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“Our mission is to serve Isle of Wight County with the provision and enhancement of quality of life services for all citizens.”
Isle of Wight County Mission Statement

Introduction

General Discussion

Isle of Wight County is located in southeast Virginia near the mouth of the James River. The County currently contains rural landscape and small town living, but the influence of the adjacent Hampton Roads District has increased in recent years.

Isle of Wight County is comprised of 319 square miles of primarily forested and agricultural land. It is bordered to the North by the James River and to the east by the City of Suffolk. The County has several main transportation corridors including Routes 460, 17, 58, 258, 10, and the Norfolk and Southern Rail Line. These transportation passageways have attracted the bulk of the residential, business, and industrial growth within the county.

The goals and objectives of the community, whether social, economic, or environmental, can be promoted or impeded by the provision of water and sewer service. As a long-range plan, this will have to be adjusted as other developments alter the course for the County and the needs for utilities.

The Comprehensive Plan adopted by the County in 2006 designated areas in the County for specific use to manage future growth. Outlined within the land use plan are the six different types of area designations: resource conservation area, rural/agricultural conservation district, highway corridor, village center, incorporated town, mixed use activity center, development service district. The goal of the land use plan is to preserve the rural areas of the County and direct growth to areas served with adequate roads, water and sewer utilities, schools, and emergency services.

There are three designated development service districts expected to receive the majority of the County growth which have been further divided into six different types of land uses. These land uses include conservation development, suburban residential, suburban estate residential, mixed used activity, business and employment, and resource conservation areas.

Purpose of Study

The Isle of Wight County Board of Supervisors has retained the services of ***R. Stuart Royer & Associates, Inc. (Royer)*** to produce a master water and sewer plan. The purpose of this master plan is to identify and map public and private water and sewer systems currently known to be located within Isle of Wight County and also to determine the future needs (source, distribution, treatment, and storage) through the year 2035. It should be noted that the future growth scenarios depend in many cases on the actions taken by the County. This study is intended to explore the provision of future water and sewer utilities based on growth projections as provided by the Hampton Roads Planning District Commission (HRPDC) and coordinated with Isle of Wight County.

Scope of Study

The County government, throughout the Comprehensive Plan adopted in 2006 and by various other actions, has sought to preserve the rural character of the County. A portion of this effort is characterized by the identification of Development Service Districts within the County. These districts are targeted to receive the utilities and other services necessary to support the growth within the County. The remainder of the County includes large tracts of agricultural and forested land.

The County has identified three service areas consisting of the Newport Development Service District (NDS), Windsor Development Service District (WDS), and the Camptown Development Service District (CDS). These three districts are targeted for greater development than other areas of the County due to their location along the major transportation routes and nearby towns. The districts have historically been the primary centers of employment and residential, commercial, and business development within the County. It is expected that these districts will continue to be the centers of growth and employment in the coming years.

Existing Conditions

Demographic Data

The current population of Isle of Wight County is estimated to be approximately 32,484 based on HRPDC forecasted growth rates and census data. The average County population density is approximately 103 persons per square mile. However, the density is greater around the Towns of Smithfield and Windsor since these areas contain a large percentage of the County population.

The County had an average median household income of \$45,387 in 1999. Low to moderate income households are defined as those families whose incomes is 80% or less of the median or \$36,309. An average of 2.61 people occupies each household in Isle of Wight County.¹

The manufacturing industry is the major source of employment for the County with approximately 47% of the workforce.² The second largest sector of occupation is in the retail trade area with about 7% of the employment of the County. This is closely followed by accommodations and food services (6%), health and social services (4.7%), and the construction industry (4.5%). There are numerous other employment sectors in the County that individually comprise 3.9% or less of the workforce.

¹ Weldon Cooper Center for Public Service, 2000

² Virginia Employment Commission, 2006

Population Projections

The HRPDC population estimate assumes an average annual growth rate of 1.78% which is slightly higher than the County historical growth rate of 1.64% between 1970 and 2000. The three districts will experience different growth rates due the amount of land zoned for development. The CDSO projections used the 1.78% growth rate since it has significantly less land zoned for residential and commercial development. The growth rates for the NDSO and WDSO are expected to be higher based on the land use plans and historical as well as anticipated residential construction in these two areas. Thus, this historical and anticipated residential construction was used to forecast the population growth for the NDSO and WDSO. An average of 300 new residential structures per year was used for the NDSO. The WDSO projections assumed an average of 35 new residential structures per year.

Proposed Waterline and Force Main Extension

The discussion of each of the DSO's includes proposed waterline and force main extension projects. These lines have been sized to provide service for areas assuming they have reached maximum development based on the land use designation. Current demand patterns and proposed developments should be taken into consideration prior to construction of such lines, especially in the case of waterlines. The extension of waterlines into areas where there is little demand may propagate water quality issues.

Newport Development Service District

Overview

The Newport Development Service District (NDS) is in the northern part of the County and is bordered by the Town of Smithfield to the west and Chuckatuck Creek to the east. This district replaces the former larger Northern Development Service District established in 1991. The district is bisected by the two (2) primary roads of Route 258 and Route 17. Route 17 connects to the James River Bridge which serves as one of the main transportation routes between the Peninsula and the Southside Tidewater Area. The NDS is expected to experience a high level of growth due to the availability of public utilities and its proximity and accessibility to the Hampton Roads area.

The present NDS is primarily residential and commercial and this trend will continue in the future because of the land use plan. The majority of the 10.91 square miles in the NDS has been designated as mixed used activity, business and employment, suburban residential and suburban estate. The designated land uses will help foster the expected residential and commercial development to take place.

The estimated residential population of the NDS is approximately 3,474 people. The population is expected to be 26,964 people by the year 2035. It is assumed that virtually all of the new population growth will be served by public utilities.

The NDS is also expected to have commercial growth in the areas selected for business and employment. Recent historical data from the 2005 annual report shows a total of twenty-six new commercial building permits from 2001 through 2004. This equates to an average of 6.5 new commercial building permits per year for the NDS.

Existing Water Facilities

The NDS obtains water from the Western Tidewater Water Authority. The County and the City of Suffolk formed the Western Tidewater Water Authority (WTWA) in 1998. This agreement benefits the County by allowing its Newport Development Service District to access 1 MGD of the City of Suffolk's treated water supply. The County is currently using approximately 21% of this water supply. There is a 16" water main along the Route 17/Route 258 corridor from Suffolk to the Town of Smithfield. This serves as the main distribution source for NDS water system. A 1,000,000 gallon elevated water tank at Bartlett provides the storage for the NDS distribution system.

There are also individual wells and community systems that provide water to residents not connected to the main distribution system. There are currently five private existing water systems located throughout the NDS. A summary description of each system with information regarding deficiencies is provided in Table 1.

Table 1 – Private Water Systems

Private Community	No. of Wells	Pump Yield (GPM)	Prod. Capacity (ERC)	Storage Capacity (ERC)	Design Capacity (ERC)	Problems
Brewers Creek	2	82	124	117.0	80	
Cannon Acres	1	30	60	63.3	52	
Pine crest MHP	1	NA	NA	NA	49	Yes
Queen Anne’s Court	2	80	160	83.3	83	
Red Oaks MHP	3	30	60	16.7	178	Yes

Note: Problems indicate either insufficient production capacity, storage capacity, or water quality problems.

Existing Wastewater Facilities

Isle of Wight does not currently own any wastewater treatment facilities within the NDSD. The County does own and maintains a sewer system consisting of gravity sewer, force mains, and pump stations. This County system is served by a HRSD 30” force main that follows the main highway corridor in the district. This force main parallels Route 17 from Chuckatuck Creek to Bartlett, then proceeds west along Route 258 to Benn’s Church, then north along Route 10 to Smithfield. There is capacity in this force main to serve the NDSD, which provides a significant growth incentive especially with the possibility of County water service through the same corridor. The force main carries the wastewater to the HRSD Nansemond Treatment Facility in Suffolk. The Nansemond Treatment Facility has an average flow of 21 MGD and a capacity of 30 MGD.

The majority of residential and commercial structures built before 1996 are served by septic systems and some are starting to experience failures. The new commercial facilities and all new construction after 1996 are served by public sewer owned by the county and connected to the HRSD system. In the near future the County will have to begin addressing the issue of failing septic systems. The schedule for replacing the systems will depend on their level of deterioration and how it is affecting public health. The communities which experience problems affecting public health should be given precedence.

Demand Projections

The following table shows the population projections, demand, and storage requirements anticipated for the NDS. These projections assume that all future connections will be served by public water and sewer.

Table 2 - NDS Demand Projections

Year	Population Projection	Population Served	Demand (gpd)	Storage Required (gpd)
2010	7,389	5,947	667,950	515,709
2015	11,304	10,022	1,091,700	827,969
2020	15,219	14,097	1,515,450	1,140,230
2025	19,134	18,172	1,939,200	1,452,490
2030	23,049	22,247	2,362,950	1,764,751
2035	26,964	26,322	2,786,700	2,077,011

Notes:

1. Population initially based on US Census Data, population projections based on an average annual increase of 300 new residences anticipated/proposed in the NDS.
2. Projected population served assumes all new growth will be connected to the system. The projections also estimate 2% of the remaining residents on private systems will connect to the NDS annually (32 people/year or 160 people/every 5 years)
3. Demand Projections based on population served (100 gpd per person) by public utilities, existing commercial/business demand plus expected commercial growth. Expected commercial growth rate = 6.5 new commercial structures per year with an average demand of 500 gpd per structure.
4. Storage requirements based upon 200 gpd per equivalent residential connection plus 2 hour fireflow @ 500 gpm.

The NDS water distribution system currently serves approximately 717 residential and 27 business customers. The number of customers will increase due to development and from existing private communities that may experience problems with their wells. The water demand projections assume that all new population growth will be connected to the NDS distribution system. The projections also assume an average of 6.5 new commercial buildings per year based on the historical commercial building permits obtained from 2001-2004 (total commercial building permits obtained $26/4 = 6.5$ per year).

Water Model Analysis

The NDS was modeled using the existing distribution system plus the proposed extensions. The projected future demands outlined in Table 2 were used in the model analysis. The model showed that the distribution and storage system will be sufficient to sustain the projected demands at the peak hour under fire flow conditions through 2010. However, the projected demands will exceed the available water supply by 2015 and the storage requirements by the year 2020.

Proposed Water Facilities

The existing NDS water system has enough capacity and storage to support the expected growth over the next seven years. However, an additional water supply of 1.8 MGD will be needed to support the projected demands of the NDS through the year 2035. The NDS will also need an additional elevated storage tank with a capacity of 1.3 million gallons to provide the 2035 required storage.

The system may need some water line extensions to supply future development and remote well water systems which are having problems or will have problems in the future as their systems deteriorate. These problems may range between insufficient production capacity, storage, distribution system, and water quality. The systems which have water quality problems should take precedent over systems with insufficient production and/or storage since this is a public health concern. It would also be beneficial for the NDSO area to have an additional storage tank for reserve in the event of an emergency or required system maintenance.

Short Term – 0-10 years

The Carisbrooke Community is currently connected to the NDSO; however, it does have a well system which needs to be permanently abandoned. This involves demolishing the buildings, clearing the site, and abandoning the well. The Carisbrooke subdivision also needs to replace the existing water meters. It is recommended that the water line from Eagle Harbor be connected to the Carisbrooke development along Whippingham Parkway.

The projected demands in the NDSO will exceed the available water supply by 2015. The County should negotiate with the WTWA to obtain an additional 1 MGD of water to meet the demands of the NDSO 2025. A total of 3 MGD will be needed by 2035 based on the projected demands.

The Virginia Department of Health (VDH) waterworks requirements for daily storage capacity are 200 gallons per equivalent residential connection. Thus, the VDH storage requirements for 2035 would be 2,017,011 gallons (26,322 people/2.61 people per connection = 10,085 connections x 200 gallons). If a suggested fire storage capacity of 60,000 gallons (500 GPM over 2 hour period) is added, the total storage recommended would be 2,077,011 gallons.

The proposed location of the new tank is in the Bennis Church area. An additional tank will be needed to support two (2) proposed subdivisions of Bennis Grant and St. Luke's as well as commercial development. Also, this would give the NDSO a storage tank near each of the two major road intersections in the district. A minimum storage capacity of 1,300,000 gallons is recommended for the future storage tank. The Bennis Church area is approximately 22' higher in elevation than the Bartlett Tank. An inline booster station is recommended on Brewer's Neck Boulevard west of the existing tank to sustain system pressure in the Bennis Church area.

In addition to the Bennis Church tank, it is recommended that a 16" waterline is extended south along Bennis Church Boulevard to support the Bennis Grant Subdivision. This waterline extension would also provide a future tie in point to Suffolk and the WTWA effectively looping the water system. The looped system would reduce problems with water stagnation and also provide redundancy in an emergency or maintenance situation for the connection points.

The future development of areas within the NDSO may require new waterline extensions. These projects are listed below based on the road name which the waterline would parallel.

Reynolds Drive Waterline Extension

The Reynolds Drive waterline extension would create a loop from the Eagle Harbor subdivision to the intersection of Brewer's Neck Boulevard and Reynolds Drive and consists of approximately 13,800 LF of 12", 10", and 8" waterline.

Campbell's Chapel Drive Waterline Extension

The Campbell's Chapel Drive extension would provide water service through 5,300 LF of 8" pipe from the intersection of Brewer's Neck Boulevard to New Town Haven Lane.

New Town Haven Lane Waterline Extension

This project would extend 1,600 LF of 8" waterline down New Town Haven Lane to the intersection of Campbell's Chapel Drive.

Deep Bottom Drive Waterline Extension

The Deep Bottom Drive project would create a loop along Deep Bottom Drive with 4,000 LF of 8" waterline between Brewer's Neck Boulevard and Carrollton Boulevard.

Turner Drive Waterline Extension

This project involves constructing 4,700 LF of 8" waterline down Turner Drive to the NDSD Boundary.

Norsworthy Drive Waterline Extension

The Norsworthy Drive project would extend 2,300 LF of 10" waterline from Reynolds Drive to Brewers Creek Boulevard.

Long Term – 20-30 years

The NDSD 2035 projected demand of 2.78 MGD will require additional water from the WTWA. If the expected residential development occurs, the County will need 3 MGD from the WTWA to supply the NDSD. The cost of the additional water will be reflected in the rate for which the County purchases water from the WTWA.

Table 3 – NDSO Water Improvements Summary

Project	Number of Connections	0-10 Years
Carisbrooke/Eagle Harbor	N/A ¹	\$521,000
Benns Church Tank	N/A	\$3,052,000
Benns Church Blvd WL	N/A	\$1,116,000
NDSO Pump Station	N/A	\$589,000
Reynolds Drive W/L Ext.	N/A	\$1,862,000
Campbell’s Chapel Drive W/L Ext.	N/A	\$667,000
New Town Haven Lane W/L Ext.	N/A	\$220,000
Deep Bottom Drive W/L Ext.	N/A	\$556,000
Turner Drive W/L Ext.	N/A	\$582,000
Norsworthy Drive W/L Ext.	N/A	\$378,000
Total for Water		\$9,543,000

Notes:

1. The number of connections was not included since these systems are already connected to the NDSO.
2. Costs include professional services and contingencies in present day dollars.

Proposed Wastewater Facilities

The HRSD force main currently has capacity for the projected residential and commercial growth in the NDSO. The County is not anticipating funding extensions in support of economic development. However, many residents in the community are experiencing problems with their septic systems due to poor soil conditions. It is expected that the number of failing septic systems will increase in the future due to age and soil conditions. These neighborhoods will need a method to dispose of their wastewater.

Short Term – 0-10 years

The feasibility of replacing the failing septic systems is questionable due to the soil conditions and as development occurs, there will be less land area available for treatment systems. The availability and capacity of the HRSD force main in the NDSO makes it a practical solution for meeting the future sewer needs of these existing communities. The following communities have been identified by the local health department that currently need or will soon require sewer service.

Cannon Acres

The Cannon Acres neighborhood will need gravity sewer, pumping station, and associated force main to connect its existing 60 residential connections to the HRSD force main.

Rollingwood

Rollingwood has approximately 20 structures and will require the extension of gravity sewer, force main, and a sewage pumping station to serve the community.

Carisbrooke Subdivision

The Carisbrooke Community will need sewer service in the near future. The topography and layout of this subdivision will prevent the use of gravity sewer in serving the entire community.

It is expected that this community will require a combination of gravity sewer, individual grinder stations, force main, and a main pump station.

Channel Way

The Channel Way Community would need gravity sewer, force main, and one sewage pumping station to serve the approximate 15 structures.

Deep Bottom Drive

There are 20 residential connections in this area which would require gravity sewer, force main, and a pumping station.

Beechwood Drive

The Beechwood Drive project will comprise the extension of gravity sewer, force main, and one sewage pumping station to serve 20 structures in the community.

Booker T. Estates

The Booker T. Estates sewer system is currently under design and contains gravity sewer, a pump station, and a force main that will discharge into the HRSD force main.

Brewers Creek /Obrey/Green Meadows

There are approximately 130 residential connections requiring a combination of gravity sewer, force main, and pump stations.

The Laurels

The Laurels project will require gravity sewer, force main, and a pumping station to provide service for approximately 23 connections.

Pine Meadows

The Pine Meadows Subdivision will need gravity sewer, force mains, and several pump stations to serve approximately 41 residences.

The future development of areas with the NDSD may require force main extensions and pump stations to discharge wastewater into the HRSD force main.

Reynolds Drive Force Main Extension

The Reynolds Drive project will require approximately 14,600 LF of 8" force main and a minimum of one pump station.

Campbell's Chapel Drive Force Main Extension

The Campbell's Chapel Drive project would require approximately 5,300 LF of 8" force main and a pump station.

New Town Haven Lane Force Main Extension

This project will require a pump station and an estimated 2,700 LF of 8" force main.

Norsworthy Drive Force Main Extension

This project will require approximately 2,300 LF of 8" force and a pump station.

Benns Church Boulevard Force Main Extension

The Benns Church Boulevard force main will require approximately 6,200 LF or 12" force main and will need a minimum of one pumping station.

Table 4 – NDSW Wastewater Improvements Summary

Project	Number of Connections	0-10 Years Est. Cost
Beechwood Drive	20	\$1,278,000
Cannon Acres	60	\$1,500,000
Carisbrooke	179	\$3,506,000
Channel Way	15	\$1,375,000
Deep Bottom Drive	20	\$1,795,000
Rollingwood	20	\$1,058,000
Brewers Creek /Obrey/Green Meadows	130	\$6,954,000
The Laurels	23	\$1,659,000
Pine Meadows	41	\$4,444,000
Reynolds Drive	N/A	\$2,267,000
Campbell's Chapel Drive	N/A	\$1,205,000
New Town Haven Lane	N/A	\$965,000
Norsworthy Drive	N/A	\$972,000
Benns Church Boulevard	N/A	\$1,427,000
Total for Wastewater	508	\$30,274,000

Notes:

1. Costs include professional services and contingencies in present day dollars.

Windsor Development Service District

Overview

The Windsor Development Service District (WDS) is centrally located within the County and encompasses the area around the Town of Windsor. The WDS is split by Route 460 and the Norfolk and Southern Railway. This district covers approximately 13.9 square miles and is bordered by the City of Suffolk to the East. The majority of residential development is expected to occur within the Town of Windsor limits and has been designated as Town Growth Area. Approximately half of the district area outside of the Town is designated as conservation development which will result in very low population density if developed in the future. The two transportation routes establish a high potential for industrial growth within the district. The County has established the Shirley T. Holland Commerce Park for this expected industrial development. There is also the possibility of a large Intermodal Park for shipping containers to be developed in the WDS. This park could employ as much as 26,000 people by the year 2030.³ The WDS also includes approximately 210 acres on Route 460 just outside the western Town limits of Windsor designated for business and employment.

The Virginia Department of Transportation has conducted a study for improving the Route 460 corridor between I-295 in Prince George to Route 58 in Suffolk. A new alignment has been chosen to run parallel and south of the existing Route 460. The County does have some input on the portion of the new Route which is within Isle of Wight. The new 460 will have economic and development impacts on this corridor of the County.

The availability of main transportation routes and proximity to the Hampton Roads Ports makes Isle of Wight a candidate for receiving an Intermodal Park for ship container storage and transporting. The development of this park would occur on approximately 3,000 plus acres south of Windsor Town and the existing Shirley T. Holland Industrial Park. This facility could employ up to 26,000 jobs by the year 2030 and require a significant amount of water and sewer.

Existing Water Facilities

The County neither owns nor operates any water production facilities within the WDS. This makes Isle of Wight reliant on an independent political entity for its future water needs. The County obtains water from the Town of Windsor for the Shirley T. Holland Industrial Park by a 16" water main along Route 460. The agreement with the Town of Windsor is for 100,000 gpd of which the industrial park is using approximately 5,000 gpd. A County owned 600,000 gallon elevated tank provides storage for the industrial park. The Town, which is located in the center of the WDS, has four (4) production wells, three (3) small storage tanks, and two elevated storage tanks. The County has an agreement with the Town of Windsor to store up to half or 150,000 gallons of water in the 300,000 gallon elevated storage tank. There are approximately 850 customers served by the Windsor distribution system. The single family residences outside of the Town limits are served by individual well systems. The Town serves all customers located within the corporate limits of Windsor.

³ Isle of Wight Board of Supervisors meeting minutes, August 2005.

Existing Wastewater Facilities

The WSDS is served by a combination of a gravity and vacuum sewer system and several small treatment facilities. There are three pump stations which collect the wastewater from this system and discharge into a 20" HRSD force main. This force main is part of the HRSD system which discharges its wastewater to the Nansemond Treatment Facility in Suffolk. The WSDS system currently serves approximately 785 residential connections. The Clydesdale mobile home community north of the Town has its own wastewater treatment.

Demand Projections

Population Projections

The following table shows the population projections anticipated for the WSDS.

Table 5 - WSDS Total Population Projections

Year →	2010	2015	2020	2025	2030	2035
Surrounding Area	730	991	1,252	1,513	1,774	2,035
Windsor Town	2,775	3,102	3,429	3,756	4,083	4,410
WSDS Total	3,505	4,093	4,681	5,269	5,857	6,445

Note: Population initially based on US Census Data. Projections based on 25 new residential structures within the Town and 20 new residential structures in the district.

Table 6 - WSDS Population Served by County Water Utilities

Year →	2010	2015	2020	2025	2030	2035
Surrounding Area	116	232	348	464	580	696
Total	116	232	348	464	580	696

Note: Estimated approximately 75% of the new residential population growth outside the Town of Windsor will be low-density and expected to be served by individual well and septic. Estimate approximately 2% of existing population per year currently served by private utilities will join the County system.

Table 7 – WSDS Population Served by County Wastewater Utilities

Year →	2010	2015	2020	2025	2030	2035
Surrounding Area	116	232	348	464	580	696
Windsor Town	2,775	3,102	3,429	3,756	4,083	4,410
WSDS Total	2,891	3,334	3,777	4,220	4,663	5,106

Note: Estimated approximately 75% of residential population growth outside the Town of Windsor will be low-density and expected to be served by individual well and septic. Estimate approximately 2% of existing population per year currently served by private utilities will join the County system.

Table 8 - WSD Water Demand Projections

Year	Population Projection	Population Served	Demand (gpd)	Storage Required (gpd)
2010	730	116	252,850	186,425
2015	991	232	405,700	262,850
2020	1,252	348	558,550	339,275
2025	1,513	464	711,400	415,700
2030	1,774	580	864,250	492,125
2035	2,035	696	887,100	503,550

Notes:

1. Demand projections based upon 100 gpd per population served + 4.5 new commercial connections per year with a demand of 500 gpd each + industrial park demand of 100,000 gpd (this assumes the worst case scenario the industrial park will at capacity in 5 years)+ Intermodal Park Development Demand of 130,000 gpd every 5 years (5,200 people x 25 gpd) reaching a maximum of 650,000 gpd by the year 2030 (Assuming maximum employment of 26,000 jobs)
2. Storage requirements based upon 200 gpd per equivalent residential connection plus 2 hour fire flow @ 500 gpm.

Table 9 - WSD Wastewater Demand Projections

Year	Population Projection	Population Served	Demand (gpd)
2010	3,505	2,891	530,350
2015	4,093	3,334	715,900
2020	4,681	3,777	901,450
2025	5,269	4,220	1,087,000
2030	5,857	4,663	1,272,550
2035	6,445	5,106	1,328,100

Notes:

1. Demand projections based upon 100 gpd per population served + 4.5 new commercial connections per year with a demand of 500 gpd each + industrial park demand of 100,000 gpd (this assumes the worst case scenario the industrial park will at capacity in 5 years)+ Intermodal Park Development Demand of 130,000 gpd every 5 years (5,200 people x 25 gpd) reaching a maximum of 650,000 gpd by the year 2030 (Assuming maximum employment of 26,000 jobs)

The Town of Windsor is currently permitted to withdraw 630,000 gpd from its wells. The average water usage for the Town is approximately 200,000 gpd. Isle of Wight County has an agreement with the Town of Windsor for up to 100,000 gpd for the Industrial Park. There is currently only one customer in the park using approximately 5,000 GPD. This leaves 95,000 gpd of water for future industrial development in the park. The growth rate and demand projections could vary depending on what type of industry is developed. The projections above assume that the park will be using its maximum capacity of 100,000 gpd by the year 2010.

The projections also assume an average of 4.5 new commercial buildings per year based on the historical commercial building permits obtained from 2001-2004 (total commercial building permits obtained 18/4 = 4.5 per year).

The Intermodal Park project could employ 26,000 jobs by the year 2030. The Virginia Department of health (VDH) regulations for waterworks design flow estimates between 15-35 gpd (average of 25 gpd) per person for a factory. Applying the VDH criteria to the Intermodal Park equates to a possible maximum demand of 650,000 gpd by the year 2030.

Water Model Analysis

The WDS system was modeled based on the Industrial Park system plus the Town of Windsor distribution network. The model also incorporates connecting to the WTWA in the future.

The water model demonstrated that the existing storage should be capable of supporting the future demands at a sustainable pressure under County fireflow standards (500 gpm for 2 hours). However, if the fireflow requirements for the Intermodal Park exceed the County standard, additional storage may be required.

Proposed Water Facilities

Short Term – 0-10 years

There is a potential for economic development for the 210 acres designated business and employment West of Windsor along Route 460. The extension of a 12" water line along this corridor would allow for this type of development to occur. The County will require the developers finance the cost for this extension. However, the County would still need to negotiate with the Town of Windsor to obtain water for this development. The County could trade water with the Town of Windsor once supply is obtained from the WTWA.

The Western Tidewater Water Authority is a desirable alternative water source for future needs due to its supply capabilities and proximity to the WDS. Approximately 4.1 miles of 16" water main and a booster pump station would be required to connect the Industrial Park to the WTWA. The maximum projected demand for the area outside of the Town of Windsor by the year 2035 is 857,100 gpd (39,600 gpd residential + 67,500 gpd commercial + 100,000 gpd Industrial Park + 650,000 gpd Intermodal Park). Obtaining 1 MGD from the WTWA would be sufficient in meeting the County water needs in the WDS for the next 30 years.

Intermodal Park

The Intermodal Park will require water service and fire protection from the existing WDS distribution system. The extent of the distribution system required for the facility is unknown until a plan of the Park is developed and approved. However, it is recommended that the main line serving this development should be 16" to provide for the possible future demand. It is recommended that this water line is looped to minimize stagnation. The existing Industrial Park tank has enough storage to provide for the projected demand and a 500 gpm fireflow over a two hour period. However, if the Intermodal Park requires more than 500 gpm of fire protection, an additional storage tank may be required near the facility. If a 2,200 gpm fireflow is required, an additional 600,000 gallons of storage may be need at the Intermodal Facility.

Future development of areas within the WDS will require waterline extensions along the main roads. The following are extension projects which may be needed upon development.

Antioch Road

The Antioch Road extension is approximately 22,600 LF of 6" and 8" waterline along Antioch Road.

Stavemill Road

The Stavemill Road project would require an estimated 6,000 LF of 8" waterline from Route 460 to Antioch Road.

Courthouse Highway Waterline Extension

This project would consist of approximately 9,700 LF of 8" waterline from Route 460 to Antioch Road along Courthouse Highway.

Walters Highway & West Blackwater Road Waterline Extension

This project will require approximately 11,400 LF of 8" and 6" waterline creating a loop from Route 460 in Windsor to Antioch Road.

Deerpath Trail Waterline Extension

The Deerpath Trail project would need an estimated 7,000 LF of 8" waterline from Church Street to Antioch Road.

Buckhorn Drive Waterline Extension

This project will require an estimated 9,100 LF of 8" and 6" waterline from Route 460 to the WDSB Boundary south of the Town of Windsor.

Shiloh Drive & Lovers Lane Waterline Extension

This project would tie in the Deerpath Trail extension to the County's existing waterline along Route 460. Approximately 6,300 LF of 8" waterline would be needed.

Dunston Drive Waterline Extension

The Dunston Drive waterline would connect the Buckhorn Drive and Intermodal Park extensions and would require an estimated 5,000 LF of 8" pipe.

Table 10 – WDSB Water Improvements Summary

Project	Number of Connections	0-10 Years Est. Cost
Route 460 West W/L	30	\$1,764,000
WTWA Connection	N/A	\$3,912,000
Intermodal Park W/L	N/A	\$3,210,000
Intermodal Park Tank	N/A	\$1,492,000
Antioch Road	N/A	\$2,681,000
Stavemill Road	60	\$720,000
Courthouse Highway W/L Ext.	N/A	\$1,148,000
Walters Hwy & West Blackwater Rd. W/L Ext.	N/A	\$1,462,000
Deerpath Trail W/L Ext.	N/A	\$831,000
Buckhorn Drive W/L Ext.	N/A	\$1,139,000
Shiloh Drive & Lovers Lane W/L Ext.	20	\$814,000
Dunston Drive W/L Ext.	N/A	\$618,000
Total for Water	110	\$19,791,000

Notes:

1. Costs include professional services and contingencies in present day dollars.

Proposed Wastewater Facilities

There will not be a need for new wastewater treatment facilities in the WSDS since the existing 20" HRSD force main has the capacity to support future growth. However, there will be a need for additions to the vacuum sewer system, new sewage pumping stations, and new force mains to support the residential and commercial growth. The majority of the cost for these projects is expected to be funded by developers. Though, new sewer service is going to be needed for those communities around Windsor that are currently experiencing or expected to have problems with their septic systems.

The industrial park may require additional gravity sewer. When exactly it will be needed depends on the future growth rate of the industrial park. The expansion of the gravity system should be handled on an as-needed-basis dependent upon the prospect of new industry. The cost of this additional sewer will be funded by the developer.

Short-Term – 0-10 years

Shiloh Drive/Carolwood/Lovers Lane

Sewer service will need to be extended to the Shiloh Drive and Lovers Lane area due to problems with existing septic systems. The sewer will involve installation of gravity sewer, two pumping stations, and force main in the existing Shiloh Drive and Lovers Lane area which will serve approximately 125 structures.

Route 460 West Sewer Project

The existing communities west of Windsor along Route 460 with approximately 150 structures will need to be served by the extension of gravity sewer and two (2) pumping stations.

Stavemill Road Sewer Project

The Stavemill Road area has approximately 100 structures that are going to need sewer service in the near future. It is recommended that this area be served by gravity sewer and a pump station which discharges into the HRSD force main.

Old Suffolk Road/Old Mill Road Sewer Project

The Old Suffolk and Old Mill Road area will need sewer service to replace the existing septic system. There are approximately 15 structures in this area that will need to be provided with a gravity sewer, pump station, and force main system.

Intermodal Park

The Intermodal Park will need to be served with public sewer utilities. The extent of the sewer system is unknown until a plan of the Park is developed and approved. However, a general cost estimate was prepared based on the assumptions of one (1) mile of 8" gravity sewer and manholes, approximately two (2) miles of 12" forcemain, and one (1) pump station. The County will require the developer to fund the sewer required for this facility.

Additional sewer projects may be required contingent upon development. Sewer service will need to be provided by the developer for these projects; however the appropriate line sizes are shown on the figures.

Antioch Road Force Main Extension

This extension will involve an estimated 21,600 LF of 4" and 6" force main and several pump stations along Antioch Road.

Stavemill Road Force Main Extension

This project consists of extending 1,900 LF of 4" force main from Antioch Road to the Stavemill Road Sewer Project.

Courthouse Highway Force Main Extension

The Courthouse Highway force main would extend approximately 9,700 LF of 6" force main from Route 460 to Antioch Road.

Walters Highway & West Blackwater Road Force Main Extension

This project consists of extending 8,600 LF of 6" force main from the DSD boundary along Walters Highway and West Blackwater Road to Route 460.

Buckhorn Drive Force Main Extension

This project consists of extending 9,100 LF of 6" force main from Route 460 South to the DSD boundary.

Dunston Drive Force Main Extension

The Dunston Drive project would extend 5,000 LF of 6" force main from Buckhorn Drive to Tyler Drive.

Deerpath Trail Force Main Extension

This project would involve approximately 7,000 LF of 6" force main from Antioch Road to Church Street.

Table 11 – WSDS Wastewater Improvements Summary

Project	Number of Connections	0-10 Years Est. Cost
Shiloh Drive	20	\$3,251,000
Route 460 West	30	\$3,254,000
Stavemill Road	60	\$1,897,000
Old Suffolk/Old Mill	15	\$1,024,000
Intermodal Park	N/A	\$4,139,000
Antioch Road FM Ext.	N/A	\$2,021,000
Stavemill Road FM Ext.	N/A	\$747,000
Courthouse Highway FM Ext.	N/A	\$1,305,000
Walters Hwy & West Blackwater Rd. FM Ext.	N/A	\$1,358,000
Buckhorn Drive	N/A	\$1,417,000
Dunston Drive	N/A	\$1,007,000
Deerpath Trail	N/A	\$1,141,000
Total for Wastewater	125	\$22,561,000

Notes:

1. Costs include professional services and contingencies in present day dollars.

Camptown Development Service District

Overview

The Camptown Development Service District (CDS) is located in the southern tip of Isle of Wight County and encompasses the Camptown area (bound by the City of Franklin, City of Suffolk, Route 615 and a conservation development area to the north). See the attached Figures 6&7 for the CDS boundaries.

The Camptown area is approximately 10.17 square miles of total land area.

The Camptown area hosts Franklin Municipal Airport, Norfolk and Western Railroad, CSX Railroad, International Paper Inc., Franklin Equipment Company, and the Jamestown and Airport Drive residential communities.

Existing Water Facilities

Camptown Area

Through an existing bulk water purchase agreement (200,000 gallons per day), the City of Franklin supplies water to the Camptown area. The County currently uses approximately 120,000 gallons of water per day. The City has a 12-inch waterline that connects to the County's 8-inch line where Route 58 crosses over the border between Isle of Wight and the City of Franklin. The County has a 750,000 gallon elevated water tank on Carver Road to provide water storage for the area.

The permitted groundwater withdrawal for the City of Franklin is 2.6 MGD. The Current water usage total is approximately 2.4 MGD, leaving an estimated 0.2 MGD excess capacity in the City's well system.

While the City of Franklin's wells are currently operating below their permitted capacity, expanded service to the Camptown area is constrained by transmission capacity and pressure concerns.

The majority of the Camptown water distribution system has been replaced. Areas along Carrsville Highway, North Lynn Road, Airport Road, Walters Highway, and around International Paper may need to be replaced to handle higher demand capacity as economic growth occurs in these areas.

International Paper Corporation operates an industrial site in the Camptown area. They operate a privately owned water system, and are permitted to withdraw 32 million gallons per day from their wells. The International Paper system is independent of the County's water system.

Existing Wastewater Facilities

Camptown Area

Sewer treatment service to the Camptown area is provided by the Franklin wastewater system. A cooperative agreement between Isle of Wight County and the City of Franklin allows Isle of Wight to discharge up to 333,000 gpd of wastewater into the Franklin system. The County currently discharges approximately 130,000 gpd. International Paper discharges a portion of their wastewater to the County's system, thereby accounting for the difference in the water consumption and wastewater discharge values.

The County owns and operates the sewage collection and conveyance system within the Camptown area which includes gravity sewer, six (6) pump stations and force main. Pump station number 6 will require reconditioning and upgrading to provide for anticipated future commercial and industrial growth. The entire gravity sewer system was inspected by closed circuit television and found to be in excellent condition.

There are several locations within the Camptown area currently utilizing private treatment systems or drainfields, which are either failing and/or lack available space for replacement drainfields. The Airport Road and Johnson Circle area located in the center of Camptown are two such locations. Extension of public sewer service to these locations is critical.

Demand Projections

The following table shows the population projections anticipated for three different areas comprising the CDS.

Table 12 - CDS Population Projections

Year →	2010	2015	2020	2025	2030	2035
Camptown area	897	980	1,070	1,169	1,277	1,394

Note: Population initially based on US Census Data, projections based on 1.78% annual increase in population as projected by Hampton Roads Planning District Commission.

Camptown Area Demand Projections

As discussed previously, the Camptown Area water usage is approximately 120,000 gpd. Utilizing the population projection, the water demand for the Camptown area is expected to be as follows:

Table 13 – Camptown Water Demand Projections

Year	Population Served	Demand (gpd)	Storage Required (gpd)
2010	897	169,700	128,714
2015	980	178,000	135,096
2020	1,070	187,000	141,973
2025	1,169	196,900	149,579
2030	1,277	207,700	157,790
2035	1,394	219,400	166,809

Note:

1. Demand projections based on 100 gpd per person from historical water usage + 80,000 gpd for Industrial/Business
2. Storage requirements based upon 200 gpd per equivalent residential connection plus 2 hour fire flow @ 500 gpm.

The County’s agreement with the City of Franklin for 200,000 gallons of water per day will meet the projected demands for the Camptown area. However, the existing booster station and transmission main would require upgrading to handle the future capacity.

The Camptown Area discharges more wastewater to the City of Franklin than it uses in water. This is assumed to result from the wastewater discharged by International Paper to the County’s collection system. International Paper currently obtains the bulk of their water from their own system, but it is estimated that they use approximately 30,000 gpd of the County’s water. International Paper also has their own wastewater treatment system and discharges the bulk of their wastewater via their own VPDES permit. However, they do discharge a portion of their wastewater to the County. International Paper is discharging an estimated 90,000 gpd into the local sewer system.

Table 14 - Camptown Wastewater Demand Projection

Year →	2010	2015	2020	2025	2030	2035
Demand (gpd)	259,700	268,000	277,000	286,900	297,700	309,400

Note: Water Demand + 90,000 gallons from International Paper

Water Model Analysis

A water model was developed for the existing CSDS system and the proposed future expansion. The 750,000 gallon elevated tank on Carver Road will have the required storage capacity for the projected domestic demand in the Camptown Area.

Proposed Water Facilities

Short-Term – 0-10 years

The County has a 1 MGD withdrawal permit from the Department of Environmental Quality (DEQ) which will expire in 2007. This withdrawal permit should be utilized before it expires. It is recommended that the County develop a well and water treatment system at the existing tank site. The treatment system would consist of an expandable reverse osmosis (R.O.) system. Treatment by R.O. removes essentially 100% of the fluoride and other mineral salts. Initially the system would be capable of supplying 340,000 GPD with one R.O. unit. The facility should be

sized so that a second R.O. unit could be added in the future. The second R.O. unit would enable the facility to supply 680,000 GPD.

The County may want to consider extending water service, approximately 12,750 LF, from the existing water tank site up to the intersection of Beaverdam Road and Route 58 (Route 58 Water Main). This may potentially help spur development along the Route 58 corridor in the future.

The future development of areas within the CDSB may require new waterline extensions. These projects are listed below based on the road name which the waterline would parallel.

Airport Drive / Johnson Circle Waterline Extensions

This project involves the extension of approximately 5,300 LF of 8" diameter waterline from Carrsville Highway along Airport Drive to Johnson Circle.

Beaverdam Road Waterline Extensions

The Beaverdam Road extension involves an estimated 6,400 LF of 8" diameter waterline to run from Walters Highway to the Carrsville Highway.

Great Mill Highway Waterline Extensions

This project would require approximately 6,900 LF of 8" waterline from Union Camp Drive down Great Mill Highway to the boundary of the DSD.

Lee's Mill Road Waterline Extensions

The Lee's Mill Road project would need an estimated 3,300 LF of 12" diameter and 8,500 LF of 8" diameter waterline to extend from Carver Road to the boundary of the DSD.

Union Camp Drive Waterline Extensions

This project would involve approximately 4,000 LF of 12" diameter waterline from Carver Road to the intersection of Wash Hole Road and Great Mill Highway.

Walters Highway Waterline Extensions

The Walters Highway extension would need roughly 7,900 LF of 8" diameter waterline to run from the Carver Road/Carrsville Highway vicinity to Beaverdam Road.

Wash Hole Road Waterline Extensions

This project would extend approximately 9,200 LF of 8" diameter waterline from Union Camp Drive to the boundary of the DSD.

Table 15 –CDS Water Improvements Summary

Project	Estimated Connections	0-10 Years Est. Cost
RO System at Tank Site	N/A	\$3,285,000
Route 58 Watermain (from Tank)	20	\$2,620,000
Airport Drive / Johnson Circle W/L Ext.	40	\$684,000
Beaverdam Road W/L Ext.	N/A	\$796,000
Great Mill Highway W/L Ext.	N/A	\$846,000
Lee's Mill Road W/L Ext.	N/A	\$1,591,000
Union Camp Drive W/L Ext.	N/A	\$584,000
Walters Highway W/L Ext.	N/A	\$1,017,000
Wash Hole Road W/L Ext.	N/A	1,154,000
Total	60	\$12,577,000

Notes:

1. Costs include professional services and contingencies in present day dollars.

Proposed Wastewater Facilities

It may be feasible for HRSD to extend service to the area in the future depending upon the wastewater needs of the City of Franklin, Southampton County, and the City of Suffolk. The potential combined number of connections from some or all of these municipalities may attract HRSD service to this part of the County.

The future development of areas within the CDSB may require new gravity sewers, pumping stations, and force mains. These projects are listed below based on the road name which the project would be adjacent.

Short Term – 0-10 years

Camptown

The Airport Road and Johnson Circle communities will need gravity sewer, pumping station, and force main. The force main would discharge into the existing gravity sewer in the Camptown area and would be treated by the Franklin Wastewater Facility.

Beaverdam Creek Road

The County may want to consider extending sewer service to the intersection of Beaverdam Creek Road and Route 58. This may potentially help spur development along the Route 58 corridor in the future.

Airport Drive and Johnson Circle Sewer Project

This project requires approximately 3,700 LF of 8" diameter gravity sewer, pumping station, and 3,000 LF of 4" diameter force main.

Beaverdam Road Sewer Project

This project would need 3,900 LF of 8" diameter gravity sewer, pumping station, and 15,300 LF of 12" diameter force main.

Great Mill Highway Force Main Extensions

This project would require approximately 6,900 LF of 8" force main from Union Camp Drive down Great Mill Highway to the boundary of the DSD.

Lee's Mill Road Force Main Extensions

The Lee's Mill Road project would need an estimated 3,300 LF of 12" diameter and 8,500 LF of 8" diameter force main to extend from Carver Road to the boundary of the DSD.

Route 58 Force Main Extensions

This project involves extending 16,500 LF of 12" FM from Carver Road and Route 58 to the boundary of the DSD.

Union Camp Drive Force Main Extensions

This project would involve approximately 4,000 LF of 12" diameter force main from Carver Road to the intersection of Wash Hole Road and Great Mill Highway.

Walters Highway Force Main Extensions

The Walters Highway extension would need roughly 7,900 LF of 8" diameter force main to run from the Carver Road/Carrsville Highway vicinity to Beaverdam Road.

Wash Hole Road Force Main Extensions

This project would extend approximately 9,200 LF of 8" diameter force main from Union Camp Drive to the boundary of the DSD.

Table 16 – CSDS Wastewater Improvements Summary

Project	Estimated Connections	0-10 Years Est. Cost
Beaverdam Road Sewer Project	20	\$758,000
Airport Drive / Johnson Circle Sewer Project	40	\$1,527,000
Beaverdam Road FM Ext.	N/A	\$1,322,000
Great Mill Highway FM Ext.	N/A	\$1,365,000
Lee's Mill Road FM Ext.	N/A	\$1,966,000
Route 58 FM Ext.	N/A	\$2,905,000
Union Camp Drive FM Ext.	N/A	\$1,191,000
Walters Highway FM Ext.	N/A	\$1,355,000
Wash Hole Road FM Ext.	N/A	\$1,596,000
Total	60	\$13,985,000

Notes:

1. This number of connections is also included in the FM project.
2. Costs include professional services and contingencies in present day dollars.

Rural Areas

A majority of the County consists of rural and agricultural land. Agriculture is a significant industry and a core component of the County's character. The land use plan will preserve this rural and agricultural character by limiting the residential development. Any residential development in these areas will be limited to a density of 1 unit per five acres. The single family residences built in these areas will be served by individual well and septic systems.

Community Centers

There are several existing villages within the County which function as a hub for business, public services, and residential development for the surrounding area. These areas typically have a greater population density than the surrounding area and may contain churches, businesses, post offices, emergency services, and public buildings. There are ten (10) of these village centers located at Rushmere, Battery Park, Rescue, Uzzle's Church, Isle of Wight Courthouse, Central Hill, Orbit, Zuni, Colosse, and Walters. The land use plan will limit the growth of the existing community centers.

Rushmere

The Rushmere water system contains a well house, two (2) deep wells, a 30,000 gallon storage tank, two (2) booster pumps, a 5,000 hydro tank, and distribution system serving 105 customers. The production system needs an alarm and approximately half of the distribution system needs to be replaced.

Uzzles Church

The Uzzles Church Community is located around the intersection of Route 692 and Route 654. This community began as a Methodist Congregation in the 18th century and contains approximately 20 homes, equipment repair shop, general store, and a church. The structures are served by individual well and septic systems.

Central Hill

The Central Hill village center is located 1.5 miles west of Route 258 on Route 637. There are approximately 80 homes, two churches, and local grocery store/gas station are served by a community well system, individual wells, and septic.

Isle of Wight Courthouse

The Courthouse Complex is situated on Route 258 between Windsor and Smithfield. The area also contains a post office, several small businesses, and approximately 45 residences. All of the structures in this community obtain groundwater from wells.

The Isle of Wight Courthouse Complex is served by five individual septic tank/drainfield systems. The Isle of Wight Academy located in this area is served by its own wastewater treatment facility. All other residences and businesses in the vicinity have individual septic systems.

The Courthouse Complex well system includes a single three inch well, a 1,000 gallon pressure tank, well house and distribution system serving approximately five customers including the County Government Complex.

Orbit

Orbit is positioned around the Route 637 and Route 605 crossroads. This area is traditionally a rural farming community. There are approximately 54 residences, two churches, and a grocery store in this community. It is served by individual well and septic systems. Any future growth in this community is expected to be low density and will be served by individual well and septic.

Walters

The Walters Village Center can be found between Windsor and Franklin along Route 258. Individual well and septic sewage disposal serve the area church, store, and approximately 67 residences.

Colosse

This community is located on Route 641 southeast of Route 258 and contains approximately 33 structures. The community is served by individual well and septic systems.

Battery Park

The Battery Park well system has experienced high fluoride content. The current system serves 70 residential customers and there are no plans for further development. The Battery Park system is interconnected to the Gatling Point System. The Town of Smithfield has the available capacity to supply the Battery Park community with water. The distribution system would require upgrading if fire protection is desired.

Rescue

Rescue is located on the east side of Jones Creek and is primarily a fishing community. The village contains two marinas, a post office, a couple of businesses, and approximately 83 residences. This system is currently experiencing a problem with fluoride in its well water.

The waterworks system (Permit 3093400) is owned by Rescue Waterworks. The system includes one well with a system design capacity of 33,200 gpd (83 ERC). The well has a yield of 145 gpm while the pump yield is 114 gpm. The production capacity is 228 ERC with a storage capacity for 8.33 ERCs. This system was grandfathered in due to the existing permit.

Zuni

The Zuni community is located on Route 460 near the Southhampton County border. It is a farming community which has had a significant peanut market due to surrounding agricultural land. Approximately 86 homes, three churches, a post office, two lodges, a dentist office, a grocery store/gas station, and three shops are located in Zuni.

The County owned Zuni well system consists of a single well, five pressure tanks, one 10,000 gallon storage tank, two booster pumps, a well house and distribution network that serves approximately 27 customers. The distribution system was recently replaced and the production system does not currently need any improvements.

Carrsville

The Carrsville Village includes an Elementary School, fire station and post office. As with the Camptown Area, the railroad runs through the center of the village. Development within the Village Area has been constrained due to the availability of public facilities to foster growth. The Carrsville area is comprised of primarily residential and small commercial customers.

The Carrsville Elementary School well is connected to and supplies the community water system in addition to the school. The County maintains the well while the School Board possesses ownership. This well and the community house well will be abandoned once the new wells are online due to existing high fluoride levels.

There are currently three (3) additional wells serving the Carrsville village system, however, only one is utilized. The well on Community House Road is active, and the other two wells are not on-line and have been abandoned. The current Carrsville well has had high fluoride levels (exceeding the maximum contaminant limit of 4.0 ppm). After evaluating several options, the County has decided to drill two (2) new groundwater replacement wells.

The new wells are located behind the volunteer fire station within 50-60 feet of each other. They are designed to alternate in operation. The specifics of the new well system are as follows:

Table 17 – Proposed Carrsville Well System

	Well #1	Well #2
Well Yield	100 gpm	150 gpm
Well Pumping Rate	85 gpm	82 gpm
Fluoride level	3.22 ppm	3.25 ppm

The new well system will include a 25,000 gallon ground storage tank and 6,951 gallon hydro pneumatic pressure tank, providing a total effective volume of 24,730 gallons. The County is currently awaiting Virginia Department of Health approval before the new wells can be connected to the distribution system and put on-line.

A portion of the Carrsville water distribution system is being replaced with new 4" pipe. Water meters will also be installed (individual connection water usage was previously unmetered). The 4" pipe will not provide any fire protection and therefore there are no fire hydrants installed on the system. There are currently approximately 108 individual water connections in Carrsville.

The Carrsville community does not currently have a public wastewater system. The elementary school discharges to its own wastewater treatment lagoon. The remainder of the area utilizes privately owned, individual drainfields.

The new Carrsville well pumps are capable of pumping a minimum of 82 gpm. The DEQ groundwater permit is expected to permit an average withdrawal of 40,419 gpd. The County will need to increase the well capacity and withdrawal permit or find another supply source for the Carrsville community. If larger pumps are installed matching the minimum well yield of 100 gpm, a water demand of 75,000 gpd can be supported. However, the Carrsville community is limited by storage capacity.

The Carrsville area is not currently served by a public sewer or treatment system. The Carrsville Elementary school has its own wastewater lagoon while the rest of the community discharges wastewater to individual drainfields. The development of this area will be limited based on the soil conditions and land available to accept new septic drainfields unless Carrsville is served by public sewer.

Other Communities

County Owned

Smithfield Heights Well System

The Smithfield Heights system includes two wells (Smithfield Heights and Sandy Mount) a 10,000 gallon storage tank and a 5,000 gallon pressure tank, well houses and distribution system serving approximately 163 customers. This system is to be replaced with two (2) new production wells at Sandy Mount, one 50,000 gallon storage tank, and a 6,031 pressure tank. The Smithfield Heights system will be demolished and abandoned. There will be additional development in the Smithfield Heights neighborhood adding 25 new residential connections.

Bethel Heights Well System

This system consists of a single 6 inch well, a 50 gpm 5 hp submersible pump, two 1,000 gallon pressure tanks, well house and a 4 inch PVC distribution system serving 23 customers. The system needs replacement of the control electronics, alarm system, a 5,000 gallon storage tank and booster pumps.

Days Pointe Well System

This system consists of a single 6 inch well, a 5,000 gallon pressure tank, well house and distribution system serving approximately 81 customers. The Days Pointe Well System needs the following: one 15,000 gallon ground storage tank, two (2) booster pumps, new control electronics, an alarm system, replacement of half of the distribution system, new fire hydrants and water meters.

Gatling Pointe Water System

The Gatling Pointe system includes a single 6 inch well, a 610 gpm pump, an 81,000 gallon ground storage tank, two 325 gpm transfer pumps, a 5,000 gallon pressure tank, well house and distribution system serving approximately 525 customers. The primary source of water for this system is the Town of Smithfield via the Battery Park interconnection. The existing wells used

for emergency only. The water meters in this system need replacement, and the line that interconnects Gatling Point & Battery Park needs replacement.

The County has an agreement with the Town of Smithfield for 100,000 GPD. This agreement supplies water for the Gatling Pointe and Battery Park communities. This system may be annexed by the Town of Smithfield in the future.

Thomas Park Well System

Thomas Park has a single 6" well system yielding 15 gpm with a 10,000 gallon storage tank, two (2) booster pumps and a 2,000 gallon pressure tank, well house and distribution system serving 33 customers. The system needs control electronics and an alarm system.

Tormentor Creek Well System

This system consists of a single well, a 5,000 gallon pressure tank, well house and system supplying 23 customers. The system needs replacement of control electronics, an alarm system, booster pumps, and an additional 15,000 gallons of storage. Approximately half of the distribution system needs to be replaced including fire hydrants, fire storage, and replacement of the water meters.

Privately Owned

Ashby Subdivision

The Ashby Subdivision system (Permit 3093049) is located in the Ashby Subdivision. The system is owned by C&P IOW Water Company. The system includes three wells. The system design capacity is 36,000 gpd (90 ERC). The well yield is 200 gpm. The pump yield is 160 gpm. Production capacity of the RO treatment system is 300 ERC (120,000 gpd). Storage capacity is available for 199 ERCs. Treatment capacity is available for 106.4 ERC.

Brewer's Creek

The Brewer's Creek system (Permit 3093115) is located in the Brewer's Creek Subdivision. The system is owned by C&P IOW Water Company. The system includes two wells. The system design capacity is 32,000 gpd (80 ERC). The well yield is 90 gpm. The pump yield is 82 gpm. Production capacity of the RO treatment system is 124 ERC (49,600 gpd). Storage capacity is available for 117 ERCs. Treatment is only available for 42.5 ERCs.

Cherry Grove Acres

The Cherry Grove Acres system (Permit 3093180) is located in the Cherry Grove Acres Subdivision. The system is owned by Central Water Systems, Inc. The system includes one well. The system design capacity is 19,600 gpd (49 ERC). The well yield is unknown. The pump yield is 77 gpm (110,880 gpd). Production capacity is 154 ERC (61,600 gpd). Storage is available for 54 ERC. The system is limited to 49 ERC due to one well.

James River Shore Acres

The James River Shores Acres system (Permit 3093319) is located in James River Shores Subdivision. The system is owned by Central Water Systems, Inc. The system includes one well. The system design capacity is 12,000 gpd (30 ERC). The well yield is 60 gpm. The pump yield is 60 gpm. Production capacity is 120 ERC (48,000 gpd). Storage is only available for 8.33 ERCs.

Longview Acres

The Long View Acres system (Permit 3093324) is located in Long View Acres subdivision in the southern portion of the NDS. The system is owned by Central Water Systems, Inc. The system includes one well. The system design capacity is 19,600 gpd. Well yield is 60 gpm (86,400 gpd). Pump yield is 36,000 gpd (90 ERC). Production capacity is 90 ERC. Storage is only available for 53.3 ERCs.

Murphy's Trailer Court

The Murphy's Trailer Court system (Permit 3093330) is located in Murphy's Trailer Court. The system is owned by the Estate of Bob Murphy, Sr. The system design capacity is 19,600 gpd (49 ERC). There is no information available on well yield, pump yield, or production capacity. Storage is only available for 3.3 ERCs. VDH records indicate the permit for this system was issued on February 1, 1980 with a variance to Sections 5.08.02 and 6.00 of the VDH Waterworks

Regulations. The variance required metering of total water production (5.08.02) and implementation of a cross-connection/backflow prevention program (6.00) by February 1, 1981. This system currently serves 49 connections. Only 1,500 gallons is available for storage which is less than VDH requirement for one connection. Based on VDH standards, 7,350 gallons of storage are required for this system. The most recent VDH Survey Report indicates several deficiencies. This report also indicates a cross-connection/backflow prevention program is required. Improvements are currently planned to bring this system into compliance with VDH regulations.

Pinecrest MHP

The Pinecrest MHP system (Permit 3093381) is located in Pinecrest MHP. The system is owned by J. R. McKinney. There is no information available on well yield, pump yield, or production capacity. The system design capacity is 980 gpd (20 ERC). VDH records indicate the permit for this system was issued on February 1, 1980 with a variance to Sections 5.08.02 and 6.00 of the VDH Waterworks Regulations. The variance required metering of total water production (5.08.02) and implementation of a cross-connection and backflow prevention program (6.00) by February 1, 1981. This system currently serves 20 connections. Only 120 gallons is available for storage which is less than VDH requirement for one connection. Based on VDH standards, 3,000 gallons of storage are required for this system.⁴ The most recent VDH Survey Report indicates the system is well maintained and is currently in compliance with all administrative and monitoring requirements.

Red Oaks Mobile Community

The Red Oaks Mobile Community system (Permit 3093316) is located in Red Oaks Mobile Community in the southern portion of the NDSD. The system is owned by Coastal Investors, Inc. The system design capacity is 178 trailer connections (53,400 gpd). The system consists of three wells. The well yield is unknown. Pump yield is 30 gpm. Production capacity is 60 ERC. Storage is only available for 16.7 ERC. The system is allowed to continue based on existing permit.

Riverview Improvement Corporation

The Riverview Improvement Corporation system (Permit 3093430) is located at the intersection of Twin Hill Lane and Route 665. The system is owned by Riverview Improvement Corp. The system includes one well. The system design capacity is 20,000 gpd (50 ERC). The well yield is 20 gpm. The pump yield is 20 gpm. Production capacity available for 40 ERCs. Storage is available for 1.67 ERCs. This system was grandfathered in due to an exiting permit.

Willing Workers Club

The Willing Workers Club system (Permit 3093850) is located at the intersection of Route 668 and Route 665. The system is owned by Willing Workers Club. The system includes one well. The system design capacity is 12,000 gpd (30 ERC). The well yield and pump yield are unknown. Storage is available for 1.7 ERCs. This system was grandfathered in due to an existing permit.

⁴ 150 gallons per trailer connection*20 connections = 3,000 gallons

Table 18 - Community Water Improvements Summary

Project	Estimated Connections	0-10 Years Est. Cost
Battery Park	20	\$125,000
Bethel Heights	30	\$273,000
Days Point	60	\$1,382,000
Gatling Point	15	\$475,000
Rushmere	70	\$428,000
Smithfield/Sandy Mount	165	\$1,446,000
Thomas Park	40	\$105,000
Tormentor Creek	25	\$1,343,000
Sub-Total	425	\$5,577,000
Total	425	\$5,577,000

Note:

1. Costs include professional services and contingencies in present day dollars.

Intergovernmental Considerations

The formation cooperative agreements with neighboring counties, towns, municipalities, etc. to supply water or collect and treat County wastewater, may be an economical solution to the increased demands that will be associated with population growth. It should be noted that as with any agreement, there will be positive and negative aspects associated with an arrangement.

Cooperative agreements are convenient for short-term solutions. However, they can be complex and a source of contention for parties involved when the collection and/or treatment systems approaches capacity and additional funds are required to make improvements or expansions. For this reason, these arrangements require thorough comprehensive agreements in order to account for these long-term solutions.

An added benefit of cooperative agreements is the advantage of economy of scale. Economy of scale is simply a term to describe the economic benefits often associated with comprehensive agreements. For instance, if flow doubles at a WWTP, then the cost for treatment does not necessarily double as long as the plant has the capacity to handle such an increase. Some associated reasons for this economy include that the plant is already being paid for, the operators are already being paid, and chemicals cost less if bought in bulk.

Environmental Limitations

Public health is a primary design consideration that needs to be taken into account when determining the location and need for future water systems. This consideration stems from the potential for groundwater contamination, specifically contamination that has, or is likely, to occur as a result of failed private septic systems. These failures (or potential for failure) of private septic systems can be directly linked to soil characteristics.

The soils that comprise the Tidewater region can typically be characterized as silty and sandy in nature and generally have a higher percolation rate. The soils that resemble the Piedmont regions can typically be characterized as more clay-like and generally have a lower percolation rate than sandy soils. A high water table, which is common to the Tidewater region, historically results in shorter contact times for septic system effluents with the soil in drain fields. This reduced contact time with the soil may result in inadequate treatment of septic system effluents and subsequently, may present the potential risk for the contamination of the groundwater. A County water system providing water to residents in areas characteristic of these conditions may effectively reduce the risk of health hazards associated with contaminated groundwater. Wastewater systems eliminate health hazards associated with septic field saturation and overflow on ground surface during periods of high groundwater table.

The two design considerations mentioned above directly relate to each other as well. An increase in population for a given area will increase the population density. This increase in population density to a point where soil conditions cannot assimilate the multitude of discharges from septic systems may warrant new wastewater collection facilities and new water distribution systems. Growth in areas with soil conditions unsuitable for septic system discharges can cause health related problems stemming from possibly contaminated groundwater and surface excursions during high groundwater or wet periods.

Design Considerations

Fire protection is another primary design consideration that needs to be taken into account when determining the location and need for future water systems. In the design process, fire protection is simply an additional demand placed on the system to simulate the added water use associated with the control and extinguishing of a fire. The Fire Protection Handbook published by the National Fire Protection Association outlines and explains various methods and practices for design of water systems with capacity for fire protection. Upon the beginning of the design process for each of the proposed water system improvements, fire protection will have to be taken into account.

Distribution mains transport water from the transmission main to the customer. Based on preliminary modeling, these lines range from 6” to 12”. The smallest distribution mains considered herein are 6”. VDH regulations regarding line size and fire flow allow smaller diameter water lines where fire flow is not a factor and residual pressure can be maintained above 20psi. The criteria for pipe sizing and water modeling are a fire flow of 500 gpm sustainable for 2 hours and a residual system pressure of 20 psi.

Regulatory Requirements and Limitations

Water

Water distribution systems must be designed such that they meet the requirements of the VDH Waterworks Regulations. The regulations require that all distribution systems shall be designed to provide a minimum working pressure of no less than 20 pounds per square inch (psi) at the customer’s service connection based on the system’s design flow (maximum hourly or daily demand plus applicable fire flow). The regulations also require that the minimum effective finished water storage for domestic purposes shall not be less than 200 gallons/equivalent residential connection (ERC). An ERC is defined by the VDH Waterworks Regulations as volume of water used equal to a residential connection, which is 400 gallons per day unless supportive data indicates otherwise.

The primary way to ensure the future improvements and expansions to the distribution system meet the above-mentioned requirements is to incorporate them into the hydraulic model of the County’s existing system. The distribution system’s characteristics (pressure, flows, etc.) can then be assessed and evaluated under numerous demand scenarios to ensure adequate system performance. It should also be noted that a preliminary engineering report is also required by VDH prior to the approval for construction of any waterworks facility (source, treatment, or distribution) and the updated hydraulic model will serve as substantiating evidence in those reports.

Wastewater

The Department of Environmental Quality (DEQ) governs wastewater system regulations. The DEQ Sewage Collection and Treatment (SCAT) Regulations govern the design and operation of

wastewater systems. The SCAT Regulations set the minimum size and capacity of the various wastewater system components.

The minimum gravity sewer pipe established by the DEQ SCAT Regulations is 8-inch diameter. An 8-inch diameter gravity sewer at installed at the minimum grade (0.4%) required by SCAT regulations will carry approximately 340 gpm of wastewater or 0.5 million gallons per day. The SCAT Regulations also mandate that the flow rate through a sewage force main shall be at least 2.0 ft/s. This equates to approximately 80 gpm for a 4-inch diameter force main.

For systems with pumping stations, DEQ requires that at least two pumping units be provided in a pumping station. Each individual pump shall be capable of handling the maximum peak flow. The wastewater pump station pumps should be sized so that under average conditions, each pump starts no more than approximately 6 times per hour. Ideally, the pump should run for at least three minutes before shutting down. These design guidelines protect the pump motors from excess wear and tear.

When the monthly average flow to a sewage treatment plant reaches 95 percent of the design capacity for each month of any consecutive three-month period, a written notice and plan of action must be submitted to the DEQ. This does not apply to the County; however, it does apply to the City of Franklin and HRSD. Often the plan of action includes an upgrade of the treatment plant to increase the design flow. Upgrades to the collection and conveyance system to decrease inflow and infiltration may also be in the action plan.

Currently, there are no pending/proposed regulations affecting this master wastewater plan for the study period. However, this information may be found at either of two web sites. The two web site addresses are <http://www.townhall.state.va.us> and <http://www.deq.state.va.us> for the Commonwealth Town Hall web site and the DEQ web site, respectively. Regulations do change over time and the trend is for the regulations to become stricter.

Summary

Overview

The majority of project population growth in Isle of Wight County will occur in the three designated development service districts (DSD's). The Newport DSD (NDS) is expected to have the highest increase due to the large amount of land designated for residential development and its proximity to the Hampton Roads Area. The Windsor DSD's (WDS) future growth will be significantly impacted by the potential development of industry. The Camptown DSD (CDS) is expected to have the least amount of growth; however, approximately 25% of the land in the CDS has yet to have its use specifically designated. Future demand projections may need to be revisited once the land use designations have been finalized for the CDS.

Water Sources

The Western Tidewater Water Authority (WTWA) is the practical solution for supplying the future water demands of the NDS and WDS due to their proximity to Suffolk. The NDS is already connected to the WTWA and currently has the waterline infrastructure to distribute the future water demand along its main corridors. The NDS will need additional storage capacity in the Benn's Church area. The WDS will need to connect to the WTWA in Suffolk and obtain approximately 1-million gallons per day (MGD) of capacity to meet the projected 2035 demand. The County's most feasible solution for obtaining future water for the CDS is to develop a groundwater treatment facility at the existing Camptown water tank site. The construction of a well and Reverse Osmosis treatment system will supply the CDS with enough water to meet the projected needs through 2035. This system will also allow the County to become completely independent of any other municipality for its water needs in the CDS. Communities located outside the development service districts will continue to be served by groundwater systems.

WTWA Capital Improvements Plan

The WTWA has developed a plan for capital improvements through the year 2015. This plan incorporates several projects which have a total estimated cost of \$26.9 million. These projects involve increasing their permitted groundwater withdrawal, developing a water plan, and obtaining additional water from the City of Norfolk.

The Authority obtained a groundwater permit from DEQ permitting an additional withdrawal of 3 MGD from the Reids Ferry well and 1.611 MGD from a well along the Crittenden Road corridor in Suffolk. These withdrawals equal an additional 4.611 MGD available to the WTWA.

A portion of the raw water main connection between the City of Portsmouth and the Norfolk Reservoir was upsized and ultimately funded by the WTWA. The pipeline capacity increase will provide the WTWA with an 8 MGD reserve for future water supply.

The Authority is also requiring its members to develop a water plan to be incorporated into the State Water Plan. This plan will address the following nine components:

1. Description of existing water sources and uses;
2. Assessment of water demand;
3. Drought response and demand management;
4. Statement of need;
5. Water supply alternatives;
6. Maps;
7. Local program documents;
8. A resolution approving the water supply plan for each locality participating in plan;
9. Public hearing record.

The WTWA is also developing a plan to meet the future water demands beyond 2013 by obtaining water from the City of Norfolk system. It is estimated that the Authority will need approximately 10 MGD to supply its member jurisdictions by the year 2030. An incremental buy-in approach (instead of a long term water sales contract) is proposed to meet the Authority's needs. The estimated cost for this water acquisition project is approximately \$20 million.

As part of its agreement with the Authority, Isle of Wight will share 25% of the costs expended by the WTWA for financing, constructing, leasing, operating, and maintaining facilities for providing water to member jurisdictions. The agreement also encumbers 25% of the safe yield of the Authority for Isle of Wight. As of the February 2006 agreement, the safe yield of the WTWA is 12.04 MGD.

Wastewater Treatment

Hampton Roads Sanitation District (HRSD) is the best option for the County for treating the present and future wastewater demands of the NDS and the WDS. The interceptor force main infrastructure is already present through the main corridor of these two districts for collecting the wastewater. The HRSD is also an option for serving the CDS; however, the feasibility of this scenario will be dependent upon the sewer needs of the City of Franklin, Southampton County, and the City of Suffolk. A new interceptor force main will be required through the main corridor of the CDS to collect and transport the wastewater to HRSD. The number of connections in the CDS alone will not support the cost of constructing an extensive force main. Communities outside of the development service districts will continue to be served by septic systems.

HRSD will construct interceptor lines within accordance with its Interceptor System Policies when growth and/or flow warrants. The local jurisdiction must provide financial assistance if an interceptor line is constructed early before growth and/or flow warrants. This type of financial assistance can be in the form of one of two agreements. The two types of agreements with HRSD are the Interest Participation Agreement and the Lease/Purchase Agreement. If an Interest Participation Agreement is used, Isle of Wight would be required to make quarterly payments to HRSD. The quarterly payment would be equal to the interest rate times the construction cost minus a credit of 70 percent of the wastewater treatment charges collected from new connections to the interceptor line. These construction costs include land, easements, permit acquisition, planning, design, and construction. The credits for connections can only be applied to one Interest Participation Agreement and cannot be transferred to subsequent agreements. Only new

connections tying into the HRSD interceptor line would be eligible for credits. The interest rate for such agreements is based upon the annual interest cost of 25-year AA revenue bonds.

A Lease/purchase Agreement is a contract wherein the County would construct the interceptor line which would not otherwise be planned or financially practical for HRSD to construct. The County would lease the line to HRSD until the time in which it is financially practical for HRSD to acquire. HRSD would make quarterly payments during the lease term to the County. The payments would be equal to 70 percent of the sewage treatment charges collected for new connections to the interceptor line. HRSD will operate the force main once the Certificate to Operate has been received from DEQ and the line is put into operation. The line will normally be purchased when the quarterly payments are equal to or greater than one-fourth of the annual interest cost of 25-year AA revenue bonds.

Neighborhood Sewer Extension Program

Isle of Wight met with the County Health Department to list which communities will need sewer service because of failing septic systems and lack of space for replacement drain fields. The failure of the septic systems presents a public health hazard and need to be addressed. The communities placed on this list were those currently experiencing failures or expected to have problems in the near future. The sewer projects covered in this report include those communities on that list. It is expected that more communities will be added to this list in the future as they begin to experience problems.

The sewer connection fee for existing structures is approximately 1/3 of the normal connection fee. The revenue generated from connecting these existing structures will not cover the capital construction cost of providing these customers with public sewer. In some cases, even the full connection fee would not pay for the capital cost of the project. The cost of extending sewer service to these communities may have to be borne by revenue from all of the County connection and user fees. Some of the community sewer extension projects may be eligible for grants from a government entity. These funds will not completely pay for an entire project; however, they may provide a significant contribution. The eligibility will depend upon the income level of the community's residents. These neighborhoods will need to be examined in greater detail to determine whether they are entitled to receive funding.

Future Projects

The County will need a variety of water and sewer projects to either support future demand projections or to serve communities which will suffer from problems with their existing utilities. The two (2) tables below summarize the projects discussed in detail throughout this report. The communities incorporated into the Neighborhood Sewer Extension Program are included in the sewer table. The projects have been separated by either water or sewer designation and are listed by DSD or community system.

Table 19 – Total Water Improvements Summary

Project	Number of Connections	0-10 Years
NDSB		
Benn’s Church Tank	NA	\$3,052,000
Benn’s Church Blvd	NA	\$1,116,000
Carisbrooke/Eagle Harbor	N/A ²	\$521,000
NDSB Booster Station	N/A	\$589,000
Campbells Chapel Drive	N/A	\$667,000
Deep Bottom Drive W/L Ext.	N/A	\$556,000
New Towne Haven Lane W/L Ext.	N/A	\$220,000
Norsworthy Drive W/L Ext.	N/A	\$378,000
Reynolds Drive W/L Ext.	N/A	\$1,862,000
Turner Drive W/L Ext.	N/A	\$582,000
WDSB		
Route 460 W/L Extension	N/A	\$1,764,000
WTWA Connection	N/A	\$3,912,000
Intermodal Park Tank	N/A	\$1,492,000
Intermodal Park W/L	N/A	\$3,210,000
Antioch Road	N/A	\$2,681,000
Buckhorn Drive	N/A	\$1,139,000
Courthouse Hwy	N/A	\$1,148,000
Deer Path Trail	N/A	\$831,000
Dunston Drive	N/A	\$618,000
Shiloh Drive & Lovers Lane W/L	N/A	\$814,000
Stavemill Road	N/A	\$720,000
Walters Hwy	N/A	\$1,462,000
CDSB		
Beaverdam Creek Road	20	\$1,874,000
RO System at Tank Site	N/A	\$3,285,000
Route 58 Water main	110	\$2,057,000
Airport Road	40	\$684,000
Great Mill Hwy	N/A	\$846,000
Lee’s Mill Rd.	N/A	\$1,591,000
Union Camp Drive	N/A	\$584,000
Walters Hwy.	N/A	\$1,017,000
Wash Hole Rd.	N/A	\$1,154,000
Rural		
Battery Park	20	\$125,000
Bethel Heights	30	\$273,000
Days Point	60	\$1,382,000
Gatling Point	15	\$475,000
Rushmere	70	\$428,000
Smithfield/Sandy Mount	165	\$1,446,000
Thomas Park	40	\$105,000
Tormentor Creek	25	\$1,343,000
<i>Subtotal</i>	<i>595</i>	<i>\$47,730,000</i>
TOTAL	595	\$47,730,000

Notes:

1. The number of connections was not included since these systems are already connected to the NDSB.
2. Costs include professional services and contingencies in present day dollars.

Table 20 - Total Wastewater Improvements Summary

Project	Number of Connections	0-10 Years Est. Cost
NDS		
Beechwood Drive	20	\$1,278,000
Benns Church Blvd FM	N/A	\$1,427,000
Campbells Chapel Drive FM	N/A	\$1,205,000
Cannon Acres	60	\$1,500,000
Carisbrooke	179	\$3,506,000
Channel Way	15	\$1,375,000
Deep Bottom Drive	20	\$1,795,000
New Towne Haven Lane FM	N/A	\$965,000
Norsworthy Drive FM	N/A	\$972,000
Rollingwood	20	\$1,058,000
Pine Meadows	41	\$4,444,000
The Laurels	23	\$1,528,000
WDS		
Antioch Road FM	N/A	\$2,021,000
Buckhorn Drive FM	N/A	\$1,417,000
Courthouse Hwy FM	N/A	\$1,305,000
Deer Path Trail FM	N/A	\$1,141,000
Dunston Drive FM	N/A	\$1,007,000
Intermodal Park	N/A	\$4,139,000
Shiloh Drive FM	20	\$3,251,000
Route 460 West FM	30	\$3,254,000
Stavemill Road	60	\$1,897,000
Stavemill Road FM	N/A	\$747,000
Old Suffolk/Old Mill	15	\$1,024,000
Walters Hwy FM	N/A	\$1,358,000
CDS		
Airport Road	40	\$1,527,000
Beaverdam Road FM	20	\$1,322,000
Beaverdam Road	N/A	\$758,000
Route 58 FM	N/A	\$2,905,000
Great Mill Hwy FM	N/A	\$1,365,000
Lee's Mill Rd. FM	N/A	\$1,966,000
Union Camp Drive FM	N/A	\$1,191,000
Walters Hwy FM	N/A	\$1,355,000
Wash Hole Road FM	N/A	\$1,596,000
<i>Subtotal</i>	<i>563</i>	<i>\$66,820,000</i>
Total	563	\$66,820,000

1. Costs include professional services and contingencies in present day dollars.

Financing

There are several possible State or Federal funding sources for the proposed utility projects within the County. These include Rural Development (RD) Community Development Block Grant (CDBG), Virginia Department of Health (VDH), Virginia Department of Environmental Quality (DEQ), and the Virginia Resource Authority (VRA).

Rural Development has a water and waste loan and grant program available for rural water and sanitary sewage projects. It is generally directed towards rural areas with populations of 10,000 people or less.

The CDBG is a program established by the US. Department of Housing and Urban Development. The program provides funding to local government for projects which address needs that are critical to community development. These needs are housing, infrastructure, and economic development. The Virginia CDBG receives approximately \$19 million annually for community projects. The project or any activity in a project is eligible to utilize CDBG funding if it meets at least one national objective. These national objectives include: activities benefiting low to moderate income persons; activities which aid in the prevention or elimination of slums or blight; and activities designed to meet community needs having a particular urgency.

The VDH offers financial assistance through the Drinking Water State Revolving Fund (DWSRF) Program and the Water Supply Assistance Grant (WSAG) Fund Program. The DWSRF is a mix of Federal and State funding and can provide assistance with construction and design through loans and or grants. The WSAG is state funded only and awards projects with grants only. The DWSRF is capable of providing construction assistance through a loan or grant. Only grants are available for non-construction assistance (planning/design). The grants typically favor community waterworks which are small, disadvantage and financially stressed. The construction loans are typically 1% below municipal bond market rates and have a maximum term of 20 years.

The Virginia Department of Environment Quality offers construction financing through the Virginia Clean Water Revolving Loan Fund Program. This program provides municipalities with a low interest financing option for upgrading, rehabilitation, and/or additions to their wastewater collection systems and treatment facilities. The VRA serves as the financial manager of this fund.

The VRA assists a variety of local governments in funding infrastructure projects. In addition to co-managing fund programs with VDH and DEQ, the VRA established the Virginia Pooled Financing Program. This pooling program was created to issue long-term bonds in the national municipal bond market and lends the proceeds to Virginia localities for funding projects. The VRA also offers interim financing for approved borrowers. This program allows a municipality to proceed with the construction of a project before the issuance of the VRA bonds.

Water and Sewer Rates

The two principal sources of revenue for a municipal utility are from the sale of water and sewer service and the connection charges from new customers. The connection charges are typically associated with the cost of providing the utility infrastructure to serve the customer. The sale of water and sewer are typically based on the cost of operations and maintenance expended by the County. The price for the sale of water and sewer as well as the cost for connection charges typically increase over time. It is easier for the customers of the distribution system to experience these increases gradually every year instead of sharp increases every 5 years.

The capital improvement projects needed for the future demand are a substantial cost to the County and these costs need to be reflected in the connection fees. The County's operation expenses will increase when the proposed pump stations, booster stations, and RO facility are put into service. For these reasons, it is recommended that a rate study be performed by the County to determine the percentage at which rates to need increase.

Water Model

The projected future demands in each DSD have been incorporated and analyzed in a water model of the distribution system. As development occurs in each DSD, the demand for water will increase. The present anticipated developments and projected DSD demands have been included in the analysis for this report. However, any major development in the future should be analyzed to determine the impacts on the distribution system. The impact of this added demand may require improvements in the distribution system. Industrial and commercial developments can be significant due to the large amount of fireflow required by these facilities. Incorporating development as it occurs into the water model will keep the County aware of the present and future needs of its water distribution system.