Theme 6: Environmental Assets

Vision

Water Supply

As clearly seen in the 2002 drought, water is the lifeblood of the Town. While the Town's citizens took heroic steps to augment the Town's water supply in 2002, major steps remain to be taken to secure an adequate water supply for the future. As an alternative to the Rapidan River, a drainage basin for a water supply reservoir to serve the western portion of the County should be identified and developed as a long-term water supply.

Rapidan River 2002 Drought Conditions

Drainage

The Town will manage rainfall at the source to mimic a site's predevelopment hydrology. Low Impact Development (LID) design will be used to infiltrate, filter, store, evaporate, and detain runoff to reduce

flooding and provide adequate groundwater base flow to support native in-stream aquatic life in surrounding streams. The Town will also take steps to begin to manage storm water in a more comprehensive manner.

Trees

Orange will become a Town admired for its tree-lined lanes, roads, sidewalks, and parking areas that compliment the grounds of Montpelier. Tree planting and maintenance programs will be developed to increase tree cover throughout town.

Air

We will seek health and environmentally-compatible commerce and in-town transport systems that facilitate biking and walking. We assume responsibility for whatever portion of our air quality is derived from local human activity.

Open Space

Parks and open space should be interspersed throughout Town and within easy walking distance for every Planning Sector. Open space should accommodate a variety of recreational uses, including recreational games (soccer, basketball, etc.), outdoor sports (biking and hiking) and more passive activities such as picnicking and bird-watching.

Environmental Setting

The Southwestern Mountains and associated northeastern ridge bisect the Town, dividing it into the Rapidan-Rappahannock River watershed to the north and the North Anna-Pamunkey-York River watershed to the south. The Town is enclosed by hilly terrain, which opens into fan-shaped corridors of gently rolling terrain to the northwest and southeast. Town elevations range from 420 feet to 620 feet.

One hundred-year flood plain maps prepared by the Federal Emergency Management Agency indicate that no properties within the Town limits or adjacent areas are considered to be subject to major flooding. However, to an increasing degree, lands along Spicer's Mill Road are becoming increasingly susceptible to flooding from small storms.

The majority of land within the Town limits has slopes of 15 to 25 percent. The Town is hilly and in limited area, particularly in the western part of Town, do contain slopes greater than 25%.

The soils within the Town generally fall within the Davidson Association as classified by the Department of Agricultural Soil Conservation Service in 1971. These soils generally present few limitations and are considered suitable for the types of development expected within the Town. It should be noted that the SCS survey is general in nature and is not meant to reflect specific site conditions. It is possible that some sites may contain soil conditions that limit development potential or suitability.

Goal EA1: Develop the Town within available water resources capacity.

Analysis:

Overview

Within the vicinity of the Town of Orange are three potential types of water supply resources:

- Rapidan River
- Groundwater
- Impoundment

The first of these three is the only currently developed source. The following discussion will provide a basic review of the availability of the river, and potential for groundwater and impoundment development. Additional information on the planning and construction of a new impoundment is found in Theme 2: Infrastructure.

Rapidan River Monthly Mean Stream Flows

The nearest gauging station on the Rapidan River for the Town of Orange is USGS #01667500, approximately 8.5 miles south of Culpeper and east of Orange. This station is used by DEQ to set various withdrawl limits for the Town. Data from this station are available from 1930 to the present.

A review of the data coupled with observations of the river show that streamflows are lowest from July-October. Figures 14 and 15 below show monthly mean flows for July-October for the complete period of record (1930-2003). The data reveal that low flows are a frequent occurrence. Note: Flow is portrayed on a logarithmic scale.

In 2002, DEQ set a mandatory conservation threshold limit of 44 cubic feet per second for a rolling average of 14 days. 18 times during this period of record, the monthly mean dropped at or below this threshold.

Figure 14

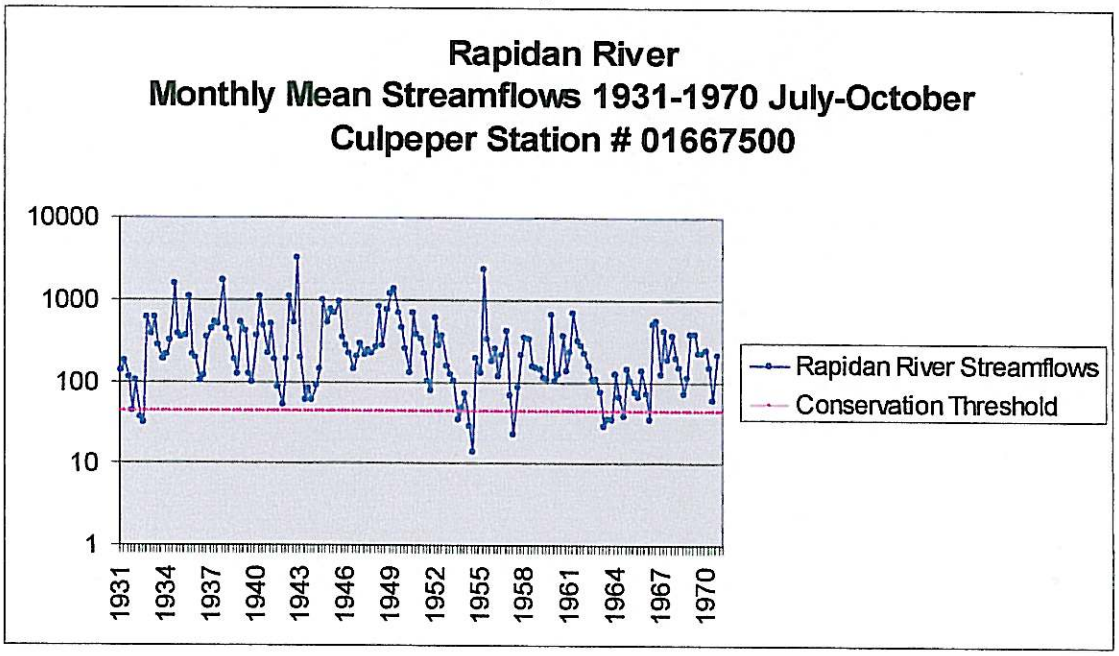
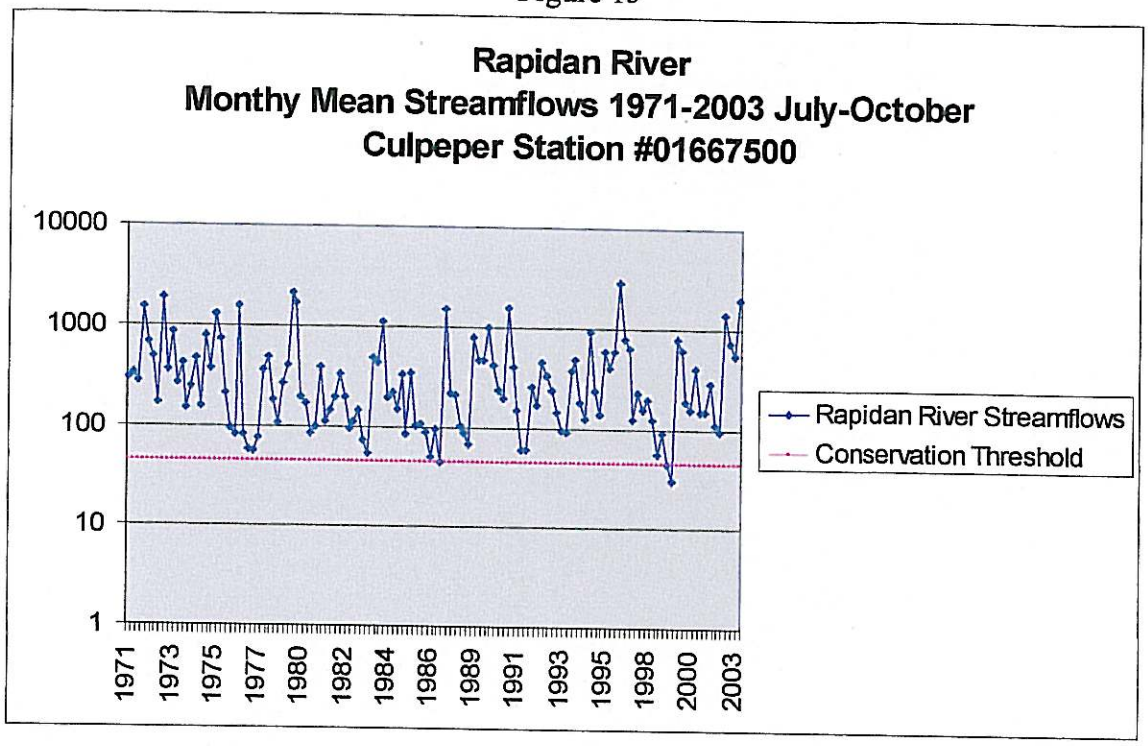


Figure 15



Rapidan River Daily Mean Stream Flows

To provide a more detailed portrayal of the flow characteristics of the river, daily mean flows (in cubic feet per second (cfs)) for July-October are shown for 1932, 1960, 1999, and 2002. 1932 and 2002 were selected to portray worst-case drought type conditions. 1960 and 1999 were selected to show more average conditions. Note: Flow is portrayed on a logarithmic scale.

Figures 16, 17, and 18 reveal that during low flow years, daily mean flows can fall below the conservation threshold for many weeks. During more average conditions, stream flows meet or fall below the conservation threshold for fewer consecutive days.

Figure 16

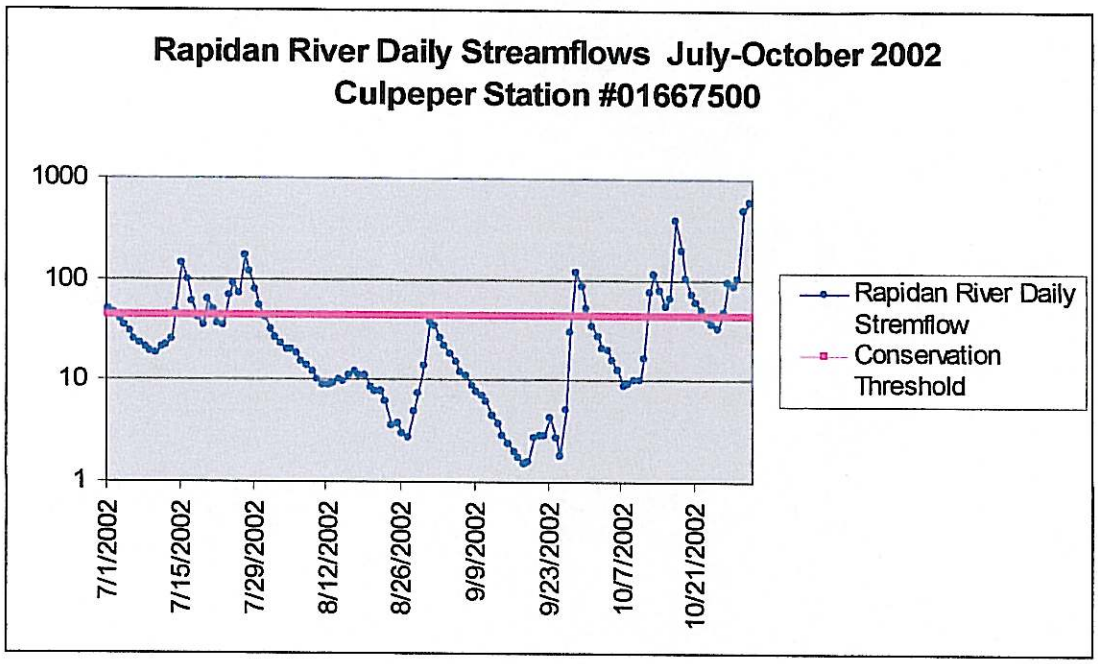


Figure 17

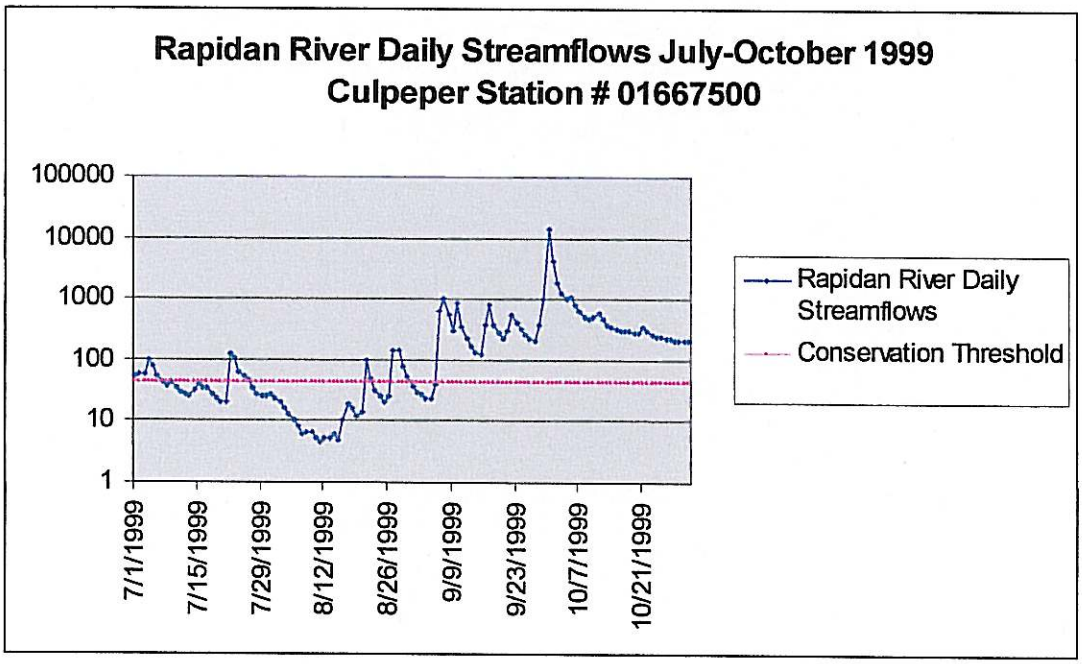
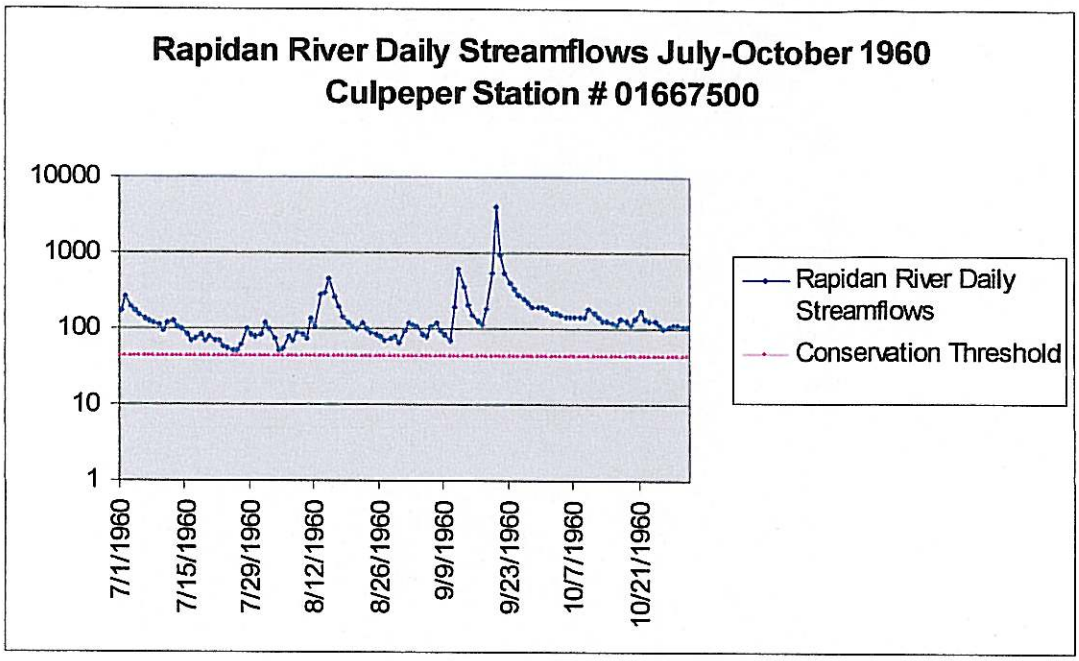


Figure 18



Considering this information, the following can be noted:

- The DEQ Mandatory Conservation Limit was set prior to construction of the Town of Orange Raw Water Strorage Basin.
- The Conservation Limit is based on total yearly water withdrawl by the Town. The total withdrawl in 2004 was 393 million gallons. The Town's permit shows that the limit would increase to 63 cfs should yearly withdrawls increase to 511 million gallons.
- Town withdrawls of water from the river can occur at flows below the Mandatory Conservation limit.
- Mandatory Conservation has significant financial and cultural negative impacts on the Town.

Rapidan River Historic Streamflow Findings

The following are preliminary findings by the Town of Orange staff. More detailed demand-supply studies are needed to better model interactions between river flows, the raw water basin, mandatory conservation limits, and demand.

- Assuming that past trends continue and drought flows are experienced, on the average, once per decade, and that flows below 44 cfs last 30-120 days or more, current supply (raw water basin and river withdraw) could roughly meet demand.

- Significant increases in demand from Gordonsville and the Town of Orange will increase risk of inadequate supply during drought flows.

Groundwater

Rivers of underground water do not exist in the Piedmont of Virginia. Instead, water in the ground is found in fractures (cracks) in and among solid rocks. Average yields for most geologic formations in this area are low, and range from a sustained 1-3 gallons per minute. Yields are variable and are found outside of this range, depending upon the number and size of cracks encountered during the drilling process. Certain geologic formations around the Town have greater tendencies for more favorable fracture zones, the most notable being the Everona Formation, which runs just to the east of Rt. 15 between Gordonsville and Orange.

With the advent of recent water quality regulations, groundwater development on a large scale has become increasingly expensive. However, municipal wells with significant sustained production capacity (in excess of 100 gpm) can provide sufficient efficiencies in unit cost development to be considered a viable water supply alternative.

Impoundment

A surface water impoundment can supply large quantities of water at a low unit construction cost. Due to increasing concerns about the damming of free-flowing streams, however, permit costs are high, and approval from state and federal agencies can take many years.

For many decades, plans have been considered by the Towns of Orange and Gordonsville, and Orange County, to construct an impoundment to serve the western portion of the County. With the advent of recent residential growth in the area, a fresh consideration of a western impoundment is underway, with the County and Towns cooperating on an engineering study to prioritize an impoundment site.

Action EA1.1: Convene a Rapidan River Roundtable to determine short and long-term water quantity and quality constraints for the counties of Orange, Madison, and Greene.

Indicator EA1.1.1:	Rapidan River Roundtable
Benchmark EA1.1.1:	Local governments appoint members from each locality
Progress EA1.1.1:	
Responsible Party EA1.1.1:	Town of Orange Orange County Town of Gordonsville Madison County

Implementation EA1.1.1:	Greene County 2007-2008
Indicator EA1.1.2:	State of the Basin Report
Benchmark EA1.1.2:	Report completed
Progress EA1.1.2:	
Responsible Party EA1.1.2:	Roundtable Members
Implementation EA1.1.2:	2009-2011

Action EA1.2: Complete a Town Water Supply Availability Study.

Analysis:

The purpose of the study is to model future development scenarios in and around the Town and project water demand and availability. The study should also include policy recommendations for each scenario. Portions of this work may be already underway through the Orange-Gordonsville-Orange County Joint Water Supply Study.

Indicator EA1.2.1:	Water Supply Study
Benchmark EA1.2.1:	Study completed
Progress EA1.2.1:	
Responsible Party EA1.2.1:	Town of Orange Orange County Town of Gordonsville
Implementation EA1.2.1:	2007-2008

Goal EA2: Protect the Town's air quality.

Analysis:

Much of the Town's air quality is a product of human activities in other regions and states to our west and south. Locally, however, during a stagnant August day, or in the midst of a neighbor's burning of brush, air quality can be negatively affected. Air quality is, therefore, a by-product of very local as well as regional human activities.

Action EA2.1: Adopt Town Burn Ordinance to regulate in-Town burn practices of residents and contractors.

Indicator EA2.1.1: Burn Ordinance
Benchmark EA2.1.1: Ordinance adopted by Council

Progress EA2.1.1: 

Responsible Party EA2.1.1: Town Manager
Implementation EA2.1.1: 2009-2011

Action EA2.2: Create a Town mulch/leaves and expanded recycling center at the old Town public works facility to help curb inappropriate burning of brush until or unless a better use is found for the property.

Indicator EA2.2.1: Mulch/leaves facility
Benchmark EA2.2.1: Area constructed

Progress EA2.2.1: 

Responsible Party EA2.2.1: Public Works Superintendent
Implementation EA2.2.1: 2009-2011

Goal EA3: Preserve sensitive environmental resources.

Action EA3.1: Identify sensitive environmental features.

Indicator EA3.1.1: Sensitive environmental features map
Benchmark EA3.1.1: Map completed and added to Comprehensive Plan

Progress EA3.1.1: 

Responsible Party EA3.1.1: Town Planner
Implementation EA3.1.1: 2009-2011

Action EA3.2: Implement innovative site planning techniques to protect sensitive environmental areas.

Analysis:

Environmental planning within designated Towns or urban areas is a challenge. The channeling of a higher density of human settlement into any area will have a negative impact on non-human natural systems. These systems primarily include streams and surrounding water recharge areas (often including floodplains) that also include forested corridors and the biological life that lives within them as well as soils on steep slopes. This also includes the topography on which the systems have evolved. The loss of these systems, or "natural infrastructure", has financial, environmental, and social costs. Consistent with the Visions established in this Plan, the Town seeks to protect and enhance these features, wherever possible.

Action EA3.3: Revise zoning ordinance to discourage large-scale grading of the Town's natural, hilly topography, and protect natural infrastructure.

Indicator EA3.3.1:	Amended zoning ordinance to protect topographic diversity
Benchmark EA3.3.1:	1 new development sensitive to topographic variability on site
Progress EA3.3.1:	
Responsible Party EA3.3.1:	Town Planner
Implementation EA3.3.1:	2009-2011

Action EA3.4: Create Town-County Purchase of Development Rights Program.

Analysis:

The premise of this program is that Town residents have a variety of interests in the maintenance of the rural landscape in the County. These interests may include water supply watershed protection, scenic vistas for heritage economic development, passive recreation for hiking and mountain biking, and others. The proposed Joint Proffer Policy, discussed in more detail in Theme 9, may provide a conduit for funds (through proffers) to be provided for areas in which private landowners desire to participate.

Proposed Chesapeake Bay regulations designed to cap nutrient contributions may trigger such a program. It is estimated that by 2010, localities that need to increase sewage treatment capacity will be required to purchase nutrient credits from other

plants or from rural landowners in exchange for non-point source nutrient reduction strategies. This could include the use of conservation easements to protect riparian areas.

Indicator EA3.4.1:	Town-County Purchase of Development Rights Study
Benchmark EA3.4.1:	Presentation of costs and benefits of program to Town and County appointed and elected officials
Progress EA3.4.1:	
Responsible Party EA3.4.1:	Town Planner County Planner
Implementation EA3.4.1:	2009-2011

Action EA 3.5: Create Storm Water Fund to assist landowners with routine property damage from recent (10-20 year) development projects.

Analysis:

Many landowners now experience routine property damage from off-site storm water. Developers that built these projects no longer work in Town, or declared bankruptcy, or, the development's Homeowners Association (HOA) is no longer active or functional. As a result, affected landowners are unable to cost-effectively seek compensation from the responsible party. Funds from the private and public sectors (proffer and special use permit contributions, grants, etc.) would be collected to pay for needed improvements.

Indicator EA3.5.1:	Storm Water Fund
Benchmark EA3.5.1:	$1,00,000.00 in Fund
Progress EA3.5.1:	
Responsible Party EA3.5.1:	State Agencies Town Council Town Planner Non-profit organizations Local businesses
Implementation EA3.5.1:	2009-2011

Action EA3.6: Enforce erosion and sediment control through Town management of E&S program.

Soil Erosion at Orange Estates I

Indicator EA3.6.1:	Town management of E&S program
Benchmark EA3.6.1:	Program approved by Council
Progress EA3.6.1:	
Responsible Party EA3.6.1:	Town Planner Town Manager Director of Public Works Orange County Planning Director
Implementation EA3.6.1:	2009-2011

Action EA3.7: Provide/promote more tree canopy and landscaped areas for soil absorption of water (see Theme 5: Architectural Assets and Aesthetics).

Action EA3.8: Amend zoning ordinance to provide more specific guidance landscape plan requirements, including the need for canopy trees, protection of existing trees from road building, grading, and utility placement (see Theme 5: Architectural Assets and Aesthetics).

Goal EA4: Reduce human health risks from environmental hazardous material threats.

Action EA4.1: Conduct Phase II Environmental Impact Assessment on old public works facility

Indicator EA4.1.1:	Phase II EIA
Benchmark EA4.1.1:	Assessment completed
Progress EA4.1.1:	
Responsible Party EA4.1.1:	Department of Public Works DEQ
Implementation EA4.1.1:	2007-2008

Action EA4.2: Remediate contaminated areas that may exist.

Indicator EA4.2.1:	"Clean" site
Benchmark EA4.2.1:	DEQ standards
Progress EA4.2.1:	
Responsible Party EA4.2.1:	Department of Public Works DEQ
Implementation EA4.2.1:	2007-2008

Goal EA5: Reduce waste.

Action EA5.1:Pick-up recyclables at curbside.

Indicator EA5.1.1:	Study costs and benefits of curbside recyclable program
Benchmark EA5.1.1:	Study completed
Progress EA5.1.1:	
Responsible Party EA5.1.1:	Town Planner Department of Public Works
Implementation EA5.1.1:	2007-2008

Action EA5.2: Maintain drop-off center for recyclables.

Indicator EA5.2.1: Study costs and benefits of curbside recyclable program

Benchmark EA5.2.1: Study completed

Progress EA5.2.1: 

Responsible Party EA5.2.1: Department of Public Works

Implementation EA5.2.1: 2011 and beyond

Goal EA6: Promote water usage conservation.

Action EA6.1: Provide information on water conservation-friendly landscaping and yard maintenance methods in Town newsletter and on public access channel.

Indicator EA6.1.1: Newsletter articles

Benchmark EA6.1.1: 1 per year

Progress EA6.1.1: 

Responsible Party EA6.1.1: Town Manager

Implementation EA6.1.1: 2007-2008

Action EA6.2: Develop rebate programs to encourage residential and business remodeling to include water conserving appliances such as low water usage toilets.

Analysis: Rebate programs are offered by localities throughout the U.S. (http://www.ci.louisville.co.us/PublicWorks/consrvprgm.htm). Residents that install water-saving appliances could be provided a reduction in water bill.

Indicator EA6.2.1: Remodeling water saving appliance rebate analysis

Benchmark EA6.2.1: Analysis completed

Progress EA6.2.1: 

Responsible Party EA6.2.1: Town Planner
Director of Public Works

Implementation EA6.2.1: 2011 and beyond

Action EA6.3: Require low water usage appliances/fixtures in all new construction.

Analysis:

Orange County currently administers the building code for the Town of Orange. Localities throughout the U.S. do require water saving appliances in new construction (http://www.sustainable.doe.gov/buildings/gbcodtoc.shtml).

Indicator EA6.3.1:	New construction water saving appliance analysis
Benchmark EA6.3.1:	Analysis completed
Progress EA6.3.1:	
Responsible Party EA6.3.1:	Town Planner Director of Public Works Orange County Building Official
Implementation EA6.3.1:	2011 and beyond

Action EA6.4: Require water recycling by large water consumption users.

Indicator EA6.4.1:	Large user recycling study
Benchmark EA6.4.1:	Study completed
Progress EA6.4.1:	
Responsible Party EA6.4.1:	Town Planner Director of Public Works
Implementation EA6.4.1:	2011 and beyond

Goal EA7: Protect and enhance identified greenways (see Theme 11: Recreation).

Analysis:

Green spaces cleanse the air and water, control flooding, moderate temperatures, and reduce pollution. Green spaces make communities more livable, produce fresh foods, give context to historic sites and provide space in which to relax and play. Like the region's roads, green spaces are a shared trust, connecting people across political boundaries.

Large areas of contiguous, or "linked," green spaces are particularly important to the region's economy and ecology. Linear greenways provide important habitat for wildlife, buffer streams from pollution and runoff, and create tranquil settings for recreation close to home.

Goal EA8: Reduce the scale of invasive species in Town.

Action EA8.1: Require indigenous (or less invasive) and drought-resistant species on landscape plans submitted to Town.

Indicator EA8.1.1:	Planting of indigenous species
Benchmark EA8.1.1:	Amended zoning ordinance requiring indigenous (or less invasive) species for landscape plans
Progress EA8.1.1:	
Responsible Party EA8.1.1:	Town Planner
Implementation EA8.1.1:	2006

Goal EA9: Protect nighttime dark skies over the Town.

Analysis:

Light pollution is a growing problem in urbanizing communities throughout the world. The ability to live in-Town and see evening stars is as much of an asset as any other described in this Plan. Recent advances in technology allow lighting for residential and commercial purposes to help protect dark night skies and protect public safety with adequate lighting. http://www.darksky.org/.

Action EA9.1: Review lighting portions of zoning ordinance for opportunities to further protect night skies using new technologies.

Indicator EA9.1.1:	Zoning ordinance with provisions to protect night skies and ensure public safety
Benchmark EA9.1.1:	1 new development project with night-sky sensitive lighting.
Progress EA9.1.1:	
Responsible Party EA9.1.1:	Town Planner
Implementation EA9.1.1:	2006

Action EA9.2: Review existing public lighting to retrofit for more night-sky friendly and efficient fixtures (see Theme 2: Infrastructure).

Indicator EA9.2.1:	Existing public lighting examined for retrofit to night sky-friendly technology
Benchmark EA9.2.1:	20% of public lights night-sky friendly retrofit
Progress EA9.2.1:	
Responsible Party EA9.2.1:	Department of Public Works
Implementation EA9.2.1:	2007-2008

Goal EA10: Protect and enhance the health of Town creeks.

Analysis:

Town streams have many values for people and wildlife. These include:

- Drinking water
- Recreation
- Industrial uses
- Transportation
- Ecotourism
- Views and waterfronts
- Floodwater retention
- Agricultural soil deposition
- Aesthetic values
- Cultural values
- Habitats for fish, animals
- Corridors for safer passage
- Water sources

Unfortunately, most communities do not begin to consider the need for stream management until repeated flood events, when they must deal with the costs associated with emergency repairs and the loss of property and sometimes, lives. They fail to realize that the causes of increased flooding and stream damage are often the result of changes to the watershed's land development patterns, which may have modified the hydrologic regime so that storm flows peak higher and faster than before, causing greater in-stream bank erosion, stream bed scouring, and habitat damage.

In this Plan, stream management is considered in two contexts. The first, found in Theme 2: Infrastructure, is primarily based on issues related to stormwater infiltration and detention. The second dimension, found here, is based on stream health, conceived as a systems approach, including morphology, floodplain protection, water quality, etc. Implementation of a systems approach to stream management, in the long-term, is the most cost-effective means to increase density and reduce public infrastructure costs associated with stormwater.

Action EA10.1: Conduct Town creek study.

Analysis:

The first step of stream corridor management is assessment. This Plan proposes a partnership between the Town, state agencies, local non-profit organizations, and local public and private high schools and elementary schools, to undertake an in-Town stream corridor analysis.

Indicator EA10.1.1:	Orange Stream Assessment Program
Benchmark EA10.1.1:	Improvement in stream health of limited section of one of the streams in Town
Progress EA10.1.1:	
Responsible Party EA10.1.1:	Town of Orange Local schools State agencies Local non-profit organizations
Implementation EA10.1.1:	2009-2011

Action EA10.2: Study the costs and benefits of local adoption of advanced Best Management Practices (BMP) regulations.

Indicator EA10.2.1:	Consideration of zoning ordinance change on Best Management Practices
Benchmark EA10.2.1:	Detailed memorandum to Planning Commission and Town Council on costs and benefits
Progress EA10.2.1:	
Responsible Party EA10.2.1:	Town Planner Planning Commission
Implementation EA10.2.1:	2007-2008