Overview

The purpose of the Water and Wastewater chapter is to provide information on the water and wastewater services in Chesterfield County. The chapter also provides guidance and direction for meeting the county’s needs based upon the growth and development anticipated by The Land Use Plan chapter.

Currently, needs for water use and wastewater disposal are met primarily by the public water and wastewater systems. Private individual wells and individual on-site septic systems serve some limited development.

Upon adoption of the Comprehensive Plan, a more detailed analysis of the public utility systems will be performed with an update to the Water and Wastewater Facilities Plan. Currently, developers are responsible for bearing the cost of water and wastewater line extensions to serve their development. Developers, however, may receive partial reimbursement for constructing lines as discussed in the “Existing Regulations for Public Water & Wastewater” section. The majority of the county’s public utility systems were built by developers.

Growth will naturally occur where public water and wastewater are available and private development will often dictate where public water and wastewater services are provided. Proper planning will provide for the orderly and efficient expansion of the utility service areas, while limiting other public facilities needed to support development.

**Desired Outcomes of This Chapter**

- Ensure a resilient, reliable and safe public water supply with growth capacity well into the future
- Support an orderly and efficient development pattern
- Ensure a reliable and environmentally compliant public wastewater system with growth capacity well into the future
- Promote wise use and conservation of treated public water through enhanced community education
- Regional cooperation in public water and wastewater provision
- Maintain fiscally fit philosophies and Utilities AAA bond rating while ensuring reasonable water and wastewater service rates
- Aid revitalization and redevelopment of older communities
Public Water and Wastewater

The Department of Utilities (“Department”) operates and maintains extensive water and wastewater systems which include water treatment, storage, transmission and distribution as well as wastewater treatment and collection systems. The county is well positioned to meet current water demands and wastewater flows with sufficient reserve capacity to accommodate the growth anticipated by the Land Use Plan.

The following is an overview of the Department’s operations:

- Funded solely by connection and user fees and not by the general fund.
- One of only three utilities in the country to have a AAA bond rating from the top three credit rating services.
- Lowest water and wastewater user fees in the Richmond area.
- One of a limited number of governmental water and wastewater agencies that has a budgeting structure to fund replacement of aging infrastructure.
- Owns, operates and maintains water and wastewater treatment plants.
- Member of the Appomattox River Water Authority and the South-Central Wastewater Authority.
- Obtains water from three sources—Swift Creek Reservoir, Lake Chesdin and the James River.
- Maintains approximately 1,946 miles of water lines with over 107,000 water accounts.
- Maintains approximately 2,044 miles of wastewater lines with over 90,000 wastewater accounts.
- Agreements with Richmond for water and wastewater services, and Colonial Heights and Petersburg for wastewater conveyance.
- Through an agreement with Powhatan County, provides a maximum of 572,000 gallons of water per day.
- Through an agreement with Gray Land and Development Company, provides a maximum of 180,000 gallons of water per day and 135,000 gallons per day of wastewater service to specific properties in Powhatan.

The operations of the Department’s facilities are permitted and regulated by the Virginia Department of Health and the Virginia Department of Environmental Quality. These state agencies along with other local, state and federal agencies regulate how public water and wastewater systems are constructed and operated.
CHAPTER 12: WATER & WASTEWATER

WATER AND WASTEWATER PLAN

The county’s current Water and Wastewater Facilities Plan, last revised in 2013, addresses county-wide water and wastewater system expansions and upgrades. The Plan specifies improvements to increase the quality and reliability of the systems and to meet demands due to growth. For utility planning purposes, the update will assume a land use scenario consistent with that performed for the Transportation chapter and will assume full development of the county (“build-out”). The build-out scenario assumes that the county will ultimately be fully developed. While the Land Use Plan Map does not anticipate build-out during the lifecycle of this Comprehensive Plan, evaluation of a build-out potential is necessary to establish a foundation for an adequate water and wastewater network should future land uses differ from those recommended for the Rural Residential/Agricultural area. The build-out scenario assumes development based upon the recommendations of the Land Use Plan, except for that area designated for Rural Residential/Agricultural. To plan for possible future growth in the Rural Residential/Agricultural area and the resulting impact on the road network, a land use scenario was developed assuming that at some time in the future public facilities to include public wastewater service would be available to support alternative land uses. More detail regarding the build-out scenario can be found in the Transportation chapter.

The Water and Wastewater Facilities Plan promotes orderly growth and efficient system expansion by using sound engineering practices to ensure future extensions are an integral part of the Department’s overall water and wastewater systems. Once the Comprehensive Plan has been adopted, the Department’s consultant will begin updating the Water and Wastewater Facilities Plan. This technical document assists with the annual review of the Department’s 10-year Utility Capital Improvements Program.

WATER

The Swift Creek Reservoir, James River and Lake Chesdin provide an ample water supply to the county’s citizens. Treated water from these three sources is interconnected, thereby providing a reliable water distribution system. The county owns 105.5 million gallons per day of water capacity from these three sources and has negotiated with the City of Richmond for an additional 5 million gallons per day to increase capacity to a total of 110.5 million gallons of water per day.
Public Water Sources

Swift Creek Reservoir

- Reservoir is approximately 1,700 acres.
- County owns water rights, but the land underneath the reservoir is privately owned.
- Watershed is approximately 40,000 acres with 33,000 acres within the county’s boundary.
- Water is treated at the county’s Addison-Evans Water Production and Laboratory Facility.
- Facility has capacity to provide 12 million gallons of water per day.
- Facility capacity cannot be increased.
- Facility is a state-certified drinking water laboratory, analyzing approximately 4,000 public water samples each month.

In addition to Chesapeake Bay Regulations, specific water quality measures are in place for that part of the watershed within the county boundary. More detailed information is provided in the Environment chapter.
CHAPTER 12: WATER & WASTEWATER

James River

- County purchases treated water from Richmond.
- Water is treated at the City of Richmond Water Purification Plant.
- Richmond owns, operates and maintains the plant.
- Plant has capacity to provide 132 million gallons of water per day.
- As of 2017, county has rights to 27 million gallons of water per day. Currently, the county is in the process of constructing a new water pump station, storage tank, and approximately 4.4 miles of water transmission mains.
- These new facilities will allow the county to efficiently utilize an additional 5 million gallons per day supply it has secured from the City of Richmond.

Lake Chesdin

- Lake Chesdin is approximately 3,100 acres, fed by the Appomattox River and owned by the Appomattox River Water Authority.
- Its watershed is approximately 854,000 acres with 65,500 acres within the county’s boundary.
- Water is withdrawn and treated by the Appomattox River Water Authority (ARWA).
- The water treatment plant is owned by members of the Authority (Counties of Chesterfield, Dinwiddie and Prince George; and the Cities of Colonial Heights and Petersburg).
- The plant has a capacity to treat 96 million gallons of water per day.
- Chesterfield County has rights to 66.54 million gallons of water per day.
Over the past five years, the annual average water usage from each source is as follows:

- Swift Creek Reservoir – 19.74 percent
- James River – 24.12 percent
- Lake Chesdin – 56.14 percent.

The map on the following page depicts the general location of the water treatment facilities which serve the county and the current boundary of the areas served by the existing lines from each facility. As previously noted, the system is interconnected to allow water distribution throughout the county from any of the treatment plants. The map does not show the ultimate limits of the area that can be served by the public water system. Areas currently served by private wells and individual septic systems are shown as white. See Chapter 9 Environment for further information on the use of private wells and individual septic systems.
CHAPTER 12: WATER & WASTEWATER
Planning for Future Water Demands

In Fiscal Year 2016, water demands averaged 34.91 million gallons of water per day, while historic peak demand occurred in July 2010, when 70.4 million gallons of water was used. While the average daily and maximum daily water use has decreased slightly over the past five years, it should be noted that during this timeframe the region has experienced higher than average rainfall. The county is currently evaluating the water demands and estimates based on the regional water supply plan that indicate water supplies will be adequate until 2042; the decrease in demand trends resulting from water smart home appliances and conservation efforts may extend this projection several years beyond the original projection.

Public Water Use & Supply

Future water needs will be met by increasing source capacity and implementing demand management strategies. Because of the limitation on increasing the water supply from Swift Creek Reservoir, Lake Chesdin and the James River, the county plans to evaluate future water sources and determine the availability of additional water sources to maximize system reliability and redundancy.

The drought in 2002 led the state to direct localities to develop a 50-year water supply plan. As a result, the Appomattox River Water Authority retained a consultant to determine if Lake Chesdin could meet future member jurisdictions’ water demands. The consultant has completed the draft study, Regional Water Supply Plan (2007), which was incorporated into the Commonwealth of Virginia State Water Resource Plan (2015).
The Regional Water Supply Plan suggests several alternatives for increasing the capacity of Lake Chesdin and also recommends implementation of demand management strategies:

- Construction of another reservoir to capture water from the Appomattox River during wet periods to be released to Lake Chesdin, as needed.
- Increasing the overflow elevation of the George Brasfield Dam on Lake Chesdin.

The Department of Utilities and Chesterfield County leaders fully understand and appreciate how critical adequate water supplies are for the county’s future. The recent droughts of 2010 and 2012 serve to accentuate the importance of reliable water sources for the health and sustainability of a community. Staff from both the ARWA and the Department of Utilities continuously works with regulatory agencies, engineering consultants and water supply professionals and others to evaluate and develop feasible short- and long-term solutions for enhancing and expanding drinking water sources that will reliably serve the county’s needs in the future.

Demand management strategies and low-impact development standards promote water conservation resulting in overall efficiency of system operations and reducing the need for capital investments. Reduction in peak demands lowers total capacity requirements and the cost of providing services. Implementation of strategies by individual utility customers and the county will extend the capacity of the county’s water supply. The degree of customer participation will determine when additional water sources are needed.

Customers can implement efficient irrigation practices and install:

- Drought-resistant landscaping
- Efficient irrigation systems with soil moisture and rain sensors
- Micro and drip irrigation systems
- Rain barrels and other innovative rainwater harvesting systems

Chesterfield County will:

- Provide education on efficient irrigation practices, drought resistant landscaping and use of rain barrels and other innovative rainwater harvesting systems.
- Install automated meter reading and advanced metering infrastructure to provide customers access to consumption data and trends more frequently than the current bi-monthly bill.
- Review the utility rate structure for alternative methods of providing incentives for reducing usage.
- Review current development “quality” standards and perspectives to identify opportunities of reducing potable water consumption, i.e., minimizing the need for irrigation.
- Consider more use of low-impact development with lower irrigation demand and opportunities for saving potable water supply for future uses that require it.
**Chapter 12: Water & Wastewater**

**Water Reclamation andReuse**

Water reclamation and reuse will likely play a significant role in the county’s future water use. Wastewater from the county’s treatment plants has the potential to be further treated for reuse to reduce the demands on the existing potable water supply. Treated wastewater can be used for many industrial processes such as cooling. The level of additional treatment depends upon the end use of the water. The Virginia State Water Control Board has developed *Water Reclamation and Reuse* regulations which are administered by the Virginia Department of Environmental Quality.

The immediate benefits of water reuse projects are:

- Saves potable water for uses that require it.
- Less treated wastewater discharge to the James River.
- Reduction in operational costs for the county and users of reclaimed wastewater.

The county has one of the largest water reuse projects in the state through an agreement with Dominion Virginia Power to supply reclaimed water from the Proctors Creek Plant for use in air scrubbers at the Dutch Gap Power Plant. This is an example of potential future opportunities for use of reclaimed water. Additional treated wastewater reuse opportunities are currently being considered by the Utilities Department.

**Wastewater**

County wastewater is treated at four plants: Falling Creek, Proctor’s Creek, the City of Richmond and South Central Wastewater Authority. The general service area for these plants is based upon topography. Chesterfield County and Richmond have reciprocal agreements for wastewater service to areas that naturally drain to each other’s jurisdiction. The total treatment capacity, exclusive of the City of Richmond’s plant, is 41.3 million gallons per day.

**Public Wastewater Treatment Facilities**

**Falling Creek**

- County owns, operates and maintains the plant.
- Plant capacity is 12 million gallons per day.
- Plant capacity expansion may be impractical due to physical land constraints.
- Some wastewater from Richmond is treated at this plant.
**Proctors Creek**
- County owns, operates and maintains the facility.
- Facility capacity is 27 million gallons per day.
- Facility treatment capacity will be expanded to 54 million gallons per day and the expansion will be phased. The first phase will increase the plant’s treatment capacity to 34 million gallons per day and is anticipated to be complete by 2032.
- Facility provides laboratory services for county treatment plants and tests related to the Industrial Wastewater Pre-Treatment Program.

**Richmond**
- City owns, operates and maintains the plant.
- Plant capacity is 70 million gallons per day.
- Some of county’s wastewater is treated at this plant.

**South Central Wastewater Authority**
- South Central Wastewater Authority operates and maintains the plant.
- Plant is owned by members of the Authority.
- Plant capacity is 23 million gallons per day.
- County has rights to 2.3 million gallons per day of plant’s capacity.
- Plant could be expanded to 32 million gallons per day.

The map on the following page depicts the general location of the wastewater treatment facilities which serve the county and the current boundary of the areas served by the existing lines to each facility. To address capacity limitations at the Falling Creek Treatment Plant, flows from the northern Falling Creek area can be directed to, and treated at, either the Falling Creek Treatment Plant or the Proctor’s Creek Treatment Plant.
Moving Forward... The Comprehensive Plan For Chesterfield County
Planning for Future Wastewater Service

The wastewater agreement with the City of Richmond does not specify the amount of county wastewater that will be accepted into their system. The county plans a phased expansion of the Proctors Creek Plant increasing the total capacity of wastewater treatment, exclusive of the Richmond plant, to 68.3 million gallons per day.

The Virginia Department of Environmental Quality regulates the amount of nutrients, primarily nitrogen and phosphorus, which can be discharged to surface waters from wastewater treatment plants. Each locality has a nutrient allocation that may be discharged which impacts the amount of wastewater that can be treated. The county’s permit allows the Proctor’s Creek Facility and Falling Creek Plant a total nitrogen waste load of 564,952 pounds per year and a total phosphorus waste load of 45,817 pounds per year. While the county plans to increase the total hydraulic capacity to 66.0 million gallons per day, the total waste load allocations will remain the same. Both treatment plants are being upgraded to meet nutrient removal standards. With this capability, wastewater treatment should be adequate well into the future. Details related to the Federal Clean Water Act, the Virginia Pollution Discharge Elimination System and the Virginia Water Pollution Permit process can be found in the Environment chapter.

Public Wastewater Use & Treatment Capacity
At Falling Creek & Proctors Creek

![Graph showing public wastewater use and treatment capacity at Falling Creek & Proctors Creek from 2000 to 2004. The graph includes average monthly flow, maximum monthly flow, permitted flows, and historic trend and projected flows.]

Fiscal Year
- Average Monthly Flow
- Maximum Monthly Flow
- Permitted Flows
- Historic Trend and Projected Flows

Proctors Creek WWTP
Phase 1 Expansion

Falling Creek WWTP
Capacity Iterated
CHAPTER 12: WATER & WASTEWATER

Existing Regulations for Public Water & Wastewater

MANDATORY CONNECTIONS

Mandatory connection areas were adopted with previous Comprehensive Plan amendments and are designed to address orderly growth and development patterns. County Code provides that connections to the public water and wastewater systems are generally required for development under the following circumstances:

- For residential:
  - Property line is within 200 feet of a water line unless the required on-site service line is greater than 400 feet;
  - Located within a lot subdivision recorded with the requirement for connection;
  - Located within a lot subdivision which is located in the area shown as “required” on the residential public water and wastewater connection areas on the GIS map that receives after March 12, 2014 either:
    - Preliminary plat approval; or
    - Final plat approval where there are 50 or fewer lots and the subdivider has chosen not to submit a preliminary plat; or
  - Located in a multifamily development.

- For nonresidential:
  - Located in the area shown as “required” on the nonresidential public water connection areas on the GIS map; or
  - Located in the area shown as “provisional” on the nonresidential public water connection area on the GIS map and the property line is within 200 feet of a water line; and
  - Located in the area shown as “required” on the nonresidential public wastewater connection area on the GIS map.

The maps depicting the geographic areas described above are provided on the following pages.

The County Code does provide for certain individual parcel exemptions or exceptions based upon specific conditions. In addition, under the County Code the Board of Supervisors may grant exceptions to these mandatory connection requirements under certain circumstances through a public hearing process.
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MANDATORY PUBLIC WATER CONNECTION AREA
RESIDENTIAL DEVELOPMENT

MANDATORY PUBLIC WASTEWATER CONNECTION AREA
RESIDENTIAL DEVELOPMENT

MANDATORY CONNECTION AREA

MANDATORY CONNECTION AREA

MANDATORY CONNECTION AREA

MAY 2017

MAY 2017
CHAPTER 12: WATER & WASTEWATER
**Utility Extensions**

Utility extensions must be in the best interest of the utility system with respect to effective design and the health, safety and welfare of citizens. The private sector, such as developers, is responsible for extending, and bearing the cost of, public water and wastewater infrastructure necessary to serve their developments. For residential development, off-site extension of any public water or public gravity wastewater trunk line shall not exceed a distance of 3,000 feet from the nearest existing line as measured along the most reasonable extension route, as determined by the Department Director. This limitation shall not preclude extension to accommodate a mixed-use development that has a primary component of non-residential uses, as determined by the directors of Planning and Utilities.

Consistent with their Facilities Plan, the Department may require a developer to install larger lines than those required for the specific development. In return, the developer is eligible for refunds from the Department derived from connection fees generated by the development. The developer may also receive refunds in a similar manner for off-site utilities installations when it meets the criteria within the County Code.

**Special Districts**

County Code allows the Board of Supervisors to establish special districts for public water and wastewater extensions and services. These districts include:

- Assessment districts to fund extension of the public systems into developed areas experiencing issues with private on-site wells or septic systems or to undeveloped or partly developed areas. The Utilities Department funds the extensions with the property owners repaying the Utilities Department through a supplemental assessment applied to the property.
- Development districts to promote economic development in areas where it is not practical for individual property owners to pay for the cost of extensions. The county funds the extension through the capital improvements program with property owners repaying the county when the property is developed. Given that the county’s investment is for an indefinite period of time with speculative return, the county has not recently created any of these districts.

**Private Water and Wastewater**

**Individual On-Site Wells**

Private wells are regulated by the Chesterfield Health District and discussed in Chapter 9 Environment.

**Individual On-Site Wastewater Systems**

Private on-site wastewater systems are regulated by the Chesterfield Health District and discussed in Chapter 9 Environment.

**Privately Owned/Operated Community Water and Wastewater Treatment Facilities**

The evolution of the county’s water and wastewater treatment facilities reflects an efficient trend away from dispersed smaller facilities to fewer, larger facilities serving large areas. The county does not support the use of water and wastewater facilities serving multiple users which are owned and operated by private entities. The potential risks associated with operational failures resulting in environmental consequences, rate inequities and business failures are significant and could result in undue financial remedies at public expense. It is critical that the county continue to maintain the public centralized treatment approach to ensure orderly growth and development, protect public health, protect the environment and ensure fiscal accountability to citizens.
General Water and Wastewater Guidelines

The General Water and Wastewater Guidelines provide direction for the orderly extension of the public systems when addressing specific development proposals, preserving the water supply and protecting the environment.

Major considerations in the development of these guidelines include:

❖ Acknowledging the guidelines of The Land Use Plan chapter relative to the use of public systems.
❖ Acknowledging existing regulations regarding protection of water quality and the impact of those regulations on wastewater treatment.
❖ Supporting the guidelines of the Environment chapter relative to the protection of water quality.
❖ Continuing operational practices that contribute to the Department of Utilities’ financial stability and AAA bond rating from each of the top three credit rating services.

The following General Water and Wastewater Guidelines should be used when considering water and wastewater decisions:

➢ **Public Water and Wastewater Line Extensions.**
  • Support development that is consistent with The Land Use Plan chapter with respect to use of the public water and wastewater systems.
  • Discourage development that is inconsistent with The Land Use Plan chapter relative to use of the public water and wastewater systems and could place a strain on the public utilities systems.
  • Consider the impacts of developments proposing to extend water and wastewater systems through undeveloped areas potentially spurring growth and development inconsistent with the recommendations of The Land Use Plan chapter.

➢ **Financial Stability.** Consider the impacts of decisions on the financial stability of the public water and wastewater systems.

➢ **Business Development and Revitalization.** Seek sources of funding to address utility infrastructure needs for Economic Development Opportunity Sites, Technology Zones and Revitalization Areas, identified in the Business Development and Revitalization Strategy chapters.

➢ **Private Sector Financing of Public Utilities.** Continue to require the private sector, such as developers, to bear the cost of public water and wastewater infrastructure to serve new developments.

➢ **Water Quality.** Support efforts to continue to protect the quality of the county’s drinking water sources, as outlined in the Environment chapter.

➢ **Regional Cooperation.** Encourage continued regional cooperation in providing public water and wastewater infrastructure and acquiring additional capacity necessary to meet future growth and development needs.
 CHAPTER 12: WATER & WASTEWATER

➢ **Water Supply.** Evaluate measures and aggressively pursue capacity improvements recommended by the *Regional Water Supply Plan* to ensure adequate water supply well into the future.

➢ **Water Reuse.** Promote opportunities for industries in the vicinity of the wastewater treatment plants to partner with the county to use treated reclaimed water, saving potable water for needed human consumption and uses that require it.

➢ **Reduction in Water Demands.** Provide incentives to reduce irrigation usage and consider utilizing more low-impact development criteria while maintaining “quality” development.

➢ **Education.** Consider enhancement and expansion of community, school and library outreach programs to educate the public on water conservation practices related to the use of rainwater harvesting for irrigation and drought-tolerant landscaping. Include fiscal impacts and an emphasis on water as a finite resource with examples of the challenges experienced in other regions in the country and around the world.