission, “Environmental levels of RF energy routinely encountered by the general public are typically far below levels necessary to produce significant heating and increased body temperature.”⁷⁶

The steady population growth in the region and related use of wireless communication suggests continued demand for new antennas. Two main goals of the policies in this section are to reduce the visual impacts of antennas and minimize impacts to human health.

The federal government should:

- FE.M.1** Consider the joint-use of antennas and collocating antennas to reduce aesthetic impacts and limit the area of radiofrequency exposure. Federal agencies should evaluate the cumulative effect of multiple transmitters at one location to ensure that the combined radiofrequency emissions continue to meet Federal Communications Commission guidelines.
- FE.M.2** Follow a practice of “prudent avoidance” of RF exposure. Federal agencies should reduce the exposure of workers and the public to RF fields where they may be prevalent, including those from power lines, antennas, equipment, and other recognized sources of RF and electromagnetic field emissions.

The Federal Communications Commission authorizes and licenses transmitter and facilities generating radiofrequency and microwave radiation. As a result of NEPA regulations, the Federal Communications Commission must evaluate all transmitters and facilities for potential impacts to the environment, including human exposure to radiofrequency radiation. The Federal Communications Commission issued guidelines for Human Exposure to Radio Frequency Fields to help address this requirement. NCPC issued Guidelines and Submission Requirements for Antennas on Federal Property, last updated in 2000. Additional policies in the Parks & Open Space Element address the siting and design of antennas and towers.



- FE.M.3** Incorporate adequate interior building attenuation measures to reduce RF field penetration into the habitable areas of buildings.
- FE.M.4** Require adequate communication of potential risks where occupational/controlled exposure may be present.
- FE.M.5** Utilize advances in technology, such as fiber optics, cooperative antenna technologies, and teleports; and monitor changes in standards and guidelines for the installation of antennas.
- FE.M.6** Minimize visual impacts of telecommunication antennas proposed for the rooftop of a building with historic value by using a variety of tools including, but not limited to, matching building colors and design, incorporating screens, and moving antennas away from the building’s edge. All measures should be coordinated with local historic preservation requirements.

SECTION N: Policies Related To Environmental Justice

Environmental Justice

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Historically, minority and low-income populations have been disproportionately impacted by environmental pollution. The Environmental Protection Agency through [Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations](#)⁷⁶ (1994), provides guidance on considering environmental justice to ensure that no group of people bears a disproportionate burden of environmental harms and risks resulting from federal activities and operations.

The federal government has a role to identify and address potential environmental justice concerns in the region because of the proximity of federal facilities to residential communities, businesses, public recreation areas, and visitor attractions; the distribution of significant numbers of federal property and facilities throughout the region; and the historic use of select federal facilities for environmentally hazardous operations. Federal agencies can contribute to social equity and environmental stewardship by rehabilitating under-utilized and/or contaminated properties (often called grayfield and brownfield sites), which are often located in minority and low-income areas. Federal agencies have a responsibility to be good neighbors, to promote and support the general public health and welfare of all sectors of society.

The federal government should:

- FE.N.1** Identify and address any disproportionately high and adverse health or environmental effects on minority and low-income populations resulting from agencies’ programs, policies, and activities. Consider the indirect, multiple, and cumulative effects of actions on the cultural, social, historical, and economic characteristics of an affected community.
- FE.N.2** Analyze and consider, as prescribed by NEPA, the demographics of a potentially affected area to determine whether such communities are characterized by low-income levels or high minority populations.
- FE.N.3** Establish effective public outreach programs so that affected communities can participate in decisions that will impact its future.
- FE.N.4** Prioritize and support the re-use of brownfield sites for federal or private-sector redevelopment.
- FE.N.5** Adhere to the federal guidelines of the Department of Housing and Urban Development’s [Site and Neighborhood Standards](#).⁷⁷ which strongly encourage development to be located in areas having access to amenities like transportation, educational, and health facilities.

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