



City of Hialeah Comprehensive Plan 2015-2025

Aquifer Element

DATA, INVENTORY, AND ANALYSIS

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A. INTRODUCTION

The protection of recharge areas is critical in locations that rely on aquifers as the sole source of drinking water. Well-drained areas are often subject to alteration by development since these areas are typically prime land for urban growth. The development of impervious surfaces such as roads, roofs, and parking areas reduce the area available for percolation, which, in turn, reduces the quality and quantity of natural recharge to the aquifer. Development can compromise the quality of the water due to the increase in pollutant loadings. Runoff can absorb contaminants from development and transmit them to the aquifer. This element is intended to preserve the quality and quantity of water that is recharged back to the aquifer. The quality of the water for drinking purposes is addressed in the Potable Water Element.

1. Terms and Concepts

Aquifers are water-bearing layers of porous rock, sand or gravel. It is possible that several aquifers may be present in the same location, each separated by confining layers of materials that are impermeable or semi-permeable to water. Rainfall and surface water bodies are the sources of water for aquifers. As a result of gravity, rainfall and surface water runoff infiltrates downward through the surface soils and porous layers to the aquifer strata. The rate of aquifer recharge is dependent upon the permeability rate of the soil layers above the aquifer. The areas of highest recharge potential are called prime recharge areas.

Several terms and concepts will be used in this sub-element to help define the groundwater resource and its requirements for protection.

- Aquifer – a geologic formation, group of formations, or part of a formation through which water can percolate, sometimes very slowly, for long distances. Springs and wells are recharged from aquifers. Aquifers feed groundwater to water wells.
- Groundwater - all water found beneath the grounds surface in the voids, fractures, and pores or other openings of soil and rock material.
- Permeability - the ability of a rock or sediment to transmit fluid.
- Potentiometric surface - the elevation at which water would stand in a well penetrating into an aquifer.
- Recharge - renewal of the groundwater resource.
- Water Recharge Area - land or water areas through which groundwater is replenished.
- Water Table – the surface of an unconfined aquifer, defined by the level at which water stands in wells that penetrate the water body far enough to hold standing water.

B. AQUIFER RECHARGE DATA AND INVENTORY

Miami-Dade County, which supplies potable water to the City of Hialeah, obtains all of its raw water from the Biscayne Aquifer. The Biscayne Aquifer was declared a “sole source aquifer” in 1979. As



such, protection of this aquifer is of critical importance to the residents of this area. This wedge shaped aquifer ranges in depth from zero feet on the western border of Miami-Dade County to approximately 120-feet in depth along the Biscayne Bay. Groundwater travels a few feet each day in a southeasterly direction. The aquifer is recharged over its entire area by rainfall and surface water bodies. Surface water flows, from Lake Okeechobee into the Conservation Areas, southward to Miami-Dade County by way of various SFWMD drainage canals, which assist in maintaining a high water table in the vicinity of the Miami-Dade Water and Sewer Department wellfields, as well as along the coast. The Biscayne Aquifer is composed primarily of limestone and sand formations. The high porosity and the many passages through the solution-riddled limestone offer little resistance to the flow of groundwater. The result is one of the most permeable and productive aquifers in the world distinguished by the following characteristics:

- The water table has a slight seaward gradient and is only a few feet above sea level;
- The raw water yields of the wellfields are large;
- The ground and surface water regimens have an uncommonly high inter-relationship;
- The water table reacts quickly to rainfall. There is a high rate of rainfall penetration, surface water infiltration, and relatively little surface runoff compared to other locations; and,
- The coastal areas are susceptible to saltwater intrusion.

1. Miami-Dade County Water and Sewer Department

The Miami-Dade County Water and Sewer Department (WASD) obtains 100% its raw water supply from the Biscayne Aquifer through wells extending approximately 80-feet below the ground surface. Approximately 330 million gallons of raw water are withdrawn from the Biscayne Aquifer on a daily basis to meet the demands of the County including that of the City of Hialeah. The raw water is pumped to the Hialeah, John E. Preston, Alexander Orr and the South Dade Water Supply System treatment plants. These treatment plants process the raw water into potable water which is then pumped into distribution mains for consumption.

Customers judge the quality of their drinking water based on taste and appearance. The raw water provided to residents in the northern portion of the County originates from a region of the Biscayne Aquifer that contains natural organic materials. These natural substances increase the color of the water such that the water may have a yellowish tint. There are no harmful effects associated with the tint in the water. In December 1998, the EPA approved the Stage 1 – Disinfectants and Disinfection Byproducts Rule (D/DBPR) that established a maximum contaminant level (MCL) of 60 parts per billion for five monitored Haloacetic Acids. Additional treatment processes necessary to meet these standards will result in the reduction of the organic material compounds present in the water. This new treatment process will not only meet the requirements of the D/DBPR but will also result in a reduced yellowish tint of the water in the northern portions of the County. It is estimated that the treatment modifications will cost the WASD and its customers approximately \$90-million to implement.



2. Hialeah's Relationship to the Biscayne Aquifer

a. Effects of Development

The City of Hialeah is much more urbanized relative to comparable areas of Miami-Dade County. As such, there are a high percentage of impervious surfaces within the City. The primary recharge areas for the Biscayne Bay are located outside of the urban development boundary of the City of Hialeah. Map VIII- 2: Groundwater Recharge Areas identifies those areas of recharge and discharge within Hialeah and the surrounding areas of Miami-Dade County. The increase in impervious areas associated with development has a direct impact on recharge to the Biscayne Aquifer within the City of Hialeah. To mitigate the impacts of the increase in impervious surface areas, the City of Hialeah provides open swale areas for drainage for the retention and transmission of surface runoff. These swales collect runoff and allow gradual infiltration into the groundwater and eventually into the aquifer, thus providing a source of recharge.

b. Effects of Septic Systems

Consistent with many older cities within the State of Florida, the City of Hialeah initially relied upon the use of septic systems for the collection and disposal of its wastewater. The use of septic systems is known to adversely impact the quality of the groundwater, including that contained within the Biscayne Aquifer. To offset this impact, the City of Hialeah began, in the late 1960's, the installation of a centralized sanitary sewer collection and transmission system throughout the City. To date, all areas of the City have access to the central sewage collection system. However, some residential and non-residential establishments continue to use septic systems and are not connected to the central collection system. The vast reduction and elimination of active septic tanks has helped alleviate potential impacts to the aquifer.

c. Miami-Dade WASD Wellfields

The City of Hialeah is home to two of Miami-Dade WASD water treatment plant facilities. Both the Hialeah and the J.E. Preston Water Treatment plants are located in the southwest portion of the City (see Map V-1 of the Potable Water Element). In addition, the wellfields providing raw water to these water treatment plants are located in near proximity to these plants. These wellfields consist of 45 individual wells (see Map V-2 of the Potable Water Element). Of these wells, 23 provide raw water to the Hialeah Plant while the remaining 22 wells service the J.E. Preston Plant. The capacities of these wells range from 2.5 MGD to 15.0 MGD. To protect the quality of the groundwater, the City of Hialeah has adopted the Miami-Dade County Wellfield Protection Program, which restricts the types of land uses allowed within the cone of influence of the wellfields. The following are some of the restrictions associated with the Wellfield Protection Program:

- Only uses that do not generate hazardous waste are allowed within the Cone of Influence as identified on Map V-2 of the Potable Water Element;



- All permitted uses within the Cone of Influence shall be required to connect to the City of Hialeah's central sewer collection system;
- Developments within the Cone of Influence shall be required to meet the minimum requirements for percentages of pervious area;
- Land uses within the Cone of Influence shall be restricted to those uses that do not create water pollution.

C. AQUIFER RECHARGE ANALYSIS AND RECOMMENDATIONS

Groundwater recharge is vital for providing adequate raw water supplies for future uses and for preserving the quality of groundwater resources. The Biscayne Aquifer is recognized as the sole source aquifer available to Miami-Dade County including the City of Hialeah. As such, the preservation and protection of this natural resource is a major priority in order to ensure adequate supplies of raw and fresh water for future generations.

1. Hialeah's Efforts to Protect the Aquifer

Recognizing the importance of protecting the quality and quantity of raw water in the underlying Biscayne Aquifer, the City of Hialeah has adopted various policies in an effort to support this objective. The construction of a central sanitary sewer system and the reduction in septic systems, the incorporation of Miami-Dade County's Wellfield Protection Program, active clean-up of known contaminated sites, and the implementation of more stringent stormwater best management practices requiring retention of the first inch of runoff on-site have a positive influence on the quantity and quality of groundwater recharge to the Biscayne Aquifer. These efforts, combined with open communication and cooperation with the surrounding jurisdictions and South Florida Water Management District, ensure a viable water supply throughout the planning horizon.

In addition to the requirements already established, the City of Hialeah can further the protection of this natural resource by continuing to encourage the following water saving practices:

- Installation of low flow plumbing fixtures in new development and redevelopment;
- Promotion of Xeriscape landscaping designs for all new development, including trickle-drip irrigation systems;
- Educating the public with respect to water conservation;
- Maintaining an active leak detection program for its potable water distribution system to minimize the loss of water; and,
- Working closely with Miami-Dade WASD for the development of a reclaimed water plant and distribution system.

2. South Florida Water Management District's Efforts to Protect the Aquifer

The SFWMD has jurisdiction over 16,164 square-miles and is divided into four regional planning areas: Kissimmee Basin, Upper East Coast, Lower East Coast, and Lower West

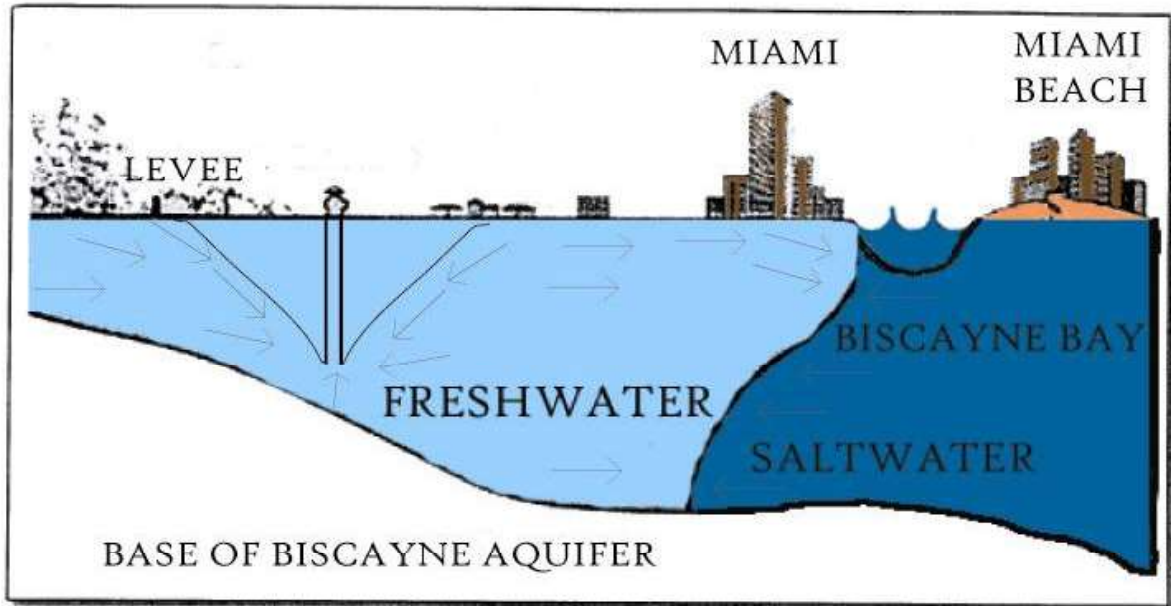


Coast Planning Regions. The Lower East Coast (LEC) Planning Region includes the City of Hialeah. The SFWMD intends to develop a Lower East Coast Water Supply Plan, which will provide cost effective and implementable strategies for assuring that adequate water supplies are available to meet future demands through the year 2020. Currently, the SFWMD is operating under an interim plan until the final Lower East Coast Water Supply Plan is completed in 2004. The Interim Plan has identified \$187 million in projects designed to increase available storage and recharge throughout the region. The intent of the LEC Water Supply Plan, according to the Executive Summary of the LEC Regional Water Supply Plan – Planning Document, will include the following:

- Create a water supply that fully meets the future (2020) needs of almost 7-million people, agricultural needs and industries uses during a 1-in-10 year drought;
- Reduce the number and severity of violations of Minimum Flow and Levels (MFL) criteria for the Everglades, Lake Okeechobee, and the Biscayne Aquifer by 2020;
- Reserve from allocations, sufficient water to allow for the restoration of the Everglades and enhancement of other significant natural systems;
- Reduce the uncertainty for issuing long-term permits for water users as they invest in tomorrow's water supply infrastructure; and
- Provide public forums to modernize District operational procedures and promote greater flexibility in the operation of the regional water management system.



Map VIII- 1: Generalized Hydrologic Cross Section

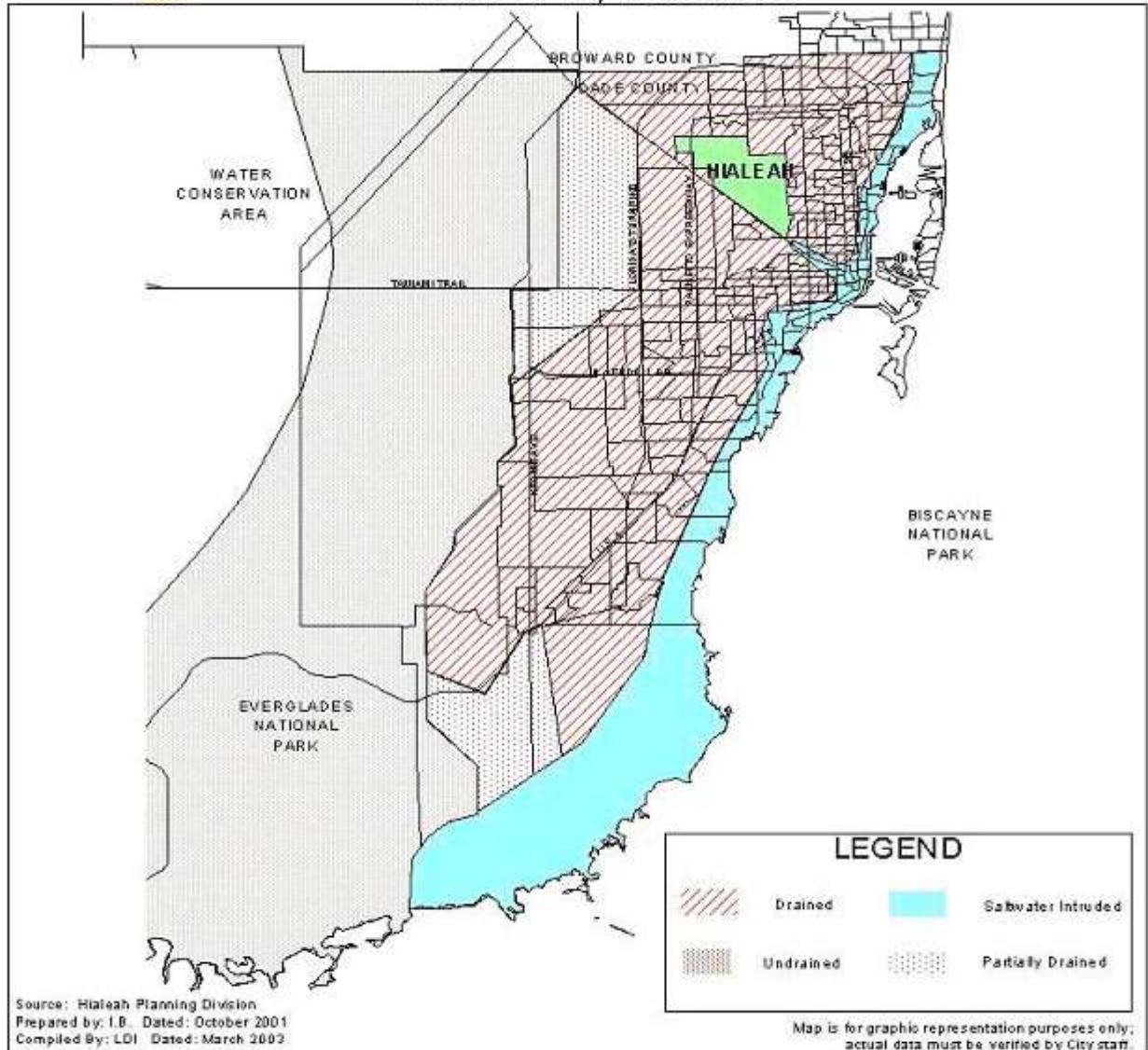




Map VIII- 2: Groundwater Recharge Areas



HIALEAH COMPREHENSIVE PLAN 2003-2015 HIALEAH, FLORIDA



Map VIII-2: Groundwater Recharge Areas Map

2 0 2 4 6 8 10 Miles

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