

Chapter 4

Natural Resources and Environmental Constraints



“I want to live in a city that cares about air quality and the environment.”

“Keep Birmingham beautiful, especially the water ways.”

GOALS	POLICIES FOR DECISION MAKERS
natural areas and conservation	
A comprehensive green infrastructure system provides access to and preserves natural areas and environmentally sensitive areas.	<ul style="list-style-type: none"> • Support the creation of an interconnected green infrastructure network that includes natural areas for passive recreation, stormwater management, and wildlife habitat. • Consider incentives for the conservation and enhancement of natural and urban forests.
Reinvestment in existing communities conserves resources and sensitive environments.	<ul style="list-style-type: none"> • Consider incentives for reinvestment in existing communities rather than “greenfields,” for new commercial, residential and institutional development. • Consider incentives for development patterns and site design methods that help protect water quality, sensitive environmental features, and wildlife habitat.
air and water quality	
The City makes every effort to consistently meet clean air standards.	<ul style="list-style-type: none"> • Support the development of cost-effective multimodal transportation systems that reduce vehicle emissions. • Encourage use of clean fuels and emissions testing. • Emphasize recruitment of clean industry. • Consider incentives for industries to reduce emissions over time. • Promote the use of cost-effective energy efficient design, materials and equipment in existing and private development.
The City makes every effort to consistently meet clean water standards.	<ul style="list-style-type: none"> • Encourage the Birmingham Water Works Board to protect water-supply sources located outside of the city to the extent possible. • Consider incentives for development that protects the city’s water resources. • Consider incentives for the protection of natural drainage in stormwater management systems where feasible. • Consider incentives for the use of conservation and low-impact development techniques. • Support state water quality standards and enforcement. • Monitor drilling uses of water resources to avoid contamination or excessive use and use best management practices.

findings

Red Mountain Park and Ruffner Mountain Nature Preserve are significant natural areas that provide access to nature and environmental services (such as reduction in urban heat island effects, air pollution, and nonpoint source pollution of water) in an otherwise urban environment.

The city has had success in flood mitigation through flood buyouts along Village, Valley and Shades Creeks in conjunction with FEMA, Corps of Engineers and state agencies and continued flood mitigation planning.

With the exception of engineering design standards for streets, the only regulations for steep slopes are those that require geotechnical engineers' affidavits for construction on parts of the north face of Red Mountain.

Segments of the Cahaba River, Valley Creek, Village Creek, Shades Creek and Camp Branch Creek exceed Total Maximum Daily Load allowances for various pollutants.

Water quality monitoring is performed by the City's Stormwater Management Division.

Birmingham does not consistently meet EPA ozone standards, which reflects impacts on public health due to air pollution, and constrains industrial expansion and recruitment and federal transportation funding.

There are numerous local and regional private organizations involved in parks development, open space preservation and environmental stewardship.

Almost all of the land in the city limits that is adjacent to or near the Cahaba River, Little Cahaba River, and Lake Purdy is owned by the Birmingham Water Works Board to protect water supply resources.

Quality of life, which includes environmental quality, is an increasingly important criterion in private sector economic investment decisions.

challenges

Reducing vehicle emissions through increased transit use will require regional partnerships/cooperation.

Increased walking and bicycling can help reduce vehicle emissions, but extensive improvements are needed in bicycle and pedestrian infrastructure to support these alternative travel modes.

Many sources of air pollution are not located in the city or subject to City control.

Threats to Birmingham's water quality are not all located in the city or subject to City influence.

The potential development of land in the Cahaba area poses risks to the Cahaba River, a drinking-water source. Most of this land is outside the city limits.

A. What the Community Said

From the outset of this plan’s community involvement process, participants have held up the city’s natural environment and green infrastructure as vital parts of the city.

Attendees at the various forums ranked Birmingham’s parks, landscape and topography as its best asset, receiving twice as many votes as any other category. Participants also indicated that pollution, clean air and other environmental issues were among the city’s top challenges. Among the “Top Five Priorities” from table discussions, walking/biking routes and parks, beautification and addressing pollution were all noted.

During the Communities of Interest workshop on Green Systems and Sustainability, attendees identified issues that brought them to the meeting and table discussions provided a set of priorities. Several of those dealt with the environmental concerns addressed in this chapter.

Issues

- Water quality and stormwater management
- Air quality
- Interconnected green infrastructure network
- Green the city, more trees
- Sprawl
- Using the city’s green amenities to attract investment

Priorities

- Improve air quality
- Improve water quality
- Protect biodiversity and wildlife habitat
- Increase public awareness on green systems and sustainability
- Promote alternative, clean energy sources
- Protect and increase citywide tree canopy
- Clean up and re-use brownfields
- Build greenways with destinations



TCI Ensleyworks is the one of the largest brownfields in the Birmingham area.

B. Topography, Geology and Landscape Character

Since its early history Birmingham capitalized easily on its natural assets but struggled with their long-term stewardship. Birmingham’s geology offered tremendous economic opportunity during the industrial boom of the late 1800s. The three main components of iron and steel production—coal, iron ore and limestone—were readily available from Jones Valley, which also provided a convenient landscape for settlement. Railroad, mining and iron production facilities exploded across the landscape and Birmingham grew rapidly and densely.

Of its major topographic features, the city is most closely associated with Red Mountain, which rises to just over 1,000 feet above sea level—about 400 feet above downtown Birmingham directly to the north. Shades Mountain, further to the south, is the tallest formation in Birmingham, peaking at about 1,150 feet above sea level.

The city developed along the relatively flat Jones Valley between Red and Sand mountains. This provided a logical path for the railroads that were laid through the middle of the valley. As communities took shape along the railroad, the mountains limited development to the north and south. Birmingham grew as a dense urban grid that diminished as it extended toward the neighboring ridges, particularly the steeper and more challenging Red Mountain. Urban villages developed further east and west along the valley including areas like Woodlawn and East Lake, Bessemer and Ensley.

Today, mining and manufacturing remain but represent a much smaller part of Birmingham’s economy. Its readily harvestable geologic resources have been greatly depleted. Vacant mines and foundries dot the landscape. But these remnants of the area’s industrial heritage are seeing a second life as regional parks (Ruffner Mountain Nature Center, Red Mountain Park and Vulcan Park), greenways, and historic landmarks (Sloss Furnaces). However, there is continued mining northwest and west of the city along the Mulberry Fork of the Black Warrior River.

HYDROLOGY

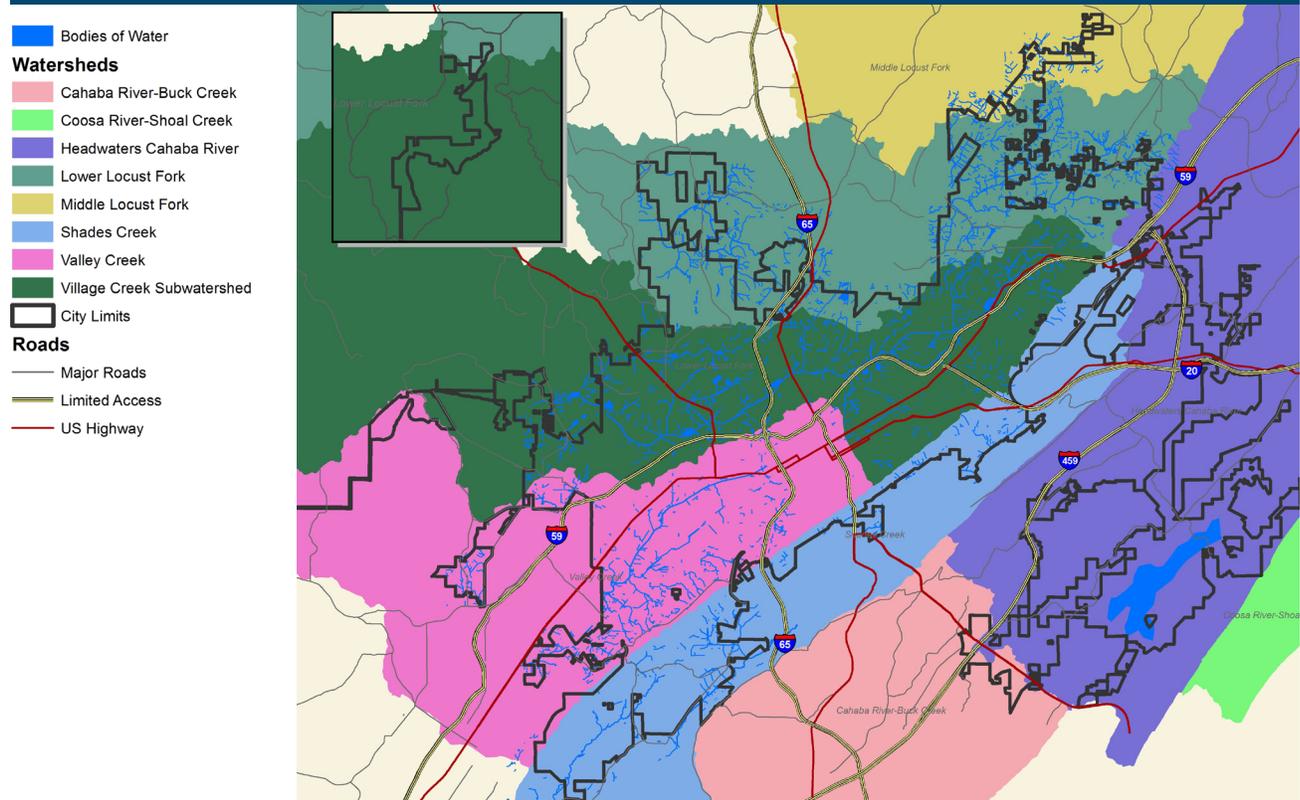
The northern and western portions of the city lie within the Black Warrior-Tombigbee River Basin while the areas south and east of Red Mountain are in the Alabama River Basin. Through each basin numerous tributaries flow and form watersheds including: Village Creek, Valley Creek, Shades Creek, Five Mile Creek, and the Cahaba River.

Streams

The early communities of Birmingham were relatively far from the Black Warrior and Cahaba Rivers, to the northwest and southeast respectively. But Jones Valley is traversed by the smaller Village Creek and Valley Creek. Like Red Mountain to the south, Village Creek limited northern expansion early on. It served as the city’s early water supply until it was too contaminated to provide clean water.

After decades of development and industrial and other forms of pollution, efforts by the City, UAB, the grassroots Village Creek Society, area residents and others, including

FIGURE 4.1: WATER AND WATERSHEDS



the construction of a Jefferson County peak-flow treatment facility that began operation in 2003, have greatly improved its water quality. The state designates the creek a Limited Warmwater Fishery, the second-lowest of seven water-use designations. The creek is listed as impaired for pathogens and pesticides.

Village Creek has also been the site of destructive floods. Due in part to urbanized development with concentrations of impervious surfaces, repetitive property losses led the City, in cooperation with the US Army Corps of Engineers (USACE) and FEMA to carry out multiple mitigation programs between 1983 and 2000. The USACE and FEMA tout the Village Creek program as a successful case study in flood-mitigation practices, citing a significant return on the investment of \$36 million by avoiding continued property losses estimated at \$60 million.¹ With the acquisition of land through flood-mitigation efforts and ongoing clean-up activities, the Freshwater Land Trust's Champions for Village Creek Greenway are working with the City, the Southern Environmental Center and the Jefferson County Department of Health to construct a major greenway trail and park system along the creek.

A 0.9 mile stretch of Valley Creek, which flows through southwest Birmingham to Bankhead Lake, an impoundment of the Black Warrior River, has been listed as impaired by the Alabama Department of Environmental Management (ADEM) due to atmospheric deposition, which contributes to the presence of mercury in the water. Its tributary to the south, Opossum Creek is similarly impaired.

Shades Creek flows southwesterly through the city into the Cahaba River. Because water-quality measurements did not support its use designation for Fish & Wildlife, Shades Creek has been placed on the state's list of impaired waterways. Repetitive-flood-loss property along Shades Creek was acquired through a FEMA-funded mitigation project in 2000. A greenway and multi-use trail have been developed along the creek near Lakeshore Parkway in the Homewood and Mountain Brook area.

Five Mile Creek, a tributary of the Black Warrior River, flows westward along the northern edge of the city. It is not listed as impaired. Following flooding in the early

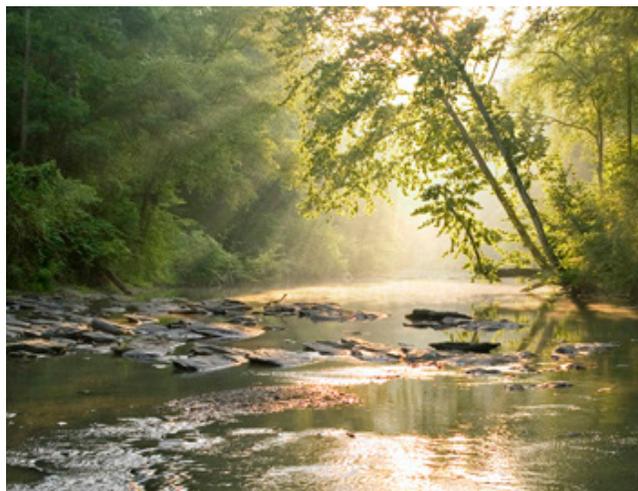
2000s, the Five Mile Creek Partnership was formed with support from Cawaco RC&D and area municipalities. The Partnership has prepared plans for and is using flood-acquired land to construct parks and trails along the creek corridor.

Cahaba River

The longest free-flowing river in the state, the Cahaba River is nationally recognized for its biodiversity, including being home to several endangered animal species, numerous plant species and eighteen species of fish found nowhere else in the world.

The Black Warrior Cahaba River Land Trust was funded by the County as part of the consent agreement with the EPA over pollution mitigation. Today it is known as the Freshwater Land Trust. Since its creation, the land trust has acquired a total of 4,500 acres along multiple waterways and in other strategic locations, 4,300 acres in fee and 200 acres in conservation easements. Creation of the land trust produced benefits to the region that were unforeseen at the time—establishment of Red Mountain Park and preparation of the countywide Red Rock Ridge and Valley Trails Master Plan.

In 2003 a consortium of local governments oversaw the development of the Upper Cahaba Watershed Study. The plan has raised public awareness of potential water quality and other environmental issues.



Cahaba River near Grants Mill Road (Photo: *Encyclopedia of Alabama*, Hunter Nichols)

¹ <http://mitigation.eeri.org/files/resources-for-success/00008.pdf>

Lakes

The Birmingham Water Works Board built the Lake Purdy Dam on the Little Cahaba River in 1929 soon after Village Creek became too polluted to serve as a water supply. The reservoir, near the headwaters of the Cahaba River, is owned by the Birmingham Water Works Board (BWVB) and encompasses 990 acres. In 2008 the BWVB adopted a policy requiring Board approval for development in the Cahaba River watershed to manage possible pollution in order to protect the water supply. That policy includes prohibitions on certain contaminating uses and activities; performance requirements for nonpoint source pollutants; and enforcement measures. As a temporary measure the City created the Holding Zone District to limit development in the Lake Purdy/Cahaba River area. This zoning classification was applied to properties in the immediate vicinity of Lake Purdy, most of which is owned by the BWVB.

Bayview Lake was built on Village Creek in 1910 as a water supply reservoir for coal mining activities and for the Ensley Iron Works. Receiving flow from Village Creek, it too became polluted from untreated industrial and sanitary wastewater. After the closing of the Thomas and Ensley Works and installation of secondary treatment facilities required by the Clean Water Act of 1972, water quality in the lake improved to the extent that it is now used for recreational purposes.



Lake Purdy (Photo: 280 Living, Chris Mason)

Floodplains

Floodplains occur in several areas throughout the city and are associated with Birmingham’s major streams—Village, Valley, Shades and Five Mile creeks—and the Cahaba River. Localized flooding in other low lying areas also occurs. Urban development along Birmingham area streams resulted in increased flood elevations during heavy rainfalls. As previously described, the City, with state and federal support, has acquired a significant number of properties impacted by past flooding, particularly along Village Creek. And, following the County-EPA consent decree, the Freshwater Land Trust has also acquired property and conservation easements within area floodplains.

Floods are of relatively short duration, usually less than ten hours. Maximum flood stage is typically reached within two to four hours of an intense rainfall event. Past events have seen flood waters rise at three feet per hour with significant velocities experienced in some parts of the city. The most destructive flooding has occurred along Village Creek, which led to the mitigation and buyout programs along that corridor. Area floodplains have historically flooded but due to the intensive flood events that occurred between 1995 and 2003, the City increased efforts to mitigate flood damage and improve stormwater-management programs.

There are three flooding segments typically regulated to protect against flood damage: The floodway, the flood fringe, and the floodplain. The **floodplain** is the area deemed to have a 1% chance of flooding every year (the “100-year” flood). This creates a 26% chance of flooding during a typical 30-year home mortgage. The **floodway** is the area that must be kept clear immediately adjacent to the stream because it functions as the natural conduit for flood



Flooding on Tallapoosa Street during Tropical Storm Lee in September 2011 (Photo: Birmingham News, Hal Yeager)

waters. The **flood fringe** is an area between the floodway and the floodplain boundary, where development is allowed as long as it meets certain criteria. The floodplain includes both the floodway and the flood fringe.

The City joined the National Flood Insurance Program (NFIP) in 1981 and the Community Rating System, a voluntary program to establish floodplain management programs to exceed NFIP requirements, in 1993. Development within Birmingham's 100-year floodplains is controlled through a Flood Plain Ordinance and is reviewed and permitted by floodplain management staff housed within the Planning, Engineering and Permits (PEP) Department. The ordinance requires residential buildings be located above the 100-year base flood elevation and non-residential buildings must be elevated or flood-proofed. Through its floodplain management efforts, the city is rated Class 6, which provides a 20% reduction in flood insurance premiums for property owners.

Stormwater Management and Water Quality

As described above, the city has historically experienced challenges to maintaining water quality in area waterways. However, in the past 20 years, the City intensified its efforts to better manage stormwater and water quality. The City developed its first Phase 1 NPDES (National Pollutant Discharge Elimination System) MS4 Program application in 1992 and then joined a multi-jurisdictional stormwater program. The City of Birmingham withdrew from the most recent version of the multi-jurisdictional program in 2008 to improve program accountability and organizational coordination, and to lower program costs. Following its withdrawal, the City contracted with a private firm to assist city staff in its stormwater-management program.

The Birmingham stormwater-management program involves preparation and maintenance of a comprehensive stormwater management plan, compliance activities, stormwater monitoring and related functions. Currently, the City manages stormwater and water quality through several program strategies:

- preventive measures
- property protection

- emergency services
- structural projects
- natural resource protection
- public education programs

Because Birmingham's waterways flow through multiple jurisdictions, the City cannot fully protect its water resources. In addition to the stormwater management activities the City performs, it must work in partnership with other local governments to meet its water quality objectives.

DEVELOPMENT CONDITIONS IN BIRMINGHAM'S 100-YEAR FLOODPLAIN

There are approximately 5,700 parcels, altogether about 5,000 acres, located within the city's 100-year floodplains.

- *Today, about 2,100 acres of that land is owned by the City, county, state and federal governments; the Freshwater Land Trust; Airport Authority; and utility companies.*
- *An estimated 4,800 parcels—just over 2,900 acres—are privately owned.*
- *There are over 3,900 residentially-zoned, privately-owned properties in the city's 100-year floodplains. Over 800 of those properties are vacant and undeveloped.*
- *230 properties, totaling 186 acres, are zoned for business or institutional uses and over 60% of those properties are developed.*
- *More than half of the privately owned land in the 100-year floodplain—about 1,500 acres—is zoned for industrial or manufacturing use.*

SOURCE: CITY OF BIRMINGHAM, GIS DATA.

AIR QUALITY

Similar to its historical water quality issues, Birmingham is not entirely in control of its air quality. Air quality in the city is affected by point and nonpoint sources both inside and outside the City's jurisdiction. A major focus to improve air quality in the region has been and continues to be to decrease vehicle emissions through congestion-mitigation activities, including consideration of high-occupancy vehicle lanes on major arteries and regional transit system improvements. Chapter 12, pp. 12.34–12.42, contains a discussion of transit and active transportation opportunities.

In addition to vehicle emissions and industrial activities, buildings contribute to air quality issues. Burning of fossil fuels, such as coal, oil and gas, and the use of various building materials and cleaning products affect both



CommuteSmart is a ridematching, carpool and vanpool service operated through the Birmingham Metropolitan Planning Organization (MPO) to reduce vehicle emissions.

indoor and outdoor air quality. The production of energy necessary to operate buildings (lighting, heating, cooling, etc.) is a significant contributor to air quality problems but can be managed through better building systems designs to increase energy efficiency. Likewise, aircraft engines produce emissions that affect air quality. Therefore air quality around airports may be impacted by aircraft engines. Aircraft engine emissions produce nitrogen oxides (NO_x), carbon monoxide (CO), oxides of sulfur (SO_x), unburned or partially combusted hydrocarbons (also known as volatile organic compounds (VOCs), particulates, and other trace compounds.

EPA is adopting emission standards for aircraft gas turbine engines that should improve air quality. The final rule contains standards and related provisions that were previously adopted by International Civil Aviation Organization (ICAO). Specifically, EPA is adopting two new tiers of more stringent emission standards for oxides of nitrogen (NO_x). Also, FAA is phasing out leaded gas by 2018 which will help improve air quality and protect airport neighbors from airborne lead.

Pollutants in the air also can contribute to poor water quality, adding to the importance of addressing the city's air quality. The source of contamination to Valley and Opossum Creeks in Birmingham, both on ADEM's list of 303(d) impaired streams, were classified as being due to air quality.

HABITATS AND BIODIVERSITY

Birmingham is located within the Ridge and Valley ecoregion and is a geographic transition point that supports significant, unique biodiversity, notably on the Cahaba River and Turkey Creek.

The Ridge and Valley ecoregion, also referred to as “the foothills of the Appalachians,” is characterized by rugged terrain with sandstone ridges and limestone valleys. Trees typical to the region include white, northern red, black, and chestnut oak, and loblolly, shortleaf, and Virginia pine. The region supports several amphibian and reptiles “of Coastal Plain affinity that are not known to occur elsewhere above the Fall Line” according to Alabama's Comprehensive Wildlife Conservation Strategy (CWCS). Significant wildlife in the region includes the Southern Hognose Snake, Coldwater Darter, Goldline Darter, and Coosa Creekshell.² The Cahaba Lily is found only in Alabama, Georgia, and South Carolina.

Alabama's CWCS was prepared by the state Department of Conservation and Natural Resources under a federally-funded State Wildlife Grant. According to the CWCS, the top concern for wildlife in the Cahaba River in the Birmingham area is water quality degradation from sedimentation and nutrient enrichment. Water quality problems stem from development in the upper watershed and agricultural and silvicultural practices. These same problems, plus the presence of abandoned surface mines threaten species along the Black Warrior River. Along the Black Warrior, the areas in most critical need for conservation action include the Locust Fork drainage area—encompassing most of the City of Birmingham—where there is a high number of imperiled species. The CWCS recommends implementation of the River Basin Management Plans and restoration of habitat and streams by ADEM, US Forest Service (USFS), Alabama Forestry Commission (AFC), Natural Resources Conservation Service (NRCS), Clean Water Partnership, local governments and other partners.³

² Alabama Department of Conservation and Natural Resources, “Alabama Comprehensive Wildlife Conservation Strategy”, <http://www.outdooralabama.com/research-mgmt/cwcs/outline.cfm>, p: 28.

³ *Ibid*, pp. 151-161.

HIGHLAND RIM

- TV Tennessee Valley
- LIM Little Mountain
- MOV Moulton Valley

CUMBERLAND PLATEAU

- WB Warrior Basin
- JCM Jackson County Mountains
- SM Sand Mountain
- SQV Sequatchie Valley
- BM Blount Mountain
- MV Murphrees Valley
- WV Wills Valley
- LOM Lookout Mountain

ALABAMA VALLEY AND RIDGE

- COV Coosa Valley
- COR Coosa Ridges
- WR Weisner Ridges
- CAV Cahaba Valley
- CAR Cahaba Ridges
- BBC Birmingham-Big Canoe Valley
- AR Armuchee Ridges

PIEDMONT UPLAND

- NP Northern Piedmont Upland
- SP Southern Piedmont Upland

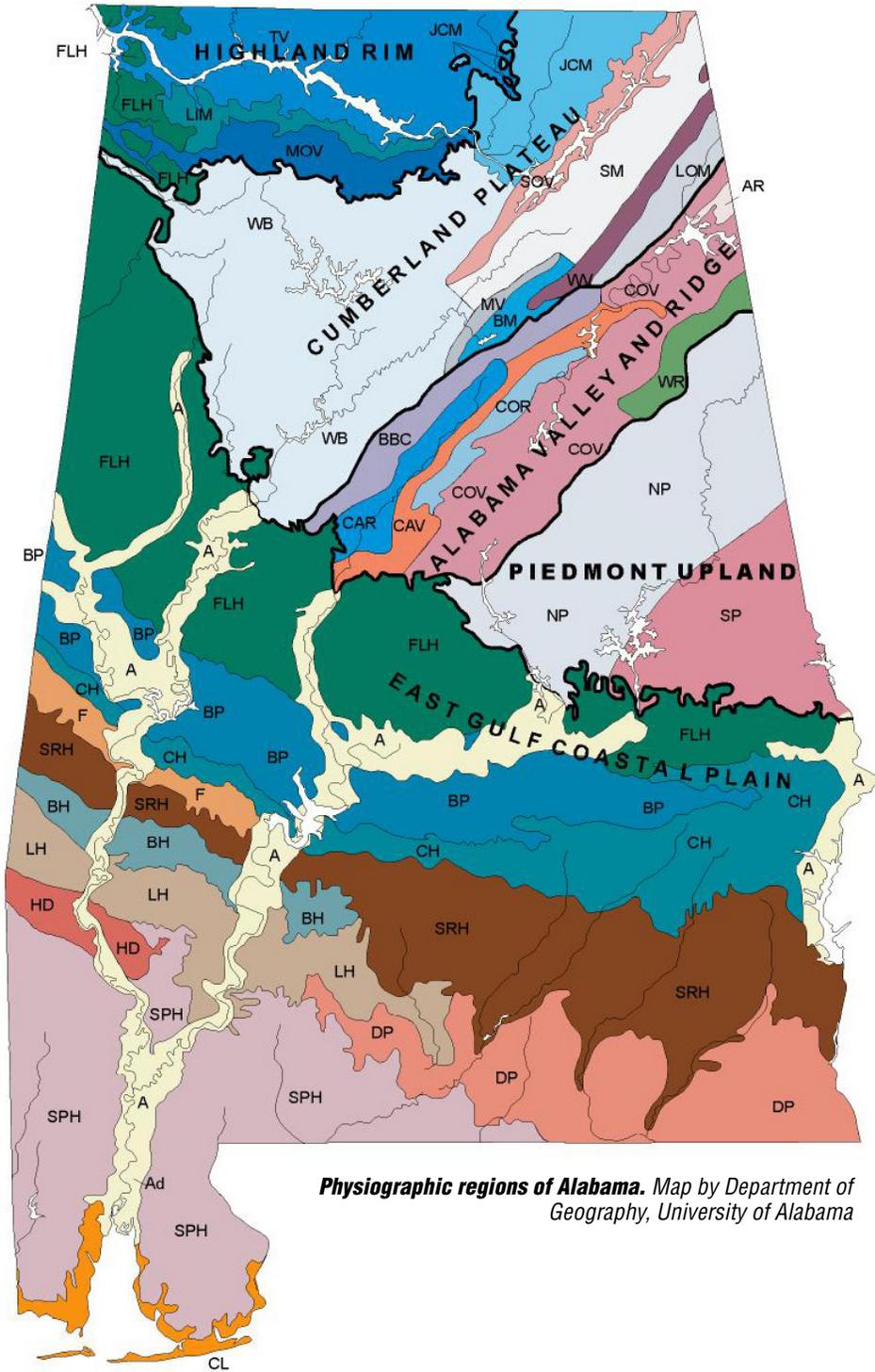
EAST GULF COASTAL PLAIN

- FLH Fall Line Hills
- BP Black Prairie
- CH Chunnenugee Hills
- SRH Southern Red Hills
- F Flatwoods Subdistrict
- BH Buhrstone Hills Subdistrict
- LH Lime Hills
- HD Hatchetigbee Dome Subdistrict
- SPH Southern Pine Hills
- DP Dougherty Plain
- CL Coastal Lowlands

A, Ad Alluvial-deltaic Plain

— District boundary

— Region boundary



Physiographic regions of Alabama. Map by Department of Geography, University of Alabama

Threatened and Endangered Species

In Jefferson County there are several endangered and threatened species and plants and animals, some of which, for example, the watercress darter, are known to occur within the city. In fact, the watercress darter is believed to occur naturally only in the Jefferson County area. A few of these rare species are believed to occur naturally in Jefferson, Blount and Bibb Counties only.

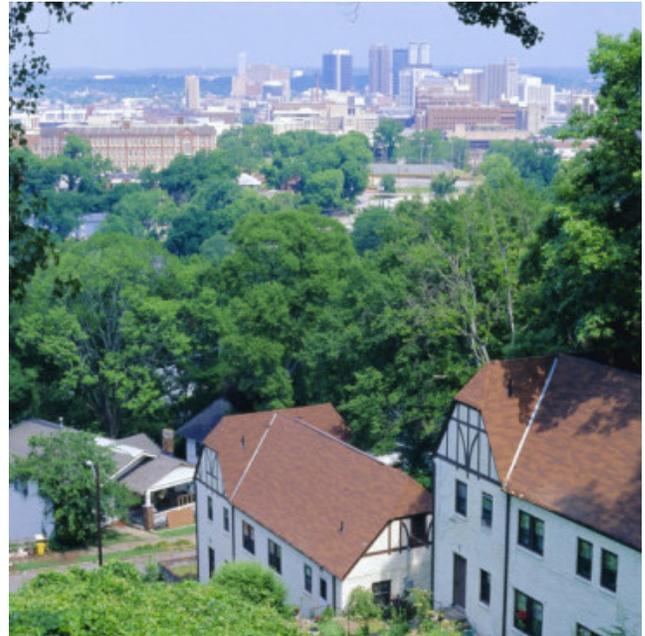
URBAN FOREST

The “urban forest” includes all the trees in and around urban areas—street trees and trees on public and private property. The large trees characteristic of Birmingham’s early neighborhoods are an important part of their sense of place. However, other parts of the community, particularly in more recently developed neighborhoods and business areas, have little tree cover. Planting and maintaining trees in the urban environment has a variety of benefits:

- improving the public realm and community aesthetics
- increasing property values
- providing shade and reduced energy costs
- enhancing walkability
- enhanced flood mitigation
- preserving wildlife habitat
- reduction in greenhouse gas pollution (CO₂)
- oxygen production

According to the 2004 study “State of the Forest in the Cities of Jefferson County” carried out by the Jefferson County SWMA, the urban forests of the Birmingham metro area, including portions of the Cahaba River watershed in Shelby and St. Clair Counties, provided \$248 million annually in air pollution and stormwater reduction. The report suggested that the presence of trees, and therefore the ground in which they are planted, allow stormwater to be absorbed into the ground while impervious parking areas, rooftops, and roadways funnel stormwater more rapidly to area streams. The stormwater monetary savings were based on the cost that would be required for detention ponds and other stormwater controls that would otherwise be required in the absence of such forested areas.⁴

⁴ Birmingham Environmental News #212, “Tree Study: Trees Worth \$248 Million a Year in Birmingham Metro,” <http://www.bamanews.com/BEN-1-3-04.html>.



Birmingham’s Five Points South neighborhood has a healthy urban tree canopy (Photo: Robert Francis)

The City has an adopted tree ordinance (Ordinance No. 90-88), but the City has drafted an ordinance that would replace or amend existing policies and standards for the preservation of the city’s tree canopy, particularly trees within public rights-of-way and easements. The ordinance establishes a Tree Commission to guide the development and administration of future policies and recommendations; specifies standards for tree planting and maintenance; establishes management authority for tree planting, removal and maintenance under the City’s Urban Forester and those concerned with public safety; and promotes public education on the importance and value of urban forests. The draft amended ordinance is under internal review as of summer 2013.

Invasive Plants

Invasive plant species are typically non-native and proliferate in hospitable environments. In these circumstances they can out-compete native plants and disrupt ecosystems. Among those that are of particular concern in the Birmingham area are privet and kudzu. Other invasive plants in the area include heavenly bamboo, English ivy, Oregon grape/Beale’s barberry, Japanese honeysuckle, mimosa, Amur honeysuckle, Bradford pear, and leatherleaf mahonia.

TABLE 4.1: ENDANGERED AND THREATENED SPECIES OF JEFFERSON COUNTY, ALABAMA		
SPECIES	NAME	STATUS
AMPHIBIANS	Black warrior waterdog	Candidate
CLAMS	Orangenacre mucket	Threatened
	Southern acornshell	Endangered
	Upland combshell	Endangered
	Finelined pocketbook	Threatened
	Ovate clubshell	Endangered
	Triangular kidneyshell	Endangered
	Alabama moccasinshell	Threatened
	Dark pigtoe	Endangered
	Southern pigtoe	Endangered
FISHES	Watercress darter*	Endangered
	Cahaba shiner	Endangered
	Goldline darter	Threatened
	Vermilion darter**	Endangered
	Rush darter	Endangered
FLOWERING PLANTS	Georgia rockcress	Candidate
	Mohr's Barbara button	Threatened
	Gentian pinkroot	Endangered
	Tennessee yellow-eyed grass	Endangered
	Georgia aster	Candidate
MAMMALS	Indiana bat	Endangered
	Gray bat	Endangered
REPTILES	Flattened musk turtle	Threatened
SNAILS	Cylindrical lioplax***	Endangered
	Plicate rocksnail**	Endangered
	Round rocksnail***	Threatened

* Known to or believed to occur only in Jefferson County.
 ** Known to or believed to occur only in Jefferson and Blount counties.
 *** Known to or believed to occur only in Jefferson, Blount and Bibb counties.

SOURCE: US FISH & WILDLIFE SERVICE ENVIRONMENTAL CONSERVATION ONLINE SYSTEM



Above: Coldwater Darter, *Etheostoma ditrema* (Photo: Outdoor Alabama). The Cahaba Lily (left) is found only in Alabama, Georgia and South Carolina. One of the two largest remaining stands of the plant is in the Cahaba River National Wildlife Refuge in West Blocton.

CONSERVATION AND ENVIRONMENTAL ORGANIZATIONS

Numerous nonprofit organizations and initiatives are working to improve conservation of sensitive environmental areas and restore environmental health both locally and throughout the region.

Alabama Clean Fuels Coalition is an affiliation of businesses, governmental and utilities representatives whose mission is to advance the use of alternative fuels in Alabama, particularly in the Birmingham metropolitan area, in order to improve air quality.

Alabama Environmental Council (AEC) is a statewide nonprofit organization located in Birmingham that focuses on environmental stewardship through community education and advocacy. The AEC also operates a recycling center in Downtown Birmingham, which accepts recyclable materials not served by the City recycling program.

Alabama Partners for Clean Air (APCA) is an affiliation of public, private and nonprofit organizations promoting voluntary programs to improve air quality in the Birmingham metropolitan area to improve public health, achieve and maintain compliance with national clean air standards, and to support economic growth consistent with air quality goals.

Black Warrior Riverkeeper is a citizen-based nonprofit organization that focuses on the improvement and protection of water quality, habitat, recreation and public health associated with the Black Warrior River and its



Coal mining along the Black Warrior River in Walker County
(Photo: Black Warrior Riverkeeper)

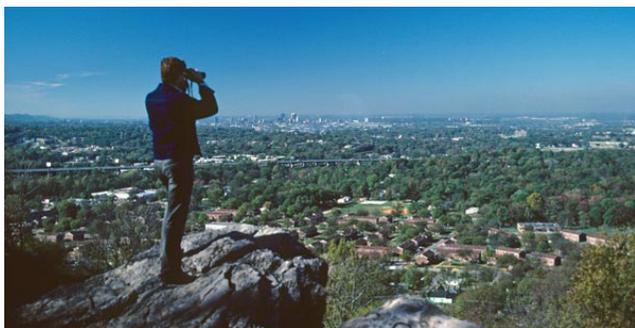
watershed. The Riverkeeper monitors the river, reports contamination problems, and provides public education programs on water quality.

Cahaba River Society (CRS) is also a citizen-based nonprofit organization that focuses on protection of water quality of the Cahaba River. CRS works with developers, local governments and ADEM to encourage development policies, low impact and best management practices, and other public and private actions to safeguard the Cahaba River as a drinking water supply for the region and as a uniquely important plant and animal habitat.

Cawaco Resource Conservation and Development (RC&D) Council, named after the three rivers—the Cahaba, Warrior and Coosa Rivers—that flow through the five counties it serves, is part of a nationwide program under the US Department of Agriculture. The RC&D works with local governments and community groups to protect and take advantage of their natural resources, directing federal, state and local resources to accomplish locally determined resource goals.

Conservation Alabama is a non-partisan, statewide environmental lobby centered in Birmingham. The organization works with local governments and state officials to develop policies and programs that protect the environment in ways that benefit the state economy and the quality of life of its citizens. Conservation Alabama, as a member of the Jefferson County Health Action Partnership, recently worked with AARP and other agencies to promote Complete Streets legislation in the state as well as similar policies at the local level.

Freshwater Land Trust (FWLT) is a private, nonprofit land trust originally created as the Black Warrior Cahaba River Land Trust under the consent decree established between Jefferson County and the EPA. Initially, the land trust was funded wholly by Jefferson County, but once the County had fulfilled its obligation under the consent decree, the Freshwater Land Trust sought funding through public and private sources. FWLT is part of the JCHD Health Action Partnership and with funding from a Communities Putting Prevention to Work (CPPW) grant obtained from the Centers for Disease Control, facilitated the development of the countywide Red Rock Ridge and Valley Trail System



View of the city from atop Ruffner Mountain (Photo: The Trust for Public Land)

Plan. The FWLT continues land and conservation easement acquisitions to protect water quality while also pursuing strategies to implement the greenway plan. FWLT, since its inception, has acquired approximately 4,500 acres of land in the City of Birmingham and throughout Jefferson County.

Ruffner Mountain Nature Center, founded in 1977, is a public nonprofit nature preserve in the midst of Birmingham's otherwise urban environment. Today it encompasses over 1,000 acres of undeveloped land, including formerly mined sites, along a Red Mountain ridge ten minutes east of downtown. Ruffner is not only a nature preserve, but a recreational amenity of tremendous size, recently joined by Red Mountain Park in southwest Birmingham.

The Southern Environmental Center (SEC) is an environmental education facility on the campus of Birmingham Southern College. The SEC, in addition to its on-campus activities, provides community education programs and works with community organizations through its EcoScape program.

Other conservation and environmental organizations active in the Birmingham area include:

- Alabama Rivers Alliance
- Auntie Litter, Inc.
- Birmingham Audubon Society
- Cahaba Group of the Sierra Club
- Cahaba Riverkeeper
- Five Mile Creek Greenway Partnership
- Greater Birmingham Alliance to Stop Pollution (GASP)
- Interfaith Environmental Initiative of Alabama
- Keep Birmingham Beautiful Commission
- The Nature Conservancy of Alabama
- Save Our Unique Rivers, Community and Environment (SOURCE)

- Southern Environmental Law Center
- Village Creek Society

Conservation and Environmental Programs

ECOSCAPE PROGRAM

This program was created by the Southern Environmental Center at Birmingham Southern College in 1996 combines organic gardening, environmental education, local art, and neighborhood revitalization to convert vacant sites into outdoor learning sites.

RED ROCK RIDGE AND VALLEY TRAIL SYSTEM

This proposed countywide trail system emerged from the Our One Mile planning process and is now being prepared for implementation by the Freshwater Land Trust, affiliated nonprofits and local governments. In 2012 the City and FWLT, with support from the Cities of Homewood, Fairfield and Midfield and other government and nonprofit agencies, received a TIGER grant to construct 33.6 miles of the plan's on- and off-road bicycle and pedestrian facilities.

RED MOUNTAIN PARK

This 1,100 acre park was established through the creation of the Red Mountain Greenway and Recreational Area Commission by the state legislature in 2007. While portions of the park had been opened for special events, the park more recently opened to the general public. Located in southwest Birmingham on former mining territory that stretches from Homewood to Bessemer, this major park includes a complex of over 10 miles of trails and is an industrial archaeological site. Park operations, since its inception, have been ambitious and diverse, running the gamut from documenting oral histories of mining camp residents to incorporating zip line routes through the park. The park and related initiatives are discussed further in Chapter 5, pp. 5.5 and 5.20.

GREEN INFRASTRUCTURE

Altogether, the city's parks, urban forests, greenways, floodplains and streams and other natural and open space areas form its "green infrastructure" while its utilities, roads and public facilities are considered the city's "grey infrastructure." In the same way that water and sanitary sewer lines provide essential functions to the community,



Red Mountain Park Plan

green infrastructure elements support stormwater management, air quality and other services essential to the community. To perform effectively, both types of infrastructure must be planned, maintained and enhanced as interconnected systems, rather than collections of isolated facilities.

Green infrastructure systems are living, breathing networks of land, water, plants and animals that give cities character, make them healthier, and improve quality of life—all of which are critical not only to the well-being of residents and ecosystems, but also to the city’s economy and its ability to retain and attract residents and investment. The essential functions served by green infrastructure elements go largely unnoticed by the community-at-large though they may be appreciated for their aesthetic values. For example, residents may enjoy the water features at Avondale or East Lake Parks but few recognize that these quality-of-life amenities also are part of the city’s stormwater management system. Ironically, such well-designed facilities disguise their functional value while a detention basin within a contemporary development portrays itself clearly as serving a necessary function, though often lacking in aesthetic value.

According to recent research, including a 2007 EPA study, green infrastructure approaches to stormwater management in development projects are cost-effective and can be less expensive than conventional grey infrastructure systems. Cost savings typically occur in equipment and

installation, long-term operations and maintenance, and replacement.⁵

Compared to built systems, green infrastructure increases cost-effectiveness by improving:⁶

- water quality of municipal drinking water supplies that can lower water treatment costs
- water quality predictability that can reduce long-term capital costs
- longevity of water quality investments
- development benefits through increased demand and pricing for “green” properties
- flood control and groundwater recharge

⁵ American Rivers, Water Environment Federation, ASLA and ECONorthwest, *Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide*, (2012), <http://www.americanrivers.org/assets/pdfs/reports-and-publications/banking-on-green-report.pdf>, p. 9.

⁶ *Ibid.*, p. 10.



Kickoff meeting for the countywide greenway planning process
(Photo: Freshwater Land Trust)

C. Recommendations

goal 1

A comprehensive green infrastructure system provides access to and preserves natural areas and environmentally sensitive areas.

POLICIES

- Support creation of an interconnected green infrastructure network that includes natural areas for passive recreation, stormwater management, and wildlife habitat.
- Consider incentives for conservation and enhancement of natural and urban forests.

STRATEGIES

A. Enhance Birmingham's urban forest.

Birmingham's urban forest includes trees located within public rights-of-way and on City and private property. As a part of the city's green infrastructure, trees serve both qualitative and quantitative functions: reducing urban heat islands, supporting stormwater management and air quality, reducing energy use, and improving community appearance and property values.

ACTIONS

1. Amend Tree Ordinance.

Multiple City departments, land owners and utility companies affect the amount and condition of trees within public rights-of-way and easements and on City property. Internal actions by City departments should be consistent with the city's overall urban forestry policy and improvements in coordination, where needed, will help assure that all such actions further these goals. Coordinating departmental policies to assure proper treatment of the urban forest can be facilitated by adoption and implementation of the amended tree ordinance that is consistent with the needs for public safety as it relates to utility lines and is under review, as of September 2013.

2. Plant more trees.

The City should set an annual target for planting/replanting of trees on City property and public rights-of-way. Prior to developing an Urban Forestry Plan as recommended below, the City should seek to plant 800-1,000 trees each year, including street trees and trees in parks and on other City properties. Over the last several years, the City has planted between 500-600 trees annually. Due to special funding allocations, tree-planting programs in the early 2000s resulted in the City's planting almost 2,000 trees in each of the two years those programs were implemented.

ECONOMIC BENEFITS OF THE URBAN FOREST



According to the University of Washington's Center for Urban Horticulture, trees in cities provide multiple economic benefits. In residential areas, a 25-foot tree can reduce cooling costs by 8 to 12%. City centers are subject to the urban heat island effect due to the amount of buildings and paving, but increased tree canopy can reduce temperatures by as much as 10° F, which results in lower temperatures in area buildings.* These temperature reductions also can reduce air pollution, representing additional economic savings. Urban designer and walkability guru Dan Burden estimates that a single street tree generates over \$90,000 in direct benefits—fewer vehicular and pedestrian accidents, cleaner air, improved business, less crime, and stormwater management among others—over its lifespan, not including aesthetic or other subjective benefits.**

* Center for Urban Horticulture, University of Washington, "Urban Forest Values, Economic Benefits of Trees in Cities," <http://www.treebenefits.terraSUMMIT.com/Documents/Business/EconBens-FS3.pdf>.

** Glatting Jackson Kercher and Anglin, "22 Benefits of Urban Street Trees," <http://www.walkable.org/assets/downloads/22%20Benefits%20of%20Urban%20Street%20Trees.pdf>.

CITYgreen

*CITYgreen is a computer program used by landscape architects, planners, engineers and others to analyze green infrastructure elements, such as the urban tree canopy. An extension to mapping software ArcGIS, which the City already uses, CITYgreen helps cities understand the monetary value that green infrastructure components contribute to stormwater management, air quality, and water quality, all based on local conditions.**

* American Society of Landscape Architects "American Forest CITYgreen," <http://www.asla.org/ContentDetail.aspx?id=14874>

This incremental tree planting should be focused on strategic locations, such as major corridors and gateways, and Strategic Opportunity Areas defined in this plan, particularly any of these locations where there is a high level of pedestrian activity or where such activity is meant to be increased. Residential neighborhoods should also be included. Once a citywide urban forestry plan has been prepared, tree-planting goals and priority locations should be adapted to the strategies in that plan.

Whenever streetscape work is planned, planting of street trees should be considered standard operating procedure unless there is inadequate right-of-way width or other constraints. Such an operating policy should also include green infrastructure improvements.

With the planting of trees in public rights-of-way, on public lands and in easements, the City must also commit to their long-term maintenance.

3. Prepare an Urban Forestry Plan.

Preparation of a citywide urban forestry plan should include the following components to help the City's Urban Forestry Division best maintain the city tree population and do so in a cost-effective manner:

- Tree inventory, analysis and mapping
- Tree risk reduction/emergency storm response plan
- Recommendations for the tree commission
- Public relations and education strategies
- Cost/benefit analysis of urban forest management

The plan should be based upon a thorough inventory and analysis. It is important to know species as well as numbers of trees because different species have varying life expectancies and maintenance needs. Using GIS-based mapping and software allows city staff to create work reports, schedule tree maintenance and planting tasks, and track costs.

In addition to species, number and location, the inventory should also collect information on tree health conditions; proximity to utility lines, traffic signs and signals; sidewalk and other hardscape damage; and insect and disease problems. These inventories are generally conducted by Certified Arborists or similarly trained professionals.

The plan should establish percentage-based targets for growth of the city's tree canopy, including specific goals for the city overall and for residential areas, business districts, parks and natural areas. For example, the plan might set a target to increase the tree canopy in business districts by 10% within five years or to increase the canopy citywide by 5% in a similar timeframe.

In setting these targets the plan must account for maintenance of the growing urban tree canopy. More ambitious tree planting goals will require a greater financial commitment by the City over the long term to maintain the health of trees.

4. Engage the public around the importance of the urban forest for quality of life.

Trees in the urban environment serve multiple purposes of which residents may be unaware. Community workshops should be organized through the Birmingham Tree Commission and potential partners such as the Botanical Gardens or Southern Environmental Center to convey information to residents on the safety benefits of healthy urban forests and green infrastructure services they provide. Other public education programs include press releases, brochures and mailers to residents regarding tree planting and maintenance activities in their area.

B. Implement priority portions of the Red Rock Ridge and Valley Trail System (RRRVTS).

Implementation of those segments of the Red Rock Plan within the city limits will help provide physical connections between other elements of Birmingham’s green infrastructure network, such as existing and planned parks. Among the trails and greenway projects identified in the countywide plan, several proposed major greenway routes traverse the city, of which most follow Birmingham’s primary stream corridors—Village Creek, Five Mile Creek, Valley Creek and Shades Creek. Each then provides an opportunity to preserve or restore the associated floodplains to a more natural condition, enhancing the city’s green infrastructure while simultaneously providing attractive, safe routes for pedestrians and bicyclists to move about the city. Interconnected greenways and natural corridors, particularly along streams, also provide important habitats and travel routes for area wildlife.

Because the proposed trail system is countywide, restoration of streams and their associated floodplains—as part of the process to develop greenways along them—offers the chance to improve portions of Birmingham-area streams inside and outside the city limits. As has been the case with the Health Action Partnership, a regional partnership of adjoining governments and public and nonprofit organizations will lend a competitive advantage to the overall effort in attracting funding.



Conceptual plan for a segment of the Village Creek trail corridor at Arkadelphia Road by the Auburn University Center for Architecture and Urban Studies

ACTIONS

1. Initiate priority projects for green infrastructure improvements.

Developing the trail system both at the countywide level and within the city is a substantial undertaking that will take many years. Priorities may be based on green infrastructure benefits, recreation and mobility or a combination of these factors.

The Village and Valley Creek greenways should be considered high priorities due to their value to the city’s green infrastructure, particularly stormwater management, as well as other benefits that trails along the corridors would provide. These streams flow through the most urbanized portions of the city. While earlier buyout programs helped acquire land, some developed properties remain in the floodplains along these streams that are susceptible to damage caused by flooding in the future. Greenway development would further the flood mitigation efforts already begun with past buyout programs. Special consideration should be given to segments of those greenway routes that would allow pedestrians and bicyclists to access employment centers from surrounding neighborhoods.

Stream restoration should be included as part of these efforts, particularly along Village and Valley Creeks, where contamination and the stigma associated with it are both a detriment to the quality of life in surrounding neighborhoods.



In 2011 the Saw Mill River in Downtown Yonkers was “daylighted” after being buried for 90 years. The restoration project not only had environmental benefits but also has spurred revitalization in the surrounding downtown area. Source: www.scenic Hudson.org

2. Develop partnerships and funding.

The City should continue and expand on partnerships with the Freshwater Land Trust, the Community Foundation of Greater Birmingham and other Health Action Partnership members; corporations that own facilities and land along the routes; and others to develop these projects.

The 2012 application for federal funding for greenway segments along Village and Shades Creeks is a great example of the City’s partnering with adjacent municipalities and private and nonprofit organizations, to further city and regional objectives. In addition to federal transportation funding, greenway projects along Village and Valley Creeks may also be eligible for FEMA, U.S. Army Corps of Engineers and similar flood-mitigation funding sources.

C. Audit and amend development regulations, as needed, to promote environmental goals.

Many of Birmingham’s conservation and environmental goals are or can be addressed through its development regulations. These primarily include the zoning ordinance, subdivision regulations, and engineering design guidelines. The subdivision regulations were amended in 2011 but several aspects of these requirements could be improved to better support the development goals of this plan. Over the past two decades, the zoning ordinance, which has significant impact on land development and conservation, has been amended only incrementally and is due for a comprehensive update.

ACTIONS

1. Audit development regulations.

A thorough review of the City’s development regulations, particularly the zoning ordinance, should be performed to identify regulatory obstacles to environmentally friendly development. Regulations should allow best practices that advance environmental goals.

This audit should include a review of parking, subdivision design and engineering standards. Low-impact design (LID) strategies and similar site design



Chicago’s Green Alley Program retrofits alleys with pervious pavers to allow stormwater infiltration. (Photo: EPA, David Leopold)

methods could be allowed particularly on sites whose development will affect environmental features and natural systems.

Environmental impacts of development on steep slopes are addressed currently through engineering standards. Existing requirements can be supplemented to consider incentives for the use of low impact design and green infrastructure systems. Density limitations may also be appropriate on hillsides and ridge tops above a certain threshold, which may vary based on soil conditions.

Low-impact and green-infrastructure design techniques that could be encouraged include:

- Use of green roofs and rain harvesting
- Pervious surfaces for parking and vehicular use areas
- Shared parking and reduced minimum parking requirements
- “Skinny” streets (narrow streets where wider rights of way are not needed to accommodate traffic) and other alternative street designs to reduce impervious surfaces
- Retention, planting and/or replanting of trees
- Use of low-maintenance, native species of plants in required landscaping
- Use of bioswales (vegetated depressions for drainage) as an alternative to curb and gutter systems
- Use of parking lot landscaping for stormwater management
- Regional Retention Systems where appropriate
- Riparian buffers along streams

These design features can be valuable in new developments as well as retrofits in existing neighborhoods and business areas by improving stormwater drainage and reducing flooding. Increased tree and other vegetative cover and decreased impervious cover can reduce urban heat islands and ultimately improve cooling costs. Likewise, rain harvesting and water-efficient landscaping lowers water consumption and associated utility costs.

Birmingham’s subdivision regulations require a minimum pavement width for new streets based on their classification. (Because there is no officially adopted master street plan, classification decisions are based on regional planning commission classifications.) However, this does not account for the actual lane assembly and can unnecessarily raise impervious surface cover and travel speeds. For example, collector streets are required to have a minimum pavement width of 37 feet from back-of-curb to back-of-curb. While this is appropriate for three-lane segments, in two-lane segments the resulting lane width would be over 17 feet, about five feet wider than desirable. Basing pavement width on lane assembly and design speed, rather than tying it solely to street classification, would be more precise and allow decreases in impervious surfaces



Seattle’s Street Edge Alternatives (SEA) program encourages the use of low-impact design techniques, including bioswales, narrower street widths, structural grass, flush curbs and other features. After two years of monitoring, the 2001 pilot street project had reduced the total volume of stormwater leaving the street by 99%. The redesign also reduced pavement costs by 49%. (More information: Seattle Public Utilities, Street Edge Alternatives http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/)



FLOODING CONTROL USING GREEN INFRASTRUCTURE

Episcopal High School in Baton Rouge, Louisiana, was troubled by ongoing flooding on the campus due to an obsolete drainage system. The gym flooded during severe rains and the quad was typically muddy. The cost to replace and upgrade the drainage system was estimated at \$500,000. Instead of re-piping the drainage system, the school opted for a more natural, green infrastructure design that included bioswales and a rain garden. The project cost \$110,000 for design and construction representing, a considerable savings compared to the conventional design. (Further information: American Society of Landscape Architects, Stormwater Case Studies, http://www.asla.org/uploadedFiles/CMS/Advocacy/Federal_Government_Affairs/Stormwater_Case_Studies/Stormwater%20Case%20459%20Episcopal%20High%20School%20Stormwater%20Rain%20Garden,%20Baton%20Rouge,%20LA.pdf.)

Photo: Brown+Danos landdesign

where fewer lanes are required. This can lessen costs of street construction and eventually the costs to the City for maintenance and repaving. Keeping lane widths to the minimum necessary also calms travel speeds making streets safer for pedestrians and motorists alike. This issue is pertinent to other street classifications as well.

The subdivision regulations require standard curb and gutter in all but estate, agricultural and manufacturing districts. This prohibits the use of bioswales in all but the least dense residential developments. While use of bioswales—a low impact device for managing stormwater—is not appropriate in all land use contexts, the City should not only allow but encourage them, subject to appropriate design standards, in more types of residential development. In residential contexts, allowances should be made for “green streets,” which

combine the use of natural drainage elements, such as bioswales and rain gardens, at the roadside with narrow street widths to reduce overall impervious surface cover. Flush curbs and structural grass can be used to accommodate access for emergency vehicles. Similarly, bioswales and other green infrastructure and low-impact development techniques should be more strongly recommended for use in flood prone areas.

Changing the City’s parking regulations can also aid in stormwater management. Parking is a major contributor in the amount of impervious surfaces associated with development. While most cities maintain minimum parking requirements for uses, more recently several cities have transitioned to maximum parking standards to mitigate the negative impacts that excessive parking ratios engender. Others have reduced their minimum parking requirements and/or require that overflow parking be provided with pervious paving. Parking requirements can also be improved by allowing reductions for shared parking among multiple uses with parking demands at different times of the day and throughout the week. Different types of pervious paving are available today and should be permitted to meet City parking standards where suitable to the use and context.

2. Consider incentives for the use of conservation developments.

Conservation developments or conservation subdivisions are an advantageous tool in achieving the city’s green infrastructure goals through private development. Conservation development provisions allow developers to forego area and dimensional requirements of the zoning ordinance, such as minimum lot size or lot width, when environmental features are preserved within a permanent open space.

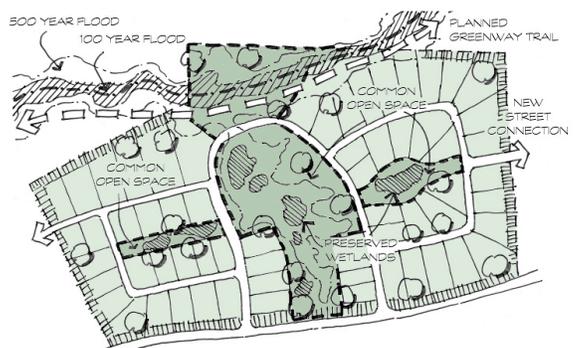
These types of development (and redevelopment) are of particular benefit where steep slopes, tree canopy, wetlands, floodplains, historic features or other elements are to be conserved. These protected spaces can serve stormwater or other environmental functions while also providing amenity space for the development—whether in the form of a community garden, playground or a combination of open space uses. These protected spaces can provide connections to adjacent elements in the city’s green infrastructure network.

Conservation design is facilitated by zoning regulations through “density-averaging” or density bonuses. The design process begins with identification of the open space(s) to be protected. Preferably, the open space will contain both environmentally sensitive land and otherwise developable land. This assures its usefulness as an amenity and prevents it from being merely remnant land that goes unused and unmaintained.

In density-averaging, a maximum amount of development available to the site is determined based on zoning limitations. The developed portion of the site is clustered more densely together than would be allowed under normal zoning requirements in order to create the open-space amenity and achieve the available density. Incentives such as density bonuses can be awarded to further encourage this approach. Density bonuses can be offered in return for higher percentages of usable open space, land dedication, or other desired development features.

The design and uses of the open space must be constrained to ensure the space functions properly as a green infrastructure element and provides some usable open space for residents or workers. Provisions are also required to ensure proper ownership and maintenance of the open space.

Many times developers can achieve greater efficiency in the way that streets, water, sewer and other utilities are laid out due to clustering, conservation developments can be a “win-win” for the community and the developer. Consider incentives for the use of conservation developments would provide an



Through density averaging, conservation subdivisions preserve green infrastructure elements and create usable open space, without reducing development capacity.

economically and environmentally attractive alternative to the conventional method of mass grading and clear cutting difficult sites.

3. Establish zoning provisions to allow for compact housing.

There may be opportunities for cluster housing and cottage subdivisions in redevelopment and infill projects in existing communities. Similar to conservation developments, cluster housing and cottage subdivisions represent more compact housing development when usable, common open space is provided for residents, taking the place of individual front- or rear-yard setbacks. Cottage subdivision regulations were adopted early by cities in Washington state but also in Southern cities like Nashville and Auburn. In addition to modifying normal zoning requirements for yard setbacks, these provisions waive street frontage requirements, which are normally mandated for all single-family dwellings.

Just as in conservation subdivisions, the common open space around which cluster housing is developed can serve green infrastructure purposes. The compact nature of these developments also contributes to walkability while retaining the scale and character of conventional single-family detached housing. Because land area and costs per dwelling are lower, they can be built affordably.



The cottages of Cliff Road are a local, historic example of compact design that would not normally be allowed under City regulations today.

goal 2

Reinvestment in existing communities conserves resources and sensitive environments.

POLICIES

- Consider incentives for reinvestment in existing communities, rather than “greenfields,” for new commercial, residential and institutional development.
- Consider incentives for development patterns and site-design methods that help protect water quality, sensitive environmental features or wildlife habitat.

COTTAGE SUBDIVISIONS

The Cottage Company in the State of Washington has worked with municipalities to incorporate provisions in their zoning regulations to allow for these types of cluster housing.



Photo: Union Studio Architects, www.unionstudioarch.com

STRATEGIES

A. Convert selected brownfields to usable open space.

Birmingham contains many “brownfields,” former industrial and commercial sites that are contaminated or believed to be contaminated. But the city’s brownfields can be returned to productive use in a variety of ways. Remediation not only allows the property to be put back into a productive use, but it also can remove a stigma that depresses property values in the surrounding area.

Appropriate reuse of brownfields can include new industrial, commercial or residential reuses as well as usable open spaces. In remediating any contamination and

transforming these sites to open space use, they can also be (re)integrated into the overall green infrastructure system. For recommendations on the types of income-producing uses appropriate for brownfield redevelopment, refer to Chapters 9 (pp. 9.9, 9.13) and 10 (pp. 10.24–10.25).

ACTIONS

1. Identify brownfield sites for open space use.

Depending on their location, context, size and other factors, brownfield sites or portions of them may be adaptively reused as parks or other types of publicly accessible, usable open spaces. A Phase 1 assessment should be conducted to determine the scope of any contamination, cleanup costs and strategies for remediation and reuse.

Brownfields can also be allowed to return to a more natural state. These are referred to as “urban wilds” and, even with little or no remediation, they can serve as part of the green infrastructure system. Urban wilds are not open to the public and may not be a desirable end use for most brownfields. But they can serve as an interim option until funding, demand or other factors align to remediate and adaptively reuse a site.

2. Acquire and remediate selected sites.

Upon determining desirable sites for conversion to open space uses, acquisition may be required. Because of the potential exposure to the landowner for remediation costs and liability, the City may be able to acquire the land more easily and pursue EPA funds for assessment and cleanup activities.

Remediation, which can involve excavation of contaminated soil, replacing it with clean soil, and capping of the site, can be costly, despite the possibility of assistance through government programs and grants. Because of these costs, brownfields may lie dormant for some time.

Phytoremediation is a slow but lower-cost process—using plants to clean toxic soils, groundwater, surface water and sediment—that can be used during this dormant period. This remedial process has been employed locally, including at Sloss Furnaces, and across the country on sites both large and small. In Chicago, former gas station sites were cleaned through phytoremediation for reuse as pocket parks.

Phytoremediation is most effective on sites with moderate amounts of pollution but has been used successfully to address a range of contaminants, including those in landfills, wood-treating facilities, military bases, fuel-storage sites, sewage treatment plants and mining sites. According to the US EPA:

Phytoremediation can occur even if the chemicals are not taken into the plant by the roots. For example, chemicals can stick or sorb to plant roots. Or they can be changed into less harmful chemicals by bugs or microbes that live near plant roots...Plants grown for phytoremediation also can help keep harmful chemicals from moving from a polluted site to other areas. The plants limit the

PHYTOREMEDIATION

*In phytoremediation, plants remove a variety of contaminants from brownfield sites, including heavy metals, radionuclides, chlorinated solvents, petroleum hydrocarbons, PCBs, pesticides and others. Plant types must be selected for local conditions and for the types of contaminants to be removed. Plants typically used to remove arsenic, for example are Chinese brake fern, sunflower and highland bent grass. Lead removal uses blue sheep fescue, Indian mustard, wheat and ragweed.**

Plants should be harvested, the soil retested and the planting cycle continued until the soil contaminants decline to an appropriate level. Some plants are “hyperaccumulators” and must be disposed of as hazardous waste when harvested. A small bioremediation project was implemented north of the railroad tracks to Morris Avenue between 15th and 16th streets.

* Kaja Kuhl, *From Brownfields to Greenfields: A Field Guide to Phytoremediation*, 2010, <http://urbanomnibus.net/>.



(Photo: Ideonexus.com)



Phytoremediation is not new to Birmingham. Above is a phytoremediation demonstration project at Sloss Furnaces. Recently a bioremediation project was performed along the railroad near Morris Avenue. (Photo: www.choosepeace.info)

amount of chemicals that can be carried away by the wind or by rain that soaks into the soil or flows off the site.⁷

⁷ United States Environmental Protection Agency, *A Citizen's Guide to Phytoremediation*, 2001.

goal 3

The City makes every effort to consistently meet clean air standards.

POLICIES

- Support the development of cost-effective multi-modal transportation systems that reduce vehicle emissions.
- Encourage use of clean fuels and emissions testing.
- Emphasize recruitment of clean industry.
- Consider incentives for industries to reduce emissions over time.
- Promote the use of cost-effective energy efficient design, materials and equipment in existing and private development.

STRATEGIES

The City must pursue multiple strategies to improve regional air quality, which inherently will require collaboration with federal, state and local governments, the business community and other interested stakeholders. Transportation-related initiatives include: reduced vehicle emissions by managing annual vehicle miles traveled (VMT), encouraging transit and active transportation, and advancing use of clean fuels and emissions testing for personal vehicles. Other important initiatives to improve air quality involve promoting energy efficiency in the built environment and consideration of incentives that encourage reducing emissions related to industries.

A. Implement priority portions of the Red Rock Ridge and Valley Trail System.

Increasing pedestrian and bicycle options through development of the countywide trails system will support transit use and reduce dependency on personal vehicles, which will lead to reductions in vehicular emissions that pollute the air. Federal grants are available for these types of projects, for instance through MAP-21, which requires local matching funds. The City received a TIGER grant in 2012 that will help initiate several portions of the trail system.

ACTION

1. *Develop a priority list for unfunded segments of the Trail System and seek funding according to the list.*

Priority ranking should take into account criteria such as connections between neighborhoods and destinations such as parks and commercial districts; stormwater management and flood mitigation opportunities; and enhancement of urban villages and associated strategic opportunity areas discussed in Chapter 7 (p. 7.8).

B. Use clean fuels and encourage voluntary vehicle emissions testing.

ACTIONS

1. *Expand use of clean fuels*

In 2007, the City of Birmingham began the transition to a “green” fleet, installing biodiesel refueling stations to run its diesel vehicles on B20 blend fuels. Since then E-85 ethanol fueled vehicles were introduced. These efforts led to reduced vehicle emissions that promise better air quality in the region.

Birmingham and other area cities, in collaboration with Algasco and Energen, have also been converting parts of their fleets to run on compressed natural gas (CNG), and are supporting the development of CNG fuel stations in the region. By continuing these initiatives, Birmingham and other cities and corporations can help to create the demand necessary to attract private investment in alternative fueling stations, which will ultimately make it easier for consumers to move to alternative fuels and reduce their air-quality impacts.

2. *Encourage periodic voluntary vehicle emissions testing*

Personal vehicle use contributes significantly to Birmingham’s air quality conditions, but multiple strategies can be used to reduce the negative impacts of vehicle emissions. As described in Chapter 12, increased use of alternative modes of travel (transit, ridesharing, walking and biking) can reduce the vehicle miles traveled in the region and therefore the overall amount of VOCs, NOx and other pollutants in the air. Secondly, vehicle emissions testing lets car owners know the degree to which their vehicles are contributing to

air quality problems. Tests can identify maintenance issues or repairs needed for the vehicle to produce fewer pollutants.

Over 30 states currently require or have required periodic vehicle emissions tests, generally in counties or metro areas with air quality concerns. Testing is required either annually or biennially. More recently, states are loosening requirements for or are exempting hybrid vehicles and newer-model cars with increased fuel efficiency. Washington state, for example, recently exempted 2009 and later model vehicles. Average test costs are \$10 to \$20. Centralized testing programs, where motorists travel to a single facility operated by a public or non-profit agency, are generally more cost-effective, while decentralized programs tend to be more convenient for motorists.⁸ Decentralized programs allow motorists to have their vehicles inspected by private automotive repair businesses.

Voluntary emissions testing has been conducted by the Birmingham Metropolitan Planning Organization (MPO) and APCA in the past. Resuming these activities could be supplemented by public awareness and education programs. The City can also support the passage of state legislation to require periodic testing for applicable metro areas. This could include a sunset provision tied to air-quality improvements and/or to the percentage of newer, cleaner-burning cars in use.

⁸ US EPA, *Clean Cars—Clean Air: A Consumer Guide to Auto Emission Inspection and Maintenance Programs*, <http://www.epa.gov/oms/cfa-air.htm>.



Vehicle emissions testing helps reduce air pollution caused by personal vehicles. Photo: <http://ecologywa.blogspot.com>

goal 4

The City makes every effort to consistently meet clean water standards.

POLICIES

- Encourage the Birmingham Water Works Board to protect water-supply sources located outside the city.
- Consider incentives for development that protects the city's water resources.
- Consider incentives for the protection of natural drainage in stormwater management systems where feasible.
- Consider incentives for the use of conservation and low-impact development techniques.
- Support state water quality standards and enforcement.
- Monitor drilling uses of water resources to avoid contamination or excessive use and encourage best management practices.

STRATEGIES

There are several approaches to be undertaken to continue to improve Birmingham's water quality and, in the process, remove those segments of the Cahaba River, the Locust Fork of the Black Warrior River, Village Creek, Valley Creek and Opossum Creek from ADEM's 303(d) list. Efforts include improved stormwater management and design practices, continued flood mitigation efforts, ongoing water-quality monitoring, stream restoration and green infrastructure retrofits, and changes to development regulations.

In addition to these strategies, the City must also continue to work with the BWWB, as well as other stakeholders, to protect Birmingham's water supply. Because Birmingham's water supply involves sources outside of the city limits, it is essential for the City to support regional and state efforts to assure protection of area waterways.

Due to a constrained state budget, concerns have arisen regarding the ADEM's ability to sustain water quality monitoring and enforcement operations. Properly funding and providing policy support for this state function is essential to protecting and improving water quality within and outside the city limits.

A. Maintain updated citywide flood-mitigation and stormwater plans.

Following multiple storms and severe flooding in the early 2000s, the City prepared and adopted a citywide flood-mitigation and stormwater-management plan in 2004. The City also participated in multi-jurisdictional natural-hazard and flood-hazard mitigation planning efforts organized by Jefferson County in this same period. These efforts resulted in multiple mitigation programs, including buyout initiatives along Village Creek, Valley Creek, Five Mile Creek, Upper Shades Creek and other floodplain corridors.

ACTIONS

1. Update the 2004 Flood Mitigation/Stormwater Management Plan.

Given the substantial amount of flood mitigation activities that occurred in the early 2000s, this effort should reveal a much improved picture of flood hazards in the city. A renewed flood conditions assessment will allow greater focus on remaining priorities. This plan update should be coordinated with ongoing stormwater planning and water quality monitoring, analysis and reporting conducted by the City, since the two issues are so closely related. The City should also continue to update its flood-hazard mapping.

2. Evaluate recommendations and update flood regulations.

The 2004 plan included a recommendation to adopt the proposed Jefferson County floodplain regulations or to strengthen existing regulations on floodplain development within the City zoning ordinance. Notably, the recommendations in this plan echo several of the strategies described in the 2004 plan: continued land acquisition along floodplains and regulatory improvements such as encouraging low-impact development practices and conservation and cluster developments.

The following recommended changes to the floodplain regulations in the Zoning Ordinance were also included in the 2004 plan:

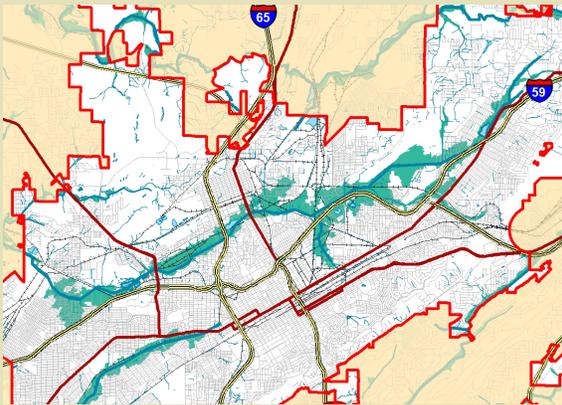
- Increase the flood-protection elevation for new construction from 1'-0" to 1'-6" or 2'-0" above the base flood elevation.

FLOODPLAIN TERMINOLOGY

Flood fringe—That portion of the flood plain outside the regulatory floodway.

Floodway—That portion of the floodplain which is effective in carrying flow, within which this carrying capacity must be preserved and where the flood hazard is generally highest, i.e., where water depths and velocities are the greatest. It is that area which provides for the discharge of the base flood so the cumulative increase in water surface elevation is no more than one foot.

Floodplains—Lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year. The base floodplain is used to designate the 100-year floodplain (one percent chance floodplain). The critical floodplain is defined as the 500-year floodplain (0.2 percent chance floodplain).



Birmingham’s largest floodplain complex lies along Village Creek.

- Prohibit the placement of fill in the floodway and limit its development to conservation, open space, passive recreation, flood-control and utility uses.
- Require no net loss of flood-storage capacity for developments in the Special Flood Hazard Area.
- Establish maximum percentages of impervious cover in Special Flood Hazard Areas.

B. Continue water-quality monitoring and begin enforcement based on new city-wide Stormwater Ordinance.

As part of the City’s state water-quality permit requirements under the federal Clean Water Act, the City prepares an annual report on water quality issues and an annual stormwater management plan. These activities should continue and be coordinated with a regularly updated flood mitigation plan.

Hydraulic fracturing is a drilling technique used to release petroleum, natural gas and other substances for energy production. Advancements in the fracturing process—“fracking,” as it has become known popularly—over the last two decades have made it economically effective but also have made its possible environmental impacts less well understood. Critics maintain that the chemicals used in fracturing fluid can contaminate ground water and threaten drinking water supplies.

Birmingham lies along a shale gas formation eyed for fracking that stretches across north central Alabama roughly along the I-59 corridor. A concentration of natural gas wells are believed to occur in the vicinity of the Black Warrior River, one of Birmingham’s drinking water supplies. However, Coalbed Methane producers in Jefferson and Tuscaloosa Counties have had limited success producing promising well in the area, and current wells in the region are being sealed due to declining production and the outlook for future wells is limited. Even though, the City and BWWB should monitor the practice in the region (as well as in other locations) and, if necessary, support state efforts to protect drinking water sources from chemical.

ACTIONS

1. Work to remove local streams from the 303(d) list of impaired waters.

Section 303(d) of the federal Clean Water Act requires that each state identify those waters that do not currently support designated uses and to develop a TMDL (total maximum daily load) plan for impaired streams. Village Creek and Valley Creek are the most important city streams on the list. Different segments

of Village Creek are listed for Draft TDML plans in 2014 and 2019, and Valley Creek is listed for 2019. Urban runoff and storm sewers are among the sources of pollutants and they can be mitigated by implementation of stormwater-management programs that reduce runoff and stormwater entering the streams.

2. *Work to reduce pollutant loading on City Water resources.*

In conformance with the City’s NPDES permit, focus water quality monitoring on the elimination of pollutants and deduction of pollutant loadings on City water resources.

C. Use green infrastructure best practices, as feasible, in City capital improvement projects, as well as consider incentives for private development.

To demonstrate the effectiveness of green infrastructure design techniques and to integrate them into the local engineering and design practices, the City should incorporate best practices in sidewalk and street improvements and create a pilot program to convert selected “gray” stormwater facilities to green systems. The pilot program can initially focus on public infrastructure, such as concrete swales and drainage facilities along streets and in City parking lots. The program can also include retrofitting drainage facilities on private property through partnerships and grants. Because green infrastructure can reduce pollutants entering local streams, the BWWB would be a logical partner for carrying out a pilot program.

The program should execute multiple demonstration projects each year that may range in size and complexity from bioretention in city parks to green roof conversions on City buildings. The floodplain manager with assistance of planning, engineering and public works personnel should identify retrofit projects in locations where there are known flooding or drainage problems.

The Cawaco Resource Conservation and Development Council provides funds annually through its challenge grant program to municipalities and nonprofit organizations for community improvement projects that incorporate LID and green infrastructure programs.

ACTIONS

1. *Create a green infrastructure program as part of the City’s street and sidewalk improvement plans.*

The infrastructure bond approved by voters in 2012 will include street improvement plans. Street and sidewalk improvements should be designed to include best practices in stormwater management, such as bumpouts with rain gardens and bioswales, where appropriate, to promote natural drainage. (See Chapter 13 for more information.)

2. *Incorporate green infrastructure best practices in implementation of the 2012 TIGER grant and implementation of the Red Rock Ridge and Valley Trail System.*

3. *Create incentives to promote green infrastructure (low-impact) development for Private Development.*

Economic Development Department and Stormwater Management Division work in partnership with the development community to establish offset credits by ordinance to promote economic development that helps to improve water quality in Birmingham.

D. Getting Started

ACTIONS	RESPONSIBLE PARTY
Audit and amend zoning and subdivision regulations to enable conservation developments, incentivize reinvestment in existing communities and encourage low-impact design (LID) techniques in site plans and subdivision designs.	PEP; Planning Commission, City Council.
Identify locations for and implement a pilot phytoremediation program to clean and adaptively reuse contaminated sites for interim and/or permanent open space uses.	PEP; Public Works (Horticulture and Urban Forestry Division); ADEM; Cawaco RC&D.
Identify sites for green-infrastructure demonstration projects and a pilot green-infrastructure retrofit program, including sites with repetitive, localized flooding.	PEP (Floodplain Division); Public Works, BWWB; Cawaco RC&D.