

CHAPTER 11: PUBLIC FACILITIES & UTILITIES

OVERVIEW

Providing and maintaining public facilities is essential to the protection of the health, safety, welfare and quality of life of the residents and businesses in Henrico County. Adequate land allocation for public facilities is necessary to maintain high levels of service as growth continues. As the county continues to experience development of residential and commercial uses, it becomes vital that the land allocation needs for public facilities are identified before development occurs and limits options. When safety services (Police/Fire/EMS) are able to provide high levels of service, the community is safer, and lower insurance rates can be maintained. Public facilities like schools, parks and libraries contribute to the identity of a community and provide public gathering places. Additionally, when these facilities are provided in an exemplary manner, they contribute to higher property values and increased community appeal.

Public facilities and utilities should be designed and built to be environmentally sensitive and consistent with the urban/suburban form in which they are located. They should also maintain desired levels of service where applicable, maximize the existing infrastructure, and be cost efficient. Public facilities and utilities are critically important to economic development. Additionally, natural and cultural opportunities provided through public facilities are important for social interaction, offering amenity value to the community. Finally, it is important to enhance community facilities where possible, and identify deficiencies in order to accommodate the expected growth.

This chapter provides guidance to identify future needs for public facilities and their locational requirements. The primary goal of this chapter is to establish criteria for the identification of general locations for new facilities and areas where services can be expanded which best serve a growing population. This chapter does not provide specific locations, the necessary equipment acquisition, personnel needs or other service-related expenditures. These elements will be addressed in the *Public Facilities Handbook* and *Public Utilities Plan*, which will accompany this Plan as implementation tools. While it is important to plan for public facilities, it is also important for the county to remain flexible so it can respond to growth and service needs in a fiscally sustainable manner, and provide services when and where they are needed.

Planning for public facilities is based in part on attaining a desired and reasonable “level of service.” A level of service (LOS) standard is a way for the county to measure the services being provided. A LOS standard for public facility capital expenditures can be derived from existing data or goals, and is generally expressed as a ratio of floor area to population. LOS standards, locational criteria and general policies are provided in the Plan for the following public facilities:

- Schools
- Fire/Rescue
- Police
- Libraries
- Water and Sewer
- Wireless Communication Facilities

While parks and roads are also public facilities, they were discussed in previous chapters due to the broader scope of planning needed to address them. Chapter 9: Recreation, Parks, Open Space & Cultural Resources contains the recreation, parks, open space and cultural resources element and transportation and roadway improvements are addressed in Chapter 10: Transportation.

The general policies for the development of new public facilities are provided first, and are intended to act as an over-arching guide for future decisions. These general policies are followed by a description of the existing facilities, the needs assessment, locational criteria and other recommendations associated with each of the public facility types listed above.

GENERAL FACILITY POLICIES

The following policies are intended to act as a guide for the county in the location, acquisition and design of new public facilities:

1. Consider the location of new public facilities to be substantially in accord with this Plan when addressing the locational standards and policies of this chapter for general planning purposes.
2. Avoid locating facilities, such as schools, that may be negatively impacted by noise within the airport noise contours as defined in Chapter 8: Natural Resources.
3. Encourage co-location and multi-purpose use of existing and future public facility sites.
4. Mitigate adverse visual, noise and odor impacts associated with future public facilities to the greatest extent possible in order to maintain the county's attractive living environment.
5. Locate and design public facilities in a manner that minimizes disruption to established land uses.
6. Use appropriate, high-quality designs so public facilities can portray a sense of community pride and identification, thereby setting a positive example for private development within the county.
7. Centrally locate new public facilities to make them accessible by the local roadway network and serving the largest possible concentrations of population and employment areas, in addition to addressing response times and levels of service.
8. Coordinate the development of improvements to public facilities with the phasing of private development.
9. Design and build upgrades and/or improvements made in conjunction with private development to standards that are adequate to meet build-out needs under the Plan's land use recommendations, not just the mid-range needs of a

specific development. Additionally, coordinate the development and expansion of public facilities to ensure upgrades benefit as many nearby property owners as possible who are not currently being served.

10. Identify and consider the possible need for modification to, or expanded capacity of, existing public facilities when reviewing redevelopment, intensification or infill development proposals.
11. Identify appropriate sites for public facilities in growing areas of the county and pursue acquisition of these sites in advance of development pressures.
12. Encourage new developments to include pedestrian access via sidewalks and paths to public facilities, such as schools, libraries and parks.
13. Encourage new development in areas where public water and sewer services are available to connect into the system.

SCHOOLS

Schools play an important role in the county's high quality of life. The excellent school system in the county is an asset, which attracts businesses to locate and remain, stimulating additional jobs and economic development. While this Plan provides guidance for the numerical criteria that can be used to determine the need for a new school, it should be recognized the needs associated with high quality education are not limited to new buildings. The quality of education goes beyond a numeric ratio of students to floor area and encompasses programs that enhance the overall educational experience. The Henrico County Public Schools and the Henrico County Department of Planning should maintain a relationship of flexibility in developing recommendations for future development of school facilities that meet the changing needs of a growing population.

EXISTING FACILITIES

The current school system is comprised of seventy (70) facilities; of these, forty-five (45) are elementary schools, thirteen (13) are middle schools, nine (9) are high schools, and three (3) are technical centers. These facilities serve approximately 48,000 students and are identified on the Existing School Facilities Map.

The current level of service goal is to operate school facilities at ninety percent (90%) of their capacity. However, because it takes considerable time to acquire land and construct a new school building, the growing student population is often accommodated by expanding existing facilities or moving students to locations where facilities can support their enrollment until new facilities are constructed. As a result, schools typically function at approximately one-hundred ten percent (110%) capacity when needed. This method has worked well for the schools, allowing a high quality of education to be provided in an efficient manner that accommodates growth.

EXISTING SCHOOL FACILITIES MAP

NEEDS ASSESSMENT

From the late 1990's, much of the population growth in the county has occurred in the northwest portion resulting in the majority of new schools being constructed in this area. As the amount of land available becomes more limited, the Plan estimates the northwest portion of the county will begin to approach build-out in the next ten (10) to fifteen (15) years. As growth begins to increase in the eastern portion of the county, the demand for new school construction in these areas will likewise increase. This trend is already evident with the development activity occurring at Rocketts Landing and Tree Hill Farm along the James River.

While this Plan can generally prepare for aspects such as the density and quality of development, it is impossible and unrealistic to estimate exactly when and where development will occur—these factors are generally driven more by market forces. For this reason, it is important that the county remain flexible when planning for new school facilities.

The following standards have been applied to derive a forecasted demand for new school facilities. The analysis of population and housing trends portrays a “what if” scenario and assumes the county’s population will continue to grow at a rate just below two percent (2%) annually, and will continue to be distributed within various housing types as illustrated in Appendix A: Demand Analysis. Each household has been assumed to generate a specific number of students based on forecasting. Factors which cannot be predicted may change in the future affecting the real-time demand for school facilities. These standards are presented for planning purposes to help guide future decisions. Requirements for new school sites and facilities are set by State regulations. The county should continue to monitor these standards in order to maintain its excellent educational levels.

Current Levels of Service

Student population projections were generated based on the household results from the Future Land Use Map in Chapter 5: Land Use. These projections were applied to an average level of service for capacity at ninety-five percent (95%). This current level of service was derived based on past practices and discussions with county staff during the creation of new capital facilities to meet the needs of the growing population. It is a standard that represents the middle ground created when the schools strive for a ninety percent (90%) capacity and have some schools operating at one-hundred ten percent (110%) for periods of time. It was determined that a ninety-five percent (95%) capacity level of service best represents current conditions. The standard capacity for new schools of each type is as follows:

- **Elementary Schools** – Capacity for 736 students
- **Middle Schools** – Capacity for 1,100 students
- **High Schools** – Capacity for 1,450 students

Future Facilities Needed

Future needs or circumstances outside of the assumptions mentioned above may have an impact on the need for new schools even in the near future. Using this methodology to project needed facilities, it serves as a point of reference and gives the county a possible future scenario to prepare for land needs and understand the fiscal implications of providing services to a growing population.

If the county grows at a different rate than what is shown in the Demand Analysis and, if the household compositions change, or the desired level of service is modified, the number of new schools and their timing would obviously be affected. The needs assessment methods presented here have been used in a similar form by the schools for many years, and they should continue to employ these methods to determine the need for new schools on an annual basis.

LOCATIONAL CRITERIA

The following criteria can be used to help identify appropriate locations for new school construction. It has long been the practice of the school system to provide smaller-scale “local” elementary schools to best serve the population. Middle schools have a slightly higher capacity, and high schools can serve a much larger population. Historically, the school system has developed elementary schools on sites of approximately twenty (20) to thirty (30) acres, middle schools on fifty (50) to sixty (60) acres and high schools on sites in excess of sixty (60) acres. These site sizes reflect the former rural/suburban transition of most of the county, when land was more available and design prototypes were different. The land use recommendations in Chapter 5: Land Use propose a more diverse character and development level however, and it may be appropriate for future schools to be sited on fewer acres in the more dense, urban portions of the county. Also, as land becomes scarcer and more expensive, smaller sites with alternative building configurations could accommodate the projected student population within the limited land resources.

School Sites

New school sites should meet the following criteria:

1. Sites should meet the acreages listed below depending on school level and the existing or planned character of the location. Sites in areas planned for more dense urban neighborhoods could be smaller (on the lower end of the ranges below), while sites in rural or suburban areas may be larger.
 - a. **Elementary Schools** – 15-20 acres
 - b. **Middle Schools** – 20-40 acres
 - c. **High Schools** – 40-60+ acres
2. Sites should be selected to provide recreational opportunities appropriate for school-aged children, including playgrounds, athletic fields and open space.

3. Sites should be located within Residential areas and away from major roadways to increase student safety. High schools may be located on or closer to higher-volume roadways than elementary schools.
4. Sites should not be located in areas with Daily Noise Levels in excess of sixty-five (65) decibels.

RECOMMENDATIONS

In addition to the locational criteria listed above, the following recommendations should be used to guide the acquisition of land for the development of new school facilities:

1. The growth patterns and trends in the county should be monitored by the Department of Planning and the Henrico County Public Schools on an annual basis to ensure the educational needs of the community are being met.
2. Encourage school site co-location with recreational and park facilities and other public facilities.
3. Integrate school sites into neighborhoods, providing pedestrian access and promoting walking to reduce the roadway impacts. This policy is particularly important for elementary and middle schools in Traditional Neighborhood Developments and Urban Mixed-Use areas.
4. Locate schools in primarily Residential areas to be in close proximity to the students' homes.
5. Develop an urban prototype for schools to take advantage of different site opportunities in the proposed Urban Mixed-Use and Traditional Neighborhood Development areas proposed in Chapter 5: Land Use.
6. Promote site design ensuring availability of adequate land area for faculty parking and emergency access.
7. Encourage acquisition of land for schools in advance of development pressure when possible, because the cost of land typically increases over time and as demand rises.
8. Design all public school facilities to meet or exceed State and Federal standards for universal accessibility.

FIRE/RESCUE

The mission of the Division of Fire is to promote and sustain a superior quality of life in Henrico County through the provision of fire/rescue services. The Division delivers professional, cost-effective services in a personal, responsive, and innovative manner that serves the public's interest. It also provides fire planning and response; emergency medical services; environmental control; specialized rescue; fire prevention and investigations; training and education; and planning, hazard reduction, response, and recovery related to natural and man-made disasters.

EXISTING FACILITIES

The Division of Fire responds to all types of emergencies including fire, emergency medical, hazardous materials, high-rise, confined space, and water emergencies. Staffed with over four-hundred ninety-nine (499) career firefighters, the Division currently operates twenty (20) fire stations, a fire/ems training facility, specialty repair shops and a central administration office. The Existing Fire/Rescue Stations Map illustrates the location of these facilities.

NEEDS ASSESSMENT

The need for new fire/rescue facilities associated with growth over the next twenty (20) years will be estimated using the following criteria:

Current Level of Service

The current level of service is determined by the ratio of calls to floor area of fire/rescue facilities. The reported number of calls for Fiscal Year 2006/2007 was 38,094; this figure is divided into the current floor area of the existing fire/rescue stations (125,090 square feet) to derive a current level of service of 3.28 square feet per service call. This translates to 0.5250 stations per 1,000 calls for service. Based on current figures, the number of annual calls per person in the county is 0.1272.

Estimated Future Demand for Facilities

Future calls for service can be projected using the growth scenario associated with the land use recommendations in Chapter 5: Land Use, which is based on the Demand Analysis, and applying the average calls for service (0.1272) per new person. This is a general countywide approach, which does not take into account response time or proximity to development.

Additional Factors Influencing Needs

As with schools, additional factors can sway the location, timing and demand for a new fire station making it difficult to quantify with numeric ratios. The county does respond to these factors by employing a Computer Aided Design-based application known as CADADAM. This program allows the Division to map out the potential location of a needed station by incorporating road conditions, trip times and area populations into a model.

A primary hindrance to rapid response times under current conditions is often attributed to traffic congestion and lack of multiple routes. The successful development of an interconnected transportation network will significantly influence the response times for each of the existing and future stations. With the data included in this chapter, the Major Thoroughfare Plan Map and the growth scenario associated with the Future Land Use Map and recommendations in Chapter 5: Land Use, the county can employ the CADADAM system to generate call response data and identify specific locations based on a service goal response time of eight (8) minutes.

EXISTING FIRE/RESCUE STATIONS MAP

LOCATIONAL CRITERIA

A primary concern of the Division of Fire is transportation routes to access areas of development. The location of stations is vital, and response time from multiple locations can be decreased by frequent interconnections of the transportation network and access to the interstate.

The following locational criteria should be considered when identifying locations for fire/rescue facilities:

1. Co-locate fire fighting facilities and emergency medical services for maximum efficiency. Multi-use structures housing police or other public facilities are also encouraged.
2. Locate fire fighting facilities and emergency medical services with easy access to a major arterial or at an intersection of two (2) major arterials to gain both east-west and north-south access.
3. Encourage sites to be large enough to accommodate equipment storage and facilitate maneuverability, allowing equipment to either pull through or be backed into garage bays without hindering traffic flows in the public right-of-way.
4. Locate fire/rescue station facilities on sites of between two (2) and five (5) acres to allow for future expansion. Sites may be smaller when developed as part of a Traditional Neighborhood Development or an Urban Mixed-Use area.
5. Select and design sites to minimize the adverse impact of sirens and other noise on Residential areas.

RECOMMENDATIONS

In addition to the locational criteria listed above, the following recommendations should be used to guide the acquisition of land for the development of new fire/rescue facilities:

1. Continue the use of the CADADAM system to assist in the identification of general locations for future station sites by applying the data from the Major Thoroughfare Plan Map, transportation model, and the Future Land Use Map and recommendations in Chapter 5: Land Use, and update annually.
2. Promote the inclusion of fire/rescue stations as one of the civic elements in the design and development of Traditional Neighborhood Developments and in Urban Mixed-Use areas to provide adequate service to these more densely populated areas.

POLICE

The mission of the Division of Police is to provide quality service to the citizens and community through honor, professionalism, commitment, compassion, and accountability. The Division of Police is organized into three (3) major commands: uniform, investigative operations and support operations. With the exception of a few staff functions directly under the Chief of Police, all components of the organization are categorized so as to fall under one of the major commands. The Division of Police is responsible for a broad range of law enforcement activities that can generally be placed in one of the following categories:

- Community Policing
- Criminal
- Traffic
- School Services
- Animal Control

The facilities associated with these operations include two (2) district headquarters and the animal shelter.

EXISTING FACILITIES

The Division operates primarily out of two (2) district headquarters. District I encompasses the eastern portion of the county and is currently headquartered in the Fair Oaks facility on Eastpark Court. District II encompasses the western portion of the county and is headquartered at the Public Safety Building at the intersection of Parham and Shradler Roads. This facility also serves as the Division's main headquarters. The Henrico Animal Protection Unit is located near the county's Eastern Government Center. The Existing Police Facilities Map shows the existing police districts and facility locations.

NEEDS ASSESSMENT

The future need for police facilities will be identified based on the following information:

Current Level of Service

The current level of service for police stations is at 0.92 square feet of building space per call for service (137,000 sf./149,688 calls annually). The Division's records indicate approximately eighty-one percent (81%) of the calls originate from residential uses and nineteen percent (19%) from nonresidential uses. Based on this analysis, it is estimated that each new person in the county will generate 0.416 calls for service.

Estimated Future Demand

The future demand for police facilities can be generated by applying the current level of service to the projected county population.

LOCATIONAL CRITERIA

The following locational criteria should be considered when identifying locations for police stations:

1. Identify sites which have good central access to the local road network in the district which they will serve.
2. Sites should accommodate approximately 10,000 square feet of operational building space of which 3,500 square feet should accommodate vehicles and other equipment which should be protected from the elements.

RECOMMENDATIONS

In addition to the locational criteria listed above, the following recommendations should be used to guide acquisition of land for new facility development:

1. Maintain an active exchange of information between the Division of Police and the Department of Planning to address future needs for police services in the county.
2. When possible, use existing space for new district headquarters to reduce the start-up costs associated with establishing a new district command.

EXISTING POLICE FACILITIES MAP

LIBRARIES

The Henrico County Public Library System strives to provide residents with resources in friendly and technologically up-to-date facilities. Residents of Henrico and the City of Richmond or Chesterfield County, who have proper photo identification that provides a name and current address within the library’s service area, may register and borrow library materials. The public library also offers a non-resident membership for an annual fee.

EXISTING FACILITIES

The Henrico County Public Library System currently has a bookmobile and ten (10) permanent locations comprising 207,423 square feet and listed in **Table PF-1: Libraries**. The Existing Library Facilities illustrates the location of these facilities.

TABLE PF-1: LIBRARIES

Branch & Size	Address	Phone	Hours	
Bookmobile NA	Mobile	652-3214	Varies	
Dumbarton Area Library 22,500 sf.	6800 Staples Mill Rd. Henrico, VA 23228	262-6507	M - Th: F & S:	9:00 a.m. - 9:00 p.m. 9:00 a.m. - 6:00 p.m.
Fairfield Area Library 24,000 sf.	1001 N. Laburnum Ave. Henrico, VA 23223	652-3251	M - Th: F & S:	9:00 a.m. - 9:00 p.m. 9:00 a.m. - 6:00 p.m.
Gayton Branch Library 12,500 sf.	10600 Gayton Rd. Richmond, VA 23238	740-2747	M - Th: F & S:	9:30 a.m. - 9:00 p.m. 9:30 a.m. - 5:30 p.m.
Glen Allen Branch Library 12,000 sf.	10501 Staples Mill Rd. Glen Allen, VA 23060	756-7523	M, - W: TH: F & S:	10:00 a.m. - 9:00 p.m. 1:00 p.m. - 9:00 p.m. 10:00 a.m. - 6:00 p.m.
Municipal Government and Law Library 1,980 sf.	4301 E. Parham Rd. Henrico, VA 23228 (Henrico County Courthouse)	501-4780 or 501-5155	M - F:	8:00 a.m. - 4:30 p.m.
North Park Branch Library 15,000 sf.	8508 Franconia Rd. Henrico, VA 23227	262-4876	M & W: T & Th: F, S:	9:30 a.m. - 9:00 p.m. 1:00 p.m. - 9:00 p.m. 9:30 a.m. - 5:30 p.m.
Sandston Branch Library 7,833 sf.	23 E. Williamsburg Rd. Sandston, VA 23150	737-3728	M -W: Th: F & S:	10:00 a.m. - 9:00 p.m. 1:00 p.m. - 9:00 p.m. 10:00 a.m. - 6:00 p.m.
Tuckahoe Area Library 53,000 sf.	1901 Starling Dr. Henrico, VA 23229	270-9578	M - Th: F & S:	9:00 a.m. - 9:00 p.m. 9:00 a.m. - 6:00 p.m.
Twin Hickory Area Library 53,000 sf.	5001 Twin Hickory Rd. Glen Allen, VA 23059	364-1400	M-Th: F & S:	9:00 a.m. - 9:00 p.m. 9:00 a.m. - 6:00 p.m.
Varina Branch Library 5,600 sf.	2001 Library Rd. Henrico, VA 23231	222-3414	M,W,F & S: T & Th:	9:30 a.m. - 5:30 p.m. 1 :00 p.m. - 9:00 p.m.

NEEDS ASSESSMENT

A primary concern for the provision of adequate library services is the operational hours for each library. The preference is to design facilities that are larger in scale, provide more comprehensive services and offer longer hours of operation.

Current Level of Service

The current countywide level of service for library facilities is 0.8632 square feet per county resident.

Estimated Future Demand for Facilities

To estimate the future demand for library facilities, the current level of service can be applied to the projected future population. This demand would apply only to the public portion of the libraries. In addition to new public space needs, the administrative/headquarter operations space may need to be expanded to accommodate the increased demand for services.

LOCATIONAL CRITERIA

The following locational criteria should be considered when identifying locations for new libraries:

1. Encourage site sizes adequate enough to allow for the initial construction of 20,000 square feet with potential expansion to over 60,000 square feet as demand increases. Sites should be approximately eight (8) acres in size to accommodate this size facility.
2. Select sites to expand the service area of the library system rather than locating close to existing facilities.
3. Locate sites in close proximity to residential neighborhoods, parks, and schools to allow easy facility access and incorporation into a neighborhood.

RECOMMENDATIONS

In addition to the locational criteria listed above, the following recommendations should be used to guide the acquisition of land for development of new library facilities:

1. Add additional square footage to the existing library space in areas of the county anticipated to increase in population. The additional space could be accommodated through a new location or through the expansion of existing facilities.
2. Encourage the inclusion of libraries as one of the civic elements in the design and development of Traditional Neighborhood Developments and in Urban Mixed-Use areas to provide adequate service for these more densely populated areas.

EXISTING LIBRARY FACILITIES MAP

UTILITIES (WATER AND SEWER)

The Department of Public Utilities is responsible for the provision and maintenance of county water and sewer services. In conjunction with this Plan, the consulting firm of Greeley and Hansen will complete a *Public Utilities Plan* to assist with the implementation of the county’s Vision. That plan will be based on projected growth associated with the recommendations and the Future Land Use Map contained in Chapter 5: Land Use. These system improvements and expansions will address the growing demand from increased development over the planning period and beyond.

EXISTING FACILITIES

The current network of water and sewer service lines serves most of the central and western portions of the county. The county is divided into sewer pumping station basins which are based on the topography of the land and indicating areas where gravity flow can be used and where pumps are necessary. **Table PF-2: Basin Status** shows the water and sewer service status of these basins. A Sewer Pumping Station Basins Map also illustrates the location of these basins.

TABLE PF-2: BASIN STATUS

Basin Name	Water	Sewer
ACCA	Extensively Served	Extensively Served
Allens Branch	Extensively Served	Extensively Served
Almond Creek	Partially Served	Partially Served
Area D	Partially Served	Partially Served
Area H	Partially Served	No Existing Service
Area J	Partially Served	Partially Served
Bailey Creek (Longbridge)	Partially Served	Partially Served
Boar Swamp	Partially Served	No Existing Service
Bottoms Bridge	Partially Served	Partially Served
Broadwater Creek (1)	Partially Served	Partially Served
Broadwater Creek (2)	Partially Served	Partially Served
Carters Mill	No Existing Service	No Existing Service
Charles City Road	Partially Served	Partially Served
Chickahominy	Extensively Served	Extensively Served
Cornelius Creek	Partially Served	Partially Served
Deep Bottom	Partially Served	Partially Served
Elko	Partially Served	Partially Served
Four Mile Creek	Partially Served	Partially Served
Gambles Mill	Extensively Served	Extensively Served
Gill Dale	No Existing Service	No Existing Service
Gillies Creek	Extensively Served	Partially Served
Hines Road	No Existing Service	No Existing Service
Holladay Branch	Partially Served	Partially Served
Keeton Road	Extensively Served	Extensively Served
Mayfield	Extensively Served	Extensively Served
Meredith Branch	Extensively Served	Extensively Served
Mill Creek	No Existing Service	No Existing Service
New Market	Partially Served	Partially Served

Basin Name	Water	Sewer
Poplar Spring	Partially Served	Partially Served
Pouncey Tract	No Existing Service	No Existing Service
River Road	Extensively Served	Extensively Served
Rooty Branch	Extensively Served	Extensively Served
Roundabout Creek (1)	No Existing Service	No Existing Service
Roundabout Creek (2)	No Existing Service	No Existing Service
Sandston Woods	Partially Served	No Existing Service
Scandia Road	Partially Served	No Existing Service
Strawberry Hill	Extensively Served	Extensively Served
Turkey Island	No Existing Service	No Existing Service
Virginia Center	Partially Served	Partially Served
White Oak (1)	Partially Served	Partially Served
White Oak (2)	No Existing Service	No Existing Service
Williamsburg Road	Partially Served	No Existing Service
Willow Lawn	Extensively Served	Extensively Served

The Department of Public Utilities operates a water treatment plant with a current capacity of fifty-five (55) million gallons per day. In addition, the county has an agreement with the City of Richmond to purchase between twelve (12) and thirty-five (35) million gallons per day as reserve capacity. This provides the county with an available maximum daily water supply of ninety (90) million gallons. The current average daily demand is approximately forty (40) million gallons, with a maximum day use of sixty-one (61) million gallons. The remaining twenty-nine (29) million gallons of daily capacity is available for growth until the water treatment plant capacity is increased. Designs to increase the capacity of the plant by an additional twenty-five (25) million gallons began in 2006.

Sewage treatment is handled at the county’s wastewater treatment plant which has a capacity of seventy-five (75) million gallons per day with a recent treatment average of forty-two (42) million gallons per day. The remaining thirty-three (33) million gallons per day capacity would be available for future growth.

SEWER PUMPING STATION BASINS MAP

NEEDS ASSESSMENT

Greeley and Hansen's preparation of a *Public Utilities Plan* uses a hydraulic model which addresses the necessary expansion and modification to the county's sewer and water systems. The *Public Utilities Plan* will identify the necessary improvements to support the build-out based on the recommendations and the Future Land Use Map in Chapter 5: Land Use, not just projected growth within the planning period.

Chapter 5: Land Use recommends redevelopment and infill in a number of locations that may intensify the current development density of these areas. Redevelopment and intensification of development in areas with established infrastructure can be challenging to serve with adequate water and sewer. In many of these areas, the sewer and water line capacity or pipe diameter was designed and installed to handle a former or existing development intensity and flow. Areas of the county with the oldest sewer and water lines frequently do not have existing capacity for additional growth. Infill and redevelopment are still strongly encouraged with the caveat that in instances where existing sewer and water lines cannot manage additional capacity, parallel or replacement lines will be necessary to provide adequate service.

The ability to provide adequate sewer and water service to individual areas of the county depends on the functionality of the overall system. Efficiency is achieved when the sewer and water lines are extended in an orderly manner that builds the system incrementally. The *Public Utilities Plan* is intended to designate the necessary capacity to serve the county at build-out, and as new service lines are constructed they must be designed and handle such capacity.

LOCATIONAL CRITERIA

Locational criteria for sewer and water facilities relate primarily to the acquisition of easements for the location and placement of sewer lines relative to land slope. The following criteria should apply to the location of new water and sewer facilities:

1. Gravity sewer lines are preferable, but sewage pumping stations may be needed.
2. Sewer lines should correspond to the natural and altered slope of the land.
3. When possible, water and sewer lines should follow public rights-of-way.
4. Specific engineering will be required for each system expansion.
5. Needed facilities' locations for sewage pumping stations, water pumping stations and water storage tanks will be determined in the *Public Utilities Plan*.

RECOMMENDATIONS

In addition to full system improvement recommendations for sewer and water services in the *Public Utilities Plan*, the following recommendations should be used to guide water and sewer improvements:

1. Support improvements recommended in the *Public Utilities Plan*.
2. Continue the construction of water and sewer lines to serve growing areas of the county.
3. Developers should be responsible for funding the expansion of sewer and water lines to serve new development.
4. In instances where the *Public Utilities Plan* indicates a necessary capacity greater than that which is needed to serve new development, the facility should be built to handle the capacity stated in the plan. The developer should receive credits for the additional capacity, which can be used for future developments or transferred to another developer.
5. Redevelopment and infill projects are desirable when consistent with Chapter 5: Land Use and Chapter 7: Planning & Economic Focus Areas, and are to be approached with caution from the provision of utilities. The county and developers should recognize there may be limitations to the capacity of existing sewer and water facilities in these areas.
6. Encourage new development adjacent to existing lines to tie into the sewer and water systems in the most efficient way possible. It may be necessary to loop water lines to provide redundancy within the system.

WIRELESS COMMUNICATION TECHNOLOGY

Digital or cellular phone service, otherwise known as wireless communication, has become an essential element of modern day communication, and usage continues to increase. Although wireless communication services are not publicly owned utilities, their inclusion in the county's Plan is appropriate given their necessity and scope of use.

The future development of wireless communications services in the county calls for careful planning. The citizens and businesses of the county will continue to demand services, which will improve the quality of life and economic development of the community; however, the manner in which these services are provided must be sensitive to the aesthetic, health, safety and property values of the community. Striking a balance between the desires for state-of-the-art, cost-effective communications infrastructure while being aesthetically sensitive to residential and commercial areas will be necessary. This will require careful consideration not only on a case-by-case basis but may also warrant an in-depth, countywide network analysis given the continued evolution of the industry and related technology.

EXISTING CONDITIONS

The county is currently served by several wireless communication providers. Since the county has encouraged co-location on towers, many of the existing structures are filled and cannot support additional equipment. In some cases, available space is at the lowest tower level and may not meet the coverage goals of the service providers. The demand for wireless communication services will require the expansion of existing facilities or location of new ones.

NEEDS ASSESSMENT

While the system/network of wireless facilities has become more established in the past several years, the technology continues to evolve, thus requiring additional facilities. The original service provider strategy was to serve a strictly mobile market; however, the market has begun shifting toward replacing the conventional landline with cellular service. Following this trend, facilities are being located closer to residential areas, resulting in increased sensitivity to the impacts created by these facilities.

The Technology of the Wireless System

Most personal wireless services operate in a similar fashion. A portable communication device receives from and, in the case of a portable telephone, sends signals to an erected antenna or antenna set. The area covered by an antenna set is commonly referred to as a "cell." The signal is routed to switching equipment that selects the channel and monitors the signal strength. In telephone applications, the signal normally is connected to a conventional or landline public telephone system. If the communication device is moving, the signal is passed on to an antenna in an adjoining cell, and the call continues uninterrupted.

For services which require more than one (1) antenna to serve a large area, such as wireless telephone service, an effective system requires a more-or-less uniform grid or network of antennas mounted on towers or other structures in a pattern somewhat resembling a honeycomb.

Depending on the technology used, the height of the tower, the position of the antenna, topography, vegetation and other factors, the cell size can vary from less than a mile to several miles across a given area. The Personal Communication Service (PCS) provider seeks to locate antennas spaced just far enough apart to provide the coverage needed. If the antennas are too close the signal overlap can cause interference problems, and the capacity of the system suffers. If the antennas are too far apart, gaps or holes are created in the coverage pattern, which can result in calls being “dropped” as travelers move beyond the range of the antenna handling the call.

Each cell can only handle a finite number of conversation calls at one time. As the signal traffic becomes too congested, additional cells are required to provide additional system capacity. The primary networks are largely established in Henrico County, and service providers are infilling towers/antennas in locations where the network is over capacity due to increased use.

Demand for Wireless Facilities

Demand for wireless communication technology is increasing, while appropriate locations for such facilities are becoming more difficult to find. In addition, telecommunication towers have special land use implications because of their potential visual impact on surrounding properties. These realities place a premium on determining the most efficient distribution of wireless infrastructure on the whole, rather than solely for individual service providers. Considering the highly technical nature of wireless infrastructure development, the interdependence of tower sites, and the scope of the existing wireless network, the drafting of a separate wireless study and/or plan may be appropriate to help achieve greater efficiency in facility placement.

Public Safety

Public safety is often a concern when dealing with the installation of wireless communications facilities. It is within the purview of local government to regulate the manner in which structures are located and constructed in order to protect the safety of its citizens. While a good wireless communication network can offer an increase in public safety through the provision of the E911 services, there remain some concerns with public safety associated with PCS facilities. The following are the prominent perceived safety issues associated with PCS facilities, and the measures in place to ensure the protection of public safety.

Radio Frequency Emissions

The power used in PCS technologies is relatively low and is not of the type normally associated with health risks caused by certain kinds of radio frequency radiation. The *Federal Telecommunications Act of 1996* took steps to remove radio frequency emissions as a basis for regulating or

prohibiting PCS facilities, as long as specific standards are met. The Act states:

No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of environmental effects of radio frequency emission to the extent that such facilities comply with the Commission's regulations concerning such emissions.

Because the Federal Communications Commission (FCC) does not review each cell site, it is incumbent upon local government to assure that Radio Frequency (RF) standards are being met; at a minimum, this should involve certification by the carrier that the proposed cell site meets the FCC guidelines.

Structural Hazards

Structural hazards are minimized because tower structures are constructed to BOCA National Building Code standards, and can withstand hurricane force winds up to one-hundred ten (110) miles per hour. Structures are also designed to collapse into themselves if there is a failure. In response to potential hazards of falling debris, some local governments designate a "fall zone" around the base of the tower structures. These are generally expressed as distance-to-height ratios. The County of Henrico's Zoning Ordinance currently requires fall zone setbacks. The basis for these setbacks is to prevent damage from ice or other falling debris from the antenna platform.

DESIGN CONSIDERATIONS

One method to reduce the visual impact of towers on surrounding residential areas involves stealth or camouflage facility designs. The county's policies related to tower location and design are detailed in the following sections; however, the technique of "stealth design" is further elaborated here. While the county encourages a minimum number of towers necessary, it is also important that these wireless communications facilities have as little visual impact on Residential areas as possible.

To minimize the negative impact on existing Residential areas or areas recommended for residential use, the county encourages the use of camouflage or "stealth design" for newly constructed communication towers. Stealth design towers support the county's efforts to preserve its existing aesthetic qualities, maintain its quality of life and protect property values.

A stealth design can reduce the visual profile of the tower structure and antennae, create a structure that is not easily recognizable as communications equipment, or hide equipment from view entirely. Stealth design may include flush-mounted equipment; antennas totally enclosed within an existing or proposed structure; and facilities that replicate more common structures such as flagpoles, church steeples, bell towers, light poles, or roof structures.

Stealth design can also be used to camouflage equipment at the base of towers. The equipment can be housed in a shed or similar structure that is architecturally compatible

with nearby dwellings or other buildings. The location of cell tower structures throughout the county can be found on the Communication Towers and Antenna Co-Locations Map.

LOCATIONAL CRITERIA

The *Telecommunications Act* established a role for three (3) parties in the future development of wireless communications services: the communications industry, the FCC, and local government. Within the confines of FCC licensing and administration and local government regulations of land use and zoning, each provider is free to design its own network or system. Wireless communications service providers are not treated as public utilities or franchises, but are competitors in an open market. Although the free-market approach is intended to result in the best communications services for the least cost, it also results in an increase in the number of wireless communications antennas and towers.

In order to balance the interest of providing quality wireless service with the interests of the public health, safety and welfare, community aesthetics and promoting the integrity of the county's residential neighborhoods, preserving the residential character of the community is especially crucial. Telecommunications facilities are not encouraged in large areas consisting of low-rise residential uses, with limited nonresidential and commercial uses; however, if telecommunications facilities are located in close proximity to these areas, the facilities should utilize a stealth design.

Location Opportunities

The following provides general location types which may be appropriate if the siting and design standards and policies of this section are met.

Existing Communication Towers

Co-location opportunities may still exist on some existing towers in the county. New towers should be designed to allow co-location.

Dominion Virginia Power

Dominion Virginia Power has several large power transmission corridors which cross the county. These corridors consist of easements and rights-of-way between one-hundred fifty (150) and three-hundred (300) feet in width, and combined are over eighty (80) miles in length. These corridors offer opportunities for co-location of transmission towers and communications antennas. Dominion Virginia Power has worked closely with the telecommunications industry in facilitating co-location within its rights-of-way.

Buildings

Wireless service antennas can be mounted on the roofs or sides of buildings. While most buildings in the county are less than thirty-five (35) feet tall, taller structures could be used for co-location opportunities.

Churches

Many churches in the county present telecommunication service providers with the potential for locating antennas inside existing steeples or building a steeple for a church that does not presently have one.

COMMUNICATION TOWERS AND ANTENNA CO-LOCATIONS MAP

Public Sites

County government sites appropriate for locating commercial wireless communications facilities include selected fire stations, libraries, schools, parks, post offices, water tanks, towers erected for public service use, and other public facilities. These facilities are often large enough to allow sufficient separation from surrounding residential uses, or are located adjacent to industrial land uses. Even on these sites, steps must still be taken to minimize impacts on surrounding properties.

Private Land

Although the use of existing facilities is preferred to the construction of new ground-mounted facilities, there are opportunities for the development of freestanding mounts on private land. In particular, land planned and zoned for industrial uses could be used for new tower locations.

Locational/Siting Policies

The following policies should be used to determine appropriate sites for the location of wireless communication facilities:

1. Discourage towers in areas zoned or planned for residential uses.
2. Discourage towers in private cemeteries.
3. Encourage stealth tower design when towers are requested adjacent to or in close proximity to existing Residential areas or areas recommended for residential use in Chapter 5: Land Use.
4. Only consider new locations for towers when co-location or replacement of existing towers is not adequate and feasible. The order of preference for land use categories when considering a new site is Industrial, Commercial, or Agricultural not utilized for residential purposes.
 - a. Consider county-owned, State-owned, or Federal properties and facilities that encourage proper siting of wireless communications towers provided:
 - i. The use and character of public properties and adjacent properties is not adversely impacted;
 - ii. The proposed telecommunications facilities are consistent with other elements of the Comprehensive Plan and *Zoning Ordinance*; and
 - iii. Appropriate approvals and agreements are reached with the public agency's boards, or authorities.
5. New telecommunications sites in areas zoned or planned for Industrial, Commercial or Agricultural properties with no residences should be initially constructed or designed to be extended to a height of one-

hundred ninety-nine (199) feet. Reduced tower height may be more appropriate in sensitive locations.

6. If co-location opportunities are not possible, encourage siting of towers at locations within wooded areas or remote sites away from residential structures. While such locations may not obscure from view the entirety of the tower, they may reduce the visual impact.
7. Locate towers at the lowest possible point along ridgelines.
8. Ensure new towers or antenna structures do not block the county's microwave paths or interfere with the county's public safety radio system.
9. Discourage the location of towers within 1,400 feet of New Market Road (Route 5) unless an acceptable stealth-tower design is utilized.

RECOMMENDATIONS AND POLICIES

In addition to the standards listed above for the selection of appropriate locations for wireless communication facilities, the following policies should be applied to guide the county's decisions regarding wireless communication facilities:

1. Encourage, where appropriate, the placement of antennas on existing structures including but not limited to existing towers, utility poles, water tanks, building rooftops, and other tall structures.
2. Encourage, where appropriate, the upgrade or replacement of lower towers with taller towers designed to maximize co-location opportunities.
3. Expedite the permitting of wireless communication towers that have minimal visual impacts and meet all regulatory standards.
4. Maintain an inventory of tower sites and all existing telecommunication facilities to determine co-location opportunities.
5. Coordinate with adjoining localities when a tower request is proposed near the county boundary.
6. Encourage providers to submit their "build-out" coverage grid for the entire county.
7. Obtain industry and citizen input in the future development of local wireless communications regulations.
8. Ensure ground-mounted equipment does not generate noise in excess of fifty (50) decibels at the property line of the parcel on which the tower is located.
9. Encourage the consideration of stealth tower designs for all applications.
10. Use monopoles rather than lattice towers.

11. Limit clearing of the sites to allow existing mature vegetation to remain for visual screening.
12. Screen security fencing and visible tower locations from public view. A row of evergreen trees a minimum of eight (8) feet tall and a maximum of ten (10) feet apart, and a continuous hedge at least twenty (20) inches in height in front of the tree line should be planted around the perimeter of the fence.
13. Discourage lighting and painting of a tower unless required by the FAA. Construct towers at reduced height to eliminate FAA lighting requirements. Limit flashing strobe lights to requirements by the FAA.
14. When lighting is required on equipment shelters, shield and orient it inward so as to not project on surrounding properties.
15. Finish equipment shelters in earth-tone colors and provide appropriate screening.
16. When antennas are attached to an existing building, blend them with the existing structure.
17. Use the requirements of the Department of Public Works to evaluate access to the site.
18. Use flush-mounted or stealth antennas in visible or sensitive locations.
19. Consider the development of a countywide network analysis to help achieve greater efficiency in facility placement.

