

# **Natural Groundwater Aquifer Recharge**

Sub-Element

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## **II E. NATURAL GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT**

### **1. INTRODUCTION**

#### **a. Purpose of Element**

This Sub-Element has been prepared to meet the requirements of Chapter 9J 5.011, F.A.C., as per Chapter 163, F.S. The contents of this Sub-Element address aquifer recharge in Palm Beach County including identification of prime recharge areas, characteristics, problems, and needs.

Because the aquifer system which underlies the City of Greenacres is only a portion of the larger, countywide Surficial Aquifer System, the City will follow Palm Beach County's lead in addressing recommendations which protect these natural groundwater recharge areas.

#### **b. Overview of Element**

Aquifers are formed by subsurface rock or other materials such as coarse sands, gravel and limestone, which are capable of holding a significant amount of water in their interstices. The quality of aquifer water varies with the type of surface rock and nearby sources of pollution.

The source of water in aquifers is rainfall. Under the force of gravity, rainfall percolates downward through porous surface soils to enter the aquifer strata. Because of the variable permeability of different soil types, the rate of aquifer recharge from rainfall may vary from one location to another. The areas of highest recharge potential are called prime recharge areas. The presence of overlying confining beds also determines which surface areas will be effective recharge areas for a given aquifer, and is another factor in identifying prime recharge areas for the aquifer.

Since aquifer recharge areas are surface features, they are subject to alteration by development. Covering a recharge area with impervious surfaces, such as roads, parking lots and buildings reduces the area available for rainfall percolation, altering the total rate and volume of recharge in that area. Increasing the rate at which stormwater drains from recharge area surfaces also decreases recharge potential.

A second concern related to development within aquifer recharge areas is the potential for contamination of groundwater within the aquifer. Just as with stormwater runoff to surface waters, pollutants picked up by runoff which enters an aquifer can degrade the quality of the groundwater. Since water flows within an aquifer in a manner similar to surface water flow, downstream portions of the groundwater may be polluted over time. This becomes particularly significant when the aquifer is tapped as a potable water supply downstream.

## 2. INVENTORY AND ANALYSIS

### a. Natural Groundwater Aquifer Recharge Areas

The groundwater system underlying Palm Beach County (the City of Greenacres), consists of two aquifers:

1. Surficial Aquifer System
2. Floridan Aquifer System

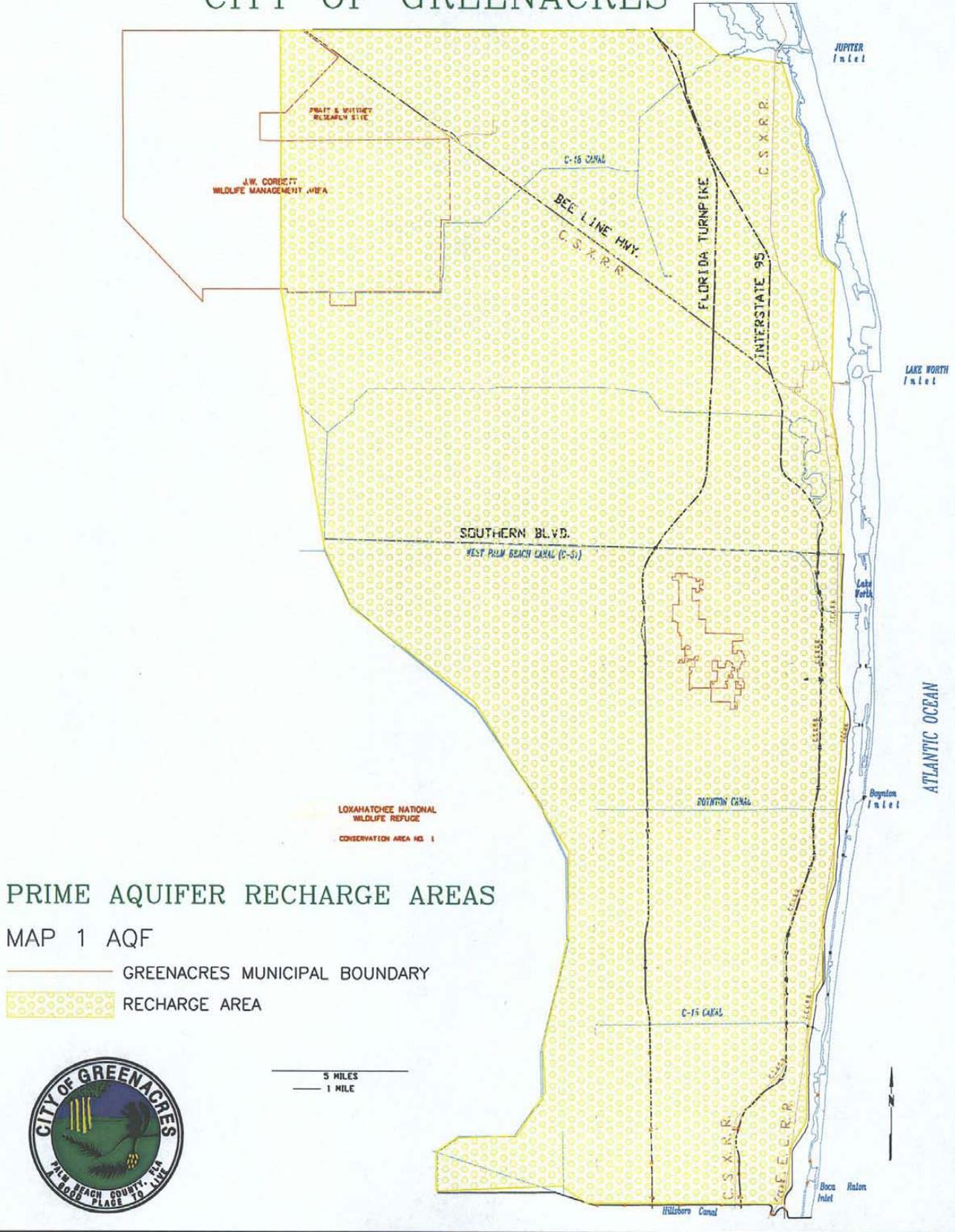
#### 1) Surficial Aquifer System

The Surficial Aquifer System is the primary source of fresh water for eastern Palm Beach County. It is open to infiltration from rainfall in varying degrees, depending on the percolation characteristics of surface soils and the extent of impervious surfaces covering the aquifer. Transmissivity of the Surficial Aquifer System is depicted on Map No. 3 in the Conservation Element of this plan. Soil associations are also discussed in the Conservation Element but a more complete study including geologic cross-sections and soil descriptions are found in the Future Land Use Element of this plan.

The Surficial Aquifer System is an unconfined shallow aquifer which starts just below land surface and is approximately 300 feet thick. The base of the Surficial Aquifer System beneath the City of Greenacres is minus 290-250 feet and is graphically depicted on Map No. 4 in the Conservation Element of this plan.

This system is divisible into three interconnected zones on the basis of relative permeabilities. The City of Greenacres is located in Zone 1, generally the most permeable part of the aquifer system. The location of the City of Greenacres in relationship to prime aquifer recharge areas is depicted on Map No. 1 and is based on Palm Beach County Comprehensive Plan of 1989.

# CITY OF GREENACRES



## 2) Floridan Aquifer

The Floridan Aquifer lies below the Surficial Aquifer and is separated by confining layers with relatively low permeability.

Several utilities in the County are investigating this aquifer. The Floridan dwarfs the Surficial Aquifer in size. For these reasons, it is important to recognize the Floridan as a future water source.

This aquifer has potential for uses either as a source of brackish water for reverse osmosis or as a reservoir for storage and recovery of fresh water.

The Floridan Aquifer System is composed of limestone and dolomite. Dissolved solids are generally greater than 3000 mg/l. This water is not often used, but could be desalinated. This aquifer could also be used as a reservoir for storage and recovery of fresh water. This system is divided into two parts by a regionally-extensive, impermeable sequence. The lower portion (informally called the Boulder Zone) is extremely cavernous and is extensively used for waste disposal through deep injection wells.

### b. Needs Assessment

The pattern of development within the City is expected to remain relatively stable during the next few years, supported by regional water and sewer facilities. The major impact in the urban area will come from reduction of the area available for recharge to the water table aquifer. To offset this impact, the county stormwater drainage regulations emphasize the preservation of natural drainage features and the use of drainage retention structures to maximize aquifer recharge. For all new development, the County incorporates provisions in its land development code requiring conservation of areas with the greatest recharge potential, based on the soil survey for the county.

#### 1) Environmental Resources Management

The City of Greenacres is located above the aquifer in a highly permeable area. A source of concern is the vulnerability of the aquifer to contamination from various sources. USGS findings show that despite rapid infiltration, instances of pollution and disease outbreaks have been rare except for long term landfill sites and major contaminant spills (Pollutant Attenuation Capacity of Unsaturated Zone of Biscayne Aquifer, USGS). One reason may be the ability of vegetation, soils and aquifer materials above the water table to attenuate certain pollutants.

On February 23, 1988, Palm Beach County passed the Wellfield Protection Ordinance giving the Department of Environmental

Resources Management responsibility of reviewing the City's zoning, permitting, and licensing decisions for activities within wellfield "zones of influence." The City supports their decisions. These "zones of influence" are identified in more detail in the Potable Water Sub-element of this plan.

2) South Florida Water Management District (SFWMD)

The City of Greenacres' role in the coordination of efforts between the County and SFWMD is relatively small in regard to recharge of the Surficial Aquifer System through drainage canals. This interaction between the Surficial Aquifer and the overlying network of canals involves the SFWMD which operates the Central and Southern Florida Flood Control Project.

As the designated authority on surface water management, the South Florida Water Management District provides guidance to the City and private local owners in planning secondary water control facilities. (See Stormwater Sub-Element)

c. Regulatory Framework

1) Federal

In 1986, the Federal Safe Drinking Water Act (PL 93-523) was amended to strengthen protection of public water system wellfields and aquifers that are the sole source of drinking water for a community. The amendments for wellfield protection require states to work with local governments to map wellfield areas and develop land use controls that will provide long-term protection from contamination for these areas. The aquifer protection amendments require EPA to develop criteria for selecting critical aquifer protection areas. The program calls for state and local governments to map these areas and develop protection plans, subject to EPA review and approval. Once a plan is approved, EPA may enter into an agreement with the local government to implement the plan.

2) State

In implementing the Florida Safe Drinking Water Act (Ch. 403, F.S.), DEP has developed rules classifying aquifers and regulating their use (Chapter 17-22, Part III, F.A.C.). DEP has also established regulatory requirements for facilities which discharge to groundwater (Section 17-4.245, F.A.C.) and which inject materials directly underground (Chapter 17 28, F.A.C.).

The task of identifying the nature and extent of groundwater resources

available within the state has been delegated to the regional water management districts. Each district must prepare and make available to local governments a Groundwater Basin Resource Availability Inventory (GWBRAI), which the local governments are to use to plan for future development in a manner which reflects the limits of available resources. The criteria for the inventories, and legislative intent for their use, are found in Chapter 373, Florida Statutes, which reads:

Each water management district shall develop a groundwater basin resource availability inventory covering those areas deemed appropriate by the governing board. This inventory shall include, but not be limited to, the following:

- \* A hydrogeologic study to define the ground water basin and its associated recharge areas.
- \* Site specific areas in the basin deemed prone to contamination or overdraft resulting from current or projected development.
- \* Prime ground water recharge areas.
- \* Criteria to establish minimum seasonal surface and ground water levels.
- \* Areas suitable for future water resource development within the ground water basin.
- \* Existing sources of wastewater discharge suitable for reuse as well as the feasibility of integrating coastal wellfields.
- \* Potential quantities of water available for consumptive uses.

Upon completion, a copy of the Ground Water Basin Availability Inventory shall be submitted to each affected municipality, county, and regional planning agency. This inventory shall be reviewed by the affected municipalities, counties, and regional planning agencies for consistency with the local government comprehensive plan and shall be considered in future revision of such plan. It is the intent of the Legislature that future growth and development planning reflect the limitations of the available groundwater or other available water supplies (Sec. 373.0395, F.S.).

The Florida Legislature has also directed local governments to include topographic maps of areas designated by the water management districts as prime recharge areas for the Floridan or Biscayne aquifers in local

comprehensive plans, and to give special consideration to these areas in zoning and land use decisions (Section 163.3177(6)(c),F.S.).

3) Local

At the present time, the City of Greenacres' involvement with special regulatory programs related to protection of natural groundwater aquifer areas is through support and cooperation with those entities which control permitting and management of groundwater resources (See "Needs Assessment").