



South Miami-Dade

WATERSHED STUDY AND PLAN

Planning for a sustainable, healthy environment and economy



PEOPLE, WATER, LAND AND SPECIAL PLACES -- A VISION FOR THE FUTURE

A vision without a plan is just a dream. A plan without a vision is just drudgery. But a vision with a plan can change the world.

-- Proverb



MARCH 2007

- The Waters of Biscayne Bay -



TABLE OF CONTENTS

	Acknowledgementsii
	Executive Summary <i>The Vision, the Plan</i>iii - xiv
	CHAPTER 1 - Overview of the South Miami-Dade Watershed Study and Plan <i>The Best Chance to Get it Right</i>	1.1 - 1.6
	CHAPTER 2 - The Planning Process <i>Using Sound Science and Planning</i>	2.1 - 2.68
	CHAPTER 3 - Public Input <i>Engaging the Public and Stakeholders</i>	3.1 - 3.8
	CHAPTER 4 - Choosing a Direction for the Watershed <i>Choosing a Sustainable Future</i>	4.1 - 4.12
	CHAPTER 5 - The Recommended Watershed Plan <i>Choosing the Future Today</i>	5.1 - 5.24
	CHAPTER 6 - Appendices	6.1 - 6.3

ACKNOWLEDGEMENTS

The South Miami-Dade Watershed Study and Plan was supported by the South Florida Regional Planning Council, Miami-Dade County and the South Florida Water Management District.



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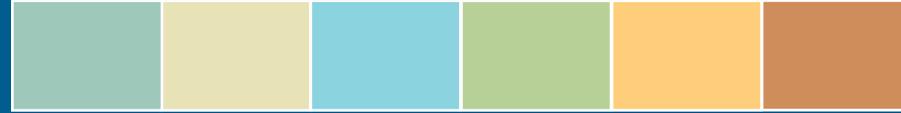
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Executive Summary

THE VISION, THE PLAN



This report is about the future of South Miami-Dade County. It is a report that presents a vision and a plan for a healthy and sustainable environment and economy for this important Watershed. This vision and plan are based on nearly four years of public input and over 4,000 pages of technical analysis.

South Miami-Dade County will change between now and the year 2050. The population will increase - perhaps even double as projected. Existing issues of land use, traffic and water resources will intensify. At stake is the protection of national treasures like Biscayne and Everglades National Parks, the preservation of agriculture and natural resources, and the overall sustainability of the region. The decisions made today on these issues will determine the quality of life for future generations.

Miami-Dade County should be commended for its efforts over the past few decades to promote good planning in the Watershed. The County has a talented and dedicated professional planning staff. As such, this report should not be construed as a criticism of the County's planning program or staff. This report recognizes the enormous pressures that the County is beginning to face as new developments are proposed in the Watershed. In just the past year, the County leadership and staff have reviewed nine requests for developments outside the existing Urban Development Boundary. The Watershed Study provides the County unequivocal data on the substantial negative impacts associated with moving the UDB for low density sprawl development. The Watershed Plan provides the County a sustainable approach for the future.

The Watershed Plan presented in this report is based on the well recognized and tested concepts of Smart Growth and sustainability. The Watershed Plan, if adopted and implemented, will demonstrate great vision and leadership and put South Miami-Dade County on a sustainable path to 2050. The Watershed Plan will help protect the waters of Biscayne Bay, reduce traffic congestion, preserve wetlands and agriculture land, promote tourism - - and cost billions of dollars less than the current path of sprawl.



Dixie Highway 1935.



Dixie Highway 2007.

LOOKING TO 2025 AND 2050 - WHAT HAPPENS IF SPRAWL CONTINUES?

Water Pollution



Flooding



Loss of Natural Areas



Loss of Agricultural Land



Traffic Congestion



Infrastructure Costs



Community Character



CDMP-LUP 3E

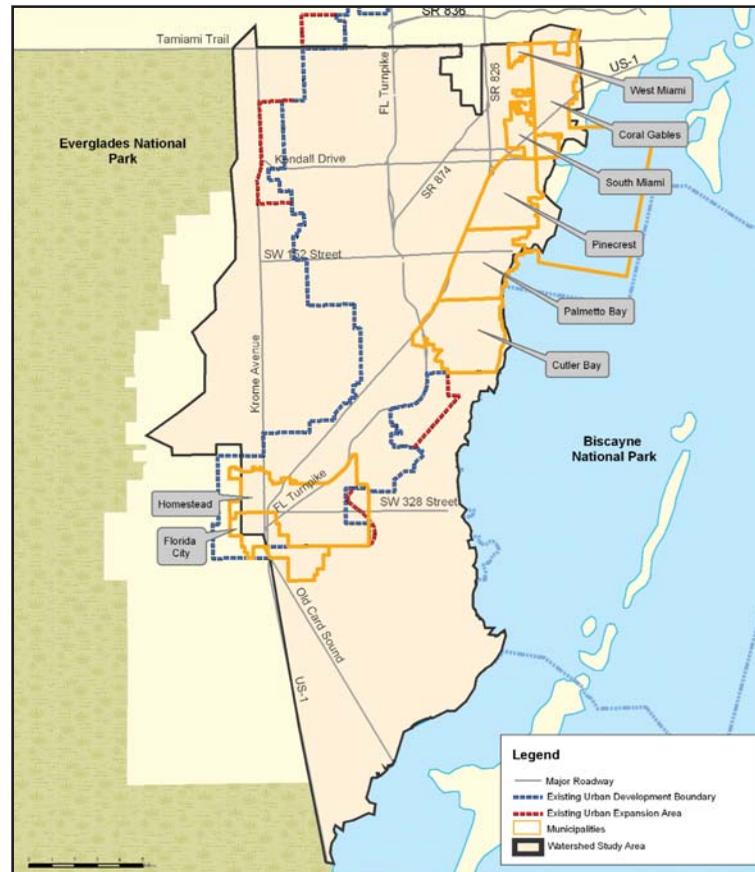
The Watershed Study and Plan was required in the County's Comprehensive Development Master Plan Land Use Policy 3E, adopted by the Miami-Dade Board of County Commissioners on October 10, 1996. The Watershed Plan meets the objectives of LUP 3E. The objectives of this policy are:

- 1) To identify and protect lands, including their uses and functions, that are essential for preserving the environmental, economic and community values of Biscayne National Park;
- 2) To identify and establish mechanisms for protecting constitutional private property rights;
- 3) To support a viable, balanced economy including agriculture, recreation, tourism, and urban development in the Plan area; and
- 4) To assure compatible land use and zoning decisions in the Watershed Study Area are consistent with the long term objectives for a sustainable South Miami-Dade.

OVERVIEW OF THE SOUTH MIAMI-DADE WATERSHED STUDY AND PLAN CHAPTER 1 The Best Chance to Get it Right

Where is the South Miami-Dade Watershed?

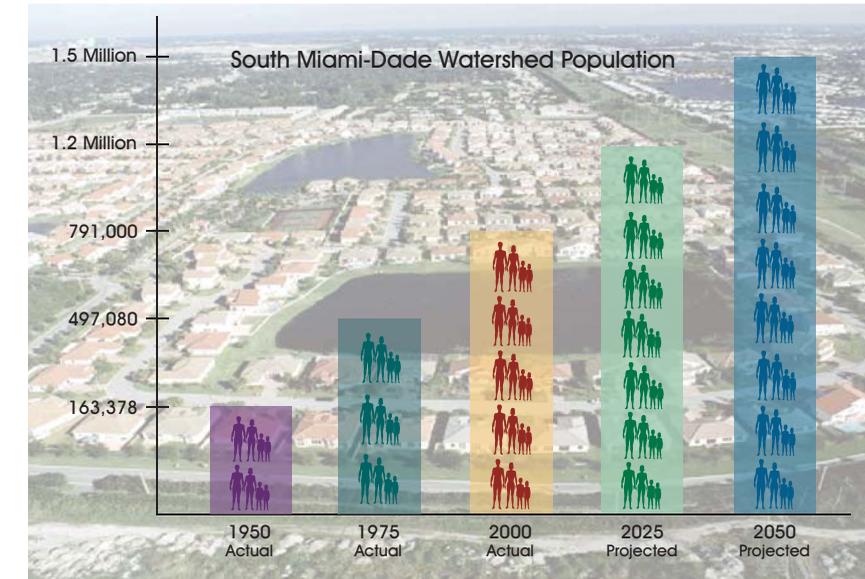
Recognized as one of the most critical watersheds in Florida, the South Miami-Dade Watershed is located in the southeastern portion of Miami-Dade County between two national treasures: Biscayne National Park and Everglades National Park. It comprises 371 square miles (237,440 acres). The Watershed plays a vital role in the health of Biscayne Bay as well as providing for the urban and agriculture needs of the County.



The South Miami-Dade Watershed

What is the South Miami-Dade Watershed Study and Plan?

The South Miami-Dade Watershed Study and Plan (SMDWSP) is comprised of two basic parts: the *Watershed Study* and the *Watershed Plan*. The Study includes a wide-ranging look at South Miami-Dade County's projected population growth; land uses (including agriculture, industrial and urban land uses); water quality; transportation and water resources infrastructure; natural resources; and economy. The Study resulted in over 4,000 pages of scientific analysis and evaluation. The Plan, which is based on the Study results, provides the County with a planning roadmap to the year 2050.



Why undertake the Study and Plan?

The SMDWSP allows Miami-Dade County to influence the future of the Watershed in a positive manner. Far too often communities and their elected leadership only react to population growth -- long after the opportunity for a meaningful response has passed. One only needs to look at poorly planned communities to confirm the negative

consequences of this reactive approach. The SMDWSP is a proactive look into the future based on the assumption that the population will nearly double by the year 2050. In 2000, the Watershed was inhabited by approximately 791,000 people - the population is estimated to reach 1.5 million by the year 2050.

While it may be appropriate to debate the policy of allowing the population to nearly double, it is important to understand that this Study was not a carrying capacity study. Specifically, the scope of the Study dictated an evaluation of the impacts of the projected population growth at 2025 and 2050 and how such impacts might be mitigated. In short, the goal of the Plan was to properly plan for the projected growth.

Pursuant to the CDMP Land Use Policy 3E, the Study evaluates potential policy choices on how growth might occur and looks at the consequences of each of those choices. Armed with better information, leaders in the County and municipalities can make more informed choices today. If implemented, the Watershed Plan will help reduce the impacts that population growth will have on Biscayne Bay, agriculture, community character, the economy, natural resources, transportation, and private property rights.



Who Conducted the Watershed Study and Prepared the Watershed Plan?

Miami-Dade County, the South Florida Regional Planning Council (SFRPC), and the South Florida Water Management District (SFWMD) are signatories to a Memorandum of Understanding that authorized the SFRPC to manage the consulting contract. The consultant, Keith and Schnars, P.A., completed the Study and wrote the Plan. The SFRPC, the County and the SFWMD provided review support to the Keith and Schnars Team.

The Watershed Study Advisory Committee (WSAC), representing a diverse range of interests, helped shape the scope of work, reviewed Study reports and provided a venue for stakeholder and public input. The 29 member WSAC, which met 55 times throughout the Study, was chaired by Roger Carlton. In addition, the Technical Review Committee (TRC), an independent, 17 member panel of water, planning and natural resources experts, complimented the Keith and Schnars Team by reviewing methodologies and commenting on work products. The TRC was moderated by Jim Murley, Director of Florida Atlantic University's Center for Urban and Environmental Solutions.

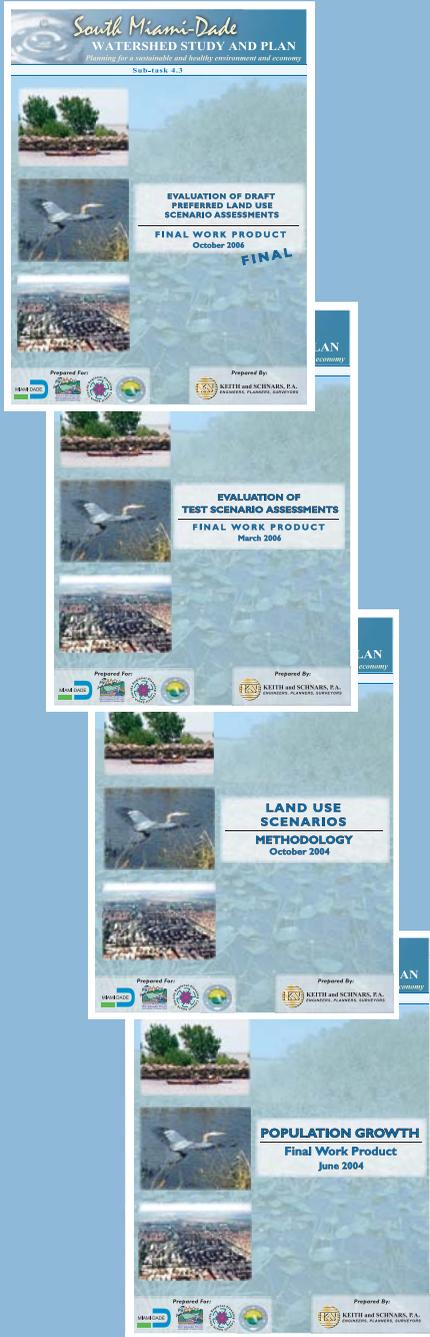


KEITH and SCHNARS, P.A.

THE PLANNING PROCESS CHAPTER 2

Using Sound Science and Planning

The SMDWSP is based on technically sound and established practices for the formulation of large-scale water and land use plans. The Study was divided into five major task areas, each of which contains multiple sub-tasks. Each task is part of a logical progression that created the information necessary to complete this comprehensive 43-year land use and water management plan for South Miami-Dade County (the Watershed Plan). All final documents are posted on the project website, and may be reviewed by visiting www.southmiamidadewatershed.com.



To assist the County in implementing the Plan and to mitigate for impacts from growth on the County and Biscayne Bay, a set of Implementation Strategies for the preferred land use scenario was developed in Task 5. These strategies include site development standards, best management practices for protecting water quality, and land preservation techniques, including regulatory incentives. These strategies help address potential effects on property rights and include measures to mitigate such effects. A watershed land use design guide map and the implementation strategies make up the Watershed Plan.

Task 4 involved the development of a draft preferred land use scenario. The development of the draft preferred scenario was informed by the results of the test scenario assessments completed in Task 3. The draft preferred scenario was refined based on input from the WSAC, stakeholders, the public, and the TRC. The revised draft preferred scenario was then assessed against the same 21 parameters and thresholds used in Task 3.

The impacts of the six test land use scenarios were assessed against the 21 parameters and thresholds developed in Task 1, and compared to the baseline condition. This evaluation included an assessment of the impacts of each scenario on water resources, agriculture, natural resources, community character, employment, economy and infrastructure.

Potential opportunities for, and constraints against, future development were defined and mapped. A baseline map was created depicting 2003 land uses. The final step in Task 2 was the development of hypothetical test land use scenarios based on three different land use policy directives. Both 2025 and 2050 population projections were utilized, resulting in six test land use scenarios.

Baseline conditions that create the foundation for the Study were established in Task 1. This included an analysis of population projections and inventories of development features, water resources, and natural communities. In addition, a wide-ranging series of parameters and thresholds for assessing the impacts of various land use scenarios were developed in Task 1. The 21 parameters included water quality, development patterns, transportation, parks, agricultural lands, flood protection, and wetlands.

PUBLIC INPUT **CHAPTER 3** Engaging the Public and Stakeholders

An integral part of the Study was an extensive public involvement program to disseminate information and gather input from stakeholders and the public at key stages throughout the planning process. Clear and continuous communication was essential for members of the public to understand that their input to the Study is vital and is key to the Plan's development and future success. This effort began in the initial stages of the Study with a Public Involvement Plan, a plan that defined the goals and objectives of the Study as it related to the public, stakeholders and elected officials within the Watershed.

Providing information, obtaining public input and identifying the public's concerns and issues were accomplished through consistent, ongoing efforts that included active consultant participation in over 45 WSAC meetings, six public meetings, 28 public events, numerous meetings with officials from Miami-Dade County as well as cities located within the Watershed, forums with community and agricultural interests, events with the Keith and Schnars Mobile Information Station, newsletters, e-mail campaigns, editorial boards, fact sheets, the project website and media releases.

As noted above, the WSAC played an important role throughout the Study in providing information to the public and to stakeholders. Many WSAC members provided opportunities for the consulting team to present information to stakeholders, opinion leaders and to the public.

CHOOSING A DIRECTION FOR THE WATERSHED **CHAPTER 4** Choosing a Sustainable Future

Faced with a projected doubling of the population and associated development, the Watershed will dramatically change over the next several decades. The Study clearly shows that the Watershed cannot

grow as projected without substantial consequences to its water and natural resources, quality of life and community characteristics. The land and water use management challenges confronting the Watershed will only increase. Without a well thought out plan, reconciling these challenges will be virtually impossible, and the consequences will negatively change the Watershed and the County forever.

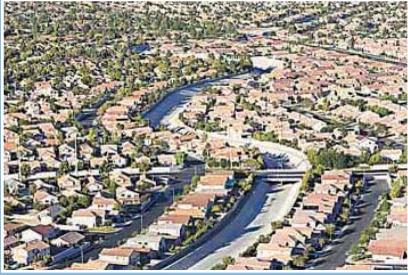
After nearly four years of study, thousands of pages of analysis and scores of meetings with stakeholders and the public, what has emerged is a clear picture of two potential futures for South Miami-Dade County - a future based on either a sprawl scenario or a Smart Growth scenario.

From a watershed-level planning perspective, the two major policy choices for the future can be characterized as either a Sprawl Scenario or a Smart Growth Scenario. The long-term consequences of a sprawl scenario are enormous. This is the path that the County is on today.

The Smart Growth choice will require the County to take some bold, but achievable, policy steps. The benefits of choosing a Smart Growth policy are substantiated by the Study and supported by the literature.



“SPRAWL”



Source: www.reviewjournal.com



Source: www.csmonitor.com

“SMART GROWTH”



Source: www.landdesign.com



Source: www.kirkfromm.com

What is Sprawl?

Sprawl is generally defined by non-contiguous, scattered or leap-frog patterns of development. Sprawl also includes numerous low-density subdivisions that fan out from established urban cores and absorb open lands. The environmental impacts of sprawl include the loss of ecologically significant open areas such as wetlands, forests and agricultural lands. Sprawl development and the associated impervious surface interrupt surface water flows and reduce infiltration into the groundwater. More impervious surface results in increased stormwater runoff and conveyance of polluted water to Biscayne Bay.

In addition, sprawl creates negative transportation impacts resulting from greater reliance on the automobile. Longer trips between the suburbs and urban core job centers result in more air pollution, more roads requiring long-term maintenance, and additional demand for parking spaces. The scattered, fragmented nature of sprawl development increases the costs of infrastructure and municipal services. The Study concluded that this approach would cost approximately \$8 billion more than a Smart Growth approach.

What is Smart Growth?

Smart Growth is a concept based on a set of principles that encourage land use patterns that are more compact, transit-oriented, walkable, bicycle-friendly, and include mixed-use development with a range of housing choices. Smart Growth promotes:

- communities with a unique sense of place;
- the preservation of natural and cultural resources;
- a more equitable distribution of the costs and benefits of development;
- expanded transportation options;
- more employment and housing choices;

- the long-range, regional considerations of sustainability over a short term focus; and
- healthy communities.

By locating people near each other, near employment centers, near shopping and promoting transit-oriented development, travel times and transportation infrastructure costs will be reduced. As a result, these communities improve quality of life and promote a healthier lifestyle with less pollution.

The Smart Growth principle of compact building design creates livable urban neighborhoods and attracts more people and businesses to the community. This results in communities that are economically viable and environmentally sustainable. Smart Growth is an alternative to sprawl and its associated traffic congestion, disconnected neighborhoods, and potential urban decay.

The Impacts of Sprawl

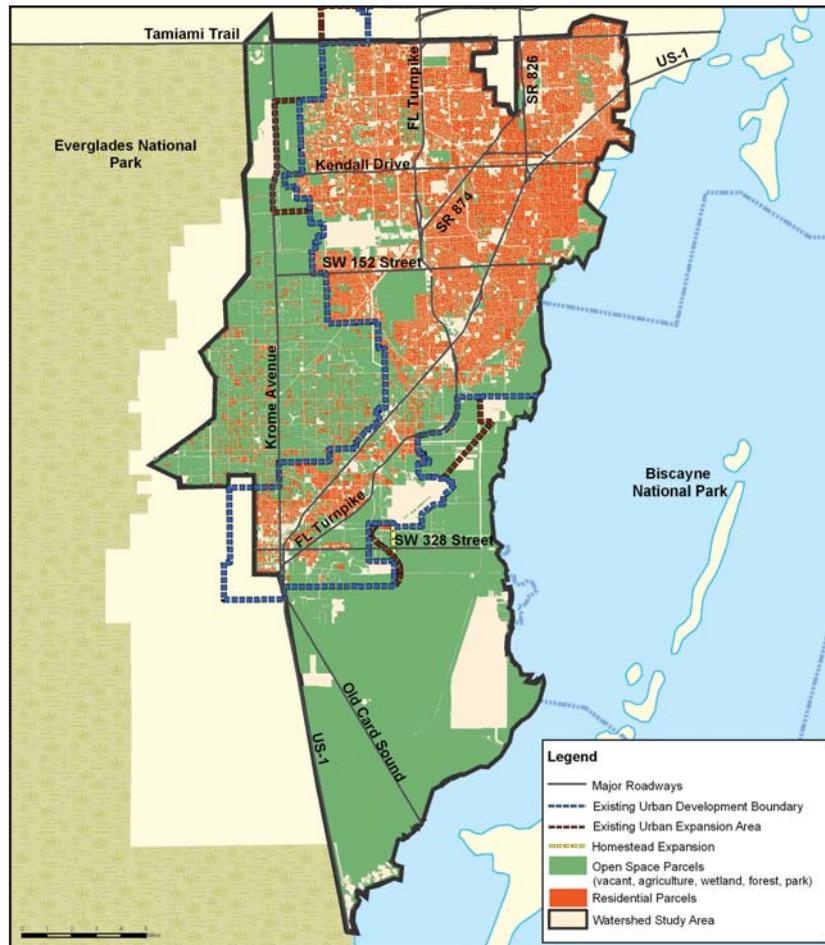
The sprawl scenario will negatively and irreversibly change the character of the Watershed:

- the waters of Biscayne Bay will be subject to substantial increases in water pollution;
- three-fourths of the agricultural land will be lost to low density residential developments;
- already imperiled natural resources such as wetlands and remnant forests will be diminished further;
- traffic congestion will increase; and
- the effectiveness of the restoration of America's Everglades will be reduced.

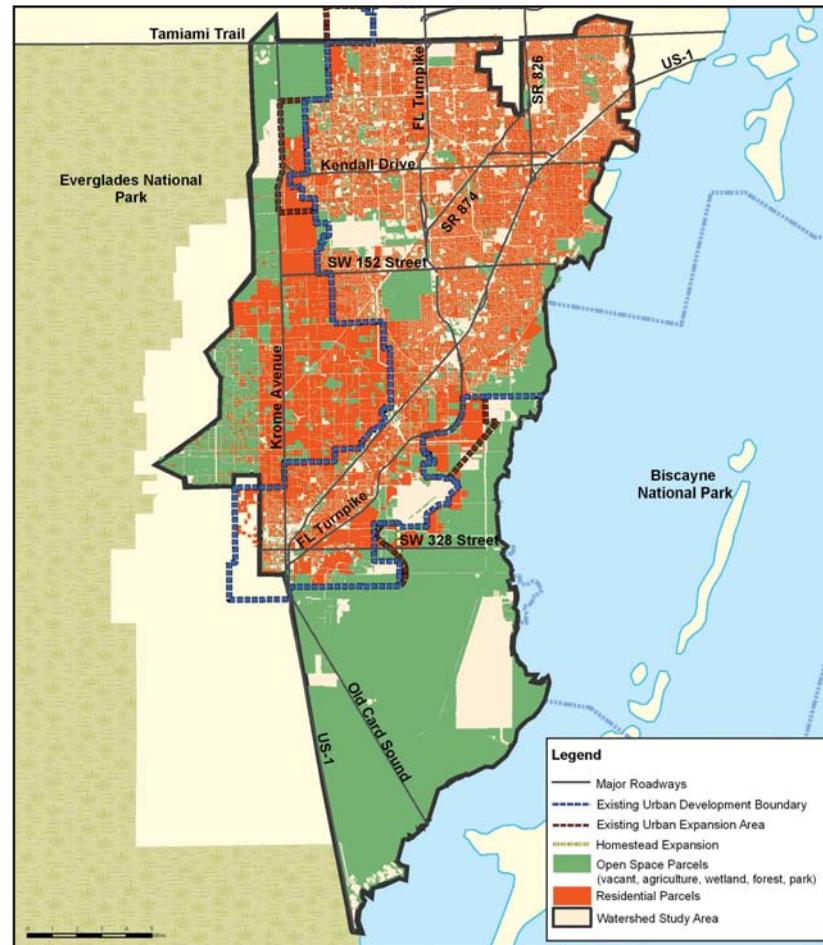
A policy path of sprawl will not be a path of sustainability for the environment or the community.

It is estimated that a sprawl scenario in the Watershed will cost nearly \$8 billion more for infrastructure than the Recommended Watershed Plan between now and 2050. This does not include the substantial environmental costs, including impacts to Biscayne Bay and other natural resources, that will result from a sprawl development pattern. While certain upfront development costs are often shared between the private and public sectors, it is important to note that the long-term life-cycle infrastructure costs to support sprawl developments are borne by municipalities and the County.

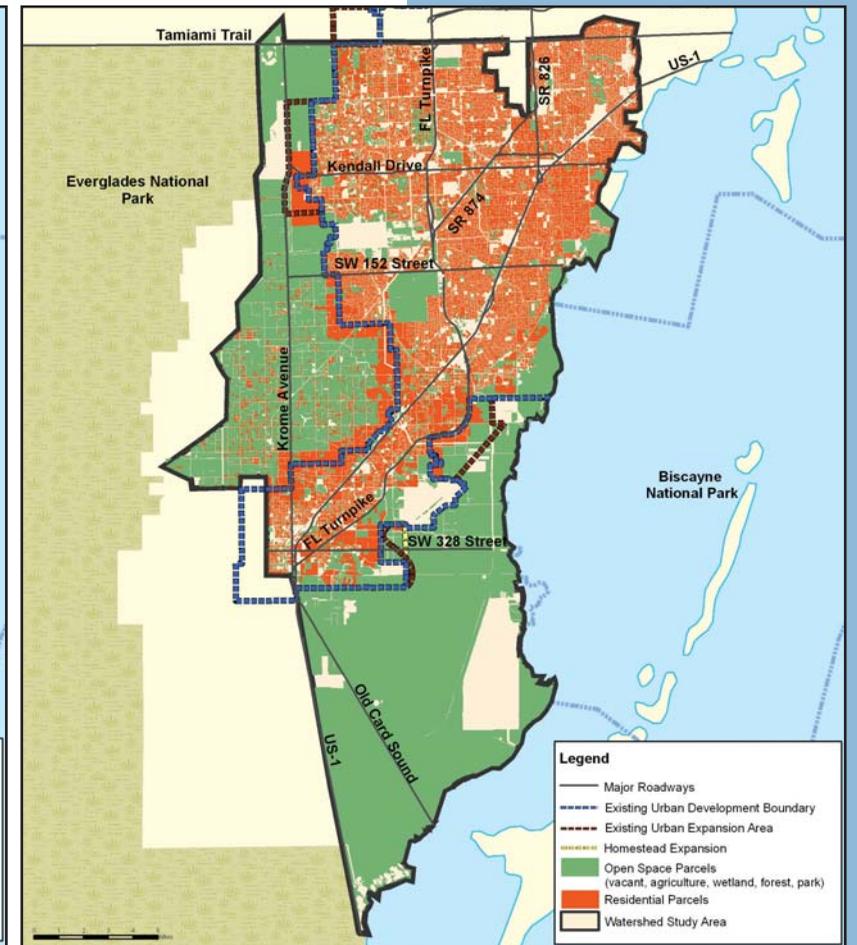
If adopted, a Smart Growth scenario will afford the Watershed the best chance for a sustainable future. While it will take a long-term vision and the courage to make difficult decisions today, the Smart Growth scenario reflected in the Recommended Watershed Plan will leave a legacy of vision and leadership for generations to come.



Vacant and Residential Parcels
in 2003



Vacant and Residential Parcels
in 2050 with Sprawl



Vacant and Residential Parcels
in 2050 with Smart Growth

THE RECOMMENDED WATERSHED PLAN

CHAPTER 5 Choosing the Future Today

The Recommended Watershed Plan is about choosing a different future for the Watershed - a future based on the concepts of Sustainability and Smart Growth.

The Recommended Watershed Plan consists of two major parts: the Watershed Plan Design Guidelines and the Implementation Strategies. Part one, the Watershed Plan Design Guidelines, creates a temporal and spatial policy framework for Smart Growth and resource protection to the year 2050.



THE DESIGN GUIDELINES AND ASSOCIATED DESIGN GUIDE MAP:

- Provides direction to the County, developers and the communities in the Watershed on how to facilitate and promote a Smart Growth development pattern and resource protection;
- Increases predictability for developers and property owners;
- Establishes a general framework for development - it is not a parcel-based zoning map; and
- Does not dictate future land use of any given parcel, but rather provides general guidance that allows the exercise of good judgment consistent with Smart Growth concepts.

General Watershed Plan Guidelines:

- More compact building design;
- Mix of commercial and residential land uses;
- Greater densities along transit corridors;
- Variety of transportation choices;
- Creation of walkable neighborhoods;
- Preservation of open space, wetlands and farmland;

- Better protection/management of surface and ground waters; and
- Enhancement of tourism and economic development.

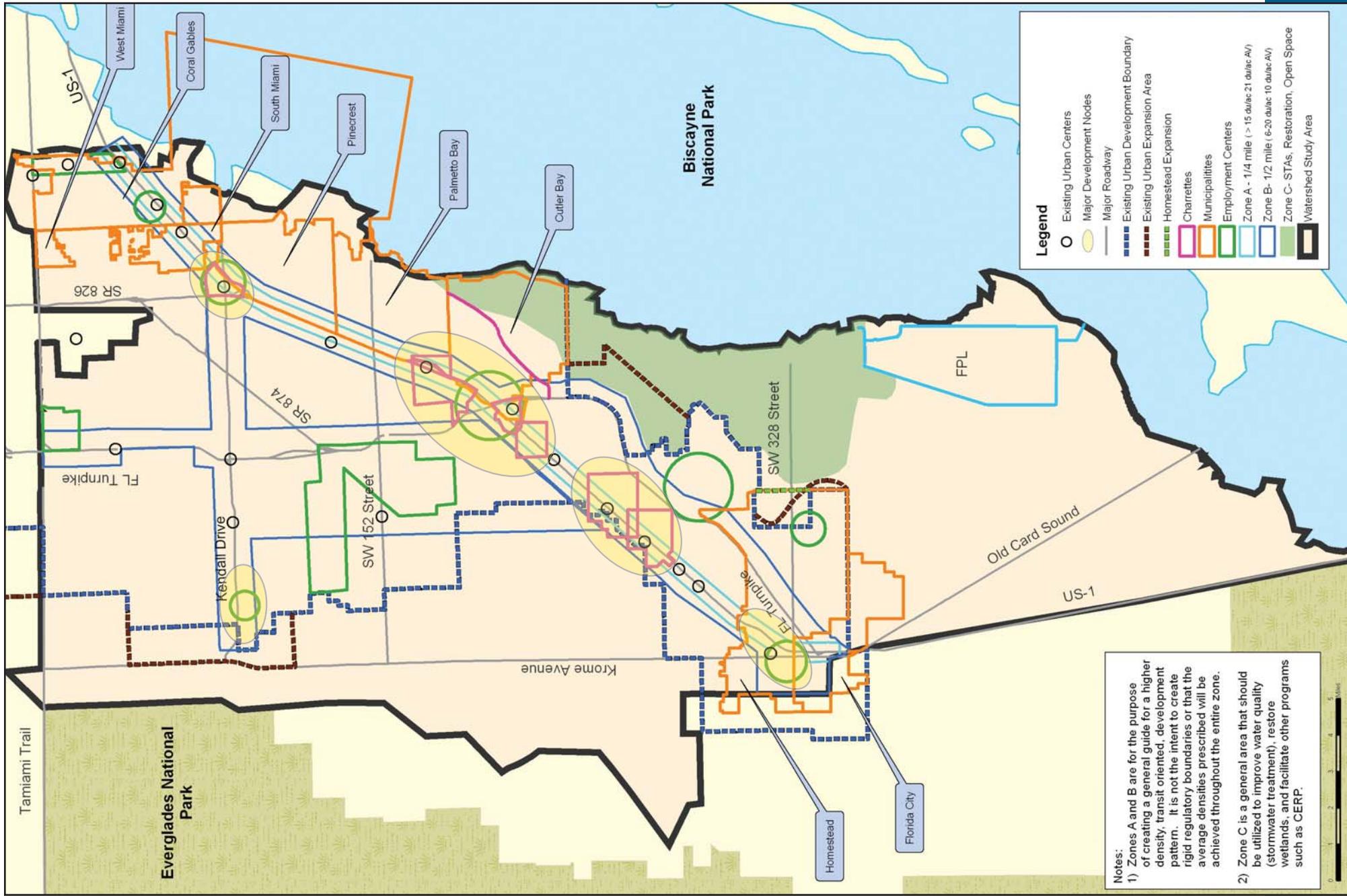
Specific Watershed Policy Guidelines:

Temporal Policy Guidelines

- **2007 through 2025:** Allocation of 100 percent of the required 102,000 dwelling units inside the existing Urban Development Boundary (UDB) through 2025;
- **2026 through 2050:** Allocation of a minimum of 60 percent (61,000) of the required 102,000 dwelling units inside the existing UDB between 2026 and 2050;
- Consistent with the CDMP and Implementation Strategies, allocation of a maximum of 40 percent (41,000) of the total required dwelling units outside the existing UDB between 2026 and 2050.

Spatial Policy Guidelines

- In coordination with local municipal plans, utilize the eight existing consensus-based charrette areas in the Watershed at 75 to 100 percent of the densities approved and agreed upon by the municipalities, resulting in 40,000 to 50,000 units in the charrette areas;
- Make completion of enhanced transit corridors a priority, including completion of the Metrorail to Florida City;
- Establish two major zones (A and B) along enhanced transit corridors to guide the allocation of dwelling units;
- Consistent with the charrette areas and Zones A and B, establish a minimum of five major development nodes along transit corridors;
- Encourage municipalities located in Zones A and B to utilize Smart Growth approaches, including higher residential densities and mixed use developments. The determination of how to distribute the density would be determined by municipalities; and
- Establish an open space/conservation zone (Zone C) that ensures that lands needed for the protection of Biscayne Bay are available for stormwater treatment, wetlands restoration and open space.



Recommended Watershed Plan Design Guide Map

The Recommended Watershed Plan will not result in a “skyscraper canyon” on US 1.



10 dwelling units per acre



21 dwelling units per acre



87 dwelling units per acre

Watershed Plan Guideline Zones

Zones A and B are established for the purpose of creating a general guide for a higher density, transit oriented development pattern. These zones do not create rigid regulatory boundaries and it is not the intent that the entire area within these zones will achieve the average densities prescribed.

- **Zone A:** Located $\frac{1}{4}$ mile on each side of US 1. Minimum density of 15 units per acre and average density of 21 units per acre. It is not intended or recommended that every acre in Zone A would have these densities.
- **Zone B:** Generally located $\frac{1}{2}$ mile on each side of US 1 and along other major corridors such as Kendall Drive and 137th Avenue. Density range is 6 to 20 units per acre with an average of 10 units per acre. It is not intended or recommended that every acre in Zone B would have these densities.
- **Zone C:** Located on the eastern portion of the Watershed near the confluence of Canals C-1, C-102 and C-103 with Biscayne Bay. This approximately 18,000 acre area may be used for a combination of stormwater treatment areas (STAs), wetlands restoration (including the Biscayne Bay Coastal Wetlands CERP project) and open space (including agriculture). It is important to note that it is not anticipated that all of this area will be needed. A larger area than potentially needed was selected to provide the County and willing seller landowners the greatest flexibility in the use of Zone C.

Zone C is an integral part of the Recommended Watershed Plan. Under all growth scenarios the discharge of water pollutants into Biscayne Bay increases. In this regard, it will be necessary to capture and treat stormwater runoff before it enters the Bay. The area of Zone C was selected because of its landscape position in relation to the three major canals that result in the highest pollutant load increases.

Part two of the Recommended Watershed Plan is a set of 67 implementation strategies that provide the policy direction needed to make the Plan effective and implementable. These strategies were developed after extensive discussions with the WSAC and stakeholders. If adopted, many of these strategies, along with the Design Guidelines, would be codified in the County's CDMP or other policy documents.

The implementation strategies are organized into the following categories:

Overarching Policy Framework of the Watershed Plan

- General Implementation Strategies

Thematic Implementation Strategies

- Agriculture
- Economy
- Housing
- Natural Communities/Open Space
- Property Rights
- Smart Growth Economic Incentives
- Transportation
- Water Resources

The Implementation Strategies are provided in Chapter 5.



The Cost of Growth - - Paying for the Recommended Watershed Plan

Several of the advantages associated with the Smart Growth based Recommended Watershed Plan are discussed in this report. While the Recommended Watershed Plan will result in substantial costs savings compared to the sprawl scenario, it nevertheless will require a significant investment of resources. There is no free lunch where the population is doubling.

The infrastructure assessments identified the capital improvement projects required in South Miami-Dade by using population and housing projections out to 2050. This is useful because the current capital improvement plan only looks out 15 to 20 years. Ensuring funding for the Recommended Watershed Plan will be vital to its successful implementation. The report discusses some of the current capital improvement programs that can help fund the infrastructure required to implement the Recommended Watershed Plan.

Conclusion

After nearly four years of science-based analysis, public input and technical review, a clear picture of two different futures for the Watershed has emerged. One picture is on a canvas with increased water pollution, increased traffic congestion and the substantial loss of agriculture land and natural resources. This picture reflects the dark clouds that are cast over a future based on a sprawl approach to accommodating population growth.

A second picture of a future South Miami-Dade Watershed is framed with the potential for a healthy and sustainable environment and economy for the generations that follow the leaders of today. This Smart Growth picture highlights the blue waters of Biscayne Bay, a stronger economy, viable agriculture, efficient transportation, safe communities, protected natural resources - - all resulting in a good quality of life for South Miami-Dade communities.

In addition to the contrasting pictures of the future, other important facts have been brought to light by the Study. These include:

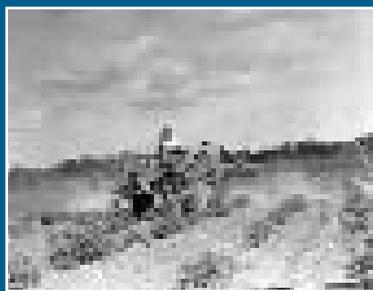
- With the projected increases in population, all scenarios will result in impacts to the environment, economy and the quality of life;
- The Smart Growth scenario allows the County and municipalities to more effectively manage and mitigate for the impacts of growth, including the impacts to Biscayne Bay;
- Sprawl development costs more than Smart Growth development;
- The County must work with the municipalities to build on existing Smart Growth approaches and adopt new approaches as necessary;
- The County must develop a coordinated strategy for funding the infrastructure for a Smart Growth based future;
- If adopted, the Recommended Watershed Plan will position the County better for State and federal funding and policy support; and
- There is no silver bullet response to the issues facing South Miami-Dade County - - but there are many silver BBs.

The leadership of Miami-Dade County should be commended for the courage and vision they exhibited in calling for the Watershed Study and Plan. The decisions that are made now will put the first brush strokes on the picture depicting the future of the South Miami-Dade Watershed. The Recommended Watershed Plan provides the County with a vision of what the picture can look like - - a healthy and sustainable Watershed. It is now up to the County to take the brush and paint the picture. While challenges exist, the opportunities are far greater. The County has the opportunity to leave a legacy of planning responsibly today to ensure the future for generations to come.



The South Miami-Dade Watershed

Past



Present



Future?



or



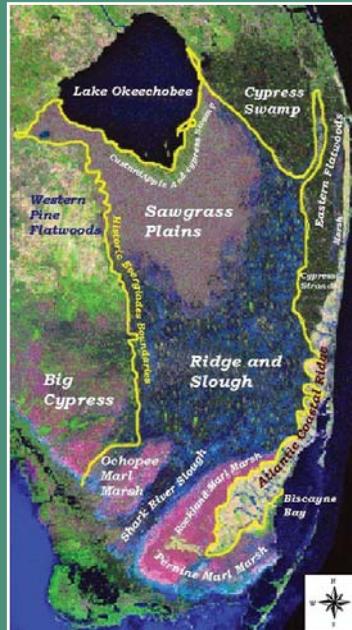
CHAPTER 1

Overview of the South Miami-Dade Watershed Study and Plan

THE BEST CHANCE TO GET IT RIGHT

*All things are possible once human
beings realize that everything
is at stake.*

- Norman Cousins



Representation of the Pre-Development Natural Landscape from "The Role of Flow in the Everglades Ridge and Slough Landscape", U.S. Department of the Interior, South Florida Ecosystem Restoration Working Group.

To understand the geography of the South Miami-Dade Watershed, it is helpful to look at its natural history, particularly as it relates to water resources. Prior to development, the Watershed was a diverse landscape of freshwater marshes, sloughs, pine flatwoods and rockland, hardwood hammocks, scrub, sandhills, and coastal mangrove swamps. The Watershed area was the hydrologic and ecological link between the Everglades to the west and Biscayne Bay to the east. In the Everglades, a 60-mile wide "river of grass" slowly moved water primarily from Lake Okeechobee to Florida Bay. A coastal ridge within the Watershed area kept most of the water west, but some water flowed through rivers, sloughs, and groundwater and discharged to the east into Biscayne Bay. The natural system's storage capacity was so enormous that rainfall from wet seasons and from wet years provided ample supply to maintain the ecosystem through dry seasons and dry years.

The extent and natural flows of the water limited the development of the region. But beginning in the late 1800s and early 1900s, extensive drainage projects began to make vast areas of land usable for agriculture and housing. By 1927, the Everglades Drainage District had put in place 440 miles of canals, levees, locks, and dams. By the 1970s, a massive water management project called the Central and Southern Florida Project was essentially complete: about 1,000 miles of levees and canals, 150 gates and other water control structures, and 16 major pump stations had been installed throughout South Florida. The C&SF Project was highly successful at regulating the water resources for flood protection and water supply, but had unforeseen environmental effects. The natural flows through the Everglades, through the coastal ridge, and into Biscayne Bay had been substantially changed. The timing, quantity, quality, and distribution of water were not right, and the Everglades, Biscayne Bay, and other natural areas were suffering. To get the water right, the Comprehensive Everglades Restoration Plan (CERP) was authorized in 2000. The goal of CERP is to capture fresh water that now flows unused to the ocean and redirect it to areas that need it most. The majority of the water will be devoted to environmental restoration, reviving a dying ecosystem. The remaining water will benefit cities and farmers by enhancing water supplies in South Florida. There are several CERP projects within the Watershed - these are key to the future of the Watershed and Biscayne Bay. The natural landscape cannot be returned to pre-development conditions, but a long-range vision and plan can manage the water resources and promote a sustainable ecological system.

Overview of the South Miami-Dade Watershed Study and Plan

THE BEST CHANCE TO GET IT RIGHT

The purpose of this chapter is to provide an overview of the South Miami-Dade Watershed Study and Plan (SMDWSP). Specifically, information will be provided on: **Where** the Watershed is located, **What** the SMDWSP is, and **Why** it is being completed.

Where is the South Miami-Dade Watershed?

The South Miami-Dade Watershed is located in the southeastern portion of Miami-Dade County between two national treasures: Biscayne National Park and Everglades National Park (Figure 1.1). It is for this reason that this area is recognized as one of the most critical watersheds in Florida. The Watershed, which comprises 371 square miles (237,440 acres), plays a vital role in the health of Biscayne Bay as well as providing for the urban and agriculture needs of the County. It includes eight municipalities and 20 percent of the total land area in the County. Like all watersheds, every activity on the land in South Miami-Dade County potentially affects the aquatic, natural and human environment.

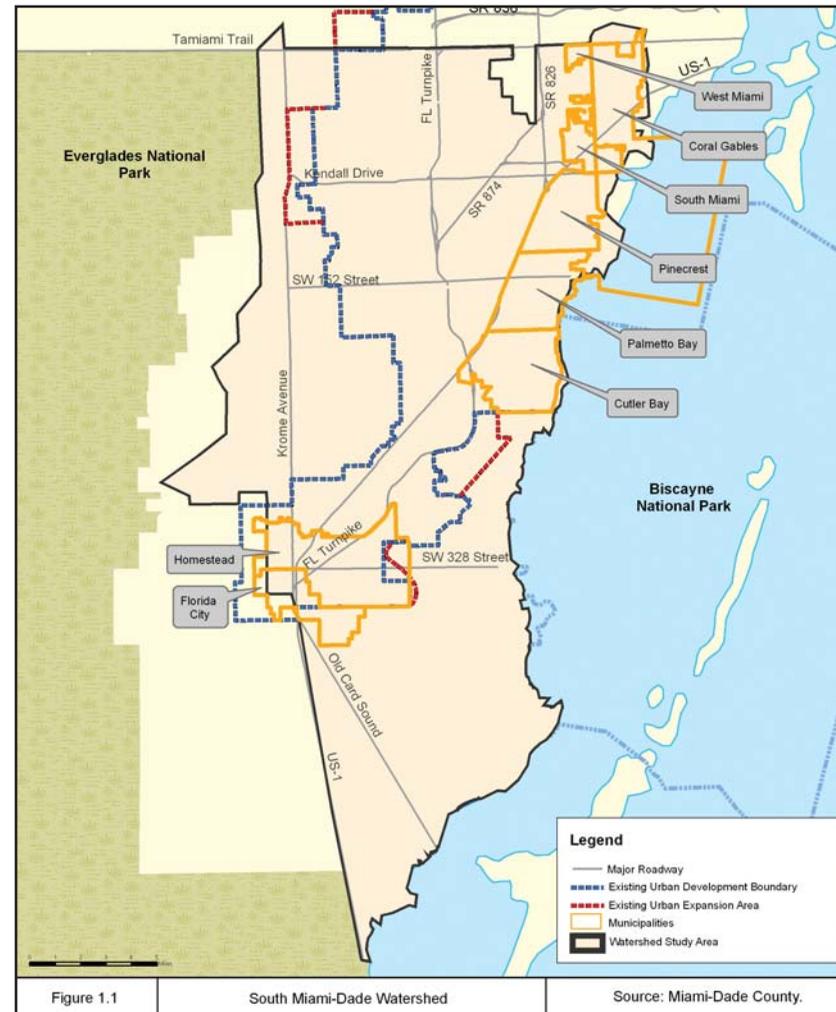
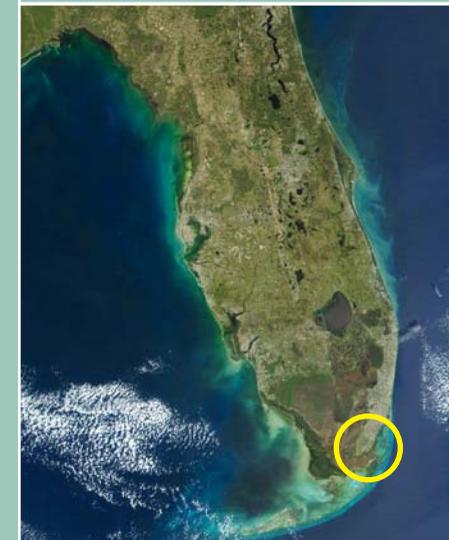


Figure 1.1 South Miami-Dade Watershed Source: Miami-Dade County.

SOUTH MIAMI-DADE WATERSHED FACTS

- ➔ 1,965 square miles in Miami-Dade County
- ➔ 371 square miles in the Watershed
- ➔ 237,440 acres in the Watershed
- ➔ 791,000 people in 2000
- ➔ 1.5 million people projected in 2050



What is the South Miami-Dade Watershed Study and Plan?

The SMDWSP is a long-term land planning and water resources study and plan required by the Miami-Dade County Comprehensive Development Master Plan (CDMP). The SMDWSP is comprised of two basic parts: the **Watershed Study** and the **Watershed Plan**. The Study includes a wide-ranging look at South Miami-Dade County's projected population growth; land uses (including agriculture, industrial and urban land uses); water quality; transportation and water resources infrastructure; natural resources; and the economy. The Study resulted in over 4,000 pages of analysis and evaluation. The Plan, which is based on the Study results, provides the County with a planning roadmap to the year 2050. The Study process, which is based on standard planning practices, is explained in more detail in Chapter 2 of this report. The Plan is presented and discussed in Chapter 5.

Why undertake the Study and Plan?

The SMDWSP allows Miami-Dade County to influence the future of the Watershed in a positive manner including the protection of Biscayne Bay. Far too often communities and their elected leadership can only react to population growth and other changes -- long after the opportunity for a meaningful response has passed. One only needs to look at other South Florida communities to confirm the negative consequences of a reactive approach to planning. The SMDWSP is a proactive look into the future based on the assumption that the population will nearly double by the year 2050. In 2000, the Watershed was inhabited by 791,000 people. The population is projected to reach 1.5 million by the year 2050 (Figure 1.2).

While it may be appropriate to debate the policy of allowing the population to nearly double, it is important to understand that this Study is not a carrying capacity study. Specifically, the scope of the Study dictated an evaluation of the impacts of the projected population growth at 2025 and 2050, and the goal of the Plan is to determine how such growth can be accommodated in an environmentally sustainable manner.

What is a Watershed?

The term watershed is frequently used to refer to the entire area that water flows across, under and through on its way to a common body of water, such as Biscayne Bay. No matter where you are, you're in a watershed!

A watershed is the area of land where all of the water that is under it or drains off of it flows or runs off into the same place. In other words, a watershed is an area of land with a common hydrologic system. For the South Miami-Dade watershed this means that all of the water in this part of the County flows into Biscayne Bay, either from a canal, through a wetland or through the aquifer.

One of the main functions of a watershed is to temporarily store and transport water from the land surface to the water body and eventually on to the ocean. In addition to moving water, watersheds and their water bodies also transport sediment and other materials (including pollutants), energy, and many types of organisms.

Watersheds come in all shapes and sizes. They cross county, state, and national boundaries. Large watersheds, like the Mississippi River basin, contain thousands of smaller watersheds. In many areas, watersheds are defined by the ridge line on the top of mountains. In other places, like South Florida, the watershed "divide" is much less prominent and may be difficult to see. In South Miami-Dade County the watershed is characterized by drainage canals/basins.

Extensive scientific studies have demonstrated that man's activities, such as land use changes, can have a profound impact on the health of a watershed.

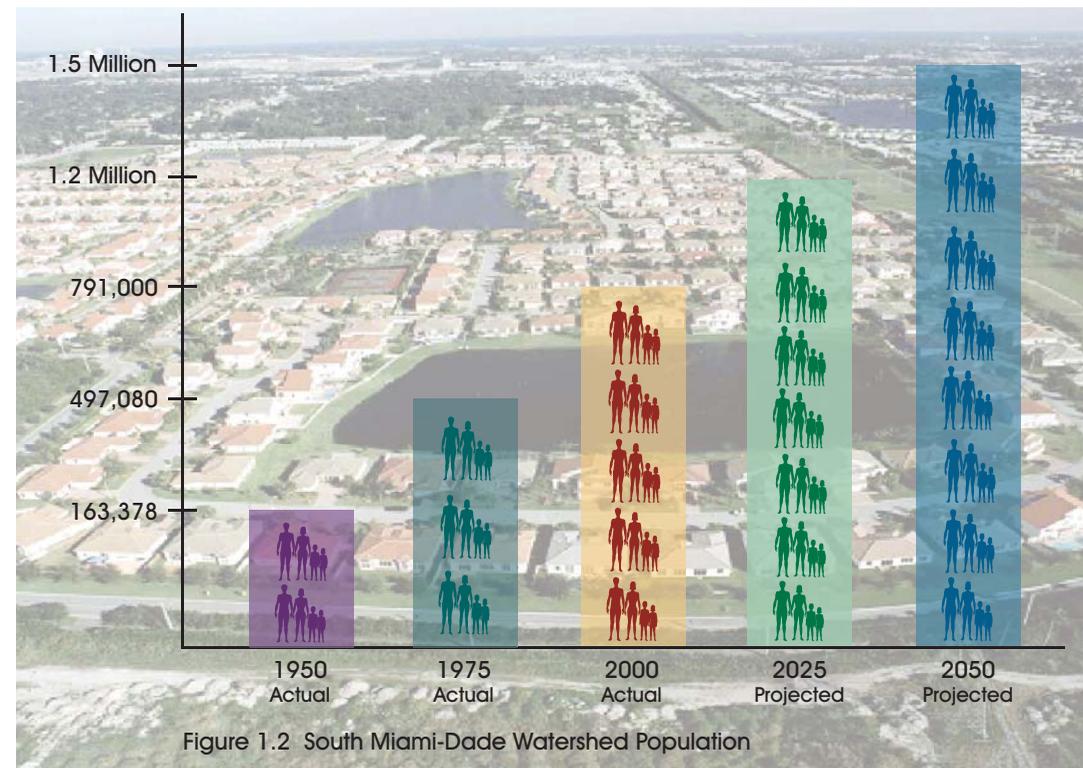


The Study evaluates potential policy choices on how growth might be distributed and looks at the consequences of each of those choices. Armed with better information, leaders in the County and local municipalities can make better, more informed, choices today that can chart a positive and sustainable course to the year 2050. The Plan will serve as the guide, or roadmap, for sustainable development and Smart Growth. As defined by the United States Environmental Protection Agency, Smart Growth makes it possible for communities to grow in ways that support economic development and jobs; create strong neighborhoods with a range of housing, commercial, and transportation options; and achieve healthy communities that provide families with a clean environment. If implemented, the Watershed Plan will help reduce the negative impacts that population growth will have on Biscayne Bay, agriculture, community character, the economy, natural resources, transportation, and private property rights.

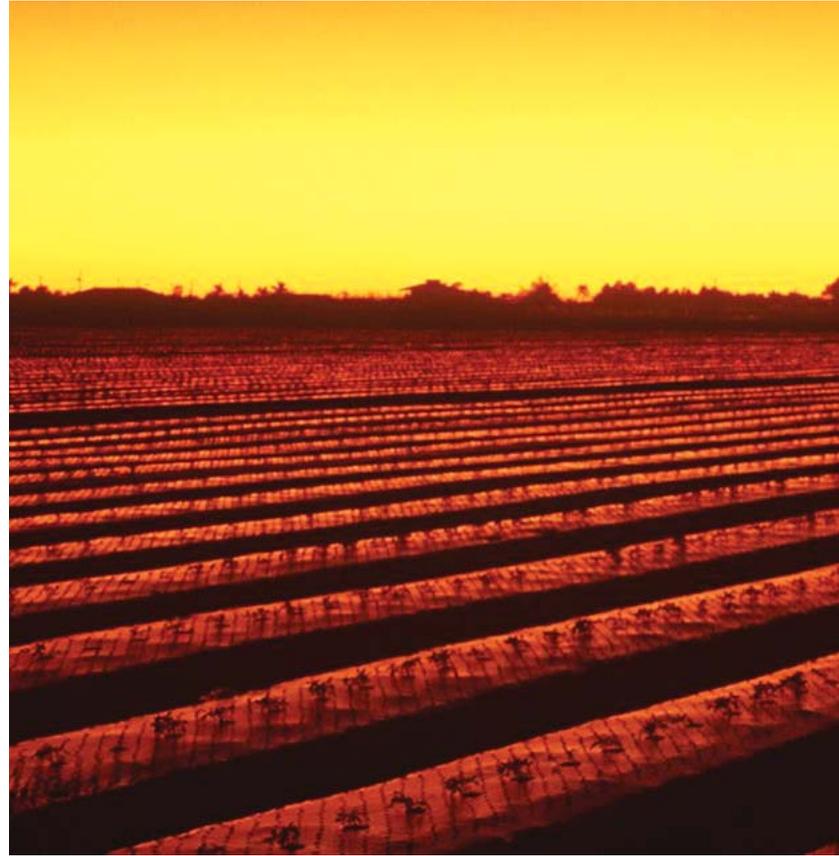
What are the Specific Objectives of the SMDWSP?

The SMDWSP was developed consistent with the objectives of CDMP Land Use Policy 3E, which was adopted by the Miami-Dade Board of County Commissioners on October 10, 1996. The objectives of this policy are:

- 1) To identify and protect lands, including their uses and functions, that are essential for preserving the environmental, economic and community values of Biscayne National Park;
- 2) To identify and establish mechanisms for protecting constitutional private property rights;
- 3) To support a viable, balanced economy including agriculture, recreation, tourism, and urban development in the Plan area; and
- 4) To assure compatible land uses and zoning decisions in the Watershed Study Area are consistent with long term objectives for a sustainable South Miami-Dade.



- The Watershed Plan is about a vision for a healthy and sustainable South Miami-Dade County.
- The Watershed Plan is about leaving a legacy of a high quality of life for Miami-Dade County's future generations.
- The Watershed Plan is about leadership.



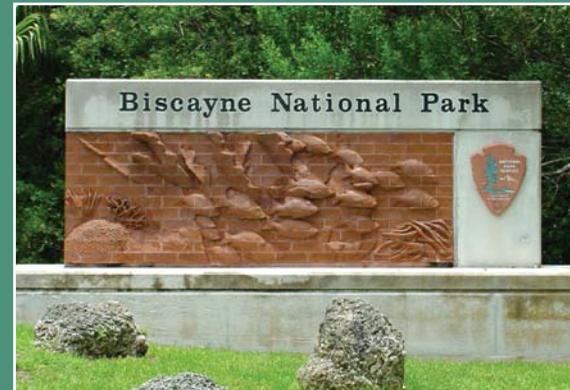
To help ensure that Land Use Policy 3E is met, the Watershed Study Advisory Committee (WSAC), a diverse stakeholder group, formulated seven goals for the SMDWSP. The WSAC goals clearly reflect the importance of environmental and economic sustainability and community character. The purpose of the SMDWSP is to formulate a land use plan that meets these goals.

The Watershed Plan contains the policies, strategies and procedures necessary to balance the various competing interests in South Miami-Dade - providing the framework for a sustainable economy and environment through the year 2050.

WATERSHED STUDY ADVISORY COMMITTEE GOALS

- Goal 1* Create and maintain vibrant communities with strong identities that achieve environmental, economic and social sustainability.
- Goal 2* Honor private property rights.
- Goal 3* Support economically diverse agriculture.
- Goal 4* Ensure a healthy and sustainable Biscayne Bay and Biscayne and Everglades National Parks.
- Goal 5* Promote open space and tourism and recreational facilities based on natural wonders.
- Goal 6* Welcome other compatible enterprises.
- Goal 7* Preserve historic quality and rural character with a strong sense of local community and stewardship.





Everglades National Park



Biscayne National Park

The South Miami-Dade Watershed is located between Everglades and Biscayne National Parks. Unprecedented natural resources both surround the Watershed and are intricately woven into the ecosystem and its hydrological processes. As the final catchment area for the Watershed's drainage function, Biscayne Bay's environmental health is determined by land use decisions and urban development patterns occurring within the Watershed. The type and mix of land uses affect the water quality of the Bay, its natural communities and the recreational value of this resource.

Everglades National Park is designated by UNESCO as a World Heritage Site. Key components of the most ambitious ecosystem restoration program ever undertaken, the Comprehensive Everglades Restoration Plan, are proposed in the Watershed, including the Biscayne Bay Coastal Wetlands Project.



KEITH and SCHNARS, P.A.

Who Conducted the Watershed Study and Prepared the Watershed Plan?

The South Florida Regional Planning Council (SFRPC), Miami-Dade County and the South Florida Water Management District (SFWM) are signatories to a Memorandum of Understanding (MOU) that authorized the SFRPC to manage the Watershed Study contract.

The SFRPC through a competitive process, with input from the County and the SFWM, selected Keith and Schnars, P.A. as the project Consultant. The Keith and Schnars Team completed the Watershed Study and Plan. The SFRPC, the County and the SFWM provided technical support to Keith and Schnars. Together, these four entities formed the Project Management Team. Several County departments, including the Department of Planning and Zoning (MDPZ), Department of Environmental Resources Management (DERM), Water and Sewer Department, Public Works, Parks and Recreation and the Miami-Dade County School Board assisted in this effort.

A Technical Review Committee (TRC), a 17 member independent panel of technical experts, complimented the Project Management Team by reviewing methodologies and commenting on work products. The TRC was comprised of experts in Land Use Planning/Urban Design/Rural Design; Water Modeling/Hydrology; Land Use Law/Property Rights; Natural Areas/Habitat Management; Economics; Marine Biology; and Engineering.

The WSAC, a citizens advisory group, was established to represent a broad cross section of interests and stakeholders. The WSAC served as a conduit for information between the Project Management Team and their respective organizations. The WSAC also reviewed work products and made recommendations to the Team. Additional information on public involvement and the WSAC is provided in Chapter 3.



WSAC Chair, Miami-Dade County, South Florida Regional Planning Council and Consultant sign project contract (May 2003).

The Planning Process

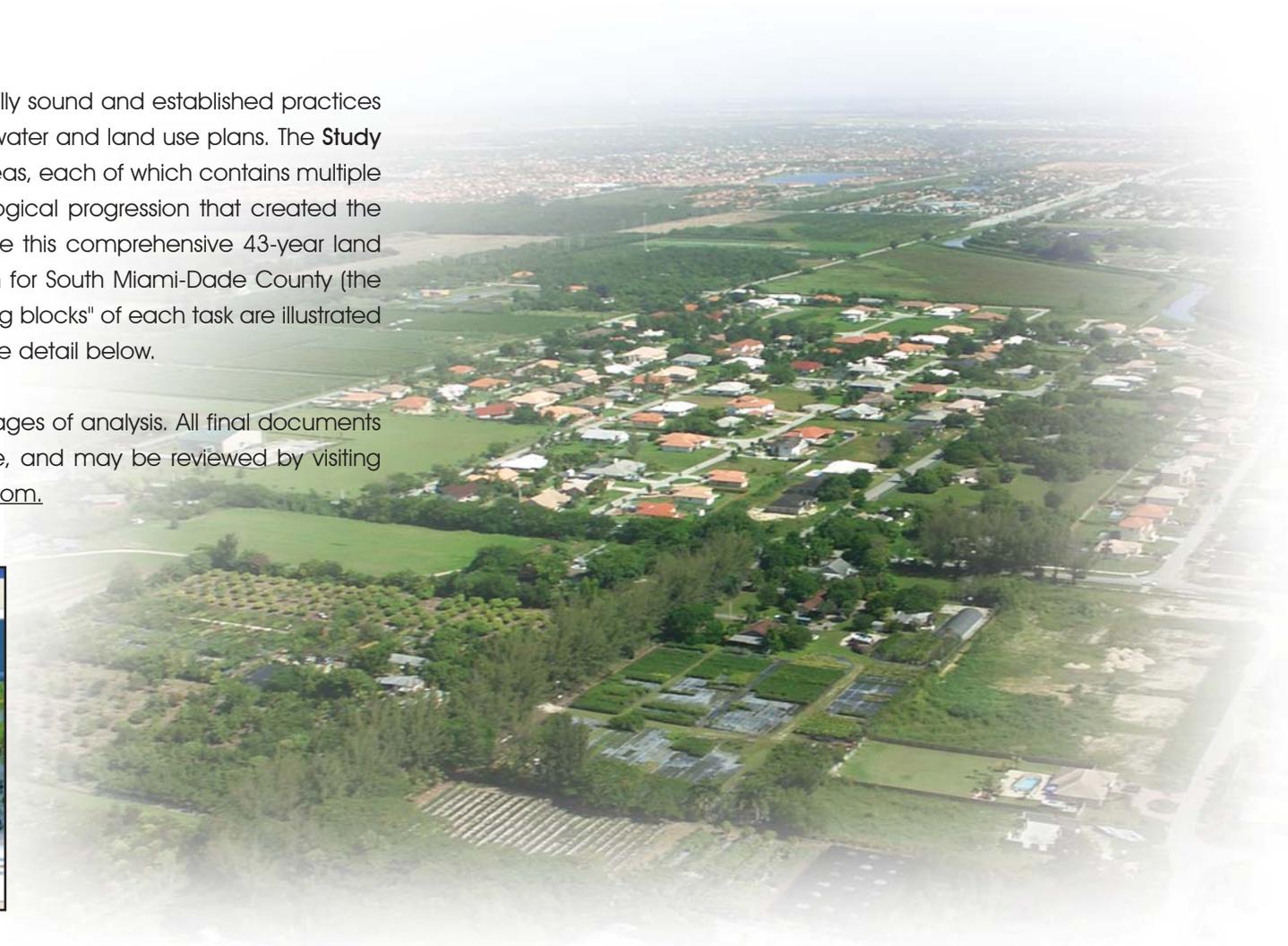
USING SOUND SCIENCE AND PLANNING



Introduction

The SMDWSP is based on technically sound and established practices for the formulation of large-scale water and land use plans. The **Study** was divided into five major task areas, each of which contains multiple sub-tasks. Each task is part of a logical progression that created the information necessary to complete this comprehensive 43-year land use and water management plan for South Miami-Dade County (the **Watershed Plan**). The main "building blocks" of each task are illustrated in Figure 2.1 and discussed in more detail below.

The Study resulted in over 4,000 pages of analysis. All final documents are posted on the project website, and may be reviewed by visiting www.southmiamidadewatershed.com.



The Watershed Study Planning Process

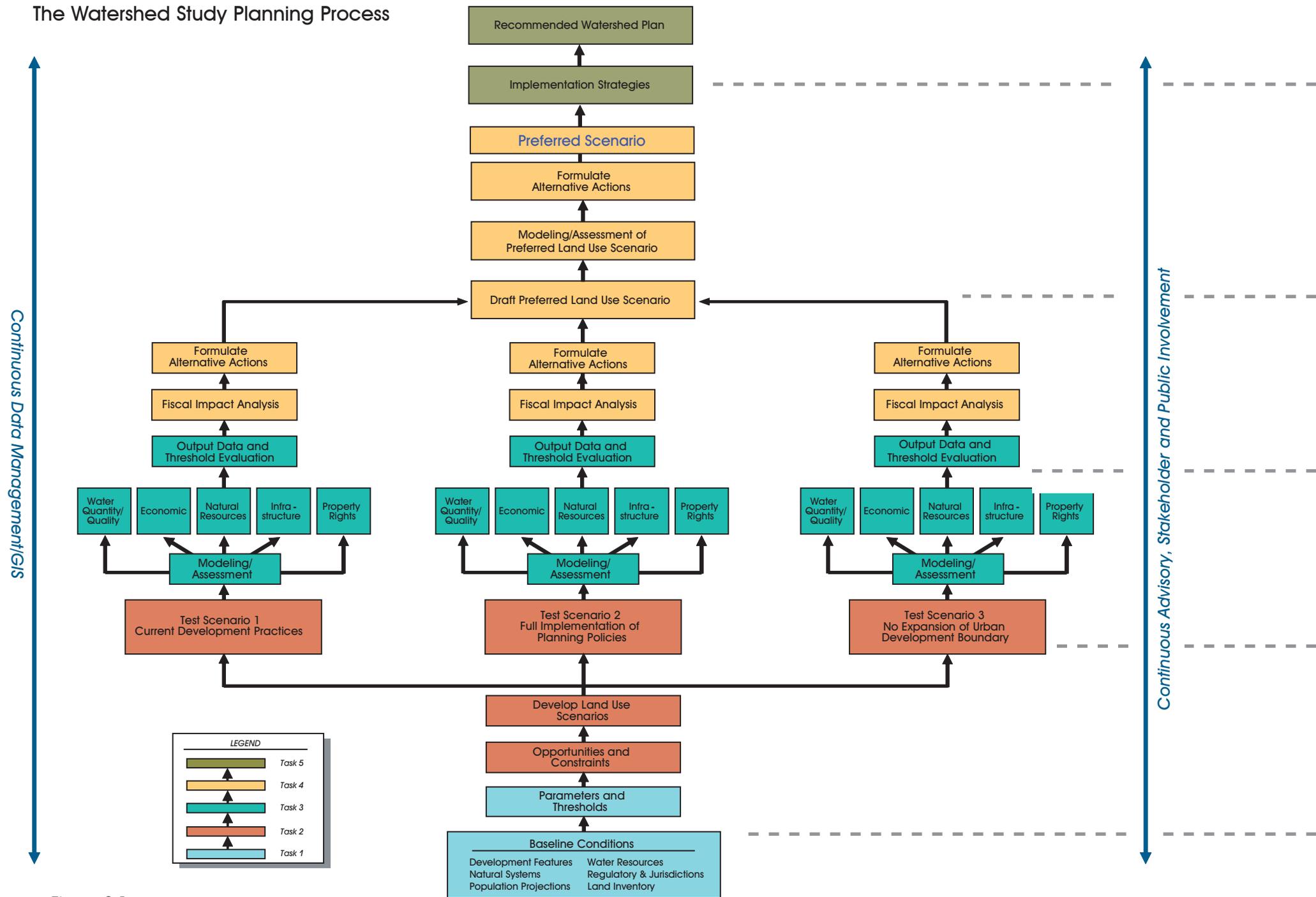


Figure 2.1

TASK 5

To assist the County in implementing the Plan and to mitigate for impacts from growth in the Watershed, including Biscayne Bay, a set of Implementation Strategies for the preferred land use scenario was developed in Task 5. These strategies include site development standards, best management practices for protecting water quality, and land preservation techniques, including regulatory incentives. These strategies help address potential effects on property rights and include measures to mitigate such effects. A watershed land use design guide map and the implementation strategies make up the Recommended Watershed Plan.

TASK 4

Task 4 involved the development of a draft preferred land use scenario. The development of the draft preferred scenario was informed by the results of the test scenario assessments completed in Task 3. The draft preferred scenario was refined based on input from the WSAC, stakeholders, the public, and the Technical Review Committee and then assessed against the same 21 parameters and thresholds used in Task 3.

TASK 3

The impacts of the six test land use scenarios were assessed against the 21 parameters and thresholds developed in Task 1, and compared to the baseline condition. This evaluation included an assessment of the impacts of each scenario on water resources, agriculture, natural resources, community character, employment, and economy and infrastructure.

TASK 2

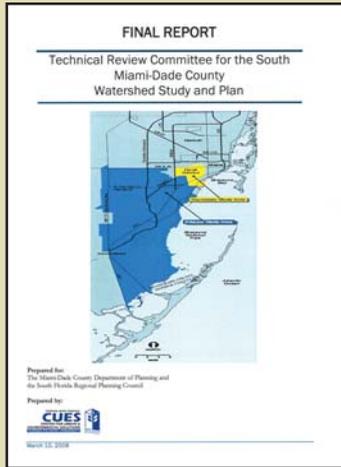
Potential opportunities for, and constraints against, future development were defined and mapped. A baseline map was created depicting 2003 land uses. The final step in Task 2 was the development of hypothetical test land use scenarios based on three different land use policy directives. Both 2025 and 2050 population projections were utilized, resulting in six test land use scenarios.

TASK 1

Baseline conditions that create the foundation for the Study were established in Task 1. This included an analysis of population projections and inventories of development features, water resources, and natural communities. In addition, a wide-ranging series of parameters and thresholds for assessing the impacts of various land use scenarios were developed in Task 1. The 21 parameters included water quality, development patterns, transportation, economics, parks, agricultural lands, flood protection, and wetlands.

*Let our advance worrying become
advance thinking and planning.*

- Winston Churchill



**PEER REVIEW -
The Technical Review Committee**

Peer review was an integral part of the Watershed Study. In light of the unprecedented nature of the study, its complexity in terms of professional disciplines and the large spatial extent, an independent 17-member committee of State and national experts was assembled to review key study components. The Technical Review Committee (TRC) assisted and complemented the Keith and Schnars Team by identifying additional data sources, reviewing methodologies and commenting on work products. Moderated by Mr. Jim Murley, Director of Florida Atlantic University's Center for Urban and Environmental Solutions, the TRC was composed of experts in various fields ranging from land use planning, urban and rural design to natural areas management and economics. The TRC, which met on seven occasions, served as the principal technical peer review body.

The ultimate success of the Watershed Plan will turn on its strong technical basis, the WSAC's involvement and its inclusion in the County's CDMP.

The Study and Plan were completed by Keith and Schnars, P.A., a full service planning, environmental, engineering, public involvement and surveying firm based in Ft. Lauderdale, Florida. The Keith and Schnars Team included experts in the fields of planning, natural resources, water resources, economics, transportation planning, property rights and public outreach. Keith and Schnars was assisted by a Project Management Team (PMT) consisting of representatives from the South Florida Regional Planning Council, Miami-Dade County Department of Planning and Zoning and the South Florida Water Management District.

KEITH AND SCHNARS KEY TEAM MEMBERS

- Michael L. Davis, Vice President
- John Abbott, P.G., Director of Environmental Sciences
- Eric Silva, AICP, Director of Planning
- Kim Giles, Director of Public Involvement
- Juan Carrizo, P.E.
- Dr. Fadi Nassar, P.E.
- Chen Qi, P.E.
- Rosil Saldana
- Jennifer Heidgerken
- Christina Pate
- Ian Miller (Ecology and Environment)
- Dr. Robert Cruz (Barry University)
- Sean Ebersold (Ecology and Environment)
- Robert Diffenderfer (Lewis, Longman and Walker)
- Richard Pettigrew (Former Chair, of Governors Commission for a Sustainable South Florida)
- Allan Milledge (Former Chair, South Florida Water Management District)

- Senior Project Manager / Principal-in-Charge*
- Deputy Project Manager*
- Deputy Project Manager*
- Public Outreach Manager*
- Water Resources Manager*
- Transportation Planning Manager*
- Water Resources Engineering Planner/GIS Manager*
- Graphic Design Manager*
- Public Outreach Specialist*
- Economic Evaluations*
- Economic Evaluations*
- Planning Support*
- Legal Advisor/Property Rights*
- Plan and Policy Review*
- Plan and Policy Review*



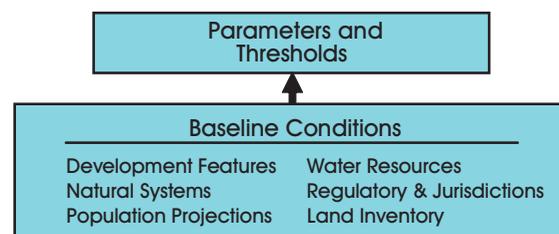
PROJECT MANAGEMENT TEAM MEMBERS

- Bob Daniels, Assistant to the Director, Policy and Planning
- Cindy Dwyer, Principal Planner
- Evan Skornick, Lead Water Resources Manager

- South Florida Regional Planning Council*
- Miami-Dade County Planning and Zoning*
- South Florida Water Management District*

FIVE STEPS TO A SOLID WATERSHED PLAN

TASK 1



The purpose of Task 1 was to establish key baseline conditions that created the foundation for the Study. This included an analysis of population projections and inventories of development features, water resources, and natural communities. In addition, a wide-ranging series of parameters and thresholds for assessing the impacts of various land use scenarios were developed in Task 1. The 21 parameters included water quality, development densities, transportation, parks, agricultural lands, flood protection, and wetlands.

Relevant Studies (Sub-task 1.1)

An important part of the baseline information was an understanding of previous and on-going research and studies that may have relevance to the Study. In Sub-task 1.1, 87 documents were reviewed and evaluated for such relevance. Several factors, including regulatory jurisdiction and relationship to the Study objectives, were considered and documented for future reference.

Population Growth (Sub-task 1.2)

Like Florida in general, and South Florida in particular, the population in the Watershed will dramatically increase. With a sub-tropical climate, Florida will remain a retirement destination. Immigration from Latin America and the Caribbean along with natural increases (births minus deaths) will be the main drivers for growth in Miami-Dade County. More than any other factor, impacts associated with population growth will

shape the future of the South Miami-Dade Watershed. Water resources, natural resources, traffic, housing, agriculture and the economy will all be influenced by increases in the number of people living in the Watershed. The magnitude of such impacts will depend on the actual amount of growth and how and where it is accommodated.

In light of the potential impacts of growth on the Watershed, a key part of the Study was the development of population and household projections for the years 2025 and 2050. For the Study, these projections were based on methods reviewed and approved by Miami-Dade County and the Technical Review Committee. Projections were completed at the census tract level and were geo-referenced to the five major Watershed drainage basins. Methods included the use of a logistic curve fitting at the Minor Statistical Area (MSA) level of detail, statistical extrapolation and other shift share methods accepted by demographers for sub-area population and household projections.

Based on the extensive analysis documented in the Sub-task 1.2 report, the population and household projections in Table 2.1 and Figure 2.2 were developed. These projections suggest that the Year-2000 population of 790,835 will increase to nearly 1.2 million by 2025 and to nearly 1.5 million by 2050. It is important to understand that the population projections developed in this sub-task and used throughout the Study are for planning purposes only and are not intended to advocate for such growth.

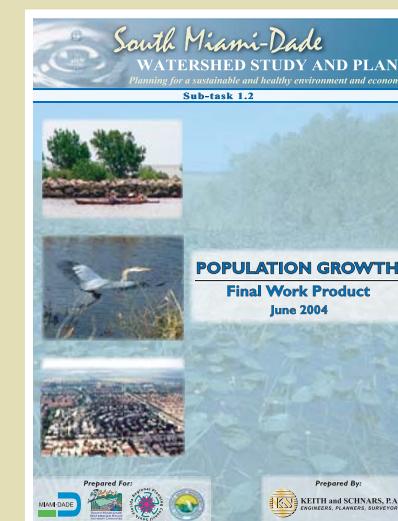


Table 2.1
Watershed Population and Household Projections

Year	Population	Households	Average Household Size
2000	790,835	265,559	2.98
2003	839,419	280,728	3.00
2005	871,807	290,840	3.00
2010	952,779	316,121	3.01
2015	1,033,751	341,402	3.03
2020	1,097,384	361,917	3.03
2025	1,161,016	382,431	3.04
2030	1,224,649	402,946	3.04
2035	1,288,282	423,461	3.04
2040	1,351,914	443,975	3.05
2045	1,415,547	464,490	3.05
2050	1,479,180	485,005	3.05

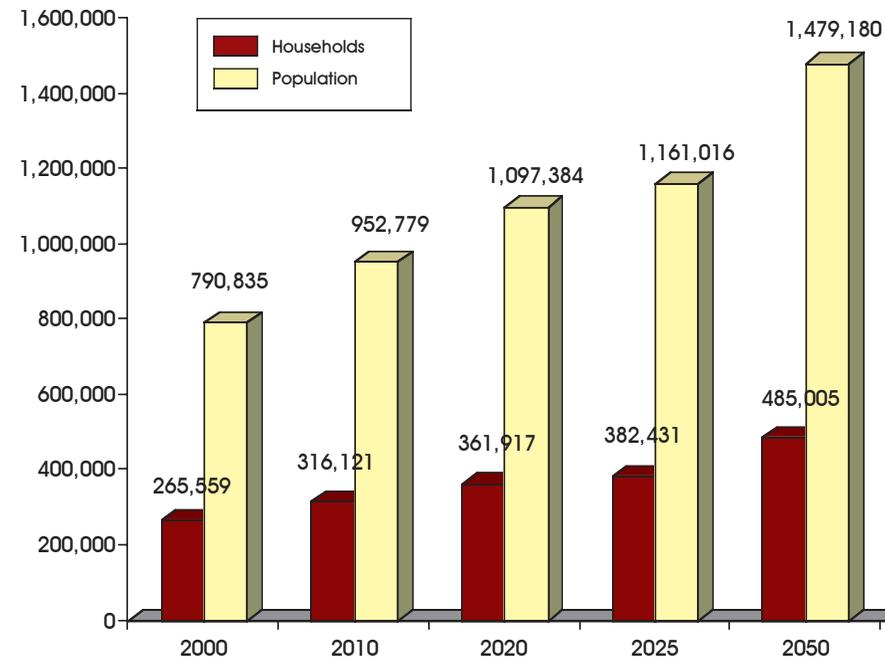


Figure 2.2 Watershed Projected Population and Households

Development Features (Sub-task 1.3)

Before the test land use scenarios could be formulated in Sub-task 2.2, it was necessary to understand existing development features in the Watershed. Existing land uses and infrastructure systems form the built environment baseline condition. The Sub-task 1.3 report analyzed existing land use and proposed land use changes. In addition, baseline infrastructure such as power distribution, water and wastewater, natural gas distribution, transportation, schools and solid waste were evaluated. Figures 2.3 and 2.4 provide examples of the information presented in this sub-task. The information was mapped using Geographical Information System (GIS) technology.



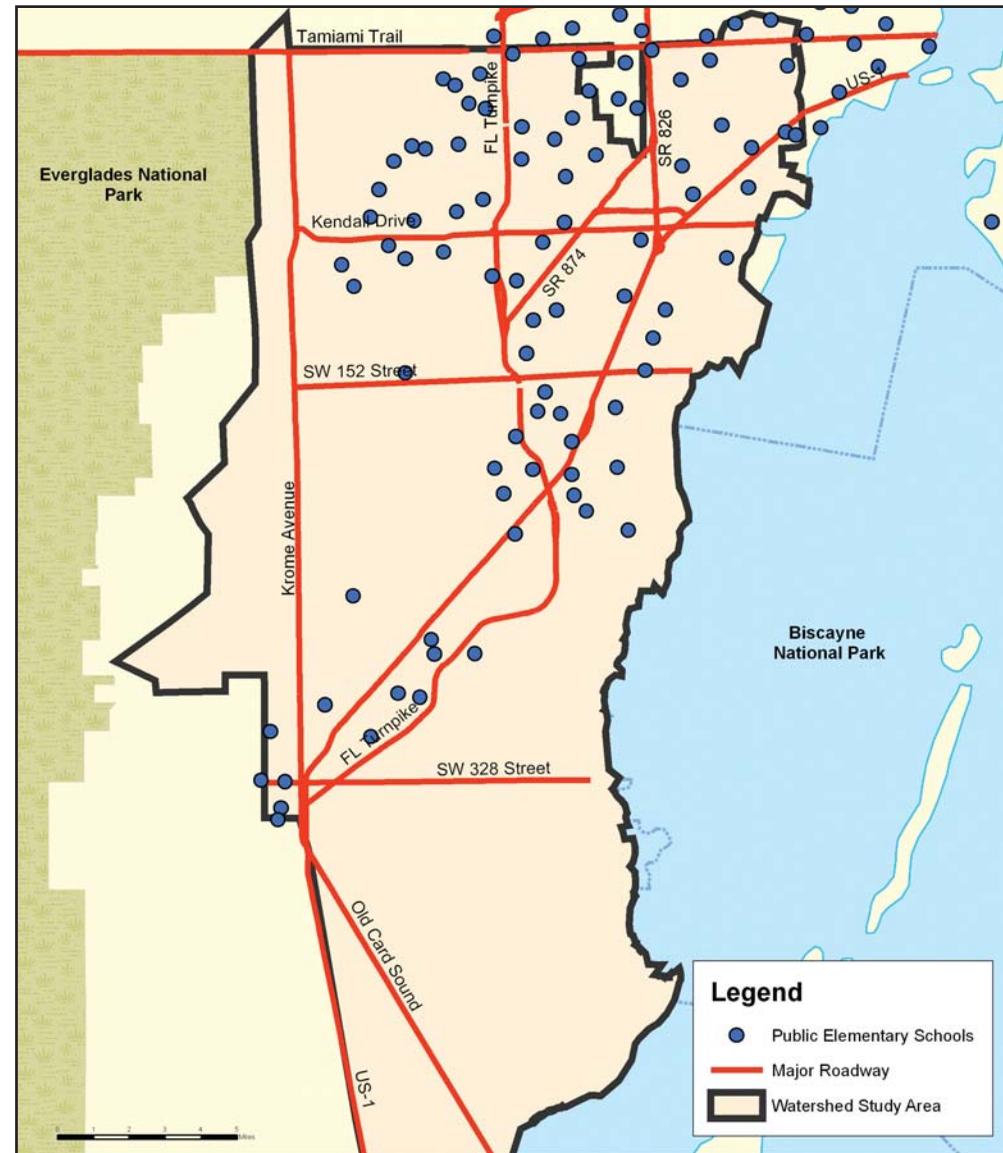
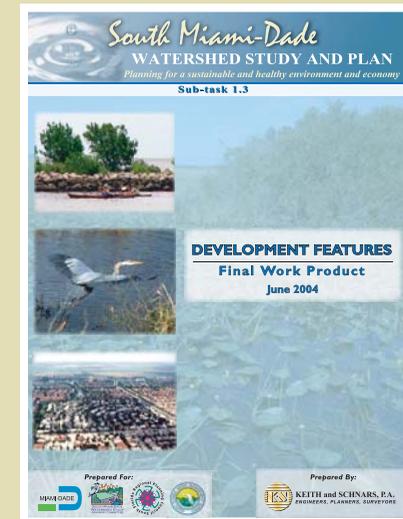


Figure 2.3 Solid Waste Services (Sub-Task1.3) Source: Miami Dade Solid Waste Management 2003

Figure 2.4 Public Elementary Schools (Sub-Task1.3) Source: Miami-Dade County School Board 2003



Natural Communities (Sub-task 1.4)

In the Sub-task 1.4 report, the natural resources located in the Watershed were identified to further establish the baseline conditions for the Study. This baseline was used to compare and assess impacts from projected future land uses at 2025 and 2050.

Major natural community types located in the Watershed include:

Remnant Natural Forests

- Pinelands
- Hammocks

Wetlands

- Freshwater Marsh
- Marl Prairie and Rocky Glades
- Salt Marsh
- Mangroves

Transitional Communities

- Undeveloped Lands
- Exotic-dominated Lands

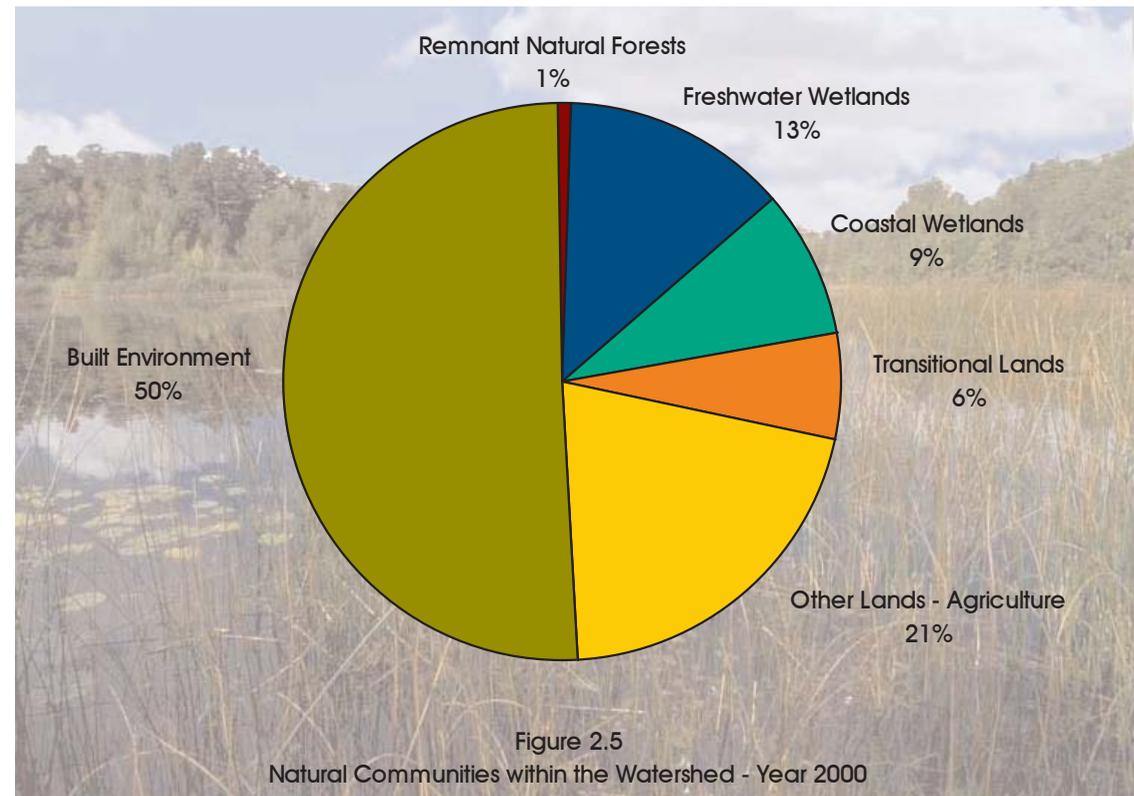
Other Lands

- Row Crops and Open Pasture
- Tree Crops and Ornamentals



The natural communities inventory was based on existing information and programs. The information was mapped using GIS technology. Figure 2.5 provides a graphical description of the relative composition of the natural communities compared to the built environment. Figure 2.6 provides a spatial overview of the major community types in the Watershed.

The natural communities in the Watershed range from relatively pristine to highly disturbed. Some are important to regional hydrological restoration goals and others have suffered substantial historical losses. Some, like remnant natural forests, include globally imperiled ecosystems that cannot be replaced or restored. Figure 2.7 provides a historical perspective of the natural vegetation in 1943 - - prior to the alterations resulting from the year 2000 built environment as reflected in Figures 2.5 and 2.6.



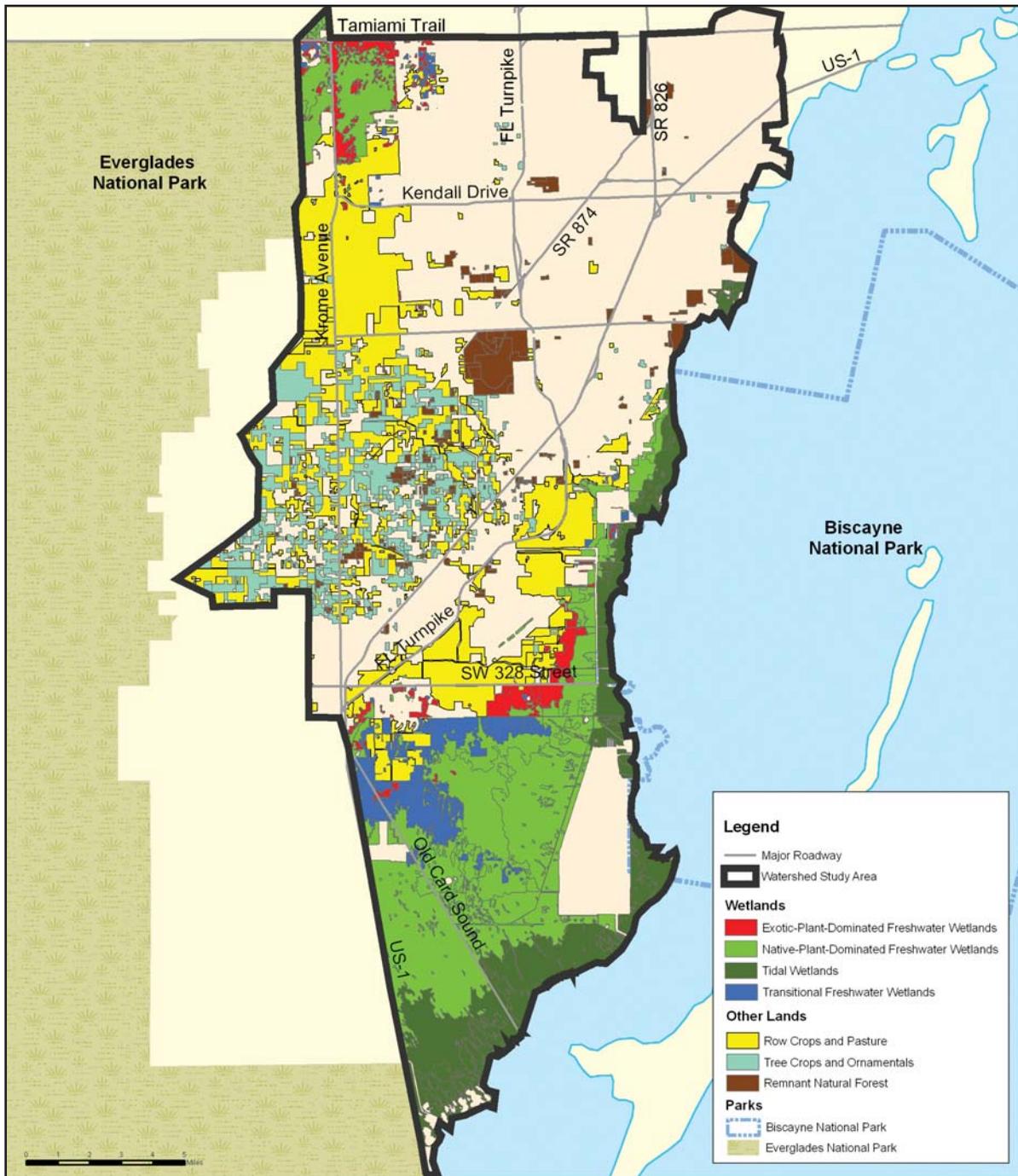


Figure 2.6

Major Natural Community Types

(Sub-Task 1.4)

Source: FLUCCS 1994-95, FMRI 2000, DERM ADID 1992

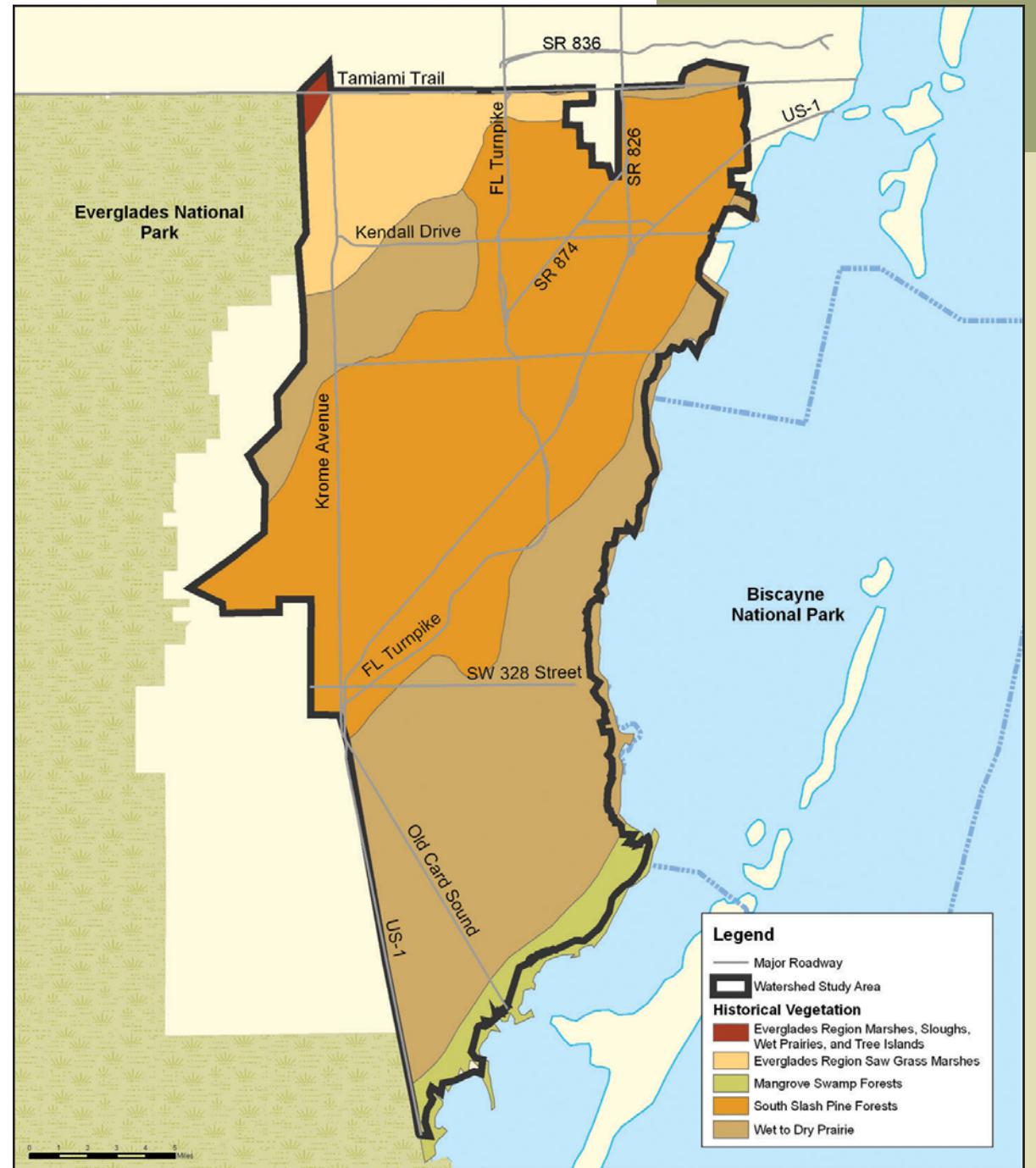


Figure 2.7

Historical Vegetation (Davis 1943)

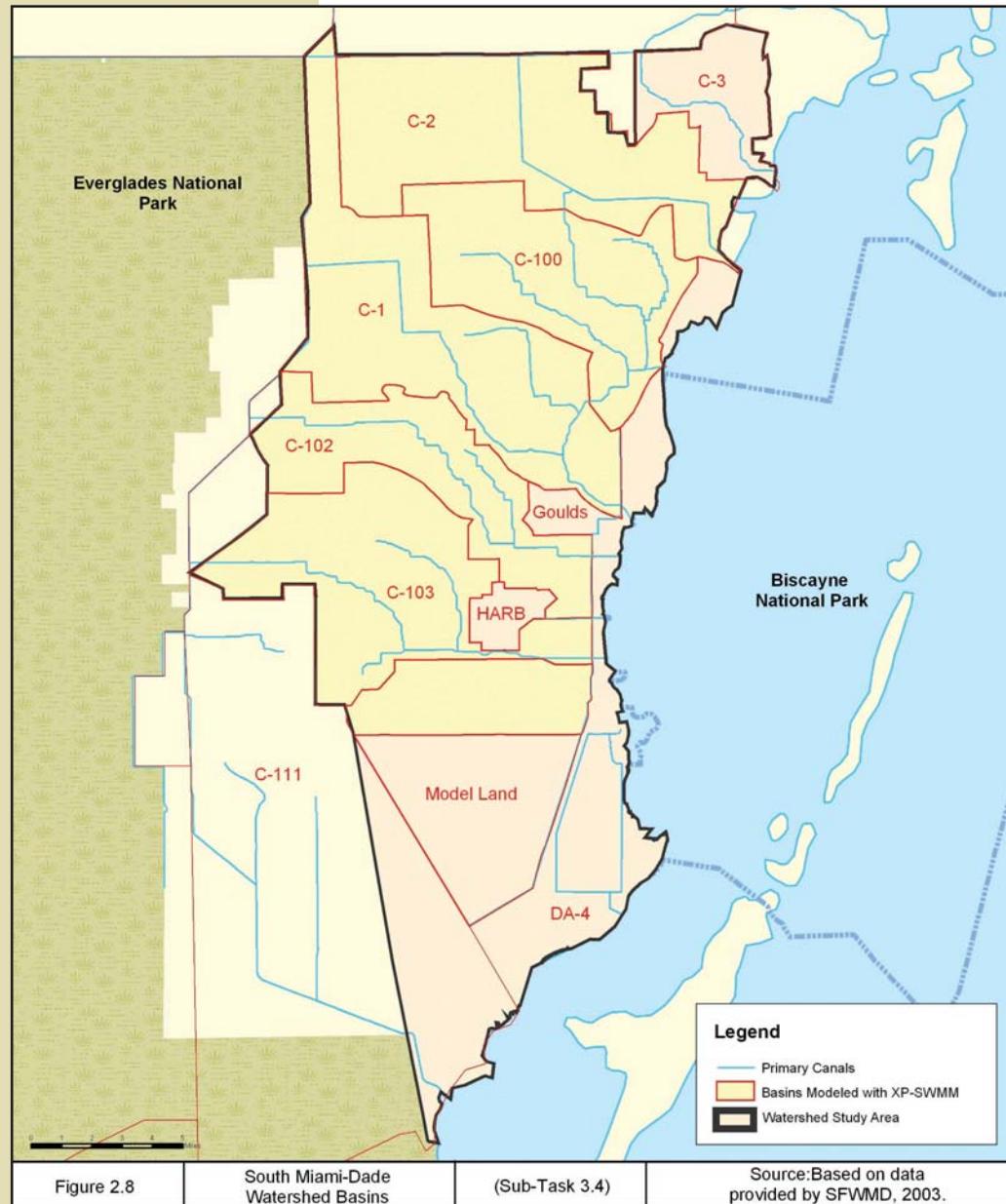
(Sub-Task 1.4)

Source: FFWCC 1982

Water Resources (Sub-task 1.5)

An integral part of the Watershed Plan is the protection of the waters of Biscayne Bay. This requires a solid understanding of the water resources and how they are affected by changes in land use as the population increases. The Sub-task 1.5 report established the baseline water resources conditions for the Watershed. This included background on the hydrologic and hydraulic characteristics of each basin. The Sub-task 1.5 report also included a discussion of model set-up, calibration and verification and a listing of maximum flows and stages for each basin. The model includes "blocks" for each basin to simulate runoff, system hydraulics and pollutant transport. These blocks and how they work are discussed in the Sub-task 1.5 report.

The five major basins in the primary study area were evaluated using the Expert Stormwater and Wastewater Management Model (XP-SWMM) version 8.5. The basins modeled were C-1, C-2, C-100, C-102 and C-103 (Figure 2.8). The Miami-Dade Department of Environmental Resources Management (DERM) provided input data and along with the SFWMD reviewed the results of the modeling. The 18 square mile C-3 basin is essentially built out and was not modeled.



The C-1, C-2 and C-100 canals drain 151 square miles of primarily urban lands. The C-102 and C-103 canals drain 66 square miles of mixed urban and agriculture lands. Generally, the major canal systems were designed to provide a 1-in-10 year level of flood protection by discharging excess water to tide during flood events. The canals include coastal structures to limit saltwater intrusion and storm surges.

Regulatory Jurisdictions (Sub-task 1.6)

The successful implementation of the Watershed Plan requires interagency cooperation, coordination and collaboration. Further, an understanding of existing regulatory and planning jurisdictions is required to evaluate options for development, restoration and resource protection within the Watershed. The Sub-task 1.6 report provided an inventory of regulatory and planning agencies having jurisdiction in the Watershed and Biscayne Bay. The report contains a description of federal, State and local agency programs that may affect the Watershed. This includes a listing of local municipalities within the Watershed existing at the time the Sub-task 1.6 report was completed.

Land Inventory (Sub-task 1.7)

Sustainable development in the Watershed will include the reuse and redevelopment of previously used land. Also, vacant and certain agriculture lands are often desirable sites for development. The Sub-task 1.7 report identified 10 "Significant Areas" with the highest probability of development, redevelopment or preservation. Each of the Significant Areas were placed into one of three categories: 1) an abundance of vacant land; 2) large tracts of land in agricultural use; and 3) parcels with a high probability for redevelopment. The Sub-task report included maps of Significant Areas (Figure 2.9), environmentally sensitive lands and land targeted for redevelopment by the County. Using GIS, these maps were used to help formulate the test land use scenarios in Sub-task 2.2.

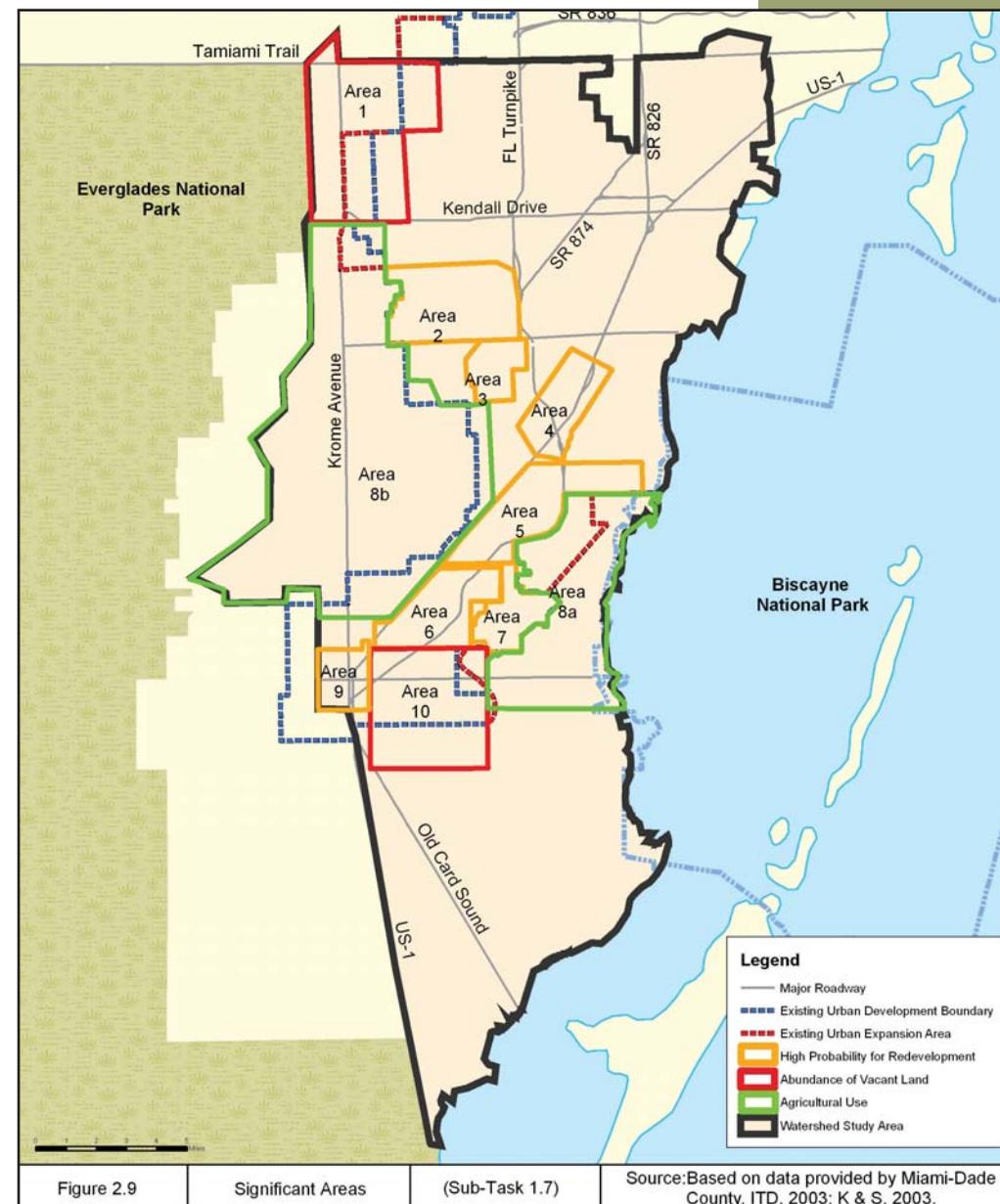


Figure 2.9 Significant Areas (Sub-Task 1.7) Source: Based on data provided by Miami-Dade County, ITD, 2003; K & S, 2003.

Parameters and Thresholds (Sub-task 1.8)

One of the most crucial components of the Study was the development of measurable characteristics (parameters) and associated tolerance levels (thresholds) for assessing land use scenarios and determining if the overall planning objectives have been met. For the Study, these planning objectives are based on the Miami-Dade County Comprehensive Development Master Plan Land Use Policy 3E and the Watershed Study Advisory Committee's (WSAC) goals and vision statement.

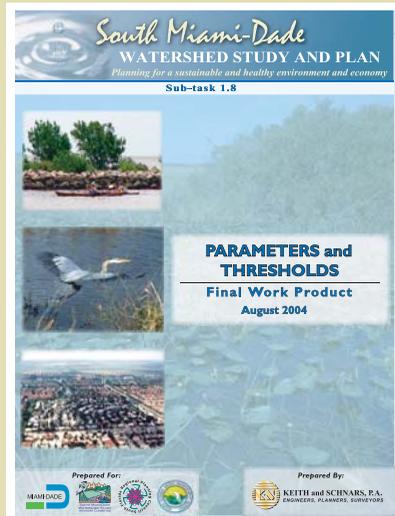
The 21 parameters developed for the Study in Sub-task 1.8 are the environmental and economic metrics for determining the health of the Watershed. Further, in the aggregate, the parameters help paint a picture of the desired community characteristics - - clean and abundant water, safe and efficient transportation, open space, and a landscape of mixed uses, including cities, parks, agriculture and wetlands. The parameters were organized into the following functional categories:

- Water Resources;
- Natural Communities;
- Land Use/Community Character;
- Employment/Economy; and
- Infrastructure.

For each parameter, thresholds were developed to establish: 1) the minimum or maximum limits or conditions acceptable; or 2) the relative performance of each test scenario in comparison to the baseline condition. In this regard, the 21 parameters (Table 2.2) were utilized during Tasks 3 and 4 to determine the performance of each of the test scenarios and the draft preferred scenario.

Table 2.2

Parameters
Water Quality
Groundwater Demand
Surface Water Flows/Distribution
Flood Protection
Tidal Wetlands
Native-Plant-Dominated Freshwater Wetlands
Exotic-Plant-Dominated Freshwater Wetlands
Transitional Freshwater Wetlands
Remnant Natural Forests
Development Patterns
Agricultural Land
Proximity of Housing and Employment to Transit
Parks, Recreation and Open Space
Economic Base
Cost of Housing
Mix of Wages
Transportation
Public Schools
Potable Water
Wastewater
Air Quality



TASK 2

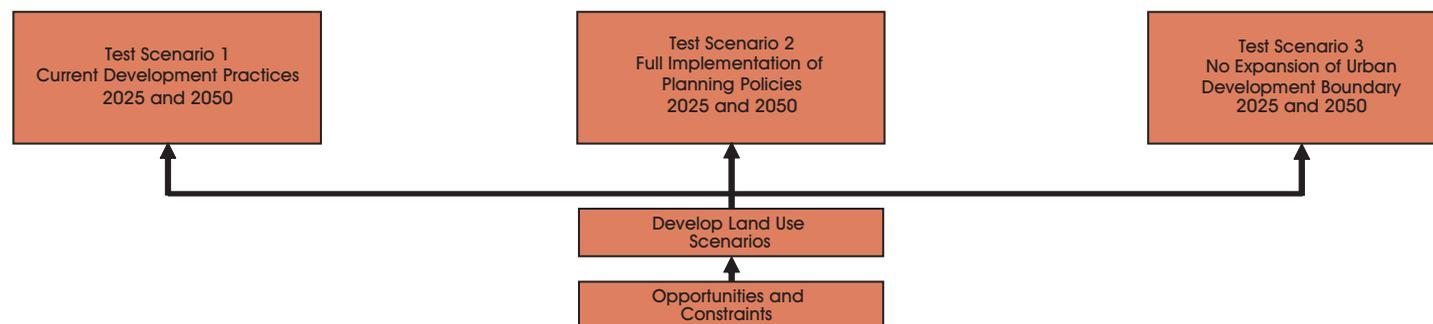


Table 2.3
Opportunities and Constraints

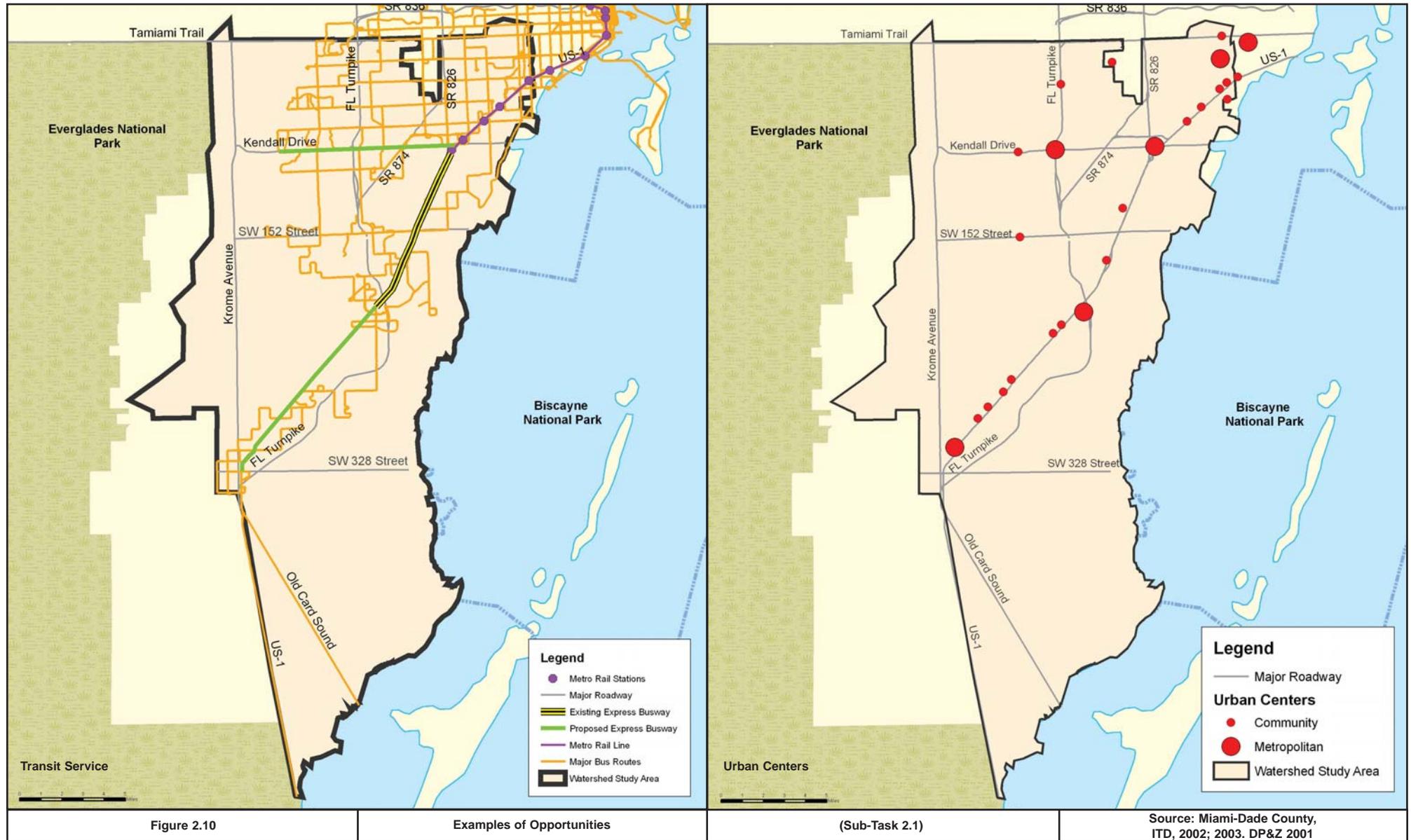
In Task 2, potential opportunities for, and constraints against, future development were defined and mapped on a GIS baseline map depicting 2003 land use patterns. The final step in Task 2 was the development of hypothetical test scenarios based on three different land use policy options. Both 2025 and 2050 population projections were utilized, resulting in six test land use scenarios.

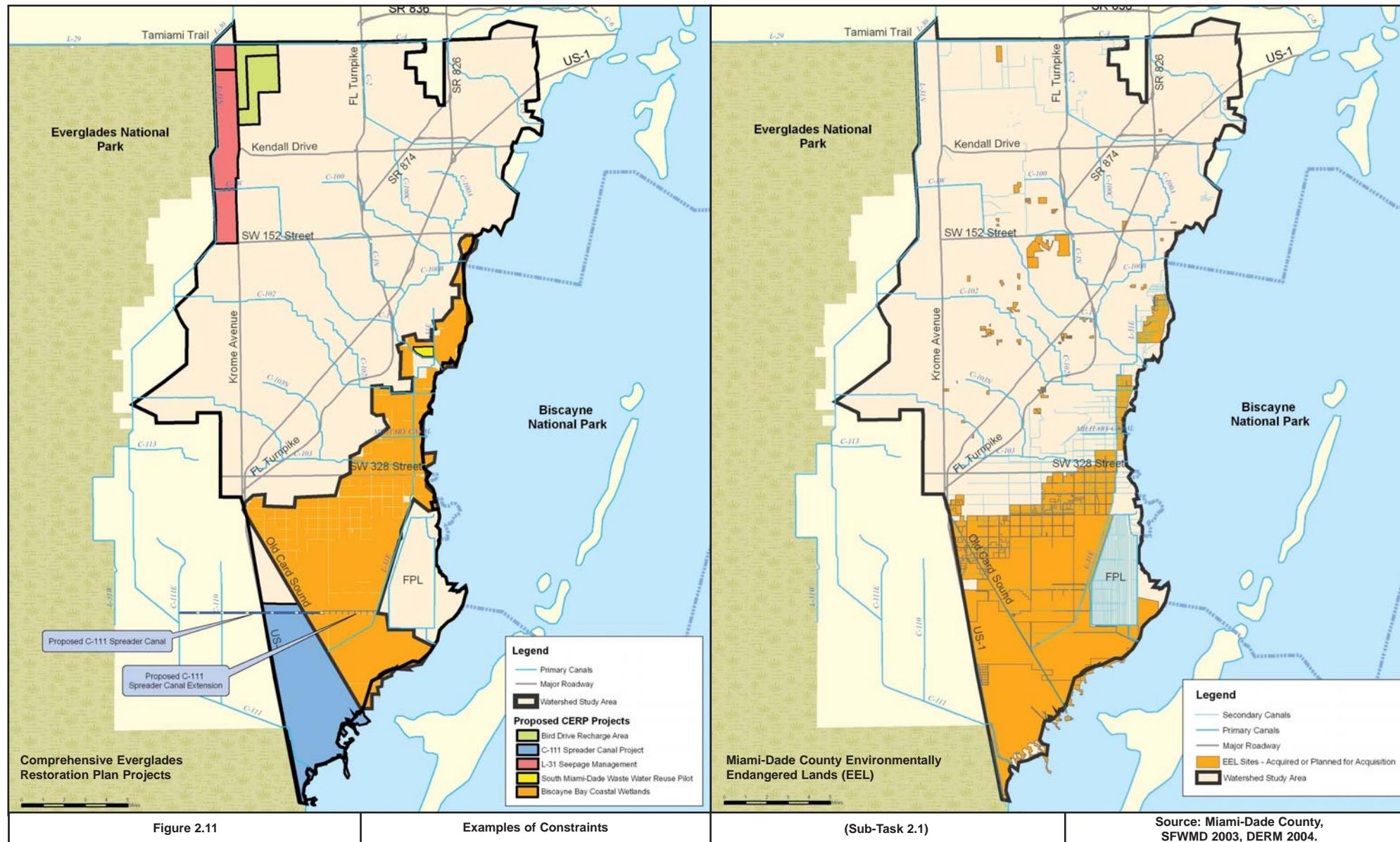
**Opportunities and Constraints
(Sub-task 2.1)**

The purpose of Sub-task 2.1 was to: 1) identify those lands in the Watershed where changes in land use are clearly appropriate in terms of sustainable development (opportunities); and 2) identify those lands where changes in land use are clearly not appropriate (constraints). Using baseline information from Task 1, GIS data was sorted into opportunities and constraints and associated maps were prepared. A list of all opportunity and constraint maps is provided in Table 2.3. These maps were used in the preparation of the test land use scenarios prepared in Sub-task 2.2. Figures 2.10 and 2.11 provide two examples of opportunity and constraint maps.

Development Opportunities	Development Constraints
Community Redevelopment Areas	Wellfield Protection Areas
Potential Brownfield Areas	Comprehensive Everglades Restoration Plan
Eastward Ho!	Miami-Dade County Environmentally Endangered Lands
Enterprise Zones	Save Our Rivers
Empowerment Zones	Parks
Planning Charrette Sites	Federal Emergency Management Act Floodplains
Transit Corridors	Historic Resources
Infrastructure Service Areas	Transportation and Utility Facilities
Homestead Air Reserve Base	Mitigation Areas
Developments of Regional Impact	
Sustainable Development Concepts	
Urban Centers	







Test Land Use Scenarios (Sub-task 2.2)

A key part of the Study was projecting how population increases to the years 2025 and 2050 could change land use and impact the Watershed. Understanding such changes, and assessing their impacts, formed the foundation of the Study.

In Sub-task 2.2, test land use scenarios were formulated based on the following planning policy approaches:

- **Scenario 1** - continuing current development practices - - low density growth inside and outside the existing Urban Development Boundary (UDB) (See Figure 2.12 for UDB location);
- **Scenario 2** - full implementation of existing County policies, including applying certain "Smart Growth" planning practices and allowing expansion of the existing UDB; and
- **Scenario 3** - maintaining the existing UDB at its current location.

Each policy approach was applied to the projected population for the years 2025 and 2050 -- resulting in a total of six test scenarios. The test scenarios reflect the land use that could result from each policy at the projected population. As noted in Table 2.4, the primary driver, in terms of land use and potential impacts, is the requirement to absorb the 204,000 new residential dwelling units expected by 2050. For example, where and how you allocate these dwelling units will have the greatest impact on water resources, agriculture, natural resources, transportation and other quality of life parameters. For each test scenario, land uses were allocated to create a GIS-based assessment map (Figures 2.13, 2.14 and 2.15). As explained in the next section, the impacts resulting from each test scenario were assessed in detail in Task 3.

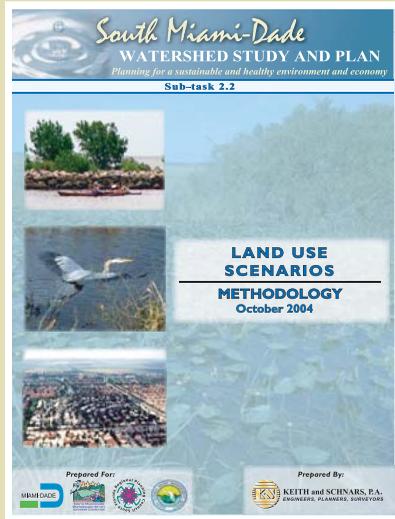


Table 2.4
Major Inputs for Creating Test Scenarios

	2003 Baseline	2025 (Scenarios 1A, 2A, 3A)	2050 (Scenarios 1B, 2B, 3B)
Projected Population	839,419	1,161,016	1,479,180
Land Use	2003 Total Baseline	2025 Total 2003 - 2025	2050 Total 2003 - 2050
Residential (Dwelling Units)	280,728	382,431 (+ 101,703)	485,005 (+204,277)
Commercial (Acres)	4,806	7,063 (+2,257)	9,860 (+5,054)
Industrial (Acres)	1,232	1,423 (+191)	1,582 (+350)

Note: Other input included parks, schools, hospitals, etc.

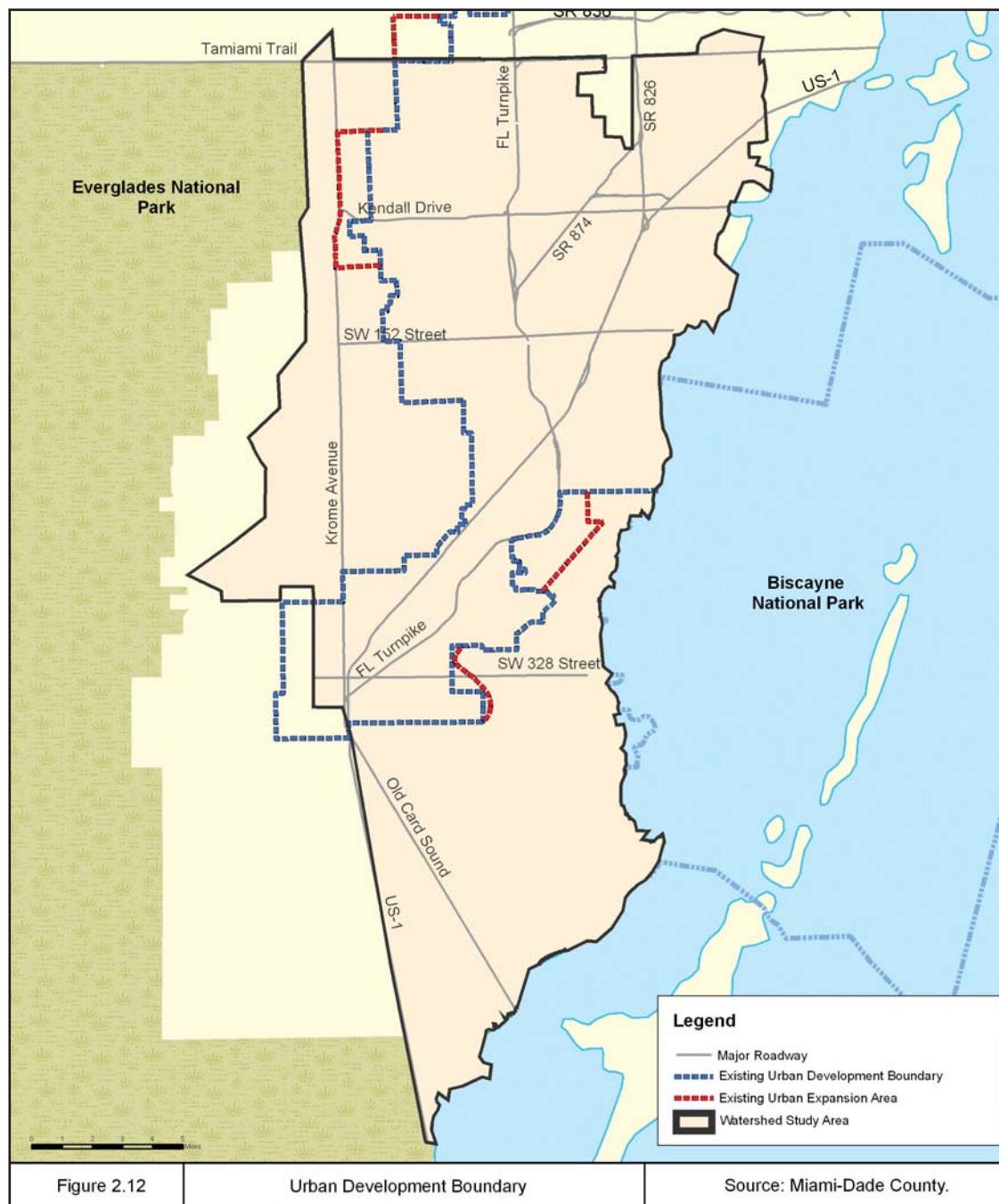


Figure 2.12

Urban Development Boundary

Source: Miami-Dade County.

What is the UDB?

- The Urban Development Boundary (UDB) is included on the County's Land Use Plan map to distinguish the area where urban development may occur from areas where it is limited to 1 dwelling unit per 5 acres. Development proposals will generally be approved within the UDB provided that level-of-service standards for necessary public facilities will be met.
- The Urban Expansion Area (UEA) is the specific area adjacent to the UDB where future expansion might be appropriate after the capacity within the UDB is realized.

History of UDB Amendment Activity

Year	Sq. Mi. Added	Sq. Mi. in UDB *
1975		366
1976-80	9	375
1981-87	14.5	390
1988 Update	25	414
1989-95	0.75	415
1996-2005	0.93	416
Total	50	416

*Entire Miami-Dade County

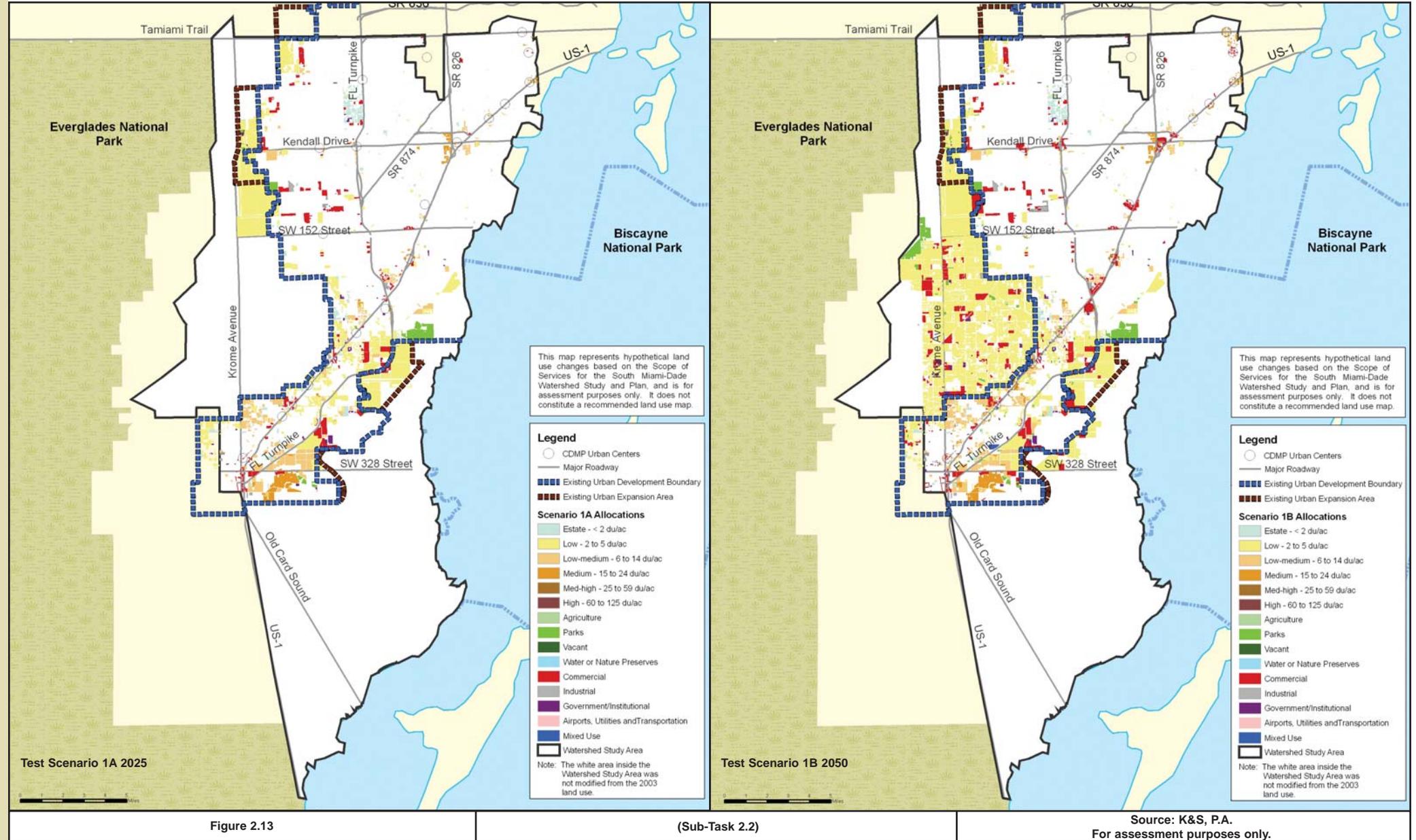
TEST SCENARIO 1

Test Scenarios

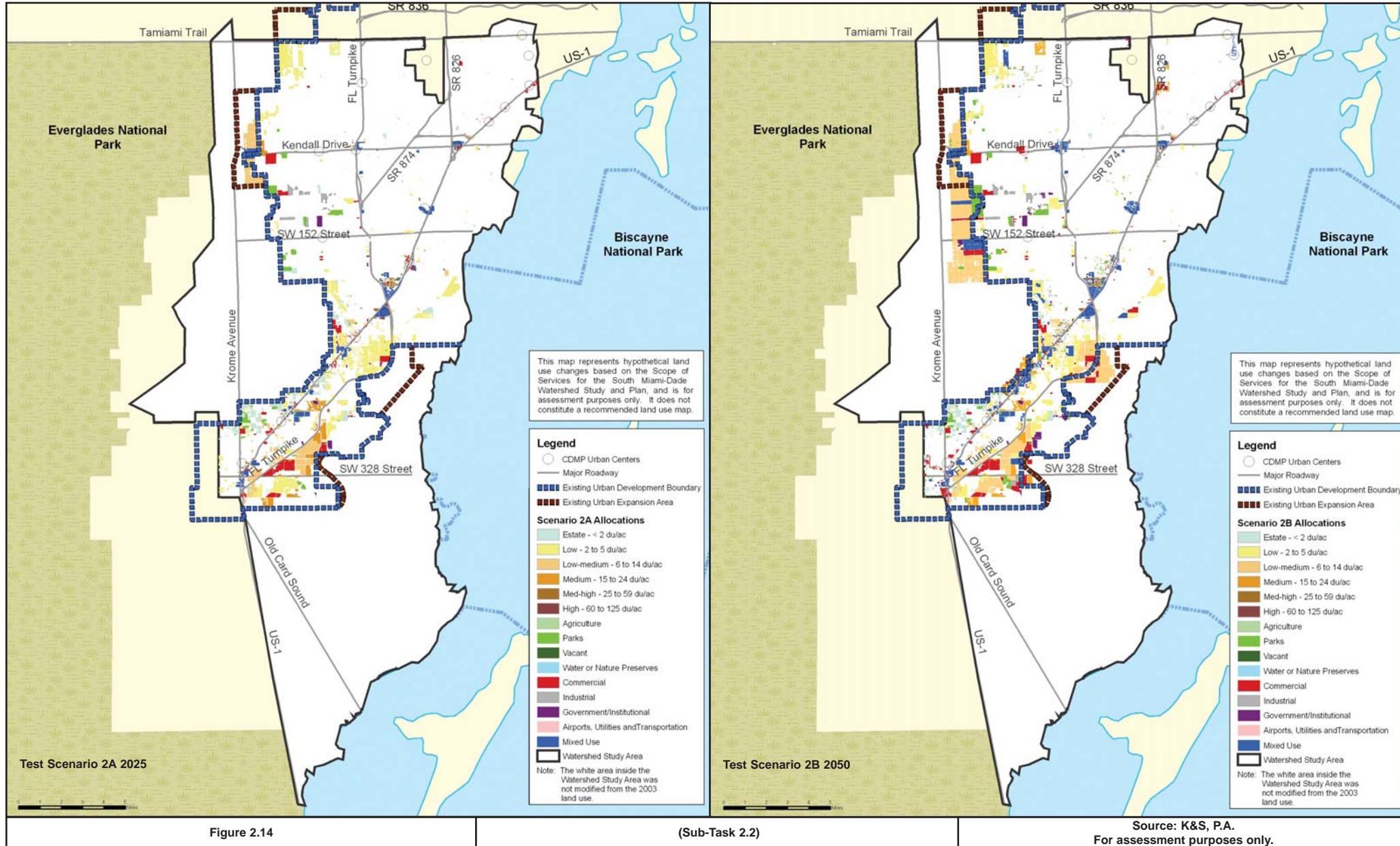
1A (2025) and 1B (2050) - -

Current Development Practices or
“Sprawl Scenario”

Test Scenarios 1A and 1B are based on the policy of applying current land development practices to the two population increases projected for 2025 and 2050 respectively. A review of existing land development practices in the Watershed was undertaken as part of this effort. Existing and recently approved residential densities were examined and the equivalent density units per acre were allocated to vacant parcels, representing future growth trends. Expansion of the existing UDB was necessary to accommodate the projected 2025 and 2050 populations under this test scenario which represents the current development practices.



Note: White area represents areas with no changes in land use.



TEST SCENARIO 2
 Test Scenarios
 2A (2025) and 2B (2050) - -
 Full Implementation of County
 Policies, Including Certain "Smart
 Growth" Practices While Allowing
 UDB Expansion

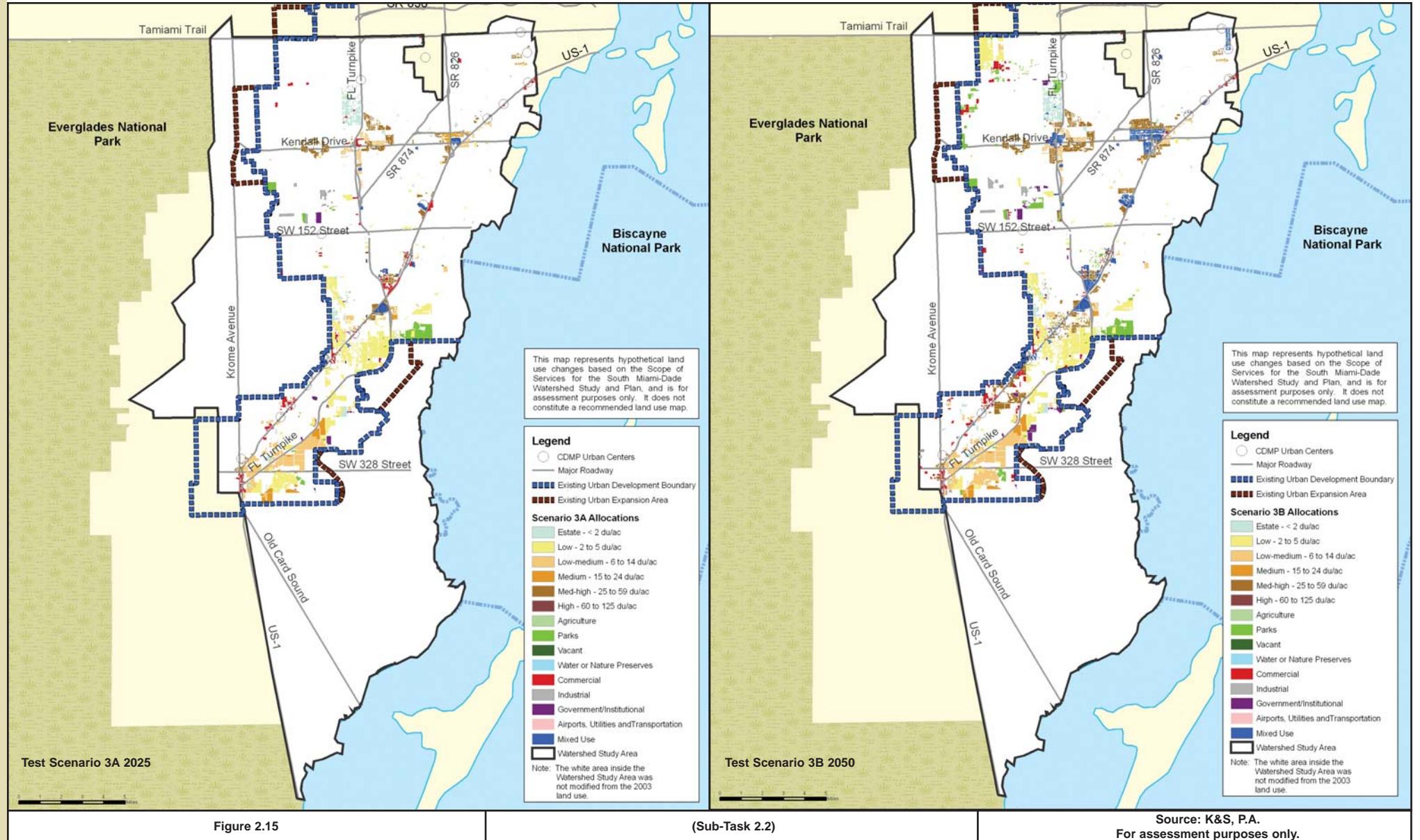
Test Scenarios 2A and 2B are based on a policy of applying fully existing County policies, including certain Smart Growth approaches and policies with the population increases projected for 2025 and 2050 while allowing limited expansion of the existing UDB. These test scenarios assume expansion of the UDB may be necessary to allocate the projected population growth in the most efficient development pattern with the implementation of existing planning and smart growth policies. Test Scenario 2 represents how development patterns would appear if existing smart growth policies were applied fully. The assessment results from Test Scenarios 1 and 3 were used in the formulation of Test Scenario 2.

Note: White area represents areas with no changes in land use.

TEST SCENARIO 3

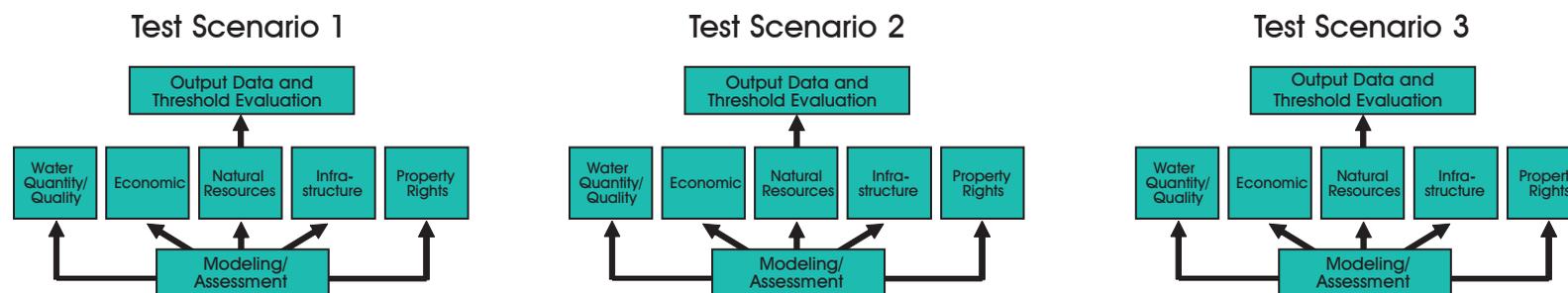
Test Scenarios 3A (2025) and 3B (2050) - - "Smart Growth" With No UDB Expansion

Test Scenarios 3A and 3B are based on a policy of distributing land uses with the population increases projected for 2025 and 2050, respectively, while maintaining the existing UDB at its 2003 location. For these test scenarios land use categories were assigned in a manner that would not require expansion of the UDB. Policy and zoning changes would be required to distribute all new development within the UDB. Smart Growth approaches and policies were applied more aggressively to intensify development within the UDB.



Note: White area represents areas with no changes in land use.

TASK 3



The successful formulation of a watershed or land use plan requires a comparison of alternatives (test scenarios) against the current condition (baseline), using a consistent set of metrics. In this regard, the impacts of the six test land use scenarios were assessed against the 21 parameters and thresholds developed in Sub-task 1.8, and compared to the baseline condition. This evaluation included an assessment of the impacts of each test scenario on water resources, agriculture, natural resources, community character, employment and economy and infrastructure.

Scenario Assessments

(Sub tasks 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6)

Output data from modeling and impact assessments (Sub-tasks 3.1 through 3.5) were compared to the threshold established for each parameter. This comparison (Sub-task 3.6) determined whether a particular test scenario met the overall planning objectives and which test scenario had the best overall performance.

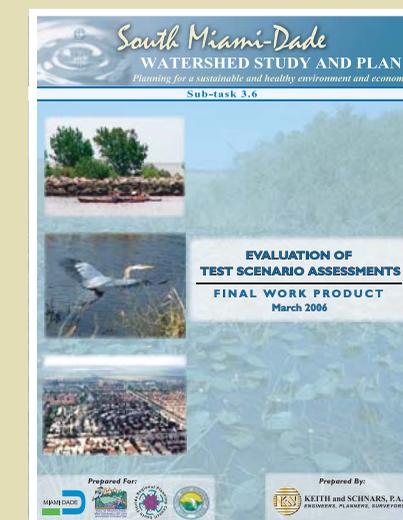
While no single scenario met all of the criteria contained in the WSAC vision and goals and Land Use Policy 3E, a clear distinction can be made between Test Scenario 1 (Current Practices) and Test Scenarios 2 and 3. For most of the 21 parameters, the assessment results for Test

Scenario 1 show a much higher exceedance of established thresholds, leading to the conclusion that Test Scenarios 2 and 3 (Smart Growth based) are more successful at meeting the WSAC goals and vision and Land Use Policy 3E. As noted in Table 2.5, overall, on a comparative basis Test Scenario 3 performed substantially better than Test Scenario 1 and slightly better than Test Scenario 2. The results clearly indicate that under any of the test scenarios substantial policy changes and infrastructure investments must be implemented to mitigate the impacts of population growth and associated land use changes. This requirement is discussed in more detail in Chapter 5.

Highlights of the results of the test scenario assessments are presented below, grouped in five major areas:

- **Water Resources**
- **Natural Communities**
- **Land Use/Community Character**
- **Economics**
- **Infrastructure**

For detailed information on methods, underlying data and assessment results, see the complete Sub-task 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6 reports.



- Overall, Test Scenario 1 resulted in substantially greater negative impacts on the Watershed.
- All test scenarios resulted in some negative impacts.

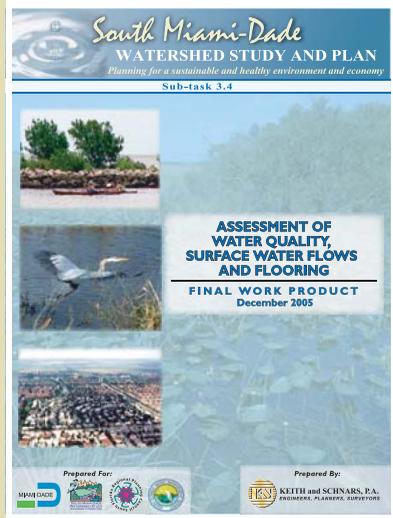


Table 2.5
Test Scenario Assessment Performance

Parameter	Test Scenario 1	Test Scenario 2	Test Scenario 3
Water Quality	■	■	■
Groundwater Demand	■	■	■
Surface Water Flows/Distribution	■	■	■
Flood Protection	■	■	■
Tidal Wetlands	■	■	■
Native-Plant-Dominated Freshwater Wetlands	■	■	■
Exotic-Plant-Dominated Freshwater Wetlands	■	■	■
Transitional Freshwater Wetlands	■	■	■
Remnant Natural Forests	■	■	■
Development Densities	■	■	■
Agricultural Land	■	■	■
Proximity of Housing and Employment to Transit	■	■	■
Parks, Recreation and Open Space	■	■	■
Economic Base	■	■	■
Cost of Housing	■	■	■
Mix of Wages	■	■	■
Transportation	■	■	■
Public Schools	■	■	■
Potable Water	■	■	■
Wastewater	■	■	■
Air Quality	■	■	■

■ Lowest Performance ■ Mid-Level Performance ■ Best Performance

Note: The color descriptions in this table are for comparison purposes only and do not necessarily suggest acceptable performance. In some cases, two or more test scenarios exhibited similar performance on a parameter and were labeled the same color.

WATER RESOURCES

Concern over the health of Biscayne Bay was the key reason behind the requirement to complete the Watershed Study and Plan. As such, the impacts associated with population increases and associated land use changes on the waters of the Bay are an integral part of the Watershed Study.

To allow decision makers to understand better the consequences of different approaches to land use changes on water resources, the Study compared the current condition of water resources to each test scenario at the years 2025 and 2050. The areas evaluated were: water quality, groundwater demand, surface water flows to Biscayne Bay, and flood protection.

Summary of Water Resources Assessment Results

The results of the water resources comparative assessments are summarized below. More detailed information on these assessments may be found in the Sub-task 3.4 and 3.6 reports.



Water Quality

- Comparative assessment using the 14 pollutants in the DERM stormwater XP-SWMM model (Table 2.6);
- All test scenarios resulted in increases in pollutant loadings to Biscayne Bay, an "Outstanding Florida Water", compared to the baseline;
- Under Test Scenario 1, current development practices, pollutant loading increases were substantially higher than Test Scenarios 2 and 3; and
- For the year 2050, the more compact development pattern of Test Scenario 3 had the best overall performance.

Summary: The low density development pattern of Test Scenario 1 resulted in substantially greater impacts in terms of water quality compared to the more compact development in Test Scenarios 2 and 3. All three test scenarios, however, result in pollutant load increases compared to the baseline.

Table 2.6
Water Quality Comparative Assessments for all Basins
(C-1, C-2, C-100, C-102, and C-103)

Water Quality Parameter	Baseline Scenario	Scenario 1 B Year 2050		Scenario 2 B Year 2050		Scenario 3 B Year 2050	
	Pollutant Load (lbs)	Pollutant Load (lbs)	% Difference Scenario 1/ Baseline	Pollutant Load (lbs)	% Difference Scenario 2/ Baseline	Pollutant Load (lbs)	% Difference Scenario 3/ Baseline
BOD5	203,034	358,674	77	264,712	30	248,095	22
COD	1,087,243	1,941,088	79	1,446,700	33	1,348,420	24
TSS	895,850	1,420,126	59	1,134,517	27	1,072,811	20
TDS	7,868,403	17,576,643	123	12,344,446	57	11,528,019	47
TN	43,045	66,636	55	55,357	29	52,778	23
Nox-N	12,857	31,925	148	17,661	37	18,666	45
NH3-N	2,458	4,516	84	3,524	43	3,259	33
TKN	26,488	46,214	74	35,208	33	33,056	25
TP	6,811	9,880	45	8,423	24	8,115	19
DP	4,249	7,319	72	5,881	38	5,573	31
Cd	58	138	138	95	63	86	48
Copper	764	1,076	41	992	30	985	29
Lead	2,531	5,896	133	3,970	57	3,606	42
Zn	1,810	3,396	88	2,535	40	2,376	31

Lowest Performance
 Best Performance



WATER POLLUTANTS EVALUATED

- (BOD5): 5 day Biochemical Oxygen Demand
- (COD): Chemical Oxygen Demand
- (TSS): Total Suspended Solids
- (TDS): Total Dissolved Solids
- (NH3-N) (or TN): Total Nitrogen
- (NOx-N): Nitrate Nitrite
- (NH3-N): Ammonia Nitrogen
- (TKN): Total Kjeldahl Nitrogen
- (TP): Total Phosphorus
- (DP): Dissolved Phosphorus
- (Cd): Total Cadmium
- (Cu): Total Copper
- (Pb): Total Lead
- (Zn): Total Zinc

Groundwater Demand

- The total combined (urban and non-urban sources) average annual groundwater demands are slightly higher under Test Scenarios 2 and 3 compared to Test Scenario 1 (Figure 2.16); and
- The projections show that the total demand for urban water (that provided by MDWASD) by 2050 will be less under Test Scenarios 2 and 3 compared to Test Scenario 1.

Summary: Without changes in water sources, groundwater demands will substantially increase under all test scenarios.

Surface Water Flows

- In the year 2025, for all test scenarios, there is slight decrease in the annual volume of surface runoff from the baseline. The decrease ranges from virtually no change with Test Scenario 1 to a 0.8 percent reduction for Test Scenarios 2A and 3A;
- In the year 2050, the decrease of surface water volume flowing to Biscayne Bay, compared to current conditions is less than 1 percent for Test Scenarios 2B and 3B. Test Scenario 1B resulted in a slightly higher discharge volume than the baseline (Figure 2.17).

Summary: Surface water flows to the Bay are not altered significantly under any test scenario.

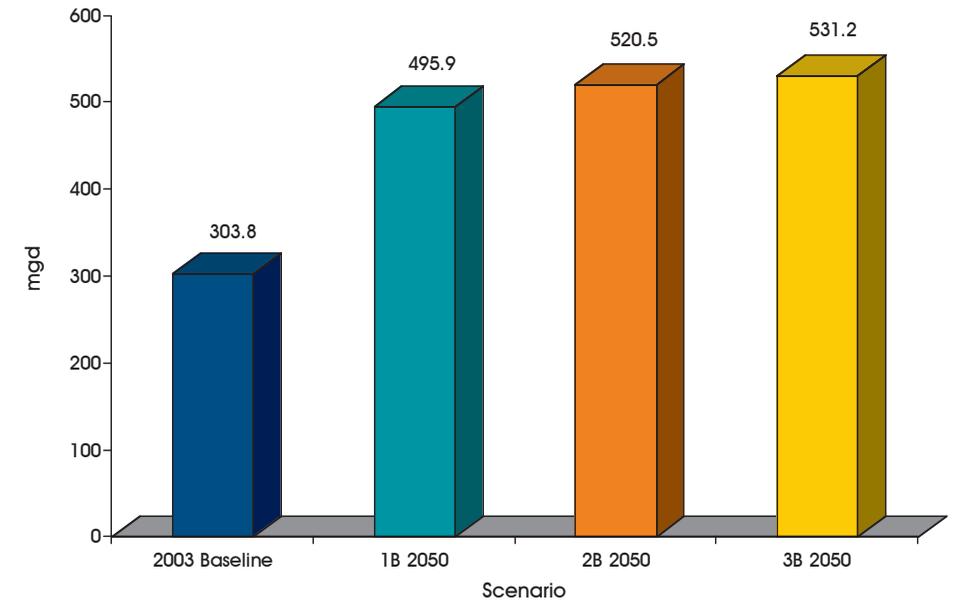


Figure 2.16 Groundwater Demand = Meeting one in ten year drought demands (Urban Public Supply + Non-urban)

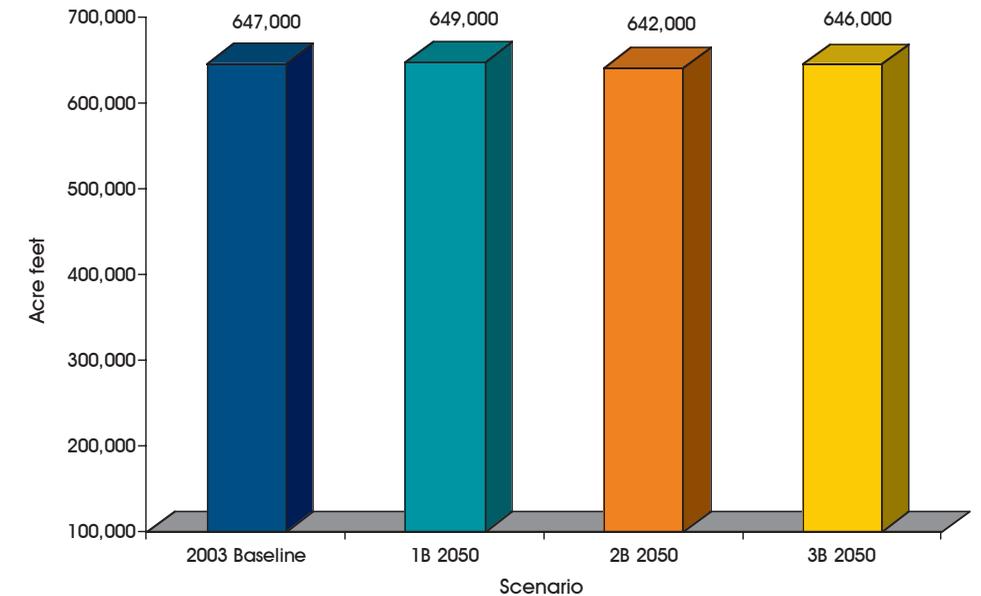
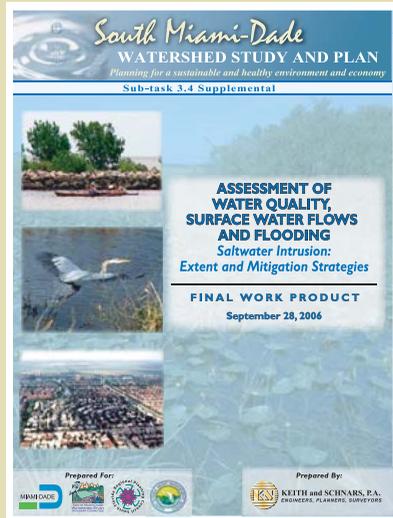


Figure 2.17 Surface Water – Flows/Distribution to the Biscayne Bay



Flood Protection

- Flooding problems currently exist in the Watershed, with 350 sites (nodes) exceeding the Flood Protection Level of Service (FPLOS) standard;
- Test Scenario 1B resulted in a 30 percent increase in sites exceeding the FPLOS (Figure 2.18); and
- Test Scenario 3B resulted in the smallest increase in the number of sites exceeding the FPLOS.

Summary: While all test scenarios increase flooding over the baseline condition, flooding under the low density residential development pattern in Test Scenario 1 was substantially worse.

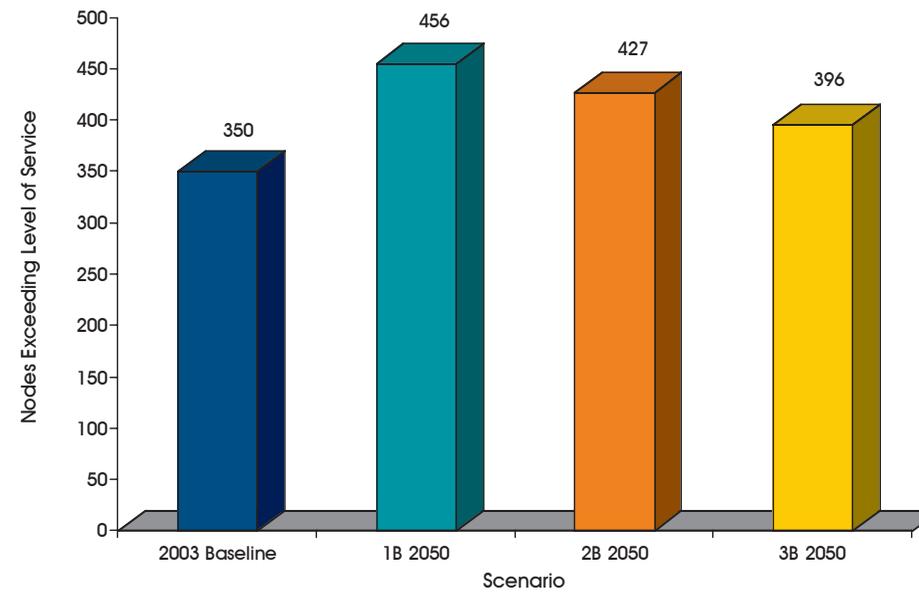


Figure 2.18 Flooding

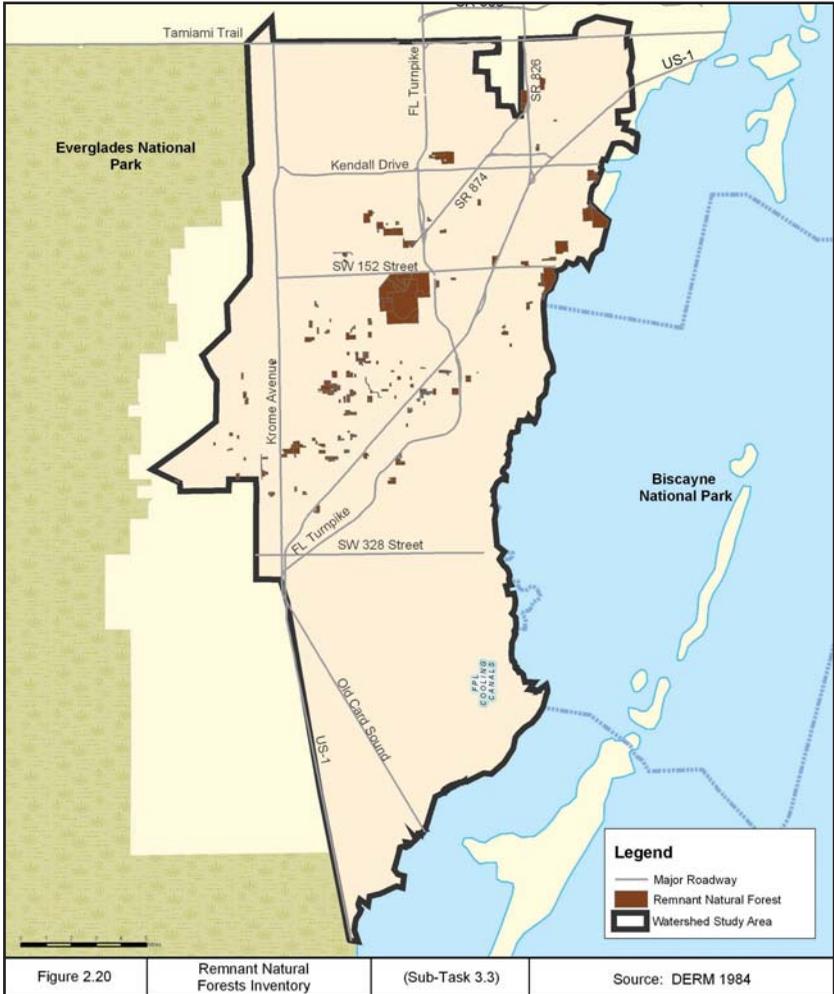
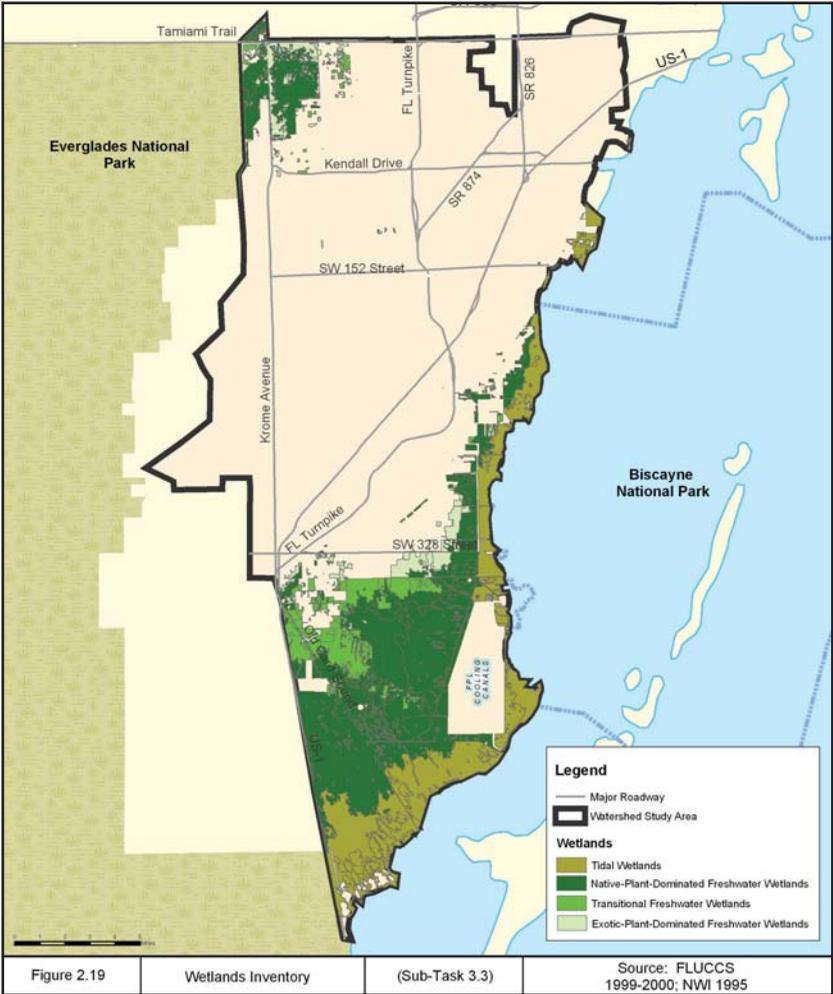
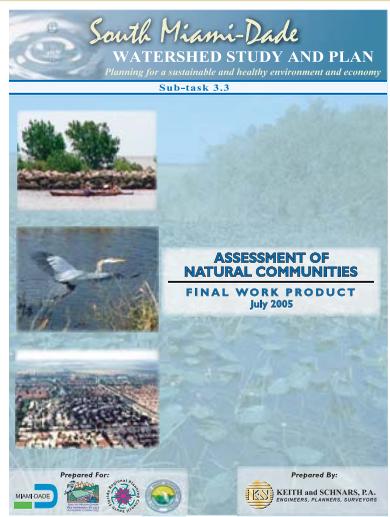


NATURAL COMMUNITIES

Natural communities within the Watershed include wetlands and remnant natural forests (Figures 2.19 and 2.20). They are considered important to the health of the Watershed and have been substantially impacted by development. Avoiding and minimizing future losses of these resources is an objective of the Recommended Watershed Plan.

Wetlands perform important functions, including attenuating stormwater, filtering pollutants, recharging aquifers and providing fish and wildlife habitat. Wetlands are generally recognized as one of the most productive ecosystems. In the Watershed, wetlands are important both locally and in support of regional goals for ecosystem restoration such as the Comprehensive Everglades Restoration Plan.

Remnant natural forest communities are important from a habitat diversity perspective. These forests, which have suffered substantial losses in the Watershed, are important to the recovery of several threatened and endangered plant and animal species.



Summary of Natural Community Assessment Results

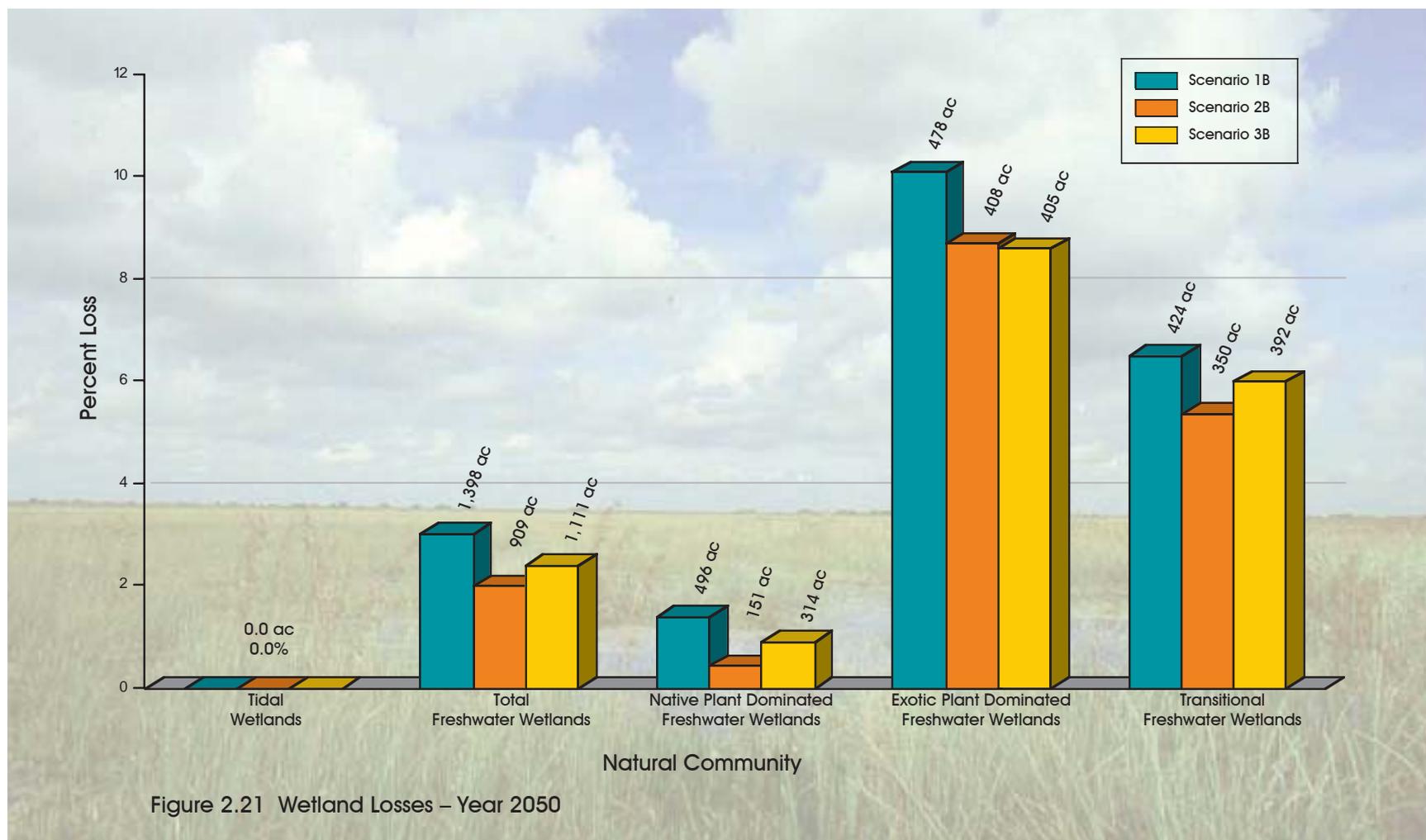
GIS software was used to assess the performance of the test scenarios on natural communities. This GIS analysis produced the acreage loss for each natural community type for each test scenario (Figures 2.21 and 2.22). The results of the natural community assessments are summarized below. More detailed information on these assessments may be found in the Sub-task 3.3 report.

Tidal Wetlands

- 17,685 acres in the Watershed
- No tidal wetlands lost under any Test Scenario

Native-Plant-Dominated Freshwater Wetlands

- 34,953 acres in the Watershed
- Test Scenario 1 resulted in the greatest losses (496 acres)
- Test Scenario 2 resulted in the least amount of loss (151 acres)



Exotic-Plant-Dominated Freshwater Wetlands

- 4,711 acres in the Watershed
- Test Scenario 1 resulted in the greatest losses (478 acres)
- Test Scenarios 2 and 3 resulted in similar losses (408 and 405 acres)

Transitional Freshwater Wetlands

- 6,527 acres in the Watershed
- Test Scenario 1 resulted in the greatest losses (424 acres)
- Test Scenario 2 resulted in the least amount of loss (350 acres)

Remnant Natural Forests

- 5,695 acres in the Watershed
- Test Scenario 1 results in the greatest losses (655 acres)
- Test Scenario 3 results in the least amount of losses (196 acres)

Summary: While overall acres of losses to both wetlands and remnant natural forests out to 2050 may seem modest, such losses are significant in light of the substantial historical losses of both natural community types in the Watershed.

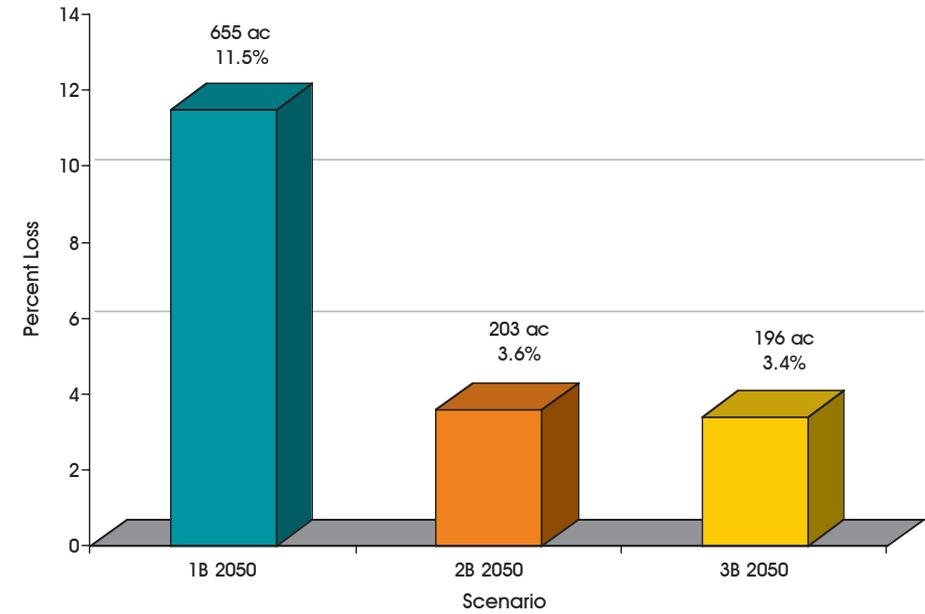


Figure 2.22 Remnant Natural Forest Losses - 2050



LAND USE / COMMUNITY CHARACTER

Accommodating a nearly doubling population by 2050 will greatly influence the look and livability of South Miami-Dade County. How and where people live will have an enormous impact on the environment and the character of the community. Specifically, without proper planning, the relatively rural landscape could become a large low density development with increased traffic congestion that is typical of a sprawl development pattern.

Under Test Scenario 1, rural lands are substantially decreased and low density suburban lands increased. This scenario results in only a modest increase in higher density urban land use. Under Test Scenarios 2 and 3 substantial increases in urban land uses and reduced loss of rural lands define the development pattern.

Summary of Land Use/Community Character Assessment Results

The results of the Land Use/Community Character assessments are summarized below. More detailed information on these assessments may be found in the Sub-task 3.1 and 3.6 reports.



Agricultural Land

Agriculture is an important part of the Watershed landscape and the community character. Approximately 20 percent of the Watershed is classified as agriculture land. The Miami-Dade County agriculture community produces a variety of products including traditional and tropical vegetables, tropical fruits, ornamental nursery and greenhouse products as well as seed crops, livestock and aquaculture species.

- Currently, within the 237,440 acre Watershed, approximately 44,000 acres* are considered agriculture land. Approximately 7,100 of these acres are inside the existing UDB.
- Under Test Scenario 1, 74 percent of the agriculture land in the Watershed is lost to low density residential development (Figures 2.23 and 2.24).
- Under Test Scenarios 2 and 3, 32 and 13 percent of the agriculture land in the Watershed, respectively, is lost.

*It is important to note that this represents approximately one half of the agriculture land in Miami-Dade County.

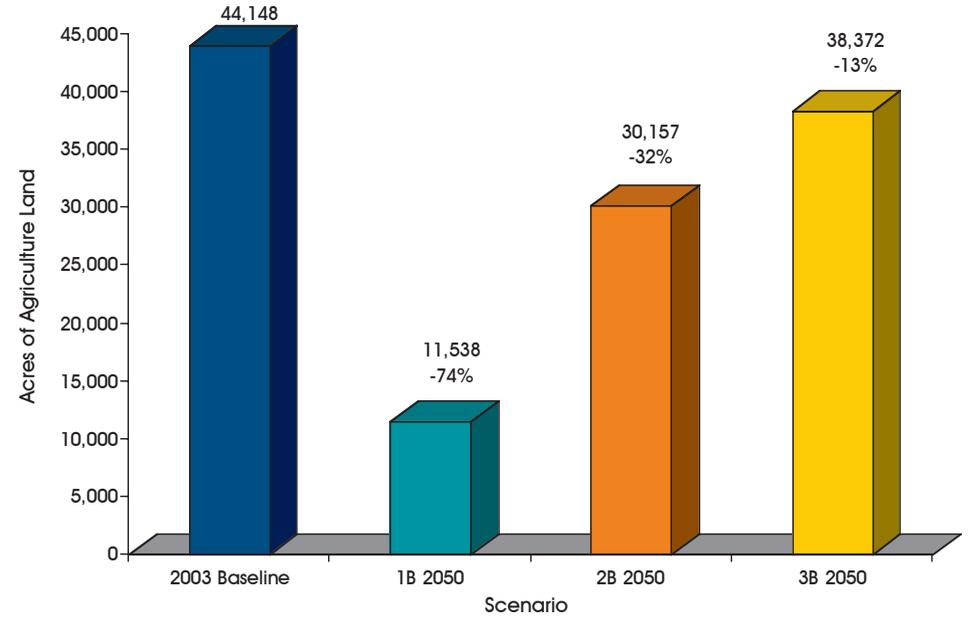
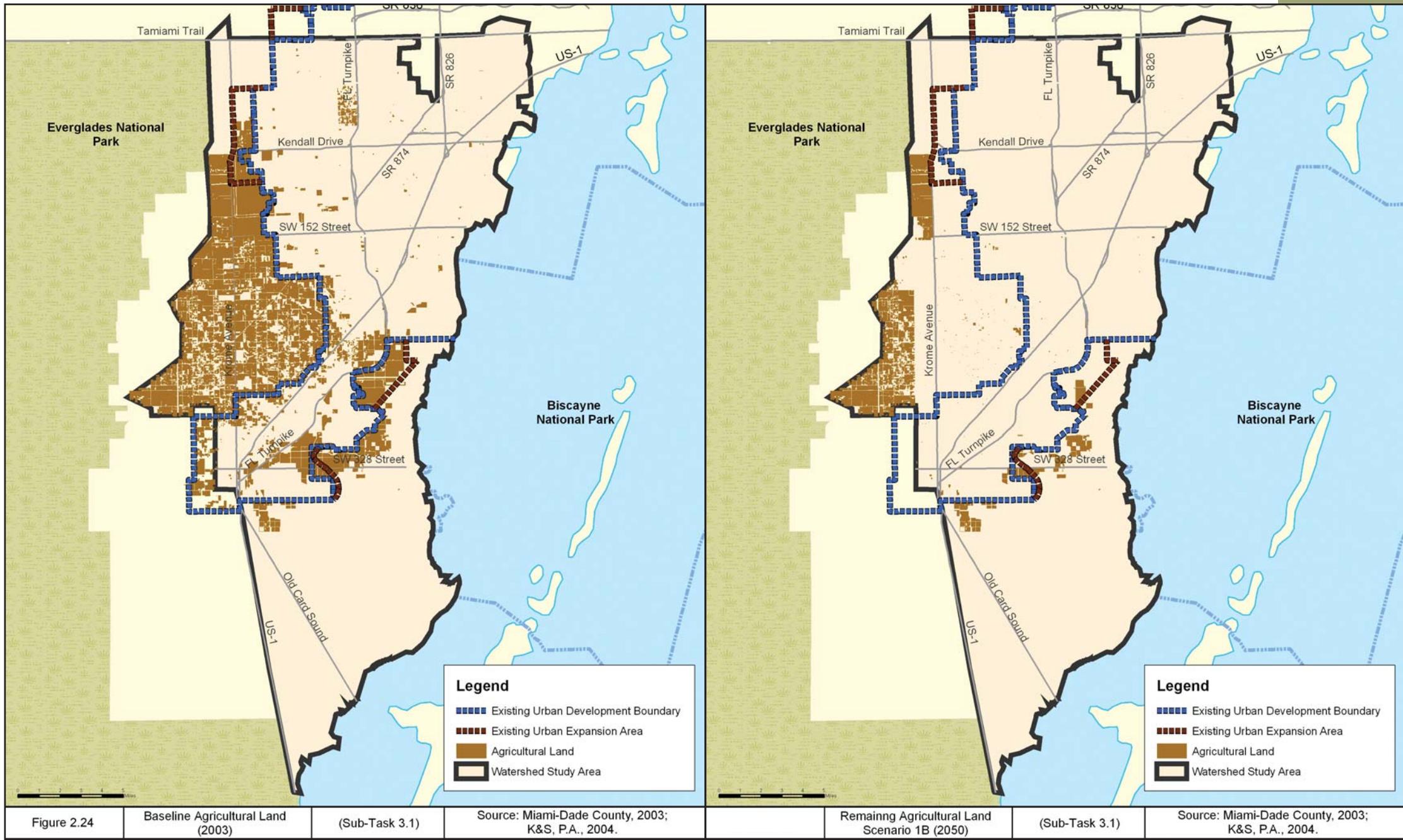


Figure 2.23 Agriculture Land





Summary: Under Test Scenario 1, 94 percent of the agriculture land in the Watershed is lost to low density residential development. The more compact development pattern of Test Scenarios 2 and 3 preserve a substantial portion of the agriculture land in the Watershed.

Proximity of Housing and Employment to Transit

Efficient and effective public transportation is a key part of a Smart Growth community. It is also important that people live and work within a reasonable distance of such transportation facilities. For example, as a general rule, people will walk up to 1/2 mile to a transit stop.

In light of this, proximity of housing to premium transit was assessed for each test scenario. Premium transit service provides a high-quality transit experience with frequent headways; stops at all transit villages, includes express service stops at intermodal centers, allows buses to change traffic signals from red to green and link regional centers.

- To create a less automobile-dependent development pattern, the proximity of housing and employment within 1/2 mile to efficient transit is vital.
- Currently within the Watershed Area approximately 72,000 residential units are within 1/2 mile of premium transit (Table 2.7 and Figure 2.25).
- While not anticipated, Test Scenario 2 resulted in the least new residential units close to premium transit (14 percent).
- Test Scenario 3 resulted in 53 percent of new residential units (109,000 units) within 1/2 mile of premium transit (Figure 2.26).

Summary: Test Scenario 3 performed well in facilitating transit corridors. This approach will result in more pedestrian friendly and less automobile dependent communities with the required density to support a robust transit program. Test Scenarios 1 and 2 do not facilitate such a transit oriented development approach, resulting in greater dependence on the automobile.

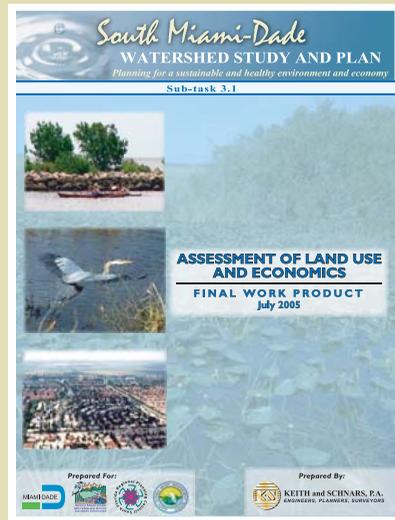


Table 2.7
Dwelling Units within 1/2 Mile of Premium Transit

Baseline Dwelling Units	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
71,720	+35,863 18%*	+29,182 14%*	+109,162 53%*

* Percentage of the 204,277 new dwelling units in 2050.



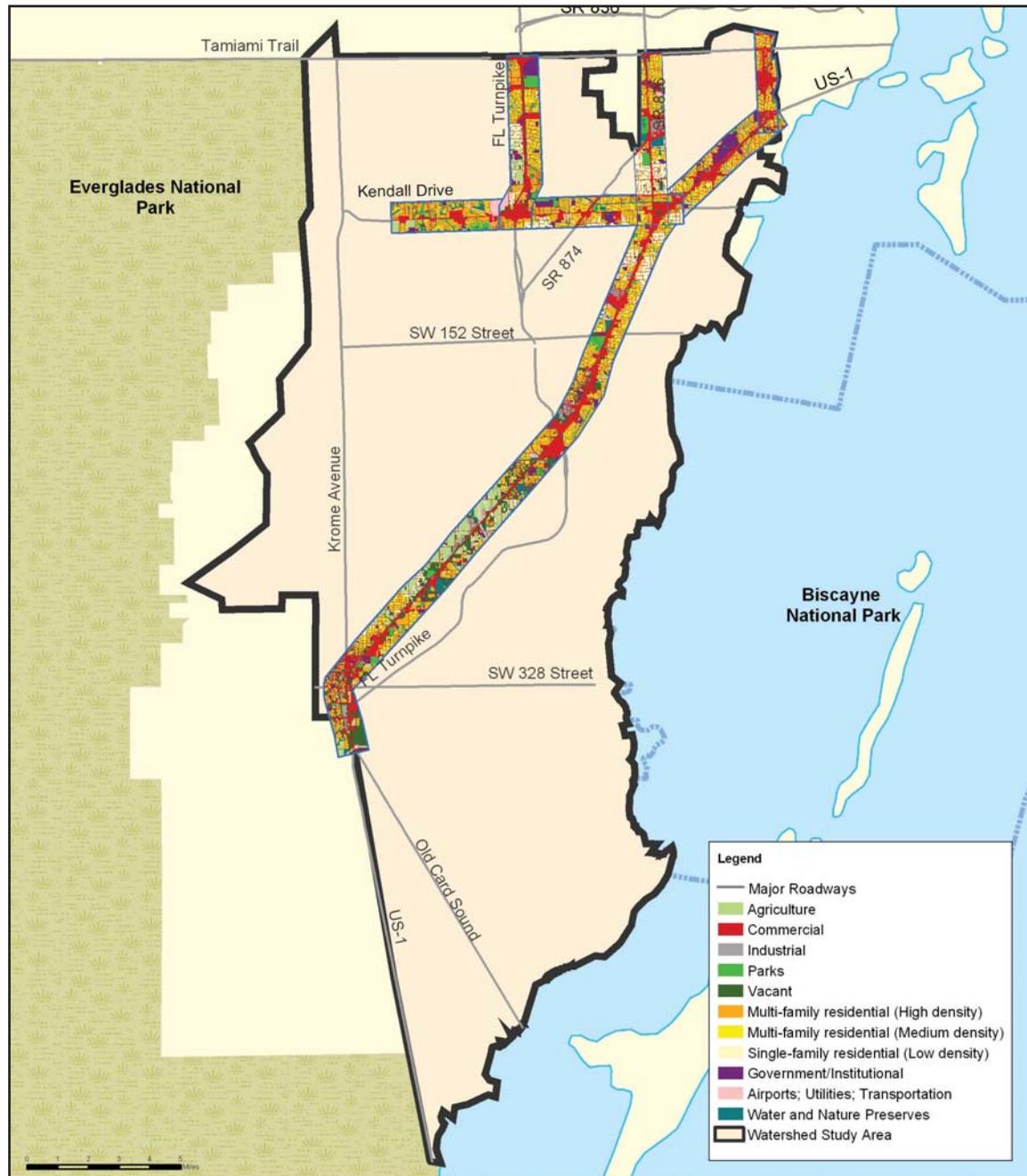


Figure 2.25

Parcels within 1/2 Miles of Transit Corridors (2003)

(Sub-Task 3.1)

Source: Miami-Dade DP&Z

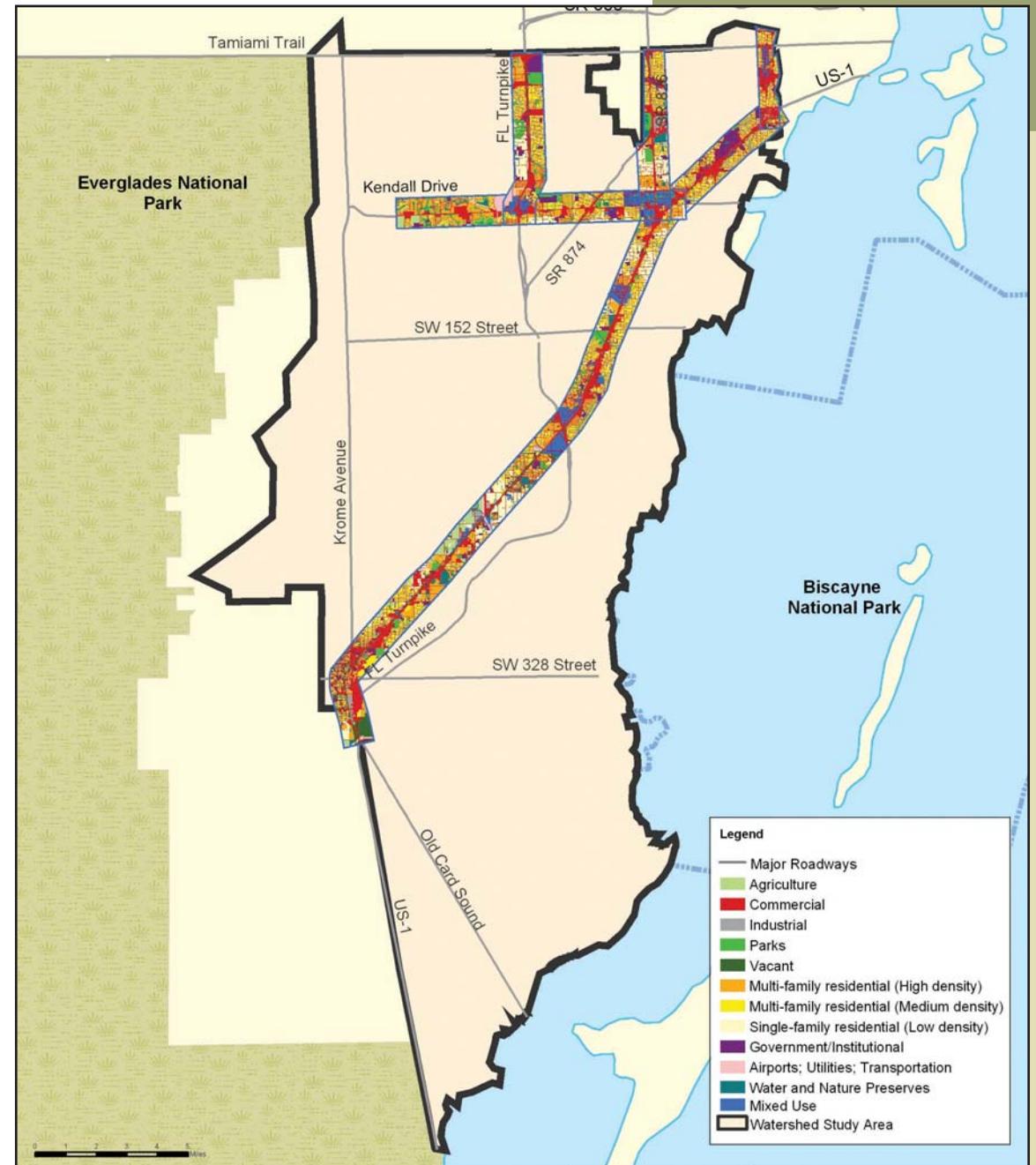


Figure 2.26

Parcels within 1/2 Miles of Transit Corridors Test Scenario 3B 2050

(Sub-Task 3.1)

Source: K&S, P.A.

Development Patterns

Development patterns are a measurable representation of an area's characteristics. By defining development patterns based on attributes for four different general types of land use, a quantifiable and visual picture of the different test scenarios can be generated. This information provides a basis for evaluating general changes in land use patterns in the Watershed.

The four development patterns evaluated were: Rural, Ex-Urban, Suburban, and Urban. Table 2.8 summarizes the results of the development pattern assessment.

- Test Scenario 1B results in the highest percentage of land with suburban character (Figure 2.27).
- Test Scenario 3B provides the highest percentage in acres of land with rural character.

Summary: *By concentrating new development and growth in urban areas where infrastructure exists, rather than sprawling out into undeveloped lands, more of the existing community character can be retained.*



Table 2.8
2050 Development Patterns

Development Pattern Category	2003 Baseline Square Miles	Test Scenario 1B Square Miles	Test Scenario 2B Square Miles	Test Scenario 3B Square Miles
Rural	216	159	184	201
Ex-Urban	14	25	16	24
Suburban	163	206	186	159
Urban	3	6	10	12
Total	396	396	396	396

Development Pattern Category	2003 Baseline Percentage of Study Area	Test Scenario 1B Percentage of Study Area	Test Scenario 2B Percentage of Study Area	Test Scenario 3B Percentage of Study Area
Rural	55%	40%	46%	51%
Ex-Urban	4%	6%	4%	6%
Suburban	41%	52%	47%	40%
Urban	Less than 1%	2%	3%	3%
Total	100%	100%	100%	100%

For a detailed definition of each category, see page 34 of the Sub-task 1.8 report.

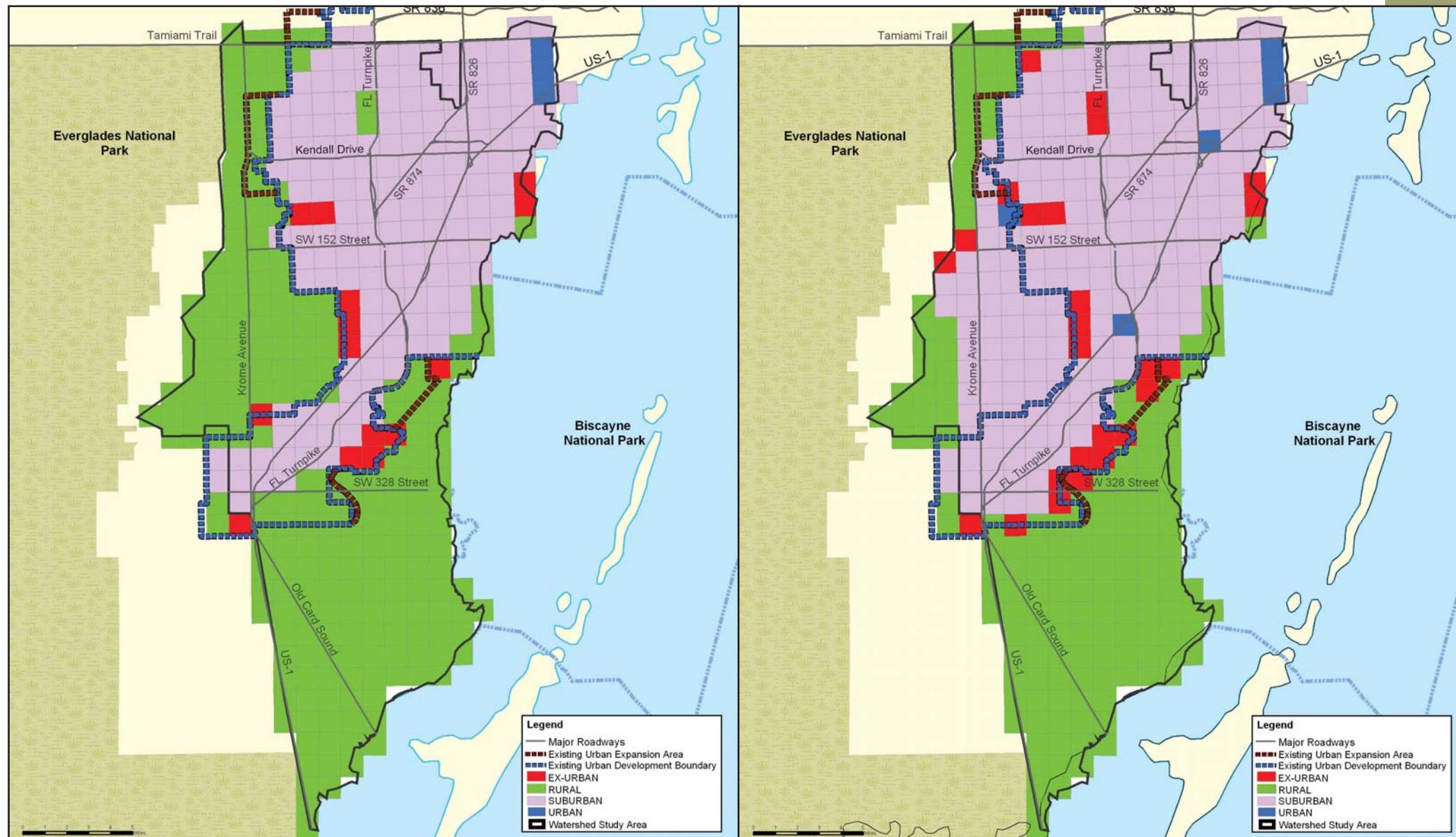


Figure 2.27

Development Patterns 2003

(Sub-Task 3.1)

Source: Miami-Dade DP&Z

Development Patterns
Test Scenario 1B - 2050

(Sub-Task 3.1)

Source: Miami-Dade DP&Z

Parks and Recreation Land

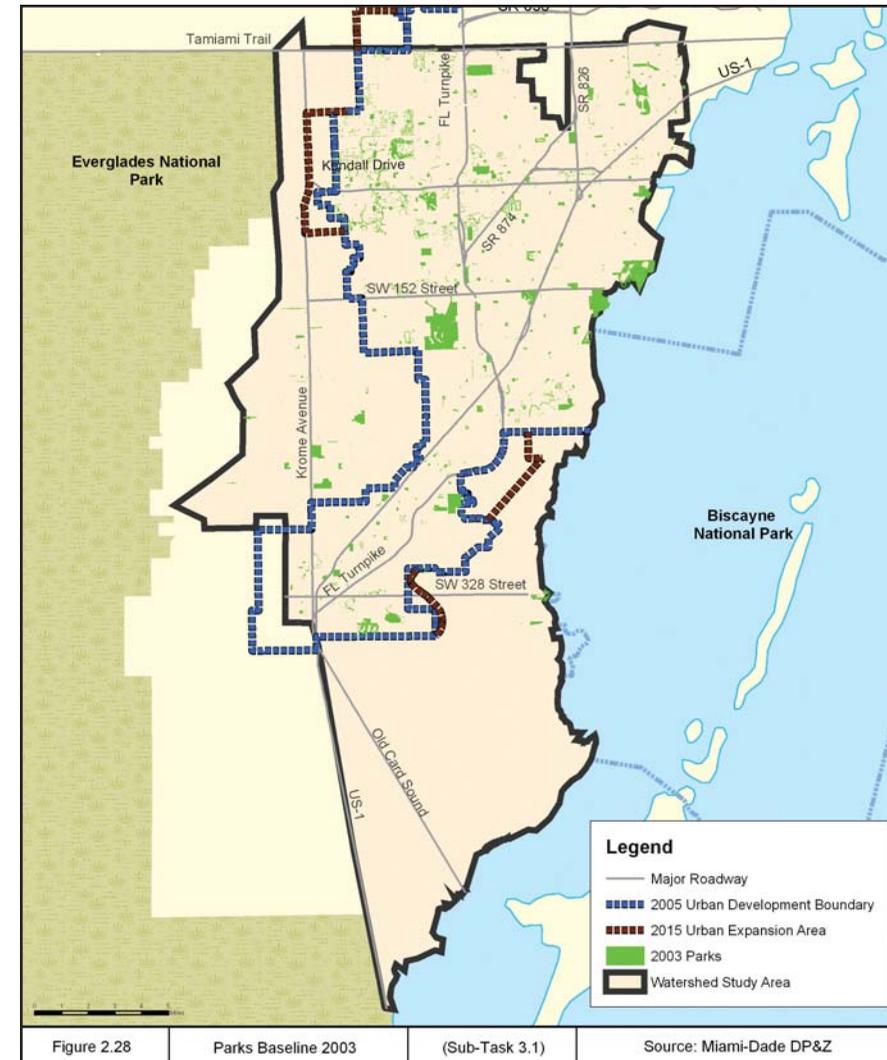
Parks and recreation land are key attributes to a healthy and sustainable Watershed. As such, it is important to understand how park and recreation services will be provided as the population grows. The number, size and location of these facilities must be considered fully in the long-range plans for the Watershed.

- The current Miami-Dade County requirement for park space was applied to all scenarios (2.75 acres of new park space for each 1,000 person increase in population), resulting in the same amount of new park space for each test scenario.
- In the 2003 baseline land use, there were 7,287 acres of park and recreation land in the Watershed (Figure 2.28).
- For each scenario, approximately 1,759 acres of new park and recreational space will be added by 2050.
- As noted in Table 2.9, the size and distribution of parks and recreation land varies between test scenarios.

Summary: The total acreage of park and recreation space was nearly the same for all scenarios. However, the location and size of parks was different for each scenario. The actual location and size of parks will be determined based on the County's master plan for parks and the implementation strategies in Chapter 5.

Table 2.9
Parks and Recreation Land (Acres)

Size of the Park (acres)	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
1-4	210	333	253
5-30	283	409	379
30-100	80	416	406
over 100	1,186	601	719
Total Acres	+1,759	+1,759	+1,757



ECONOMICS

Summary of Economic Assessment Results

The results of the economic assessments are summarized below. More detailed information on these assessments may be found in the Sub-task 3.1 and 3.6 reports.

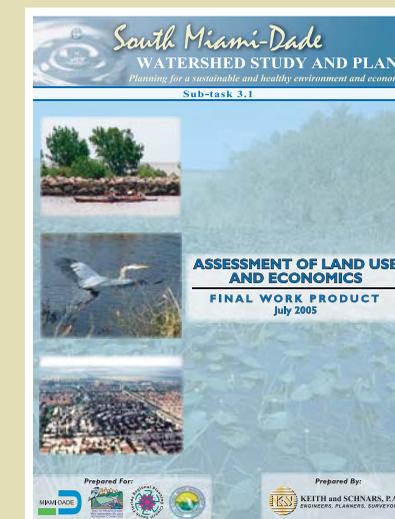
Economic Base

The ability of a region to sustain a strong economy or weather economic downturns depends on the types of industries and jobs that are supporting the region. A diversified economic base is one that is not overly dependent on any one sector. While land use and economic development strategies can contribute towards attaining such a base, macroeconomics and other factors (e.g., natural endowments of land, labor, capital and ecological systems) largely determine the mix of business establishments, industries and employment opportunities within the Watershed. Table 2.10 provides data on the projected employment levels in the Watershed for each test scenario.

Table 2.10
Employment Levels Within the Watershed Study Area by Test Scenario

	Baseline	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
	2003	2050	2050	2050
Employment				
Commercial	258,274	529,876	529,876	529,876
Industrial	36,319	41,274	41,274	41,274
Institutional	70,765	75,636	75,636	75,636
Farm	6,351	1,248	3,255	4,144
Total Employment	371,709	648,034	650,041	650,930

"Institutional" uses include government, education, hospitals, religious, parks and recreation.





Tourism is one of Miami-Dade County's most important economic sectors, directly affecting a variety of industries from air transportation and lodging to retail trade and food and beverage establishments. Nearly 11 million overnight visitors traveled to the County in 2004, spending an estimated \$12.3 billion. Lodging and shopping accounted for over 50 percent of the per visitor expenditures (Figure 2.29). Approximately two-thirds of visitors to the County were on vacation, 13 percent were visiting for business and 10 percent were visiting friends and family. Approximately 10 percent (1,052,000) of the overnight visitors to the County in 2004 stayed in the Watershed, spending nearly \$1.2 billion. Since 2001 the number of visitors staying in the Watershed has risen from 736,000 to over one million. As noted in Table 2.11, tourism related employment is projected to increase from 109,000 jobs in 2005 to over 154,000 jobs in 2050.

- Anticipated growth of acreage in commercial, industrial and institutional land uses are essentially the same across all three test scenarios.
- Projected employment growth under all test scenarios is approximately the same (Table 2.12).
- Results suggest that additional focus should be placed on increasing the tourism economic base.
- Using data from the US Census Bureau agricultural census of 2002, Test Scenario 3 would result in the most agriculture related employment with 5,086 in 2025. By 2050, such jobs are reduced to 4,144 (Figure 2.30).
- Test Scenario 1 produces the least amount of agriculture jobs in both 2025 and 2050.

Summary: The economic base factors measured are similar for all three test scenarios and as such do not provide a basis for concluding that one test scenario performs better than another. However, the findings do suggest that additional emphasis could be placed on increasing the tourism sector of the base including agri-tourism. In this regard, one could conclude that the development patterns in Test Scenarios 2 and 3 would result in a more sustainable tourism base than the sprawl pattern of Test Scenario 1. Similar opportunities in the agriculture sector may also exist.

Table 2.11
Projected Watershed Employment in Tourism Associated Industries: Thousand Jobs

Industry	2005	2015	2025	2035	2050
Hotels	26.8	28.7	32.7	34.8	38.6
Amusement and recreation services	<u>10.5</u>	<u>11.9</u>	<u>11.9</u>	<u>11.3</u>	<u>12.5</u>
Hotel and Leisure	37.3	40.6	44.6	46.1	51.1
Food and beverage establishments	65.6	73.6	77.9	83.0	93.4
Museums, botanical, zoological gardens	0.7	0.8	0.8	0.8	0.8
Commercial sports	<u>5.4</u>	<u>6.0</u>	<u>7.2</u>	<u>8.2</u>	<u>9.0</u>
Other Tourism Related Employment	71.7	80.4	85.9	91.9	103.3
Total	109.0	121.1	130.5	138.0	154.4

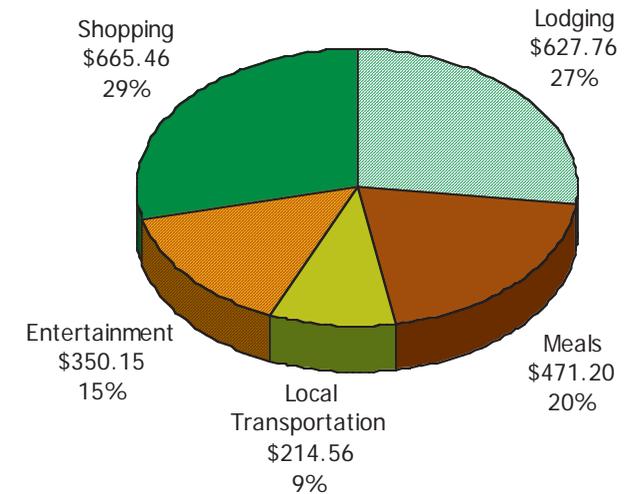


Figure 2.29 Tourism Expenditures Per Party, 2004

Table 2.12
Economic Base

Employment by Industry				
Industry	Baseline	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
Commercial	69.5%	81.8%	81.5%	81.4%
Industrial	9.8%	6.4%	6.3%	6.3%
Institutional	19.0%	11.7%	11.6%	11.6%
Farm	1.7%	0.2%	0.5%	0.6%

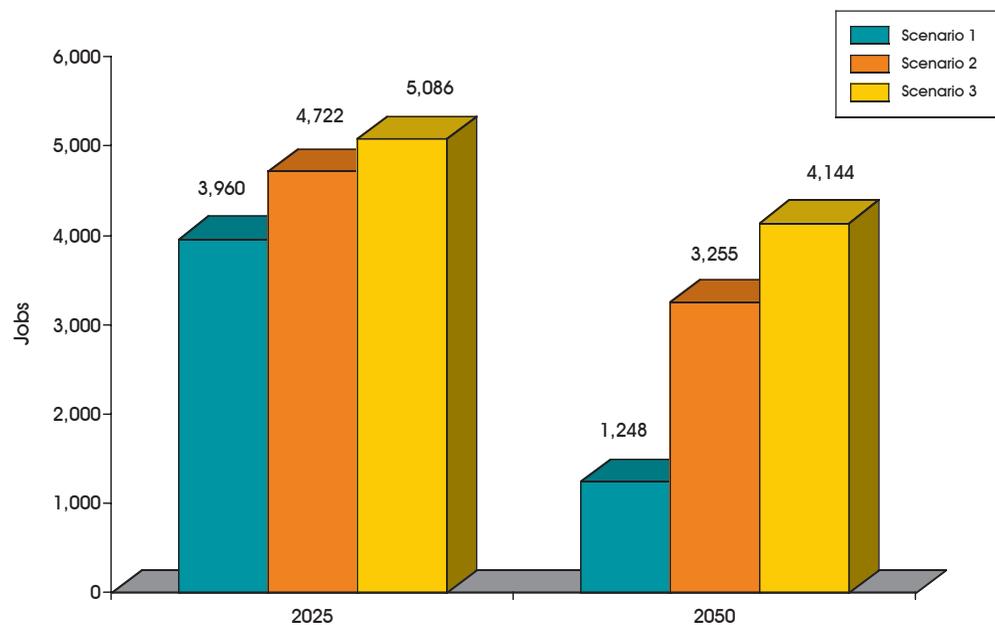


Figure 2.30 Farm Employment

Cost of Housing

Like other metropolitan areas in Florida and the nation, the price of single and multi-family homes rose quickly in Miami-Dade County over the first five years of the 21st century. The median price of an existing single family home in the County reached \$297,200 in the fourth quarter of 2004, an increase of 25 percent in one year. While this trend slowed substantially and in some cases reversed in 2006, it is reasonable to expect continued increases in the cost of housing over the next several decades.



When supply and demand factors lead to higher prices for single family homes, the price of all types of units tend to rise. As increases in the price of single family units put the purchase of single family homes beyond the reach of many potential home buyers, the demand shifts to multi-family units. This generally leads to higher prices for multi-family units as well. As monthly cost of owner-occupied housing rises, the monthly cost of rental housing tends to rise also.



- Test Scenario 1 resulted in a slightly lower median home price, when compared to Test Scenarios 2 and 3 (Table 2.13).
- In Test Scenario 1 at 2025, the projected median price of a typical housing unit has risen 50 percent above its price in 2003, and by 2050 the price is projected to be 90 percent higher the price of a typical unit in 2003.
- Median housing prices projected for 2025 and 2050 are slightly higher in Test Scenarios 2 and 3 than in Test Scenario 1 (Figure 2.31).
- Projected average rents for all test scenarios are similar at 2025 and Test Scenarios 2 and 3 are slightly higher than Test Scenario 1 in 2050.

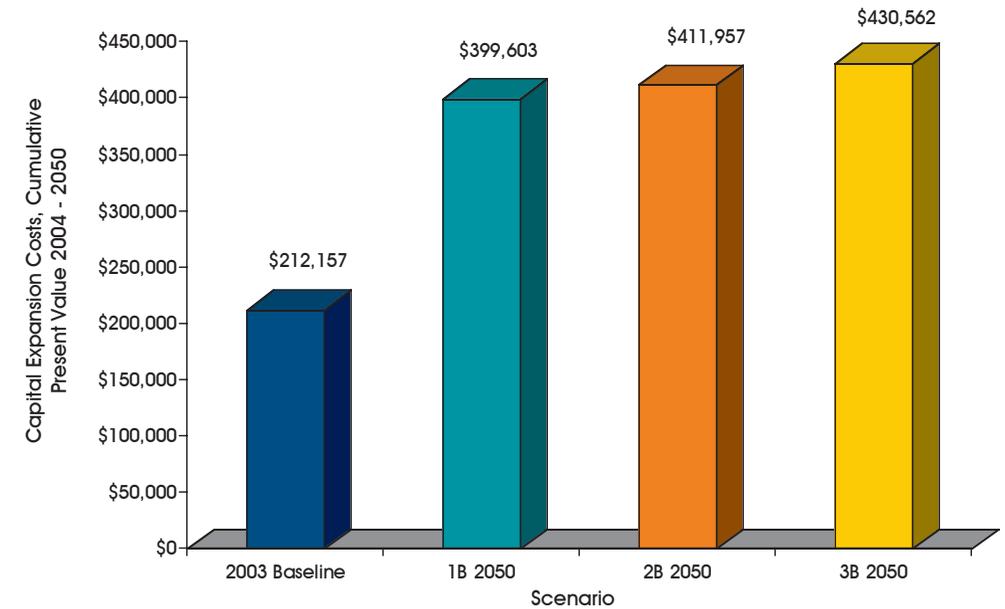


Figure 2.31 Cost of Housing (2004 Dollars)

Summary: Cost of housing is similar for all three test scenarios and as such does not provide a basis for concluding that one test scenario performs better than another.

Table 2.13
Historical and Projected Average Price of Owner Occupied Housing and Monthly Rent

	Baseline	Test Scenarios 2050		
	2003	1B	2B	3B
Average Price, All Units (\$)	212,157	399,603	411,957	430,562
Single Family	228,492	446,303	477,321	499,358
Multi-family	165,408	323,084	345,538	361,491
Pct of Owner Occupied Units (All Units)				
Single Family	78.1%	62.1%	50.4%	50.1%
Multi-family	20.0%	37.9%	49.6%	49.9%
Other (Mobile, RVs and Boats)	1.9%	0.00%	0.00%	0.00%
Average Monthly Rent (\$)	790	1,543	1,650	1,727

Notes:

1. Historical values are obtained from the Census Bureau, American Community Survey, 2003.
2. All monetary values expressed in constant 2004 dollars.
3. All units include baseline units and additional units allocated between 2003 and 2050.

Household and Per Capita Income and Wages

Household income, wages and poverty issues are important socio-economic factors that help define the character of the Watershed. Wages are the main source of household income and they provide a measure of household or consumer purchasing power. Wages, together with jobs and household incomes describe the economic baseline of the Watershed. In short, household incomes are the fabric that supports a viable, balanced economy. The projected average annual wages in the County and in the Watershed are provided in Table 2.14.

- The median household income is slightly higher for Test Scenario 1 (Figure 2.32). However, the actual difference between the test scenarios is not likely significant in light of other factors, such as the reduced transportation costs associated with Test Scenarios 2 and 3.

Summary: Income and wages are similar for all three test scenarios and as such do not provide a basis for concluding that one test scenario performs better than another.

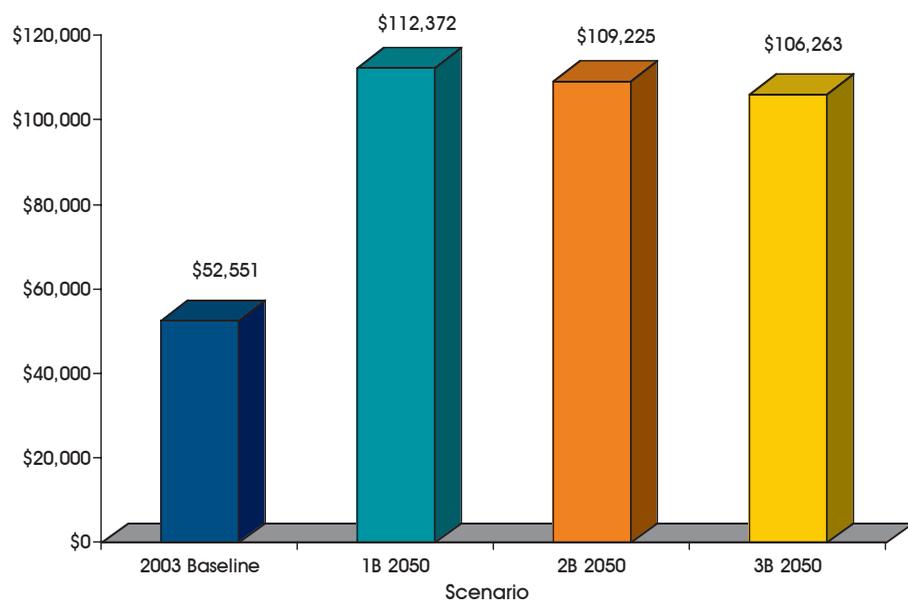


Figure 2.32 Median Household Income (2003 Dollars)

Table 2.14
Projected Average Annual Wages by Industry and Land Use

Broad Industry Group or Land Use Category	Current Dollars			2003 Dollars	
	2003	2025	2050	2025	2050
Farm & Agricultural Services	14,970	31,738	65,281	21,987	29,911
Construction & Mining	23,877	50,621	104,122	35,068	47,708
Manufacturing	31,853	68,469	140,353	47,433	64,308
Transportation, Communications, Public Utilities	35,922	74,914	153,398	51,897	70,285
Finance, Insurance and Real Estate	36,982	73,640	151,084	51,015	69,225
Retail Trade	20,316	43,055	88,446	29,827	40,525
Wholesale Trade	45,280	96,000	197,459	66,505	90,474
Private Services	28,677	62,608	130,768	43,372	59,917
Government	41,779	86,667	151,051	60,039	69,210
Activities Requiring:					
Commercial Land Uses	27,677	59,097	122,955	40,940	56,337
Industrial Land Uses	34,980	75,533	156,269	52,326	71,601
Institutional Land Uses	39,813	83,058	148,009	57,539	67,816
Average Annual Wage, Watershed Study Area					
Scenario 1A-1B	32,059	66,355	130,186	45,968	59,650
Scenario 2A-2B	32,059	66,356	130,186	45,968	59,650
Scenario 3A-3B	32,059	66,355	130,186	45,968	59,650

INFRASTRUCTURE

Summary of Infrastructure Assessment Results

The results of the Infrastructure assessments for transportation, air quality, schools, potable water and wastewater are summarized below. More detailed information on these assessments may be found in the Sub-task 3.2 and 3.6 reports.

Transportation Infrastructure

Transportation infrastructure is a key part of the Watershed landscape today. An efficient and effective transportation system is vital to the long-term sustainability of the Watershed. How people move through and within the Watershed in the future will shape the character of the region. Figure 2.33 illustrates how transportation level of service changes with Test Scenario 1 and 3 compared to the 2003 baseline. The measure "Volume to Capacity" is a standard method used to determine the level of service (LOS) on roadways.

- When compared to the test scenarios, volume to capacity and delays are the lowest in Test Scenario 3, making it the best option for reducing congestion and infrastructure costs (Table 2.15).
- This occurred because of distribution of new development along higher density corridors and new activity centers with improved transit services.
- Compared to Test Scenario 1, the transit systems in Test Scenarios 2 and 3 operated at shorter headways along the corridors serving the designated activity centers.

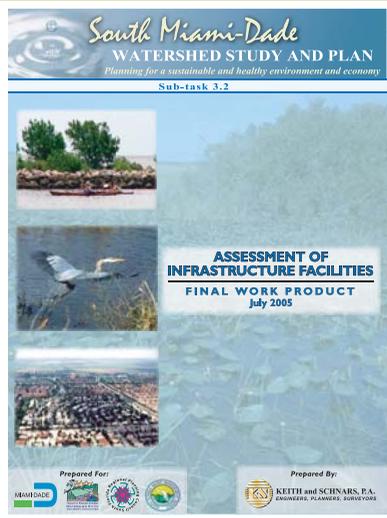
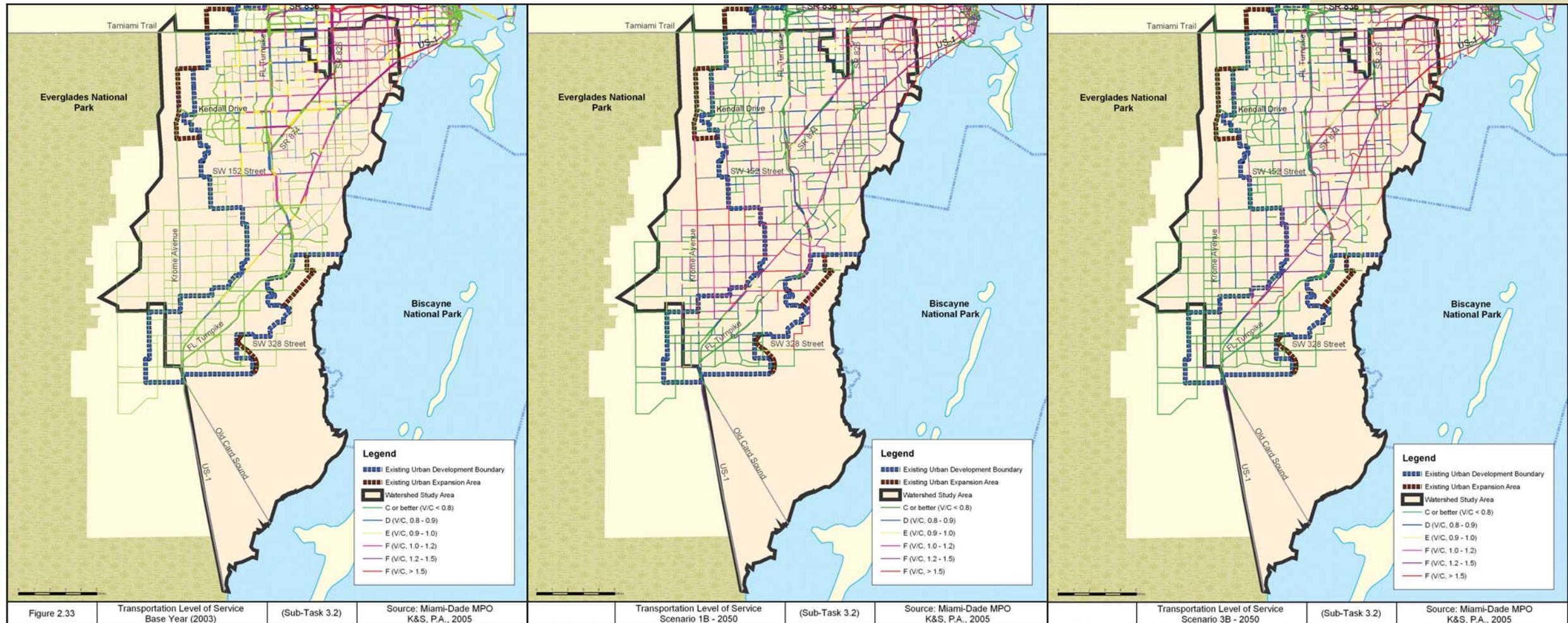


Table 2.15
Transportation – Adopted Level of Service, 2050

	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
Average Volume to Capacity	1.02 LOS F	1.0 LOS F	0.98 LOS E
Total Delays Due to Congestion - Hours	5,250,634	5,179,572	5,030,644
Total Cost to Improve Overcapacity Roads - Dollars	\$2.1 billion	\$2.0 billion	\$1.9 billion
Driving Miles per Year (Billions)	24.4	23.9	23.4





Summary: The higher density development pattern reflected in Test Scenario 3 performs the best and supports more efficient modes of transportation, including transit.

Air Quality

Pursuant to the Clean Air Act, the State Implementation Plan specifies vehicle emission budgets for air pollutants. There is a direct relationship between the total vehicle miles traveled and the emission levels of carbon monoxide (CO), volatile organic compounds (VOC) and oxides of nitrogen (NOx). Emissions are also affected by congested speed, which is calculated for each roadway.

- From an air quality perspective, the difference between the three test scenarios was negligible and all scenarios met current air quality standards (Table 2.16).
- Test Scenario 3 at 2050 produced slightly lower emissions in all three pollutant categories compared to Test Scenarios 1 and 2.

Table 2.16
Air Quality

Tons of Pollutants Per Day - 2050			
Pollutant	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
VOC	21.19	20.91	20.11
CO	388.23	383.01	368.41
NOx	18.19	17.94	17.26

Summary: Air emissions resulting from all three test scenarios meet State air quality requirements and as such do not provide a substantial basis for concluding that one test scenario performs better than another.

Schools Infrastructure

The purpose of the schools assessment was to determine public school demand and compare it with future public school capacity. Since the Study has a long-term planning horizon (43 years), the schools assessment considered capacity and planned improvements.

- The total number of public school enrollees for the Watershed is expected to grow to approximately 160,000 by 2025 and to 213,000 by 2050.
- Parts of the Watershed (Basins C-1, C-102, C-103 and Homestead/Florida City) must add student station capacity to accommodate the anticipated growth in enrollment.
- Compared to Test Scenario 1, the more compact development pattern of Test Scenario 3 would save approximately \$400 million in public school facilities costs over the planning horizon of 2050.
- The total cost of meeting capacity deficiencies in 2050 for Test Scenario 1 would amount to \$1.9 billion (2004 present value dollars). This is compared to \$1.5 billion for Test Scenario 3 (Figure 2.34).

Summary: While the number of students are the same across all test scenarios, the cost of providing school services is higher in Test Scenario 1 and the lowest in Test Scenario 3.

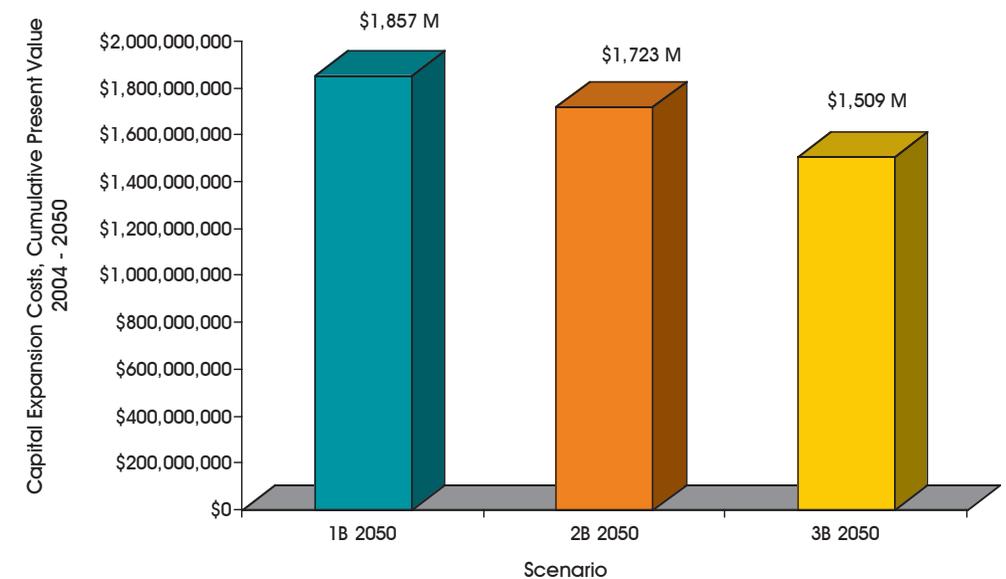


Figure 2.34 Public Schools (2004 Dollars)*

*Reflects both public and developer funded projects.

Potable Water Infrastructure

Providing clean and safe drinking water is vital to the health of the Watershed. As the population increases, greater demands will be placed on existing water supply infrastructure and new infrastructure will be required. How and where the population and associated dwelling units are distributed within the Watershed will determine the costs for providing this service.

Using the projected population, households, employment and acreage data for each test scenario, water demand was calculated out to the year 2050. Infrastructure costs were determined based on comparing incremental water supply costs associated with providing water to newly developed areas. Potable water costs included water connection fees, water mains and water treatment plant capacity. An allocation or attribution of these costs to different segments of society (public vs. private) was not made.

- Total urban water demand is less under Test Scenarios 2 and 3.
- Agriculture water usage is less under Test Scenario 1 as over 70 percent of the agriculture land has been converted to residential development.
- The total combined average annual water demands are greater under Test Scenarios 2 and 3 since they both have greater demands from agriculture (Table 2.17).
- The present value of total potable water capacity expansion and distribution costs is estimated to be \$1.2 billion for Test Scenario 3 over the entire planning horizon (2004-2050) compared to \$3 billion for Test Scenario 1 (Figure 2.35).
- The effect of recent reuse requirements of the FDEP and the recent SFWMD regional water availability rule are not included in this analysis.

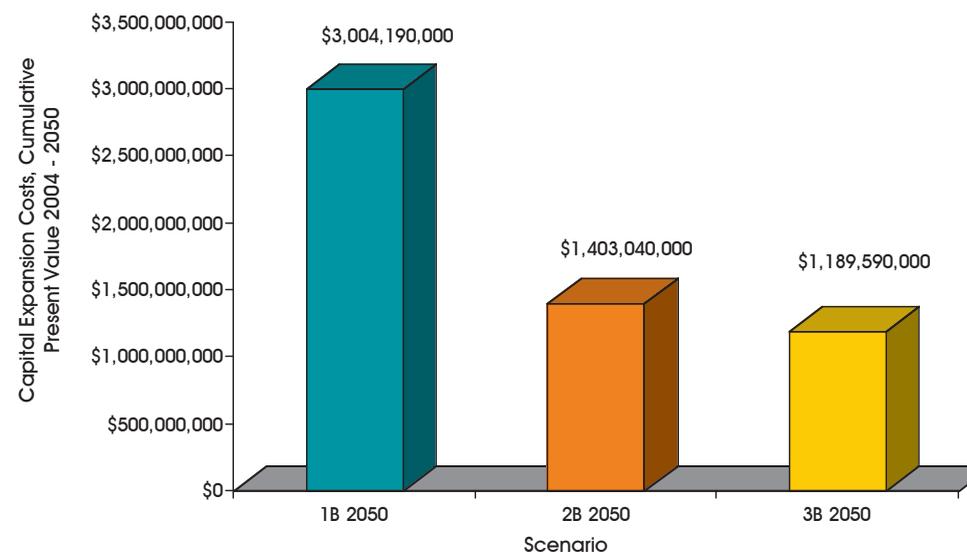


Figure 2.35 Potable Water (2004 Dollars) = Water connection fees, water mains, WTP capacity*
*Reflects both public and developer funded projects.

Table 2.17
 Projected Urban and Agricultural Water Demand for Watershed Study Area by Main Sector
 Million Gallons per Day

Water Demand Sector	Baseline		Test Scenario 1		Test Scenario 3	
	2003	%	2025	2050	2025	2050
Urban						
Public Water Supply	174.5	60.8%	234.4	302.0	234.5	293.0
Residential	81.2	28.3%	110.1	140.1	106.9	131.0
- Multifamily High Density	14.7	5.1%	18.4	23.7	28.9	50.1
- Multifamily Medium Density	10.4	3.6%	18.4	18.1	16.4	16.9
- Single-Family	56.1	19.5%	73.3	98.4	61.6	64.1
Non-Residential	93.3	32.5%	124.2	161.9	127.6	162.0
- Commercial	60.4	21.0%	88.6	123.7	92.0	123.7
- Industrial	6.5	2.3%	7.0	7.4	6.8	7.5
- Institutional	26.4	9.2%	28.6	30.8	28.7	30.8
- Agriculture	0.05	0.02%	0.003	0.0016	0.015	0.01
Domestic Self Supply	8.1	2.8%	8.7	2.2	10.0	6.2
Commercial/Industrial Self Supply	12.4	4.3%	17.0	24.4	17.0	24.4
Recreational Self Supply	18.4	6.4%	20.8	22.8	20.8	23.1
Power	10.4	3.61%	12.0	14.2	12.0	14.2
Total Urban Demand	223.8	77.9%	292.9	365.7	294.3	361.0
Agricultural-Self Supply						
Citrus	0.4	0.1%	0.3	0.1	0.4	0.4
Other Fruits & Nuts	3.8	1.3%	2.6	1.0	3.5	3.4
Vegetables, Melons, Berries	30.7	10.7%	21.1	8.2	27.7	27.4
Plant Nurseries/Ornamentals	26.6	9.2%	20.4	7.5	22.9	22.8
Misc. Other (Cattle, Aquaculture)	1.9	0.7%	1.1	0.6	1.2	1.2
Total Agricultural Demand	63.4	22.1%	45.5	17.4	55.5	55.2
Total Urban and Agricultural Demands	287.2	100%	338.4	383.1	349.8	416.2
FKAA (So. Miami-Dade Exports)	16.7		21.4	22.7	21.4	22.7
Grand Total Including Exports	303.8		359.8	405.8	371.2	438.9

*Does not include the cost of the County's proposed reuse of water conservation programs.

Summary: While the actual water demands are less under Test Scenario 1 because of losses of agriculture land, the cost of providing the necessary water supply infrastructure is more than double the costs of Test Scenarios 2 and 3.

Wastewater Infrastructure

Like drinking water, providing effective wastewater treatment is vital to the health of the Watershed. Population increases will place greater demands on the wastewater infrastructure. New wastewater infrastructure will be required. How and where the population and associated dwelling units are distributed within the Watershed will determine the costs for providing this service.

Using the projected population, households, employment and acreage data for each test scenario; wastewater demand was calculated out to the year 2050. Infrastructure costs were determined based on comparing incremental costs associated with providing wastewater service to newly developed areas. The estimated wastewater infrastructure costs included sewer connection fees, force mains, gravity sanitary sewer lines, sewage pumping stations and wastewater treatment plant capacity. An allocation or attribution of these costs to different segments of society (public vs. private) was not made.

- Wastewater infrastructure costs for Test Scenario 3 between 2004 and 2050 are approximately \$7 billion compared to over \$12 billion for Test Scenario 1 (Figure 2.36).
- The actual wastewater demands are similar for all test scenarios (Table 2.18).
- By 2050, total wastewater treatment capacity in the County must approach 565 million gallons per day (mgd), less an allowance volume for water reuse that was not estimated. As such, an additional wastewater treatment plant capacity of 150 mgd will need to be in place by 2050.

Summary: While the actual wastewater demands are similar under all test scenarios, the cost of providing the necessary wastewater infrastructure under Test Scenario 1 is nearly double the cost of Test Scenario 3.

Table 2.18
Projected Wastewater Flows (mgd)

	Average Annual Daily Flow			Peak Wet Weather Flows	
	2005	2025	2050	2025	2050
Scenario 1	176.2	222.7	286.9	989.2	1,274.7
Scenario 2	175.9	219.8	277.8	976.2	1,234.0
Scenario 3	176.0	222.8	278.4	989.6	1,236.7
Systemwide (MD County)	325.2	410.1	547.9	1,821.7	2,433.9

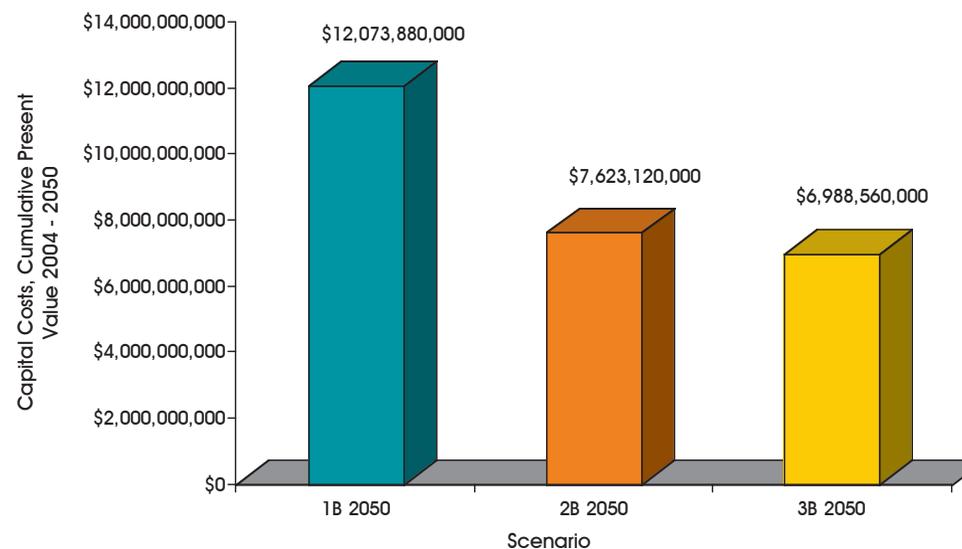


Figure 2.36 Wastewater (2004 Dollars) = sewer connection fees, force mains, gravity sanitary sewer lines, sewage pumping stations, WWTP capacity*
*Reflects both public and developer funded projects.

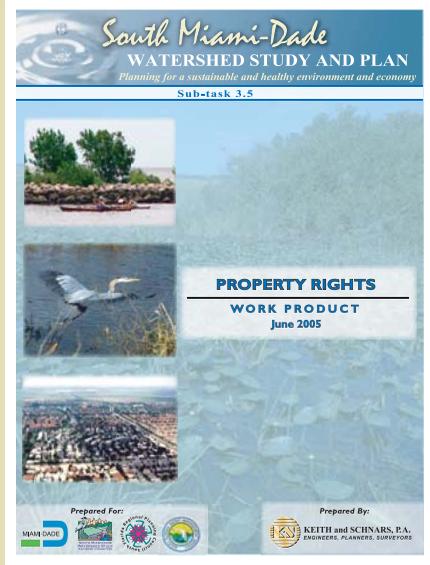


Property Rights Assessment (Sub-task 3.5)

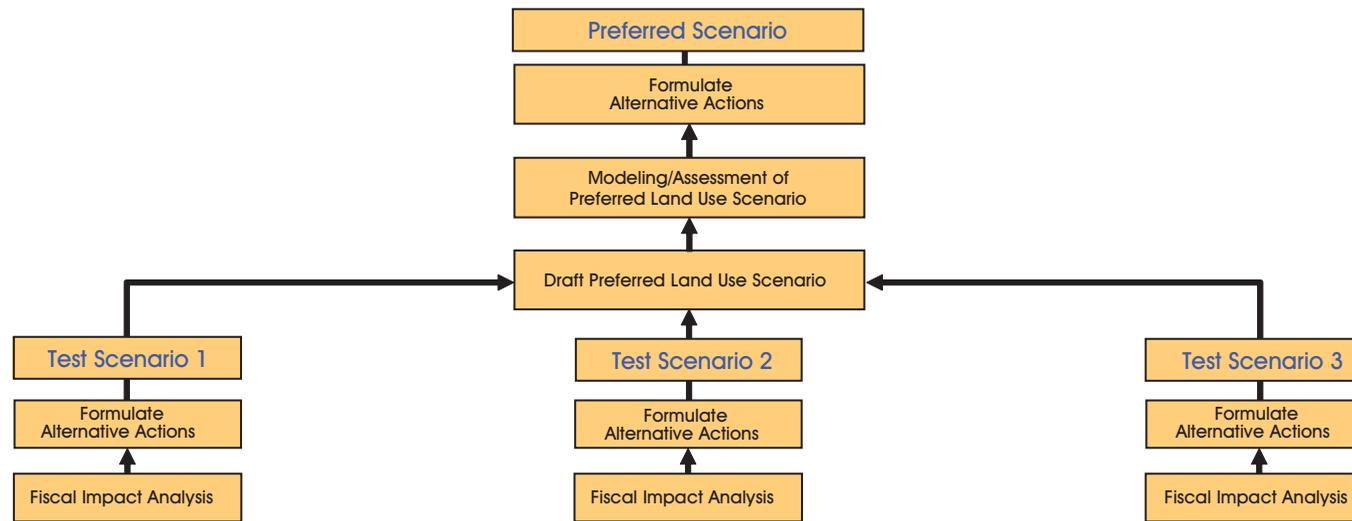
The protection of private property rights is a requirement of the County's Comprehensive Development Master Plan (CDMP) Land Use Policy 3E and is included in the WSAC goals. As such, the protection of private property rights served as a guiding principle for the Study and the formulation of the Recommended Watershed Plan. The first step in implementing this principle was to obtain a common understanding of the legal context and background for federal and State property rights law. In this regard, a report was completed to help determine if the Study planning process created any exposure or liability under Takings Law, the Bert Harris Private Property Act, or any other theory of law. Specifically, the following legal authorities were evaluated:

- 5th Amendment to the United States Constitution (made applicable to states through the 14th Amendment);
- Art. 10, §6 of the Constitution of Florida; and
- Chapter 70, Florida Statutes (Bert J. Harris, Jr., Private Property Rights Protection Act).

Readers are encouraged to review the more detailed legal analysis presented in the Sub-task 3.5 report. In addition, several implementation strategies are included in the Recommended Watershed Plan to ensure the protection of property rights.



TASK 4



Based on the results of the test scenario assessments in Task 3, a draft preferred scenario was formulated in Task 4. This represented the starting point for the final Watershed Plan recommended in Chapter 5.

The draft preferred scenario was refined based on input from the WSAC, stakeholders, the public, and the Technical Review Committee. The draft preferred scenario was then assessed against the same 21 parameters and thresholds used to assess the test scenarios in Task 3. The results from the work products completed in Task 4 are summarized below.

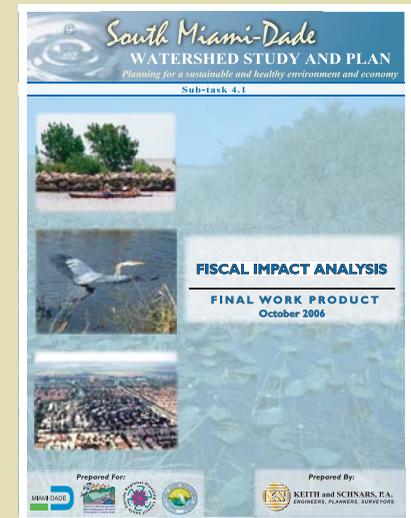
Fiscal Impact Analyses (Sub-task 4.1)

Fiscal Impact Analysis

To measure the potential public budgetary impact of each test scenario, including the draft preferred scenario, a comprehensive analysis was completed that evaluated the fiscal impact on the County and

the incorporated municipalities within the Watershed for each year out to 2050 (Note: The Fiscal Impact Analysis included the draft preferred scenario that was formulated in Sub-task 4.2 and is discussed below).

The fiscal impact analysis measured the net public balances (revenues - expenditures) that would accrue to the jurisdictions providing municipal services to the Watershed's taxpayers. Projected public expenditures included the additional future capital cost investments identified from the infrastructure assessments, and long-term operational and maintenance costs out to 2050. Projected revenues were based on the land use and



density patterns modeled under each test scenario and the historical tax bases that corresponded to these densities and mix of residential, commercial and industrial parcels.



The method used to measure fiscal impacts was the modified per capita/average costing approach, which was based on the household, employment and population projections completed in Sub-task 1.2. Given the long-term planning nature of the study, this method was chosen after discussion with the TRC. The analysis was completed at the canal basin level, to capture the allocation of households per each test scenario, and to reflect the municipal service demands expected within key growth areas of the Watershed. The details of this analysis can be found in the Sub-task 4.1 report.

Summary of Fiscal Impact Results

The results indicated that the more compact design of Test Scenarios 2 and 3 and the Draft Preferred Scenario would result in more favorable fiscal balances over the planning horizon compared to Test Scenario 1. Both the County and incorporated municipalities would save taxpayer resources by following and implementing land use development strategies that are consistent with the Smart Growth-based Draft Preferred Scenario. Specifically,

- Test Scenario 1 would result in more persistent annual public deficits (expenditures exceeding revenues) over time.
- Compared to the future development pattern exhibited by Test Scenario 1, the Draft Preferred Scenario would result in cumulative net public resource savings to taxpayers of approximately \$3.5 billion over the entire planning horizon.
- Cumulatively, the present value sum (2003-2050) of all future annual balances (surpluses and deficits) would total -\$437 million

for the Draft Preferred Scenario. Test Scenario 1 resulted in a cumulative deficit of -\$3.9 billion over the planning period. Table 2.19 summarizes the key differences across scenarios.

- The results of the fiscal analysis were also expressed in terms of important public debt burden ratios followed by the bond rating agencies. The Draft Preferred Scenario's average per capita deficit (over planning horizon) would represent 12 percent of the average net general obligation bonded debt per capita (for Miami-Dade County). In contrast, Test Scenario 1's average per capita deficit of -\$115 per person would represent 111 percent of the existing net general obligation bonded debt per person. The future growth obligations imposed by Scenario 1 would mark a reversal of the improving trend in the County's ratio of bonded indebtedness per capita.

Table 2.19
Fiscal Impact Analysis Results
Cumulative Present Value Sum of Future Annual Fiscal Balances
(Surpluses & Deficits) Over the Planning Horizon (in Millions of \$)

Time Period	Test Land Use Scenario			
	1	2	3	Draft Preferred
2003 - 2025	\$ (1,958)	\$ 701	\$ 831	\$ 425
2003 - 2050	\$ (3,943)	\$ (226)	\$ (183)	\$ (437)

Summary: The relatively more favorable fiscal outcomes for the Draft Preferred Scenario and Test Scenarios 2 and 3 (compared to Test Scenario 1) are attributable to less spatial expansion of the urban area (outside of the UDB). Test Scenario 1 would require more extensive public infrastructure capital investments in order to sustain an equivalent population.

Draft Preferred Scenario (Sub-task 4.2)

The Draft Preferred Scenario was formulated based on the results of the analyses completed in Sub-task 3, and input from the WSAC, TRC, and the public. Specifically, the Draft Preferred Scenario was informed by the results of the assessments of the six test scenarios (Sub-task 3.6). After evaluating the performance of the test scenarios it was determined that, on balance, Test Scenarios 2 and 3 performed the best and should be the starting point for the Draft Preferred Scenario. Both of these test scenarios were based on more compact development patterns, using Smart Growth approaches.

Like the test scenarios, the Draft Preferred Scenario is based on the population projections developed as part of Sub-task 1.2. The relationship between population growth and changes in land use is described in Sub-task 2.2, including the amount of residential and non-residential land uses required to support the projected population (see Table 2.4). Concepts and ideas for distributing land uses in the Draft Preferred Scenario were first discussed with the WSAC at a series of open house meetings in August 2005. These meetings provided members an opportunity to describe their vision for the Draft Preferred Scenario. Based on these meetings and the emerging results for the test scenario assessments, general concepts for allocating land uses in the Draft Preferred Scenario were developed.

A key component of the WSAC input was a general desire to focus new development around existing and future transit service and corridors. To provide a better sense of the level of public support for this approach, Keith and Schnars consulted with the Miami-Dade County Department of Planning and Zoning Urban Design Center, which has been conducting charrettes since its inception in 2002. A charrette is an intensive, consensus-based public planning workshop designed to develop a community's vision for its growth and future development. Upon completion of a charrette, a charrette report is prepared that includes the community's vision and a prioritized set of recommendations for consideration by the Board of County Commissioners. Within

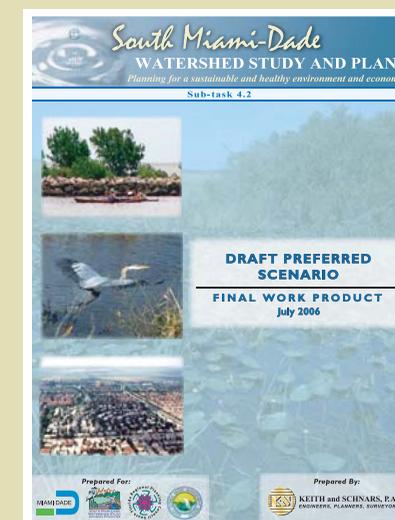
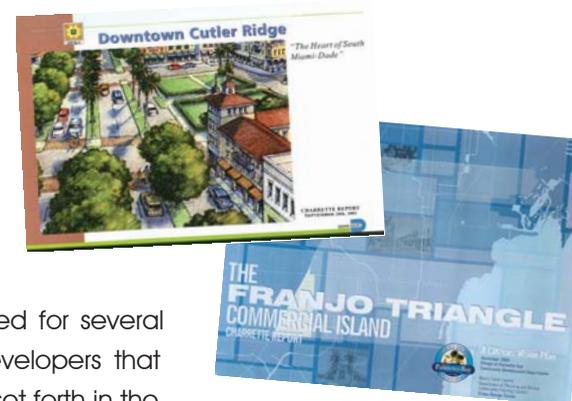
the Watershed, seven charrettes had been successfully completed at the time the Watershed Study began. Located generally along U.S. 1, these charrettes include Downtown Kendall, Naranja, Goulds, Old Cutler Road, Cutler Ridge, Perrine, and Princeton. An eighth charrette, the Franjo Triangle Commercial Island located in Palmetto Bay, was initiated after the Watershed Study began (See Figure 2.37).

Once a charrette report is accepted,

implementation strategies such as zoning regulations are developed in order to facilitate the community's vision. Revisions to the zoning code

have been processed for several of these areas. Developers that comply with criteria set forth in the new zoning district can obtain approval for their projects administratively rather than through a public hearing process. In most cases the new zoning rules allow for more intense development than the previous zoning. The average residential density recommended in the charrette plans that are located within the Watershed is 21 dwelling units per acre.

Developers have taken advantage of the streamlined approval process in several charrette areas, including Downtown Kendall and Naranja. Since the completion of the Cutler Ridge and Old Cutler Road Charrettes, the Town of Cutler Bay has been established, and these charrette areas fall entirely or partially within its borders. The Town has already created an Urban Center District for that portion of the Cutler Ridge Charrette falling within its boundaries, and is in the process of implementing the Old Cutler Road Charrette. The Town of Palmetto Bay has likewise created a zoning district implementing the Franjo Triangle Commercial Island charrette, which includes design and use standards developed with the assistance of the Urban Design Center.



SMART GROWTH PRINCIPLES:

- More compact building design;
- Mix of land uses;
- Provide a variety of transportation choices with efficient transit;
- Strengthen and direct development towards existing communities;
- Preserve open space, farmland, natural beauty and critical environmental areas such as Biscayne Bay;
- Create walkable neighborhoods;
- Create range of housing opportunities and choices;
- Foster distinctive, attractive communities with a strong sense of place; and
- Encourage community and stakeholder collaboration.

Source: www.smartgrowth.org



A Draft Preferred Scenario design guide map (Figure 2.38) was developed using the data obtained from the test scenario assessments (Sub-task 3.6 report) and information contained in the charrette area plans and input from the WSAC and TRC. Smart Growth principles were also incorporated into the development of this design guide.

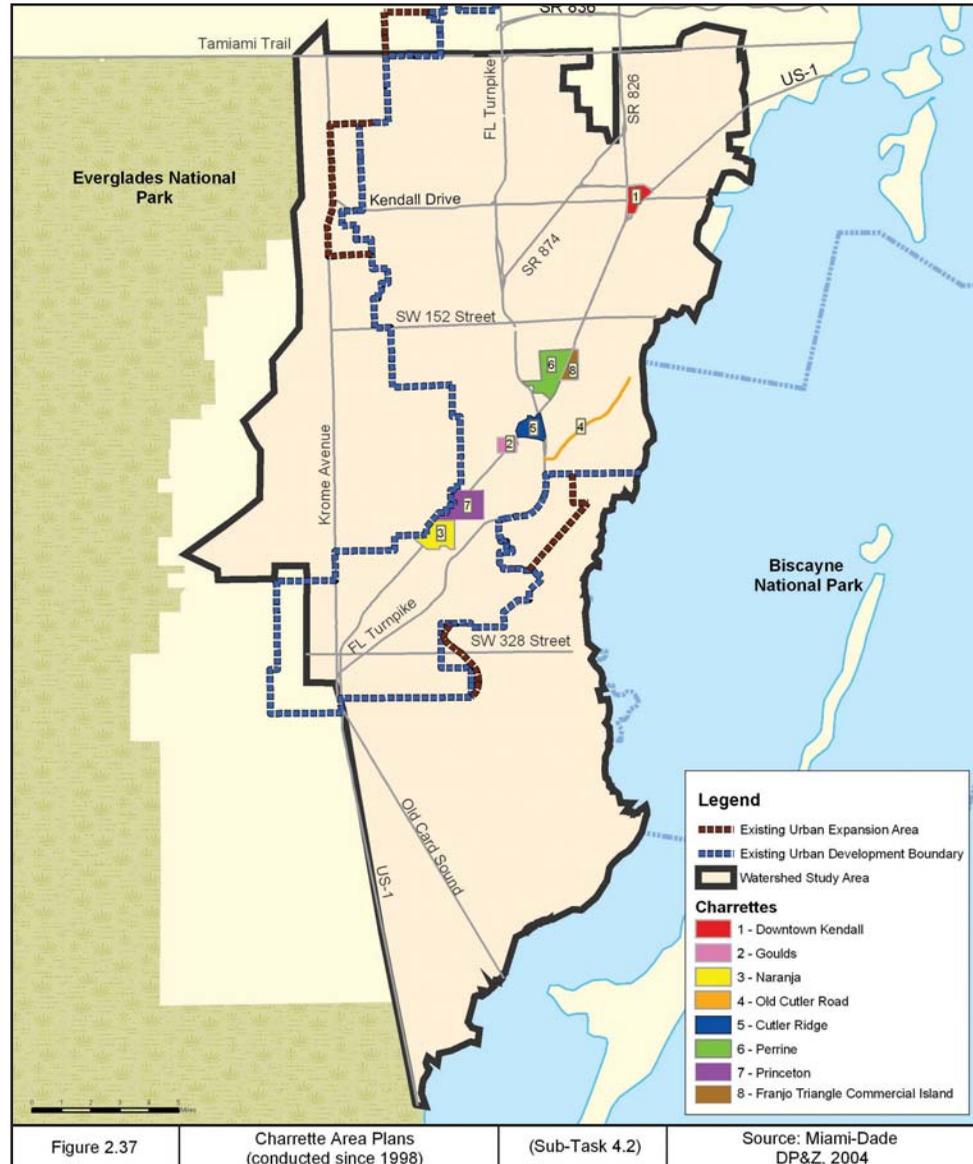


Figure 2.37

Charrette Area Plans
(conducted since 1998)

(Sub-Task 4.2)

Source: Miami-Dade
DP&Z, 2004

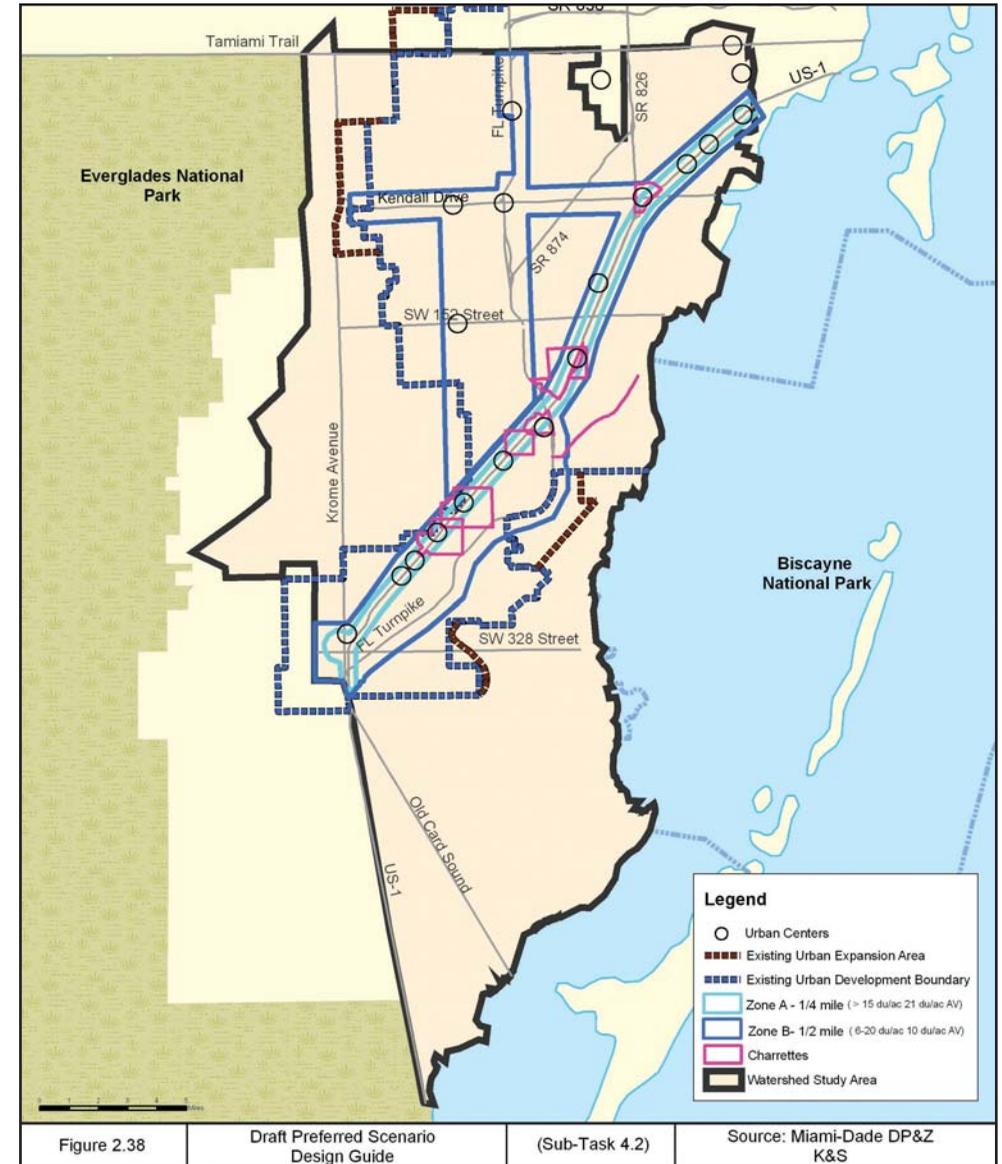


Figure 2.38

Draft Preferred Scenario
Design Guide

(Sub-Task 4.2)

Source: Miami-Dade DP&Z
K&S

The design guide map reflects the land use framework necessary to minimize and mitigate for impacts from the projected population increases in 2025 and 2050. As discussed in the Sub-task 2.2 report, the single most important factor in determining impacts from population growth is residential housing. While the number of dwelling units required is a constant (204,000 at 2050), where and how the units are placed will have a substantial impact on the overall environmental and economic health of the Watershed, including water quality in Biscayne Bay, natural resources, agriculture land and transportation. In Figure 2.39, Environmental Protection Agency research on Smart Growth demonstrates this point in a hypothetical watershed. Consistent with these results, the design guide map will help facilitate the distribution of the required dwelling units in the Watershed in a Smart Growth pattern that minimizes the amount of pollutant runoff being discharged into Biscayne Bay.

As noted in Table 2.20, the Draft Preferred Scenario design guide map was formulated through a step-by-step process that was informed by input from the WSAC, including the support of many WSAC members for increased densities along US 1 and other transit corridors.

Figure 2.39
Environmental Protection Agency
Research on Smart Growth and Density

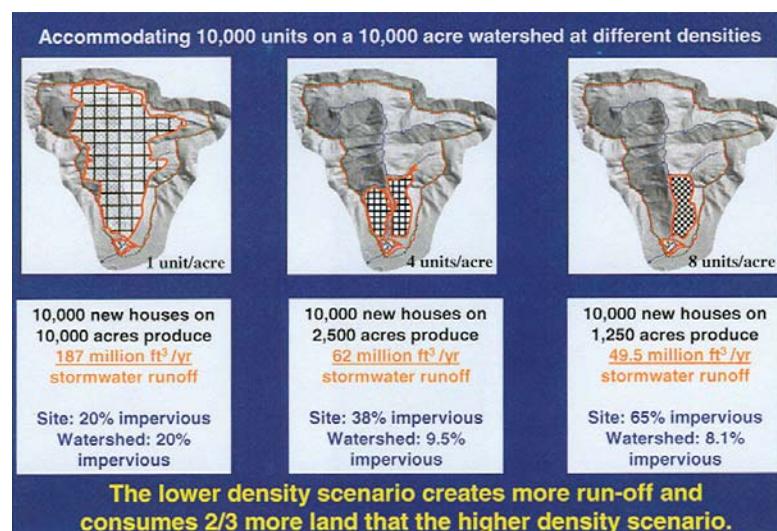


Table 2.20
Development of the Draft Preferred Scenario -
WSAC Opportunities for Review and Comment

Date	Discussion
August 17, 2005	WSAC Open House. Planning principles, charrette plans and strategies for using the test scenario results to inform the Draft Preferred Scenario.
August 24, 2005	WSAC Open House. Planning principles, charrette plans and strategies for using the test scenario results to inform the Draft Preferred Scenario.
December 8, 2005	WSAC Meeting 37. Draft Preferred Scenario Planning principles.
December 22, 2005	WSAC Meeting 38. Planning principles continued. WSAC members made 39 suggestions on how to develop the Draft Preferred Scenario.
January 12, 2006	WSAC Meeting 39. Presentation of the guidelines used to develop the Draft Preferred Scenario, presentation of the preliminary Draft Preferred Scenario map. Questions posed to breakout groups, and development of alternatives by breakout groups.
January 26, 2006	WSAC Meeting 40. Revision of the preliminary Draft Preferred Scenario map. Presentation of a revised scenario based on January 12, 2006 WSAC comments.
February 9, 2006	WSAC Meeting 41. Review of the revised Draft Preferred Scenario and initial consensus discussion. Presentation of a revised Draft Preferred Scenario map based on January 26, 2006 WSAC comments.
February 23, 2006	WSAC Meeting 42. Continuation of the review of the revised Draft Preferred Scenario map and submission of written comments and concerns. Presentation of a revised Draft Preferred Scenario map based on previous WSAC comments.



10 dwelling units per acre



21 dwelling units per acre



87 dwelling units per acre

As noted on the Draft Preferred Scenario design guide map, a key attribute is the concentration of land uses along existing and future transit corridors. To create a framework for guiding future development, two zones were established as follows:

- Zone A: Located ¼ mile on each side of US 1 with a total of 8,300 acres. Minimum density of 15 dwelling units per acre and average density of 21 units per acre;
- Zone B: Generally located ½ mile on each side of US 1 and along other major corridors such as Kendall Drive and 137th Avenue with a total of 41,900 acres. Density range is 6 to 20 dwelling units per acre with an average of 10 units per acre.

The higher densities in Zone A are required to support premium mass transit. While the charrettes and urban centers were connected in Zone A to create a high-density transit corridor, **it was not intended or recommended that every acre in Zone A would have the densities noted above.** These densities would be achieved on vacant land and where redevelopment makes sense. The southernmost portion of Zone A was expanded to include the redevelopment plans of the City of Homestead and Florida City.

Zone B was established as a transition zone to allow for multi-family and, where appropriate single family development. Like Zone A, **it was not intended or recommended that every acre in Zone B would have the densities noted above.**

After creating the Draft Preferred Scenario design guide map with Zones A and B, land uses were then allocated to the Watershed based on the projected population at 2025 and 2050 (Tables 2.21, 2.22, 2.23, 2.24). Specifically, land use allocations were made based on the following approach:

Step 1A - Land uses were allocated to vacant and agricultural areas inside the existing UDB. For residential dwelling units, the densities described in Tables 2.21 and 2.23 were used.

Step 1B - Residential dwelling units were allocated to charrette areas and community redevelopment areas in accordance with adopted plans as noted in Tables 2.21 and 2.23. It was assumed that approximately 75 percent of the densities anticipated with the hypothetical buildout in each charrette area would be achieved by 2050. This conservative assumption resulted in the allocation of 22 percent of the total units required in 2050 to the charrette areas. It is possible that additional units could be allocated in some charrettes because the implementing ordinances already allow it. In these areas developers do not have to request rezoning or land use plan amendments to construct units within the approved densities.

Step 2 - Additional units were allocated inside the existing UDB based on the assumption that only 10 percent of the currently-developed land inside Zones A and B but outside the charrettes would be redeveloped at higher densities by 2050. As noted by the TRC, this is a conservative assumption, as it is likely that more redevelopment in these zones will occur over the next 43 years.

Step 3 - After dwelling units were distributed as noted in Steps 1 and 2 above, the remaining approximately 43,000 units required after 2025 were allocated outside the existing UDB at five dwelling units per acre (Table 2.23). It is important to note that this reflects the maximum number of units that would be allocated outside the existing UDB and this would occur after 2025 and only if necessary. It is reasonable that many, if not most, of these units could be placed inside the existing UDB if the densities achieved along the transit corridors are greater than assumed.

Table 2.21
Draft Preferred Scenario Residential Unit Allocations 2025

Location	Dwelling Units	Percentage of Units
Charrettes	30,680	30%
Zone A not in a Charrette	14,471 (21 du/acre)	14%
Zone B not in a Charrette	37,426 (10 du/acre)	37%
Remaining Vacant/Agricultural land inside UDB	19,126 (5 du/acre)	19%
TOTAL	101,703	100%

Table 2.23
Draft Preferred Scenario Residential Unit Allocations 2050

Location	Dwelling Units	Percentage of Units
Charrettes	45,787	22%
Zone A not in a Charrette	31,236 (21 du/acre)	15%
Zone B not in a Charrette inside UDB	52,936 (10 du/acre)	26%
Zone B not in a Charrette outside UDB	20,059 (10 du/acre)	10%
Vacant/Agricultural land inside UDB	31,657 (5 du/acre)	16%
Vacant/Agricultural land outside UDB	22,602 (5 du/acre)	11%
TOTAL	204,277	100%

Table 2.22
Draft Preferred Scenario Nonresidential Acreage Allocations 2025

Land Use	Acres
Parks	889
Government/Education	196
Hospital	46
Religious	10
Industrial	189
Commercial	2,257
TOTAL	3,587

Table 2.24
Draft Preferred Scenario Nonresidential Acreage Allocations 2050

Land Use	Acres
Parks	1,759
Government/Education	383
Hospital	88
Religious	20
Industrial	350
Commercial	5,055
TOTAL	7,655

Based on the Draft Preferred Scenario design guide map and the land use allocations described above, Draft Preferred Scenario land use assessment maps for 2025 and 2050 (Figures 2.40 and 2.41) were developed to reflect potential development patterns. **It is important to note that these maps were developed for assessment purposes only and may not represent actual development patterns or land uses on a particular parcel.** The actual densities and location of residential units within the design guide framework will be determined by local communities, developers, Cities and the County.



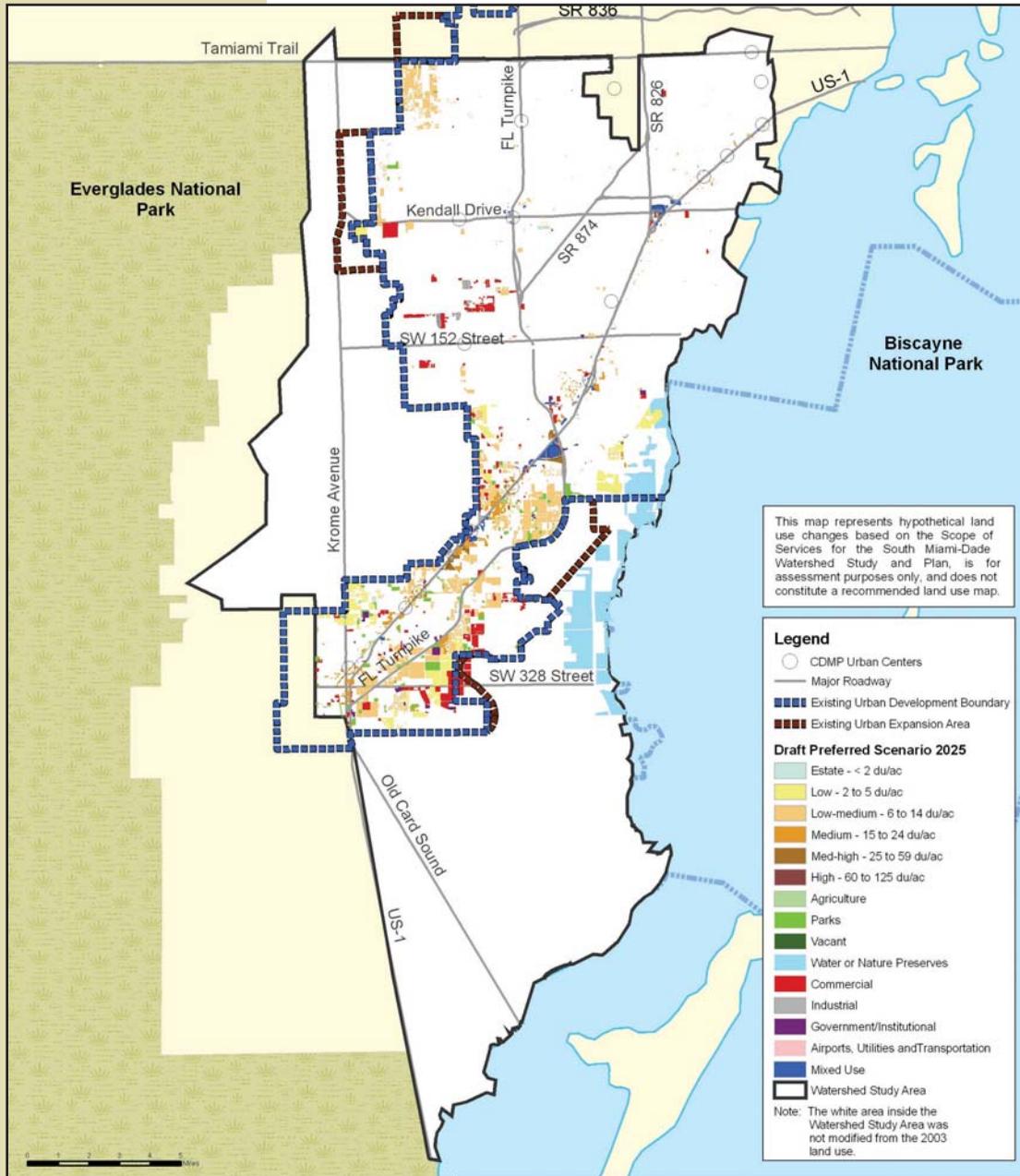


Figure 2.40

Draft Preferred Scenario Assessment Map 2025

(Sub-Task 4.2)

Source: K&S, P.A. For assessment purposes only.

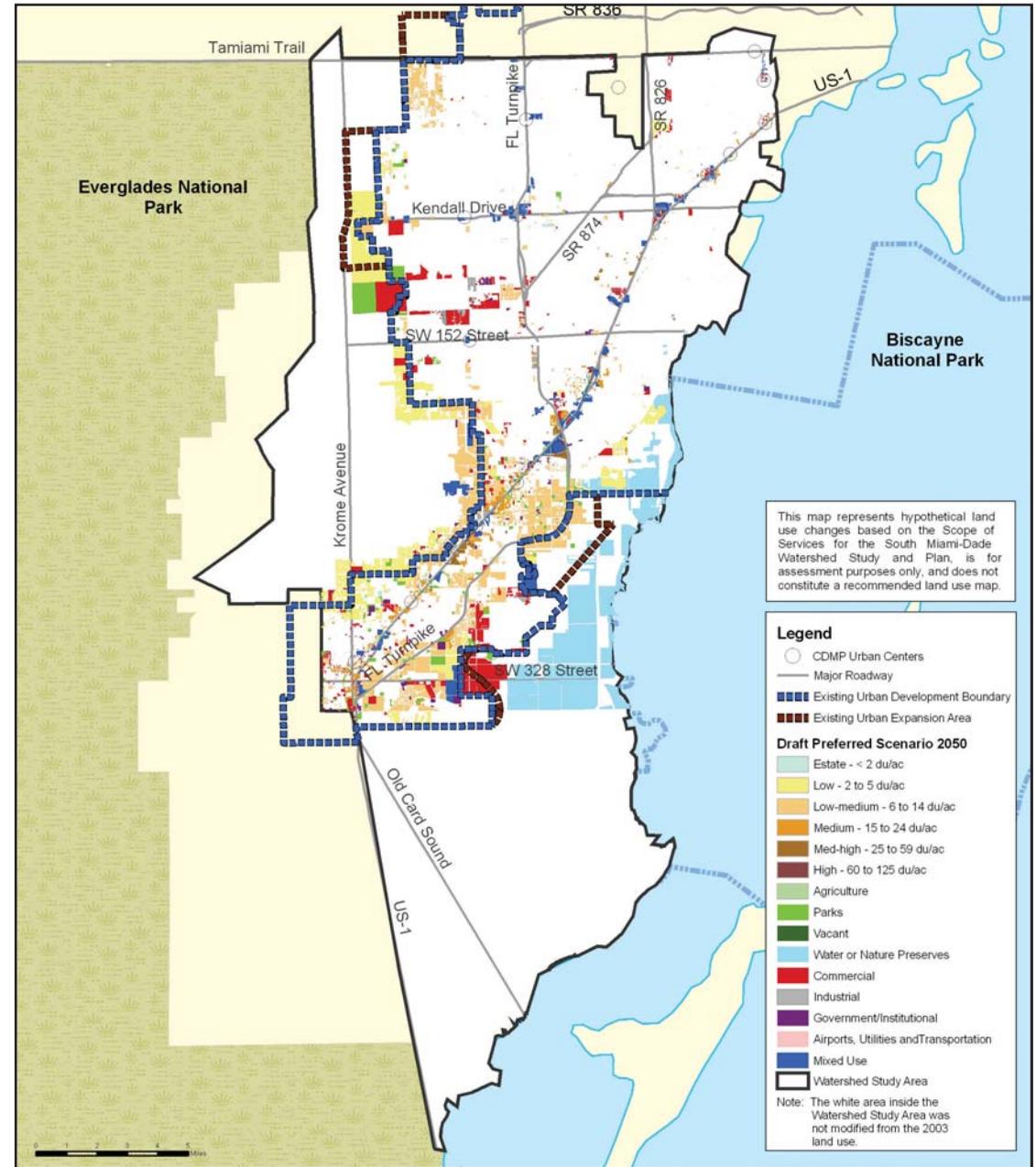


Figure 2.41

Draft Preferred Scenario Assessment Map 2050

(Sub-Task 4.2)

Source: K&S, P.A. For assessment purposes only.

An important part of the cultural and policy making fabric of the Watershed is the eight municipalities. As illustrated in Figure 2.42, with the exception of West Miami, these incorporated cities are generally located along the US 1 corridor. These cities will play an important role in how and where growth occurs in the Watershed. Because they are located along a major transit corridor, they will also play an important role in ensuring that the transit-oriented development pattern advocated by the Watershed Plan is implemented. In the Draft Preferred Scenario approximately 25 percent of the dwelling units necessary in 2050 were allocated within the boundaries of the seven cities, located along US 1.



Assessment of the Draft Preferred Scenario (Sub-task 4.3)

The next step in the Study process was the assessment of the performance of the Draft Preferred Scenario using the 21 parameters and thresholds established in Sub-task 1.8. These assessment results were compared to the results of the test scenario assessments completed in Task 3. Based on this information, a final Preferred Scenario and associated implementation strategies (Recommended Plan) were developed in Task 5.

In Table 2.25 the 2050 assessment results are ranked and qualitatively summarized, with red representing the scenario(s) that performed the worst, yellow representing intermediate or mixed performance, and green representing the scenario(s) that performed the best. The color ranking is for ease of comparison only and does not necessarily indicate that a scenario meets or exceeds a threshold level for a particular parameter.

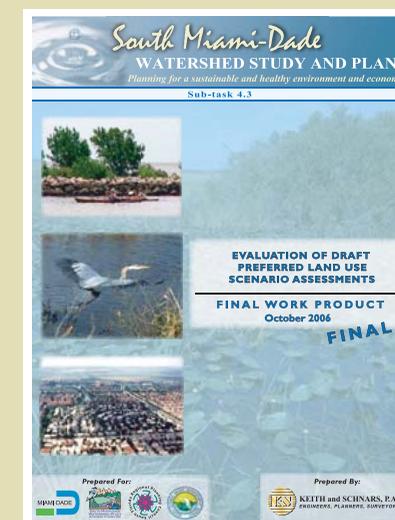


Table 2.25
Qualitative Summaries of 2050 Scenario Assessment Results

Ref #	Parameter	Test Scenario 1	Test Scenario 2	Test Scenario 3	Draft Preferred Scenario
WR-1	Water Quality	■	■	■	■
WR-2	Groundwater Demand	■	■	■	■
WR-3	Surface Water Flows/Distribution	■	■	■	■
WR-4	Flood Protection	■	■	■	■
NC-1	Tidal Wetlands	■	■	■	■
NC-3	Native-Plant-Dominated Freshwater Wetlands	■	■	■	■
NC-3	Exotic-Plant-Dominated Freshwater Wetlands	■	■	■	■
NC-3	Transitional Freshwater Wetlands	■	■	■	■
NC-4	Remnant Natural Forests	■	■	■	■
LU-1	Development Densities	■	■	■	■
LU-2	Agricultural Land	■	■	■	■
LU-3	Proximity of Housing and Employment to Transit	■	■	■	■
LU-4	Parks, Recreation and Open Space	■	■	■	■
EC-1	Economic Base	■	■	■	■
EC-2	Cost of Housing	■	■	■	■
EC-3	Mix of Wages	■	■	■	■
IS-1	Transportation	■	■	■	■
IS-2	Public Schools	■	■	■	■
IS-3	Potable Water	■	■	■	■
IS-4	Wastewater	■	■	■	■
IS-5	Air Quality	■	■	■	■

■ Lowest Performance ■ Mid-Level Performance ■ Best Performance

Note: The color descriptions in this table are for comparison purposes only and do not necessarily suggest acceptable performance. In some cases, two or more test scenarios exhibited similar performance on a parameter and were labeled the same color.



Protecting the waters of Biscayne Bay is one of the primary objectives of the Watershed Plan. In this regard, Table 2.26 provides the comparative analysis of water pollutant loadings that result from each test scenario and the Draft Preferred Scenario. This data demonstrates clearly three key points:

- Test Scenario 1 (the sprawl scenario) will result in substantially higher levels of pollution discharged into Biscayne Bay;
- All scenarios increase pollutant loads to Biscayne Bay; and
- The approach where the impacts from such substantial growth can best be mitigated is the more compact, higher density approaches in Test Scenario 3 and the Draft Preferred Scenario.

Table 2.26
Test Scenario Water Quality Assessments for all Basins
(C-1, C-2, C-100, C-102, and C-103)

Water Quality Parameter Id	Baseline Scenario	Scenario 1 B Year 2050		Scenario 2 B Year 2050		Scenario 3 B Year 2050		Draft Preferred Year 2050	
	Pollutant Load (lbs)	Pollutant Load (lbs)	% Difference Scenario 1/ Baseline	Pollutant Load (lbs)	% Difference Scenario 2/ Baseline	Pollutant Load (lbs)	% Difference Scenario 3/ Baseline	Pollutant Load (lbs)	% Difference DPS / Baseline
BOD5	203,034	358,674	77	264,712	30	248,095	22	288,024	42
COD	1,087,243	1,941,088	79	1,446,700	33	1,348,420	24	1,575,283	45
TSS	895,850	1,420,126	59	1,134,517	27	1,072,811	20	1,204,604	34
TDS	7,868,403	17,576,643	123	12,344,446	57	11,528,019	47	11,308,621	44
TN	43,045	66,636	55	55,357	29	52,778	23	54,128	26
Nox-N	12,857	31,925	148	17,661	37	18,666	45	18,693	45
NH3-N	2,458	4,516	84	3,524	43	3,259	33	3,780	54
TKN	26,488	46,214	74	35,208	33	33,056	25	35,808	35
TP	6,811	9,880	45	8,423	24	8,115	19	8,344	23
DP	4,249	7,319	72	5,881	38	5,573	31	5,537	30
Cd	58	138	138	95	63	86	48	101	73
Copper	764	1,076	41	992	30	985	29	914	20
Lead	2,531	5,896	133	3,970	57	3,606	42	4,405	74
Zn	1,810	3,396	88	2,535	40	2,376	31	2,718	50

Lowest Performance Best Performance



WATER POLLUTANTS EVALUATED

- (BOD5): 5 day Biochemical Oxygen Demand
- (COD): Chemical Oxygen Demand
- (TSS): Total Suspended Solids
- (TDS): Total Dissolved Solids
- (NH3-N) (or TN): Total Nitrogen
- (NOx-N): Nitrate Nitrite
- (NH3-N): Ammonia Nitrogen
- (TKN): Total Kjeldahl Nitrogen
- (TP): Total Phosphorus
- (DP): Dissolved Phosphorus
- (Cd): Total Cadmium
- (Cu): Total Copper
- (Pb): Total Lead
- (Zn): Total Zinc

In addition to very poor performance for water quality, as illustrated in Figure 2.43, Test Scenario 1 results in a potential 30 percent increase in flooding in the Watershed. While the Draft Preferred Scenario performs the best in comparison to the other scenarios, flooding potentially increases by 12 percent. As with the water quality data above, this flooding information points out the reality that growth will come at a cost under any scenario.

The complete assessment results for each parameter are provided in matrix form in Table 2.27. Parameters were organized based on two levels of importance: Primary Parameters and Secondary Parameters. Primary Parameters are defined as those parameters that on a stand-alone basis are generally integral to meeting the goals of the Plan. As such, primary parameters received more weight when the overall performance of each scenario was determined. For example, ensuring a healthy and sustainable Biscayne Bay (WSAC goal number four) requires the proper quality, quantity timing and distribution of water. To assess the performance of future land use scenarios, three of the four primary water resources parameters were selected to measure achievement of this goal: Water Quality, Groundwater Demand, and Surface Water Flows/Distribution.

Secondary Parameters such as air quality, while important, may not individually determine the performance of a scenario. Compliance with these parameters will be evaluated in the context of the overall performance of the scenario. For example, failure to meet the threshold for the "wastewater" parameter (a secondary Infrastructure parameter) may not, in and of itself, mean a scenario does not meet the goals of the Plan provided that the impacts are mitigated through projects and programs reflected in other parameters or alternative actions (e.g., funding additional wastewater collection and treatment facilities).

In addition to the matrix, findings for selected key parameters are also presented in graphic form in Figures 2.44 to 2.52.

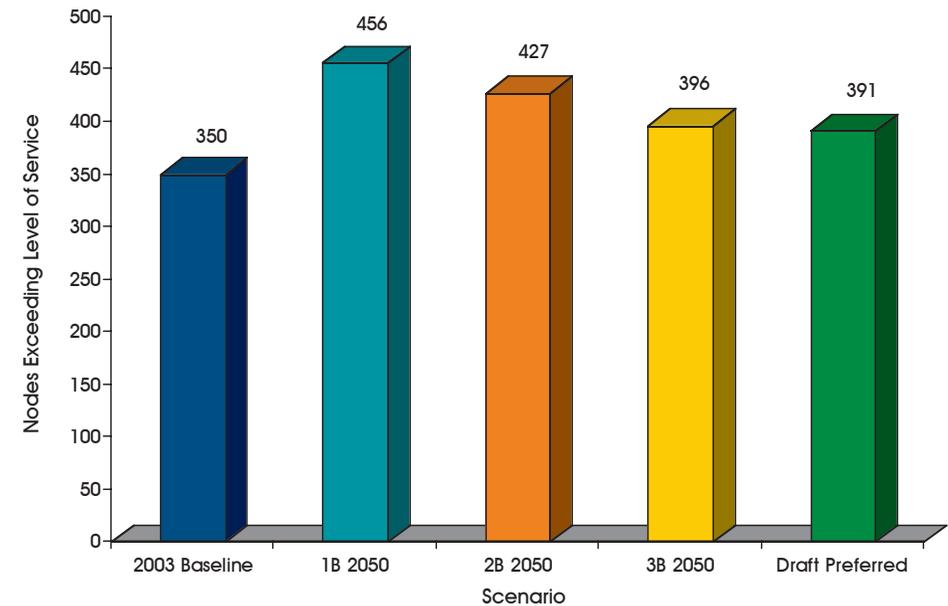


Figure 2.43 Flooding



Table 2.27
Scenario Assessment Matrix – 2050

Parameter	Scope of Threshold	Measure	Baseline	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050	Draft Preferred Scenario	
Water Resources - Primary Parameters								
Water Quality	Comparative assessment of pollutants measured by XPSWMM against a baseline	Pollutant Loads (Pounds) (Sum of Basins C-1, C-2, C-100, C-102, C-103)	BOD5	203,034	358,674	264,712	248,095	288,024
			COD	1,087,243	1,941,088	1,446,700	1,348,420	1,575,283
			TSS	895,850	1,420,126	1,134,517	1,072,811	1,204,604
			TDS	7,868,403	17,576,643	12,344,446	11,528,019	11,308,621
			TN	43,045	66,636	55,357	52,778	54,128
			Nox-N	12,857	31,925	17,661	18,666	18,693
			NH3-N	2,458	4,516	3,524	3,259	3,780
			TKN	26,488	46,214	35,208	33,056	35,808
			TP	6,811	9,880	8,423	8,115	8,344
			DP	4,249	7,319	5,881	5,573	5,537
			Cd	58	138	95	86	101
			Copper	764	1,076	992	985	914
Lead	2,531	5,896	3,970	3,606	4,405			
Zn	1,810	3,396	2,535	2,376	2,718			
Groundwater Demand Figure 2.44	Water supply needs will be met during a 1-in-10 year drought	Water Supply Needed to Meet Drought Conditions	303.8 mgd	495.9 mgd	520.5 mgd	531.2 mgd	515.4 mgd	
Surface Water Flows/Distribution Figure 2.45	Annual volume of runoff into Biscayne Bay	Flows into Biscayne Bay (Sum of Basins C-1, C-2, C-100, C-102, C-103)	647,000 ac-ft	649,000 ac-ft	642,000 ac-ft	646,000 ac-ft	641,000 ac-ft	
Flood Protection Figure 2.43	Design storm return period for primary canals and roadways	Sum of all nodes not meeting Level of Service (Basins C-1, C-2, C-100, C-102, C-103)	350 nodes	456 nodes	427 nodes	396 nodes	391 nodes	

Table 2.27 (continued)
Scenario Assessment Matrix – 2050

Parameter	Scope of Threshold	Measure	Baseline	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050	Draft Preferred Scenario
Natural Communities – Primary Parameters							
Tidal Wetlands Figure 2.46	No net loss of tidal wetlands	Acres / Percent Loss	17,685 acres	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Transitional Wetlands (Brackish Wetlands)	(Evaluated as part of Tidal Wetlands and Freshwater Wetlands)	N/A	N/A	N/A	N/A	N/A	N/A
Native-Plant-Dominated Freshwater Wetlands Figure 2.46	No net loss of freshwater wetlands	Acres / Percent Loss	34,953 acres	-496 acres / -1.4%	-151 acres / -0.4%	-314 acres / -0.9%	-174 acres / -0.5%
Exotic-Plant-Dominated Freshwater Wetlands Figure 2.46			4,711 acres	-478 acres / -10.1%	-408 acres / -8.7%	-405 acres / -8.6%	-435 acres / -9.2%
Transitional Freshwater Wetlands Figure 2.46			6,527 acres	-424 acres / -6.5%	-350 acres / -5.4%	-392 acres / -6.0%	-387 acres / -5.9%
Remnant Natural Forests Figure 2.47	No net degradation of the remnant natural forest communities	Acres / Percent Loss	5,695 acres	-655 acres -11.5%	-203 acres -3.6 %	-196 acres -3.4 %	-351 acres -6.2%

Table 2.27 (continued)
Scenario Assessment Matrix – 2050

Parameter	Scope of Threshold	Measure	Baseline	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050	Draft Preferred Scenario
Land Use/Community Character							
Development Patterns	Square Miles of urban, suburban, ex-urban and rural land	Square Miles: Rural Ex-Urban Suburban Urban	Square Miles: Rural - 216 Ex-Urban - 14 Suburban - 163 Urban - 3	Square Miles: Rural - 159 Ex-Urban - 25 Suburban - 206 Urban - 6	Square Miles: Rural - 184 Ex-Urban - 16 Suburban - 186 Urban - 10	Square Miles: Rural - 201 Ex-Urban - 24 Suburban - 159 Urban - 12	Square Miles: Rural - 183 Ex-Urban - 12 Suburban - 191 Urban - 10
Agricultural and Rural Land Figure 2.48	Remaining acres of agricultural land	Remaining acres of agricultural land and percent loss	44,148 acres	11,538 acres - 74%	30,157 acres - 32%	38,372 acres - 13%	26,392 acres -40%
Proximity of Housing and Employment to Transit	Population within 1/2 mile of transit	Additional Dwelling Units: US 1 Kendall Drive Florida's Turnpike Palmetto Douglas Rd. Douglas Road	<u>Baseline Dwelling Units</u> US 1 34,730 Kendall Dr. 17,085 Turnpike 9,445 Palmetto 7,895 Douglas Rd. 2,565 TOTAL 71,720	<u>Additional Dwelling Units</u> US 1 25,473 Kendall Dr. 5,680 Turnpike 571 Palmetto 2,004 Douglas Rd. 2,135 TOTAL 35,863	<u>Additional Dwelling Units</u> US 1 25,102 Kendall Dr. 1,634 Turnpike 192 Palmetto 2,146 Douglas Rd. 108 TOTAL 29,182	<u>Additional Dwelling Units</u> US 1 53,719 Kendall Dr. 33,481 Turnpike 12,932 Palmetto 8,551 Douglas Rd. 479 TOTAL 109,162	<u>Additional Dwelling Units</u> US 1 77,598 Kendall Dr. 10,806 Turnpike 3,294 Palmetto 6,008 Douglas Rd. 985 TOTAL 98,691
Parks, Recreation and Open Space	Acreage and distribution of parks	Acres by Park Size: 1-4 5-30 30-100 over 100	7,287 acres	<u>Additional Acres by Park Size</u> 1-4 acres 210 5-30 acres 283 30-100 acres 80 over 100 acres 1,186 TOTAL 1,759	<u>Additional Acres by Park Size</u> 1-4 acres 333 5-30 acres 409 30-100 acres 416 over 100 acres 601 TOTAL 1,759	<u>Additional Acres by Park Size</u> 1-4 acres 253 5-30 acres 379 30-100 acres 406 over 100 acres 719 TOTAL 1,757	<u>Additional Acres by Park Size</u> 1-4 acres 256 5-30 acres 671 30-100 acres 235 over 100 acres 597 TOTAL 1,759

Table 2.27 (continued)
Scenario Assessment Matrix – 2050

Parameter	Scope of Threshold	Measure	Baseline	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050	Draft Preferred Scenario
Economics							
Economic Base	Employment by industry (commercial, industrial, institutional and farm)	Percentage of Industry	Commercial 69.5% Industrial 9.8% Institutional 19.0% Farm 1.7%	Commercial 81.8% Industrial 6.4% Institutional 11.7% Farm 0.2%	Commercial 81.5% Industrial 6.3% Institutional 11.6% Farm 0.5%	Commercial 81.4% Industrial 6.3% Institutional 11.6% Farm 0.6%	Commercial 81.6% Industrial 6.4% Institutional 11.6% Farm 0.5%
Cost of Housing	Comparison of future housing costs	2004 Dollars	\$212,157	\$399,603	\$411,957	\$430,562	\$417,038
Mix of Wages	Median household income	2003 Dollars	\$52,551	\$112,372	\$109,225	\$106,263	\$107,904
Infrastructure - Primary Parameters							
Transportation	Adopted level of service	Vehicle Miles Traveled per Day (VMT) *Data shown is for entire Miami-Dade County	44,501,864 miles per day 16.2 billion miles per year	66,805,784 miles per day 24.4 billion miles per year	65,504,220 miles per day 23.9 billion miles per year	64,148,180 miles per day 23.4 billion miles per year	62,574,368 miles per day 22.8 billion miles per year
Public Schools Figure 2.50	Public Schools Infrastructure Cost	Cumulative Present Value of Future Capital Expansion Costs (in 2004 Dollars)	N/A	\$1,857 million	\$1,723 million	\$1,509 million	\$1,626 million
Infrastructure - Secondary Parameters							
Potable Water Figure 2.51	Plant capacity and expansion costs \a \c	Distribution Expansion Costs (2004 Dollars)	N/A	\$3,004 million	\$1,403 million	\$1,190 million	\$1,461 million
Wastewater Figure 2.52	Plant capacity and expansion costs \b \c	Collection Expansion Costs (2004 Dollars)	N/A	\$12,074 million	\$7,623 million	\$6,989 million	\$7,776 million
Air Quality	Tons of pollutants per day	Tons/Day	VOC 77.55 CO 931.53 NOx 125.32	VOC 21.19 CO 388.23 NOx 18.19	VOC 20.91 CO 383.01 NOx 17.94	VOC 20.11 CO 368.41 NOx 17.26	VOC 20.15 CO 369.19 NOx 17.30

Note: \a consists of the following elements: Water Connection Fees, Water Mains & Water Treatment Plant Capacity (WTP)
\b consists of the following elements: Sewer Connection Fees, Force Mains, Gravity Sanitary Sewer Lines, Sewage Pumping Stations, and Wastewater Treatment Plant Capacity (WWTP)
\c does not include the costs for system upgrades required for the County's proposed re-use and water conservation project

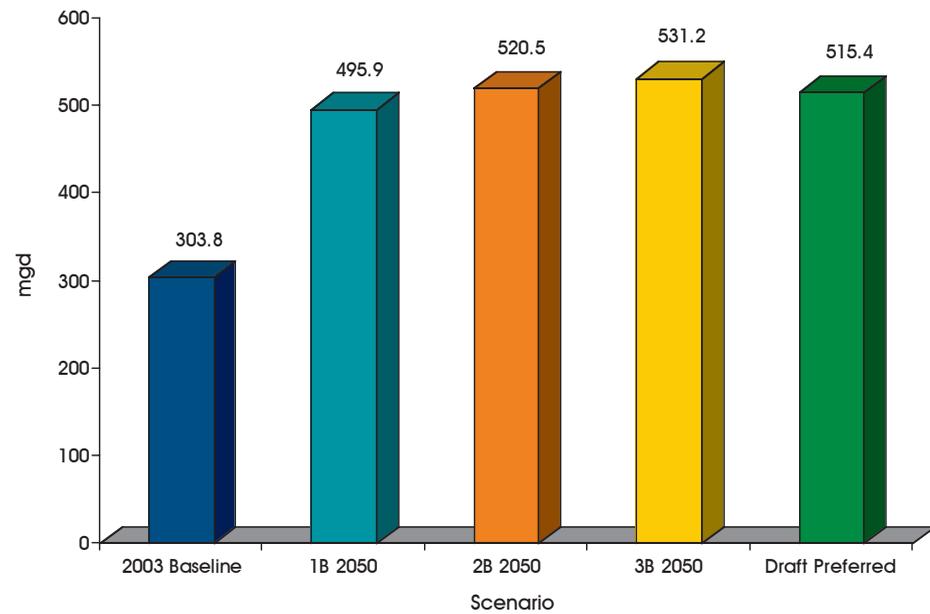


Figure 2.44 Groundwater Demand = Meeting one in ten year drought demands (Urban Public Supply + Non-urban)

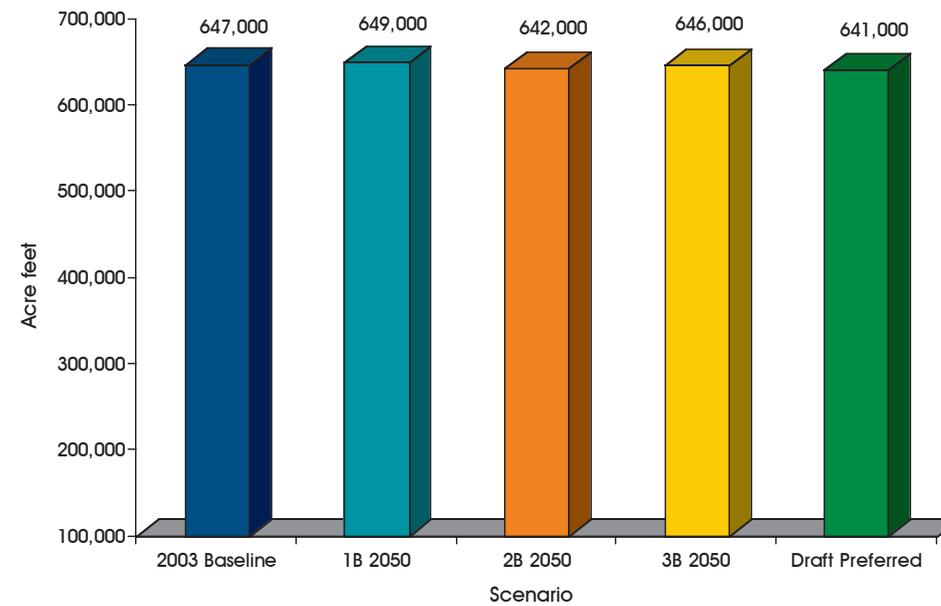


Figure 2.45 Surface Water – Flows/Distribution to the Biscayne Bay

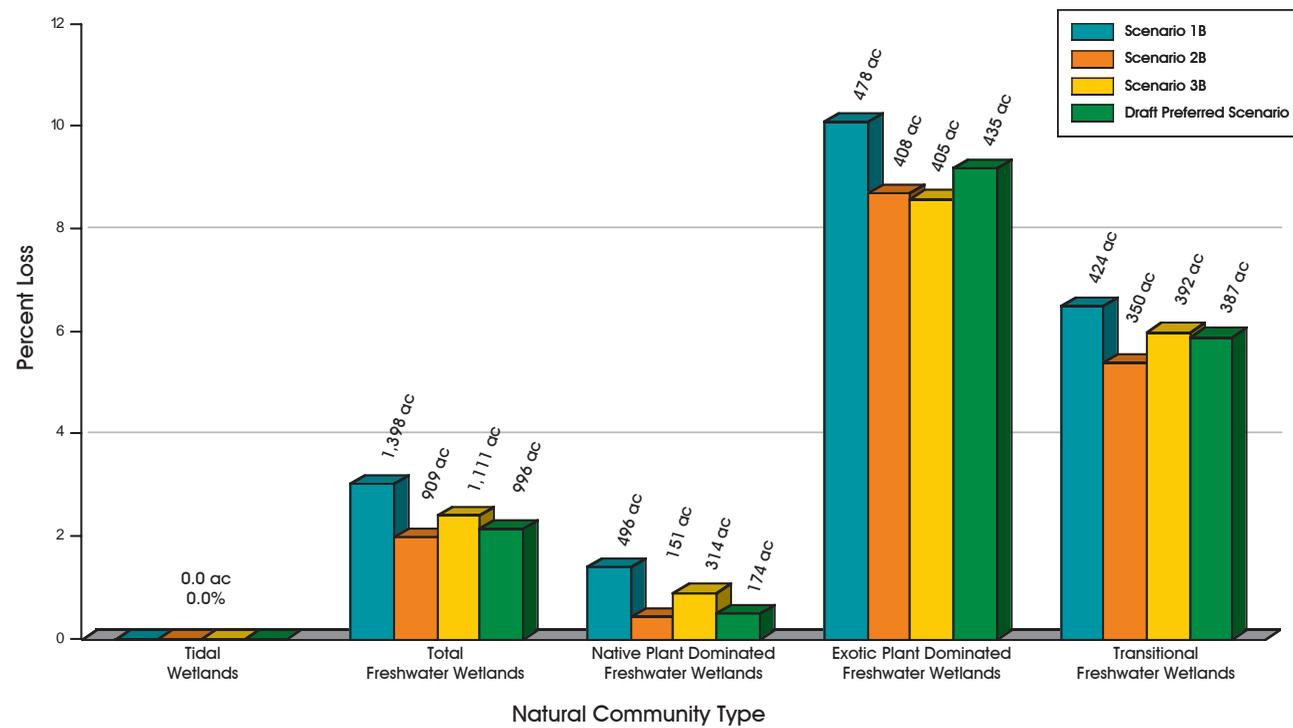


Figure 2.46 Wetland Losses – Year 2050

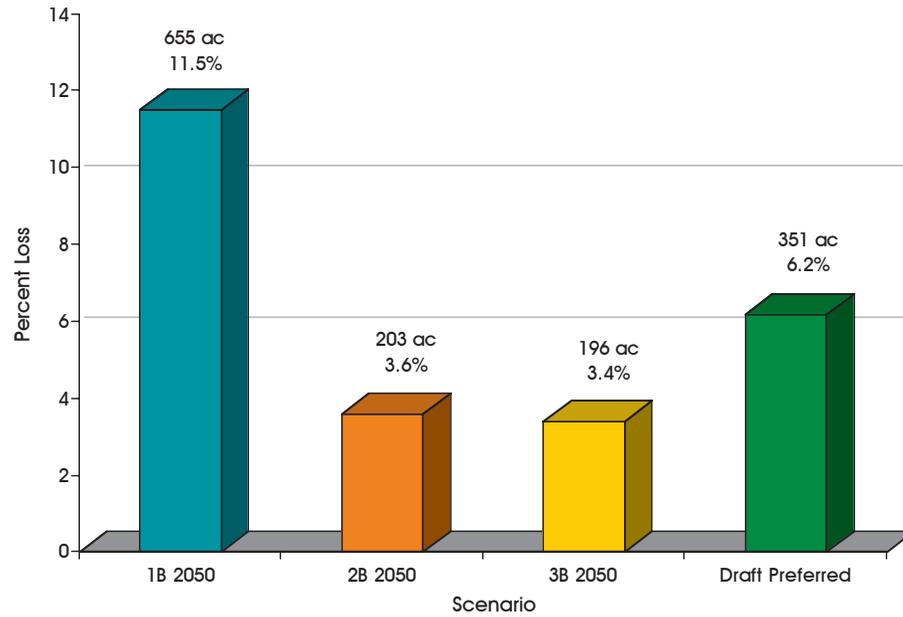


Figure 2.47 Remnant Natural Forest Losses - 2050

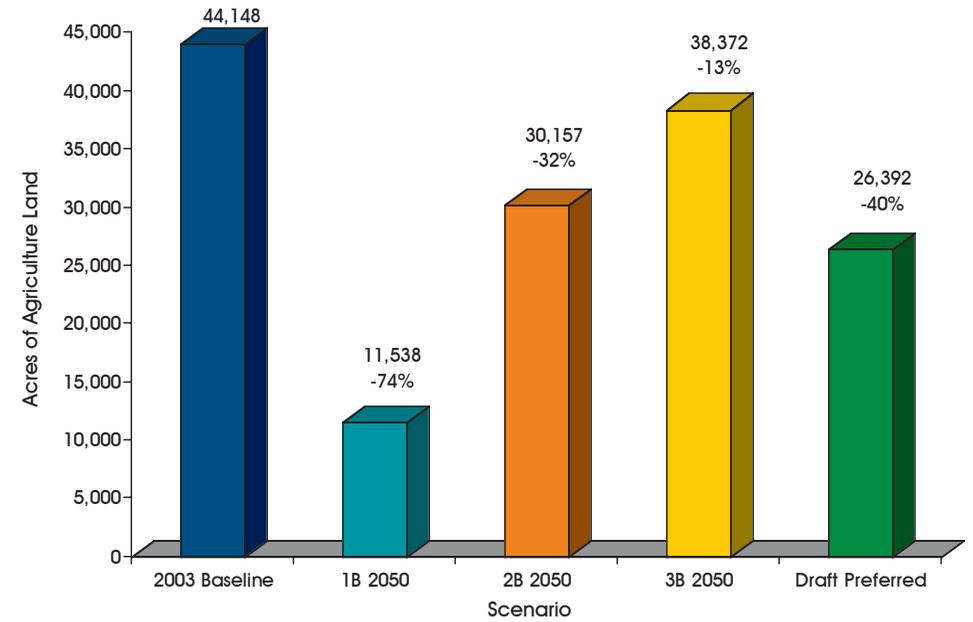


Figure 2.48 Agriculture Land

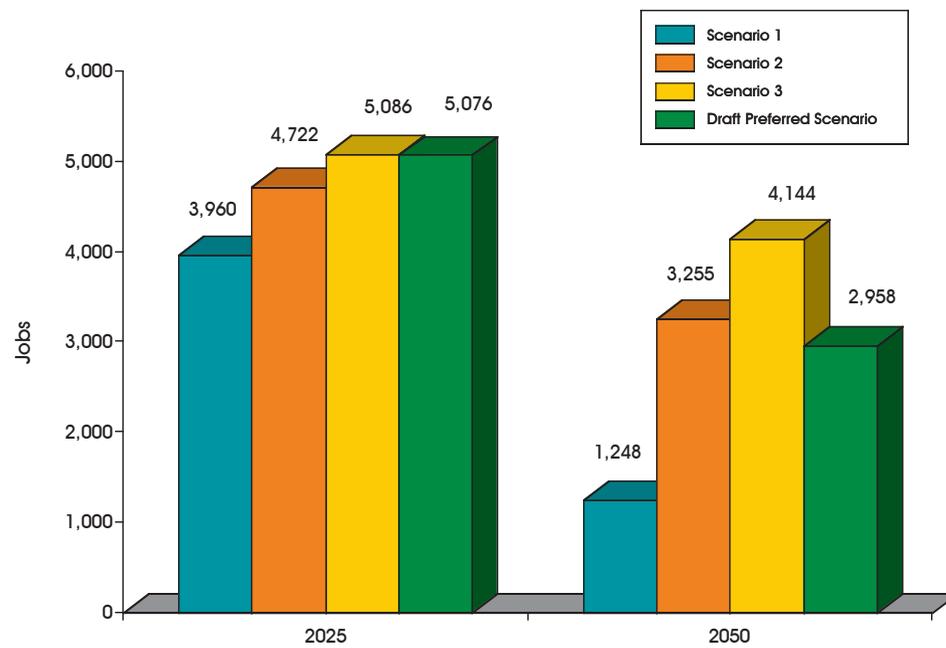


Figure 2.49 Farm Employment

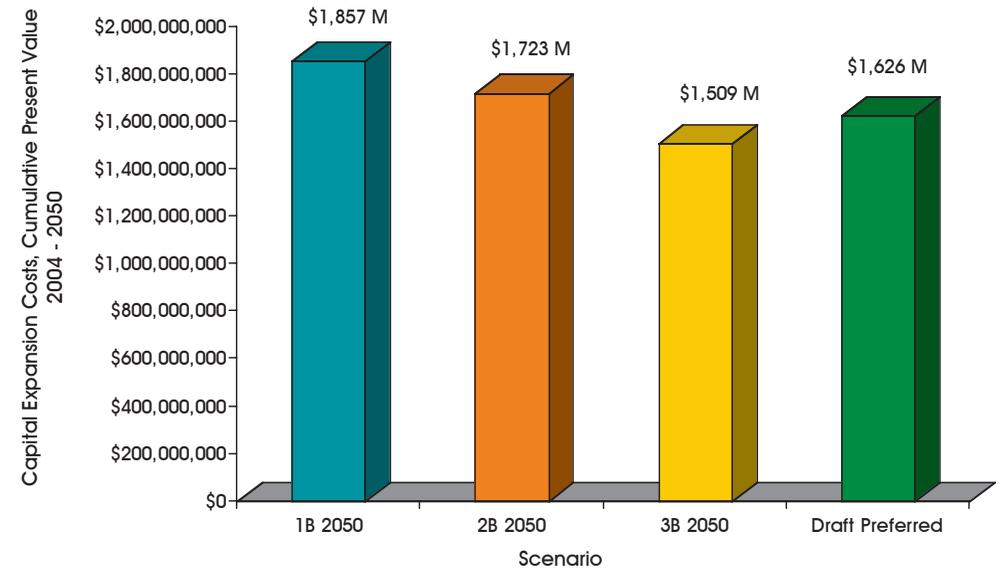


Figure 2.50 Public Schools (2004 Dollars)*
*Reflects both public and developer funded projects.

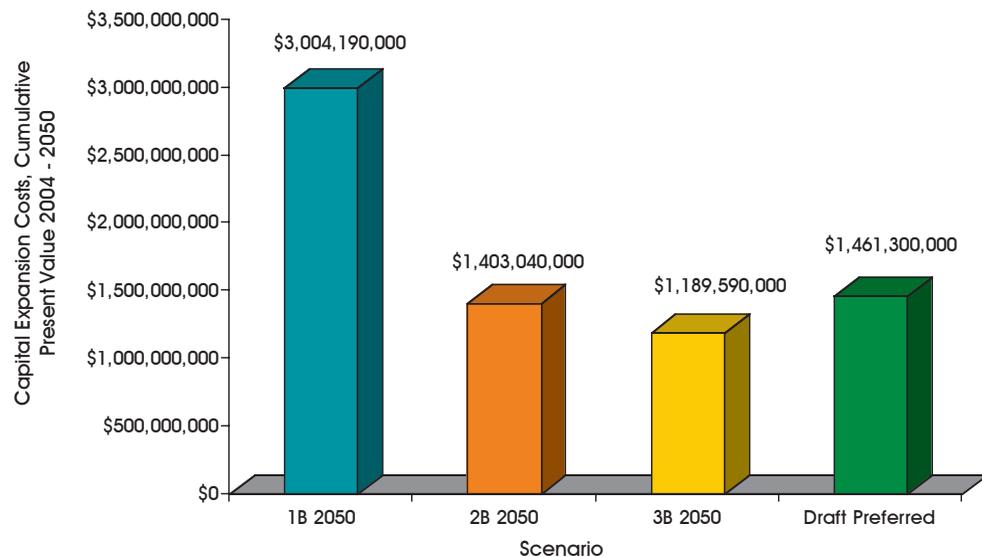


Figure 2.51 Potable Water (2004 Dollars) = Water connection fees, water mains, WTP capacity*
*Reflects both public and developer funded projects.

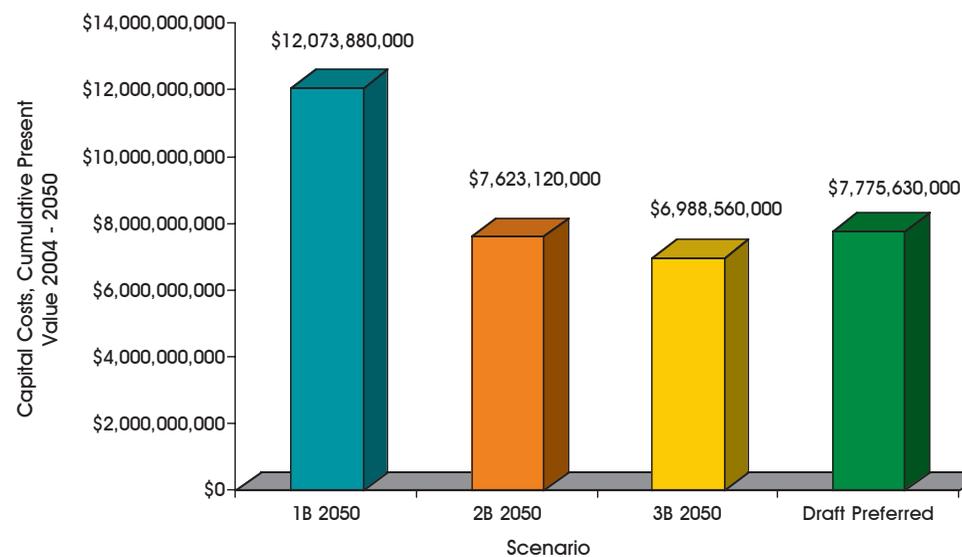
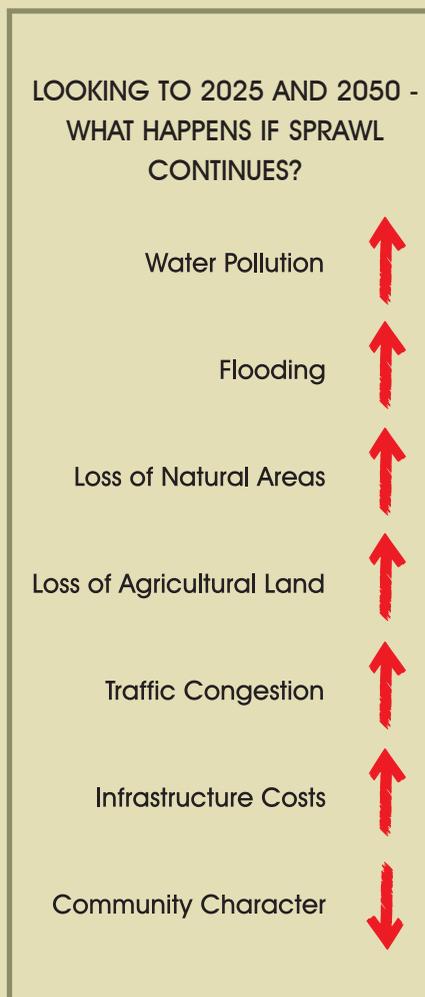


Figure 2.52 Wastewater (2004 Dollars) = sewer connection fees, force mains, gravity sanitary sewer lines, sewage pumping stations, WWTP capacity*
*Reflects both public and developer funded projects.

Summary: The analyses demonstrated that implementation of higher density, transit oriented "Smart Growth" policies result in a more sustainable environment and economy compared to the current land development pattern represented by Test Scenario 1. The low density, sprawl development pattern of this scenario performed substantially worse than the more compact, higher density transit oriented development approaches. Test Scenario 1 results in:

- *more water pollution;*
- *substantial increases in flooding;*
- *greater losses of natural resources;*
- *loss of 75 percent of the agriculture land in the Watershed;*
- *more reliance on the automobile; and*
- *significantly greater costs to the public.*

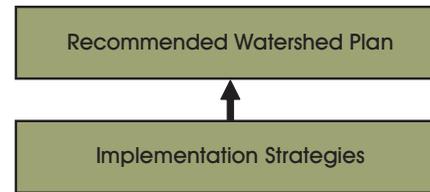
Complete results are provided in the Sub-task 4.3 report. The performance of the Draft Preferred Scenario relative to the test scenarios guided the formulation of the Preferred Scenario and the development of implementation strategies, which together form the Recommended Watershed Plan in Task 5.



TASK 5

THE RECOMMENDED WATERSHED PLAN =

Watershed Plan Design
Guidelines
+
Implementation Strategies



The final formulation of the Watershed Plan occurred in Task 5. The Recommended Watershed Plan, which is based on the extensive analysis discussed above, includes two major parts, the final Design Guide and Implementation Strategies. The process will be discussed in this section and the actual Recommended Watershed Plan is discussed in Chapter 5.

Implementation Strategies (Sub-task 5.1 and 5.2)

To assist the County in implementing the Plan and to mitigate for the remaining unavoidable impacts from growth, a set of implementation strategies was developed. These strategies include proposed site development standards, best management practices for protecting water quality, and land preservation techniques, including regulatory incentives. These strategies address potential effects on property rights and include measures to mitigate such effects.

The implementation strategies were developed in concert with staff from the agencies on the Project Management Team, including the Miami-Dade County Department of Planning and Zoning. Further, the implementation strategies were finalized after extensive discussions with the WSAC in eight meetings that were open to the public. While the WSAC did not achieve the 80 percent support required under its self-imposed voting criteria, many members supported most of the implementation strategies. It is important to note, that the WSAC did not vote on the Recommended Watershed Plan since they were charged

with commenting on its formulation and not its approval. The vote was on the draft implementation strategies only. Finally, after listening carefully to the WSAC in over 45 meetings, it was the Keith and Schnars Team responsibility to prepare the most technically sound Recommended Watershed Plan based on thorough analysis and professional planning experience and expertise. Input from the WSAC, municipalities, stakeholders and the public was considered fully.

The final implementation strategies are discussed in Chapter 5 and in the Sub-task 5.1 report.

South Miami-Dade Watershed Plan - - The Recommended Watershed Plan (Sub-task 5.3)

Based on sound science, extensive analysis and public outreach, the Recommended Watershed Plan discussed in Chapter 5 was prepared. This Plan represents nearly four years of consultant and PMT work, thousands of hours of advisory and technical committee time, and an investment in the future by the leadership of Miami-Dade County.

With the completion of this Study and Plan, the work of the consultant is essentially finished. The WSAC has completed its advisory role. The TRC has completed its review role. It is now up to Miami-Dade County to decide its vision for the future. The choices are clear and the differences stark. In Chapters 4 and 5 these choices are presented for the consideration by the County's leaders.

CHAPTER 3

Public Input

ENGAGING THE PUBLIC AND STAKEHOLDERS

*Never doubt that a small group of thoughtful,
committed citizens can change the world.
Indeed, it's the only thing that ever has.*

- Margaret Mead



Carlos Alvarez, Mayor

BOARD OF COUNTY COMMISSIONERS

Bruno A. Barreiro, Chairman

Barbara J. Jordan, ViceChairman

Barbara J. Jordan
District 1

Katy Sorenson
District 8

Dorin D. Rolle
District 2

Dennis C. Moss
District 9

Audrey M. Edmonson
District 3

Sen. Javier D. Souto
District 10

Sally A. Heyman
District 4

Joe A. Martinez
District 11

Bruno A. Barreiro
District 5

José "Pepe" Díaz
District 12

Rebeca Sosa
District 6

Natacha Seijas
District 13

Carlos A. Gimenez
District 7

George M. Burgess, County Manager

Public Input

ENGAGING THE PUBLIC AND STAKEHOLDERS



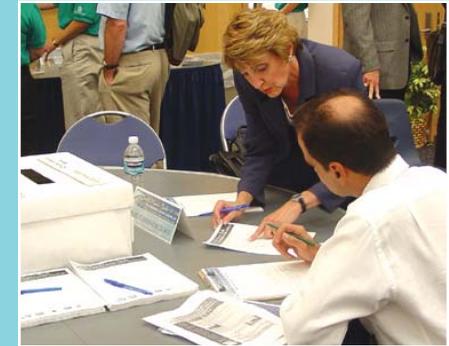
An integral part of the Study has been an extensive public involvement program to disseminate information and gather input from stakeholders and the public at key stages throughout the planning process. Clear and continuous communication has been essential for members of the public to understand that their input to the Study is vital and is a key to the Plan's development and future success. This effort began in the initial stages of the Study with a Public Involvement Plan, a plan that defined the goals and objectives of the Study as it relates to the public, stakeholders and elected officials within the Watershed.



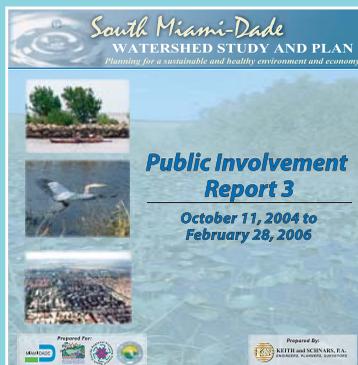
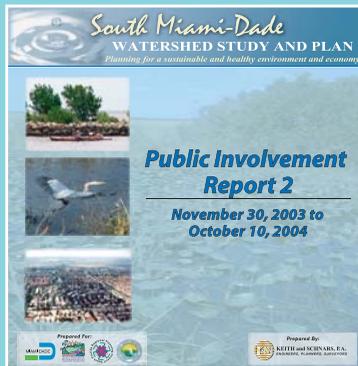
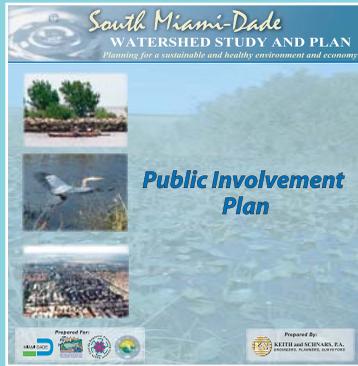
Goals of the SMDWSP Public Involvement Plan included the following:

- Inform and educate the public about the Watershed Study by sharing factual, understandable, and timely information;
- Ensure that all interested citizens, stakeholders and officials have meaningful opportunities to participate and influence recommendations;
- Listen and respond to concerns and find creative approaches to resolve them; and
- Build consensus and community support for the Study and the recommendations in the Plan.

Providing information, obtaining public input and identifying the public's concerns and issues has been accomplished through consistent, ongoing efforts that included 55 advisory committee meetings, six public meetings, 28 public events, numerous meetings with elected officials from Miami-Dade County as well as cities located within the Watershed, forums with community and agricultural interests, events with the Keith and Schnars Mobile Information Station, newsletters, email campaigns, editorial boards, fact sheets, the project website and media releases.



1. WATERSHED STUDY ADVISORY COMMITTEE (WSAC)



The Watershed Study Advisory Committee (WSAC) played an important role throughout the Study in getting information to the public and to stakeholders. The 29 member WSAC was comprised of a broad cross-section of citizens representing food producers, nursery growers, homeowner associations, local, State and federal agencies, home builders, business and environmental leaders. This advisory committee, which was chaired by Mr. Roger Carlton, was charged with serving as a conduit for information between the Keith and Schnars Consulting Team and the members' respective organizations. Committee members were nominated by the organizations included in the establishing ordinance, recommended by a committee, selected by the County Manager and approved by the Board of County Commissioners. Ms. Janice Fleischer of Flash Resolutions served as the facilitator for WSAC meetings. Meeting agenda formulation was addressed in an Organizational Committee that was comprised of the Project Management Team (SFRPC, MDCDPZ, SFWMD and Keith and Schnars), the Chair and the facilitator.

Many WSAC members provided opportunities for the Consulting Team to present information to their member organizations, opinion leaders and to the public. Examples include the Kendall Federation of Homeowners Associations, the Dade County Farm Bureau, the Rotary Club and the Tropical Audubon Society.

The WSAC met 55 times, typically on the fourth Thursday of each month for a full day. The WSAC met in several different locations from Coral Gables to Homestead. The public was provided an opportunity to comment during each WSAC meeting.

WSAC members reviewed and provided comments on the Study work products through a professionally facilitated consensus-based process. The members were provided information for discussion each month

An Honor to Serve



Nearly six years ago, then County Manager Merrett Stierheim asked me to serve as Chair of the South Miami-Dade Watershed Study Advisory Committee. I was to serve as the leader of a group of stakeholders and government representatives who would represent a diverse array of interests. We would help develop a strategy for guiding the growth of a 371 square mile area of south Miami-Dade County located between two extraordinary resources: Everglades National Park and Biscayne National Park.

I accepted this challenge for many reasons, including: having lived in this wonderful area for nearly 50 years, believing that the stakeholders wanted to find solutions and would compromise their historically rigid positions in order to achieve consensus, and a personal history of professional and civic involvement with State and local government that continues to be energized by the belief that reasonable people can overcome self interest for the collective good. The assignment was carried out utilizing a nationally recognized consultant, dedicated staff from the County and State, a technical review committee and a professional facilitator. During the past five years, County Managers Steve Shiver and George Burgess continued to support me in the role of Chair.

While the issues were often complex and involved the disciplines of planning, water resources engineering, biology and economics, the advisory committee worked through them in a professional manner. The diverse perspectives and advice of the members was value added to the Study and did help inform the Recommended Watershed Plan. I know that the consultant and the others on the Project Management Team listened and utilized the committee's input. We did not always agree but they always listened.

It has been an honor to serve as the Chair of the advisory committee. I commend the members for their time and input. It is my sincere belief that we have made a positive difference for the future of the County. Our input helped shape a technically sound and visionary plan that reflects the most environmentally and economically responsible policy to guide the projected growth in the Watershed.

The job of the WSAC is now over. It is up to the County leadership to review this Study and Plan and use its recommendations to meet the requirements of CDMP LUP 3E. To not capitalize on this work would be missing a wonderful opportunity to avoid the mistakes of the past.

Roger M. Carlton
Chair, Watershed Study Advisory Committee

and then typically given a month to reach out to their constituents for input. The facilitator and the consultant helped resolve the concerns of the members. Not every decision was reached through the consensus process. In some cases, such as formulation of the draft preferred scenario, the WSAC's input was gathered over many months through a series of charrette-style small group exercises. Based on this input from the WSAC, the draft preferred scenario prepared in Sub-task 4.2 and discussed in Chapter 2, was developed.

For another work product, the water resources assessment in Sub-task 3.4, the Committee was not able to achieve consensus on accepting all of the results of the analysis. In this case, the Committee achieved consensus on the following statement: "This sub-task has value to the South Miami-Dade Watershed Study and Plan as a comparative tool for planning level purposes". This course of action was interpreted by some as a shortcoming of the Study process. In fact, this is exactly what the water resources assessment was intended to do per the scope of services: "the (water quantity and quality) models will be executed to complete a comparative analysis against the parameters established in the parameters and thresholds phase..." This task was simply not designed to provide absolute numbers for specific parcels of land. This is also illustrative of the challenges that an



advisory group with varied and diverse backgrounds faces when reviewing thousands of pages of very technical information.

The only work product that resulted in a WSAC vote was the draft implementation strategies developed in Sub-task 5.1. As discussed in Chapter 2, the implementation strategies were developed with extensive

input from the WSAC over a period of several months. Using a self-imposed voting standard that required 80 percent support for passage, the WSAC did not vote to adopt the implementation strategies. However, many of the 68 strategies had a near majority and several members supported almost all of the strategies. It is important that seven of the voting members chose to vote against all 68 strategies regardless of their views on each implementation strategy. The consultant considered fully the WSAC's voting record on the implementation strategies and the WSAC comments made during the vote in the development of the final implementation strategies.

Each member of the WSAC donated hundreds of hours of their time to the Study. Their input

was considered carefully and it influenced the formulation of the Recommended Watershed Plan. It is important to note that the WSAC was not asked to review, consider consensus, or vote on the Recommended Watershed Plan.

Each member of the WSAC donated hundreds of hours of their time to the Study.





WATERSHED STUDY ADVISORY COMMITTEE MEMBERS

Mr. Roger M. Carlton*, *Chairperson*

Ms. Ivonne Alexander, *Miami-Dade AgriCouncil*

Mr. Richard Alger, *South Florida Potato Growers Exchange*

Mr. Jose Fuentes*, *South Florida Water Management District, Miami-Dade Service Center*

Mr. Subrata Basu*, *Miami-Dade County Department of Planning and Zoning*

Mr. Gerald Case, *Florida Avocado Committees*

Ms. Amy Condon, *The Trust for Public Land*

Dr. Guillermina Damas, *Miami-Dade College - Wolfson Campus*

Mr. Carlos Espinosa*, *Miami-Dade County Department of Environmental Resources Management (DERM)*

Mr. Jeffrey Flanagan, *Chamber South*

Mr. John Fredrick, *Dade County Farm Bureau*

Mr. Dick Frost, *Tropical Audubon Society*

Ms. Jamie Furgang, *Audubon of Florida*

Mr. Robert Johnson, *Everglades National Park*

Ms. Louise King, *Redland Citizens' Association*

Mr. Mark Lewis, *Biscayne National Park*

Mr. William Losner, *Greater Homestead/ Florida City Chamber of Commerce*

Mr. Bennie Lovett, *Florida City*

Mr. Carter McDowell, *Builders Association of South Florida / Latin Builders Association*

Mr. Reed Olszack, *Miami-Dade Agricultural Practices Board*

Mr. Mark Oncavage, *Sierra Club*

Mr. Lawrence Percival, *Kendall Federation of Homeowner Associations*

Mr. Armando Perez, *Florida Engineering Society*

Ms. Bonnie Roddenberry, *Sunny South Acres Homeowner's Association*

Mr. Jorge Rodriguez*, *Miami-Dade Water & Sewer Department*

Mr. Mike Shehadeh, *City of Homestead*

Ms. Jane Spurling, *Florida Nursery, Growers & Landscape Association*

Mr. Charles Thibos, *Tropical Everglades Visitor Association*

Ms. Julia Trevarthen*, *South Florida Regional Planning Council*

*Designates a non-voting member of the committee.

Ms. Janice Fleischer, *Facilitator*

Watershed Study Advisory Committee

Vision

"The South Miami-Dade Watershed area is composed of vibrant communities with strong identities established on foundations that are economically, socially and environmentally sustainable, which honor private property rights.

It supports economically viable and diverse agriculture; ensures a healthy and sustainable south Biscayne Bay and Biscayne and Everglades National Parks; and promotes open space and tourism and recreational facilities based on its natural wonders while welcoming other compatible enterprises. Sustainable urban development preserves historic quality and rural character with a strong sense of local community and stewardship."

2. COMMUNITY COUNCILS, MUNICIPALITIES AND AGENCIES

Informing elected and appointed officials has been a key part of the SMDWSP public involvement program, as these are the officials that must consider adopting and utilizing the Recommended Watershed Plan discussed in Chapter 5. Briefings for the Miami-Dade Board of County Commissioners (BOCC) and the South Florida Regional Planning Council (SFRPC) Board occurred at key points throughout the Study. In addition, the leadership of local municipalities was briefed and provided opportunities to provide input to the Study. The list below provides an example of the many meetings and briefings completed as of March 2007. In addition, the 55 WSAC meetings and six public meetings provided substantial opportunities for community leaders to influence and comment on the Study.

Local, State and Federal Agencies

South Florida Regional Planning Council	October 4, 2004
US Army Corps of Engineers	May 17, 2005
Community Council 12 Meeting	May 11, 2005
Community Council 11 Meeting	June 8, 2005
Community Council 14 Meeting	June 16, 2005
Community Council 10 Meeting	July 6, 2005
Community Council 15 Meeting	July 21, 2005
South Florida Regional Planning Council	October 4, 2005
South Florida Regional Planning Council	May 1, 2006
Community Council 14 Meeting	May 11, 2006
US Air Force, Homestead Air Reserve Base	June 27, 2006

County Commissioner & Other Elected and Appointed Official Meetings

Commissioner Katy Sorenson	September 8, 2003
Commissioner Dennis Moss	September 10, 2003
Commissioner Bruno Barriero	September 15, 2003
Commissioner Rebeca Sosa	September 16, 2003
Commissioner Javier Souto	September 22, 2003
City of Florida City Presentation for Elected Officials	August 25, 2004
Miami-Dade County Commissioner Katy Sorenson Presentation	September 13, 2004
Miami-Dade County Commissioner Bruno Barriero Presentation	September 13, 2004
City of Coral Gables Presentation for Elected Officials	September 13, 2004
Village of Palmetto Bay Presentation for Elected Officials	September 14, 2004
Homestead Committee of the Whole Presentation for Elected Officials and the Public	September 14, 2004
Miami-Dade County Commissioner Javier Souto Presentation	September 20, 2004
City of Pinecrest Appointed Official Presentation	September 20, 2004
Briefing for Miami-Dade County Commissioner Barbara Jordan	October 12, 2004
Briefing for Miami-Dade County Mayor Carlos Alvarez	November 4, 2004
Briefing for Miami-Dade County Commissioner Carlos Jimenez	January 28, 2005
Briefing for Terry Murphy, staff to Miami-Dade County Commissioner Natacha Seijas	January 28, 2005
Briefing for Miami-Dade County Commissioner Joe Martinez	February 22, 2005
Briefing for Miami-Dade County Mayor's Staff	February 1, 2006
Miami-Dade County BOCC UDB Workshop	February 2, 2006
Briefing for City of Florida City	March 21, 2006
INLUC Committee Meeting (Miami-Dade County BOCC)	October 13, 2006
Village of Palmetto Bay Committee of the Whole Presentation	November 15, 2006
Village of Pinecrest Council Meeting	December 12, 2006
Town of Cutler Bay Mayor and Senior Officials Meeting	December 18, 2006
INLUC Committee Meeting (Miami-Dade County BOCC)	January 16, 2007
South Dade Planners Group Meeting	January 17, 2007
Town of Cutler Bay Senior Officials Meeting	February 9, 2007



FORMAL PUBLIC MEETINGS

- ➔ September 23, 2003
- ➔ September 24, 2003
- ➔ September 30, 2004
- ➔ October 7, 2004
- ➔ February 21, 2006
- ➔ February 22, 2006

3. THE PUBLIC

In addition to the opportunities for public involvement offered through the monthly WSAC meetings, the public was engaged through six formal public meetings as well as a variety of other events and venues. The public meetings provided an opportunity for interested individuals, private organizations, special interest groups, and local, County, State and federal agencies to share their opinions and ask questions about the Study and understand the process. Through these meetings, feedback was obtained and used to gain a better understanding of concerns and issues. Surveys, fact sheets, newsletters, and event flyers were developed in English and Spanish to assist the public. Translators were also provided when necessary.

Public Events & Stakeholder Presentations

The Keith and Schnars Team, with other members of the Project Management Team, provided briefings at nearly 30 public events and stakeholder meetings. These opportunities provided meaningful exchange in mostly small group settings to allow the Team to explain, in layperson terms, the basis for the Study, where the Study was in the timeline, and what the next tasks/steps were in the process. Each of these events and stakeholder presentations were held to garner attention for the Study and to generate discussions with the public on how South Miami-Dade can benefit from a comprehensive long range plan.





The future is literally in our hands to mold as we like. But we cannot wait until tomorrow. Tomorrow is now.

- Eleanor Roosevelt

Few will have the greatness to bend history itself; but each of us can work to change a small portion of events, and in the total of all those acts will be written the history of this generation.

- Senator Robert F. Kennedy, 1966

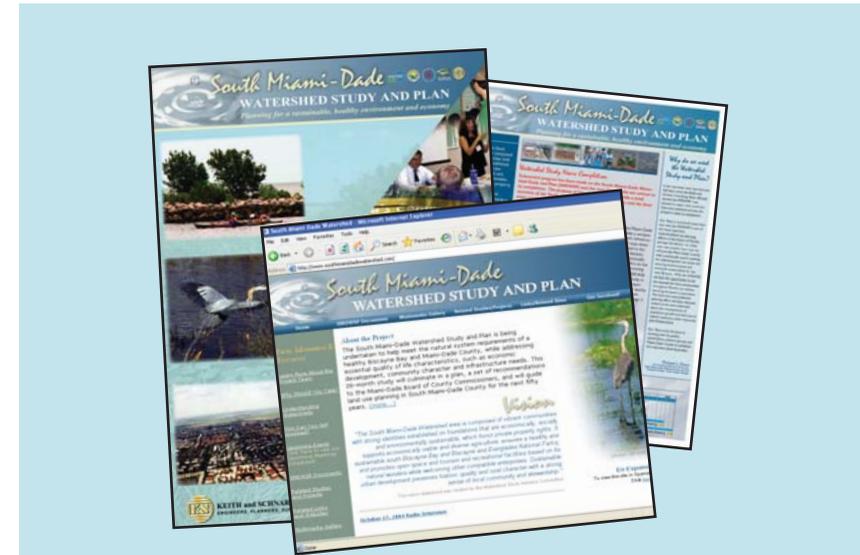


Public and Stakeholder Presentations:

- E-Fair 2003September 13, 2003
- Steven P. Clark CenterSeptember 23, 2003
- Kmart 88th & 140th Ave.September 24, 2003
- Kmart 79th & 104th St.September 24, 2003
- Kendall Federation of Homeowner Associations . . .December 1, 2003
- Everglades Coalition Conference. January 23, 2004
- Annual Village of Palmetto Bay PicnicMarch 13, 2004
- Miami-Dade County FairApril 2-3, 2004
- Baynanza '04April 17, 2004
- Decision Makers ForumMay 21, 2004
- Goulds Coalition of Ministers and Laypersons . . .September 14, 2004
- Rotary Club of HomesteadSeptember 15, 2004
- E-Fair 2004September 18, 2004
- Dade County Farm Bureau PresentationOctober 5, 2004
- Rotary Club of Homestead LuncheonMarch 30, 2005
- Agricultural Practices Study Advisory BoardApril 6, 2005
- Sierra Club MeetingApril 8, 2005
- Dade County Farm BureauSeptember 19, 2005
- Tropical Everglades Visitors AssociationSeptember 19, 2005
- Homestead/Florida City Chamber of Commerce . . .October 20, 2005
- Dade County Farm Bureau & Florida NurseryDecember 9, 2005
- Tourism and Economic MeetingJanuary 31, 2006
- University of Miami Law SchoolMarch 8, 2006
- Agricultural Practices Study Advisory Board August 2, 2006
- Tropical Research and EducationNovember 16, 2006
Center Seminar
- Agricultural Practices Study Advisory BoardDecember 6, 2006
- South Dade Economic DevelopmentJanuary 9, 2007
Council Presentation
- Tropical Audubon Society's ConservationJanuary 24, 2007
Committee Meeting

The Project Website

The project website, presented in both English and Spanish, has been a reference for anyone seeking information on the Study. The website hosts each of the final project reports that were produced during the Study. Each of these reports can be downloaded directly from the website in a PDF format. The website also served as a conduit for anyone who would like to join the SMDWSP database of contacts or to find out more about the Study, related topics, or upcoming meetings and events, including WSAC meetings.



The Watershed Plan

Provides the roadmap for how South Miami-Dade will address planning, water resources, infrastructure and natural resource issues for the next 50 years -- facilitating a sustainable environment and economy.

For more information about the South Miami-Dade Watershed Study and Plan please visit:
www.southmiamidadewatershed.com

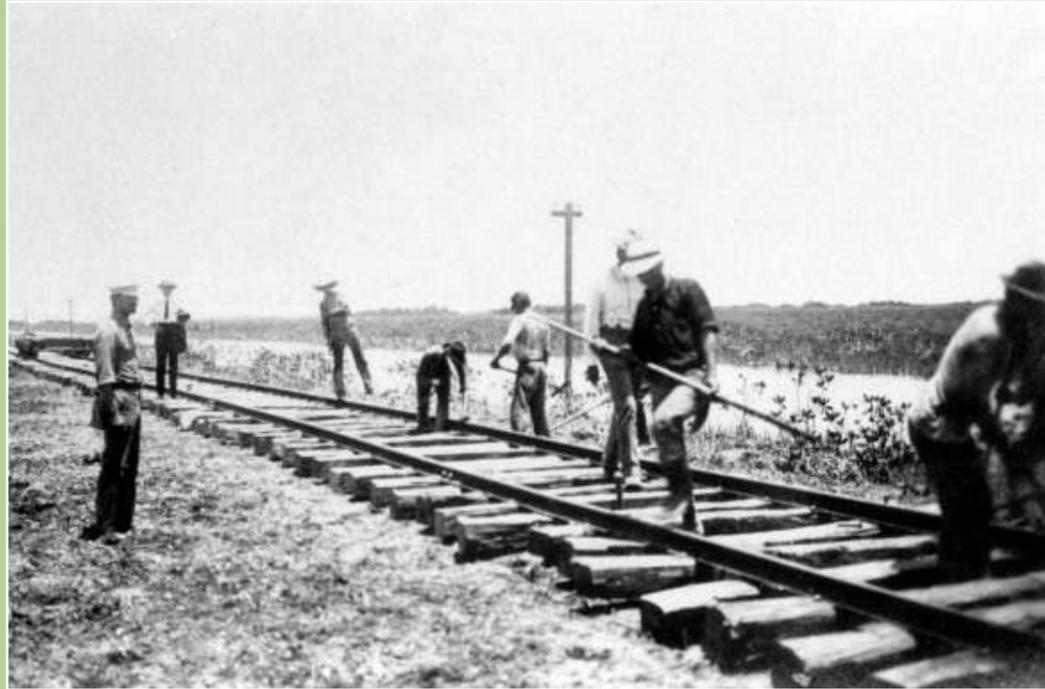
CHAPTER 4

Choosing a Direction for the Watershed

CHOOSING A SUSTAINABLE FUTURE

*You can always count on
Americans to do the right thing -
after they've tried everything else.*

- Winston Churchill



Overseas railroad extension 1906.

Choosing a Direction for the Watershed

CHOOSING A SUSTAINABLE FUTURE



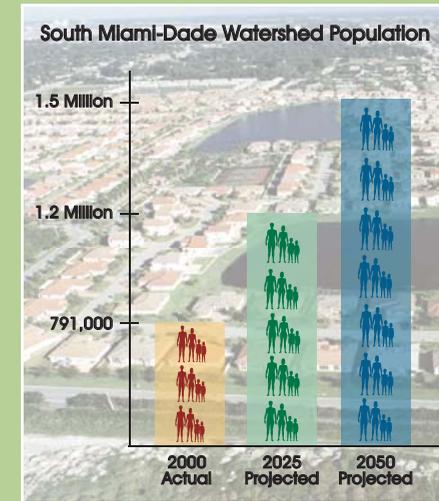
Homestead 1930's.



Kendale Lakes Mall 1982.

Faced with a potential doubling of the population and associated development, the Watershed will change over the next several decades. The Study clearly shows that the Watershed cannot grow as projected without substantial consequences to its water and natural resources, quality of life and community characteristics. The land and water management challenges confronting the Watershed will only increase. The pressures to develop land and the need to preserve natural and water resources will, without the right long-term forwarding-looking plan, be on an ecological and political collision course. At stake is the welfare and survival of a mosaic of land uses and lifestyles that balance agriculture, residential and commercial development and a unique and irreplaceable ecosystem.

After nearly four years of study, thousands of pages of analysis and scores of meetings with stakeholders and the public, what has emerged is a clear picture of two potential futures for South Miami-Dade County.



“SPRAWL”



Source: www.reviewjournal.com



Source: www.eany.org



Source: www.csmonitor.com

In this Chapter, two choices for the future are discussed. A discussion of the costs of each choice is included. In Chapter 5 a Recommended Watershed Plan is presented - - a plan that, if chosen, will put the Watershed on an environmentally and economically sustainable path.

The Choices

From a watershed-level planning perspective the two major policy choices for the future can be characterized as either a **Sprawl Scenario** or a **Smart Growth Scenario**. The consequences of a sprawl scenario are reflected in the assessment of Test Scenario 1. The sprawl scenario best describes the path that the County is on today. The Smart Growth choice will require the County to take some new, but very achievable, policy steps. The benefits of choosing a Smart Growth policy is substantiated by the test scenario assessments and supported by the planning literature.

What is Sprawl?

Sprawl is generally defined by non-contiguous, scattered or leap-frog patterns of development. Sprawl also includes numerous low-density subdivisions that fan out from established urban cores and absorb open lands. The environmental impacts of sprawl include the loss, and often disappearance, of ecologically significant open lands such as wetlands and forests. These open spaces perform important functions, including filtering runoff, assimilating water borne pollutants, recharging groundwater and providing habitat. Sprawl development and its associated patchwork of impervious surfaces interrupts surface water flows and reduces infiltration into the groundwater. More impervious surface results in increased stormwater runoff and conveyance of polluted water to rivers, lakes and the ocean. In the case of the Watershed, this means increased pollutant loads discharged into canals and ultimately into Biscayne Bay.

In addition, sprawl creates negative transportation impacts resulting from greater reliance on the automobile. Longer trips to and from

outlying areas to urban core area job centers results in the need for more roads, more air pollutant emissions, more connecting segments requiring long-term maintenance, and additional demand for parking spaces. In addition, traffic congestion increases as more and more drivers commute from outlying areas, resulting in lost production and leisure time. Sprawl analysts have shown that greater dependence on vehicles also has health impacts and results in less walking/biking to destinations as these travel modes become untenable. Furthermore, sprawl requires more municipal services such as police, emergency medical and fire to support the expanding road networks.

The scattered, fragmented nature of sprawl developments has impacts on resource efficiency and public costs such as infrastructure and municipal services. Connecting scattered subdivisions to municipal services involves



Example of Sprawl

extensive linear development of infrastructure such as water mains and sewer lines, lateral hookups, additional pumping stations, more frequent use of vehicles (and the necessity for parking spaces) and additional school capacities. While certain up front development costs are shared between the private and public sectors, long-term lifecycle infrastructure costs to support these developments are borne by municipalities and counties.

It has been documented in the planning literature that more compact forms of urban development make optimal use of established infrastructure and take advantage of existing capacities. This can result in economies of scale in providing municipal services, saving municipal governments and taxpayers' money compared to the sprawl scenario.

What is Smart Growth?

Smart Growth is a planning concept based on a set of principles that encourage land use patterns that are compact, transit-oriented, walkable, bicycle-friendly, and include mixed-use development with a range of housing choices. This approach keeps density concentrated in the center of a town or city, reducing the negative impacts of sprawl.

By locating people near each other, employment centers, and shopping and promoting transit-oriented development, travel times and transportation infrastructure costs are reduced. Smart Growth communities are designed to maximize access to public transit, and mixed-use/compact neighborhoods tend to use transit at all times of the day. As a result, these communities improve the quality of life and promote a healthier pedestrian-based lifestyle with less pollution.

The Smart Growth principle of compact building design creates livable urban neighborhoods and attracts more people and businesses to the community. This creates communities that are economically viable and environmentally sustainable -- reducing sprawl. Smart Growth is an alternative to sprawl and the associated traffic congestion, disconnected neighborhoods, and urban decay.

Additional information on Smart Growth may be found at:

General references:

- www.smartgrowth.org
- www.epa.gov/smartgrowth/
- www.planning.org/policyguides/smartgrowth.htm#I

Smart Growth measures as it pertains to the State of Florida:

- www.smartgrowth.org/news/bystate.asp?state=FL

Smart Growth and Housing Affordability:

- www.ruralhome.org/manager/uploads/VoicesWinter2001_2002.pdf
- www.rppi.org/ps287.html

Research:

- www.law.wfu.edu/x4867.xml
- www.smartgrowth.umd.edu/index.htm

Success Stories:

- www.smartgrowth.org/library/projects.asp

PRINCIPLES OF SMART GROWTH

- **Create a Range of Housing Opportunities and Choices:** Providing quality housing for people of all income levels is an integral component in any smart growth strategy.
- **Create Walkable Neighborhoods:** Walkable communities are desirable places to live, work, learn, worship and play, and therefore a key component of Smart Growth.
- **Encourage Community and Stakeholder Collaboration:** Growth can create great places to live, work and play -- if it responds to a community's own sense of how and where it wants to grow.
- **Foster Distinctive, Attractive Communities with a Strong Sense of Place:** Smart Growth encourages communities to craft a vision and set standards for development and construction which respond to community values of architectural beauty and distinctiveness, as well as expanded choices in housing and transportation.
- **Make Development Decisions Predictable, Fair and Cost Effective:** For a community to be successful in implementing Smart Growth, it must be embraced by the private sector.
- **Mix Land Uses:** Smart Growth supports the integration of mixed land uses into communities as a critical component of achieving better places to live.
- **Preserve Open Space, Farmland, Natural Beauty and Critical Environmental Areas:** Open space preservation supports Smart Growth goals by bolstering local economies, preserving critical environmental areas, improving our communities quality of life, and guiding new growth into existing communities.
- **Provide a Variety of Transportation Choices:** Providing people with more transportation choices is a key aim of Smart Growth.
- **Strengthen and Direct Development Towards Existing Communities:** Smart Growth directs development towards existing communities already served by infrastructure, seeking to utilize the resources that existing neighborhoods offer, and conserve open space and irreplaceable natural resources on the urban fringe.
- **Take Advantage of Compact Building Design:** Smart Growth provides a means for communities to incorporate more compact building design as an alternative to conventional, land consumptive development.

Source: www.smartgrowth.org

CHAPTER 4

Choosing a Direction for the Watershed

“SMART GROWTH”



Source: www.landdesign.com



Source: www.landdesign.com

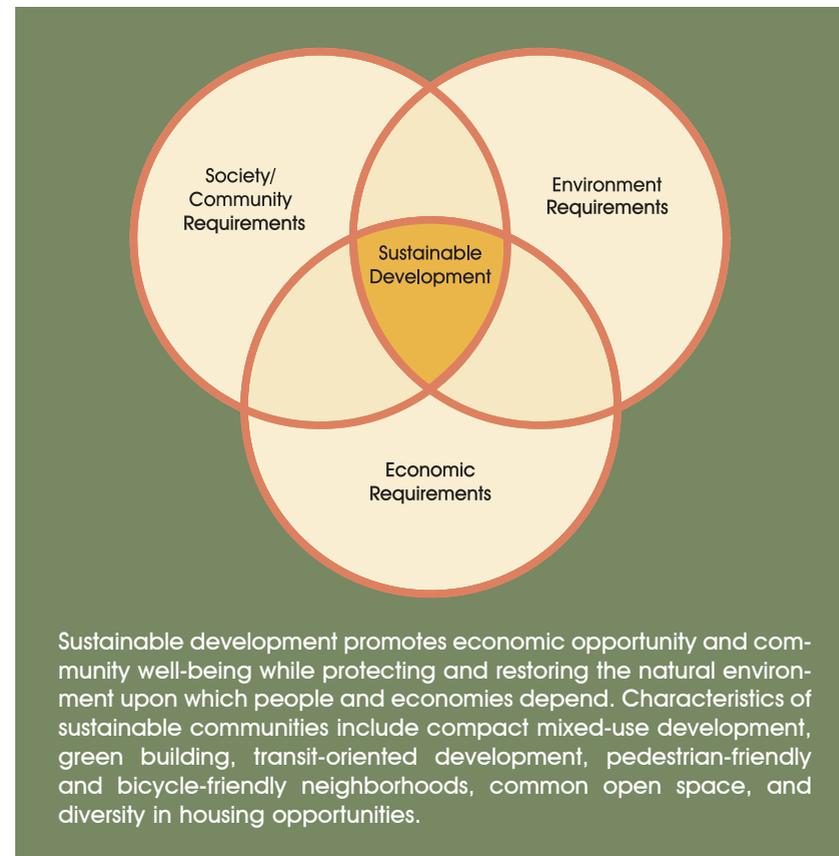


Source: www.kirkfromm.com

What is sustainability and sustainable development?

Objective 3 of the County's CDMP LUP 3E is "To ensure compatible land uses and zoning decisions in the Watershed Study Area that are consistent with long term objectives for a sustainable South Miami-Dade".

Sustainability is an approach that provides positive outcomes for the human and natural environments both now and into the future. It focuses on the relationships between the economic, social, institutional and environmental aspects of human society, as well as the non-human environment. Sustainability is intended to be a means of shaping human activity so that society and its economies are able to meet their needs and express their greatest potential today, while preserving biodiversity and natural ecosystems in the long term.



Sustainable development is an approach that promotes development which seeks to create equitable standards of living, satisfy the basic needs of all peoples and produce economic growth while taking the steps necessary to avoid irreversible damages to our natural environment. This is accomplished by reconciling development projects with the needs of the natural environment. The concept of sustainable development is reflected in the following principles:

- Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Sustainable development promotes consumption standards and population growth that are within the bounds of ecosystem capacities.
- Meeting essential needs depends on achieving economic growth potential.
- Sustainable development will not endanger natural systems, including water, soil, and plant and animal species, including their habitat.
- Sustainable development requires that the rate of depletion of non-renewable resources not foreclose options in the future.



Sustainable development is a compelling moral and humanitarian issue.

-- Colin Powell,
U.S. Secretary of State

SIX PRINCIPLES OF SUSTAINABLE DEVELOPMENT

- 1 Anticipating and preventing problems is better than trying to react and fix them after they occur.
- 2 Accounting must reflect all long-term environmental and economic costs, not just short-term benefits or costs.
- 3 The best decisions are those based on sound, accurate, and up-to-date information.
- 4 We must live off the interest our environment provides and not destroy its capital base.
- 5 The quality of social and economic development must take precedence over quantity.
- 6 We must respect nature and the rights of future generations.

Source: www.smartgrowth.org



The sprawl scenario, the path that the County is on today, will negatively change the character of the Watershed forever if it continues. The waters of Biscayne Bay will be subject to substantial increases in water pollution. Three fourths of the agricultural land in the Watershed will be lost to low density residential developments. Already imperiled natural resources such as wetlands and forests will be diminished further. Traffic congestion will increase. The effectiveness of restoring America's Everglades, the largest environmental restoration project in the world, will be reduced -- reducing benefits to the County. A policy path that leads to sprawl will not be a path of sustainability for the environment or the community.

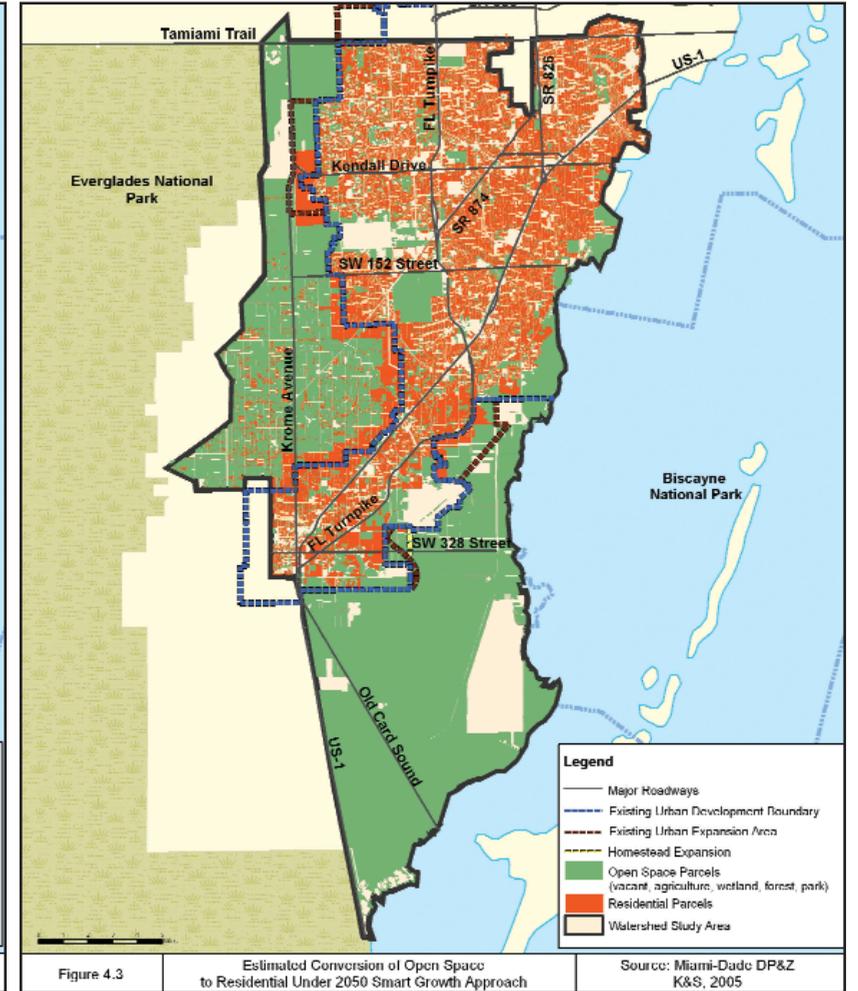
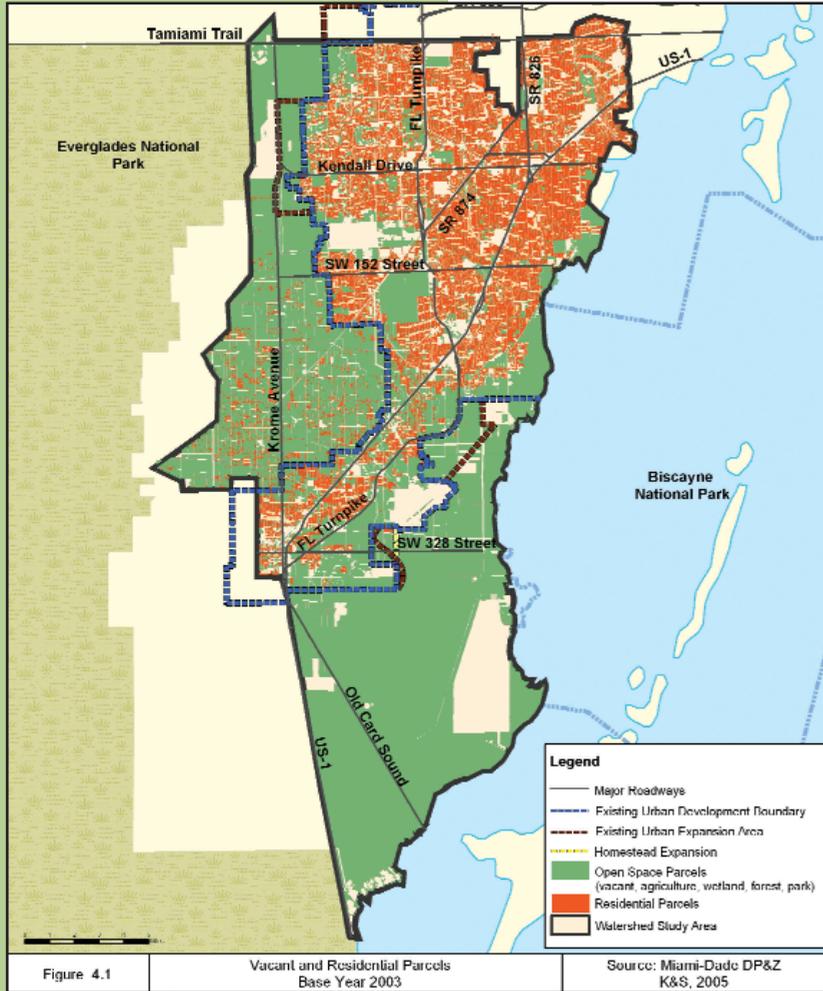
If adopted, a Smart Growth scenario will afford the Watershed the best chance for a sustainable future. While it will take a long-term vision and the courage to make difficult decisions today, the Smart Growth scenario reflected in the Recommended Watershed Plan will leave an unprecedented legacy for the County's leadership -- a legacy that future generations will be thankful for.

Sprawl or Smart Growth for the Watershed - - the choices, the costs.

The results of the Watershed Study are consistent with the literature on sprawl and Smart Growth as briefly described above. Test Scenario 1 (Sprawl Scenario) exhibited substantially lower performance and higher costs. The scenarios that more closely represent Smart Growth approaches performed the best and cost less. The Recommended Watershed Plan presented in Chapter 5 is based on Smart Growth concepts and approaches.



The following figures provide a spatial picture of the estimated change to the Watershed from the baseline condition (Figure 4.1) with a sprawl future (Figure 4.2) and a Smart Growth future by the year 2050 (Figure 4.3).



The Direct Costs of Choosing the Sprawl Scenario

It is estimated that allowing a sprawl scenario in the Watershed will cost nearly \$8 billion more than the Recommended Watershed Plan between now and 2050. This does not include the substantial environmental costs, including impacts to Biscayne Bay and other natural resources, that will result from a sprawl development pattern. While the extraordinary ecological and human value of clean water and healthy natural resources is well documented, this value is difficult to express in terms of dollars.

Figure 4.4 graphically depicts the savings from the Recommended Watershed Plan when compared to the sprawl scenario (Test Scenario 1B). The attribution of such savings is discussed below and provided in detail in Table 4.1.

When considering the costs of sprawl it should be noted that certain up front development costs are often shared between the private and public sectors. However, it is important to understand that the long-term lifecycle infrastructure costs to support these developments are borne by local governments.

Allowing a sprawl scenario in the Watershed is projected to cost nearly \$8 billion more than the Recommended Watershed Plan. A sprawl scenario will also result in substantial negative impacts to Biscayne Bay and the overall environmental and economic health of the Watershed.

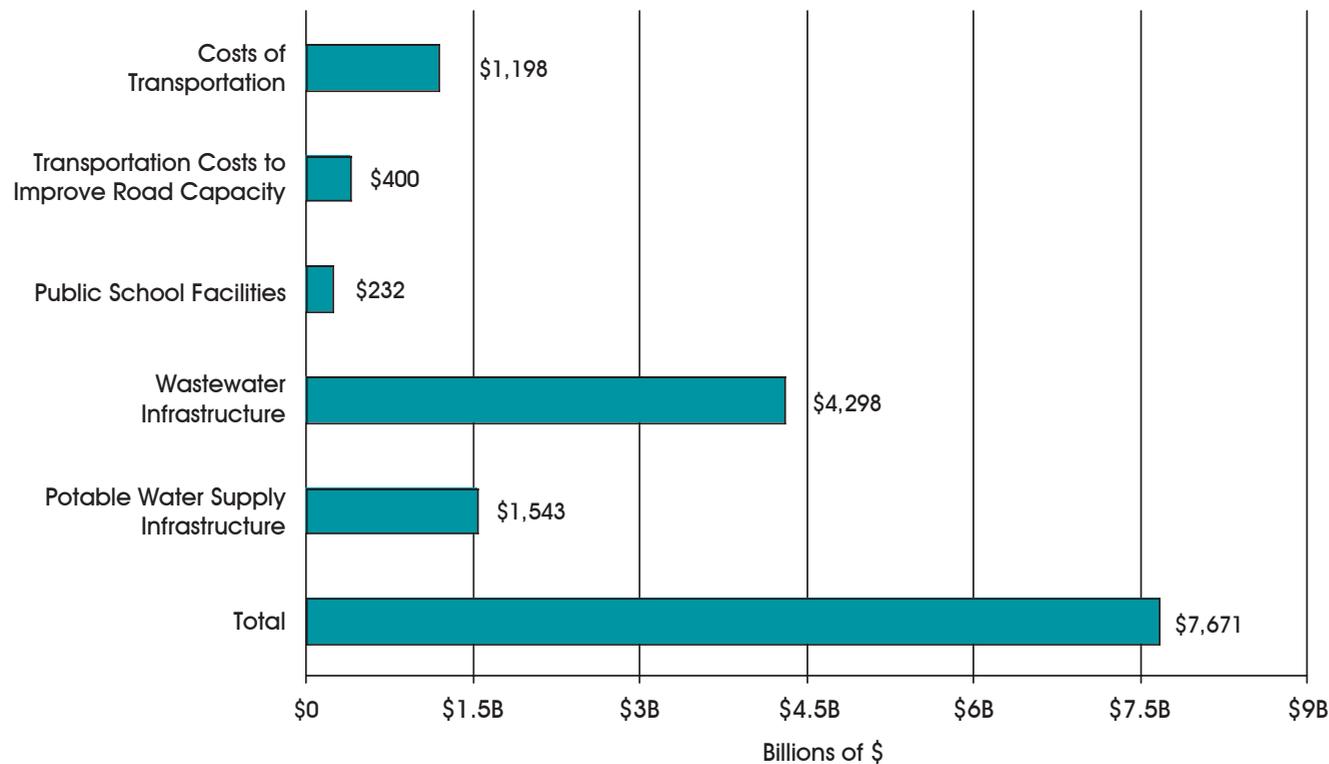


Figure 4.4 Difference in cost (savings) between the Recommended Plan and Test Scenario 1B (Sprawl)



Social Costs of Transportation

The term "social costs of transportation" refers to a measure of the monetized negative social and economic impacts associated with more vehicle use to support sprawl development under the current development scenario. For example, the **\$1.2 billion** in total savings that could be achievable under the Recommended Watershed Plan includes the following elements:

- **Travel Time Savings (\$14.6 million).** Travel time savings represent the avoided hourly cost of delays due to congestion that would be experienced under the current development path and extended system of road networks. This does not include savings that would be achieved through transportation improvements such as a completed Metrorail system.

- **Vehicle Operating Savings (\$960 million).** Vehicle operating savings are the result of the approximately 1.6 billion fewer miles of travel under the Recommended Watershed Plan, compared to the current development path. To estimate these savings, over the entire planning horizon out to 2050, the avoided vehicle miles traveled were valued using an updated average total cost per mile figure (\$0.60) from the U.S. Department of Transportation. The average total cost per mile represents the cost of owning, maintaining and operating a vehicle.



- **Social Cost of Air Pollution Savings (\$224 million).** Air pollutant emissions from vehicle exhaust affect human health in a variety of ways. The cost of these health effects is one of the largest social costs of vehicle usage. The sprawl scenario would result in the greatest daily tonnages of emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and oxides of nitrogen (NOx) compared to the Recommended Watershed Plan. The scenario differences in tons of air pollutant emissions per day were

quantified and documented in the infrastructure assessments for the alternative land use scenarios (Sub-tasks 3.2 and 4.3 work products). These savings include the reduced health costs associated with emission tonnages or health damages that would be avoided. Avoided health damages represent the morbidity and mortality that would not be experienced by the population because of less motor vehicle exhaust being emitted into the Watershed's atmosphere over time under the Recommended Watershed Plan.

Costs to Improve Road Capacity

The approximate costs necessary to improve roadway capacity out to 2050 were quantified under Sub-tasks 3.2 and 4.3. The sprawl scenario requires substantially more roadway infrastructure. The difference in such costs (savings) between the sprawl scenario and the Recommended Plan is approximately **\$400 million**. By not having to incur these investments in the future, the County would free up capital for other important infrastructure projects identified in its Capital Improvement Plan.



Shell gas station in Kendall 1950.

Public Schools Facilities

Providing a high quality public education to the Watershed's children represents one of the most valuable investment taxpayers will make over the next 43 years. Investing in youth will lead to more productive, meaningful lives and helps ensure that the Watershed's economy and community will remain vibrant and diverse. To accommodate the projected growth in population, public school enrollment is estimated to total 159,737 by 2025



and grow to 212,780 by 2050. Select areas within the Watershed will require new schools and permanent student stations. Each scenario evaluated would require substantial investments to meet student station deficiencies. However, under the sprawl scenario the cost to meet student station deficiencies would exceed those identified within the Recommended Watershed Plan by **\$232 million** by 2050.

Wastewater Infrastructure Costs

Wastewater infrastructure costs represent the largest anticipated savings associated with the Recommended Watershed Plan and would total approximately **\$4.3 billion** out to 2050. Under the sprawl scenario the total costs of adding wastewater treatment capacity and collection system expansion costs are significantly greater primarily because of the much more extensive linear feet of force mains and sanitary sewer lines required to accommodate fragmented low density developments (Table 4.1). In addition, single family residences that characterize the sprawl scenario generally consume more water per

household, discharge more wastewater, and require higher connection fees than higher density developments.

The wastewater infrastructure costs were estimated from future wastewater loadings resulting from population growth anticipated in the Watershed. Collecting, moving and routing wastewater to treatment facilities would require extensively more physical investment under the sprawl scenario. The additional system wide wastewater treatment capacity was estimated beyond the time horizons contemplated within the County's Wastewater Facilities Master Plan. Projected wastewater flows or loadings were projected to 2025 and 2050.

Serving low density, sprawl communities with wastewater infrastructure would be a very costly endeavor that can be substantially avoided by adopting the Recommended Watershed Plan in Chapter 5.

- **2004 to 2025.** Under the sprawl scenario (Test Scenario 1), the cumulative present value of annual capital cost expenditures would total \$3.0 billion in wastewater infrastructure costs over the planning period out to 2025. This amount compares to \$1.8 billion under the Recommended Watershed Plan. Linear extension of the wastewater treatment collection system under a dispersed, sprawl-like pattern drives the cost differences.
- **2004 to 2050.** Under the sprawl scenario, the cumulative present value of annual capital cost expenditures would total \$12.1 billion in wastewater infrastructure costs over the entire planning horizon from 2004 to 2050. This amount compares to \$7.8 billion under the Recommended Watershed Plan. Wastewater infrastructure cost savings under the Recommended Watershed Plan would total \$4.3 billion.



Note: The wastewater and potable water costs do not include proposed improvements to the County's re-use and water conservation programs.

Potable Water Supply Infrastructure

The potable water supply infrastructure costs are generally a result of the capital costs for additional water mains and water treatment capacity to support service extension to newly developed areas (including those areas outside of the existing Urban Development Boundary in the sprawl scenario) These planning level estimates were made out to 2050. Water connection fees were also estimated.

- **By 2025.** Under the sprawl scenario (Scenario 1), the present value cost of the water supply infrastructure (cumulatively measured from 2004 to 2025) and hookups would total \$726 million. This compares to \$335 million under the Recommended Watershed Plan. Bottom line: sprawl-like development extending outward within the Watershed adds an additional \$400 million in water supply distribution and expansion infrastructure costs over the planning horizon extending to 2025. These costs can be avoided by choosing another path, the Recommended Watershed Plan.
- **2004 - 2050.** Under the sprawl scenario, the present value cost of the water supply infrastructure (cumulatively measured from 2004 to 2050) and hookups would amount of \$3.0 billion. This compares to \$1.5 billion for the Recommended Watershed Plan. Sprawl development extending outward within the Watershed would add an additional \$1.5 billion in water supply distribution and expansion infrastructure costs over the planning horizon that can be avoided by choosing the Recommended Watershed Plan.



Homestead irrigation 1974.



Table 4.1
 Infrastructure and Social Cost Savings between the Recommended Plan and Test Scenario 1B (Sprawl).
 Present Value of Future Annual Savings in \$ millions. (2004-2050)

Cost Category	Sprawl	Recommended Plan	Cost Savings: Sprawl - Recommended Plan
Potable Water Supply			
Water Connection Fees	\$1,426.9	\$1,173.1	\$254
Water Mains	\$1,491.4	\$215.6	\$1,276
Water Treatment Plant Capacity	\$85.9	\$72.6	\$13
Subtotal:	\$3,004.2	\$1,461.3	\$1,543
Wastewater Infrastructure			
Sewer Connection Fees	\$5,748.6	\$4,726.1	\$1,023
Force Mains	\$1,789.7	\$258.7	\$1,531
Gravity Sanitary Sewer Lines	\$2,013.4	\$291.1	\$1,722
Sewage Pumping Stations	\$33.7	\$11.3	\$22
Wastewater Treatment Plant Capacity	\$2,488.4	\$2,488.4	\$-
Subtotal:	\$12,073.9	\$7,775.6	\$4,298
Public Schools Facilities Costs	\$1,857.1	\$1,625.5	\$232
Transportation Infrastructure Costs			
Total Cost to Improve Overcapacity Roads	\$2,100	\$1,700	\$400
Social Costs of Transportation			
Total Delays Due to Congestion-(Vehicle Hours)	5,250,634	4,717,978	532,656
Total Delays Due to Congestion-(Person Hours)	9,319,875	8,374,411	945,464
Monetized Cost of Delays (Mils. \$) \1	\$144.2	\$129.6	\$14.6
Billions of Miles Per Year (VMT)	24.4	22.8	1.6
Vehicle Operating Savings (Mils. \$) \2	\$14,634.7	\$13,675.1	\$960
Tons of Pollutants Per Day – 2050			
VOC	21.19	20.15	1.0
CO	388.23	369.19	19.0
NOx	18.19	17.3	0.9
Monetized Cost of Air Pollution, Mils. \$ \3			
VOC	\$284	\$270	\$14
CO	\$359	\$342	\$18
NOx	\$3,929	\$3,736	\$192
Subtotal: Sum of Air Pollution Costs	\$4,572	\$4,348	\$224
Subtotal: Total Transportation Costs	\$21,451	\$19,853	\$1,598
Total Costs in Millions:	\$38,386	\$30,716	\$7,671

Sources:

\1 US DOT Memorandum: Departmental Guidance for the Valuation of Travel Time in Economic Analysis, 1997 <http://ostpxweb.ost.dot.gov/policy/Data/OT97guid.pdf>, and the May 2005 Metropolitan Area Occupational Employment and Wage Estimates survey for Miami-Miami Beach-Kendall, FL Metropolitan Division, updated to current prices using the U.S. CPI from the U.S. Department of Labor, BLS.

\2 US DOT, Bureau of Transportation Statistics Table 3-14: Average Cost of Owning and Operating an Automobile, 2004 Average total cost per mile (current ¢) www.bts.gov/publications/national_transportation_statistics/2006/html/table_03_14.html and US BLS CPI Index, 2004 and 2006

\3 represents the cumulative present value of annual health costs, 2004-2005 (morbidity and mortality) associated with these pollutants using a 5% discount rate using (Delucchi, 2000).

Other Costs of Choosing the Sprawl Scenario

In addition to the fiscal impacts and costs discussed above, the sprawl scenario will result in substantial costs that are not easily expressed in monetary terms. As expressed in Chapter 2, the results of the water resources, natural resources and land use assessments demonstrate clearly that the sprawl scenario will cause the greatest overall negative impacts on the Watershed. This will have a direct effect on other important attributes like tourism and community character. In short, the quality of the Watershed will suffer significantly with a sprawl scenario.

Non-monetary impacts to the Watershed resulting from a sprawl scenario include the degradation of Biscayne Bay from increased pollutant loadings and the further loss of wetlands and upland forests. These pervious areas filter pollutants, reduce flooding, and provide habitat for plant and animal species.

Conclusion

The costs of sprawl are well documented in the literature and validated by the Watershed Study. Extensive work was completed to measure the relative costs for the express purpose of documenting how savings can be achieved for the County and its taxpayers through sound long-term planning.

Under a sprawl scenario the Watershed is characterized by more impervious surface and less open space, natural areas and agricultural lands. This more extensive and geographically dispersed automobile dependent development pattern costs more than a Smart Growth approach - - both in terms of fiscal costs and environmental costs. While all scenarios, including the Recommended Watershed Plan, involve unavoidable costs, such costs are not on the same scale and are more easily mitigated when Smart Growth approaches one used.

Future generations will inherit the decisions made today. Two choices have been presented in this Chapter. Continuing the current pattern of development in the Watershed will result in sprawl. Choosing a Smart Growth scenario will chart a new direction for the Watershed - - a course for a sustainable, healthy environment and economy.



CHAPTER 5

The Recommended Watershed Plan

CHOOSING THE FUTURE TODAY

*The nation behaves well if it treats the natural
resources as assets which it must turn over
to the next generation increased,
and not impaired, in value.*

- President Theodore Roosevelt, 1910



The Recommended Watershed Plan

CHOOSING THE FUTURE TODAY



In Chapter 2 the results of thousands of pages of technical analysis are presented and discussed. Chapter 3 highlights the extensive outreach undertaken to ensure that the public, landowners and stakeholders had many opportunities to influence the Study and Plan. The consequences of coordinating the current sprawl scenario and the advantages of choosing the Smart Growth scenario are discussed in Chapter 4.

This Chapter presents a plan for a sustainable South Miami-Dade Watershed. A Recommended Watershed Plan that was born in a crucible of sound planning policy, good science, and meaningful public involvement. In short, this Chapter is about choosing a different future for the Watershed - - a future based on the concepts of **Sustainability** and **Smart Growth**.



The Recommended Watershed Plan consists of two major parts: the Watershed Plan Design Guidelines and the Implementation Strategies. Part one, the Watershed Plan Design Guidelines, creates a temporal and spatial policy framework for Smart Growth and resource protection to the year 2050. The intent of the Design Guidelines and associated

Design Guide Map is to provide direction to the County, developers and the communities in the Watershed on how to facilitate and promote a Smart Growth development pattern. This guide is also intended to increase predictability for developers and property owners.

The Design Guide Map establishes a general framework for development - it is not a parcel based zoning map. It does not dictate future land use of any given parcel, but rather provides general guidance that allows the exercise of good judgement consistent with Smart Growth concepts.

Part two of the Recommended Watershed Plan is a set of implementation strategies that provide the policy direction needed to make the Plan effective and implementable. These strategies were developed after extensive discussions with the WSAC and

stakeholders. If adopted, many of these strategies, along with the Design Guidelines, would be codified in the County's CDMP. Others would become an element of Capital Improvement Plans and/or strategic plans for County departments.

THE RECOMMENDED
WATERSHED PLAN =

Watershed Plan Design
Guidelines
+
Implementation Strategies

THE RECOMMENDED WATERSHED PLAN

Part I. Watershed Plan Design Guidelines

Ia. General Watershed Policy Guidelines

- More compact building design
- Mix of commercial and residential land uses
- Greater densities along transit corridors
- Variety of transportation choices
- Create walkable neighborhoods
- Preserve open space, wetlands and farmland
- Better protection/management of surface and ground waters
- Enhancement of tourism and economic development

Ib. Specific Watershed Policy Guidelines

• Temporal Policy Guidelines

- 2007 through 2025: 102,000 residential dwelling units projected
 - Allocation of 100 percent of the projected 102,000 dwelling units inside the existing UDB through 2025
- 2026 through 2050: 102,000 residential dwelling units projected
 - Allocation of a minimum of 60 percent (61,000) of the projected 102,000 dwelling units inside the existing UDB between 2026 and 2050
 - Allocation of a maximum of 40 percent (41,000) of the total projected dwelling units outside the existing UDB between 2026 and 2050. This policy on the allocation of dwelling units outside the existing UDB should not be implemented without a specific finding of necessity by the County and until the projects necessary in Zone C (see below) for the protection of Biscayne Bay have been completed.

• Spatial Policy Guidelines

- In coordination with local municipal plans, utilize the eight existing consensus-based charrette areas in the Watershed at 75 to 100 percent of the densities approved and agreed upon by the municipalities and the County, resulting in 40,000 to 50,000 units in the charrette areas;
- Make completion of enhanced transit corridors a priority, including completion of the Metrorail to Florida City;
- Establish two major zones (A and B) along enhanced transit corridors to guide the allocation of dwelling units;
- Consistent with the charrette areas and Zones A and B, establish a minimum of five major development nodes along transit corridors;
- Encourage municipalities located in Zones A and B to utilize Smart Growth approaches, including higher residential densities and mixed use developments. The determination of how to distribute the density would be made by municipalities; and
- Establish an open space/conservation zone (Zone C) that ensures that lands needed for the protection of Biscayne Bay are available for stormwater treatment, wetlands restoration and open space.

The above design guidelines are reflected in the Design Guide Map in Figure 5.1.

Guideline Zones

Zones A and B are established for the purpose of creating a general guide for a higher density, transit oriented development pattern. It is not the intent of these zones to create rigid regulatory boundaries. Further, it is not the intent that the entire area within Zones A and B will achieve the average densities prescribed. In this regard, it is important to acknowledge that the density for most of the acreage in each zone



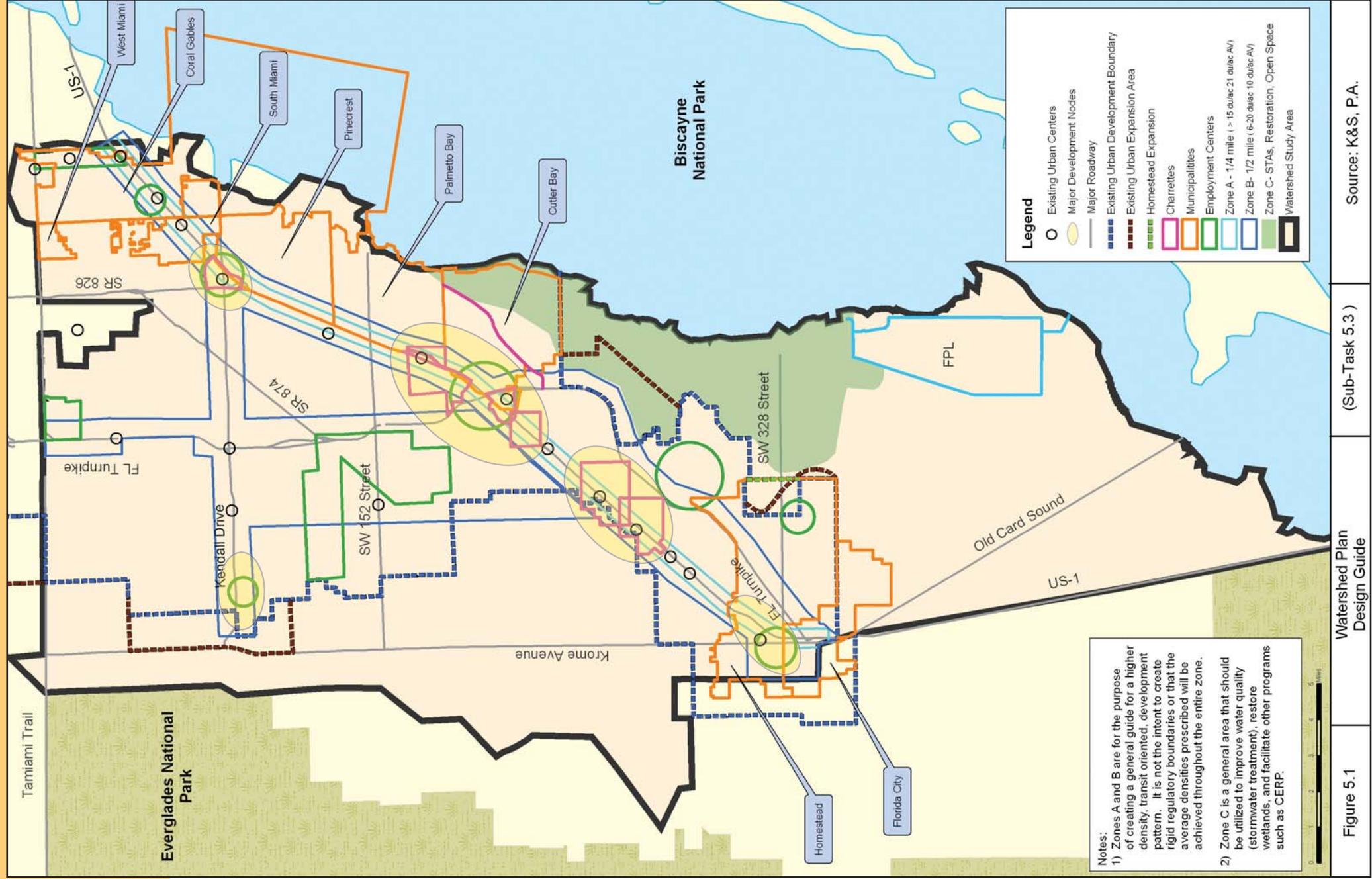
may not be higher than it is today. The densities can be achieved through the utilization of the consensus based charrettes and modest amounts of additional redevelopment over the next 43 years.

- **Zone A:** Located $\frac{1}{4}$ mile on each side of US 1. Minimum density for new development and redevelopment of 15 units per acre and average density of 21 units per acre.
- **Zone B:** Generally located $\frac{1}{2}$ mile on each side of US 1 and along other major corridors such as Kendall Drive and 137th Avenue. Density range is 6 to 20 units per acre with an average of 10 units per acre.
- **Zone C:** Located on the eastern portion of the Watershed near the confluence of Canals C-1, C-102 and C-103 with Biscayne Bay. This approximately 18,000 acre area may be used for a combination of stormwater treatment areas (STAs), wetlands restoration (including the Biscayne Bay Coastal Wetlands CERP project) and open space (including agriculture and recreation).

Zone C is an integral part of the Recommended Watershed Plan. Under all growth scenarios, including the Draft Preferred Scenario, the discharge of water pollutants into Biscayne Bay increases. In this regard, it will be necessary to capture and treat stormwater runoff before it enters the Bay. The area of Zone C was selected because of its landscape position in relation to the three major canals that result in significant pollutant load increases. Figure 5.2 demonstrates this graphically for the Draft Preferred Scenario. Zone C is also consistent with the priority lands identified by Biscayne National Park and the Biscayne Bay Coastal Wetlands CERP project.

It is important to note that it is not likely that all of the land in Zone C will be necessary. Further, specific parcels of land were not selected, consistent with the willing seller requirements in the Implementation Strategies.





STA = Stormwater Treatment Area

WATER POLLUTANTS EVALUATED

- (BOD5): 5 day Biochemical Oxygen Demand
- (COD): Chemical Oxygen Demand
- (TSS): Total Suspended Solids
- (TDS): Total Dissolved Solids
- (NH3-N) (or TN): Total Nitrogen
- (NOx-N): Nitrate Nitrite
- (NH3-N): Ammonia Nitrogen
- (TKN): Total Kjeldahl Nitrogen
- (TP): Total Phosphorus
- (DP): Dissolved Phosphorus
- (Cd): Total Cadmium
- (Cu): Total Copper
- (Pb): Total Lead
- (Zn): Total Zinc

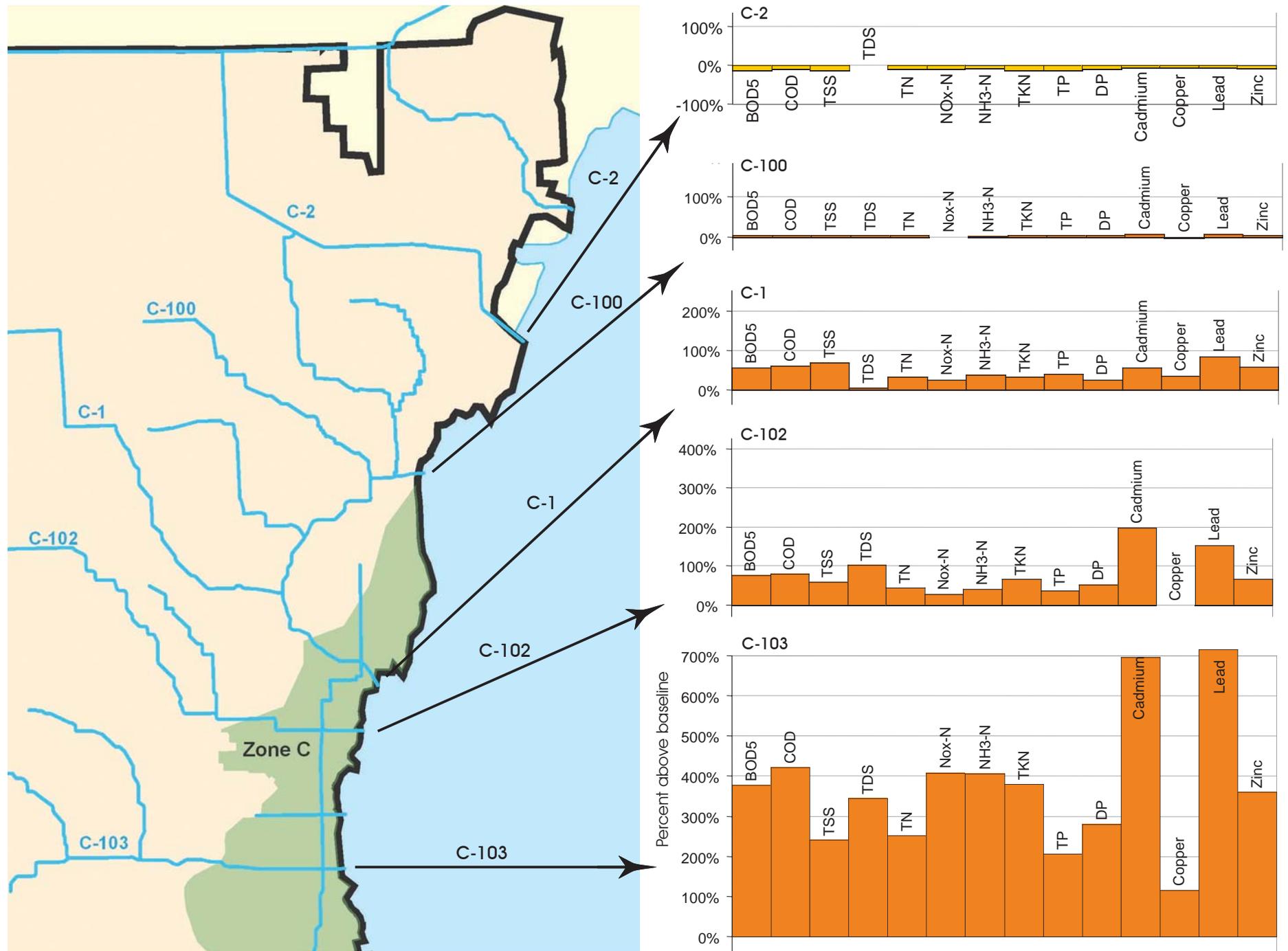


Figure 5.2 Water Quality: Zone C is located where pollutant load increases will be the highest (actual data from the Draft Preferred Scenario, 0 percent = baseline).

Part II. Implementation Strategies

To assist the County in implementing the Recommended Watershed Plan and to mitigate for the unavoidable impacts from growth, a set of implementation strategies was developed. These strategies include site development standards, best management practices for protecting water quality, and land preservation techniques including regulatory incentives. These strategies also address potential effects on property rights and include measures to mitigate such effects.

The implementation strategies were developed in concert with staff from the agencies on the Project Management Team, including Miami-Dade County Department of Planning and Zoning. Further, the implementation strategies were finalized after extensive discussions with the WSAC in eight meetings that were open to the public.

The implementation strategies, listed in Table 5.1, are organized into the following categories:

- Overarching Policy Framework of the Watershed Plan
 - ➔ ***General Implementation Strategies (GI)***
- Thematic Implementation Strategies
 - ➔ ***Agriculture (A)***
 - ➔ ***Economy (E)***
 - ➔ ***Housing (H)***
 - ➔ ***Natural Communities/Open Space (NC)***
 - ➔ ***Property Rights (PR)***
 - ➔ ***Smart Growth Economic Incentives (SG)***
 - ➔ ***Transportation (T)***
 - ➔ ***Water Resources (WR)***

To assist the County in setting priorities, the strategies are assigned into one of the following tiers:

- Tier 1** - Those implementation strategies that are critical to the success of the Watershed Plan.
- Tier 2** - Those strategies that are very important to the success of the Watershed Plan.
- Tier 3** - Those implementation strategies that, while likely to be important to the success of the Watershed Plan, require further evaluation.

The Recommended Watershed Plan meets the specific objectives identified below in CDMP Land Use Policy LU-3E:

1. To identify and protect lands, including their uses and functions, that are essential for preserving the environmental, economic, and community values of Biscayne National Park;
2. To identify and establish mechanisms for protecting constitutional private property rights of owners of land identified above;
3. To support a viable, balanced economy including agriculture, recreation, tourism, and urban development in the Plan area; and
4. To assure compatible land uses and zoning decisions in the Study Area consistent with long term objectives for a sustainable South Miami-Dade.

The relevance of the LU-3E objectives to each implementation strategy is noted in Table 5.1.

Table 5.1
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
General Implementation Strategies			
GI 1	Tier 1	The County, through the CDMP and associated regulations, shall pursue appropriate actions to ensure the long-term protection of Biscayne Bay.	3E1
GI 2	Tier 1	The County shall implement the Watershed Plan and associated policies and regulations in a manner that ensures protection of private property rights.	3E2
GI 3	Tier 1	The County shall implement policies to promote a variety of transportation/transit options to reduce reliance on single-occupancy vehicles.	3E3
GI 4	Tier 1	The County shall work cooperatively with municipalities within the Watershed to uniformly and equitably implement the Watershed Plan, including making revisions to the County and local comprehensive plans as necessary. In the unincorporated areas the County shall lead by example to actively implement the Watershed Plan.	3E4
GI 5	Tier 1	The County shall evaluate at a minimum of every five years, and as appropriate, adopt successful programs from other government entities to effectively advance resource protection, Smart Growth and sustainable development.	3E4
GI 6	Tier 1	The County shall, through all sources available, adequately fund new infrastructure needs in an equitable manner, balancing the true cost of growth with needed improvements to existing customers.	3E3
GI 7	Tier 1	The County shall provide oversight and establish a Report Card cycle consistent with the Evaluation and Appraisal Report (EAR) process to ensure implementation of the Watershed Plan.	3E4
Agriculture			
A 1	Tier 1	<p>The County shall work with the State and federal government to maximize Miami-Dade’s competitive advantage in agriculture by:</p> <ul style="list-style-type: none"> ➤ Increasing funding for research into technological developments; ➤ Exploring fully and promoting markets for new types of crops; ➤ Establishing cost-share programs for the implementation of innovative technological developments; and ➤ Working with the Agricultural Practices Study Advisory Board and other interest groups to establish and advocate positions on legislation that potentially impacts Miami-Dade agriculture. 	3E3

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Agriculture			
A 2	Tier 1	<p>The County shall establish an expert "Blue Ribbon" Panel by 2008 to identify appropriate programs and techniques to enhance the long-term viability of agriculture. This Panel shall be chaired by the County's Agricultural Manager and consult with the Agricultural Practices Study Advisory Board. The Panel should be appointed by the Mayor/County Manager and include representatives from agricultural and environmental interests. The focus of the Panel shall include, but not be limited to:</p> <ul style="list-style-type: none"> ➤ A comprehensive review of existing agricultural programs, the County Code, and other regulatory requirements that affect profitability or result in unnecessary barriers to sustainable agriculture; ➤ Devising mechanisms to enhance the profitability and sustainability of Miami-Dade agriculture, taking advantage of the appropriate recommendations contained in the <i>Miami-Dade County Agricultural Retention Study</i>; ➤ Improving communications between the agricultural community and the environmental community; and ➤ Evaluation of the on-site processing and on-site sale of agricultural products produced in the agricultural areas, including review of regulations related to packing plants and fruit stands. 	3E3
A 3	Tier 2	<p>The County shall support and fund through a variety of sources a coordinated, collaborative Miami-Dade agriculture marketing campaign, including the following:</p> <ul style="list-style-type: none"> ➤ A pilot marketing campaign and communication strategy for South Miami-Dade agriculture; ➤ Integration with the current Florida Agricultural Promotional Campaign ("Fresh from Florida") or successor program, as appropriate; ➤ A focus on the area's agricultural tourism potential (e.g., Schnebly Winery and Williams Grove in the Redlands); ➤ A community-based outreach and education program; and ➤ An agricultural tourism signage program. 	3E3
A 4	Tier 2	The County shall provide additional staff support for UF/IFAS extension programs that focus on development and dissemination of best management practices (BMPs).	3E3
A 5	Tier 2	To promote interagency coordination and the agricultural industry, the County shall provide appropriate staffing resources and funding for the Agricultural Manager position.	3E3
A 6	Tier 2	Beginning in 2010 and thereafter in coordination with the release of agricultural census data, the County should fund an economic impact analysis of agriculture and agribusiness in Miami-Dade County. This analysis shall be prepared by a qualified independent institution and coordinated through the office of the Agricultural Manager.	3E3

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Agriculture			
A 7	Tier 2	The County's Agricultural Manager shall work with the Beacon Council and the Greater Miami Convention and Visitors Bureau to promote agriculture and foster recognition of the importance of agriculture to the County's economy.	3E3
A 8	Tier 2	The County shall modify its Strategic Plan performance indicator of "no net loss of agricultural or environmentally sensitive lands" in order to: <ul style="list-style-type: none"> ➤ Differentiate between agricultural lands and environmentally sensitive lands; ➤ Recognize that the economic viability of agriculture in south Miami-Dade is not solely dependant on the quantity of agricultural lands; and ➤ Acknowledge the conversion of agriculture lands currently allowed through the CDMP amendment process. 	3E3
Economy			
E 1	Tier 1	The County shall, in coordination with municipalities, promote the development of employment centers in Zones A and B as noted on the Watershed Plan Design Guide.	3E3
E 2	Tier 1	The County shall increase tourism-based revenue in South Miami-Dade by 50 percent by 2015 and by 100 percent by 2025. This shall include a focus on environmentally sustainable tourism and agriculture and be accomplished by: <ul style="list-style-type: none"> ➤ A coordinated marketing effort with tourist development organizations such as chambers of commerce, the Beacon Council, the Tropical Everglades Visitors Association, and the Greater Miami Convention and Visitors Bureau; ➤ The promotion of the Watershed Area as a destination for tourists visiting Everglades National Park and Biscayne National Park; and ➤ The facilitation of the creation of medium- and high-end eco-tropical and adventure resorts. 	3E3
E 3	Tier 1	The County shall allocate at least 50 percent of the Tourist Development Tax collected within the Watershed to further promote tourism therein.	3E3
E 4	Tier 2	The County and allied business organizations shall develop a South Miami-Dade industry recruitment program to attract and increase clean industries such as biotechnology, film and entertainment, health services, international commerce, tourism, and telecommunications. To ensure a skilled workforce capable of supporting these industries, the County shall develop educational partnerships with local universities, colleges, vocational centers and high schools.	3E3
E 5	Tier 2	The County shall appoint, pursuant to FS 125.0105(4) (e), a representative residing in the Watershed Area to the Tourism Development Council. The County shall encourage the Greater Miami Convention and Visitors Bureau to appoint a similar representative.	3E3

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Economy			
E 6	Tier 2	The County shall modify zoning regulations to allow bed & breakfast accommodations consistent with community character.	3E3
E 7	Tier 2	The County shall work with the tourism community to promote the "Redland Tropical Trail" and other similar efforts, and establish a directional signage system highlighting participating attractions.	3E3
E 8	Tier 3	The County shall explore additional regulatory safeguards that would help to protect existing tourist attractions so as to reduce impacts to their operations and complement existing uses and character.	3E3
Housing			
H 1	Tier 1	The County shall implement a Transit Oriented Development (TOD) program that includes incentives for mixed-use development near major transit stops in Zones A and B.	3E3
H 2	Tier 1	The County shall adopt a program that ensures an equitable allocation of workforce/affordable housing in Zones A and B. This may include both incentive and regulatory based approaches.	3E3
H 3	Tier 2	The County shall work with lending institutions to expand home ownership through the use of Location Efficient Mortgages (LEMs) that recognize the annual savings associated with the reduced use of the automobile.	3E3
H 4	Tier 3	The County shall explore the establishment of a "live near where you work" program to provide incentives for the purchase or rental of homes in Zones A and B that are located near employment centers or transit stops.	3E3
H 5	Tier 3	The County shall explore an impact fee rate structure that creates incentives for development in Zones A and B.	3E3
Natural Communities/ Open Space			
NC 1	Tier 1	<p>The County shall substantially increase its efforts to retain and protect natural communities and open space through mechanisms such as:</p> <ul style="list-style-type: none"> ➤ Strengthening existing programs for conservation easements; ➤ Creation of community-based land trusts; ➤ Environmentally Endangered Lands (EEL) Program; ➤ Rural Lands Stewardship Program; and ➤ Purchase of Development Rights (PDR) and Transfer of Development Rights (TDR) programs. The PDR/TDR programs shall be incentive-based and development densities and intensities in receiving areas shall be "by right". 	3E1

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Natural Communities/ Open Space			
NC 2	Tier 1	The County, within six months, shall review all of its land acquisition programs and funding sources to ensure that appropriate priority is given to obtaining the lands necessary in Zone C for stormwater treatment and/or wetlands restoration. Also, as part of this review, the County shall consider fully the importance of protecting priority lands located within the Watershed but outside of Zone C.	3E1
NC 3	Tier 1	The County shall work with the federal and State government to protect lands necessary for implementation of the Comprehensive Everglades Restoration Plan (CERP).	3E1
NC 4	Tier 1	The County shall maintain the existing policies and programs that substantially prohibit development in tidal wetlands and environmentally protected lands.	3E1
NC 5	Tier 1	The County shall protect the remaining native-plant-dominated freshwater wetlands in the Watershed. This shall include a "no overall net loss" policy and the establishment of a rebuttable presumption that alternatives to impacting such wetlands exist.	3E1
NC 6	Tier 1	The County shall encourage federal, State, and County regulatory agencies to establish regional general permits for minor work (<1 acre) in heavily exotic-dominated wetlands (>90% exotic coverage in the canopy) within the UDB if certain mitigation requirements are met. This policy shall include a requirement: 1) to avoid wetlands where practicable and environmentally desirable; and 2) to restore other exotic-dominated freshwater wetlands with native vegetation where practicable.	3E1
NC 7	Tier 1	The County shall ensure protection of viable natural forest communities through: <ul style="list-style-type: none"> ➤ Willing seller acquisition programs; ➤ The establishment of a management and maintenance fund for both public and private land; and ➤ Strengthened regulations that emphasize the avoidance of direct and secondary impacts (e.g., clustering developments). 	3E1
NC 8	Tier 2	The County shall investigate innovative financing tools to facilitate acquisition and preservation of wetlands, natural forest communities, and other open space. This may include voter-approved bonds, establishment of a green utility fee as authorized by Florida Statute 369.255, public-private partnerships using federal and/or State funding programs, and other financing tools.	3E1

**Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies**

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Natural Communities/ Open Space			
NC 9	Tier 2	<p>The County, in coordination with the State and other agencies, shall implement the South Dade Greenway Network Master Plan and the County's Parks Master Plan in a manner that considers:</p> <ul style="list-style-type: none"> ➤ The programmatic linkage between natural communities protection and restoration; ➤ The use of primary canals and secondary canals where feasible; ➤ The acceleration of funding and implementation of the Biscayne Everglades Greenway; ➤ Locating parks and recreational opportunities within and adjacent to major development nodes and employment centers with a system of connectivity designed to reduce vehicle use; and ➤ An enhanced south county equestrian trails program. 	3E1
Property Rights			
PR 1	Tier 1	The County shall ensure that all County land protection, conservation and preservation initiatives related to the Watershed Plan requiring the use of private property (e.g., acquisitions, conservation easements in Zone C) shall be through willing seller/participant programs.	3E2
PR 2	Tier 1	The County shall ensure that prior to participation in a protection, conservation or preservation program; properties identified through the Watershed Plan for protection (e.g., Zone C lands) shall not be re-designated to a more restrictive land use category than in place on January 1, 2007 without the owners' consent.	3E2
PR 3	Tier 1	The County shall create an outreach and funding source to serve as local/State/federal match to create incentives for private landowners to engage in restoration/preservation activities on their lands.	3E2
PR 4	Tier 1	The County, in coordination with the State and federal government, shall, within one year, create a coordinated strategy for the acquisition or protection of those lands in Zone C necessary for stormwater treatment and/or wetlands restoration. The County will endeavor to acquire, purchase or transfer the development rights of, protect through conservation easements, or otherwise preserve the highest priority lands within 10 years.	3E2
PR 5	Tier 2	The County shall, within two years, conduct an independent evaluation of the methods that consider attributes other than developability (e.g., recharge areas, wetlands, historic buildings) for assigning value to land to be purchased for protection, conservation and/or preservation purposes. Based on the results of this evaluation, the County shall promote changes in legislation that allow appropriate modification of its property evaluation methods.	3E2

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Smart Growth Economic Initiatives			
SG 1	Tier 1	The County shall, through a "zoning-by-right" policy, expedite infill and Smart Growth projects in the unincorporated portions of Zones A and B. The focus of this policy shall be on encouraging development in those areas identified as major development nodes on the Watershed Plan Design Guide. The County shall encourage municipalities in Zones A and B to create similar incentives.	3E4
SG 2	Tier 1	The County shall work with local municipalities to provide incentives for and expedited approval of infill and Smart Growth projects in the incorporated portions of Zones A and B.	3E4
SG 3	Tier 1	The County shall ensure that any proposed development outside the UDB (after 2025) is approved only after an affirmative determination of need and if it is consistent with the Watershed Plan and CDMP Smart Growth policies.	3E4
SG 3	Tier 2	The County shall within 1 year conduct a Smart Growth Audit of the existing CDMP Smart Growth policies and their implementation. The audit shall include: <ul style="list-style-type: none"> a. Use of a Smart Growth Score Card; and b. Policy, Code and Zoning Audit Tools, in accordance with the Smart Growth Leadership Institute, that outline an audit process to identify development regulations that should be changed to enable Smart Growth development. 	3E4
Transportation			
T 1	Tier 1	The County shall allocate existing and future dedicated transportation funding sources in a manner that delivers transportation infrastructure simultaneously with the density recommended in Zones A and B.	3E3
T 2	Tier 1	The County shall expedite the planning, funding, and development of premium transit (e.g., dedicated right-of-way, enhanced bus, rail, joint use corridors) along all transit corridors in Zones A and B to encourage the intensification of development along those corridors. The US 1 and Kendall corridors should be considered the highest priority. This includes extension of the Metrorail to Homestead/Florida City.	3E3
T 3	Tier 1	The County shall, within 2 years, complete an evaluation to ensure that the ROWs and corridors needed for future transit facilities and roadways identified in Zones A and B are designated and reserved. These roadways include US 1, Kendall Drive, SW 137 th Avenue north of Biscayne Drive, and Florida's Turnpike.	3E3
T 4	Tier 2	The County shall work with the State to implement Transportation Management Systems throughout the Watershed Area. Such systems should include the following directives: <ul style="list-style-type: none"> a. Work with South Florida Commuter Services Transportation Management Initiatives (TMIs); b. Promote rideshare alternatives (e.g., van pools, car pools); and c. Reduce miles driven and time on the road (e.g., day-care facilities at employment centers). 	3E3

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
T 5	Tier 2	The County shall establish reduced-fare transit to create incentives for residents to live in Zones A and B and to increase ridership.	3E3
T 6	Tier 2	The County shall lead by example by providing financial incentives that encourage County employees to use public transit. In addition, the County shall establish a program to encourage other employers to subsidize employee use of public transit.	3E3
T 7	Tier 2	The County shall, in coordination with local jurisdictions and the State, expand the use of telecommuting options and flexible schedules for employees.	3E3
T 8	Tier 2	The County shall encourage home businesses, where appropriate, in order to reduce traffic congestion. This shall include an evaluation of land use and zoning controls that may create impediments to this policy.	3E3
T 9	Tier 3	The County shall explore privatization as a means to increase and improve transit service.	3E3
Water Resources			
WR 1	Tier 1	The County shall protect the lands in Zone C from more intense development in a manner that allows for: <ul style="list-style-type: none"> ➤ The construction of necessary stormwater treatment facilities; ➤ Wetlands restoration, including the Biscayne Bay Coastal Wetlands project; ➤ The maintenance of open space including agriculture; ➤ Implementation of the HARB Accident Potential Zone; and ➤ Retention of permeability and other natural hydrologic functions important to Biscayne Bay. 	3E4
WR 2	Tier 1	The County shall take immediate steps to implement an aggressive alternative water supply program that includes an evaluation of environmental impacts to the Watershed. As a first step the County shall, by 2015, utilize all of the average daily flow at the South District Wastewater Treatment Plant (a volume anticipated to be over 130 mgd in 2014) to recharge groundwater and/or rehydrate wetlands.	3E1
WR 3	Tier 1	The County shall encourage infill development along major transit corridors identified in the Watershed Plan through financial incentives for water and sewer infrastructure (e.g., reduced connection fees).	3E1
WR 4	Tier 1	The County shall revise its building code to achieve, at a minimum, the water conservation objectives adopted in the Water Use Efficiency Five Year Plan adopted by the Board of County Commissioners on April 25, 2006 (Resolution R-468-06). The County shall explore innovative water conservation technologies to be implemented and enforced through the development review and permitting process.	3E1
WR 5	Tier 1	The County shall adopt and require full implementation of appropriate best management practices (BMPs) to reduce flooding and water quality impacts from new developments. This shall include strict adherence to the County's "cut and fill" criteria and other approaches to reduce flooding and pollutant loadings at the source.	3E1

Table 5.1 (continued)
Recommended Watershed Plan Implementation Strategies

Strategy Number	Tier	Implementation Strategy	Relevant CDMP Policy LU-3E Objectives
Water Resources			
WR 6	Tier 1	For areas located in Zone C that are recommended for wetland restoration, stormwater retention, detention, and/or treatment; flood protection techniques, including seepage management, shall be utilized as appropriate to ensure that existing levels of flood protection are maintained.	3E2
WR 7	Tier 1	The County shall continue to work with the State and U.S. Army Corps of Engineers to expedite the Biscayne Bay Coastal Wetlands CERP project. The County should promote a project design that, to the extent practicable: (1) maximizes the reduction in pollutant loadings resulting from existing and future development in the Watershed, (2) increases the spatial extent of wetlands, and (3) mimics more closely historic flows to Biscayne Bay.	3E1
WR 8	Tier 2	The County shall work with the South Florida Water Management District (SFWMD) and the United States Geological Survey (USGS) to monitor and minimize further saltwater intrusion to the extent practicable. In addition, the County shall work with the Florida Departments of Health and Environmental Protection to develop a monitoring program for private wells located east of US 1. If chloride levels in these wells become elevated above the drinking water standard of 250 ppm, the County shall provide potable water funded on an equitable basis by existing and future development.	3E1
WR 9	Tier 2	The County shall develop a method to ensure the effective coordination of the various activities of all County departments involved in water management and regulatory issues, including, but not limited to, flooding, water supply, conservation, minimum flows and levels, Total Maximum Daily Loads, and CERP initiatives.	3E4
WR 10	Tier 3	The County shall conduct a study to identify the most feasible approach to providing water and sewer to all existing developments east of US 1 by 2020. The study shall be completed by December 2010 and include an implementation and funding plan.	3E1
WR 11	Tier 3	If a clean, cost effective, and reliable source of re-use water becomes available for agriculture use, the Water and Sewer Department shall work with the IFAS Extension Service and the Agricultural Manager's Office and DERM to develop a mutually agreeable strategy for utilizing this water.	3E1
WR 12	Tier 3	The County shall evaluate the level of compliance with its landscape requirements to determine the program's effectiveness in conserving water and promoting the use of native, drought tolerant species.	3E1

THE COST OF GROWTH - - PAYING FOR THE RECOMMENDED WATERSHED PLAN

In Chapter 4, several of the advantages associated with the Smart Growth based Recommended Watershed Plan were discussed. While the Recommended Watershed Plan will result in substantial costs savings compared to the sprawl scenario (see Chapter 4), it nevertheless will require a significant investment of resources. There is no free lunch where the population is anticipated to double.

Ensuring funding for the Recommended Watershed Plan will be vital to its successful implementation. This section discusses some of the current capital improvement programs and processes that can help fund the infrastructure required to implement the Recommended Watershed Plan. The traditional capital budget revenue sources for transit, water, sewer, and public schools are summarized in more detail, since these areas require a large share of future capital financing needs.

The Watershed Study's infrastructure assessments identified the required capital projects for South Miami-Dade by using long-term population and housing projections (out to 2050). The Study is useful because the current capital improvement plan (CIP) planning horizon goes out 15 to 20 years, while an additional 20-25 year's worth of growth demands were identified by the Watershed Study. Since the Watershed Study was a long-term planning level study, specific projects for each element were not identified. However, the broad infrastructure investments needed to sustain select essential public services were identified. The Watershed's projected growth demands for infrastructure can therefore be related to, and will dovetail with, the County's long-term CIP process.

Potential Funding Sources for Future Capital Improvement Projects

While no single source of funding will satisfy all of the anticipated needs, the following funding mechanisms could be used collectively to help finance infrastructure requirements arising from the projected population growth in the Watershed.

Building Better Communities Bond General Obligation Bond Program

The recent passage of the Community Bond Program will provide a total of \$2.9 billion in funds to finance select capital projects within the County over the next 15 to 20 years. The bond program will fund the most urgent infrastructure requirements. The Recommended Watershed Plan identifies large scale infrastructure requirements attributable to population growth that would be eligible for Community Bond Program funding.

The County created the Office of Capital Improvements to oversee the program. The bond sale proceeds are allocated to each locality in direct proportion to the area's population (75 percent factor), and based on the contribution to the County's tax rolls (25 percent factor). The County is working with the various cities, villages and towns to create interlocal agreements that will govern the scheduling and distribution of available funds. As of early 2007, several hundred million dollars in bond proceeds have been dedicated to projects.

Bond proceeds have already been used for infrastructure projects that are similar to the capital projects that will be required to sustain the future Watershed population. For example, proceeds have been earmarked in the current CIP for the installation of water mains and extension of sewer lines and to provide more accessible handicap-friendly facilities for public transit.



Transportation

Current capital improvement plans for the County show future project funding in areas that are relevant to the recommendations contained within the Watershed Plan. The Watershed Plan will help leverage highly competitive federal dollars for transportation projects.

Large scale premium public transportation projects such as the extension of Metrorail have capital financing plans that rely on a mix of revenue sources. Among these sources are: the Peoples Transportation Bond Program, FTA Section 5309 Discretionary Grants and FDOT Funds. These revenue sources are relevant to the Watershed Plan's goals of pursuing a mix of transportation options, including premium transit that would reduce vehicle usage. Following is a brief description of selected potential revenue sources.

- **Peoples Transportation Bond Program.** This program originated with “The People's Transportation Plan” (PTP) to address mobility and accessibility issues in Miami-Dade County by implementing a comprehensive program of transportation improvements designed to enhance the movement and safety of people and goods on public transit and local roadways. The Bond Program is funded by the half-penny transportation surtax enacted by Miami-Dade County voters in 2002 that provides the local funding source dedicated exclusively to implement the projects in the PTP.
- **FTA Section 5309 Discretionary Grants.** The Federal Transit Administration's transit capital investment program (49 U.S.C. 5309) provides capital assistance for three primary activities: modernization of existing rail systems; new and replacement buses and facilities; and new fixed guideway systems (such as heavy rail, commuter rail, light rail, trolleybus, aerial tramway, automated guideway transit, ferryboats, that portion of motor bus service operated on exclusive or controlled rights-of-way, and high-occupancy-vehicle (HOV) lanes). Eligible recipients for

capital investment funds are public bodies and agencies (transit authorities and other state and local public bodies and agencies thereof) including states, municipalities, and other political subdivisions. The funding match is generally 80 percent federal, 20 percent local.

- **Florida Department of Transportation (FDOT Funds).** FDOT has numerous programs designed for various project purposes. Among these programs is the New Starts Transit Program (NSTP) that was designed to assist local governments in developing and constructing fixed guideway and bus rapid transit projects to accommodate and manage urban growth and development.



The current Miami-Dade County CIP also lists the following additional revenue sources for financing transportation projects:

- **Capital Improvement Local Option Gas Tax.** The capital improvement local option gas tax (called the "5 cent LOGT") is authorized by the State Legislature and imposed with local discretion by the County. This tax is levied on every gallon of motor fuel sold at retail within the County. The proceeds from this tax may be used for transportation expenditures necessary to meet the needs of the capital improvements elements of an adopted comprehensive plan, including public transportation. The proceeds may not be used to fund operations. The 5 Cent LOGT may be used as a security pledge for revenue bond financing. Revenues from this tax flow to the Local Option Gas Tax Program are administered by the County's Public Works Department. The Local Option Gas Tax Program supports both public works and transit.
- **Federal Highway Administration.** The Federal Highway Administration (FHWA), part of the U.S. Department of Transportation, provides federal assistance to the states to construct and improve the National Highway System, urban and rural roads, and bridges via the Federal Aid Highway Program. There are five major programs based on funding levels under FHWA: National Highway System Program (NHS), Surface Transportation Program (STP), Congestion Mitigation and Air Quality Improvement Program (CMAQ), Interstate Maintenance Program (IM), and the Highway Bridge Replacement and Rehabilitation Program (HBRRP). Federal funds are channeled through the FDOT, who then allocates the earmarked funds through the regional Metropolitan Planning Organizations (MPOs).
- **FTA Section 5307 Formula Grant.** The Federal Transit Administration (FTA) of the U.S. DOT provides federal funding through the Section 5307 Urbanized Area Formula Grants Program that flows through to Miami-Dade Transit. The 5307 formula grants program provides transit capital and operating assistance to



urbanized areas with populations exceeding 50,000. Annual grant funds are based on demographic, level of service and ridership variables. Miami Dade Transit receives these funds and applies them to its capital program.

- **Miami-Dade Transit Capital Revenues (MDT).** To finance capital projects, in conjunction with other funds, grants and bond proceeds, MDT also uses revenues from system fares and other operating revenues. The commercial paper market has also been tapped to achieve bridge financing with eventual repayment through federal fund proceeds. In addition, the County also relies on revenues from financing to fund capital projects.

These funding instruments have been used successfully in the past. Given the long-range planning horizon of the Recommended Watershed Plan, it is reasonable to assume that other innovative financing vehicles will also become available in the capital markets. Recently, third party equity investors have created large infrastructure funds that invest exclusively in large scale public infrastructure projects. These investors are often attracted to the stability of the cash flows and system fares associated with transportation projects.

Water and Wastewater

Capital funds to finance potable water supply and wastewater infrastructure are currently drawn from a variety of sources. In addition to the Building Better Communities General Obligation Bond Program described above, funds may be sourced from the following programs:

- **Water and Sewer Department (WASD) Revenue Bonds.** Revenue bonds are collateralized by the net operating revenues of the WASD. The WASD bond is an enterprise fund and operates in a self sustaining nature without recourse to the General Fund. Future WASD bond proceeds could be earmarked to fund additional water or wastewater treatment capacities in the Watershed.

- **State of Florida Revolving Loan Wastewater Program.** The State Revolving Loan Fund is administered by the Florida Department of Environmental Protection through the Water Facilities Funding Program. The program provides low-interest loans available for construction, rehabilitation, and replacement of facilities needed to collect, treat, dispose of, or reuse municipal wastewater. The program is called a "revolving fund" because loan repayments are used to make additional loans. The related **Drinking Water State Revolving Fund** (SRF) Program provides low-interest loans to eligible entities for planning, designing, and constructing public water facilities. Federal and State appropriations have funded the SRF.
- **Water and wastewater connection charges** are also used to fund capital projects such as treatment plant infrastructure and construction of new pump stations.
- **The Wastewater Renewal Fund and the Water Renewal and Replacement Fund** are used to replace capital assets as they reach the end of their useful lives. For example, wastewater renewal funds would be used to rehabilitate gravity sewers to reduce infiltration and inflow.
- **SFWMD Alternative Water Supply Grants.** To address the challenge of ensuring the state's water supply, the 2005 Florida Legislature enacted the **Water Protection and Sustainability Program**. The law encourages cooperation between municipalities, counties, and the State's five water management districts in the protection and development of water supplies. More specifically, the law requires the regional water supply planning function of water management districts to promote alternative water supply projects to accommodate growth and to reduce the use of traditional ground and surface water supplies, such as aquifers and lakes. The law provides significant annual recurring State funding, underscoring the State's commitment to protect and enhance water supplies. Funds available under the program are administered and matched by Florida's five water management districts.

For Miami-Dade County, the South Florida Water Management District administers funds through the Alternative Water Supply Funding Program. The County, cities, utilities, homeowners associations, community development districts, and other water users and suppliers can apply for up to 40 percent of project construction costs under the program.



Alternative Water Supply Projects are defined as:

- use of saltwater & brackish water;
- surface water captured predominately during wet-weather flows;
- sources made available through the addition of new storage capacity;
- use of reclaimed water;
- stormwater (for use by a consumptive use permittee); and
- any other source designated as nontraditional in a regional water supply plan.

Alternative Water Supply Projects do not include water conservation projects.



- **State Community Based Issues.** During the 2006 legislative session, the Florida legislature substantially amended section 403.885, F.S., the statute that generally guides water project funding. The revisions, which were made in section 73 of SB 888, now chapter 2006-230, Laws of Florida, removes most of the qualifying criteria formerly in the law. The County and local governments seeking legislative sponsorship for water projects will need to consider the minimum criteria in the amended law as they complete the required **Community Budget Issue Request (CBIR)** application form for their sponsoring legislators.
- **EPA grants** can be used for specific project purposes such as water distribution system extension enhancements.
- **The Fire Hydrant Fund** is earmarked to install hydrants and construct related system improvements.

Water and wastewater capital project financing plans include a mix of revenue sources that depend on the nature of the specific project. For example, to fund plant process improvements at the South District Plant, including injection and monitoring wells and a land buffer, future WSD bond proceeds could be used. To construct facilities for high level disinfection to meet regulatory requirements, a mix of wastewater connection charges, State Revolving Loan Wastewater Program proceeds, and WSD Revenue Bonds could be used in the financing plan.

Public Schools

To fund new public school capacities arising from development in the Watershed, a mix of revenue sources, both public and private can be used. The mix of revenue sources used to fund public school capital projects primarily consists of:

- **Educational Facility Impact Fees** paid by private developers. Developers share part of the cost for capital outlays through the payment of impact fees but they do not pay the full cost of adding new schools.

- **State and Local Funding.** The cost of new facilities is also divided between State aid (PECO, lottery, and general fund revenues) and **Local Property Tax Revenues.** The Local Optional Millage Levy (LOML) is also used to fund capacity-expanding new school construction. In Miami-Dade County, the LOML is set at 2 mills. Only part of the LOML is used for capacity expanding construction. The rest is devoted towards other capital outlay projects (renovation, remodeling, furnishings, technology, equipment etc.). In addition to the above funding sources, local property tax revenues are also used to pay down debt service on General Obligation School Bonds.

A recent analysis by Innovation & Information Consultants, Inc for Miami Dade Public Schools performed on the average total facility capital cost per student found that an equitable funding split, given the above revenue sources, is the following: State Aid (4 percent), Debt Service on General Obligation Bonds (10.8 percent), LOML Millage (24.2 percent) and the Educational Facility Impact Fee (61 percent).

Environmental Restoration and Land Acquisition

Financing tools to facilitate acquisition and preservation of wetlands, natural forest communities, and other open space may come from a variety of sources such as grants, voter-approved bonds and taxes, low interest loans, and other incentives. Regardless of the source, a key component to securing any funding is a clear vision and technically-sound watershed plan.

Florida Forever. Florida Forever provides \$300 million per year annually for land protection by the Department of Environmental Protection, Water Management Districts, Florida Communities Trust, and other State conservation programs. Since its creation as Preservation 2000 fifteen years ago, Florida Forever has been responsible for the purchase of thousands of acres of land for parks, wildlife, community recreation, and other open space needs in virtually every part of Florida. The FDEP's Office of Greenways and Trails Land Acquisition

program is a component of Florida Forever. The SFWMD has land acquisition programs under the Florida Forever Act that acquire lands which are used to restore, preserve and manage water resources.

Florida Communities Trust (FCT) State Grant Program. Administered by the Department of Community Affairs, Florida Communities Trust is a state land acquisition grant program that has provided more than \$590 million to local governments and environmental nonprofit organizations to acquire parks and open space. These public funds have been used to create parks, acquire land for greenways, and complete other conservation and recreation projects. Local county and city governments are eligible, as are qualifying conservation-related nonprofits. Most applicants must provide a match of at least 25 percent of the total project cost. The grants favor projects near developed areas, projects that feature natural resource protection, and projects that offer a variety of recreation enhancements.

Land and Water Conservation Fund (LWCF). LWCF is the largest source of federal money for parks, wilderness, and open space acquisition. The LWCF has a matching grant program that provides funds to states for planning, development, and acquiring land and water conservation areas.

Green Utility Ordinances. Florida Statute 369.255 enables local governments to establish a mechanism, when deemed necessary by a county or municipality, to provide dedicated funding to plan, restore, and manage forest preserves, wetlands, and other aquatic zones. The fees are collected on a voluntary basis as set forth by the county or municipality. Private natural areas may qualify for stewardship grants.

Purchase-of-Development-Rights (PDR) Programs. PDR programs are a voluntary approach to conservation that allow for protection of the land combined with continued private ownership. To support the purchase of development rights, states can pass PDR enabling legislation, work cooperatively with local governments to purchase easements, appropriate funds to local governments and nonprofits, and create PDR programs that are administered at the state level.

FDEP's Invasive Upland Plant Removal Program. This program provides approximately \$9 million annually for upland invasive plant removal projects on public conservation lands recognized by the Florida Natural Areas Inventory.

The North American Wetlands Conservation Act. This act promotes voluntary, public-private partnerships to conserve wetland ecosystems for waterfowl and other migratory birds. Acquired or restored habitat can be owned or managed by any federal, state, or nonprofit organization involved in land management. The Standard Grants Program and Small Grants Program are competitive, matching grants programs that support public-private partnerships and must involve long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats.

USDA Wetlands Reserve Program. The Wetlands Reserve Program is a voluntary program that provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resource concerns on private lands in an environmentally beneficial and cost effective manner. The USDA Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. Landowners control access, recreational activities such as hunting and fishing, and the right to lease recreational uses for financial gain. Enrolled lands are mostly high-risk agricultural lands located in flood prone areas and restored to wetlands.

USDA Natural Resources Conservation Service Watershed Protection, Watershed Surveys, and Flood Prevention. The purpose of the Watershed Program is to assist federal, State, local agencies, local government sponsors, tribal governments, and program participants to protect and restore watersheds from damage caused by erosion, floodwater, and sediment, to conserve and develop water and land resources, and solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local people or project sponsors, builds partnerships, and requires local and state funding contribution.



The Farmland Protection Program (FPP). The FPP is administered by the USDA Natural Resources Conservation Service through state, Tribal, or local governments or non-governmental organizations. FPP provides funds to help purchase rights to keep productive farmland in agricultural use through conservation easements. USDA provides up to 50 percent of the costs of purchasing easements.

EPA Targeted Watersheds Grant program. This is a competitive grant program that encourages the protection and restoration of the Country's water resources through cooperative conservation. The program supports collaborative watershed partnerships that are ready to implement on-the-ground restoration and protection activities designed to achieve quick, measurable environmental results. The goal is to build on existing partnerships and coalitions that have evaluated and assessed their watershed, devised a technically sound watershed plan and are ready to embark on steps to implement their plans. The program encourages watershed practitioners to examine local water related problems in the context of the larger watershed in which they exist, to develop solutions to those problems by creatively applying the full array of available tools, including general, state and local programs, to restore and preserve water resources through strategic planning and coordinated project management that draw in public and private sector partners. In the past three years, more than \$37 million has been awarded to 46 watershed organizations. The Environmental Protection Agency will award up to \$16 million to support an additional 9 - 20 of the nation's outstanding watershed coalitions as part of the Agency's fourth round of Targeted Watersheds Grants (TWG) to help protect and restore some of the nation's most highly valued watersheds. Cost Sharing/Match Requirement: EPA requires applicants to demonstrate in their proposal submission how they will provide the minimum non-federal match of 25 percent of the total cost of the proposal. This means EPA will fund a maximum of 75 percent of the total project cost.



The Coastal Zone Management Program. CZMP, overseen by the National Oceanic and Atmospheric Administration, is a partnership between the federal government and 34 states and territories to better steward the nation's coastline. The Florida Coastal Management Program provides grants each year to support coastal management activities.

National Coastal Wetlands Conservation grants. Under the National Coastal Wetlands Conservation Grant program, the U.S. Fish and Wildlife Service provides matching grants for acquisition, restoration, management or enhancement of coastal wetlands. Projects can include acquisition of a real property interest (e.g., easement or fee title) in coastal lands or waters from willing sellers or partners (coastal wetlands ecosystems) for long-term conservation or the restoration, enhancement, or management of coastal wetlands ecosystems for long-term conservation.

The Cooperative Endangered Species Conservation Fund. Section 6 of the Endangered Species Act provides matching grants to states for conservation projects that benefit candidate, proposed, and listed endangered species on state, private, and other nonfederal land.

The Transportation Efficiency Act for the 21st Century (TEA-21). TEA-21 provides states with funds to acquire land for historic preservation, trails, scenic beautification, and water-pollution mitigation related to surface transportation.

The Forest Legacy Program. This program's focus is to protect environmentally important forest areas that are threatened by conversion to non-forest uses. It is administered by the U.S. Forest Service. States may receive federal Forest Legacy grants of up to 75 percent of the total cost of the acquisition, with the remainder to be matched by nonfederal funds.

Public-Private Partnerships. Encouraging local governments to partner with private, nonprofit organizations can promote greenprinting goals, leverage conservation resources, and increase support for land conservation. Potential partners include land trusts, neighborhood and community groups, foundations, national conservation organizations, and landowner groups.

Conclusion

After nearly four years of science-based analysis, public input and technical review, a clear picture of two different futures for the Watershed has emerged. One picture is on a canvas with increased water pollution, increased traffic congestion and the substantial loss of agriculture land and natural resources. This picture reflects a future based on the current sprawl approach to accommodating population growth.

A second picture of a future South Miami-Dade Watershed is framed with the potential for a healthy and sustainable environment and economy for future generations. This Smart Growth picture highlights the blue waters of Biscayne Bay, a stronger economy, viable agriculture, efficient transportation, safe communities, protected natural resources - - all resulting in a good quality of life for South Miami-Dade communities.

In addition to the contrasting pictures of the future, other important facts have been brought to light by the Study. These include:

- With the projected increases in population, all scenarios will result in impacts on the environment, economy and the quality of life;
- The Smart Growth scenario allows the County and municipalities to more effectively manage and mitigate for the impacts of growth, including the impacts to Biscayne Bay;

- Sprawl development costs more than Smart Growth development;
- The County must work with the municipalities to build on existing Smart Growth approaches and adopt new approaches as necessary;
- The County must develop a coordinated strategy for funding the infrastructure for a Smart Growth based future;
- If adopted, the Recommended Watershed Plan will position better the County for State and federal funding and policy support; and
- There is no silver bullet response to the issues facing South Miami-Dade County - - but there are many silver BBs.

The leadership of Miami-Dade County should be commended for the courage and vision they exhibited in calling for the Watershed Study and Plan. The decisions that are made now will put the first brush strokes on the picture depicting the future of the South Miami-Dade Watershed. The Recommended Watershed Plan provides the County with a vision of what the picture can look like - - a healthy and sustainable Watershed. It is now up to the County to take the policy brush and paint the picture. While challenges exist, the opportunities are far greater. The County has the opportunity to leave a legacy of planning responsibility today to ensure the future for generations to come.



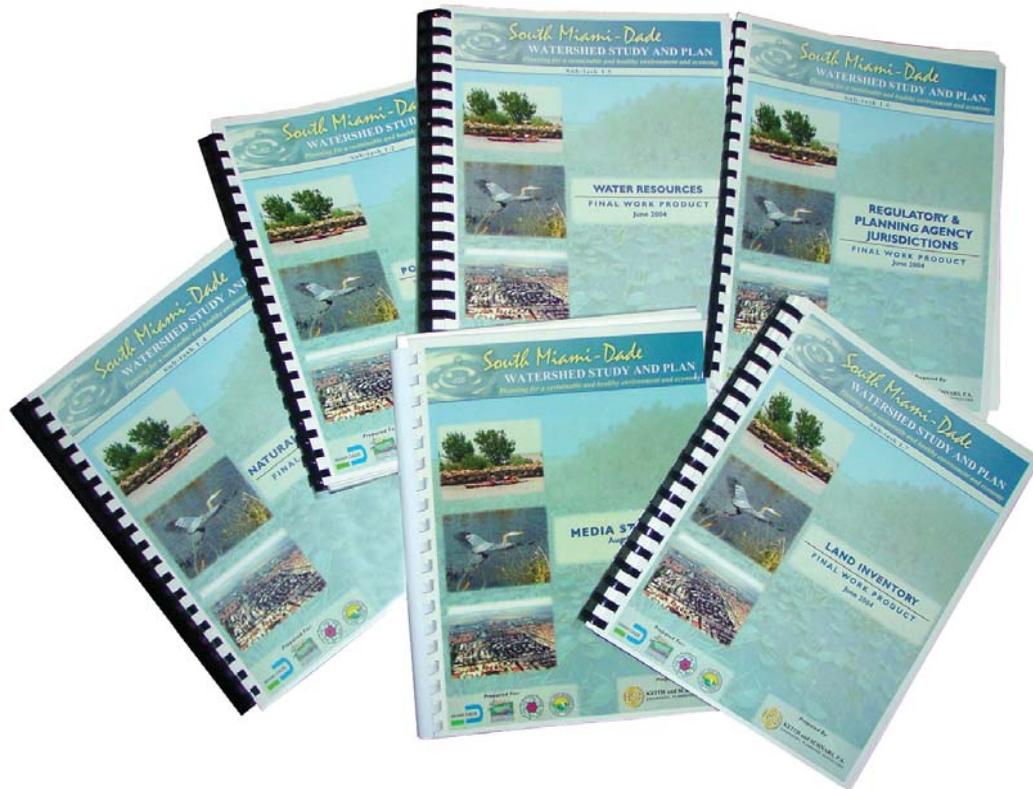
CHAPTER 6

Appendices

Appendices



APPENDIX A



The list of reports on the right were completed as part of the South Miami-Dade Watershed Study and Plan.

Task 1 Baseline Conditions Reports:

- Sub-task 1.1: Relevant Studies
 - Sub-task 1.2: Population Growth
 - Sub-task 1.3: Development Features
 - Sub-task 1.4: Natural Communities
 - Sub-task 1.5: Water Resources
 - Sub-task 1.6: Regulatory Jurisdictions
 - Sub-task 1.7: Land Inventory
 - Sub-task 1.8: Parameters and Thresholds
- Public Involvement Plan

Task 2 Test Land Use Scenarios:

- Sub-task 2.1: Opportunities and Constraints
- Sub-task 2.2: Test Land Use Scenarios

Task 3 Test Scenario Assessment Results:

- Sub-task 3.1: Land Use and Economics
- Sub-task 3.2: Infrastructure
- Sub-task 3.3: Natural Communities
- Sub-task 3.4: Water Resources
- Sub-task 3.4: Water Resources Supplemental: Saltwater Intrusion
- Sub-task 3.5: Property Rights
- Sub-task 3.6: Evaluation of Test Scenario Assessments

Task 4 Draft Preferred Scenario:

- Sub-task 4.1: Fiscal Impact Analysis/Economic Analysis
 - Sub-task 4.2: Draft Preferred Scenario
 - Sub-task 4.3: Evaluation of Draft Preferred Scenario
 - Sub-task 4.3: Appendix A: Groundwater Demand, Potable Water, and Wastewater
 - Sub-task 4.3: Appendix B: Public Schools
- Public Involvement Reports 1, 2, 3

Task 5 Implementation:

- Sub-task 5.1: Draft Implementation Strategies
- Sub-task 5.2: Public Outreach on Implementation Strategies (Public Involvement Report 4)
- Sub-task 5.3: South Miami Dade Watershed Plan Report

APPENDIX B

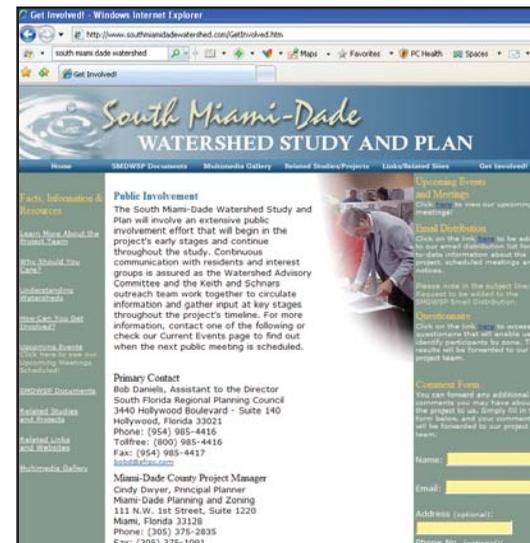
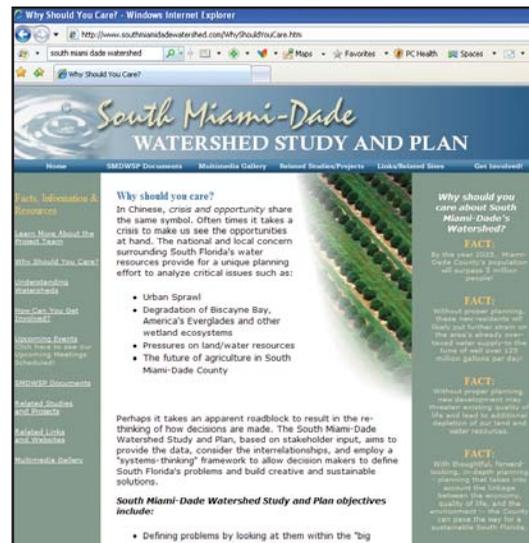
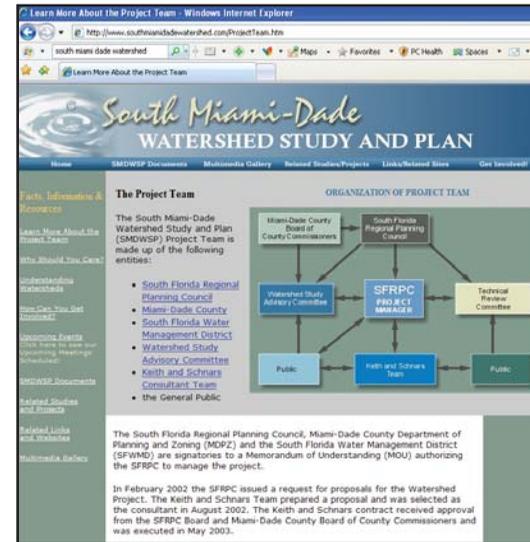
Miami-Dade County Comprehensive Development Master Plan Land Use Policy 3E (Adopted October 10, 1996):

1. By January 1, 2006, Miami-Dade County shall develop and initiate implementation of an integrated land use and water management plan for southeastern Miami-Dade County, based on a Comprehensive Study (the "Study") as described below. The Plan will direct the comprehensive management of land uses and surface and ground water, its quality, quantity, timing, and distribution. The plan will have two time horizons: 1) a short-term component extending through the year 2025, and 2) a long-term component extending through the year 2050. The overall goal of the plan will be to optimize the economic, social, and environmental values currently recognized in the County's Comprehensive Development Master Plan in the study area. As shown in Figure 1, the primary study area includes Basins C-2, C-100, C-1, C-102, Goulds, C-103, North Canal, and Florida City; the Model Lands; Drainage Areas DA-3 and DA-4; and the area between South Dixie Highway and Card Sound Road, while the secondary study area includes Canal C-3.
2. This plan and study, to be known collectively as the South Dade Watershed Plan (the "Plan"), will be prepared by an impartial person or entity approved by the Board. The selection process will include representatives from the Biscayne National Park Buffer Development Review Committee (the "Working Group") on the selection committee. The Working Group will review and make recommendations regarding the final RFP.
3. The Plan must fulfill the following specific objectives:
 - a. To identify and protect lands, including their uses and functions, that are essential for preserving the environmental, economic, and community values of Biscayne National Park;
 - b. To identify and establish mechanisms for protecting constitutional private property rights of owners of land identified in 3 (a) above;
 - c. To support a viable, balanced economy including agriculture, recreation, tourism, and urban development in the Plan area; and
 - d. To assure compatible land uses and zoning decisions in the Study Area consistent with long term objectives for a sustainable South Miami-Dade.

The South Miami-Dade Watershed Study and Plan

Website

APPENDIX C



www.southmiamidadewatershed.com

SOUTH MIAMI-DADE WATERSHED STUDY AND PLAN PROJECT TEAM

South Florida Regional Planning Council

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- Bob Daniels, SFRPC Project Manager



Miami-Dade County

- Subrata Basu, Assistant Planning Director
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WSAC Facilitator

- Janice Fleischer

Special thanks to John Hulsey (SFRPC), Liz Abbott (SFWMD), Chuck Blowers (MDC) and Lee Rawlinson (MDC) who contributed to the Watershed Study.

The South Miami-Dade Watershed Study and Plan was completed by Keith and Schnars, P.A. under contract with the South Florida Regional Planning Council through funding from Miami-Dade County and the South Florida Water Management District.





South Miami-Dade

WATERSHED STUDY AND PLAN

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