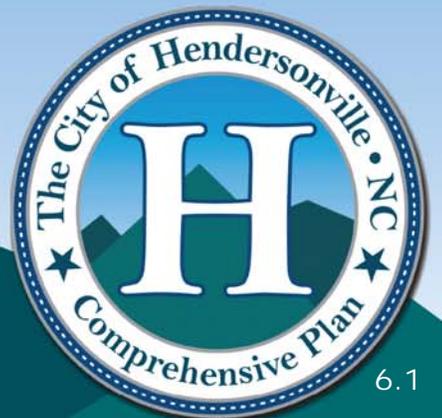


# 6

## Water Resources

- 1. Purpose ..... 6.2
- 2. Issues and Opportunities ..... 6.2
- 3. Goals and Strategies ..... 6.6



## Vision Statement

The City of Hendersonville will ensure a sustainable, high-quality water supply for its residents and businesses while respecting the water needs of communities located downstream. These efforts will support the continued vitality of the City of Hendersonville as well as the region to which its economy and quality of life are linked.

### Section 6.1. Purpose

The Water Resources Element provides policies to maintain and improve the quality of water, stormwater, and wastewater utilities in a sustainable, efficient manner as the community grows.

The primary components of this element include:

1. An analysis of existing water supply and treatment, wastewater treatment, and stormwater management utilities and their respective capacities
2. Recommendations to address existing shortcomings in utilities and services
3. Recommendations to ensure an adequate supply of water and water/wastewater treatment capacity
4. Recommendations to maintain and improve the quality of the City's water supply, as well as the quality of wastewater and stormwater
5. Strategies for Low-Impact Development that conserves water, reduces stormwater runoff and improves stormwater quality

### Section 6.2. Issues and Opportunities

#### Wastewater Treatment

- The City provides wastewater treatment to approximately 6,375 customers inside the City and 2,125 customers outside. Map 6.2a depicts sewer lines and pump stations in the Hendersonville service area.
- The capacity of the City's wastewater treatment plant is 4.8 million gallons per day (MGD) and can be increased to 6.0 MGD. Current average usage is 2.48 MGD.



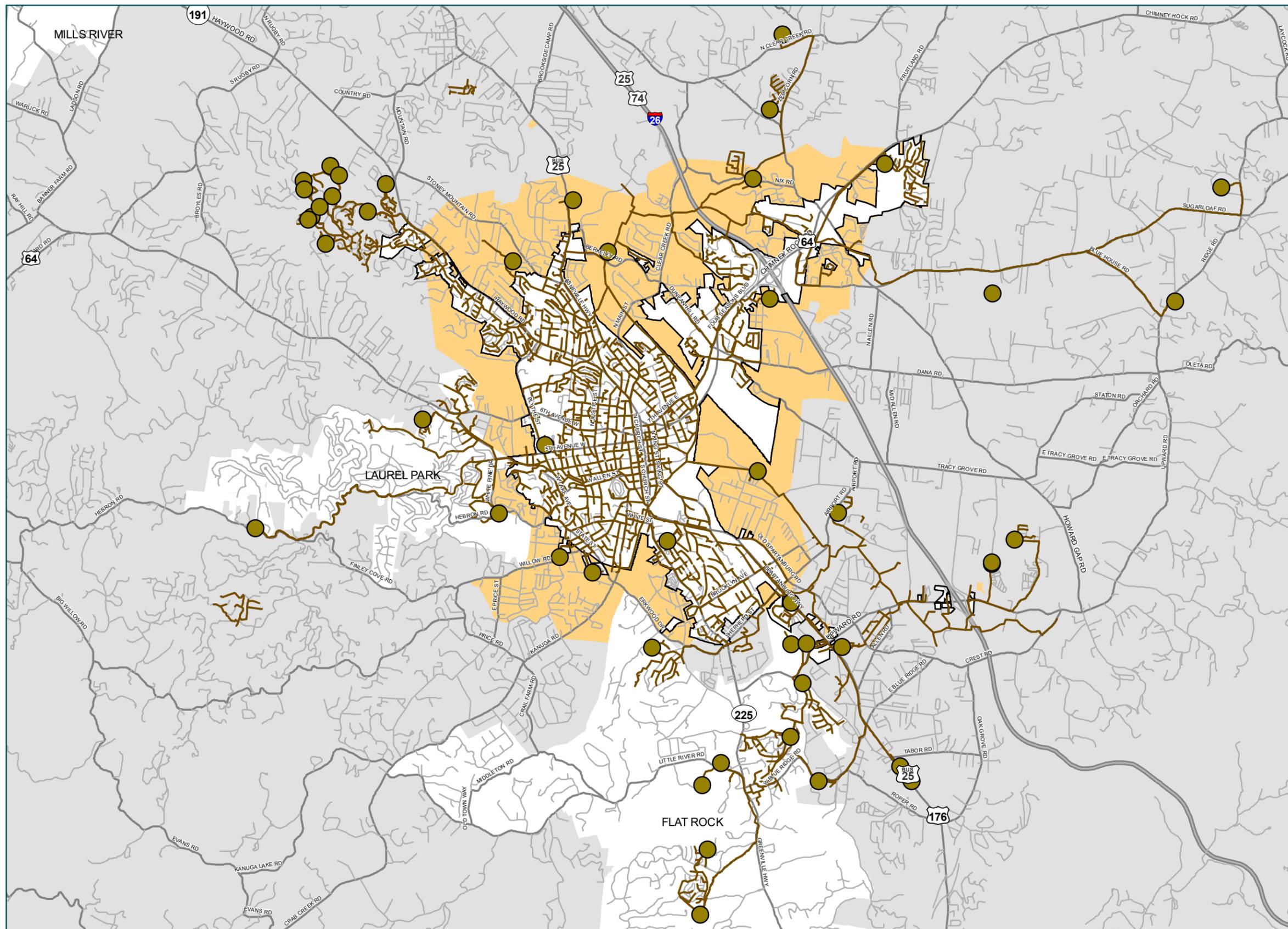
Hendersonville Wastewater Treatment Plant on Balfour Road



Map 6.2a:  
Hendersonville  
Sanitary Sewer System

Legend

- Sewer lines
- Pump Stations
- Hendersonville City Limits
- Hendersonville ETJ



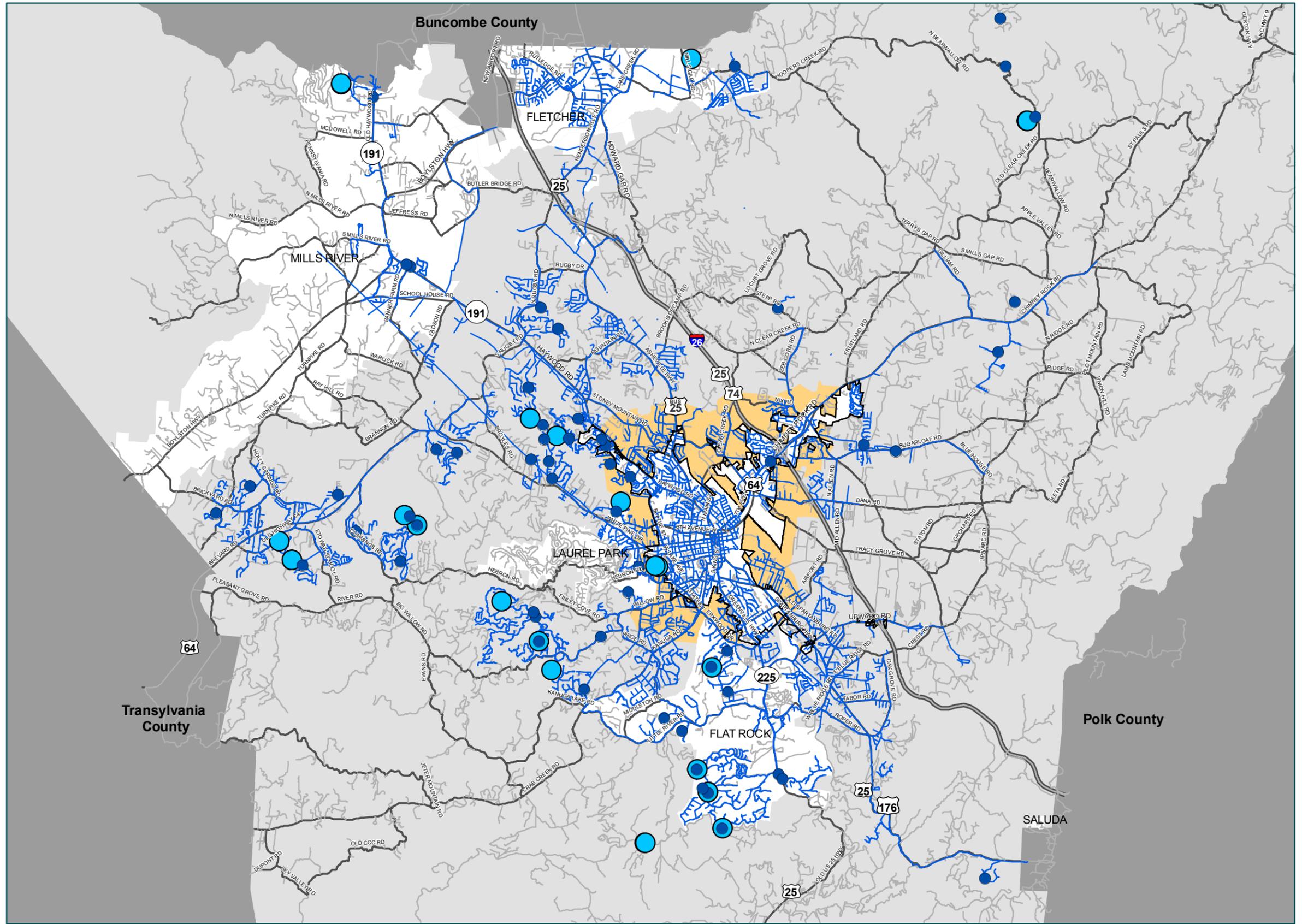
March 2009

Source:  
City of Hendersonville  
Hendersonville County

Map 6.2b:  
Hendersonville  
Water Distribution System

Legend

- Pump Stations
- Storage Tank
- Water Line
- Hendersonville City Limits
- Hendersonville ETJ
- Henderson County



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March 2009

Source:  
City of Hendersonville  
Hendersonville County

- The City will soon develop a wastewater master plan that will look at the system's needs in greater detail and identify necessary enhancements. Enhancements already planned include the Wolfpen/Clear Creek Sewer Interceptor, Shepherd Creek Sewer Outfall, and Jackson Park Sewer Interceptor, which will eliminate a combined total of five City-owned pump stations.

### Water Supply/Treatment

- Hendersonville provides water service to areas inside and outside the City, including service within the municipalities of Flat Rock and Fletcher and several unincorporated areas. Map 6.2b depicts the locations of water lines, pump stations and storage tanks in the Hendersonville service area.
- The City provides water via agreements to the municipalities of Laurel Park (0.2 MGD) and Saluda (0.2 MGD).
- The City's chief water sources are reservoirs in the Pisgah National Forest and the Mills River. Additionally, the City receives one MGD via an agreement with the City of Asheville.
- The City's water treatment plant capacity is 12 MGD, although a planned expansion will increase this to 18 MGD. Current average usage is 7.21 MGD, with peak usage of up to 10.35 MGD.
- Severe droughts in recent years have



Hendersonville Water Treatment Plant on Haywood Road

threatened water supplies across the southeastern United States, prompting frequent and prolonged mandatory water use restrictions.

- Hendersonville's Water Master Plan was developed in 1998 and updated in 2006.
- The City is developing a new raw water intake on the French Broad River that is approximately two miles from the water treatment plant.

### Stormwater

- The City has adopted several measures to protect and manage water resources in order to prevent flood damage, preserve and enhance natural habitat and protect water quality. Examples include:
  - Participation in the National Flood Insurance Program since 1982
  - A Flood Damage Prevention Ordinance in Chapter 24 of the Municipal Code
  - Natural Resource Protection Standards (Article 17 of the Zoning Code), which include provisions for prohibiting or restricting development in the Floodway and 100-Year Floodplain and stream buffer protection standards
  - A resolution of agreement with Henderson County to enforce the County-adopted Soil Erosion and Sedimentation Control Ordinance within the City's planning jurisdiction
  - Acquisition of property for flood storage and stormwater treatment through the Clean Water Management Trust, including 27 acres near the intersection of Greenville Highway, Spartanburg Highway and South Main Street
  - Stormwater management requirements (Section 6-17 of the Zoning Code) and Phase II stormwater requirements (Chapter 24 of the Municipal Code, summarized in Figure 6.2a)
  - A stormwater management program

- Participation in the Western North Carolina Stormwater Partnership
- The City has a National Pollutant Discharge Elimination System (NPDES) Phase II Permit, which was issued in December 2005 and will be effective until November 30, 2010, at which point it will need to be renewed. All NPDES permits are typically issued on a five-year cycle. The renewal of the permit every five years allows for potential changes in technology or regulations.

#### Figure 6.2a: Clean Water Act Phase II Requirements

The federal Clean Water Act requires local jurisdictions to reduce polluted stormwater runoff, and it is implemented in two phases. The first phase addressed large cities and "Phase II" addresses small and medium cities. In North Carolina, the Phase II laws took effect in 2005. According to Hendersonville's website, the "laws require chosen cities to do six things:

- Conduct outreach and education about polluted stormwater runoff.
- Provide opportunities for residents to participate and be involved in conversations and activities related to reducing polluted stormwater runoff.
- Detect illicit discharges (e.g. straight piping or dumping)
- Control construction site runoff.
- Control post construction runoff.
- Perform municipal housekeeping (e.g. take steps to prevent runoff from city buildings and activities).

## Section 6.3. Goals and Strategies

### Goal WR-1.

***Preserve the quality and quantity of the City's water supply.***

#### Strategy WR-1.1.

**Continue to provide water supply and treatment services that meet Hendersonville's needs.**

##### Action WR-1.1.1

Implement the planned expansion of the water treatment plant to a capacity of 18 MGD (million gallons per day).

##### Action WR-1.1.2

Ensure adequate funding for pipe maintenance as the system ages.

#### Strategy WR-1.2.

**Periodically review and update the Water Master Plan in order to identify needed future improvements to Hendersonville's water supply, treatment, and conveyance infrastructure.** Water is a precious resource. Periodic reviews and updates of the assumptions and projections in the Water Master Plan will give the City the information it needs to meet future water needs.

##### Action WR-1.2.1

Monitor the adequacy of the City's water sources given current conditions and updated growth projections.

##### Action WR-1.2.2

Determine whether treatment capacity will be adequate at full build-out of the service area.

##### Action WR-1.2.3

Analyze the condition and capacity of water pipes and determine necessary improvements.

**Action WR-1.2.4**

Provide cost estimates and implementation strategies for all Water Master Plan updates.

**Strategy WR-1.3.**

**Work with responsible jurisdictions to protect the City’s water supply by preserving natural areas adjacent to water sources.** Hendersonville receives its water supply from areas outside the City, so it must work with other jurisdictions to ensure that its water sources are protected.

**Strategy WR-1.4.**

**Encourage water conservation practices in order to moderate the effects of future droughts.** Water conservation will become increasingly important as Hendersonville’s water system grows. Water usage can be easily and inexpensively reduced through several measures. Additionally, green building principles can significantly reduce a building’s water usage without sacrificing occupants’ needs.

**Action WR-1.4.1**

Continue to provide information to residents on simple, inexpensive measures for reducing water usage at home as recommended by the North Carolina Division of Pollution Prevention and Environmental Assistance.

**Action WR-1.4.2**

Develop guidelines for water-efficient landscaping that minimizes the use of municipal potable water for irrigation.

**Action WR-1.4.3**

Promote LEED® (Leadership in Energy and Environmental Design) principles for water efficiency with new development. Strategy NR-3.1 in Chapter 3 provides specific actions by which the City can promote LEED® principles.

**Examples of Water-Efficient Landscaping Techniques**

Planting Techniques

- Drought-tolerant plants
- Xeriscaping

Irrigation Techniques

- Recycled wastewater
- Captured rainwater and site water
- Cisterns



Rain barrel – an example of a technique for capturing rainwater

**Action WR-1.4.4**

Periodically review the City’s Water Shortage Response regulations to ensure they meet the needs of the City during drought conditions.

**Goal WR-2.**

***Understanding that communities and the natural environment located downstream are dependent on clean water, strive to preserve the quality of water as it flows through Henderson County.***

**Strategy WR-2.1.**

**Continue to fund and operate the City’s stormwater management program.**

This program, as required through Phase II of the Federal Clean Water Act, includes the following elements:

**Action WR-2.1.1**

Conduct outreach about polluted stormwater runoff.

**Action WR-2.1.2**

Provide opportunities for residents to participate and be involved in conversations and activities related to reducing polluted stormwater runoff.

**Action WR-2.1.3**

Detect illicit discharges (e.g. straight piping or dumping).

**Action WR-2.1.4**

Continue to require the control of construction site runoff through the permitting and inspection process of Henderson County's Erosion Control Division.

**Action WR-2.1.5**

Continue to require the control of post construction runoff through the City's stormwater regulations.

**Action WR-2.1.6**

Perform municipal housekeeping (e.g. take steps to prevent runoff from city buildings and activities).

**Strategy WR-2.2.**

**Prevent development of floodplains and stream corridors in order to preserve natural drainage patterns and improve the quality of stormwater runoff.** Vegetation along riparian corridors can act as a natural filter for stormwater before it enters a stream and leaves the community. Goal NR-1 provides several strategies and actions for preserving these environmentally sensitive areas.

**Strategy WR-2.3.**

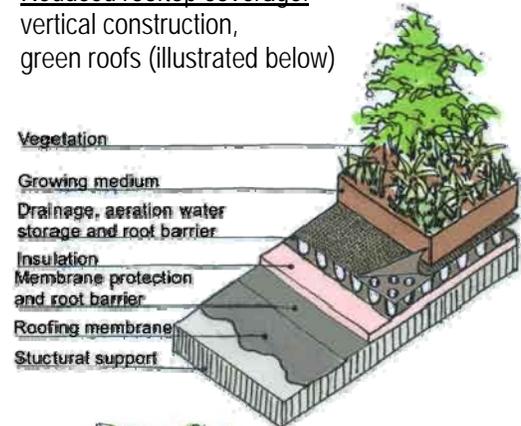
**Enable and encourage Low-Impact Development practices in stormwater management.** Low Impact Design (LID) is an innovative approach to stormwater management that mimics natural hydrological processes and focuses on

both the quality and quantity of stormwater. Table 6.3a and Figure 6.3a compare LID to conventional stormwater management and illustrate examples of LID.

Figure 6.3a: Examples of LID Practices

#### Strategies for Reducing Impervious Areas

Reduced rooftop coverage:  
vertical construction,  
green roofs (illustrated below)

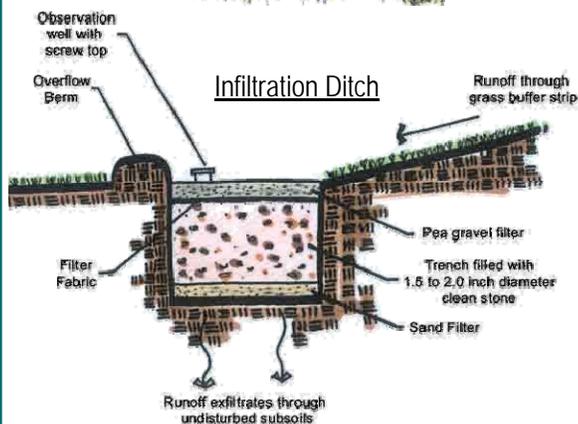
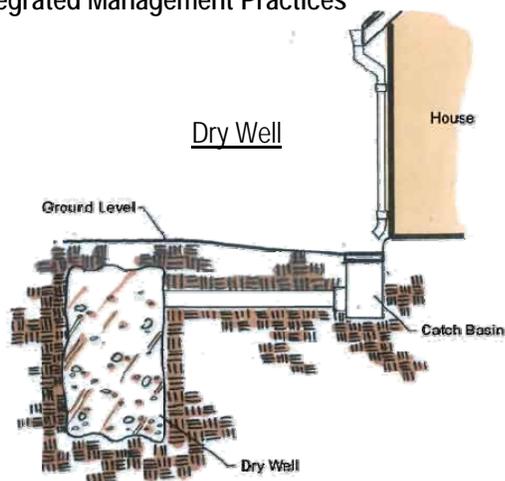


Parking/Roadway/Driveway design: shared driveways, narrower driveway and roadway widths, smaller building setbacks to reduce driveway length, shared parking, porous pavement (illustrated below)



Figure 6.3a: Examples of LID Practices, continued

Integrated Management Practices



Action WR-2.3.1

Educate development review officials about Low-Impact Development approaches.

Action WR-2.3.2

Review public roadway dimensional requirements and revise as necessary to allow narrower street widths on local streets (see Table 6.3b for additional information).

Action WR-2.3.3

Review driveway and parking regulations and revise as necessary to make efficient use of land and reduce impervious surfaces (see Table 6.3b for additional information).

Action WR-2.3.4

Develop design guidelines for Integrated Management Practices (see Table 6.3b for examples) and incorporate them into the stormwater management plan review process as an alternative to conventional stormwater management practices.

Action WR-2.3.5

Develop educational materials that instruct property owners on how to implement and maintain Low-Impact Development features such as bioswales.

Action WR-2.3.6

Promote LEED (Leadership in Energy and Environmental Design) principles for sustainable site design. Strategy NR-3.1 in Chapter 3 includes specific actions for encouraging LEED certification.

Table 6.3a: Comparison of LID and Conventional Stormwater Management

Summary	
<p>Conventional stormwater management practices focus on removing water from a site as quickly and efficiently as possible, using large, centralized, engineering facilities. The goal of LID is to protect the ecological integrity of receiving waters by replicating the natural, predevelopment hydrologic functions of a site. LID manages stormwater in small, cost-effective landscape features distributed throughout a site, in order to manage stormwater impacts at their source rather than at the end of a pipe.</p>	
Comparison	
Conventional Site Development	Low-Impact Site Development
<ul style="list-style-type: none"> <li>• Increase impervious cover and reduce vegetative cover to achieve efficient drainage</li> </ul>	<ul style="list-style-type: none"> <li>• Discourage impervious cover and maximize vegetative cover to reduce impacts and maintain predevelopment hydrology</li> </ul>
<ul style="list-style-type: none"> <li>• Designed to accommodate peak discharges from a design storm (10-year). Increased runoff duration and frequency, and large increases in volume are not controlled</li> </ul>	<ul style="list-style-type: none"> <li>• Control runoff to pre-development conditions for all storms</li> </ul>
<ul style="list-style-type: none"> <li>• Reduced rainfall interception, infiltration, storage and time of concentration; reduced groundwater recharge</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain rainfall abstractions, time of concentration, and groundwater recharge to pre-development conditions.</li> </ul>
<ul style="list-style-type: none"> <li>• Reduced pollution by limited control for storm events that are less than design discharge (i.e. smaller, more frequent storms)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced pollution and full control for all storm events</li> </ul>
<ul style="list-style-type: none"> <li>• Impacts receiving streams with channel erosion and degradation, sediment deposition, reduced base flow, and reduced habitat suitability</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain stream ecology to predevelopment conditions</li> </ul>
<ul style="list-style-type: none"> <li>• Reduces flooding immediately below the control structure, but cumulative impacts can increase flooding</li> </ul>	<ul style="list-style-type: none"> <li>• Controls flooding to predevelopment conditions</li> </ul>

**Strategy WR-2.4.**

**Continue to expand and improve the efficiency of wastewater treatment, while preserving the quality of waterways that receive treated effluent.**

**Action WR-2.4.1**

Develop a Wastewater Master Plan to identify needed improvements to treatment capacity as well as the efficiency of the overall system.

**Action WR-2.4.2**

Implement infrastructure upgrades already planned, including the Wolfpen/Clear Creek Sewer Interceptor, the Shephard Creek Sewer Outfall, and the Jackson Park Sewer Interceptor.

**Action WR-2.4.3**

Continue to work with the North Carolina Department of Environment and Natural Resources to monitor the quality of streams that receive treated effluent.