COMPREHENSIVE PLAN

PUBLIC FACILITIES ELEMENT

Policy Document

CHAPTER 4: PUBLIC FACILITIES ELEMENT

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SANITARY SEWER SUB-ELEMENT

INTRODUCTION

During 1964, the City of Port Orange constructed a wastewater treatment plant and collection system to serve 700 customers. That was the humble beginning of a system that now serves three cities, portions of unincorporated Volusia County, and is made up more than 41,000 ELUs (Equivalent Living Units).

The original plant was a 290,000 gallon–per-day trickling filter plant with a discharge to Mikes Bay, a tributary of the Halifax River. The Plant has been upgraded over the years and in 1990, the plant was expanded to 12.0 MGD and treatment was improved through the provision of nutrient removal processes, and the outfall point was relocated to the Halifax River approximately one mile south of the Dunlawton Avenue bridge. The expanded and upgraded plant has performed well and significantly reduced the pollutant load discharged to the River. The plant is currently operating at one-half its rated capacity.

The City of Port Orange has responded to the needs of its service area with timely plant expansions. The City has responded to water quality concerns through the provisions of higher treatment levels and the implementation of the Reuse Water Program, which further reduces discharge of treated effluent into the receiving surface water body.

The collection system is typical of Florida construction. It contains a series of lift stations, force mains and relatively shallow interceptor sewers. The pipeline network adequately serves the existing users. Individual segments will require reinforcement in response to system growth.

IMPLEMENTATION PROGRAM

Table 1 reflects the implementation program for concurrency related items. This program details proposed capital improvements for the wastewater system necessary to satisfy capacity and anticipated regulatory requirements.

TABLE 1
SUMMARY OF PROPOSED
WASTEWATER AND RECLAIMED WATER SYSTEM
CAPITAL IMPROVEMENT PROJECTS

PROJECT DESCRIPTION	TERM			
	IMMEDIATE (<1 YR)	SHORT (1-5 YR)	MID (6-10 YR)	LONG (>10 YR)
[(1)]6.0 MGD 'Western' WWTP Expansion				$36M
Williamson Boulevard Utility Relocation	$3.1M			
[(2)]Water Reuse Program Upgrades		$2.6M		

Notes:

(1) WWTP construction has been delayed indefinitely.

(2) Upgrades are contingent upon identification of non-potable augmentation sources sufficient to meet peak irrigation demands.

GOALS, OBJECTIVES, AND POLICIES

GOAL: SANITARY SEWER

THE CITY OF PORT ORANGE SHALL PROVIDE COST-EFFECTIVE AND EFFICIENT SANITARY SEWER SERVICE WHILE PROTECTING THE ENVIRONMENT AND PUBLIC HEALTH

Objective 1: *Wastewater Treatment*. Provide a level of wastewater treatment that meets the water quality-based effluent limitations established by the Florida Department of Environmental Protection, and the calculated level of service for the system.

Policy 1.1: Remove nitrogen and phosphorus chemically and biologically ,utilize chemical feed, only when necessary, to assure discharge standards are met.

Policy 1.2: Plant operating personnel will achieve effluent total nitrogen concentrations of 12 mg/L and total phosphorus concentrations of 1 mg/L biologically.

Policy 1.3: The City will monitor effluent quality daily and report results monthly to the State.

Policy 1.4: The City will, in coordination with relevant local, regional, and state agencies, continue to identify, develop, and encourage environmentally sound wastewater treatment and disposal methods.

Policy 1.5: The City will adopt and maintain a level-of-service standard of 160 gallons per equivalent residential dwelling unit, and 1/10 gallon per square foot of non-residential development per day.

Policy 1.6: The City shall provide sufficient plant capacity for the growth of the system through the planning period by completing plant improvements scheduled in of the Sanitary Sewer Sub-Element.

Objective 2: *Septic Tanks.* Require, through the City's Land Development Code, the extension of the City wastewater collection system to all new development, except where septic tanks can provide an environmentally sound alternative at rural residential densities.

Policy 2.1: Prohibit the use of individual "package" treatment plants in the City's utility service area, and require the connection of any such existing plants that may be annexed, when access to the central system is available.

Policy 2.2: The City shall require existing homes utilizing septic tank systems on lots smaller than one acre to connect to the City central sewer system if available

within 100 feet of the property.

Policy 2.3: The City shall continue to extend its sewer lines to areas presently using septic tank systems. These extensions shall be prioritized according to the criteria listed below, such that areas least appropriate for septic tank use shall benefit from the extensions first:

A. Soil type.
B. Water table level.
C. Proximity to aquatic preserves and Outstanding Florida Waters.
D. Proximity to open shellfish harvesting areas.
E. Proximity to other water bodies.
F. Density of septic tank systems.
G. Areas known or suspected to be impacting surface or ground water quality.
H. Proximity to existing or planned public wastewater treatment systems.

Policy 2.4: Prohibit the use of septic tanks, except as follows:

A. For single-family homes on lots of one acre or more, with soils that are suitable for the use of such systems, as defined by the Soil Conservation Service, and where the central sewer system is not available for extension.
B. For temporary, isolated use in areas scheduled for future central sewer construction.
C. For infill on existing single-family lots without central sewer service available.

Policy 2.5: On-site waste treatment system facilities and drainfields shall not be located within 75 feet of the 100-year floodplain; within 75 feet of an upland/wetland interface; or within 120 of the mean high water mark of any surface water body, whichever is greater.

Objective 3: *Reclaimed Water System/Effluent Disposal.* The City shall reduce the discharge of wastewater into State and local waters through the continued utilization and expansion of its reclaimed water system.

Policy 3.1: Install residential reclaimed water lines in all areas defined within the City's Utility Master Plan, contingent upon sufficient reclaimed water supply.

Policy 3.2: The City will continue to require, through its Land Development Code, that all new residential subdivisions shall provide alternative water sources for irrigation, including reclaimed water when determined to be available. All future developments may not be eligible to receive reclaimed water service. Non-residential developments shall connect to the reclaimed water system, where determined to be available, or install irrigation systems designed for alternative water sources.

Policy 3.3: Continue the reclaimed water system as a program of Public Utilities.

Policy 3.4: Monitor volume of reuse at wastewater treatment meters and maintain a minimum of 90% reuse of average daily flow, with the eventual goal of 100% reuse (zero discharge level) by the year 2020, with exceptions allowed as necessary accounting for operational conditions, including current weather conditions, anticipated weather patterns, reclaimed water demand, reclaimed water use patterns, system draw down restrictions, system surplus volume, interruptible customer service restrictions, system operational efficiency, production capability, reclaimed reservoir capacity, availability of storm and groundwater augmentation sources, and other agency regulatory restrictions that require river discharge.

Policy 3.5: Utilize land application of reclaimed water (irrigation) to minimize discharges to surface waters.

Objective 4: *Collection System.* The major collection lines shall have sufficient capacity to transmit peak flows to the treatment plant.

Policy 4.1: In an effort to discourage urban sprawl the City will continue to require developers to provide the main extension necessary to serve their property based on the City's Utility Master Plan.

Policy 4.2: The City will require upsizing of primary system elements which might be used for provision of service to other properties. Upsizing shall be in accordance with service area plans.

Policy 4.3: The City will review on a yearly basis the priorities for replacement, correction of facility deficiencies, and provision of future sanitary sewer facility needs. These priorities will be based on those facilities that: 1) have failed or have a high probability of failure; and 2) will meet future capacity needs.

Policy 4.4: The City will monitor Infiltration and Inflow (I/I) on an on-going basis via flow monitoring and evaluation of lift station run times. A rehabilitation program will be implemented to repair sewers and manholes which exhibit excessive I/I, contingent upon available funding.

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SOLID WASTE SUB-ELEMENT

INTRODUCTION

The collection and disposal of solid waste is necessary for the protection of the public health, safety and welfare. The provision of this service has been accepted as a governmental responsibility by the City of Port Orange.

Solid waste generated in Port Orange is handled by a solid waste private contractor through a five-year contract with the City. The private contractor operates residential and commercial collection routes as well as specialized services like semi-annual seasonal clean-ups and rear door pickups for handicapped residents.

GOALS, OBJECTIVES, AND POLICIES

GOAL 1: SOLID WASTE

THE CITY SHALL PROVIDE FOR THE COLLECTION AND DISPOSAL OF SOLID AND HAZARDOUS WASTE ON A REGULAR BASIS IN ORDER TO MAINTAIN THE APPEARANCE OF THE CITY, AND TO PROTECT THE ENVIRONMENT AND PUBLIC HEALTH.

Objective 1.1: *Solid Waste Disposal.* Solid waste disposal will continue to be provided through the planning period.

Policy 1.1.1: The City shall cooperate with Volusia County on the disposal of solid waste generated within the Port Orange collection area.

Policy 1.1.2: The City will strive to maintain its contribution to the waste stream to below 10% of the County total on an annualized basis.

Objective 1.2: *Solid Waste Collection.* Port Orange shall maintain 5-year contracts or renew contracts for the collection and disposal of solid waste within the collection area.

Policy 1.2.1: The contract shall provide for the collection of refuse from each residential unit at least twice each week as determined by contractural negotiations between vendors and the City.

Policy 1.2.2: The City will maintain a level-of-service standard for solid waste collection of 3.21 lbs. per capita per day; up to 1,350 residential units per curbside collection vehicle; and 10 lbs/1,000 square feet of non-residential development.

Policy 1.2.3: The City will monitor and assess the performance of refuse collection to ensure quality service to residents and businesses.

Objective 1.3: *Hazardous Waste.* Hazardous materials will be properly handled and disposed of in accordance with State law.

Policy 1.3.1: The City will continue to coordinate hazardous waste management with Volusia County, and with relevant local, regional, state, and federal agencies.

Policy 1.3.2: The City will assist the County, if requested, in implementing the County's hazardous materials program within the collection area.

Policy 1.3.3: Port Orange will ensure the proper collection and transport of hazardous materials generated within the collection area.

Policy 1.3.4: The City will advertise hazardous material collection days as scheduled by Volusia County.

Policy 1.3.5: The City shall encourage the development of environmentally safe hazardous waste treatment, disposal, and transportation methods.

Policy 1.3.6: The City will assist the efforts of relevant local, regional, and state agencies to identify and clean up hazardous waste sites.

Policy 1.3.7: The City shall enforce and, to the extent possible, strengthen regulations pertaining to the generation, storage, treatment, disposal, and transportation of hazardous waste.

Policy 1.3.8: The City will, in coordination with relevant local, regional, and state agencies, establish a system for identifying the location, type, and quantity of hazardous materials.

Policy 1.3.9: The City shall require all known hazardous waste generators to properly manage their own wastes.

Policy 1.3.10: The City shall encourage the research, development, and implementation of recycling, resource recovery, energy recovery, and other methods of using garbage, trash, sewage, slime, sludge, hazardous waste, and other waste.

Policy 1.3.11: The City shall encourage greater coordination of intergovernmental waste management efforts.

Policy 1.3.12: The City will work with relevant local, regional, and state agencies, to develop a permanent system for households, small businesses, and other low-volume generators of hazardous waste to safely dispose of these materials in a convenient manner.

Policy 1.3.13: The City shall encourage the strict enforcement of hazardous waste laws and the swift prosecution of violators.

GOAL 2: RECYCLING

THE CITY SHALL MAINTAIN AND EXPAND ITS RECYCLING PROGRAM TO REDUCE THE VOLUME OF WASTE DISPOSED OF IN THE LANDFILL.

Objective 2.1: *Recycling.* The City will maintain or decrease the per capita solid waste generation rate through the promotion of recycling programs, in order to achieve the statewide recycling goal of 75% by the year 2020.

Policy 2.1.1: The City will ensure the curbside collection of recyclables.

Policy 2.1.2: The City will utilize its Newsletter to advise the citizens of recycling requirements.

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DRAINAGE SUB-ELEMENT

INTRODUCTION

The City of Port Orange completed a Master Drainage Plan in September, 1990 in an effort to define acceptable levels of service, identify deficiencies, and to quantify the costs associated with both construction and operation. These concerns are under the purview of the City's Storm Drainage Utility. Subsequent studies have focused upon individual drainage basins and capital projects needed to correct specific problems within each.

Rainfall runoff is the source of the water in both natural and man-made drainage systems. When a storm event takes place, the force of gravity dictates the flow of water from uplands to sea level. Natural drainage flows through a series of depressions and channels as defined by the topography of the area.

The Port Orange service area is divided into 13 basins. A stormwater basin is an area defined by topography that acts as an independent source of runoff. The understanding of the affects of the upstream basins on downstream facilities is an essential element of the stormwater management process. Runoff does not recognize City limit lines.

In an effort to manage the natural process, the City and other governmental entities have developed facilities to convey, store, and treat stormwater runoff. The range of man-made facilities designed to move water includes canals, swales, ditches and storm sewers.

The treatment of stormwater discharges is an important issue that has instigated the construction of storage structures designed to either detain or retain runoff. Detention facilities reduce the rate of discharge. They temporarily impound runoff and allow only gradual release. The outlet structure design is critical to detention facility performance. Retention facilities are designed to percolate the storm event and eliminate the discharge to surface waters. Both retention and detention facilities target the "first flush" of pollutants. The accumulation of grease, oils and sediments that are transported by runoff must be eliminated from the area surface waters. This is the primary goal of stormwater management.

In an effort to beneficially utilize all available resources, the City has implemented stormwater augmentation stations at various ‘regional’ stormwater management facilities. These augmentation stations are controlled via remote telemetry, and pump stormwater at a controlled rate into the sanitary sewer collection system. The stormwater is subsequently treated at the WWTP and discharged into the public reuse system. The reuse water is used for irrigation or discharged to the City’s regional storage/recharge reservoir in the vicinity of the City’s Central Wellfield. Water in the reservoir recharges the aquifer and/or is stored for subsequent filtration and irrigation.

SUMMARY OF SYSTEM IMPROVEMENTS

TABLE 1
PROJECT IMPLEMENTATION PROGRAM
CURRENT CAPITAL IMPROVEMENTS PLAN

	PROJECT	IMPLEMENTATION SCHEDULE	COST	FUNDING SOURCE
1)	Storm Drain Pipe Lining	2009- 2014	2,253,772	Stormwater Utility
2)	Rose Bay Project	2009	1,088,275	Stormwater Utility
3)	Storm Sewer Reconstruction	2009-2014	270,000	Stormwater Utility
4)	B-19 Retention Basin	2011	500,000	Stormwater Utility
5)	The Cove/White Acres	2011	750,000	Stormwater Utility
6)	Drainage – Woodlake/Sleepy Hollow	2009	473,000	Stormwater Utility
7)	B-23 Canal Dredging	2011	1,000,000	Stormwater Utility

Source: Quentin L. Hampton Associates, Inc., 2009.

GOALS, OBJECTIVES, AND POLICIES

GOAL: DRAINAGE AND STORMWATER MANAGEMENT

THE CITY SHALL PROVIDE AN EFFICIENT AND EFFECTIVE DRAINAGE AND STORMWATER MANAGEMENT SYSTEM WHICH, TO THE MAXIMUM EXTENT PRACTICAL, PROTECTS PERSONS AND PROPERTY FROM FLOODING, PREVENTS NEGATIVE IMPACTS TO THE GROUNDWATER AQUIFER, AND SAFEGUARDS SURFACE WATERS AGAINST EROSION AND DEGRADATION OF QUALITY.

Objective 1: *Flood Control.* Provide a stormwater management level-of-service that will eliminate existing local flooding during the 25-year, 24-hour storm, and require all new development to provide stormwater management facilities based on a 25-year, 24-hour storm event.

Policy 1.1: Continue to utilize the Port Orange Master Drainage Plan, which establishes high water elevations, addresses existing deficiencies, and coordinates the construction of new facilities. The City shall update the Master Drainage Plan every five years in order to verify its continued validity.

Policy 1.2: The City shall maintain the 25-year, 24-hour storm as the level-of-service standard (design storm) for drainage facility capacity. This standard shall be evaluated as part of each Master Drainage Plan Update.

Policy 1.3: The City shall utilize the full carrying capacity of the existing culverts and ditches. The Citywill perform annual inspections of system elements to ascertain whether ditches have been maintained and culverts cleaned.

Policy 1.4: The City will review on a yearly basis the priorities for replacement, correction of facility deficiencies, and provision of future drainage facility needs. These priorities will be based on those facilities that: 1) have failed or have a high probability of failure; and 2) will meet future capacity needs. The City shall establish a construction schedule for identified improvements as listed in the Drainage Sub-Element in order to meet the future needs of flood control and stormwater management.

Policy 1.5: For the purpose of flood control, new construction, development, or redevelopment shall conform to the stormwater management performance standards within the City’s Land Development Code.

Policy 1.6: For all construction projects impacting the City's stormwater management capability, the City shall review detailed calculations prepared by the developer's Project Engineer which clearly show that detention or retention has been accomplished. This review shall take into consideration the following criteria:

A. The characteristics and limitations of the soil at the proposed site with respect to percolation and infiltration;
B. The existing topography of the site and the extent of topographical changes after development;
C. The existing vegetation of the site, the extent of vegetational changes after development and the threat posed to vegetation endangered or indigenous to wetlands;
D. The plans, specifications, structures, and devices the applicant intends to employ for on-site stormwater retention/detention with filtration, erosion control and flow attenuation;
E. The effect the proposed stormwater management system will have upon mosquito breeding habitat;
F. The adequacy of easements for drainage systems in terms of both runoff conveyance and maintenance;
G. The method of handling upland flow which presently discharges through the sites;
H. The effectiveness of wind and water erosion control measures during construction;
I. Standards and requirements of any other governmental jurisdiction;
J. The maintenance entity responsible for upkeep of the system upon its completion;
K. The continuity of phased projects. Phased projects will require the submission of an overall plan for the applicant's total land holdings;
L. The existing hydrologic cycle of the proposed site and the impact of the proposed alterations on the existing hydrologic cycle;
M. The impact the proposed project will have on the natural recharge capabilities of the site; and
O. The impact the proposed project will have on downstream water quantity and quality and specifically the potential for downstream flooding conditions.

Objective 2: *Groundwater Recharge*. Stormwater management facilities shall be designed to protect and enhance groundwater recharge, especially in those areas demonstrated to have significant recharge potential. Where possible, recovery systems will be implemented to enable beneficial utilization of stormwater resource for reclaimed water augmentation, aquifer recharge and/or wetland hydration.

Policy 2.1: Utilize retention as the management method on projects located on the ridge formations within the City as identified in the Groundwater Aquifer Recharge Sub-Element.

Policy 2.2: Lowering of the water table shall be prohibited in areas known to the city, based on data collected and interpreted by the U.S. Geological Survey, the SJRWMD, the City, and other professional investigators, as important to recharge or to prevention of discharge to the Floridan aquifer.

Policy 2.3: For the purpose of protecting and enhancing groundwater recharge, stormwater management system design shall conform with the following performance standards:

A. Any proposed lowering of the water table shall occur over no more than 15% of the site and to a maximum depth of five feet below the surface of the existing undisturbed ground, or an equivalent volume, as measured at the overflow elevation of the retention area(s) except where seasonal pumping is necessary for flood control.

B. If ditches, underdrains or similar devices are used to lower the water table, the lateral volumetric effect will be calculated, and the volume will be deducted from that allowed for retention areas.

C. The high water table may be lowered up to two feet below the undisturbed ground in the vicinity of roads for the purpose of protecting the sub-base and base of the roadway and/or for the purpose of preventing mosquito breeding in the roadside swales.

D. The lowering of the water table shall have no adverse effect on wetlands as defined herein.

E. The lowering of the water table shall not increase flows to the detriment of neighboring lands.

F. Stormwater resources shall be utilized for reclaimed water augmentation. This includes direct and indirect augmentation.

Objective 3: *Water Quality*. Improve the quality of stormwater discharged into surface waters, such that the discharge of inadequately treated stormwater runoff into state waters is reduced to the maximum extent possible using established best management practices (BMPs):

Policy 3.1: For the purpose of protecting water quality, stormwater management system design shall conform to the following performance standards:

A. Require construction sites to utilize best management practices to assure sediment control. Best management practice shall mean a practice or combination of practices determined by the City to be the most effective, practical means of preventing or reducing the amount of pollution generated by the project to a level compatible with Florida water quality standards found in chapter 62-3, F.A.C., and based on Volusia County's 208 Study on Stormwater Management.

B. A stormwater pollution prevention plan (SWPPP) shall be prepared with all site plan applications.

C. No site alteration shall cause siltation of wetlands, pollution of downstream wetlands or reduce the natural retention or filtering capabilities of wetlands.

D. No site alteration shall allow water to become a health hazard or contribute to the breeding of mosquitoes.

E. In order to maintain good water quality in stormwater management detention ponds and maximize the provision of fish and wildlife habitat, stormwater management systems with permanently wet detention ponds should be

designed, operated and maintained so as to resemble a natural pond to the greatest extent practicable. A natural pond design should include: a littoral zone comprised of native emergent and submersed aquatic macrophytic vegetation; a deep open water limnetic zone free of rooted emergent and submersed vegetation; and, where feasible, an upland buffer or [of] native trees, shrubs and understory vegetation.

F. Where possible, natural vegetation shall be used as a component of the drainage system. The water table should not be manipulated so as to endanger natural vegetation beneficial to water quality unless natural vegetation can be replanted and survive with a lowered water table condition.

G. Runoff shall be treated to remove oil and floatable solids before discharge from the site in a manner approved by the City.

H. Erosion by wind or water shall be prevented by the developer throughout the construction process.

I. Direct discharge to class II waters is prohibited. A workable filter system must be provided prior to any discharge to class II waters.

J. Install grates on all stormwater outfall pipes to prevent manatees from becoming trapped within the pipes. Openings in the grates shall be no more than 6 inches wide.

Policy 3.2: Protect the natural water filtering function of vegetation adjacent to Spruce Creek and other natural drainage features by:

A. Requiring development to maintain a minimum 25-foot building setback from the wetland/upland boundary.

B. Require a minimum 50-foot buffer landward of the top of bank of Spruce Creek. Where the top of bank is not discernable, the more landward of the mean high water line or edge of marsh, or other saltwater vegetative growth shall be used. Development within this buffer shall be limited as per *Policy 2.1.2* of the Conservation Element.

C. Prohibiting disturbance of areas with slopes over ten percent (10%) along the banks of Spruce Creek.

D. Directing incompatible uses away from wetlands, as consistent with the provisions of the Conservation and Coastal Zone Management Elements.

Policy 3.3: Prepare and submit all required NPDES monitoring and compliance reports in accordance with the City's permit.

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POTABLE WATER SUB-ELEMENT

INTRODUCTION

The Port Orange water system came into existence during 1941 with the assistance of a W.P.A. Grant. The treatment facility utilized ion exchange softening, and storage was accomplished with a 50,000-gallon elevated tank.

During 1951, the requirement for improved quantity and quality of the water supply dictated a plant relocation and a change in process. Lime softening was implemented, and three 10-inch wells provided the supply.

During the 1970s, the raw water supply was relocated west to Clyde Morris Boulevard in order to maintain chloride levels in line with State drinking water standards. This wellfield is still used to supplement water from the Central Recharge Wellfield.

During 1981, the first 5 million gallon per day (MGD) section of the Garnsey Water Treatment Plant was constructed and placed in service. The plant was expanded to 10 MGD in 1986 and to 15 MGD in 2002. This plant includes aeration, solids contact softening, filtration and disinfection. The facility provides its customers with an excellent quality supply meeting applicable State standards.

The water distribution system includes both large-diameter transmission mains and system storage. The pipeline and storage networks have been extended as necessary to meet service area demands.

The water system is periodically reviewed for its ability to meet peak daily demand and fire protection. These analyses identify locations needing reinforcement and improvement. The City utilizes its Capital Improvement Program to correct these system deficiencies.

The Gamsey Water Plant is rated at 15 MGD of capacity with all three 5.0 MGD process trains fully operational and with 20.0 MGD water supply wellfield capacity; the City of Port Orange will not need significant capital expansion improvements through 2025.

TREATMENT PLANT PROJECTS

The City of Port Orange plans for upgrades to the system are detailed below. An equipment replacement schedule for the water plant is included in Table 1. Other non-concurrency related projects are included in the City's Capital Improvement Program (CIP), but not specifically detailed herein.

Table 1
WATER PLANT EQUIPMENT REPLACEMENT SCHEDULE

PROCESS DESCRIPTION	DATE(S) INSTALLED	EST. USEFUL LIFE	TARGET REPLACEMENT DATE(S)
Softener Drives	(s) (c) (n) 2000, 2000, 2005	10-15	2010 – 2015
Aerator Trays	2000	25	2025
CO_2 Feed Equipment	(s) (c) (n) 2000, 1992, 2000	15	(s) (c) (n) 2015, 2023, 2015
Filter Underdrains	2000, 2006	*20	2020, 2026
Filter Controls and Valves	2000	10-15	2010 – 2015
Filter Media	2002	10	2010 – 2012
Transfer Pumps	2000	10-15	2010 – 2015
NaOCl Feed Pumps	2002	6-8	2010
NaOCl Tanks	2002	15-20	2017 – 2020
High Service Pumps	2002	10-15	2017 – 2020
Sludge Thickener Drives	2006	10	2016
Vacuum Filter Presses & Vacuum Pumps	2006	10	2016

Concurrency-related projects identified in the CIP and the Water Supply Workplan are detailed below and the cost for these projects is summarized in Table 2.

Treatment Plant Expansion, Long Term (> 10 years)

The water plant's rated capacity is 15 MGD, with all three 5.0 MGD process trains fully operational. With one train out of service, the effective capacity is 10.0 MGD. Prudent planning provides for capacity availability with one train down. Peak week flows are expected to exceed 10.0 MGD during 2020. Therefore, a 2.0–3.0 MGD plant expansion is recommended before that time to allow for utilization of lower-quality groundwater. Additional capacity will provide greater operational flexibility and redundancy. It is a long-range capital improvement, (>10 years).

When considering treatment processes, the City should plan for the future. In Port Orange's case, some form of membrane treatment may be required for a portion of the City's raw water supply. The eastern wellfield supplies approximately 30% of all raw water; this is a condition of the City's CUP. There is potential for saltwater intrusion in coastal areas, thus

the 250 mg/l isobar may impact the eastern wells. This has already occurred in Ormond Beach and Holly Hill's eastern wells. Therefore, membrane treatment would allow for a lower quality water source.

It should be noted that the City is responsible for treating all water produced from its own wells. The City's wells include all of the City's eastern wells and wells #CR 1 through 27 in the central recharge area.
Estimated costs for implementing membrane treatment at the Garnsey WTP are $3 - $4/GPD. A 2.0 MGD expansion may cost $6 - $8 million, in 2009 valuation. A 3.0 MGD expansion may cost $9 - $12 million. All cost estimates are expressed in terms of 2009 dollars. Planning, permitting and design should commence in 2018; estimated costs are approximately $1.0 million. The City should plan for an expenditure of approximately $9 - $12 million in FY '20.

Groundwater Rule Compliance

The EPA groundwater disinfection rule establishes minimum contact time (CT) requirements for groundwater treatment facilities. Port Orange uses chloramines for disinfection and CT requirements. The City covered the recarbonation basin and filters in 2009 to meet new CT requirements.

Table 2
SUMMARY OF PROPOSED WATER TREATMENT PLANT
CAPITAL IMPROVEMENT PROJECTS

PROJECT DESCRIPTION	SHORT TERM (2008-2013)	MID TERM (2014 – 2019)	LONG TERM (>10 YEARS)
3.0 MGD Membrane Treatment Planning and Expansion			$12 M
Groundwater Rule Compliance*	$1.39 M		
TOTAL	$1.39 M		$12 M

*****Funding encumbered in FY 08 and improvement is scheduled for completion in 2009.

Table 3 summarizes the proposed capital improvements for the water distribution system over the next 10 years. The projects are intended to serve new development, replace older distribution components, replace undersized mains, provide fireflow and/or provide system redundancy.

TABLE 3
SUMMARY OF PROPOSED WATER DISTRIBUTION SYSTEM
CAPITAL IMPROVEMENT PROJECTS

PROJECT DESCRIPTION	SHORT TERM (1-5 YR)	MID TERM (6-10 YR)	LONG TERM (>10 YR)
Clyde Morris Bvd North of Dunlawton 18" Water Main			$50,000
Garnsey to Madeline Avenue 16" Water Main (North Outlet)			$468,750

Northwest Storage tank and Pump Station			$2,500,000

Source: Quentin L. Hampton Associates, Inc., 2009

ALTERNATIVE WATER SUPPLY SOURCES AND OPTIONS

The City of Port Orange has existing "firm" raw water supply capacity to meet peak day flows of 20.0 MGD and treatment capacity of 15 MGD. Assuming an availability factor of 2.0 – 2.5, proposed well capacity will meet average daily flow (ADF) demands of 8.0 – 10.0 MGD, which is satisfactory through 2025. The availability factor is used to provide rotational capacity and avoid operating wells more than 12 hrs/day. As such, no new Floridan Aquifer wells are proposed through 2025.

Fresh groundwater will remain the dominant source of water supply for the City.However, potential alternative water supply options include:

- Surface Water from the St Johns River
- Brackish Groundwater
- Demand Reduction Strategies
- Artificial Recharge and Regional Aquifer Management Plan (RAMP) projects

Surface Water from the St. John's River
This alternative primarily relates to many of the water suppliers in western Volusia County. The St. John's River is a suitable potable source, given certain treatment levels. A reduction in groundwater withdrawal allocations, due to Blue Springs MFL legislation, will necessitate using surface water. It is conceivable that potable supply interconnections from western Volusia County to eastern parts of the County will enable supply to Port Orange and other regional utilities.

Brackish Groundwater
Brackish groundwater is water containing chlorides in excess of 250 mgl. Brackish groundwater may be withdrawn from the Lower Floridan Aquifer (LFA), treated using membrane processes or blended with water from the Upper Floridan Aquifer. If used as blend wells, the amount of water from this source would be limited by an acceptable blend ratio, which would maintain a safe concentration level below the Drinking Water Standard for Chlorides and Sulfates of 250 mg/l. This blend ratio would depend on the final use of the finished water. For finished potable water, the blend would need to be between 150 and 200 mg/l. The brackish waters of the LFA could also be treated using membrane treatment technology to produce high-quality drinking water or lower-quality irrigation water.

Conservation, Reclaimed, and Demand Reduction Strategies
Existing water conservation programs, such as low-flow showerheads and toilets, rain sensors for lawn irrigation, and education programs, will stay in effect. The use of reclaimed water to supplement and/or replace potable water used for irrigation purposes

has been aggressively pursued by the City of Port Orange. In addition, stormwater improvements could be design to beneficially utilize excess stormwater for reclaimed water augmentation, aquifer recharge, wetland hydration and potentially for transfers to other regional water supplies.

Regional Aquifer Management Projects (RAMP)

RAMP projects encompass a variety of programs which increases the available supply of potable groundwater. This could include interconnects, wellfield management strategies and recharge enhancement projects. Port Orange is actively constructing RAMP projects. Interconnects with New Smyrna Beach and Daytona are in place. Completion of the reclaimed water reservoir will provide enhancement of natural recharge and avoidance of wetland impacts in the vicinity of the Central Recharge Wellfield.

GOALS, OBJECTIVES, AND POLICIES

GOAL: POTABLE WATER

PRODUCE AND DELIVER SAFE, HIGH-QUALITY POTABLE WATER IN THE MOST SUSTAINABLE, COST-EFFECTIVE MANNER THROUGHOUT THE SERVICE AREA.

Objective 1: *Water Supply.* The City shall produce a safe, high-quality potable water supply based on the level-of-service criteria outlined in the Potable Water Sub-Element.

Policy 1.1: The City will monitor flow to ensure that the level-of-service standards in the Potable Water Sub-Element are met, and shall make timely system improvements as needed to meet those standards.

Policy 1.2: The adopted level-of-service standard for potable water production is 180 gallons per day per equivalent residential unit; and 1/10 gallon per square foot per day of commercial, industrial, or institutional development; not to exceed Consumptive Use Permit (CUP) capacity for groundwater withdrawals.

Policy 1.3: The raw water supply required is determined by the level-of-service and peak demand factors. Peak demand ratios will be recalculated annually by the City and raw water demand shall be estimated for the upcoming year.

Policy 1.4: The City will renew the raw water Consumptive Use Permit (CUP) during 2022, and submit 5-year compliance reports and update requests per the terms of the CUP.

Policy 1.5: The City shall explore and promote the development of new technologies, which may include reverse osmosis and desalinization and other filtration technologies for increasing water supplies.

Policy 1.6: The City will monitor water quality to ensure compliance with the Safe Drinking Water Act as well as to the American Water Works Association potable supply goals related to turbidity, taste and odor.

Policy 1.7: The City shall continue to utilize the Central Recharge Wells as the primary supply source. The operating staff will continue to optimize chemical feed and control to meet quality control standards.

Policy 1.8: All future potable water wells will be located in the City's Central Recharge Wellfield.

Policy 1.9: The City shall encourage the development of local and regional water supplies within water management districts instead of transporting surface water

across district boundaries.

Objective 2: *Water Distribution.* The City shall deliver an adequate quantity of potable water in the most cost-effective manner.

Policy 2.1: The City will provide ground storage capacity equal to 50% of average daily flow. Additional storage will be provided in concert with system growth.

Policy 2.2: The minimum pressure for fire flow shall be 20 psi.

Policy 2.3: Development patterns affect the cost of provision of service. The City will continue its current policy of requiring developers to provide the main extensions necessary to serve their property in an effort to discourage urban sprawl.

Policy 2.4: The City shall continue to require future development at urban densities and intensities greater than one unit per five acres to connect to the centralized potable water system in all areas of the City.

Policy 2.5: Continue to utilize the construction schedule for identified improvements and correction of existing deficiencies, dependant upon available funding.

Policy 2.6: The City will review on a yearly basis the priorities for replacement, correction of facility deficiencies, and provision of future potable water facility needs. These priorities will be based on those facilities that: 1) have failed or have a high probability of failure; and 2) will meet future capacity needs.

Policy 2.7: The City will upsize lines in conformance with the year 2025 distribution system.

Objective 3: *Water Conservation.* The City shall reduce groundwater withdrawal through conservation and reuse programs.

Policy 3.1: The City shall continue to implement and update the water conservation programs in the Utility Master Plan.

Policy 3.2: The City shall continue conservation practices and strive to maintain per capita consumption below 100 gpcd.

Policy 3.3: The City shall continue to require, through the Florida Building Code, low volume plumbing fixtures, including low-flush fixtures, as a potable water conservation tool for all new development.

Policy 3.43: The City shall continue to utilize the rebate program for retrofit to low-flush fixtures and other inefficient plumbing devices, where funding is available.

Policy 3.5: The City shall promote water conservation as an integral part of its water management program.

Policy 3.6: The City shall promote the use and reuse of water of the lowest acceptable quality for the purposes intended.

Policy 3.7: The City shall continue to implement the City's Utility Master Plan, which includes retrofitting developed subdivisions with reuse water mains, to provide a substitute for landscape irrigation via the potable water supply, when supply of reclaimed water is available.

Policy 3.8: The City shall continue to utilize the Land Development Code to require the installation of reuse mains in new subdivisions, when supply of reclaimed water is available.

Policy 3.9: The City shall continue to require metering of all reclaimed water customers and continue implementation of a conservation rate structure to promote conservation of reclaimed and potable water.

Policy 3.10: The City shall continue to promote water conservation through waterwise irrigation practices and the application of Florida-friendly landscaping practices.

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GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT

INTRODUCTION

The general subject of this Sub-Element is the protection of both the quantity and quality of natural groundwater. Groundwater levels and water quality are affected by many activities. Solid waste and hazardous waste facilities, underground storage tanks, and septic tanks all have the potential to contaminate the groundwater supply. These issues are addressed not only in this Sub-Element, but also in several of the other Elements in this Comprehensive Plan.

Several terms and concepts will be used in this Sub-Element to help define the groundwater resource and its requirements for protection. The term *aquifer* is used to describe a water-bearing geologic formation. Such formations can be confined or unconfined, and are noted for their ability to store and transmit usable quantities of water. In an aquifer, water is stored in the pore space of the material.

The Port Orange service area is underlaid by two water-bearing aquifers: the upper unconsolidated surficial (shallow) aquifer, and the confined limestone aquifer, known as the Floridan Aquifer. The surficial aquifer does not have consistent composition and water storage capacity throughout. There are lenses of clayey sand and shell beds, and zones of fine to coarse sand. In general, the clays and sandy clays occur in the lower half of the shallow aquifer. The limestone Floridan Aquifer also exhibits variation. There are alternating layers of porous limestone and relatively dense dolomitic limestone. The interaction between porous beds and impermeable beds is essential to the functioning of the aquifer. The alternating formations affect both the potentiometric surface and the recharge capability.

Potentiometric surface is a term relevant to the confined Floridan Aquifer and represents a measurement of head pressure. This value equals the elevation that water would reach in a well penetrating to the aquifer. Confinement occurs when the water-bearing formation is overlain by relatively impermeable strata, termed *aquitards*. The slope of the potentiometric surface defines the direction of groundwater movement. Water moves from higher surface zones to lower surface zones.

Recharge is the term for the renewal of the groundwater resource. Precipitation either augments surface water, is transpired by plants, or works its way into the groundwater. When water filters down through the unsaturated soils, it reaches the saturated zone and becomes part of the water table or shallow aquifer. In areas where the aquifer is overlain with highly permeable material (DeLand Ridge and Rima Ridge) recharge of the Floridan Aquifer is accomplished.

The protection of recharge areas is of prime importance in locations that rely on aquifers as the sole source of drinking water, such as Volusia County. Since well-drained recharge areas are considered prime land for development, they are often subject to alteration. The

installation of impervious surfaces such as roads, roofs and parking lots reduces the area available for percolation and thus recharge volume. Groundwater quality can also be affected by development of the recharge area. Groundwater can absorb development-related contamination and transmit it to the aquifer/drinking water supply. This is most significant in the case of a sole source aquifer.

The following additional definitions are derived from documents prepared by the U. S. Geological Survey. They provide a verbal framework for this section of the plan.

Cone of Depression (or Drawdown Cone). A roughly conical concavity (or dimple) in the potentiometric surface around a pumping well.

Confining Bed. A body of "impermeable" material stratigraphically adjacent to one or more aquifers, also referred to as aquitard, aquiclude, and aquifuge.

Diffusion. The process by which dissolved substances move from a region of higher to lower concentration.

Groundwater, Unconfined. Water in an aquifer that has a water table.

Groundwater Divide. A vertical, imaginary, impermeable boundary that, in an ideal, symmetrical groundwater system, coincides exactly with the topographic highs that represent surface water divides from which water flows in opposite directions.

Head/Static Head. The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point. *Head*, when used alone, is understood to mean *static head*. The head is proportional to the fluid potential; therefore, the head is a measure of the potential.

Hydraulic Gradient. The change in static head per unit of distance in a given direction. If not specified, the direction generally is understood to be that of the maximum rate of decrease in head.

Hydrologic Cycle. The continuous circulation of water between the ocean, atmosphere, and land.

Infiltration. The entry into the soil of water made available at the ground surface, together with the associated flow away from the ground surface within the unsaturated zone.

Leachate. The liquid derived from the leaching of buried refuse in sanitary landfills and dumps by percolating water derived from rain or snow melt. It frequently contains large numbers of inorganic contaminants and high concentrations of total dissolved solids, as well as many organic contaminants.

Leakance. The vertical transfer of water from a surficial aquifer system to an adjoining

aquifer.

Percolate. Water moving by gravity through pore spaces of unsaturated geologic material.

Permeability. The capacity of a porous medium for transmitting water.

Piezometer. A non-pumping well, generally of small diameter, which is used to measure the elevation of the water table or potentiometric surface. A piezometer generally has a short well screen through which water can enter.

Plume. A relatively discrete body of contaminated groundwater originating from a specified source(s) and influenced in its movement by such factors as the local groundwater flow pattern, the specific gravity and solubility of the contaminant, the subsurface geology within the zone of saturation, and the influence of pumping wells.

Porosity. The ratio of the volume of small openings in soil or rock to its total volume; it is usually expressed as a percentage.

Recharge Area. That portion of a drainage basin in which the net saturated flow of groundwater is directed away from the water table.

Recharge, Artificial. The addition of water to the groundwater by activities of man at a recharge rate greater than normal.

Runoff. 1) That portion of precipitation that does not return to the atmosphere through evapo-transpiration nor infiltrate the soil to recharge groundwater, but leaves the hydrologic system as streamflow. *2)* That portion of precipitation delivered to streams as overland flow to tributary channels.

Saltwater Intrusion. The migration of saltwater into freshwater aquifers under the influence of groundwater pumping.

Saturated Zone. The subsurface zone occurring below the water table where the soil pores are filled with water and the moisture content equals the porosity.

Safe Yield. The amount of water that can be withdrawn annually from a groundwater basin without producing an undesirable result. Undesirable results include depletion of groundwater reserves, intrusion of low quality water, contravention of water rights, and others, such as depletion of streamflow and land subsidence.

Storage Coefficient. The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. In an unconfined aquifer, the storage coefficient is equal to the specific yield.

Unconfined Aquifer. An aquifer having a water table.

Unsaturated Zone. The subsurface zone occurring above the water table and the capillary fringe, in which the soil pores are only partially filled with water, and the moisture content is less than the porosity.

Water Table. The surface on which the fluid pressure in the pores of a porous medium is exactly atmospheric. It is the level at which water stands in a shallow well open along its length and penetrating the surficial deposits just deeply enough to encounter standing water in the bottom.

GOALS, OBJECTIVES, AND POLICIES

GOAL: AQUIFER PROTECTION

MAINTAIN THE VIABILITY OF THE VOLUSIA-FLORIDIAN SOLE SOURCE AQUIFER AS THE POTABLE WATER SUPPLY FOR THE CITIZENS OF PORT ORANGE.

Objective 1: Development within the zone of influence of any wellfield shall be regulated to ensure that groundwater quality is not degraded.

Policy 1.1: If prime recharge areas are annexed into the City, development shall be limited in density/intensity and designed in a manner that limits paved surfaces and the diversion of stormwater.

Policy 1.2: The City should not support any proposed changes to the County Future Land Use Map that would increase the intensity of development on the Rima Ridge.

Policy 1.3: Given that the Rima Ridge is a location of above average annual groundwater recharge, the City shall continue to support the County's efforts to prevent development from diverting water away from the Ridge.

Objective 2: The City shall protect the water quality in the aquifer in order to maintain its potable water standards.

Policy 2.1: The City shall continue to employ best management practices for stormwater management, as outlined in the Drainage Sub-Element, such that the collection and percolation of stormwater will decrease runoff and increase potential recharge, as well as protect water quality.

Policy 2.2: The City will monitor groundwater testing information annually to ascertain changes in quality in the surficial and artesian aquifers.

Policy 2.3: The City will employ conservative well spacing and withdrawal procedures to preclude saltwater intrusion by:

A. Monitoring the potentiometric surface of pumping wells and terminating operation when the surface reaches elevation of 5 M.S.L.
B. Assuring that well spacing is greater then 750 ft. when withdrawal rates exceed 350 GPM in order to control interference drawdown.
C. Rotating wells in order to reduce withdrawal demand on individual wells.

Policy 2.4: In an effort to reduce public reliance on potable water and shallow aquifer consumption, the City, in accordance with the provisions of the Sanitary Sewer Sub-Element, shall continue to expand its reclaimed water system, to require

new development to connect to the existing system where sufficient reclaimed water supply is available, and to encourage alternative water sources for irrigation other than potable water.

Policy 2.5: All requests for development shall be reviewed to ensure that potential impacts of the proposed development do not negatively impact the quantity and quality of groundwater resources.

Policy 2.6: In order to protect the viability of the Volusia-Floridan Sole Source Aquifer, the City shall prohibit excavation projects from removing the confining layer of material separating the bottom of borrow pits from the top of the aquifer.

Objective 3: The City shall continue to protect the quality of its wellfield areas from contamination by hazardous substances, as defined in this Element, through the use of wellhead protection zones and buffers.

Policy 3.1: The City shall maintain wellhead protection zones as follows:

A. *Primary protection zone* -- The land area within a 200-foot radius of any public potable water supply well, wherein the use, handling, production, or storage of hazardous substances for non-residential purposes is prohibited.

B. *Secondary protection zone* -- The land area within a 1,000-foot radius of any public potable water supply well, and surrounding each primary protection zone, wherein the use, handling, production, or storage of hazardous substances for non-residential purposes is considered to be a non-conforming use, and therefore subject to City review.

Policy 3.2: The City will retain current wellfield buffers in public ownership, and maintain the Conservation land use designation on its Central Recharge Wellfield property consistent with the Wellfield Property and Water Supply Planning Area interlocal agreements between the City and the County, which specificy the permitted uses for this area.

Policy 3.3: The City will continue to utilize the County Minimum Standards for Wellhead Protection, in order to protect wells from potential sources of contamination.

Policy 3.4: Groundwater resources shall be protected from leaking underground storage tanks by the utilization of state-of-the art leak-prevention technology, such as double-walled storage tanks.