

ENVIRONMENTAL INFRASTRUCTURE ACTION STRATEGY PLAN

CITY OF BOWIE



Approved by Bowie City Council

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PART I - INTRODUCTION

Introduction

The City of Bowie is located in the east-central portion of Prince George's County, Maryland, comprising approximately eighteen (18) square miles, with an estimated population of 56,000. There are nine (9) public elementary schools, two (2) middle schools and one (1) high school within the City corporate limits. Bowie State University, a premier Maryland educational institution, is adjacent to the City's northern boundary.

The City has adopted a Green Building, Low Impact Development and Conservation Landscape policy. This policy has assisted the City in again being awarded the Chesapeake Bay GOLD Award, enables the City to leverage grants for capital improvement projects and allows the City to further comply with and further the goals of the Chesapeake Bay 2000 Agreement. Grant awards generally require public education and outreach, as does the National Pollutant Discharge Elimination System (NPDES). In order to comply with these requirements, the City has developed the Green Page on the City's web site and the GREEN Initiatives: Public Information and Presentation Series.

The City of Bowie has received a grant from the Maryland Department of Natural Resource's Coastal Communities Initiative grant program to contract for an assessment of the data compiled in the Western Branch and Upper Patuxent WRAS Plans, merge a variety of data into the Bowie Green Infrastructure Network Map and develop an action plan that will coordinate all pollution preventing, environmental stewardship projects, including land acquisition and forest mitigation, with the City Council's approved Green Infrastructure (GI) Strategy Plan. The City has partnered with the Maryland Department of Natural Resources to utilize their technical expertise in creating an action plan.

The Plan was created with input from a Steering Committee comprised of six (6) City residents, City staff members and the grant-funded consultant, Environmental Resources Management (ERM), Inc. of Annapolis. A Public Forum was held on June 6, 2007, and a public informational session with City Council was held on August 1, 2007. On September 4, 2007, a Public Hearing was held at which time a summary of all public comments regarding the plan were made available along with staff responses.

PART II - BACKGROUND AND PURPOSE

Background

There are twelve (12) sub-watersheds in the City that are part of two (2) larger watersheds: the Upper Patuxent and the Western Branch. The Patuxent River defines the City's eastern boundary. To the north lies the Patuxent Wildlife Research Center, part of the National Wildlife Refuge system. To the east lies Prince George's County's Patuxent River Park, an extensive passive recreation system comprised of more than 6,000 acres of natural area containing valuable natural and historical resources. These resources are governed by a "limited-use" policy permitting activities that are compatible with the natural environment and preserving the scenic character of the river exclusively. To the southwest, the City is bordered by the Belt Woods Natural Environment Area, a designated State "Wildland". Additionally, national and regional trail systems thread through Bowie and nearly 1,000 acres of publicly owned parks and open space exist throughout the City and the immediate surrounding area.

In an effort to connect and enhance the existing greenway corridors, protect biological diversity in the City and encourage the retention of wildlife habitat on sites at the predevelopment stage, the City Council approved a policy plan, the *Green Infrastructure (GI) Strategy Plan* in 2003. The Plan includes a GI Network Map that takes into account existing natural resources within the jurisdiction that create habitats that are conducive to supporting diversified wildlife. The *GI Strategy Plan* is a tool used by city planners during the development review process to ensure that natural habitat areas are protected, unified and expanded and that the protection and management of Green Infrastructure becomes a primary public investment. Given that the City is adjacent to the Patuxent River and surrounded by significant greenway hubs, the importance of land use management in relation to preserving and enhancing the integrity of existing natural resources cannot be overstated.

The 2003 Bowie *GI Strategy Plan* goals include:

- ⇒ Protection of biological diversity,
- ⇒ Improvement of water quality,
- ⇒ Improvement of air quality,
- ⇒ Enhancement of existing wildlife corridors and hubs, and
- ⇒ Increased protection of open space.

The Bowie GI Network Map identifies hubs (or large 'green' areas) and corridors (or connections linking the individual hubs to one another). The Bowie GI Network furthers the emphasis on environmental conservation found in State and County plans by presenting a micro view of the local sub-watershed areas.

The Bowie GI Network differs from the State and County networks primarily in magnitude. The State of Maryland 2000 Greenprint Program identified green corridors

with a minimum of 1,100 feet in width and green hubs with a minimum of 2,000 acres in size that contained state-significant plant and animal species and sensitive natural areas. Prince George's County's 2005 *Green Infrastructure Plan's* GI Network identified corridors with a minimum width of 200 feet wide in the Rural and Developing Tiers. 'Hubs' in the County plan were referred to as 'Special Conservation Areas'.

The Bowie *GI Strategy Plan* identified hubs with a minimum of 100 contiguous acres and included 'working lands', such as farms and timber forests. In addition, the Bowie plan identified smaller 'nodes', contiguous areas of 5 to 100 acres in size that are predominantly undeveloped and have more than one natural resource characteristic. The Bowie corridors, or 'linkages', have a minimum width of 50 feet and include the WB&A trail, A-44 R-O-W, and the PEPCO R-O-W. The A-44 linkage is a maximum of 300 feet wide and the PEPCO linkage is generally 250 feet wide. The other linkages consist of smaller perennial and intermittent stream valleys and their adjacent flood plains and wetlands.

In addition to hubs and corridors, the County plan identified network 'gaps', which were essentially areas critical to the connection of corridors and hubs. These areas are not protected and could, if lost to development, negatively affect the overall functioning and connectivity of the network. The Bowie GI Network has been updated as part of this plan and now identifies network 'gaps' that could be acquired to preserve and improve the integrity of the Network.

The GI Network is critical to the environmental health of the local area. As woodland is protected and enhanced and streams are restored, air and water quality improves as does habitat for local fauna and flora. The direct result of implementing the plan is an improvement in the overall water quality, air quality, and habitat of the area. This results in a livable community with a high quality of life that is attractive to businesses that want to locate in the area.

Following approval of the original GI plan, the City produced a Forest Mitigation Sites Inventory. Since the Inventory did not originally prioritize potential mitigation sites in order to protect and preserve environmentally sensitive sites, the City completed an update in 2006, re-evaluating the previously approved list of forest mitigation sites for the presence of environmentally sensitive areas and the potential for preservation under easement. Sites that were assessed and determined to be environmentally sensitive areas will now receive priority for afforestation/ preservation and, with woodland conservation easements (WCEs), will remain woodland in perpetuity. The acreage proposed for afforestation in the Forest Mitigation Sites Inventory will provide an increase in the City's urban tree canopy, currently estimated to be 24%.

The original *GI Strategy Plan* does not include an implementation strategy for enhancing the green infrastructure corridors throughout the City. The Plan advocates that low impact stormwater management techniques and conservation landscaping be used in order to reduce the environmental impacts of and preserve habitat areas at development sites. To update the 2003 *GI Strategy Plan*, the City set out to create an

action oriented plan, building on the information available from the Watershed Restoration Action Strategies (WRAS) performed for the Upper Patuxent and Western Branch watersheds and other resources that would assist in revising the *GI Strategy Plan's* Network Map.

Environmental Infrastructure

In 2002, Prince George's County approved a General Plan to guide future growth and development in the County. The General Plan's Environmental Infrastructure Element identifies goals, objectives and policies for a broad range of environmental considerations, including green infrastructure. The County's Environmental Infrastructure Element specifically includes policies for sustainable, livable communities that are intended to protect and enhance green infrastructure, preserve ecological functions, provide for energy conservation, reduce light and noise pollution and encourage environmental stewardship.

Early in the process for this planning effort, it became apparent that there was a need to focus the action plan on topics much broader than green infrastructure. Thus, the concept of a City Environmental Infrastructure (EI) Action Strategy Plan was developed. There are many actions the City has already taken to improve the City's Environmental Infrastructure, including the following:

Air Quality:

- As a partner in the Rebuild America Program, the City has conducted an energy audit of various municipal facilities and identified where and how energy consumption may be reduced.
- The City has purchased alternative fuel vehicles.
- The City has a contract with Fleet Pro to provide preventative maintenance on all City vehicles and equipment.
- The City recommended conditions of approval for several large projects that required implementation of carpool and shuttle bus programs to address traffic congestion.
- The City encourages carpooling by participating in the Council of Governments' (COG) Ridefinders Network.
- The City participates in COG's Climate Protection Initiative by being a Clean Air Partner.
- The City runs its own shuttle bus system serving senior citizens.
- The City has adopted by resolution a policy mandating that all municipal projects incorporate Green Building and renewable energy when feasible.
- The City plans to install an eco-roof at the new Parks and Grounds facility, which is slated to receive Leadership in Energy and Environmental Design (LEED) certification from the US Green Building Council.

Natural Resources:

- The City has adopted a Green Infrastructure Strategy Plan that identifies environmentally sensitive land in the City.
- The City developed Wildlife Habitat Management Guidelines that encourage protecting and enhancing environmental resources within the City.
- The City's forest mitigation program gives developers the opportunity to afforest city-owned property in order to meet off-site mitigation requirements in the City.
- The City has more than 17,000 street trees.
- The City's Tree Preservation/Beautification Committee conducts small-scale tree planting activities on an annual basis.
- The City has been designated as a GREEN Community, PLANT Community and Tree City USA.

Solid Waste:

- The City collects recycling at curbside once weekly.
- The City collects yard waste to be composted on a regular basis.
- The City collects leaves at curbside every fall.
- The City de-constructs all city-owned buildings slated for demolition.
- The City incorporates products made from recycled materials in all capital projects as required by the City's Green Building Policy.
- The City operates a drop-off facility for used oil, filters and antifreeze.

Water:

- The City owns and maintains over 50 stormwater management facilities and performs yearly inspections and bimonthly maintenance visits for cleaning and mowing.
- The City follows the State of Maryland guidelines as administered by the Soil Conservation District for new or redeveloped stormwater management facilities. Facilities are engineered for both quality and quantity of water.
- The City has installed grass pavers for surplus parking at the Bowie Mansion to increase retention of stormwater on-site.
- The City has BayScaped the stormwater management pond at Bogley Park to serve as a water quality improvement demonstration project and has become a model site for regional green initiatives tours.
- The City has implemented a program to use magnesium chloride on its historical properties and sensitive areas to minimize the impacts of roadway de-icers.
- A BayScapes demonstration project was implemented behind City Hall as part of a volunteer planting program.
- The City has adopted by resolution a policy supporting the use of conservation landscaping and low-impact integrated stormwater management in the City.
- The City revised its Stormwater Management Ordinance to encourage low-impact development (LID).

- The City plans to develop the Parks and Grounds Facility with low-impact development techniques such as BayScaping and bio-retention cells instead of a typical stormwater retention pond.
- The City plans to install an eco-roof at the new Parks and Grounds facility, which is slated to receive Leadership in Energy and Environmental Design (LEED) certification from the US Green Building Council.

Waste Water:

- The City implemented Nutrient Removal Technology (NTR) measures at the Bowie Waste Water Treatment Plant and became one of the nations' first Biological Nutrient Removal (BNR) Program participants.

Public Outreach:

- The City has developed an informative Green Page on the City's website.
- The City developed and loans a Water Pollution Demonstration Model to the local public schools.

Purpose of this Plan

The purpose of this EI Action Strategy Plan is to provide a strategy for projects, programmatic changes and education that will achieve the 2003 *GI Strategy Plan's* goals, as well as guide future mitigation efforts and acquisition of environmentally sensitive areas within the City. Because the 2006 Forest Mitigation Sites Inventory did not include site enhancement plans that provide cost estimates and schedules that would facilitate project implementation, this will also be accomplished through the proposed EI Action Strategy Plan. Individual enhancement plans will be prepared for all priority restoration sites identified in the EI Action Strategy Plan. These enhancement plans will allow the City to budget for implementation of the Plan on an annual basis.

The City has embarked on this revision of the *GI Strategy Plan* in order to take a more active environmental stewardship role by coordinating and consolidating municipal urban forestry, Watershed Restoration Action Strategy (WRAS) and NPDES pollution prevention (P2), clean water, clean air initiatives. The re-mapping of the GI network will allow land management and policy decisions to be made with a more holistic vision. This project encourages managing stormwater runoff with a variety of best management practices that reduces impervious surfaces and increases native habitat, resulting in improved water and air quality within and around the jurisdiction.

With funding and technical assistance from the Maryland Department of Natural Resource's (MDNR) Coastal Communities Initiative grant program, the City contracted the environmental consulting firm, Environmental Resources Management (ERM), Inc. to assist in analyzing the Upper Patuxent and Western Branch WRAS plan data and identifying problem sites, merging it with NPDES, urban forestry, and other relevant data layers, and identifying and prioritizing cost effective feasible tree canopy and/or urban greening restoration, preservation and/or retrofit projects. The results of this

endeavor have produced the EI Action Strategy Plan, which consolidates all conservation/pollution prevention activities and environmental stewardship projects with the City Council's approved *GI Strategy Plan* and serves as the implementation mechanism.

The EI Action Strategy Plan clearly and concisely defines the:

- ❖ Goal and objectives;
- ❖ Activities (tasks) to be conducted to accomplish these goals and objectives;
- ❖ Performance based evaluation plan (Outcomes and Outputs) to assess completion and effectiveness of program;
- ❖ Schedule and budget; and
- ❖ Project management mechanism to oversee project implementation.

This framework then provides the required information for inclusion in the Capital Improvement Program (CIP) and adoption in the annual budget. In this way, organizational commitment is documented and there is a central source for project relevant information that will ensure uniformity and consistency.

PART III - ENVIRONMENTAL INFRASTRUCTURE
ACTION STRATEGY PLAN

A comprehensive approach is needed to preserve, enhance, conserve and restore the remaining ecosystems native to the City, for the benefit of the natural environment and to provide for a sustainable living and working environment for existing and future city residents and workers. The comprehensive approach outlined in this plan, coupled with the City's designated green infrastructure network, form the basis for the environmental objectives, actions, and tasks.

Project Goal

- The goal of the environmental action strategy plan is to establish environmental benchmarks, consolidate the City's conservation/pollution prevention activities and define targeted geographic priorities for conducting cost effective mitigation and/or retrofit projects that preserve, enhance, conserve and restore the natural environment and its ecological functions as the basic component of a sustainable development pattern.

Of particular importance is the City's reliance on utilizing trees to enhance the urban forest in the City. Trees not only improve air and water quality, they also reduce waste by providing shade, which decreases energy usage, and by absorbing water, which decreases stormwater management costs. By increasing the amount of trees located on city-owned land and providing incentives to increase the number of trees located on privately-owned land, the City aims to address established clean air, water and waste reduction benchmarks.

This plan includes actions that are important to sustainable, liveable communities. Preserving ecological functions, providing for energy conservation, reducing pollution, enhancing wildlife habitat, restoring green infrastructure, and encouraging construction that uses green building techniques are essential elements of sustainable communities in the twenty-first century and are addressed in this plan.

Program Approach

The planning program created for this project includes Project Objectives and Outcomes that were detailed in the project description contained in the Request for Proposals (RFP) for consultant assistance.

Project Objectives

Specific Objectives included the following:

1. Assess Municipal Policies and Programs Relevant to Successfully Implementing the Green Infrastructure Plan.
2. Obtain, Correlate and Analyze Existing and New Data.

3. Develop Criteria for Prioritizing Recommendations for: (1) Restoration, Preservation and Conservation Projects; (2) Programmatic Changes; and, (3) Pollution Prevention/Educational Outreach.
4. Develop the Green Infrastructure Action Strategy Plan.

Each Project Objective included numerous tasks to be undertaken by the City or its consultants during the project.

Project Outcomes

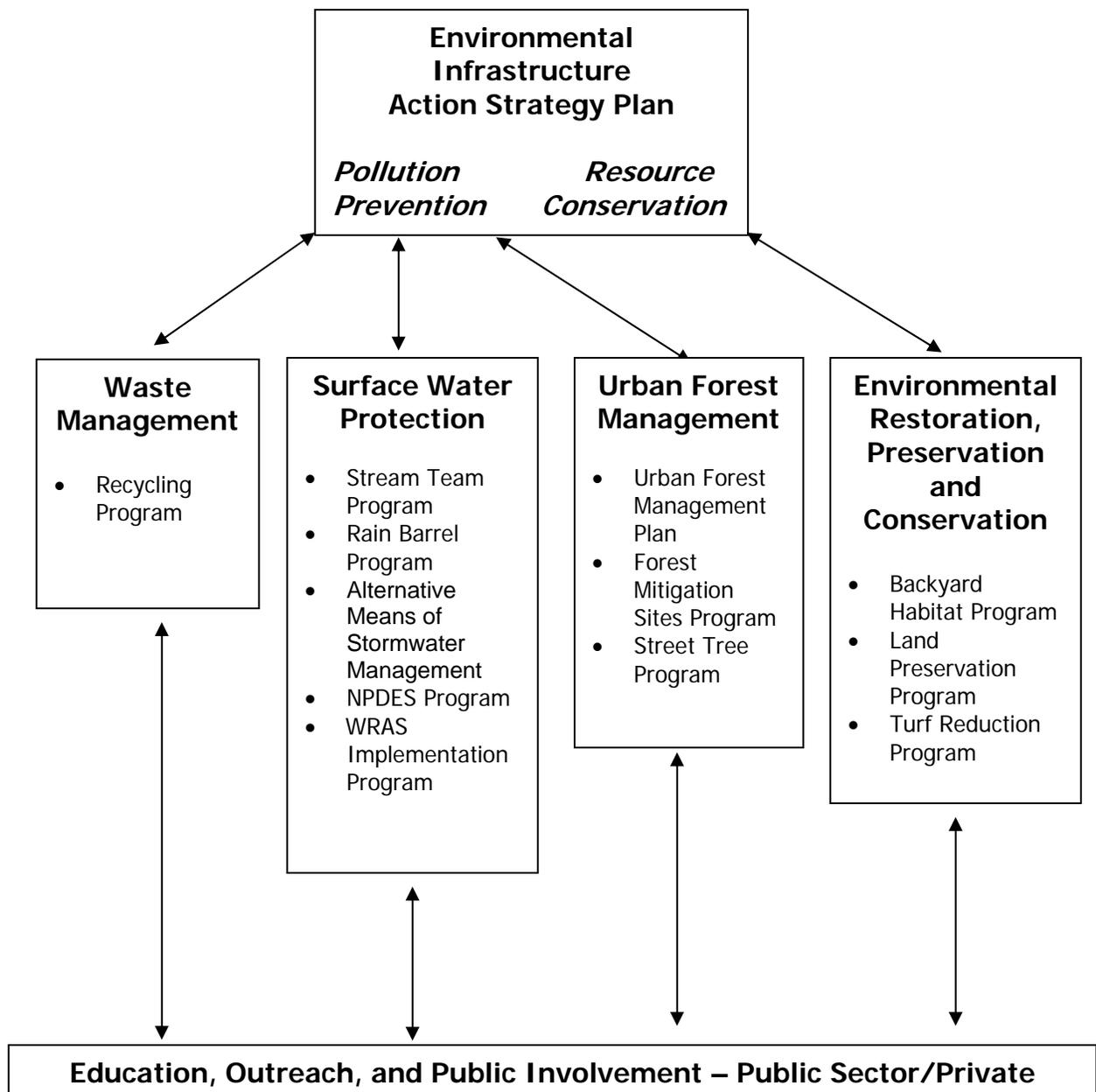
Specific Outcomes for the planning program included the following:

1. WRAS Assessment Report
2. Mapped Data, including a proposed revision to the City's Green Infrastructure Network Map
3. A Leaf-Out Analysis Report
4. A Green Infrastructure Action Strategy Plan, including a ranking system, performance indicators, implementation strategies and a performance measurement system for: (1) Restoration, Preservation and Conservation Projects; (2) Programmatic Changes; and, (3) Pollution Prevention/Educational Outreach.
5. Environmental Enhancement Plans for priority project sites.

An assessment of the WRAS data was conducted by the project consultant and a methodology was created for prioritizing projects. Appendix A is the Assessment Report (which includes Table 1 and 1A). The Assessment Report analyzes WRAS data collected within the City boundaries and highlights the specific conditions and problems found in each sub-watershed. A revised City Green Infrastructure Network Map is included as Appendix B. A list of findings and recommendations by sub-watershed is included as Appendix C. Character profiles and data sheets are included for each sub-watershed. The Performance Measurement System is included in Appendix D. During review of the project, it was discovered that a Leaf-Out Analysis Report could not be generated until satellite imagery for the City is acquired. The Maryland Department of Natural Resources committed to providing the City with the imagery and refined data to be used in a Leaf-Out Analysis effort to be completed within the next year. Environmental Enhancement Plans will be prepared by the consultant upon City Council approval of the EI Action Strategy Plan.

All of the Elements have some aspect of education, outreach and public involvement. These activities have been summarized in the Education, Outreach and Public Involvement Program contained in Appendix E. A "State of the Environment Report" will be produced annually to monitor the progress of each action. Received public comments have been summarized and included in Appendix F. Updates to the EI Action Strategy Plan will be necessary in the future if adequate progress has been made on the actions recommended in this plan and/or to develop additional Action Plans.

Figure 1: Organization of the City of Bowie’s Environmental Infrastructure Action Strategy Plan



Organization of the City of Bowie's Environmental Infrastructure Action Strategy Plan

The City's EI Action Strategy Plan was organized with two (2) primary themes: pollution prevention and resource conservation. Figure 1 represents the conceptual relationship of the four (4) Elements contained in this Action Strategy Plan. Green Infrastructure (GI) is the core of the City's overall Environmental Infrastructure, and programs related to GI are reflected throughout many of the individual Action Plans. In particular, the proposed Land Preservation Program is intended to direct future open space acquisitions to address "gaps" in the City's GI Network.

The EI Action Strategy Plan Elements have been outlined in the following Action Plans, which identify the specific tasks that must be accomplished to complete the Objectives identified for each Plan. Most of the tasks include developing a plan and procedures for each recommended program, using I-tree (a software that will track the performance outcomes of each of the actions), updating the appropriate City budget or CIP page as needed to implement the actions, and providing public education and outreach for each action. Each Action Plan indicates the City departments responsible for performing the task and the dates for beginning and completing the tasks. The Action Plans provide a step-by-step approach for achieving the City's policy goals regarding the environment.

Environmental Infrastructure Plan Elements, Goals, Objectives and Actions

E.I. Component: Pollution Prevention
Element 1: Waste Management
Goal: Reduce resource consumption
Objectives: Increase the tonnage of recyclables from 24% to 50% or more by 2012
Increase the tonnage of grass recycling by 10% by 2012
Increase the number of rebates given by the City to residents using mulching lawnmowers from 30 to 60 per year or more by 2012

Waste management is one way to reduce greenhouse gas emissions and improve cost efficiencies. Preventing waste at the source through thoughtful purchasing can decrease the need for raw materials and energy during manufacturing, transportation and disposal. Procuring cost-competitive products made from recycled materials results in less demand for virgin materials.

Waste reduction and recycling means fewer materials entering the landfill. This reduces emissions in methane, a landfill and greenhouse gas. Reducing waste also means more efficient trash collection services, long term cost savings, extended landfill life, and greater recycling rates and revenues. Each ton of material recycled reduces carbon emissions by nearly 3 metric tons, equivalent to 2/3 the emissions of a typical automobile, or the carbon absorbed by planting 76 seedlings grown for 10 years.

Action Plans:

Improve Recycling in the City (Action Plan 2)

E.I. Component: Pollution Prevention

Element 2: Surface Water Protection

Goals: Engage City residents, businesses and institutions in restoring and protecting the City's watersheds

Improve water quality

Restore flow patterns in streams to mimic natural flows to the extent possible

Objectives: Establish a minimum of 5 active stream teams by 2012

Have at least 6 trained volunteers in each sub-watershed by 2012

Complete investigations of 27 trash dumping sites by March 2008

Install 150 rain barrels by 2012

Implement 3 stormwater retrofit projects by 2012

Encourage installation of 5 green roofs in Bowie by 2012

Install a stream gage in at least 1 stream to measure water flow by 2012

Investigate 213 pipe outfall sites, 37 unusual conditions, 21 exposed pipes, and 13 DPW/ERM fieldwork 5/07 sites by 2012

Begin water quality sampling at specific locations in each sub-watershed by 2010

Install at least 1 continuous stream monitor in a sub-watershed by 2012

By 2012, make one stream habitable by a fish population

Complete investigations of 21 channel alteration sites by Dec. 2009

Complete investigations of 35 inadequate buffer sites by Dec. 2009

Begin testing family-level benthic index of biotic integrity by 2009

Complete investigations of 78 fish barriers by Dec. 2010

Establish new baseline of stream bank length with eroding banks by June 2008

The biggest threats to Bowie's streams are nitrogen and phosphorus, soil erosion, and toxic compounds. The nitrogen and phosphorus can come from burning fossil fuels, sewage, pet waste, and fertilizers. The excess soil derives from land clearing and erosion associated with development. Toxic compounds enter streams from home use, urban runoff, and burning fossil fuels—in our cars and power plants.

The biggest threat to the Chesapeake Bay and the waters that drain into it are too much nitrogen and phosphorus. Agriculture delivers the most nitrogen and phosphorus to the Bay, mainly from excess manure. Pet waste and fertilizers found in suburban to urban centers add to the problem. Phosphorus and nitrogen lead to algae blooms on the water that cloud and starve the water of oxygen. The result is large areas of the Bay that cannot support healthy plant and animal communities. Soil erosion compounds the problem by clouding the water and cutting out light needed by Bay grasses to survive. Heavier particles of soil cover spawning grounds and smother shellfish beds.

The City is already limiting the amount of point pollution produced from the Bowie Sewage Treatment Plant by implementing Nutrient Removal Technology (NTR) measures. The discharge permit required by the State to run the plant includes quantified limits on the amount of nitrogen and phosphorus that can be delivered to the water from the plant. Non-point pollution such as pesticides are found throughout the Chesapeake Bay in concentrations that exceed national water quality standards for aquatic life and wildlife. Toxic compounds accumulate in the food chain affecting the health of animals that consume them. Because of this, health advisories recommend limiting the number of fish we eat from most Maryland waters. In addition, non-point pollution from stormwater damages nearly every creek in a developed area.

We can reduce non-point pollution by implementing alternative stormwater management techniques such as creating rain gardens and bio-retention areas in yards and parking lots, which will cause a shift in how much and at what velocity stormwater enters our streams. We can conserve the water we have by installing rain barrels, which will improve the quantity of water available to the public via public wells. Ground water is the most common source of water supply and salt intrusion from road salt, dry cleaners, on-site septic systems and agriculture are the most common sources of ground water contamination.

We can also reduce the use of pesticides and reduce our exposure to toxic chemicals found in common cleaning products, which will reduce the amount of toxins entering our streams. In addition, we can promote integrated pest management practices and policies that emphasize prevention and non-chemical strategies and use the least toxic chemicals only as a last resort when all other control methods have been exhausted.

Action Plans:

- Develop a Stream Team Program (Action Plan1)
- Create a Rain Barrel Program (Action Plan 4)

Encourage Alternative Means of Stormwater Management (Action Plan 7)
Implement the NPDES Program (Action Plan 10)
Implement the WRAS Program (Action Plan 11)

E.I. Component: **Pollution Prevention**
Element 3: **Urban Forest Management**
Goal: **Improve air quality**
Objectives: **Strive for 40% canopy coverage in 20 years**
 Afforest 20 acres by 2012
 Plant 150 street trees annually through 2012

Cars and trucks pour tons of carbon dioxide, particulates, and cancer causing chemicals into the air every year. Emissions of the three most dangerous cancer-causing compounds found in the air mainly came from cars and trucks. Power plants, incinerators, and industrial operations add more chemicals.

Individuals, businesses and government can reduce air toxins in several ways. We can purchase low-emission vehicles, which also save consumers money because they are more efficient to run. We can encourage telecommuting, carpooling, biking and walking to reduce the amount we drive. In addition, we can increase the energy efficiency of our appliances at home and work, which will reduce the demand on energy from power plants, thus reducing the amount of air toxins emitted. We can reduce both greenhouse gases and pollutants by steadily reducing our use of fossil fuels. We can also invest in clean renewable sources of energy such as solar, geothermal and wind power.

We can increase our urban forest tree canopy, which will help filter the air, protect the watershed and remove carbon from the atmosphere (carbon sequestration). Trees absorb carbon dioxide so increasing the urban tree canopy reduces concentrations of greenhouse gases present in the air. The average Maryland home requires 103 trees to offset its carbon dioxide emissions. Forests improve the health of citizens by capturing, filtering, and retaining water and absorbing pollution from the air. In addition, streamside forests and wetlands can reduce the nutrient and sediment contamination in runoff by as much as 90 percent.

Action Plans:

Complete the Urban Forest Management Plan (Action Plan 5)
Implement Street Tree Program (Action Plan 6)
Implement the Forest Mitigation Sites Program (Action Plan 9)

E.I. Component: **Resource Conservation**
Element 4: **Environmental Restoration, Preservation and Conservation**
Goals: **Restore urban land to a more natural state**

- Objectives:**
- Provide abundant open space and passive recreation land to accommodate existing and planned population growth and preserve environmentally sensitive areas**
 - Increase the amount of and stewardship of wildlife habitat on private property by having a minimum of 150 lots registered by 2012**
 - Complete a Land Preservation Plan by 12/31/09**
 - Decrease the number of acres mowed Citywide by at least 10% by 2012**
 - Reduce turf at 7 sites totaling 7 acres by 2010**

Studies have shown that parks and open space increase the value of nearby properties. So investing in passive recreation area or open space is an investment in the local economy.

Restoring urban land to a more natural state by decreasing the number of acres mowed by the City reduces carbon emissions and also saves the City revenue. Unlike turf, native plants adjacent to stormwater management ponds and streams naturally cleanse water as it is returned to the system thus improving water quality in local streams. Even small, fifteen-foot wide stream buffers with native plants can improve water quality and provide a corridor for wildlife habitat. Native plants are hardy and drought-resistant so they require less water and need little to no care. They are generally easier and less expensive to maintain. Removing invasive plant species from the environment allows natives to flourish and increases biodiversity of flora and fauna in the environment.

Native plants are generally more tolerant of native insects and diseases, thus they require no chemical treatment and are better for the environment. Wildlife habitat is attracted to yards that support native plants and use fewer chemicals. Fewer chemicals in the yard translates into fewer chemicals in the soil and in stormwater runoff from yards, which improves water quality in our streams.

We can develop a program to educate the public of the benefits of not mowing near streams and allowing the forest buffer to increase in size. We can also develop a 'no mow' policy for public lands adjacent to streams and fence the area and erect signage to alert the public and maintenance staff to the purpose of letting a forest develop.

Action Plans:

- Create a Backyard Habitat Program (Action Plan 3)
- Create a Land Preservation Program (Action Plan 8)
- Create a Turf Reduction Program (Action Plan 12)

Individual Action Plans

Action Plan 1

Component: Pollution Prevention
Element: Surface Water Protection
Goal: Engage City residents, businesses and institutions in restoring and protecting the City's watersheds
Objectives: Establish a minimum of 5 active stream teams by 2012
 Have at least 6 trained volunteers in each sub-watershed by 2012
 Complete investigations of 27 trash dumping sites by March 2008
Action: Develop a Stream Team Program

Specific Tasks	Target Dates		Department/Group Assigned
	Begin	End	
Develop a program plan with procedures and goals. Identify and develop youth based volunteer lists.	7/07	9/07	Planning, Public Works
Develop subwatershed forms with inventory and maps based on Consultant work.	6/07	6/07	Planning, IT, Public Works
Develop a Grant Funding Report	9/07	12/07	Grants
Get cost estimates of supplies (garbage bags, gloves, T-shirts, Water Quality Test Kits) needed for each subwatershed.	9/07	12/07	Planning, Public Works
Perform public presentation of subwatershed graphics to solicit additional members for the team.	8/07	8/07	Planning, Public Works
Using I-tree, annually track the tonnage of trash removed in each subwatershed.	5/08	5/12	Public Works, IT
Do public promotion through the media, city newsletter and cable channel.	9/07	12/07	Public Works, Planning, City Manager's Public Information Office
Update the Green Page to include information on subwatershed graphics.	9/07	12/07	Planning, Grants
Develop appropriate Budget page.	1/08	1/08	Public Works
Produce a State of the Environment Report for the City of Bowie with information about tonnage of trash removed from streams.	7/08	7/12	Planning, IT, Public Works

Action Plan 2

Component: Pollution Prevention
Element: Waste Management
Goal: Reduce resource consumption
Objectives: Increase the tonnage of recyclables from 24% to 50% or more by 2012
 Increase the tonnage of grass recycling by 10% by 2012
 Increase the number of rebates given by the City to residents using mulching lawnmowers from 30 to 60 per year or more by 2012
Action: Improve Recycling in the City

Specific Tasks	Target Dates Begin End	Department/Group Assigned
Implement single-stream recycling-- an easy-to-use single cart system.	5/1/2007	Public Works
Using I-tree, annually track the number of recycling buckets distributed in the community and the increase in recycled tonnage in the city.	5/08-5/12	Front Desk, Public Works, IT
Include in appropriate budget page.	1/08-1/08	Public Works
Do public promotion through the media, city newsletter and cable channel.	1/08 - 3/08	Planning, Public Works, City Manager's Public Information Office
Update the Green Page to include information on the progress of the Recycling Program.	6/08 - 6/12	Grants
Develop brochures and a Poster Campaign.	1/08 - 3/08	Public Works, City Manager's Public Information Office
Produce a State of the Environment Report for the City of Bowie with information on waste management.	7/08 -7/12	Planning, IT

Action Plan 3

Component: Resource Conservation
Element: Environmental Restoration, Preservation and Conservation
Goal: Restore urban land to a more natural state
Objective: Increase the amount of and stewardship of wildlife habitat on private property by having a minimum of 150 lots registered by 2012
Action: Create a Backyard Habitat Program

Specific Tasks	Target Dates Begin End	Department/Group Assigned
Create a user friendly GI Network Map per sub-watershed of the City that denotes backyard connectivity to the network	6/07-6/07	IT, Planning
Develop a program plan with procedures and goals.	4/08 - 6/08	Planning, Community Services
Develop a grant funding report.	2/08 - 2/08	Grants
Promote public participation through the media, city newsletter and cable channel.	4/08 - 6/08	Planning
Perform public workshops to show how to create a backyard habitat utilizing an existing school site if possible.	4/08 - 6/08	Community Services
Create a list of local yards that are already certified through other programs and using I-tree, annually track the # of backyard habitats create in each subwatershed.	5/08 - 5/12	Community Services, Planning, IT
Update the Green Page to include information on creating backyard habitats.	6/08 - 6/12	Grants
Develop a brochure that instructs residents on how to create backyard habitats. Make the brochure available on the City website.	4/08 - 6/08	Planning, Community Services
Develop an awards program for exemplary backyard habitats.	4/08 - 6/08	Community Services
Include in appropriate budget page.	2/08 - 2/08	Community Services
Produce a State of the Environment Report for the City of Bowie with information about # of acres preserved.	7/08 - 7/12	Planning, IT

Action Plan 4

Component: Pollution Prevention
Element: Surface Water Protection
Goal: Restore flow patterns in streams to mimic natural flows to the extent possible
Objective: Install 150 rain barrels by 2012
Action: Create a Rain Barrel Program

Specific Tasks	Target Dates Begin End	Department/Group Assigned
Develop program plan with procedures and a demonstration site inventory and map.	7/08 - 9/08	Planning, IT, Public Works
Get cost estimates to disconnect downspouts, install rain barrels and provide signage for the areas.	7/08 - 9/08	Planning, Public Works
Develop a Grant Funding Report.	1/08 - 1/08	Grants
Perform public workshops to show how rain barrels can be installed and how they function. Educate the public regarding mosquito control. Give out rain barrels or vouchers for rain barrels.	7/08 - 9/08	Community Services
Using I-tree, annually track the number and location of rain barrels distributed in the community and the reduction in stormwater runoff per subwatershed.	5/09 - 5/12	Front Desk, Public Works, IT
Do public promotion through the media, city newsletter and cable channel.	7/08 - 9/08	Public Works, Planning, City Manager's Public Information Office
Update the Green Page to include information on how to obtain a rain barrel and the number of rain barrels distributed in the City.	5/09 - 5/12	Grants
Include in appropriate budget page.	1/08 - 1/08	Public Works
Produce a State of the Environment Report for the City of Bowie with information about rain barrels.	7/09 - 7/12	Planning, IT

Action Plan 5

Component: Pollution Prevention
Element: Urban Forest Management
Goal: Improve air quality
Objective: Strive for 40% canopy coverage in 20 years
Action: Complete the Urban Forest Management Plan

Specific Tasks	Target Dates Begin End	Department/Group Assigned
Perform a leaf-out analysis of the tree canopy coverage in the City utilizing up-to-date satellite imagery.	1/08 - 12/08	IT, MDNR
Develop benchmarks for tree canopy coverage in the City and in City Parks with a target date.	12/08-12/08	Planning, City Council, Community Services, Public Works
Develop program plan chapter with procedures and goals.	10/08 - 12/08	Planning, Community Services, Public Works
Develop a Grant Funding Report	1/08 - 1/08	Grants
Do public promotion through the media, city newsletter and cable channel.	10/08 - 12/08	Community Services, Planning
Perform public workshops to show how to successfully plant a tree. Give out trees or vouchers for trees.	10/08 - 10/08	Community Services
Using I-tree, annually track the number of trees planted in each sub-watershed.	5/09 - 5/12	Community Services, IT
Update the Green Page to include information on # of trees planted annually.	6/09 - 6/12	Grants
Develop brochures and a Poster Campaign.	10/08 - 12/08	Community Services
Update Urban Forestry CIP Budget page.	1/08 - 1/08	Community Services
Produce a State of the Environment Report for the City of Bowie with information about # of trees planted in the City.	7/09 - 7/12	Planning, IT

Action Plan 6

Component: Pollution Prevention
Element: Urban Forest Management
Goal: Improve air quality
Objective: Plant a minimum of 150 street trees annually through 2012
Action: Implement the Street Tree Program

Specific Tasks	Target Dates		Department/Group Assigned
	Begin	End	
Input all existing street tree data into I-tree Stratum software.	5/07	8/07	Community Services, IT
Develop program plan with procedures and goals.	1/09	3/09	Planning, Community Services
Create an annual report of all trees that will need to be replaced or pruned.	1/09	3/09	Community Services
Generate a list of streets that could use additional street trees and prioritize for the year.	1/09	3/09	Community Services, Planning
Develop a grant funding report.	1/09	1/09	Grants
Develop public awareness through the media, city newsletter and cable channel.	1/09	1/09	Community Services, Planning
Using I-tree, annually track the # of street trees planted in each subwatershed.	5/09	5/12	Community Services, IT
Update the Green Page to include information on # of street trees planted annually.	6/09	6/12	Grants
Update the appropriate budget page.	2/09	2/09	Community Services
Produce a State of the Environment Report for the City of Bowie with information about # of street trees planted in the City.	7/09	7/12	Planning, IT

Action Plan 7

Component: Pollution Prevention
Element: Surface Water Protection
Goal: Restore flow patterns in streams to mimic natural flows to the extent possible
Objectives: Implement 3 stormwater retrofit projects by 2012
 Encourage installation of 5 green roofs in Bowie by 2012
 Install a stream gage in at least 1 stream to measure water flow by 2012
Action: Encourage Alternative Means of Stormwater Management

Specific Tasks	Target Dates		Department/Group Assigned
	Begin	End	
Create a site inventory and map of specific lots in the City where roofs were/can be built or replaced with native plants to form eco-roofs; where turf or impervious surface area was retrofitted with native plants to green parking lots; and where turf or impervious surface area was replaced with native plants to form rain gardens.	12/07	2/07	Planning, IT
Offer 1 annual tour of rain gardens at Woodmore at Oak Creek.	4/09	4/09	Public Works
Using I-tree, annually track the number of eco-roofs, green parking lots, and rain gardens located in each subwatershed.	5/08	5/12	Planning, IT
Update the Green Page to include information on the number of eco-roofs, green parking lots, and rain gardens located in each subwatershed.	6/08	6/12	Grants
Investigate LID retrofit projects as identified in the Upper Patuxent WRAS.	1/08	3/08	Planning, Public Works
Produce a State of the Environment Report for the City of Bowie with information about eco-roofs, green parking lots, and rain gardens.	7/08	7/12	Planning, IT

Action Plan 8

Component: Resource Conservation
Element: Environmental Restoration, Preservation and Conservation
Goal: Provide abundant open space and passive recreation land to accommodate existing and planned population growth and preserve environmentally sensitive areas
Objective: Complete a Land Preservation Plan by 12/31/09
Action: Create a Land Preservation Program

Specific Tasks	Target Dates		Department/Group Assigned
	Begin	End	
Assess existing land acquisition program plan and establish procedures and goals to include a preservation focus.	7/09	9/09	Planning, Community Services
Create a list of private properties that would resolve gaps in the City GI Network.	10/07	10/07	Planning, IT
Prioritize the list based on size, cost, and environmental sensitivity.	7/09	9/09	Planning, Community Services
Develop a Grant Funding Report	1/09	1/09	Grants
Explore the feasibility of placing tree mitigation easements on gaps utilizing the State's Buffer Incentive Program for all gaps adjacent to streams.	7/09	9/09	Planning
Endorse acquisition of all privately-owned gaps in stream valleys consistent with the County's GI Network.	11/07	11/12	Planning, Community Services
Analyze number of acres used for active recreation versus number of acres used for passive recreation in the City.	7/09	9/09	Planning, Community Services
Update land acquisition CIP budget page.	1/09	1/09	Community Services
Using I-tree, annually track the # of acres preserved.	5/10	5/12	Community Services, IT
Update the Green Page to include information on the Land Preservation Program.	6/10	6/12	Grants
Produce a State of the Environment Report for the City of Bowie with information about # of acres preserved.	7/10	7/12	Planning, IT

Action Plan 9

Component: Pollution Prevention
Element: Urban Forest Management
Goal: Improve air quality
Objective: Afforest 20 acres by 2012
Action: Implement the Forest Mitigation Sites Program

Specific Tasks	Target Dates Begin End	Department/Group Assigned
Re-evaluate forest mitigation sites fee annually.	11/07 - 11/12	Planning, City Manager's Office
Separate Forest Mitigation Sites Inventory "high priority" classification (37 sites) into afforestation and preservation components. Create a "highest priority" classification for a smaller number of most desirable sites within each component. Designate DPW and Glen Allen sites as "highest priority".	5/07 - 9/07	ERM Consultant, Planning, Community Services, Public Works
Get Cost estimates for each project	1/09 - 3/09	ERM Consultant
Develop a Grant Funding Report	8/07 - 8/07	Grants
Create the Urban Forestry CIP page.	1/09 - 1/09	Planning
Perform standardized stakeholder meetings on the selected projects.	10/09 - 12/09	Planning, Public Works
Perform FSDs and develop Forest Mitigation Plans for high priority sites, showing priority preservation/afforestation envelopes. Plant afforestation envelopes.	1/09 - 3/09	Consultant, Planning
Establish forest mitigation banking program in cooperation with M-NCPPC to allow credit for afforestation projects.	10/07 - 12/07	Planning
Control phragmites at Sites 4 and 6.	1/10 - 3/10	Community Services
Designate demonstration sites at (1) Site 23, Gallant Fox Park for forest mitigation banking; (2) Site 37, Westview SWM for wildlife habitat; (3) Site 66, Black Sox Swales for SWM functionality; (4) Site 67, Church Road Park; and (5) Site 13, Former Bowie-Levitt STP.	10/09 - 12/09	Planning, Consultant, Public Works, Community Services
Using I-tree, annually track number of acres mitigated in each subwatershed.	5/10 - 5/12	Planning, IT
Develop public awareness through the media, city newsletter and cable channel.	10/09 - 12/09	Planning

Update the Green Page to include information on # of acres mitigated annually.	6/10 - 6/12	Grants
Produce a State of the Environment Report for the City of Bowie with information about # of acres mitigated in the City.	7/10 - 7/12	Planning, IT

Action Plan 10

Component: Pollution Prevention
Element: Surface Water Protection
Goal: Improve water quality
Objective: Investigate 213 pipe outfall sites, 37 unusual conditions, 21 exposed pipes and 13 DPW/ERM fieldwork 5/07 sites by 2012
 Begin water quality sampling at specific locations in each sub-watershed by 2010
 Install at least 1 continuous stream monitor in a sub-watershed by 2012
Action: Implement the NPDES Program

Specific Tasks	Target Dates Begin End	Department/Group Assigned
Develop program plan with procedures and a demonstration site inventory and map.	2/07 - 8/07	Planning, ERM Consultant
Create a citywide database of storm drain outfalls 24" and greater.	4/10 - 6/10	Public Works, IT
Identify pipe outfalls to be inspected and monitored regularly for water quality and identify/eliminate source of pollution where possible.	6/07 - 9/07	Public Works, ERM Consultant
Using I-tree, annually track the number of mitigated illicit discharge sites per subwatershed.	5/10-5/12	Public Works, IT
Collect data sampling downstream of the discharge location at Bowie Gateway Center.	4/10 - 6/12	Public Works
Develop a Poster Campaign.	4/10 - 6/10	Public Works, City Manager's Public Information Office
Update the Green Page to include information on the progress of the WRAS projects.	6/10 - 6/12	Grants
Update the appropriate budget page.	1/10 - 1/10	Public Works
Produce a State of the Environment Report for the City of Bowie with information about the progress of the WRAS projects.	7/10 - 7/12	Planning, IT

Action Plan 11

Component: Pollution Prevention
Element: Surface Water Protection
Goal: Improve water quality in the City's streams
Objectives: By 2012, make one stream habitable by a fish population
 Complete investigations of 21 channel alteration sites by Dec. 2009
 Complete investigations of 35 inadequate buffer sites by Dec. 2009
 Begin testing family-level benthic index of biotic integrity by 2009
 Complete investigations of 78 fish barriers by Dec. 2010
 Establish new baseline of stream bank length with eroding banks by June 2008
Action: Implement the WRAS Program

Specific Tasks	Target Dates		Department/Group Assigned
	Begin	End	
Develop program plan with procedures and a demonstration site inventory and map.	8/07	9/07	Planning, ERM Consultant
Address water quality and habitat problems identified in the Black Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Middle Collington Branch Sub-watershed.	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Green Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Lower Collington Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Upper Collington Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Mill Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Horsepen Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the White Marsh Branch Sub-watershed	9/07	9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Tributary 2 (Overbrook Branch) Sub-watershed	9/07	9/12	Stream Teams, Public Works

Address water quality and habitat problems identified in the Tributary 1 (Saddlebrook Branch) Sub-watershed	9/07 - 9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Tributary 4 (MSTC Branch) Sub-watershed	9/07 - 9/12	Stream Teams, Public Works
Address water quality and habitat problems identified in the Tributary 3 (Millstream Branch) Sub-watershed	9/07 - 9/12	Stream Teams, Public Works
Develop a Grant Funding Report.	1/10 - 1/10	Grants
Develop schematic concept plans for the top ranked projects in each subwatershed with estimated project costs and a feasible implementation schedule.	4/10 - 6/10	Planning, Consultant
Using I-tree, annually track the number of WRAS (Watershed Restoration Action Strategy) stream problems rectified per stream as identified in the WRAS plans.	5/10 – 5/12	Public Works, IT
Develop a Poster Campaign.	4/10 - 6/10	Public Works, City Manager's Public Information Office
Promote public awareness through the media, city newsletter and cable channel.	4/10 - 6/12	Public Works, Planning, City Manager's Public Information Office
Update the Green Page to include information on the progress of the WRAS projects.	6/10 - 6/12	Grants
Develop CIP budget page.	1/10 - 1/10	Public Works
Produce a State of the Environment Report for the City of Bowie with information about the progress of the WRAS projects.	7/10 - 7/12	Planning, IT

Action Plan 12

Component: Resource Conservation
Element: Environmental Restoration, Preservation and Conservation
Goal: Restore urban land to a more natural state
Objectives: Decrease the number of acres mowed Citywide by at least 10% by 2012
 Reduce turf at 7 sites totaling 7 acres by 2010
Action: Create a Turf Reduction Program

Specific Tasks	Target Dates		Department/Group Assigned
	Begin	End	
Develop a program plan with procedures and goals.	7/10	9/10	Planning, Community Services, Public Works
Create a list of specific stormwater management areas in the City where turf can be replaced with low-maintenance native grasses, shrubs, and trees.	6/07	7/07	Consultant, Planning, Community Services, Public Works
Prioritize the sites based on the WRAS findings.	8/07	8/07	Planning, Consultant
Develop a Grant Funding Report	1/10	1/10	Grants
Develop public awareness through the media, city newsletter and cable channel.	7/10	9/10	Planning, Community Services
Perform standardized stakeholder meetings on the selected projects.	7/10	9/10	Planning, Community Services, Public Works
Develop and approve a 'no-mow' policy for approved areas on the list.	7/10	9/10	Planning, Community Services
Using I-tree, annually track the number of acres converted from grass to native plants in each sub-watershed.	5/11	5/12	Community Services, IT
Update the Green Page to include information on # of acres converted annually.	6/11	6/12	Grants
Update CIP budget page to include fencing and signage	1/10	1/10	Community Services

Possibly land-bank the number of acres converted from grass to native trees for future off-site mitigation purposes.	7/10 - 9/10	Community Services, Planning
Conduct a feasibility study for converting other grassy areas in the City.	7/10 - 9/10	Community Services, Planning
Produce a State of the Environment Report for the City of Bowie with information about # of acres converted.	7/11 - 7/12	Planning, IT