
**EVALUATION AND APPRAISAL REPORT
OF THE
INDIAN RIVER COUNTY
COMPREHENSIVE PLAN**

**NATURAL GROUNDWATER
AQUIFER RECHARGE SUB-ELEMENT**

2008

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INTRODUCTION

The purpose of this section of the Evaluation and Appraisal Report is to assess the success or failure of the Natural Aquifer Recharge Sub-Element of the Comprehensive Plan. This assessment examines changes affecting natural aquifer recharge in Indian River County, and evaluates the achievement of objectives set forth in the Natural Aquifer Recharge Sub-Element. Based on the results of this evaluation and appraisal, certain aspects of the Natural Aquifer Recharge Sub-Element are subject to revision.

To perform this assessment, Indian River County has taken the following steps:

- Assembled baseline data
 - Identified the natural groundwater and aquifer conditions within the county at the time of the last major comprehensive plan update (1998)
- Compiled current conditions data
 - Identified existing aquifer and groundwater conditions within the county (2006-2008)
- Compared baseline data with current conditions data
 - Analyzed changes in aquifer and natural groundwater conditions between the time of the last major comprehensive plan update (1998) and the present time (2006-2008)
- Evaluated objective achievement
- Assessed status of policy implementation
- Identified future actions
- Identified anticipated amendments

BASELINE DATA

For the Natural Groundwater Aquifer Recharge Sub-Element component of the Evaluation and Appraisal Report, the baseline data were taken from the last major comprehensive plan update. That update occurred in 1998. In the 1998 comprehensive plan update, the majority of the data was collected in 1996. Consequently, the data used in the 1998 comprehensive plan update will, unless otherwise noted, be referred to as the *1996 data or baseline data* in this report.

In 1996, the natural groundwater aquifer recharge condition categories were as follows: natural groundwater aquifer recharge areas; water use; water quality; and wells. Those categories are addressed below.

Natural Groundwater Aquifer Recharge Areas

- Surficial Aquifer

The surficial ("shallow") aquifer is a groundwater reservoir encompassing the top stratum of soil in Indian River County that is directly replenished by rainfall. At the time of the last major plan update, data showed that the surficial aquifer had a depth ranging from several feet to approximately 150 feet, and an annual recharge rate of 16 inches. This recharge occurred from several sources. Due to high percolation of rainfall, the Atlantic Coastal Sand Ridge and Ten Mile Ridge were identified as important recharge areas of the surficial aquifer, while wetlands and rainfall contributed to recharge in the Inter-ridge area. Throughout the county, additional factors which contributed to the recharge of the surficial aquifer included: seepage from drainage canals, agricultural irrigation, and water percolation from the Floridan aquifer.

- Floridan Aquifer

In 1996, the upper zone of the Floridan aquifer ranged in depth from approximately 350 to 650 feet below ground level, while the lower zone of the Floridan Aquifer descended to a depth of approximately 2,000 feet. Recharge of the Floridan aquifer in Indian River County was estimated to be 1-2 inches annually. That recharge principally occurred in the area of the Osceola Plain west of Blue Cypress Lake. The majority of the Osceola Plain was located outside of the boundaries of Indian River County.

Water Use

Indian River County's total groundwater withdrawal was estimated to be 104.9 million gallons per day (MGPD) in 1994. Of this total, more than two-thirds (2/3) of the water was withdrawn from the Floridan aquifer. At that time, agriculture was the single highest water use category, accounting for 63.2 MGPD, or 83% of the total groundwater withdrawal.

In 1995, Indian River County Utilities supplied 3.4 MGPD of potable water for domestic use. At that time, the County's two water plants utilized reverse osmosis (RO) treatment to supply potable water from the Floridan aquifer.

Water Quality

At the time of the last major plan update, water quality in the surficial aquifer was potable throughout most of the county, with the exception of wells located near the Indian River Lagoon. Although the quality of water in the surficial aquifer was considered potable, surficial aquifer water contained high concentrations of minerals.

In 1995, water from the Floridan aquifer exceeded state secondary drinking water standards for chloride and total dissolved solids (TDS). Consequently, Floridan aquifer water was not considered potable until it was treated by an RO facility.

Near the Vero Beach Municipal Airport, there were carcinogens documented in surficial aquifer wells. Contamination of the surficial aquifer caused by Leaking Underground Storage Tanks (LUSTs) was also discovered at several sites throughout the county.

Water in the surficial aquifer and the Floridan aquifer were free of contamination from agricultural chemicals in 1995.

Wells

At the time of the last major plan update, the Indian River County Environmental Health Department estimated that there were 20,000 private wells located throughout the County. These wells utilized the surficial aquifer and had an average depth of 90 feet. While the area of highest surficial aquifer well yield was located west of U.S. Highway 1 on the Atlantic Coastal Ridge, the highest yielding wells for the Floridan aquifer were located south of the City of Vero Beach.

EXISTING CONDITIONS

In 2008, the natural groundwater aquifer recharge condition categories were as follows: natural groundwater aquifer recharge areas; water use; water quality; and wells. Those categories are addressed below.

Natural Groundwater Aquifer Recharge Areas

- Surficial Aquifer

In 2006, data showed that the surficial aquifer had a depth ranging from several feet to approximately 150 feet, and an annual recharge rate of 16 inches. The Atlantic Coastal Sand Ridge and Ten Mile Ridge were identified as important recharge areas of the surficial aquifer due to high percolation of rainfall. Wetlands and rainfall contributed to recharge from the Inter-ridge recharge area. Throughout the county, additional factors which contributed to the recharge of the surficial aquifer included: seepage from drainage canals, agricultural irrigation, and water percolation from the Floridan aquifer.

- Floridan Aquifer

Currently, the upper zone of the Floridan aquifer ranges in depth from approximately 350 to 650 feet below ground level. The lower zone of the Floridan Aquifer descends to a depth of approximately 2,000 feet. In 2006, recharge of the Floridan aquifer in Indian River County was estimated to be 0-4 inches annually. That recharge principally occurred in the area of the Osceola Plain west of Blue Cypress Lake. The majority of the Osceola Plain was located outside of the boundaries of Indian River County.

- Countywide Geohydrology Report

In 1988, the U.S. Geological Survey published a water resources investigations report on geohydrology in Indian River County. That report contains the most current information regarding geohydrology in the county. Recently, the County Agriculture Advisory Committee (AAC) recommended that the County obtain an updated countywide geohydrologic survey.

Water Use

In 2006, Indian River County’s total groundwater withdrawal was estimated at 199.06 million gallons per day (MGPD). Of this total, more than two-thirds (2/3) of the water was withdrawn from the Floridan aquifer. Nearly all public drinking water was withdrawn from the Floridan aquifer in 2006.

Accounting for 163.86 million gallons per day, or 82.31% of total annual groundwater withdrawal, agriculture was the single highest water use category in 2006. During that same year, potable water use totaled 15.94 million gallons per day, while per capita water use was estimated at 104 gallons per day. In 2006, the breakdown of groundwater use was as follows:

2006 Water Withdrawal

| USE | Million Gallons/ Year | Percent of Total Permitted Withdrawals |
|--|--------------------------|---|
| Potable Water | 5,819.63 | 8.01% |
| Agricultural | 59,808.99 | 82.31% |
| Rec., Golf, Commercial/Industrial, Other | 7,030.36 | 9.68% |
| Total | 72,659.36 | 100% |

In 2005, 10% of domestic water was withdrawn from the surficial aquifer by private wells. The remaining 90% came from the Floridan aquifer. Currently, the Indian River County Utilities Department supplies 9.5 MGPD for potable water use. Both of the County's water treatment plants utilize reverse osmosis (RO).

- Regional Groundwater Model

Currently, the St. Johns River Water Management District (SJRWMD) is preparing a regional groundwater model that will provide an updated estimate of groundwater quality and quantity in the surficial and Floridan aquifers. That model is expected to be completed in 2008. Early indications from the SJRWMD suggest that there will be no significant reduction in the quantity or quality of water available in the Floridan aquifer in Indian River County through at least 2025. With respect to the surficial aquifer, however, there are preliminary indications from the SJRWMD of potential drawdown impacts in the Fellsmere and Vero Beach wellfield areas.

- Priority Water Resource Caution Areas

“Priority Water Resource Caution Areas” (PWRCA) are areas designated by the SJRWMD where existing and anticipated water supplies may not meet projected demand through the year 2025. Currently, half of the counties within the SJRWMD’s jurisdiction are designated as PWRCA. Indian River County is not designated as a PWRCA at this time.

Recently, the SJRWMD concluded that the Upper Floridan Aquifer (UFA) in Indian River County can sustain continued development through 2025. For that reason, Indian River County is not currently designated as a PWRCA. According to the SJRWMD, however, the UFA may not be able to meet demand beyond 2025. If the regional groundwater model expected to be completed in 2008 indicates that the UFA cannot meet demand through 2030, Indian River County will be identified as a PWRCA.

- Watering Restrictions

In 1991, the SJRWMD began prohibiting the irrigation of lawns and landscapes between 10 a.m. and 4 p.m. district-wide. Recently, additional watering restrictions were adopted. The newly adopted regulations limit the irrigation of lawns and landscapes to a maximum of two days per week, with all watering prohibited between the hours of 10 a.m. and 4 p.m.

Water Quality

Currently, water quality in the surficial aquifer is potable throughout most of the county, with the exception of wells located near the Indian River Lagoon. Although the quality of water in the surficial aquifer is considered potable, surficial aquifer water contains high concentrations of minerals.

In 2006, the state standard for arsenic in drinking water was reduced from a maximum concentration of .05 mg/l to .01mg/l. Currently, the maximum detected level of arsenic in Indian River County’s public drinking water is .0003 mg/l. Overall, the levels of inorganic contaminants contained in Indian River County’s public drinking water were well within state drinking water standards in 2005.

Presently, County mining regulations are undergoing review. As a result of recent mining workshops, 38 “consensus recommendations” for revisions to mining regulations were compiled. Those recommendations include groundwater monitoring requirements to address the effects that mining operations may have on groundwater sources.

Wells

In 2005, the Indian River County Environmental Health Department estimated that there were 33,587 private wells located throughout the County. Those wells utilized the surficial aquifer and had an average depth of 90 feet. While the area of highest surficial aquifer well yield was located west of U.S. Highway 1 on the Atlantic Coastal Ridge, the highest yielding wells for the Floridan aquifer were located south of the City of Vero Beach.

ANALYSIS

Natural Groundwater Aquifer Recharge Areas

○ Surficial Aquifer

Within the county, the Atlantic Coastal Sand Ridge and the Ten Mile Ridge are the primary recharge areas of the surficial aquifer. Since the last major plan update, the County has:

- Acquired approximately 611 acres of xeric scrub on the Atlantic Coastal Sand Ridge for conservation under the County Environmental Lands Program.
- Obtained an undivided 23% title interest in 1,256 acres known as the Sand Lake Tract on the Ten Mile Ridge, ensuring conservation of the tract in open space.
- Enforced its wellfield and aquifer protection land development regulations, including required radial separation distances for certain land uses from public wellhead regulated areas, as follows:
 - 200 feet for on-site disposal systems, unless approved by the FDEP or DHRS;
 - 300 feet for wet retention/detention areas, unless approved by the SJRWMD;
 - 500 feet for landfill and/or transfer stations, above ground or underground storage tanks, feed lots and animal facilities, and WWTP effluent discharges, unless approved by the FDEP;
 - 1,000 for any mining and/or excavation of waterways or drainage facilities which intersect the water table.

Currently, the County has approximately \$6.5 million of unallocated funds remaining from a 2004 environmental land bond referendum to acquire conservation lands. That amount is based on the assumption that the County will receive a \$6.3 million cost-share reimbursement grant from the Florida Communities Trust (FCT) for an acquired project known as “Sebastian Harbor Preserve.”

Given current economic conditions, it is unlikely that a new environmental land acquisition bond referendum will be approved. If economic conditions improve in the next few years, however, another bond referendum may eventually be appropriate. Contingent upon availability of funding, the County should in the future consider it a priority to acquire and conserve lands within the primary recharge areas of the surficial aquifer.

○ Floridan Aquifer

Since the last major comprehensive plan update, little has changed in the condition of Floridan aquifer recharge in the county. Except for the extreme western portion of the county, west of Blue Cypress Lake, Indian River County lies largely outside of the Floridan aquifer recharge

area. Currently, the County land use designation for that area is AG-3, Agriculture, one unit per 20 acres. Going forward, the County should maintain that low development density designation in the Floridan aquifer recharge area, since it limits the potential for impervious surface and promotes open space for aquifer recharge.

Water Use

From 1996 to 2007, per capita water consumption in Indian River County increased from 70 gallons per day to 143 gallons per day. During the same time period, agricultural water consumption dropped approximately 11 million gallons per day, or 18%. Currently, agricultural water use is the single largest water use category in the county. Although agricultural water consumption has declined over the last ten years, it is anticipated that other non-citrus agricultural uses, including possible bio-fuel crop production, will slow or reverse this trend.

From a regional perspective, increases in water consumption over the long-term warrant concern. Between 1995 and the present, groundwater consumption within the SJRWMD's jurisdiction increased by 422 million gallons per day, or 20%. According to estimates by the SJRWMD, water consumption in the district will increase by an additional 100 million gallons per day by the year 2025. At that rate of increase, groundwater will not sustain district-wide demand through 2025.

- SJRWMD Groundwater Model Update

Currently, the SJRWMD is preparing a regional groundwater model that will provide an updated estimate of groundwater quality or quantity in the surficial and Floridan aquifers. That model is expected to be completed in 2008. Early indications from the SJRWMD suggest that there will be no significant reduction in the quantity or quality of water available in the Floridan aquifer in Indian River County through at least 2025. With respect to the surficial aquifer, however, there are preliminary indications from the SJRWMD of potential drawdown impacts in the Fellsmere and Vero Beach wellfield areas as development occurs in those areas.

Based on the results of the groundwater model anticipated for completion in 2008, Indian River County may be designated a Priority Water Resource Caution Area (PWRCA) in the future. The PWRCA designation means that a county does not have adequate current or anticipated groundwater supplies to meet projected demand through 2025. Currently, half of the counties within the St. Johns Water Management District are considered PWRCAs. For the reasons stated above, the county needs to closely monitor forthcoming water supply data and take action as necessary if anticipated water supplies change.

- Alternative Water Supply Plan

At present, the County's RO water treatment plant consumptive use permits allow for a maximum groundwater withdrawal of 13.79 million gallons per day by 2021. Projected demand by 2021 is significantly higher than this amount. To remedy this potential shortfall, the county recently applied for a revised consumptive use permit allowing greater withdrawal and applied for several new well permits. In response to that application, the SJRWMD recommended that the county install six new

wells and begin to analyze the potential for alternative water sources to lessen the withdrawal from the Floridan aquifer.

In 2006, Indian River County began developing an alternative water supply plan. In that plan, numerous potential alternative water sources are identified. Those sources include:

- Seawater desalination
- Surface water / reservoirs
- Surficial Aquifer
- Upper Floridan Aquifer

At this time, the county is assessing the strengths and weaknesses of each of these potential alternative water sources. In light of the potential for a future groundwater supply shortfall, the county should continue to investigate alternative water sources, and continue work on developing an alternative water supply plan.

- Watering Restrictions

In 1991, the SJRWMD began prohibiting the irrigation of lawns and landscapes between 10 a.m. and 4 p.m. district-wide. Since 1991, the SJRWMD has modified this rule to prohibit watering more than two days per week. Recently, the SJRWMD proposed additional restrictions such as limiting watering to one day per week during certain parts of the year in an effort to increase water conservation.

In order for these watering restrictions to be effective, they need to be enforced on a local level. One way to allow for local enforcement is to adopt watering restrictions consistent with the District's rules at the local government level. Recently, several municipalities under SJRWMD's jurisdiction adopted water conservation ordinances. At this time, Indian River County has not adopted a water conservation ordinance. In order to enhance the SJRWMD water conservation effort, the county should adopt a water conservation ordinance.

- Geohydrology Report Update

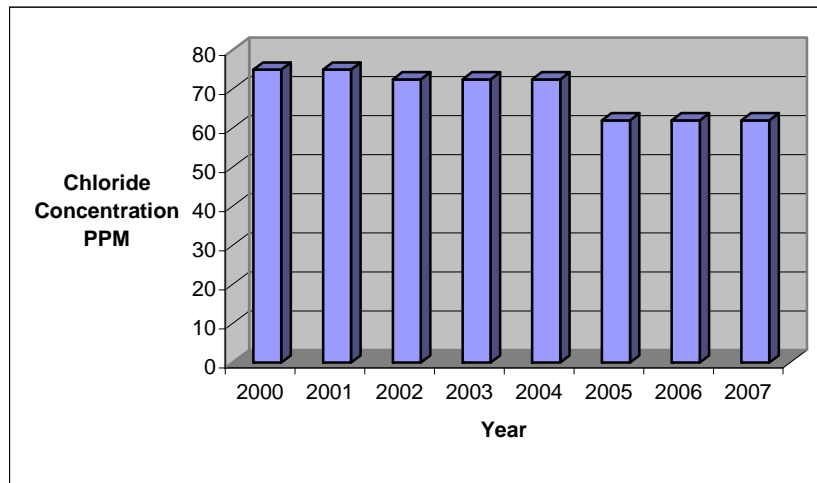
In 1988, the U.S. Geological Survey published a water resources investigations report on geohydrology in Indian River County. Because it has been 20 years since that report was completed, the County Agriculture Advisory Committee (AAC) recently recommended that the County obtain an updated countywide geohydrologic survey. Going forward, the County should adopt a new policy to obtain an updated countywide geohydrological study with seismic profiles, or comparable data, as recommended by the AAC.

Water Quality

Water from the County's water treatment plants continues to meet or exceed all minimum state and federal standards for safe drinking water. Currently, the county is reviewing its mining regulations. Proposed changes to these regulations will ensure further protection of groundwater quality by minimizing the effect surface mining may have on groundwater pollution.

Due to the nature of the aquifers in the Indian River County area, saltwater intrusion is a concern. Saltwater intrusion generally occurs when groundwater withdrawal is high in a particular area, creating a void or depression for saltwater to intrude. Since most of the County's wells draw from the Floridan aquifer, chloride levels in these wells are indicators of the degree of saltwater intrusion. In Indian River County, chloride levels in water from the Floridan aquifer generally exceed state and federal standards. The County's reverse osmosis (RO) treatment plants remove chloride and bring chloride levels well within maximum contaminant levels.

Since 2000, chloride levels in county drinking water have steadily declined. Presently, the chloride levels in treated groundwater are well below the state and federal maximum level of 250ppm.



Due to the inherent quality of groundwater within Indian River County and the treatment technologies used, degradation of water quality is not anticipated with future increases in withdrawals.

Wells

- Flow Well Plugging Program

Abandoned flow wells in the county constitute a large-scale “waste” of groundwater. Often, abandoned wells flow for years before being capped and have the potential to waste millions of gallons of water in that time. In addition to wasting water, abandoned flow wells provide easier access for surface pollutants to get into groundwater, may threaten crops and structures, and often contribute to mosquito problems.

Since 1990, Indian River County has participated in a cost-share program with the SJRWMD to plug abandoned flow wells. Through this program, abandoned flow wells are identified by county staff and plugged in coordination with the St. Johns Water Management District and the Environmental Health Department. As a result of the program, more than 375 wells have been plugged or repaired through 2007, saving millions of gallons of groundwater per day.

Despite the flow well plugging program’s success, many abandoned wells remain in the county. Over the past several years, SJRWMD staff documented fewer reports of abandoned flow wells. According to the District, this decline is attributable to the remaining abandoned flow wells in the county being less conspicuous. For this reason, the County needs to continue its policy to require that abandoned flow wells on development sites be identified and plugged by developers.

Going forward, the county should continue the flow well plugging program. Although funding may be an issue in the future due to budget constraints, the importance of groundwater and the negative impacts that broken flow wells can have on existing groundwater supplies are reasons for continuing the program as long as funding is possible.

EVALUATION OF OBJECTIVES

In the following section, the Natural Groundwater Aquifer Recharge Element's 5 objectives and related policies are listed. This section contains an evaluation of each objective and a determination of whether the objective was achieved and whether it should be maintained, revised, or deleted.

Under each objective, those policies associated with the objective were assessed to identify those that were implemented, those that were partially implemented, and those that were not implemented. Each policy was also assessed to determine if it should be maintained, revised, or deleted.

Objective 1: Protection of Water Quality

“Through 2020, there will be no instances of contamination of groundwater aquifers or public supply wells within the county. For the purpose of this Objective, water quality will be based on primary and secondary maximum contaminant levels (MCLs), as defined by the FDEP in Chapter 17-550, F.A.C”

Measure: Primary and secondary MCLs in drinking water.

Although Objective 1’s target date is in the future, the objective has been achieved.

Evaluation of Objective: Water from the county’s water treatment plants continues to meet all state and federal guidelines for safe drinking water. Objective 1 is an appropriate Objective that should be maintained.

Assessment of Policies

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|--------------------|-----------------------|--|--------------------------------------|--|
| | | | | |

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|---|--|--|--------------------------------------|--|
| (1.1) Update SAPROD map to GIS format | - SAPROD GIS layer not available at this time | NO | YES | Revise target date |
| (1.2) Assist in developing WHPA map by providing information | - County established simple radial wellhead protection areas. County has not refined WHPA areas using available technologies | YES | YES | Revise target date |
| (1.3) Restrict location of septic tanks | - County Policy (LDR Section 931.05 (2) (a)) | YES | YES | Maintain |
| (1.4) Stormwater management structure design | - Ongoing County Policy | YES | YES | Maintain |
| (1.5) Continue enforcing LDR Chapter 931 to protect public supply wellheads | - LDR Chapter 931 enforced | YES | YES | Maintain |
| (1.6) Restrict hazardous materials in NGAR areas | - County Policy (LDR Section 931.08 (2) (a)); criteria for evaluating property zoned Heavy Commercial or Industrial | YES | YES | Maintain |
| (1.7) Prohibit new deep injection wells | - No deep well injection allowed | YES | YES | Maintain |
| (1.8) Discourage flood irrigation | - Voluntary use of water conservation coordinated through the Indian River Soil & Water Conservation District (IRSWCD) | YES | YES | Maintain |

With the exception of Policies 1.1 and 1.2, the policies of this objective are appropriate, are ongoing in nature and should be maintained, without need for revisions.

Policy 1.1 calls for the County to update its Surficial Aquifer Primary Recharge Overlay District (SAPROD) map in GIS format. This has not yet occurred. A SAPROD map in GIS format would be an effective tool to determine if a proposed development is partially or wholly within the SAPROD, and thus subject to SAPROD groundwater protection regulations. Policy 1.1 is appropriate and should be maintained, but revised with a new target date (2010).

The County has established simple radial wellhead protection areas (WHPAs) for public well fields. A more effective approach to protecting public well fields would be if the WHPAs were based on wellhead area-specific scientific data. Policy 1.2, which indicates that the County will assist the SJRWMD and Department of Environmental Protection (DEP) in developing scientifically-based WHPAs in GIS format, has not been implemented. Since establishment of site-specific, scientifically based WHPAs would provide more effective protection of public well fields than simple radial WHPAs, this policy should be maintained but revised with a new target date of 2012.

Overall Assessment of Policies

Through the implementation of these policies, Objective 1 will continue to be achieved. No new policies are necessary.

Objective 2: Preserving the Quantity of the Surficial Aquifer

“Through 2020, there will be no reduction in the availability of groundwater from the surficial aquifer. For the purpose of this objective, water quantity will be based on an average well depth of 90 feet for domestic wells that tap the surficial aquifer, and on data that will be available in the Groundwater Basin Resource Availability Inventory (GWBRAI), pending completion by the SJRWMD. ”

Measure: Potential yield of groundwater in the surficial aquifer.

Although Objective 2’s target date is in the future, the objective has been achieved.

Evaluation of Objective: Currently, demand for use of groundwater in the surficial aquifer is being met. It is unknown, however, how long that demand will continue to be met in the future. The SJRWMD is in the process of preparing a regional groundwater model that will provide an updated estimate of groundwater quality and quantity in the surficial and Floridan aquifers. That model is expected to be completed in 2008. With respect to the surficial aquifer, there are preliminary indications from the SJRWMD of potential drawdown impacts in the Fellsmere and Vero Beach wellfield areas. This objective is appropriate and should be maintained, but revised to indicate a new “through date” (i.e., through 2025) and a different measurement approach (based on the regional groundwater model due to be completed in 2008).

Assessment of Policies

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|---|---|--|--------------------------------------|--|
| (2.1) Implement water conservation measures of Objective 4 of the Potable Water Sub-Element and Objective 4 of the Sanitary Sewer Sub-Element | - Implementation of water conservation policies in Objective 4 of the Potable Water Sub-Element Objective 4 of the Sanitary Sewer Sub-Element | YES | YES | Maintain |
| (2.2) Adopt water conservation ordinance | - No water conservation ordinance adopted | NO | YES | Revise target date |
| (2.3) Use NGAR areas for parks and open space | - County policy | YES | YES | Maintain |
| (2.4) Continue to issue permits for proposed mining projects exempt from | - Mining moratorium in place; regulations under review for revisions | YES | YES | Revise to reflect changes in mining regulations in |

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|---|--|--|--------------------------------------|--|
| SJRWMD regulations | | | | progress |
| (2.5) Adopt Comprehensive Wetlands Management Program | - Adopted policies under Conservation Element Objective 5 that serve as a CWMP | YES | YES | Maintain |
| (2.6) Require all stormwater ponds over one acre be designed to utilize runoff for irrigation | - Required under LDR Section 930.07 | YES | YES | Maintain |

Policies 2.1, 2.3, 2.5 and 2.6 are appropriate, continue to serve the objective, and should be maintained.

Although Policy 2.2 is appropriate and serves the objective, the policy has not been implemented, in that the County has not adopted a water conservation ordinance. In order to promote local, more effective enforcement of water restrictions, Policy 2.2 should be revised with a new target date of 2010.

Currently, a mining moratorium is in effect and the county’s mining regulations are under review for revisions. Consequently, Policy 2.4 should be updated to reflect any mining regulation changes that occur relating to groundwater protection.

New Policy: In 1988, the U.S. Geological Survey published a water resources investigations report on geohydrology in Indian River County. Because it has been 20 years since that report was completed, the County Agriculture Advisory Committee (AAC) recently recommended that the County obtain an updated countywide geohydrologic survey. For that reason, the County should adopt a new policy to obtain an updated countywide geohydrological study with seismic profiles, or comparable data, as recommended by the AAC.

Overall Assessment of Policies

Through the implementation of the existing policies and the addition of the referenced new policy, Objective 2 will continue to be achieved.

Objective 3: Preserving the Quantity of the Floridan Aquifer

“There will be no reduction in the availability of groundwater from the Floridan aquifer through 2020. For the purpose of this objective, Floridan aquifer quantity will be based on an average yield of 650 gallons per minute (GPM) for water supply wells that tap the Floridan aquifer. Also, data contained in the Groundwater Basin Resource Availability Inventory (GWBRAI) will be used to measure aquifer quantity, pending completion by the SJRWMD.”

Measure: Availability of groundwater in the Floridan aquifer.

Although Objective 3’s target date is in the future, the objective has been achieved.

Evaluation of Objective: At this time, the SJRWMD is preparing a regional groundwater model that will provide an updated estimate of groundwater quality and quantity in the surficial and Floridan aquifers. That model is expected to be completed in 2008. Early indications from the SJRWMD suggest that there will be no significant reduction in the quantity or quality of water available in the Floridan aquifer in Indian River County through at least 2025. Depending on the findings of the updated regional groundwater model, there may or may not be sufficient groundwater available from the Floridan aquifer beyond 2025.

Since the County uses the Floridan aquifer as its primary source for public water supply, availability of groundwater in the Floridan aquifer is of high importance. For this reason, Objective 3 is appropriate and should be maintained, but revised to indicate a new “through date” (i.e., through 2025) and a different measurement approach (based on the regional groundwater model due to be completed in 2008).

Assessment of Policies

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|---|--|--|--------------------------------------|--|
| (3.1) Preserve open space in the western county | - Maximum density in western portion of county is 1 unit per 20 acres according to Future Land Use map | YES | YES | Maintain |
| (3.2) Encourage use of low volume irrigation systems | - County Policy | YES | YES | Maintain |
| (3.3) Require 50% xeriscape for new developments | - County Policy (LDR Section 926.06) | YES | YES | Maintain |
| (3.4) Reuse 100% of treated wastewater effluent | - 100% of treated wastewater reused | YES | YES | Maintain |
| (3.5) Renew annual contract with SJRWMD to identify and plug abandoned artesian wells | - Ongoing County/SJRWMD well plugging program | YES | YES | Maintain |

The policies of this objective were implemented, are ongoing in nature, and should be maintained.

New Policy: A new Objective 8 is proposed in the Potable Water Sub-Element component of the Evaluation and Appraisal Report (EAR) to address alternative water supply, consistent with the County’s 2007 Alternative Water Supply Master Plan. A new policy should be adopted under

Natural Groundwater Aquifer Recharge Objective 3 as a cross-reference, indicating that the County will implement the policies of Potable Water Sub-Element (new) Objective 8.

Overall Assessment of Policies

Through the implementation of the existing policies and the addition of the referenced new policy, Objective 3 will continue to be achieved.

Objective 4: Intergovernmental Coordination

“By 2000, Indian River County will have written intergovernmental coordination agreements with local governments and state agencies to ensure protection of the natural groundwater aquifer system.”

Measure: Intergovernmental coordination agreements with local governments and state agencies.

Objective 4 was not achieved.

Evaluation of Objective: At this time, Indian River County does not have written intergovernmental coordination agreements with state agencies or local governments to protect the natural aquifer system. Objective 4 is an appropriate objective that should be maintained, but with a revised target date of 2012.

Assessment of Policies

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|--|--|--|--------------------------------------|--|
| (4.1) Coordinate / provide assistance | - County coordinates with SJRWMD and FDEP on groundwater related issues | YES | YES | Maintain |
| (4.2) Provide water use data to the SJRWMD | - County routinely provides water use data and wastewater reuse data to the SJRWMD | YES | YES | Maintain |
| (4.3) Maintain very low development densities in the west and north west portions of the county | - West and northwest portions of the county designated 1 unit per 20 acres | YES | YES | Maintain |
| (4.4) Utilize existing Interlocal agreements for efficiency in water management | -Ongoing policy | YES | YES | Maintain |
| (4.5) Study feasibility of combining operational responsibilities of all water related activities under one agency | - SJRWMD performs this function | NO | NO | Delete |

With the exception of Policy 4.5, the policies serving Objective 4 are appropriate, are ongoing in nature, and should be maintained without revisions.

Policy 4.5 indicates that the County, by 2003, will study the feasibility of combining the operational responsibilities of all water related activities under one agency to eliminate duplication of effort and to ensure efficient protection of provision of water for various uses. In retrospect, this policy is not appropriate and cannot be implemented. Currently, the SJRWMD is the primary agency overseeing water management in the region that includes Indian River County. Given existing State law, the County has no authority to create one operational agency and preempt the SJRWMD’s jurisdiction. In fact, the benefit of multiple agencies involved in water management helps maintain a “check and balance” approach to water management to ensure that local and regional water needs are considered. For these reasons, Policy 4.5 should be deleted.

Overall Assessment of Policies

Through the implementation of these policies, Objective 4 will continue to be achieved. No new policies are necessary.

Objective 5: Capital Improvements

“By 2000, the County shall protect a minimum of 100 additional acres of aquifer recharge areas for the surficial aquifer through conservation easements and fee simple acquisition.”

Measure: Acres of surficial aquifer recharge areas protected.

Objective 5 was achieved.

Evaluation of Objective: Since 1990, the county has acquired 611 acres of xeric scrub on the Atlantic Coastal Sand Ridge, a primary recharge area of the surficial aquifer. As such, Objective 5 was achieved. This objective should be revised to reflect a new baseline line of 2008 and County protection of an additional 100 acres by 2015.

Assessment of Policies

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|--|--|--|--------------------------------------|--|
| (5.1) Maintain 7 year schedule of capital improvements | - County maintains a 5-year schedule of capital improvement projects | YES | YES | Revise from “7” year schedule to “5” year schedule |
| (5.2) Pursue state and federal funding sources | - Ongoing County policy | YES | YES | Maintain |

| POLICY DESCRIPTION | ACTION/ACCOMPLISHMENT | DID THIS POLICY CONTRIBUTE TO MEETING THE OBJECTIVE? | WAS THE ORIGINAL POLICY APPROPRIATE? | SHOULD THIS POLICY BE MAINTAINED/ DELETED/REVISED? |
|--|--|--|--------------------------------------|--|
| (5.3) CIP Evaluation / Prioritization | - Capital improvement projects are ranked annually according to guidelines | YES | YES | Maintain |
| (5.4) Develop standard operating procedures for groundwater monitoring | - The IRC Utilities Department performs routine water quality monitoring at water treatment and wastewater treatment plants. | YES | YES | Maintain as an ongoing policy |

Policies 5.2 and 5.3 are appropriate, are ongoing in nature and should be maintained.

According to recent changes in State law, the County is required to maintain a five year schedule of capital improvement needs for public facilities, instead of a seven year schedule as indicated in Policy 5.1. For that reason, Policy 5.1 should be revised to reflect a five year schedule.

As written, Policy 5.4 indicates that, by 2000, the county will develop standard operating procedures for groundwater quality monitoring. Currently, the IRC Utilities Department performs routine water quality monitoring at water treatment and wastewater treatment plants. In that respect, Policy 5.4 was implemented. This policy is appropriate and should be maintained, but reworded as an ongoing policy.

Overall Assessment of Policies

Through the implementation of these policies, Objective 5 will continue to be achieved. No new policies are necessary.

OVERALL EVALUATION OF OBJECTIVES

The objectives of the Natural Groundwater Aquifer Recharge Element, with the proposed revisions, are sufficient to meet the overall intent of the element.

IDENTIFICATION OF FUTURE ACTIONS

The results of the evaluation of the existing conditions, objectives, and policies identified in the previous section are used to determine the future courses of actions needed to improve natural groundwater aquifer recharge conditions. The following section highlights anticipated amendments to the data, texts, objectives and policies. These amendments will be incorporated in the revised version of the Natural Groundwater Aquifer Recharge Element of the Comprehensive Plan, scheduled to be completed by the end of calendar year 2009.

ANTICIPATED AMENDMENTS

The following EAR related amendments to the Natural Groundwater Aquifer Recharge Element are needed to update the element's data and analysis as well as its goal, objectives, and policies sections. The following revisions are necessary:

Tables and Figures

Each of the Natural Groundwater Aquifer Recharge Element's tables and figures must be updated to reflect current conditions.

Text

Since the text of this element will be a part of the new Natural Groundwater Aquifer Recharge Element, and existing data and analysis will be revised, major revisions to the text will be required.

Objectives and Policies

Anticipated amendments to the objectives and policies of the Natural Groundwater Aquifer Recharge Element are summarized below.

| OBJECTIVE | POLICY | REVISION |
|-----------|------------|---|
| 1 | 1.1 | Revise target date |
| 1 | 1.2 | Revise target date |
| 2 | ---- | Revise time horizon and measurement approach |
| 2 | 2.2 | Revise target date |
| 2 | 2.4 | Revise to reflect changes in mining regulations |
| 2 | New Policy | Obtain an updated countywide geohydrological study with seismic profiles |
| 3 | ----- | Revise time horizon |
| 3 | New Policy | Adopt cross-reference policy for Potable Water Sub-Element new Objective 8 – Alternative Water Supply |
| 4 | ----- | Revise target date |
| 4 | 4.5 | Delete |
| 5 | ---- | Revise time horizon and measurement baseline |
| 5 | 5.1 | Revise to reflect current schedule of capital improvement projects |
| 5 | 5.4 | Revise to be an ongoing policy |

APPENDIX A

GOAL, OBJECTIVES AND POLICIES

GOAL

It is the goal of Indian River County to protect the function of natural groundwater aquifer recharge areas, to prevent the contamination of groundwater and to extend the life span of the county's aquifers through water conservation.

Objective 1 Protection of Water Quality

Through 2020, there will be no instances of contamination of groundwater aquifers or public supply wells within the county. For the purpose of this Objective, water quality will be based on primary and secondary maximum contaminant levels (MCLs), as defined by the FDEP in Chapter 17-550, F.A.C.

Policy 1.1: By 1999, the county shall update the Surficial Primary Recharge Overlay District (SAPROD) map using a geographic information systems (GIS) format.

Policy 1.2: By 1999, the county will assist the SJRWMD and FDEP in developing a Wellhead Protection Area (WHPA) map for Indian River County by providing the following information:

- the location of existing public wellheads;
- the proposed location of future public wellheads; and,
- potential conflicts between existing and future land uses and public wellhead protection areas.

The WHPA map will be compatible with the county's G.I.S. database.

Policy 1.3: The county shall continue to prohibit the location of septic systems within two hundred feet of a public water supply well, unless otherwise approved by the FDEP or HRS.

Policy 1.4: The county, through its stormwater permitting processes, shall ensure that stormwater management structures, except those located within the SAPROD, are designed to function as aquifer recharge areas.

Policy 1.5: The county shall continue to protect existing and future public water supply wells from contamination by continuing to implement Chapter 931 of the County's land development regulations and by prohibiting any non-residential land use which stores, handles, or produces a toxic degradation or petroleum-based product, or any substance regulated under 40 CFR 302, 40 CFR 122.21, and/or Chapter 487, F.S. from locating within 1,000 feet of a public water supply well. The minimum radial separation distances for land uses and structures from public wellhead regulated areas are as follows:

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- 200 feet for on-site disposal systems, unless approved by the FDEP or DHRS;
- 300 feet for wet retention/detention areas, unless approved by the SJRWMD;
- 500 feet for landfill and/or transfer stations, above ground or underground storage tanks, feed lots and animal facilities, and WWTP effluent discharges, unless approved by the FDEP;
- 1,000 for any mining and/or excavation of waterways or drainage facilities which intersect the water table.

Policy 1.6: The county shall prohibit new developments or changes of uses that produce hazardous materials from locating on the Atlantic Coastal Sand Ridge or the Ten Mile Ridge areas of Indian River County.

Policy 1.7: The county shall continue to prohibit injection wells for the disposal of wastewater.

Policy 1.8: The county, in cooperation with the Indian River Soil and Water Conservation District (IRSWCD), shall discourage the use of flood irrigation with water from the Floridan aquifer by providing incentives for low volume irrigation systems.

OBJECTIVE 2: Preserving the Quantity of the Surficial Aquifer

Through 2020, there will be no reduction in the availability of groundwater from the surficial aquifer. For the purpose of this Objective, water quantity will be based on an average well depth of 90 feet for domestic wells that tap the surficial aquifer, and on data that will be available in the Groundwater Basin Resource Availability Inventory (GWBRAI), pending completion by the SJRWMD.

Policy 2.1: The county shall implement water conservation measures, as designated in the policies under Objective 4 of the Potable Water Sub-Element and Objective 4 of the Sanitary Sewer Sub-Element, to protect the surficial aquifer from depletion.

Policy 2.2: By 1999, the county shall adopt a water conservation ordinance to minimize the unnecessary and wasteful use of groundwater from the surficial aquifer.

Policy 2.3: The county shall use natural groundwater aquifer recharge areas for passive parks and open space.

Policy 2.4: To ensure preservation of the surficial aquifer, the county shall continue to issue permits for all proposed excavation/mining projects in the unincorporated county that are exempt from SJRWMD permitting requirements. For proposed excavation/mining projects that are located along the Atlantic Coastal Sand Ridge and are exempt from SJRWMD permitting requirements, the county shall prohibit the following:

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- excavation within 1,000 feet of a public supply wellfield;
- excavation within 1,000 feet of any platted subdivision not serviced by potable water; and,
- excavation that results in an average elevation less than 25 feet above mean sea level.

Policy 2.5: The county shall preserve the aquifer recharge function of palustrine wetlands by adopting the Comprehensive Wetlands Management Program, as described in the Conservation Element.

Policy 2.6: The county will require all wet detention/retention ponds with a surface area greater than one (1) acre be designed to utilize stormwater runoff for irrigation.

OBJECTIVE 3: Preserving the Quantity of the Floridan Aquifer

There will be no reduction in the availability of groundwater from the Floridan aquifer through 2020. For the purpose of this Objective, Floridan aquifer quantity will be based on an average yield of 650 gallons per minute (GPM) for water supply wells that tap the Floridan aquifer. Also, data contained in the Groundwater Basin Resource Availability Inventory (GWBRAI) will be used to measure aquifer quantity, pending completion by the SJRWMD.

Policy 3.1: The county shall protect and preserve open space in the west portion of the county, which has been identified as a natural groundwater aquifer recharge area for the Floridan aquifer, by designating those areas for agricultural use with a very low residential density, as depicted on the future land use map.

Policy 3.2: The county shall coordinate with the SJRWMD and the IRSWCD to encourage the use of low volume irrigation systems to prevent over pumping from the Floridan aquifer.

Policy 3.3: The county shall continue to require that new developments install a minimum of 50% water-conserving xeriscape plant material, as specified in the Landscape ordinance.

Policy 3.4: The county shall reuse 100% of treated wastewater effluent for irrigation to prevent over pumping of the Floridan aquifer.

Policy 3.5: The county shall renew its annual contract with the SJRWMD to identify and plug or repair abandoned free flowing artesian wells.

OBJECTIVE 4: Intergovernmental Coordination

By 2000, Indian River County will have written intergovernmental coordination agreements with local governments and state agencies to ensure protection of the natural groundwater aquifer system.

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Policy 4.1: The county shall cooperate with agencies, such as the SJRWMD and the FDEP, in performing assessments of groundwater resources, and shall review any recommendations for incorporation into the land development regulations. County support shall include, but not be limited to, providing information, providing staff assistance, and implementing recommendations.

Policy 4.2: The county shall assist the SJRWMD with updating SJRWMD's Needs and Sources Assessment by providing water use data relating to agricultural irrigation, recreational irrigation, and public supply.

Policy 4.3: The county will assist the SJRWMD in coordinating with the other counties to the west and northwest of Indian River County to protect the natural groundwater aquifer recharge areas of the Floridan aquifer by maintaining a very low land use density in these areas, compatible with densities identified in the Indian River County future land use map.

Policy 4.4: The county shall continue to utilize existing interlocal agreements with other local governments, as identified in table 11.3 of the Intergovernmental Coordination Element, to ensure maximum efficiency of water management, by combining resources and eliminating duplication.

Policy 4.5: By 2003, the county, in coordination with the state and other local governments, shall study the feasibility of combining the operational responsibilities of all water related activities under one agency to eliminate duplication of effort and to ensure efficient protection and provision of water for various uses.

OBJECTIVE 5: Capital Improvements

By 2000, the County shall protect a minimum of 100 additional acres of aquifer recharge areas for the surficial aquifer through conservation easements and fee simple acquisition.

Policy 5.1: The county will maintain a seven (7) year schedule of capital improvement needs for public facilities, to be updated annually in conformance with the review process for the Capital Improvements Element of this plan.

Policy 5.2: The county shall pursue state and federal sources of funding available for the preservation and protection of environmentally sensitive areas, such as natural groundwater aquifer recharge areas.

Policy 5.3: The county shall evaluate and rank proposed capital improvement projects for the acquisition and preservation of the natural groundwater aquifer recharge areas according to the following guidelines:

- Level One - Whether the acquisition is needed to protect public health, to protect the function of aquifer recharge, and to fulfill the county's legal commitment to provide water services.

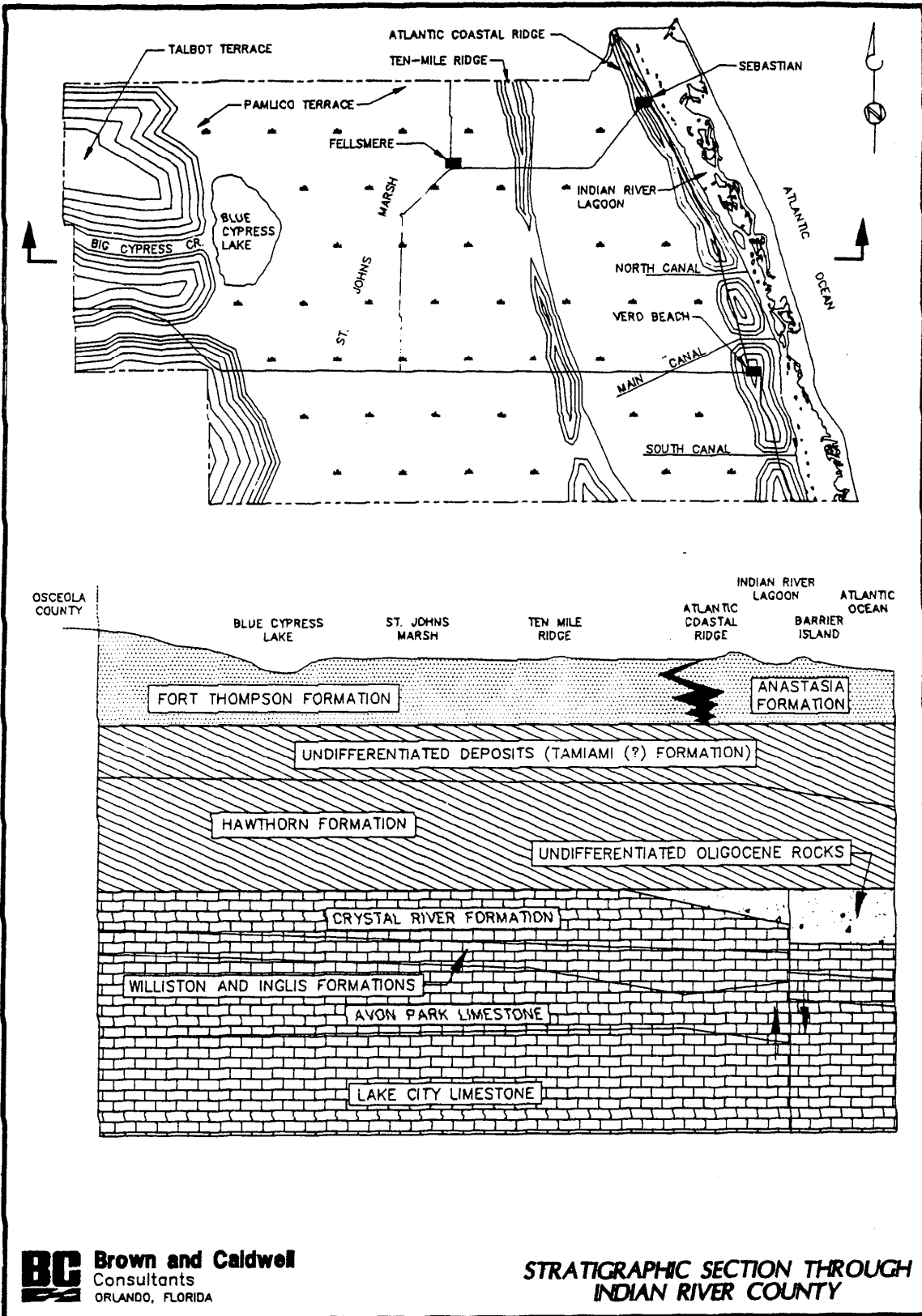
APPENDIX A

- Level Two - Whether the acquisition will improve the existing condition and prevent or reduce future capital costs.

Policy 5.4: By 2000, the county will develop standard operating procedures for groundwater quality monitoring.

ATTACHMENTS

FIGURE 3.D.1



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**STRATIGRAPHIC SECTION THROUGH
 INDIAN RIVER COUNTY**

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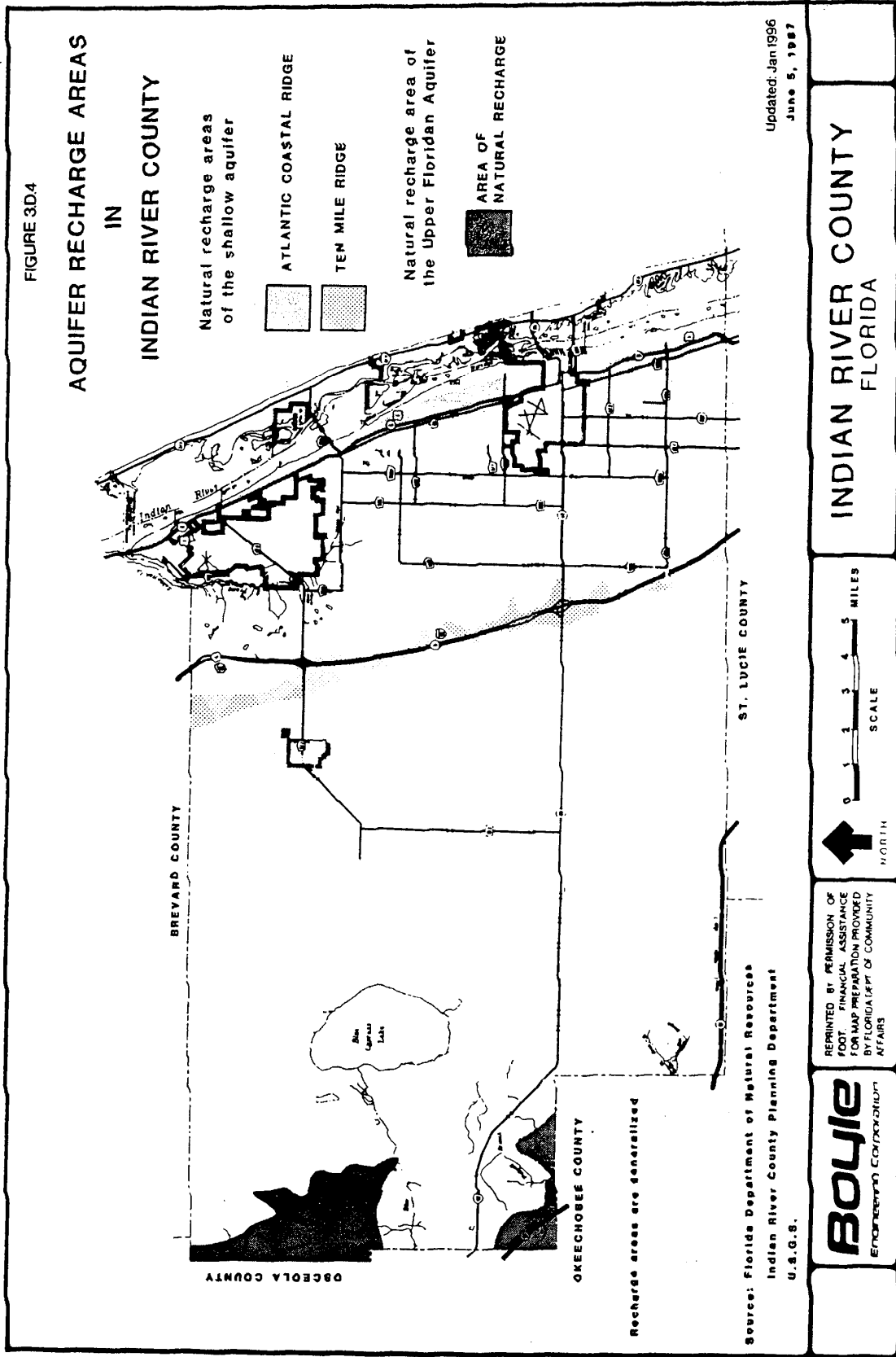
FIGURE 3.D.2
GENERALIZED STRATIGRAPHIC CROSS-SECTION

[gal/min = gallons per minute]

| System | Series | Formation name | Thickness (feet) | Description | Yield of wells | Hydrogeologic unit | | |
|---------------------|-------------------|--|---|--|--|--|-------------------------|------------------------|
| | Holocene | Undifferentiated deposits | 0-25 | Variable mixture of sand, clay, coquina, and organic material | Varies widely but mostly less than 100 gal/min | SURFICIAL AQUIFER SYSTEM | Clastic zone | |
| | Pleistocene | Fort Thompson and Anastasia Formations | 100-200 | Coquina with variable amounts of sand, silt and organic material | Varies widely, from less than 100 to about 700 gal/min | | | |
| | Pliocene | Tamlam Formation | 0-60 | Fragmented to cemented coquina and limestone | Generally 100 to 700 gal/min | | | Shallow rock zone |
| | Miocene | Hawthorn Formation | 70-520 | Silty to sandy clay, thin shell and limestone beds, phosphatic | Generally less than 100 gal/min | INTERMEDIATE CONFINING UNIT | | |
| | Eocene | Oligocene | Suwannee Limestone | 0-190 | Chalky to crystalline limestone | Generally less than 100 gal/min | FLORIDAN AQUIFER SYSTEM | Upper Floridan aquifer |
| | | | Ocala Limestone | 20-220 | Limestone, dolomitic near base in places | Varies widely, from about 100 to more than 700 gal/min | | |
| | | | | 100-500 | Limestone and dolomite | Generally more than 700 gal/min | | |
| Avon Park Formation | | 20-120 | Dolomite, dolomitic limestone, limestone, and some gypsum | Probably much less than 100 gal/min | Middle semiconfining unit | | | |
| | Oldsmar Formation | 600-700 | Limestone and dolomite | Generally 100 to more than 700 gal/min | Lower Floridan aquifer | | | |
| | | About 1,000 | Limestone and dolomite | Boulder zone used as receiving unit for injection wells | | | | |

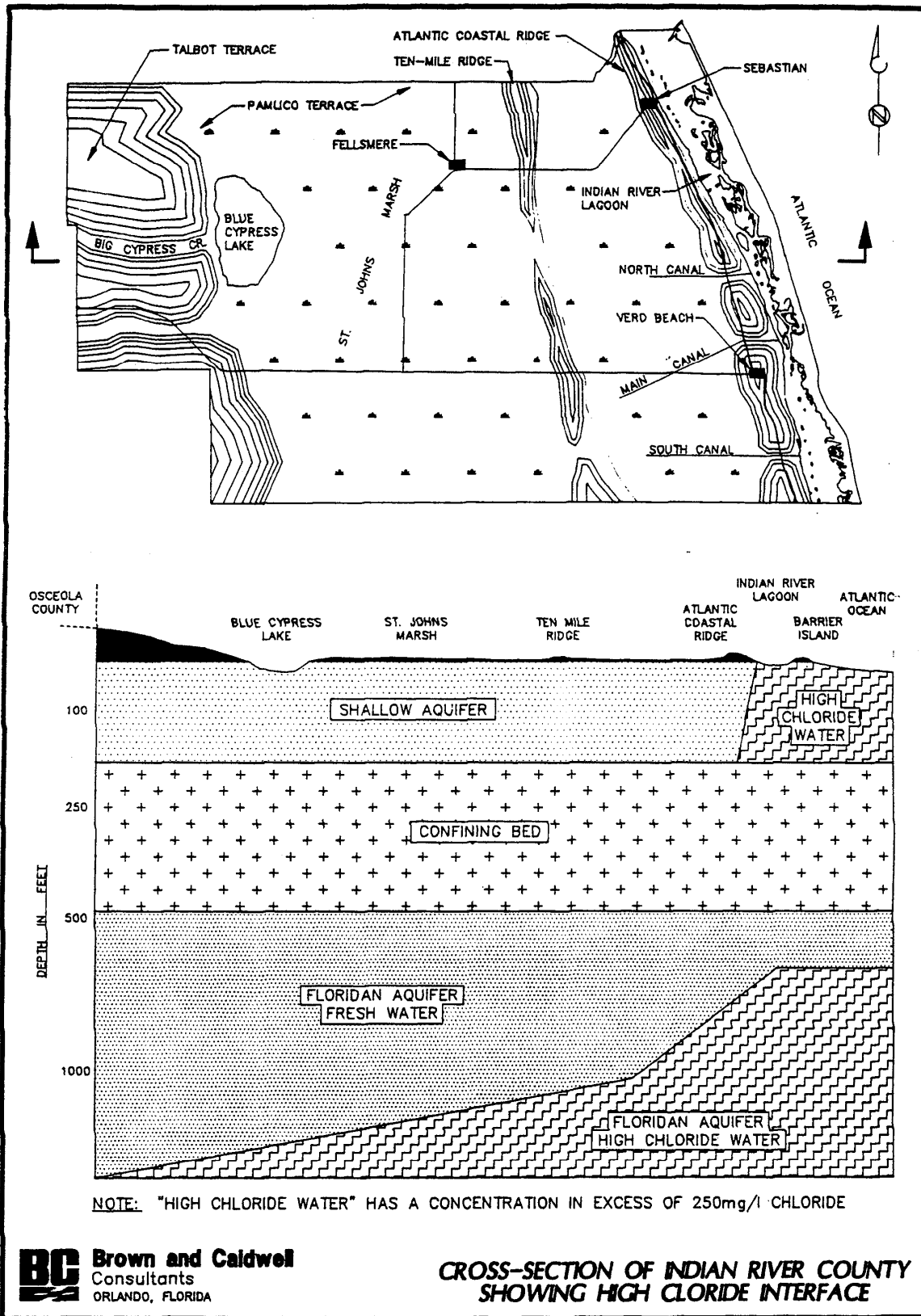
Water-bearing characteristics and descriptions
of the geologic units in Indian River County

SOURCE: U.S. Geological Survey Water-Resources Investigation Report 88-4073



ATTACHMENTS

FIGURE 3.D.9



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**CROSS-SECTION OF INDIAN RIVER COUNTY
 SHOWING HIGH CHLORIDE INTERFACE**