Water Resources Element

Town of Ocean City, Maryland

Introduction

The State of Maryland requires all Maryland jurisdictions with zoning authority to prepare a water resources element to be added to the comprehensive plan. This directive comes from House Bill 1141.

The water resources element must address the following topics:

1. Water supply needs for the present and future population of Ocean City.
2. Wastewater treatment, septic supply (not applicable to Ocean City), stormwater management capacity to meet current and future needs.
3. The impact of meeting these needs on water resources.

This is the water resources element for the Town of Ocean City, Maryland's Comprehensive Plan (adopted month September, 2006). It presents analyses of land consumption and facilities impacts that can be expected as a result of the projected growth of the Town's year-round population. The "planning period" extends up to and through the year 2025. By this action the water resources element becomes part of the *Comprehensive Plan of the Town of Ocean City, Maryland.* The comprehensive plan contains the following goal and objectives that relate to the water resources element:

Objectives

1. Provide adequate public health, safety, social, recreation, and waste disposal services
2. Protect drinking water supplies
3. Preserve and protect natural resources and their ecological functions
4. Accommodate future growth and redevelopment with standards designed to minimize environmental disruption, create an attractive theme, allow architectural variety, retain identifiable neighborhoods, and preserving special and historic buildings using incentives.
5. Provide for adequate public services to facilitate the desired amount and pattern of growth.

The water resources element's goal is to:

Maintain and protect the town's current water resources for their ecological and water supply benefits and to understand and mitigate, to the extent possible, the

adverse affects of future growth on these resources. The water resources element provides a strategy to sustain the water needs for Ocean City's population through the year 2025.

Section 1 - Land Use Plan Analysis and Growth Projection

State and local governments establish regulations for governing the development and use of land within their jurisdictions. The goal of these land use regulations is generally to promote sound physical, social, and economic development.

The Ocean City Comprehensive Plan, Land Use Chapter, states the need to maintain and encourage development of commercial uses and promote mixed use projects with the intent of sustaining the distribution of commercial restaurant, retail, and service uses. Also, we will promote mixed-use projects to reduce the strain on the transportation system's infrastructure and services by reducing the need for driving to commercial establishments. Through the use of design standards we hope to maintain and create more open space. Industrial and utility projects are considered inappropriate uses due to their adverse impacts on adjacent properties.

Presently, town streets occupy about 25% of the town's land area. Redevelopment may decrease that amount and allow for more open space. For over forty years, our land use pattern has remained "natural", meaning that it is driven by market forces. This pattern will continue into the future as the economy and other factors affect why visitors come to the beach.

The character of the ocean block has become increasingly multifamily with a rise in the number and size of individual units within condominium projects developed in recent years. There is a great variation in the density of residential development. The oceanfront areas range from 20 units per acre to over 80 units per acre in completely developed blocks. In these areas most blocks average from 40 to 70 units per acre.

The majority of land on the bayside is developed at less than ten units to the acre. Much of the bayside is being used for commercial uses and also has a number of residential neighborhoods that have remained for decades, improving with time.

The aging of the United States population will offer unprecedented challenges and opportunities. The arrival of the Baby-Boom generation is creating unparalleled urgency for understanding the need for geriatric services and making ADA code compliance in the homes being built in Ocean City all that more important. With people age 65 and older constituting 20% of the national population by 2030, Ocean City will meet their water demands and the

wastewater infrastructure needed to support this changing culture. The high-rise condominiums and privately-owned homes built during the 1960s through the 1980s are being replaced with multi-use projects and more efficient residential units together with commercial amenities. Preserving the character and quality of development with a focus on design variety is one of our main objectives.

The comprehensive plan anticipates population growth and a steady increase in retirees with multifamily units continuing to be the majority of housing structures. There is a lack of land available for future development. A demand for seasonal use and multi unit housing will persist throughout the planning period. Single-family detached housing has been and should continue to be less than 10% of the total housing stock.

The lack of affordable employee housing is the main housing problem. Some recommendations to accommodate the future employee population of Ocean City include employer-provided housing, a seasonal housing community in West Ocean City, and on-site housing provided within the larger commercial developments. Otherwise, Ocean City has the housing capacity to absorb year-round growth with existing housing stock and available infrastructure, excluding changes to our infrastructure and services. Upgrades to our infrastructure will occur as needed.

The existing land use map (Chapter Three, Land Use and Community Character, 2006 Comprehensive Plan) indicates existing residential and commercial development. Commercial uses on the Oceanside of Coastal Highway should be increased to provide services to residents on that side of the road. There are desirable services that cannot be found in Ocean City. In those cases, shoppers must travel outside the town to West Ocean City, Berlin, and Salisbury.

The future land use map (Chapter Three, Land Use and Community Character, 2006 Comprehensive Plan) proposes a majority of residential projects east of Coastal Highway which may include multi-use projects. Larger department stores will remain west of Ocean City due to the lack of developable land in Ocean City.

Current land uses and regulations have limited commercial development along the east side of Coastal Highway, and many of those commercial uses do not sustain visitor's basic daily needs. There is a great variation in the density of residential development. The oceanfront areas have blocks averaging from 40 to 70 units per acre.

An increase in mixed-use developments will provide Ocean City's residents and visitors with the basic necessities. With the appropriate zoning in place it will be possible for commercial use to be more prominent on both sides of Coastal

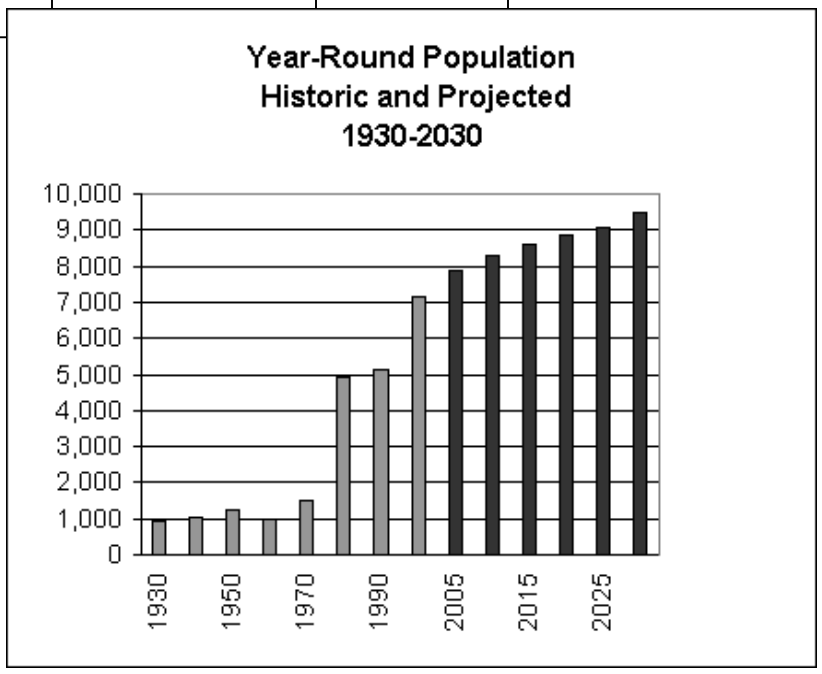
Highway. However, supermarkets, hardware stores, and big box retailers will continue to be situated along U.S. Route 50, within a few miles of Ocean City.

Year Round Population

Very little increase in residents occurred between 1930 and 1970 (Table 1-1). The largest increase in residents happened between 1970 and 1980 when over 3,000 new residents moved to Ocean City. The year round population was determined to be 7,137 in 2004 (U.S. Census Bureau) and could easily reach 9,000 by 2025 (Figure 1-1). Nevertheless, we will focus on the impact of the seasonal population as it affects water demand and wastewater treatment since we must maintain effective infrastructure to support the maximum demands of the summer seasonal population.

Table 1-1
Historical and Projected Populations

Year	Population
1930	946
1940	1,052
1950	1,234
1960	983
1970	1,493
1980	4,946
1990	5,146
2000	7,173
2005	7,900
2010	**8,308**
2015	**8,609**
2020	**8,863**
2025	**9,048**
2030	**9,473**



Sources: U.S. Census Bureau, Maryland Department of Planning, Ocean City, MD Dep't. of Planning and Community Development

Given the unique Characteristics of Ocean City as a resort community it is difficult to develop a year-round resident population forecast that can be considered reliable.

Seasonal Population

Seasonal population is estimated by a formula called “Demoflush”, which estimates population based on wastewater flows using a pre-determined number of gallons per person per day. The equation contains adjustments to account for infiltration and “day trippers” who do not use the wastewater system to any great extent.

The formula for figuring the demoflush population is:

The number of gallons of wastewater flow minus infiltration into the system is divided by the number of gallons per person per day (36.04). Infiltration is estimated to be 570,00 gallons per day. Example: If the wastewater flow on a Saturday is 10,000,000 gallons, subtract 570,000 and divide by 36.04 and the result is 261,654 people for that day. The 36.04 results from an assumption of the gallons per person per day attributed to permanent residents (60), overnight visitors (40), and day visitors (7), and the percentage of each of these groups (4%, 86%,10% respectively).

The peak demoflush population (Table 1-2) is more important in our planning efforts than the year-round population. It has been relatively stable in recent years, increasing by only about .22% per year. This plan projects the peak weekend population to continue to rise slightly through the planning period. (Figure 1-1)

PEAK DEMOFLUSH POPULATION
1990 – 2025 – Table 1-2

YEAR	PEAK DAY POPULATION	85% ADJUSTED PEAK POPULATION
1990	326,859	277,830
1995	319,755	271,792
2000	354,400	301,240
2005	322,308	273,962
2010	**347,586**	295,448
2015	**351,426**	298,712
2020	**355,309**	302,013
2025	**359,235**	305,350

The Town's ability to provide vital services must be coordinated with seasonal population growth and certain demographic aspects of the population, such as age, gender, and educational levels.

"Adjusted" population figures, which are 85 percent of the demoflush population, are discussed in Chapter 1 – Population, of the Comprehensive Plan, and in the Municipal Growth Element. For the purposes of projecting future water and wastewater need, however, the full demoflush estimate is used.

Figure 1-2 projects future total population through 2025 based on historic demoflush population figures. It is likely that much of the increase in the peak seasonal population will be influenced by Town's redevelopment policies rather than new development over the next 20 years.

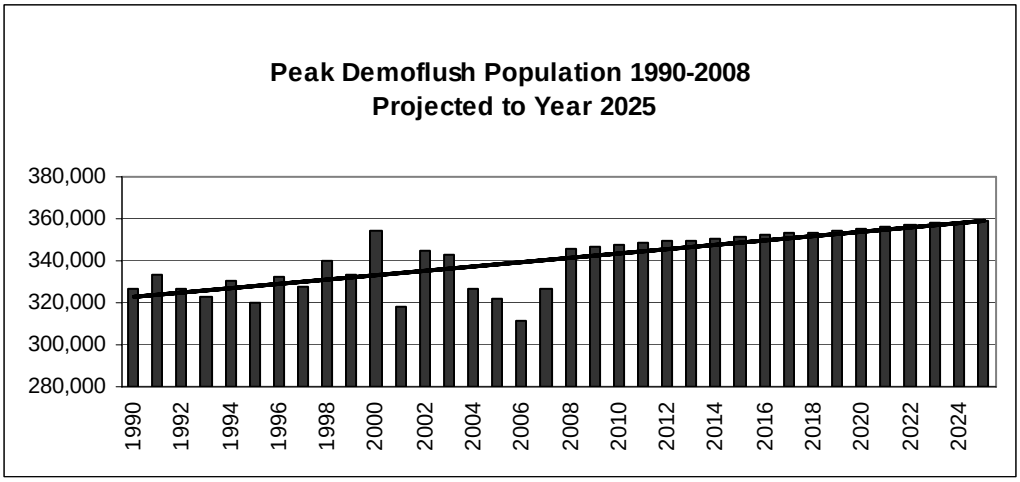


Figure 1-2

Note: Peak demoflush population estimates a year's (Summer season) highest weekend population; numbers have not been adjusted and are weekend totals

Conclusion

The water resources element provides the Town with an assessment of its water resources and how future growth will affect them. The assessment assists the Town in determining the needs of its residents and visitors and helps avoid unnecessary future expenses. The 2006 comprehensive plan anticipates about 6,000 new residents by 2025 and a slight but steady increase in the seasonal population. There are no anticipated annexations outside municipal boundaries during the planning period. Clean water sources are sufficient to handle the population's needs with ample water supply to last past the planning period.

Section 2 - Water Supply

Introduction

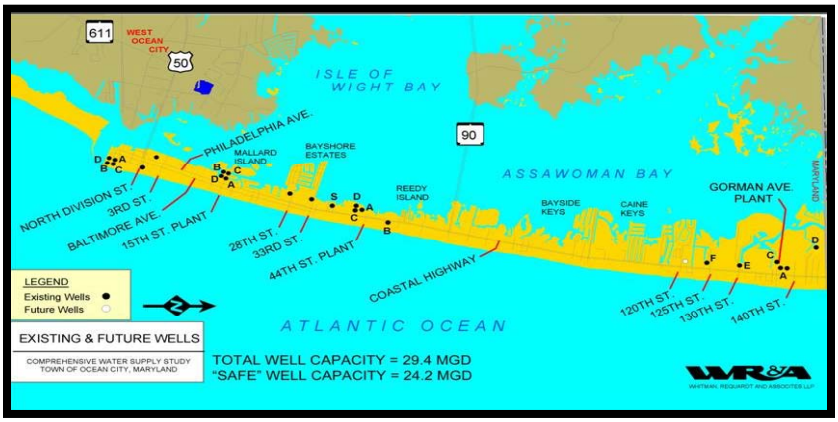
Ocean City's water supply system includes 3 water treatment plants which treat raw water to remove iron, manganese, and chlorinate the water. The 15th Street plant was constructed in the mid-1990's and replaced two old plants. Ocean City supports a proactive approach to public health. One of the Town's goals is to maintain the highest possible drinking water quality through consistent monitoring of the ground water supply and the infrastructure used to acquire and treat water. A comprehensive water study was performed by the consulting firm of Whitman, Requardt, and Associates in 1997 and updated in 2005. The firm was directed to conduct an investigation of the drinking water treatment and distribution system. The study indicated that the water supply within the Manokin and Ocean City aquifers had been and will remain safe and adequate to supply the Town of Ocean City, Maryland's safe drinking water needs beyond the planning period, ending in 2025.

There are extreme seasonal differences in population served with approximately 7,000 year-round residents augmented by over 250,000 visitors during a peak summer weekend; in essence, two completely different treatment and distribution system scenarios.

Ocean City Water System - Ownership

The Ocean City Water System is owned by the Mayor and City Council of Ocean City, Maryland, and operated by the Town of Ocean City Municipal Water Department. The system is comprised of 24 production wells (Figure 2-1), 3 treatment plants, 7 elevated water storage tanks and 1 ground storage tank. A well maintenance program is also in place to ensure that the wells maintain their productivity and reliability.

Figure 2-1



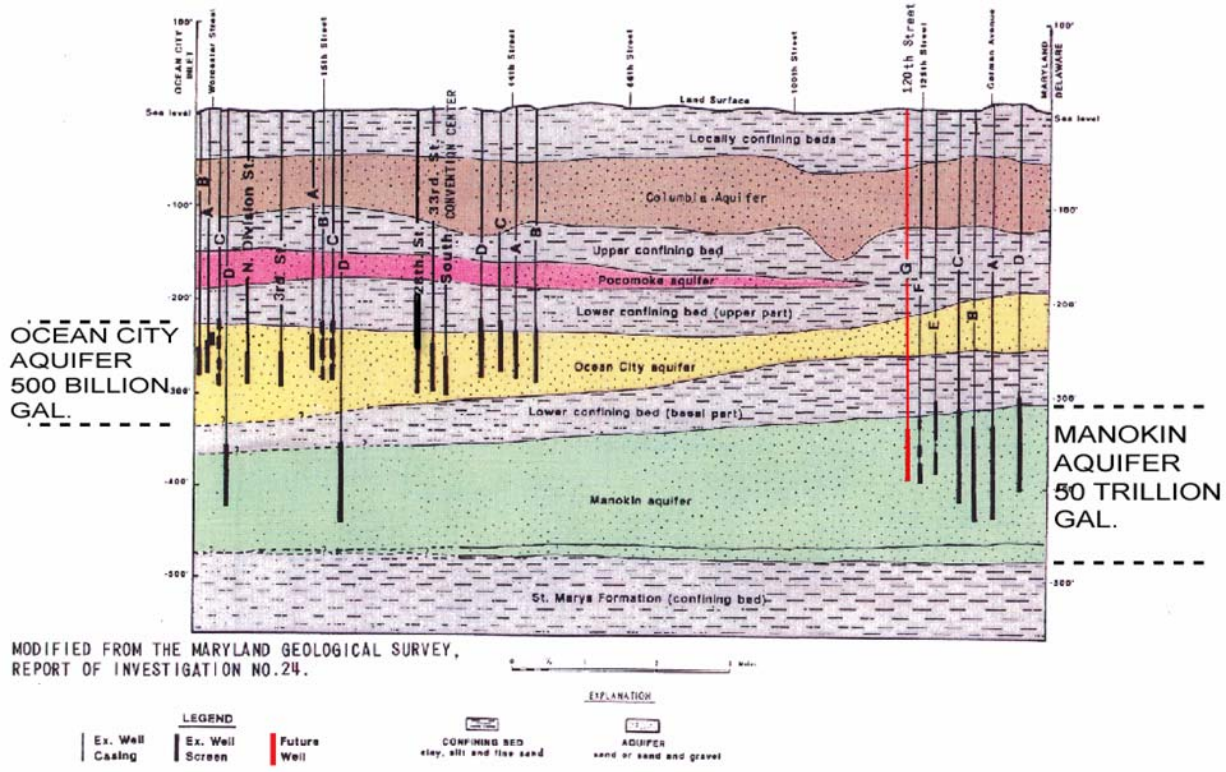
Supply and Demand

The Ocean City Water System must have adequate capacity to serve the peak seasonal population. In 1994 the system served an estimated population of 330,133 during the peak season. The maximum daily demand was 14.41 MG. The ultimate build-out population has been projected to be approximately 381,000 in the year 2025 as estimated by the Town's consulting engineers. This figure differs from the lower estimate of about 360,000 projected using Demoflush. Historical data for recent years indicates the maximum day per capita demand of 44.0 GPD. The corresponding maximum days system demand at build-out is projected to be 16.8 MGD.

Future water system requirements were evaluated in 1997 on the projected Year 2020, 16.6 MGD maximum day demand. Recent evaluation of demand by Whitman, Requardt and Associates indicates that adding allowance for additional development at year 2005 may place demand in the year 2020 somewhat higher at 17.12 MGD The existing raw water supply consists of 15 wells in the Ocean City aquifer and 9 wells in the Manokin aquifer (Figure 2-2) distributed along the length of Ocean City corresponding to the distribution of existing and projected development.

The use of low flow water fixtures wherever possible by property owners can reduce the waste of additional water resources. Broken water lines within unoccupied units have been reported to the Building Office in order that repairs can be made and water saved. Rationing of outdoor water use could be an option if supplies become short.

Figure 2-2



GEOLOGICAL CROSS SECTION AND WELL FIELDS

The Ocean City Aquifer has a 7,900,000 gallon month of maximum use withdrawal. The Manokin Aquifer has a 9,700,000 gallon month of maximum use withdrawal.

The Ocean City Water System consists of 3 water treatment plants. The first plant, located at 15th Street, using wells in the Ocean City aquifer, is a 6.0 MGD plant. The second plant, located on 44th Street, uses water from the Ocean City aquifer and is a 4.0 MGD plant. The third WTP is located in North Ocean City at Gorman Avenue with wells in the Manokin aquifer and is an 8.0 MGD plant.

The Town conducts required regulatory water quality monitoring. According to Whitman, Requardt recommendations, additional monitoring sites within the distribution system should follow when budgetary conditions allow. Rising chloride levels in an Ocean City aquifer well serving the 44th Street plant had raised concerns about intrusion of salt water into the fresh water aquifers, but this appears to have stabilized.

Continuing improvements in desalination technology have led to a change in philosophy with respect to the possible salt-water intrusion problem. The preferred approach would be to continue to pump water from the existing well fields and, if the water became brackish, to treat it by using either the reverse osmosis procedure or the electro-dialysis reversal process installed only when needed. This approach is judged to be more cost-effective, and more environmentally acceptable because it would prevent further westward movement of the salt-water front.

Desalination, if required in the future, could be constructed at the 15th Street Plant on the site. Additional land would be required to add desalination at 44th Street. At the Gorman Avenue Plant, desalination facilities could be constructed on the site previously occupied by the police station, or could be located offsite. Due to the naturally protected characteristics of the confined aquifers, Ocean City water supply is not susceptible to the other inorganic compounds. The wells serving Ocean City water supply pump water from confined aquifers. Confined aquifers are naturally well protected from activity on the land surface due to the conforming layers that provide a barrier for water movement from the surface into the aquifer below. A properly constructed well with casing extended to the confining layer above the aquifer and with sufficient grout should be well protected from contamination at the land surface.

Research indicates that rising sea levels resulting from climate change could result in increased saltwater intrusion into the groundwater in coastal regions. This is cause for concern and should be studied in depth over the next few years. The Town is prepared to deal with desalination when the time comes.

Saltwater Intrusion

A threat to Ocean City's water supply is saltwater intrusion, which is the horizontal movement of saltwater into the freshwater aquifer from the ocean or the bay. It could also occur from a vertical movement by downward leakage from the ocean or bay, or upward leakage from lower aquifers.

Testing in the past had shown a rise in chloride levels in the 44th Street area. This is caused by heavy year round water use in the area and leakage between the Ocean City aquifer and the saltier Manokin aquifer in this area. The upconing of salt water at the 44th street plant stabilized after much of the pumpage was shifted to the Gorman Avenue Plan in 1989 and 1990, indicating a state of equilibrium may have been reached. Saltwater intrusion is occurring in localized parts of the unconfined Columbia Aquifer, but it is not considered a major threat. However, it is still possible that a salt front is moving in from the oceanside or bayside near 44th Street.

The "Comprehensive Water Supply Study" recommends spacing future wells to distribute drawdown from the aquifers and relieve the salt intrusion in any particular area. The study also notes that any future water supply production wells should probably be located in the northern part of the Town where the hydrogeologic conditions are more favorable with respect to available drawdown and saltwater intrusion. The Study also states that future planning must recognize the possibility of saltwater intrusion, and flexibility in design of the water supply system must be provided so that the problem may be addressed if and when intrusion occurs.

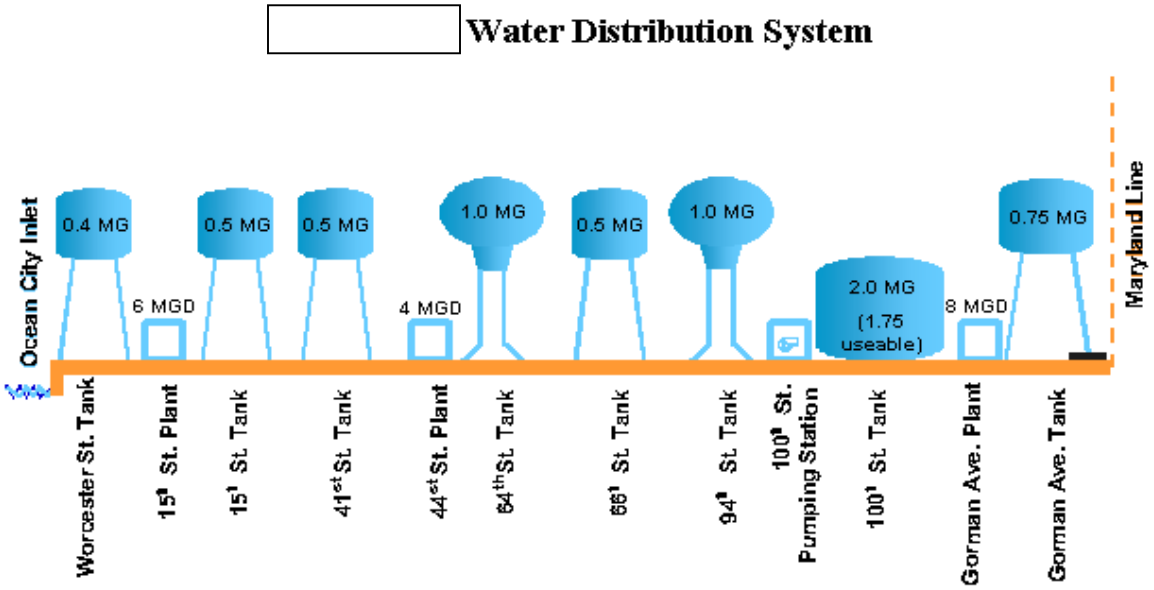
An increasingly attractive solution to salt intrusion is the rapidly developing technology and operating methods of desalination of brackish water. Desalination could be accomplished as needed by converting existing water treatment plans. By employing desalination, the saltwater intrusion could be contained at the coastline indefinitely.

Water direction frequently reverses at many points in the distribution system as treated water is pumped into the system from different plants. These reversals generally contribute to improved water quality by limiting biofilm accumulation.

Storage

The Town has 7 elevated tanks and 1 ground level tank with a total useable storage capacity of 6.30 million gallons (Figure 2-3). The present storage facilities have adequate capacity to support a maximum day demand of 18.00 MG. Under normal operation, water levels in the tanks do not significantly fluctuate. Mains are typically flushed twice each year to remove debris and iron

sediment. The pipes, themselves, are in acceptable condition with little evidence of corrosion. No new storage towers are expected to be erected during the planning period.



Source: Whitman/Requardt & Associates, 2004

Figure 2-3

Potential Service Area

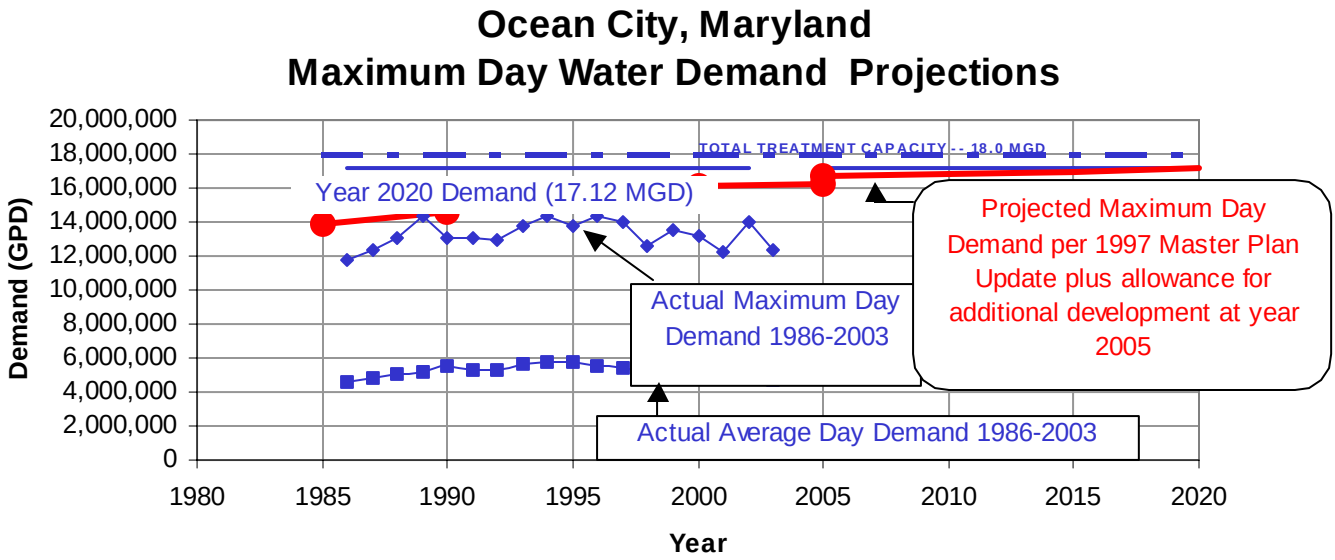
The Town of Ocean City extends from the Ocean City Inlet to the Maryland/Delaware line and is separated from West Ocean City by the Isle of Wight Bay. The existing Ocean City Water System covers the entire municipal area. Maps of the water lines are shown as Attachment "A" and were part of the 2005 Water Study done by the firm of Whitman, Requardt, and Associates. A West Ocean City connection to the Ocean City water system does not seem necessary or likely.

Appropriations for the Ocean City aquifer are 3.6 mgd/daily average. Appropriations for the Manokin aquifer are 4.4 mgd/daily average. The total average is 8 mgd. 80% of which is 6.4 mgd. The average withdrawal was 5.49 mgd, less than 6.4 mgd (2008). By the end of the planning period Ocean City will have reached total build-out of available lands. It has been estimated that approximately 381,000 people will need about 16.8 mgd. The maximum possible water withdrawal is 18 mgd.

The maximum per day per capita demand for water in 1997 was approximately 60 gallons per day. The corresponding maximum day system demand at build

out was projected in 1997 to be 16.6 million gallons per day (MGD). Future water system requirements were evaluated in 1997 on the year 2020's 16.6 MGD maximum day demand. Recent evaluation of demand indicates that adding allowance for additional development at year 2005 may place demand in the year 2020 somewhat higher at 17.12 MGD (Figure 2-4), acceptably less than the 18 MGD limit. A water usage rate of 44 gallons per capita per day was applied to the peak weekend population projections, resulting in a 2025 maximum water demand of 16.8 MGPD (44gpcd x 381,114 = 16,769,016), per Whitman, Requardt, and Associates.

Figure 2-4



Conclusion

The projected maximum peak population may require 17.2 mgd, and water withdrawal will not surpass the maxiumum withdrawal of 18 mgd through the year 2020. Ocean City has more than ample quantities of groundwater resources available from the Ocean City and Manokin aquifers for its projected growth and development. Clean water sources are sufficient to handle the needs of future populations.

Upgrades to the municipal water withdrawal and treatment systems should be correlated with population changes and as equipment warrants replacement. Ocean City should continue to work with Worcester County government and the Maryland Coastal Bays Program to assure that the goals of the Isle of Wight subwatershed plan are realized. The Town will continue to implement the Maryland Coastal Bays Critical Areas Program actions, promote effective

Stormwater Management techniques, and encourage Environmentally Sensitive Design standards to protect the source water for the town's future.

There are operational issues in Ocean City that may not be present with other drinking water utilities with more stable consumer populations. Ocean City's future withdrawals from its wells will have little to no impact on the water resources.

It is recommended that: Well drawdown and recovery levels are monitored, inappropriate development does not occur in aquifer recharge areas, groundwater quality is monitored, and the threat of saltwater intrusion is minimized.

Section 3 - Wastewater

Introduction - Treatment

In 1994, the Town of Ocean City assumed control of the Ocean City wastewater system from the Worcester County Sanitary Commission. The system has collection, treatment and disposal capabilities. The service area is, for the most part, the boundaries of the Town of Ocean City, Maryland. There are currently no maps of the wastewater service area to include in this report. The treatment plant at 64th Street was constructed in 1969, with expansions and secondary treatment upgrades completed in 1974, 1981, 1990 and 1992, and 1998.

The plant's wastewater treatment design capacity is currently 14 million gallons per day (MGD). Additional sludge handling capabilities constructed in 1998 increased the capacity from 12 to 14 MGD. The plant will serve the same physical land area of Ocean City throughout the planning period with no anticipated decreases or increases in service area coverage. (Figure 3-1)

Maximum month wastewater treated has ranged from 10.4 to 11.6 MGD for the period 1990 through 2003. The available, or unused treatment capacity, has fluctuated between 2.4 MGD (17% of the total capacity) in 1994 and approximately 3.59 MGD (25% of the total) in 2003. The average flow treated during the maximum month through the period was 11.2 MGD representing roughly 80 percent of total capacity. The average daily flow treated during the maximum month between 2003 and 2008 was 10.87 MGD in July of 2006. The available or unused capacity has averaged 23.6% during this time.

Year 2020 maximum wastewater treatment flows are projected to increase to approximately 12.14 MGD for the Town of Ocean City and West Ocean City combined. Work is currently being conducted by the City to evaluate needs for future wastewater treatment plant improvements.

Ocean City is looking into adding a fourth secondary clarifier at which point, we would have the capability of treating 16 MGD. We are currently permitted for 14 MGD. The limit for expansion of the current treatment plant is about 16 MGD. If our permit were to change and require us to begin nitrogen and phosphorous removal, we would require that some equipment changes and additions be made. Currently, we are only required to monitor these levels.

The Sunset Island development has a sewer demand of 200,000 GPD with no limits to the amount of flow.

Wastewater Discharge

Discharge point "001" is the Atlantic Ocean off of 64th St. between 3600 ft. & 4600 ft. from shore. Diffusers are located near the ocean floor at 50 foot intervals. Outfall point "002" is located at the Northwest corner of the treatment plant complex on the Assawoman Bay. This outfall would only be used in an emergency situation. To date, the Assawoman outfall has never been used. If it ever does the treatment level to the bay would be "secondary" only. This level of treatment would not be adequate and we would have to repair the ocean outfall as quickly as possible. We do flush the bay outfall annually, in February, to keep the line clear. Our NPDES permit allows us to perform this annual maintenance. We must notify MDE in advance of the date and time. The Atlantic Ocean is and shall remain the most suitable receiving water body for discharge. These discharge points will not change in the foreseeable future. Presently, our NPDES permit does not require us to report nutrient loads. There is no TMDL for wastewater nor any impairments of our receiving waters. There is a TMDL for the Assawoman Bay that is incomplete. The Isle of Wight main bay TMDL is currently being established. Herring Creek and Turville Creek have established TMDL's. (engineering staff). Since Assawoman Bay has no TMDL, the suitability of receiving waters cannot be determined at this time.

Liquid and solid wastes leave the plant after treatment. Treated secondary effluent (liquid) is pumped from the treatment plant to the Atlantic Ocean through a 30" diameter pipeline. Treated Class "A" biosolids (solid) are transported to local farms by OC tractor trailers for land application on a daily basis during the summer season and less frequently during the winter months. Any solid waste that does not meet Class "A" criteria is transported to the Worcester County Landfill for final disposal. Ocean City does have the capacity to continue these practices through the planning period.

We are in the process of renewing our NPDES permit for operating the plant through MDE. Our current permit is good through January, 2011, and the next permit is good for five years from it's issuance. We do not anticipate any changes to the new permit.

Septic Systems

Ocean City has no septic systems in use at the present time.

Future Land Use and Capacity

Future land use patterns will involve redevelopment throughout the Town as existing uses are re-evaluated and replaced. This development will have very little impact on resources as the Town's wastewater treatment capacity will remain sufficient to handle the projected increase.

Wastewater treatment capacity limits are currently and will continue to be set in anticipation of maximum peak summer populations through the planning period. There will be sufficient wastewater treatment capabilities to handle projected population increases to the year 2025.

The Municipal Growth Element contains a more detailed discussion of future growth and needs.

Wastewater Treatment Milestones

• Reach 11.2 MGD (80% of rated capacity) –Triggers planning for future growth

• Reach 12.6 MGD (90% of rated capacity) – Triggers construction for future growth

• At 16 MGD – Probable maximum month capacity –With planned improvements

• At 14 MGD - treatment plant MDE - rated capacity

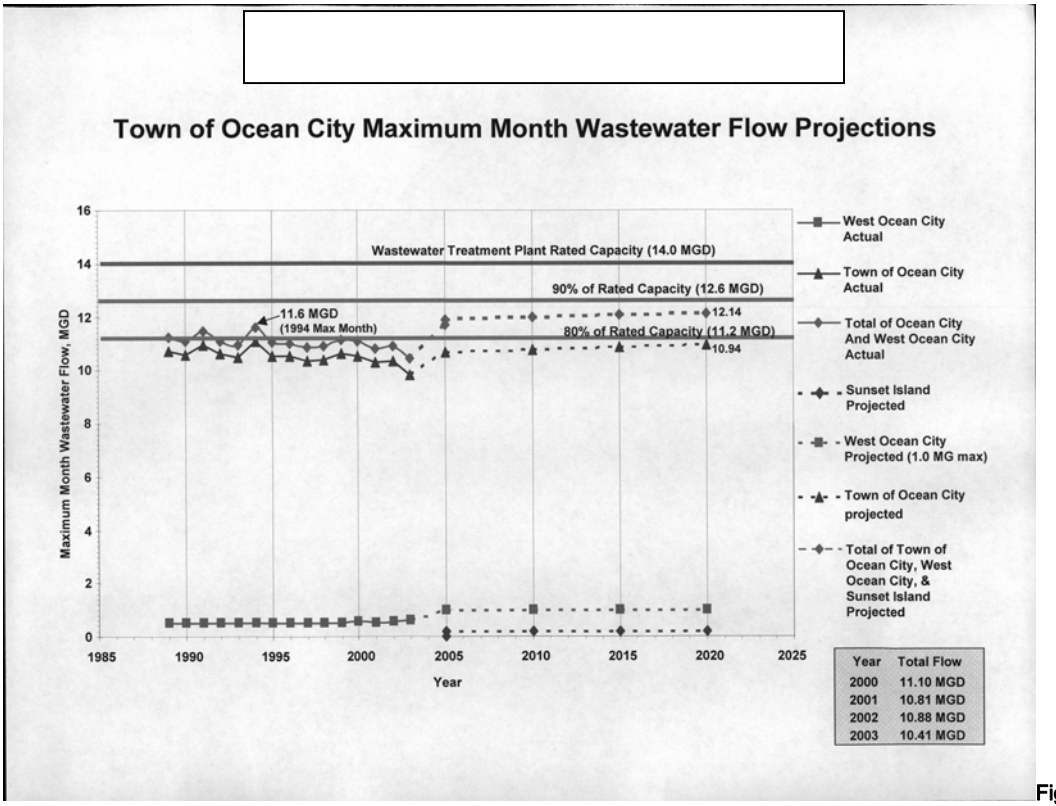


Figure 3-1

Section 4

Stormwater and Non-Point Source Pollution

The Ocean City Stormwater Management Ordinance, Article III, Section 30-141 of the City Code was adopted June 18, 2001: "The purpose of this article is to protect, maintain and enhance the public health, safety, and general welfare by establishing minimum requirements and procedures to control the adverse impacts associated with increased stormwater runoff. Proper management of stormwater runoff will minimize damage to public and private property, reduce the effects of development on land, control stream channel erosion, reduce local flooding, and maintain after development, as nearly as possible, the pre-development runoff characteristics."

Non-point source pollution comes from many sources. This pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into wetlands, coastal waters, and even our underground sources of drinking water. Non-point source pollution is the leading cause of water quality problems. The effects of non-point source pollutants on specific waters vary. These

pollutants have harmful effects on drinking water supplies, recreation, and wildlife.

To a large extent, the amount of non-point source pollution is determined by a municipality's land use. Impervious surfaces are an environmental concern because runoff amounts increase as impervious surfaces increase, causing a strain on existing stormwater control systems. Ocean City's annual rainfall averages forty-nine inches, which translates to approximately 200,000 gallons per acre or 23,000 gallons on a 5,000 square foot lot. Depending on the land cover, it either percolates into the soil or becomes runoff. The more land that is covered by impervious surface, the more runoff results.

Impervious surface coverage can be limited by restricting land use density or increasing requirements for pervious cover. Restricting density causes land elsewhere to be developed to accommodate the growing population (see Figure 4-1). In a designated growth area such as Ocean City, construction practices and open space requirements can decrease runoff while still allowing sufficient development.

It is desirable to maximize infiltration of rainwater. This water serves to replenish the groundwater, thereby helping to hold back the salt water wedge. Also, less runoff reduces nuisance flooding and the adverse impacts of stormwater on water quality. The original sandy soils of Ocean City can absorb about eight times as much water as normal Eastern Shore soils. Such soils lend themselves to the use of infiltration practices for stormwater management.

The efforts of the Town of Ocean City to minimize impervious surfaces and control stormwater runoff are vital to our goals of decreasing polluted stormwater from reaching the coastal bays. The coastal bays and the Atlantic Ocean are and will remain the primary receiving waters for stormwater run-off. The best management practices we are using in these efforts will significantly reduce the impact of future development. Our practices are listed in the Isle of Wight Subwatershed section below.

Ocean City has no septic systems or agricultural activities. The Town does not operate under NPDES Permit MS4 for stormwater management due to the Town not being a Phase II community (engineering staff).

<u>Isle of Wight Bay Subwatershed (from Worcester County Comprehensive Plan)</u>

This subwatershed includes Ocean City, Ocean Pines, some of West Ocean City, and most of the Route 50 commercial corridor. The headwaters are near Selbyville, Delaware, north of Bishopville, and contain agricultural lands and a planned industrial area. This area has been the traditional focus of population

growth and development in Worcester County because of employment opportunities and access to Ocean City and the near-by state and national parks.

In the Isle of Wight Subwatershed, development and redevelopment should be located in the priority funded/smart growth area. Ocean City is completely within these designations. Allocations of pollutant loads should be designated first to these areas. In determining water quality impacts to the watershed resulting from development and redevelopment in Ocean City, the Town uses the WRE non-point source spreadsheet to assess the impacts. Ocean City is virtually completely urban and developed. Most development activity is and will remain re-development.

Redevelopment activities in Ocean City are subject to Stormwater Management and the Critical Area regulations. Thus, all development is subject to improving water quality per MDE and DNR guidelines. Environmentally Sensitive Design is recommended in treating the Water Quality volume. These designs include Bio-swale, rain gardens, infiltration trenches, rooftop gardens, pervious paving material, cisterns for water re-use, and/or reducing impervious surfaces. The overall post construction pollutant loads will be 10% below pre-construction loads. With only 496 acres (Table below) of developable land in the town, current regulations and required stormwater management practices will continue to help protect our groundwater resources.

Developable Land and Build-Out Projections

Zoning District	Developable Land		Permitted DU per Acre	Maximum Units	Adjusted Units(75%)	Existing Units	Potential Additional Units
	# Parcels	Acres					
B-1	73	16.11	43.6	702	526	410	116
BC-2	25	3.79	43.6	165	124	240	-116
BM-1	25	8.16	43.6	355	267	7	260
BMUD	17	37.32	43.6	1,626	1,219	5	1,214
DM	23	3.97	43.6	173	130	30	100
DMX	159	20.30	43.6	884	663	540	123
DR	4	0.82	21.8	18	13	21	-8
I-1	5	3.06	43.6	133	100	2	98
LC-1	384	140.19	43.6	6,107	4,580	736	3,844
M	7	3.89	43.6	169	127	12	115
MH	44	17.12	43.6	746	559	30	529
R-1	398	54.36	8.7	473	355	321	34
R-2	432	59.47	21.8	1,296	972	625	347
R-2A	28	2.02	10.9	22	17	23	-6
R-3A	436	74.19	43.6	3,235	2,426	3,047	-621
R-3A	191	22.08	30.0	663	497	496	1
SC-1	19	56.67	43.6	2,469	1,851	122	1,729
Totals	2,270	523.52		19,236	14,427	6,667	7,760

Figure 4-1

Ocean City Non-Point Source Loading

Pollution by nutrients causes many problems, such as algal growth and oxygen reduction. Aquatic life is directly affected by this type of pollution. Total loadings are calculated below by land cover types.

The calculations for future loading are the same for the current loadings because future development of Ocean City will primarily be redevelopment of existing, already developed properties. Even so, we anticipate that efforts to require more open space, increased pervious land coverage, and improved stormwater management, together with Coastal Bays Critical Areas Program restrictions on future redevelopment projects, will reduce nutrient loading in the future.

Land Use Area Summary			
	Initial (Acres)	Future (Acres)	Change (acres)
Development	2,234	2,234	0
Agriculture*	0	0	0
Forest	321	321	0
Water	0	0	0
Other**	314	314	0
Total Area	**2,869**	**2,869**	0
Residential Septic (EDUs)	0	0	0
Non-Residential Septic (EDUs)	0	0	0

Figure 4-2

Nitrogen Loading Summary			
Land Use/Cover	Initial (Lbs/Yr)	Future (Lbs/Yr)	Change (Lbs/Yr)
Development	13,273	13,273	0
Agriculture	0	0	0
Forest	449	449	0
Water	0	0	0
Other**	701	701	0
Total Terrestrial Load	**14,423**	**14,423**	**0**
Residential Septic (EDUs)	0	0	
Non-Residential Septic (EDUs)	0	0	
Total Septic Load	**0**	**0**	
Total NPS Nitrogen Load	**14,423**	**14,423**	

Figure 4-3

Phosphorus Loading Summary			
Land Use/Cover	Initial (Lbs/Yr)	Future (Lbs/Yr)	Change (Lbs/Yr)
Development	892	892	0
Agriculture	0	0	0
Forest	6	6	0
Water	0	0	0
Other**	28	28	0
Total NPS Phosphorus Load	**927**	**927**	**0**

Figure 4-4

Conclusion

In order for Ocean City to remain a viable and successful community, adequate infrastructure must be available. Meeting the demand for high quality potable water, properly treating wastewater, and protecting water quality by managing stormwater runoff are essential for our future. The Town is committed to achieving these mandates as evidenced by the continual monitoring of the systems, by the periodic updating of the *Comprehensive Water Supply Study*, and rigorous enforcement of environmental regulations.

First Reading October 5, 2009

Second Reading October 19, 2009

ORDINANCE 2009 – 23

AN ORDINANCE TO ADOPT A MUNICIPAL GROWTH ELEMENT, WATER RESOURCES ELEMENT AND PLANNING VISIONS INTO THE COMPREHENSIVE PLAN FOR OCEAN CITY

WHEREAS, pursuant to Article 66B of the Annotated Code of Maryland, and Sections C-414 (58) and Title VIII, Sections C-801 through C-806 of the Charter of the Town of Ocean City, the Mayor and City Council of Ocean City is authorized and empowered to establish and implement a comprehensive zoning plan and a land use plan setting forth a guide for future development and proposed appropriate and desirable patterns for the boundaries and land uses; and

WHEREAS, HB 1141 and SB 2 enacted in the 2006 session of the Maryland General Assembly, require the adoption of a Municipal Growth Element and a Water Resources Element into all municipal Comprehensive Plans; and

WHEREAS, HB 294 and SB 273 enacted in the 2009 session of the Maryland General Assembly require the inclusion of twelve new planning Visions in all local Comprehensive plans; and

WHEREAS, after conducting a public hearing thereon, the Planning and Zoning Commission of Ocean City has recommended to the Mayor and City Council the adoption of a Municipal Growth Element, Water Resources Element and the twelve new Visions into "The Comprehensive Plan – Town of Ocean City – 2006";

WHEREAS, having given due consideration to the new elements;

NOW, THEREFORE, BE IT ENACTED AND ORDAINED BY THE MAYOR AND CITY COUNCIL OF OCEAN CITY THAT THE MUNICIPAL GROWTH ELEMENT, WATER RESOURCES ELEMENT AND GROWTH VISIONS BE ADOPTED INTO "THE COMPREHENSIVE PLAN – TOWN OF OCEAN CITY, MARYLAND, 2006", EFFECTIVE UPON FINAL PASSAGE HEREOF.

INTRODUCED at a meeting of the Mayor and City Council of Ocean City, Maryland held on October 5, 2009.

ADOPTED AND PASSED by the required vote of the elected membership of the City Council and approved by the Mayor at its meeting held on October 19, 2009.

ATTEST:

CAROL JACOBS, Clerk

RICHARD W. MEEHAN, Mayor

Approved as to Form:

JOSEPH M. MITRECIC, President

GUY R. AYRES III, City Solicitor

LLOYD MARTIN, Secretary

Appendix F
Comprehensive Plan
Town of Ocean City

State of Maryland Development Visions

▪**Public participation:** Citizens are active partners in the planning and implementation of community initiatives and are sensitive to their responsibilities in achieving community goals;

▪**Growth areas:** Growth is concentrated in existing population and business centers, growth areas adjacent to these centers, or strategically selected new centers;

▪**Quality of life and sustainability:** A high quality of life is achieved through universal stewardship of the land, water, and air resulting in sustainable communities and protection of the environment;

▪**Community design:** Compact, mixed-use, walkable design consistent with existing community character and located near available or planned transit options is encouraged to ensure efficient use of land and transportation resources and preservation and enhancement of natural systems, open spaces, recreational areas, and historical, cultural, and archeological resources;

▪**Infrastructure:** Growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient, and environmentally sustainable manner;

▪**Transportation:** A well-maintained, multimodal transportation system facilitates the safe , convenient, affordable, and efficient movement of people, goods, and services within and between population and business centers;

▪**Resource conservation:** Waterways, forests, agricultural areas, open space, natural systems, and scenic areas are conserved;

▪**Stewardship:** Government, business entities, and residents are responsible for the creation of sustainable communities by collaborating to balance efficient growth with resource protection; and

▪**Implementation:** Strategies, policies, programs, and funding for growth and development, resource conservation, infrastructure, and transportation are integrated across the local, regional, state and interstate levels to achieve these visions.