<u>SOUTH MIAMI-DADE COUNTY WATERSHED STUDY COVER SHEET</u>
Sub-task 3.6: Output Evaluation and Key Issues for Alternative Actions
Subject: Test Scenario Results
Final Work Product:

Evaluation of Test Scenario Results

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1. *Report with associated maps (3 electronic copies and 5 hard copies)*

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CDMP	Comprehensive Development Master Plan
DERM	Miami-Dade County Department of Environmental Resources Management
EAR	Evaluation and Appraisal Report
EMC	event mean concentration
FAR	Floor Area Ratio
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FPLOS	flood protection level of service
GIS	Geographic Information System
IWR	Institute for Water Resources
LEC	Lower East Coast
MDWASD	Miami-Dade Water and Sewer Department
MGD	Million Gallons per Day
MPO	Metropolitan Planning Organization
MUATS	Miami Urban Area Transportation Study
SFWMD	South Florida Water Management District
SDWWTP	South Dade Wastewater Treatment Plant
SIP	State Implementation Plan
SMDWSP	South Miami-Dade Watershed Study and Plan
SRPP	Strategic Regional Policy Plan
TAZ	traffic analysis zones
UDB	Urban Development Boundary
VOC	Volume over Capacity
WSAC	Watershed Study Advisory Committee
XP-SWMM	Expert Stormwater and Wastewater Management Model

Overview of the South Miami-Dade Watershed Study and Plan

The South Miami-Dade Watershed, an approximately 370 square mile area located in the southeastern portion of Miami-Dade County, is increasingly recognized as one of the most critical watersheds in Florida. 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 Study and Plan (SMDWSP) is a long-term land planning and water resources study required by the Miami-Dade County Comprehensive Development Master Plan (CDMP). Divided into five major task areas, the study includes a wide-ranging look at South Miami-Dade County's population growth; infrastructure; land ownership, including agriculture, industrial and urban land uses; pollution; water resources; wildlife; and natural areas. The SMDWSP is based on standard accepted practices for the formulation of large-scale water and land use plans.

The SMDWSP is being developed consistent with the objectives of CDMP Land Use Policy 3E, which was adopted by the 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 consistent with long term objectives for a sustainable South Miami-Dade.

To help ensure that Land Use Policy 3E was met, the Watershed Study Advisory Committee (WSAC) formulated seven goals for the SMDWSP. While not specifically articulated in Land Use Policy 3E, the WSAC goals clearly reflect the importance of environmental and economic sustainability and community character. The purpose of the SMDWSP is to formulate a preferred land use scenario that meets these major planning goals.

The results of this collaborative study process will be the development of a Plan designed to reconcile and balance the various competing interests in South Miami-Dade – providing the framework for a sustainable economy and environment through the year 2050. The Plan will contain the policies, strategies and procedures necessary for implementing the preferred scenario.

1.0 INTRODUCTION

The South Miami-Dade Watershed Study and Plan (SMDWSP) is based on standard accepted practices for the formulation of large-scale water and land use plans. The first step in the planning process was to establish and document the baseline condition. For the SMDWSP this was completed in Sub-tasks 1.1 through 1.7 in June 2004. The second part of task one (Sub-task 1.8) was to establish the parameters and thresholds for measuring the performance of various alternatives or test land use scenarios. The second task was the actual formulation of test land use scenarios based on projected population levels in 2025 and 2050. Specifically, for the SMDWSP three policy options were evaluated for the two different population levels - - resulting in six test scenarios. In task three, each of the six test scenarios were evaluated using the parameters and thresholds developed in Sub-task 1.8. This evaluation includes an assessment of the impact of each scenario on water resources, natural resources, community character, employment and economy and infrastructure. Based on this evaluation of performance of the six test scenarios, a preferred land use scenario will be formulated in task four. The performance of the preferred scenario will also be evaluated against the same parameters and thresholds. Once a final preferred scenario is selected, implementation strategies will be developed in task five.

As noted above, the parameters and thresholds established in Sub-task 1.8 were utilized during the assessment phase of the project to determine the performance of each of the six test scenarios (three policy approaches at the projected population levels for 2025 and 2050). <u>The purpose of Sub-task 3.6 is to explain how the test scenario results will inform the preferred scenario. A description of each test scenarios performance, the Watershed Study Advisory Committee's (WSAC) vision and goals and Land Use Policy 3E of the Miami-Dade County Comprehensive Development Master Plan (CDMP) are the critical measures related to informing the preferred scenario.</u>

2.0 TEST SCENARIO PERFORMANCE

While no one scenario meets all of the criteria contained in the WSAC vision and goals and Land Use Policy 3E, a clear distinction can be made between Test Scenarios 2 and 3 and Test Scenario 1. For most of the 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 are more successful at meeting the WSAC goals and vision and Land Use Policy 3E. The land use distribution principles in these two test scenarios more closely mirror the adopted Miami-Dade County guidelines rather than development trends depicted in Test Scenario 1. A summary of parameters and key measures of test scenario assessments is provided in Tables 1 (2025) and 2 (2050).

In the water resources category, Test Scenario 3 performs best in terms of water quality and flooding but Test Scenario 1 is best with respect to water supply. Test Scenario 2 results are between Test Scenarios 1 and 3.

Native dominated wetlands are best protected in Test Scenario 2 but slightly more remnant natural forests are preserved in Test Scenario 3.

The land use parameters capture the vision for the future of the Watershed Study Area. What characteristics do the residents want the Study Area to exhibit? WSAC members ideals on this vision may vary but two common themes are the protection of rural character and preservation of property rights. In Test Scenario 3, rural character is maintained and urban character is expanded. Test Scenario 1 has the greatest impact on rural land and consumes over 32,000 acres (74 percent) of agricultural land for development.

Other than the cost of housing, the economic results were basically the same for each test scenario. On average housing costs were slightly more expensive in Test Scenario 3 and least expensive in Test Scenario 1, but lower priced multi-family units were available in Test Scenarios 2 and 3.

Infrastructure costs are least expensive in Test Scenario 3 and most expensive in Test Scenario 1. Improvements to roadways, water and sewer lines can be engineered in all scenarios but by allocating development in more compact patterns (Test Scenarios 2 and 3) millions of taxpayers dollars can be saved.

Table 1
South Miami-Dade Watershed Study and Plan
Assessment Matrix - 2025

Ref #	Parameter	Scope of Threshold	Measure	Baseline 2003	Test Scenario 1A 2025	Test Scenario 2A 2025	Test Scenario 3A 2025
	Water Resources - Primary Parameters						
WR-1	Stormwater Discharge Quality	Comparative assessment of pollutants measured by XPSWMM against a baseline	Pollutant Loads (Pounds)	BOD5 203,034 COD 1,087,243 TSS 895,850 TDS 7,868,403 TN 43,045 Nox-N 12,857 NH3-N 2,458 TKN 26,488 TP 6,811 DP 4,249 Cd 58 Copper 764 Lead 2,531 Zn 1,810	262,131 1,422,385 1,128,356 12,120,083 55,371 19,622 3,449 35,011 8,450 5,798 91 990 3,815 2,480	260,090 1,416,688 1,121,116 11,901,551 54,451 18,618 3,366 34,508 8,298 5,676 88 996 3,711 2,483	251,104 1,361,444 1,094,857 11,370,741 53,449 18,610 3,315 33,342 8,221 5,592 83 1,008 3,537 2,389
WR-2	Groundwater Supply	Water supply needs will be met during a 1-in-10 year drought	Water Supply Needed to Meet Drought Conditions	303.8 mgd	437.5 mgd	443 mgd	450.5 mgd
WR-3	Surface Water Flows/Distribution	Annual volume of run-off into Biscayne Bay	Flows into Biscayne Bay (Sum of Basins C-1, C-2, C-100, C-102, C-103)	647,000 ac-ft	640,000 ac-ft	642,000 ac-ft	642,000 ac-ft
WR-4	Flood Protection	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	427 nodes	422 nodes	394 nodes

Table 1 South Miami-Dade Watershed Study and Plan Assessment Matrix 2025							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1A 2025**	**Test Scenario 2A 2025**	**Test Scenario 3A 2025**
Natural Communities – Primary Parameters							
NC-1	Tidal Wetlands	No net loss of native plant-dominated tidal wetlands	Acres Loss Percent Loss	17, 685 acres	0 0.0%	0 0.0%	0 0.0%
NC-2	Transitional Wetlands (Brackish Wetlands)	(Evaluated under Tidal Wetlands and Freshwater Wetlands)	N/A	N/A	N/A	N/A	N/A
NC-3	Native-Plant-Dominated Freshwater Wetlands	No net loss of freshwater wetlands	Acres / Percent Loss	35,698 acres	-885 acres / -2.5 %	-330 acres / -0.9%	-497 acres / -1.4%
	Exotic-Plant-Dominated Freshwater Wetlands			5,410 acres	-924acres / -17.1%	-846 acres / -15.6%	-340 acres / -6.3%
	Transitional Freshwater Wetlands			6,993 acres	-702 acres / -10.0%	-592 acres / -8.5%	-141 acres / -2.0%
NC-4	Remnant Natural Forests	No net degradation of the remnant natural forest communities.	Acres / Percent Loss	5,717 acres	-162 acres -2.8 %	-207 acres -3.6 %	-183 acres -3.2 %

Table 1 South Miami-Dade Watershed Study and Plan Assessment Matrix 2025							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1A 2025**	**Test Scenario 2A 2025**	**Test Scenario 3A 2025**
	Land Use/Community Character						
LU-1	Development Densities	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 - 193 Ex-Urban - 22 Suburban - 178 Urban - 3	Square Miles: Rural - 199 Ex-Urban - 13 Suburban - 177 Urban - 7	Square Miles: Rural - 205 Ex-Urban - 24 Suburban - 161 Urban - 6
LU-2	Rural Land	Remaining acres of agricultural land	Remaining acres of agricultural land and percent loss	44,020 acres	30,089 acres - 32%	35,903 acres - 18%	38,646 acres - 12%
LU-3	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 Road	Baseline Dwelling Units US 1 34,730 Kendall Dr. 17,085 Turnpike 9,445 Palmetto 7,895 Douglas Rd. 2,565 TOTAL 71,720	Additional Dwelling Units US 1 16,050 Kendall Dr. 5,340 Turnpike 461 Palmetto 2,004 Douglas Rd. 211 TOTAL 24,066	Additional Dwelling Units US 1 17,822 Kendall Dr. 1,481 Turnpike 554 Palmetto 683 Douglas Rd. 0 TOTAL 20,540	Additional Dwelling Units US 1 24,910 Kendall Dr. 24,199 Turnpike 7,664 Palmetto 4,141 Douglas Rd. 371 TOTAL 61,285
LU-4	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	Additional Acres by Park Size 1-4 acres 13 5-30 acres 84 30-100 acres 80 over 100 acres 707 TOTAL 884	Additional Acres by Park Size 1-4 acres 79 5-30 acres 200 30-100 acres 338 over 100 acres 267 TOTAL 884	Additional Acres by Park Size 1-4 acres 49 5-30 acres 32 30-100 acres 84 over 100 acres 719 TOTAL 884

Table 1 South Miami-Dade Watershed Study and Plan Assessment Matrix 2025							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1A 2025**	**Test Scenario 2A 2025**	**Test Scenario 3A 2025**
	Assessment Matrix						
EC-1	Economic Base	Employment by industry (commercial, industrial, institutional and farm)	Percentage of Industry	Commercial 70% Industrial 10% Institutional 19% Farm .9%	Commercial 77% Industrial 8% Institutional 15% Farm .4%	Commercial 77% Industrial 8% Institutional 5% Farm .5%	Commercial 77% Industrial 8% Institutional 5% Farm .5%
EC-2	Cost of Housing	Comparison of future housing costs	2004 Dollars	$212,157	$319,111	$326,074	$326,250
EC-3	Mix of wages	Median household income	2000 Dollars	$52,551	$77,714	$76,133	$75,616

Table 1 South Miami-Dade Watershed Study and Plan Assessment Matrix – 2025							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1A 2025**	**Test Scenario 2A 2025**	**Test Scenario 3A 2025**
	Infrastructure - Primary Parameters						
IS-1	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	56,073,760 miles per day 20.5 billion miles per year	52,387,484 miles per day 19.1 billion miles per year	54,615,068 miles per day 19.9 billion miles per year
IS-2	Schools	School Capacity Cost	Cost for Expansion (2004 Dollars)	N/A	$459,700,000	$360,100,000	$306,500,000
	Infrastructure - Secondary Parameters						
IS-3	Potable Water	Plant capacity and expansion costs	Distribution Expansion Costs (2003 Dollars)	N/A	$289,700,000	$251,000,000	$236,100,000
IS-4	Wastewater	Plant capacity and expansion costs	Collection Expansion Costs (2003 Dollars)	N/A	$1,167,300,000	$1,011,400,000	$951,200,000
IS-5	Air Quality	Tons of pollutants per day	Tons/Day Increase	VOC 77.55 CO 931.53 NOx 125.32	VOC 17.70 CO 324.30 NOx 15.19	VOC 16.71 CO 306.13 NOx 14.34	VOC 17.30 CO 316.97 NOx 14.85

Table 2 **South Miami-Dade Watershed Study and Plan** **Assessment Matrix – 2050**							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1B 2050**	**Test Scenario 2B 2050**	**Test Scenario 3B 2050**
	Water Resources - Primary Parameters						
WR-1	Stormwater Discharge Quality	Comparative assessment of pollutants measured by XPSWMM against a baseline	Pollutant Loads (Pounds)	BOD5 203,034 COD 1,087,243 TSS 895,850 TDS 1,868,403 TN 43,045 Nox-N 12,857 NH3-N 2,458 TKN 26,488 TP 6,811 DP 4,249 Cd 58 Copper 764 Lead 2,531 Zn 1,810	358,674 1,941,088 1,420,126 17,576,643 66,636 31,925 4,516 46,214 9,880 7,319 138 1,076 5,896 3,396	264,712 1,446,700 1,134,517 12,344,446 55,357 17,661 3,524 35,208 8,423 5,881 95 992 3,970 2,535	248,095 1,348,420 1,072,811 11,528,019 52,778 18,666 3,259 33,056 8,115 5,573 86 985 3,606 2,376
WR-2	Groundwater Supply	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
WR-3	Surface Water Flows/Distribution	Annual volume of run-off 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
WR-4	Flood Protection	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

Table 2
South Miami-Dade Watershed Study and Plan
Assessment Matrix - 2050

Ref #	Parameter	Scope of Threshold	Measure	Baseline 2003	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
	Natural Communities – Primary Parameters						
NC-1	Tidal Wetlands	No net loss of native-plant-dominated tidal wetlands	Acres Percent Loss	17, 685 acres	0 0.0%	0 0.0%	0 0.0%
NC-2	Transitional Wetlands (Brackish Wetlands)	(Evaluated as part of Tidal Wetlands and Freshwater Wetlands)	N/A	N/A	N/A	N/A	N/A
NC-3	Native-Plant-Dominated Freshwater Wetlands	No net loss of freshwater wetlands	Acres / Percent Loss	35,698 acres	-950 acres / -2.7%	-343 acres / -1.0%	-563 acres / -1.6%
	Exotic-Plant-Dominated Freshwater Wetlands			5,410 acres	-955 acres -17.7%	-887 acres / -16.4%	-873 acres / -16.1%
	Transitional Freshwater Wetlands			6,993 acres	-705 acres / -10.1%	-640 acres / -9.2%	-679 acres / -9.7%
NC-4	Remnant Natural Forests	No net degradation of the remnant natural forest communities	Acres Percent Loss	5,717 acres	-676 acres -11.8%	-225 acres -3.9 %	-218 acres -3.8 %

Table 2 South Miami-Dade Watershed Study and Plan Assessment Matrix 2050							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1B 2050**	**Test Scenario 2B 2050**	**Test Scenario 3B 2050**
	Land Use/Community Character						
LU-1	Development Densities	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
LU-2	Rural Land	Remaining acres of agricultural land	Remaining acres of agricultural land and percent loss	44,020 acres	-11,538 acres - 74%	-30,157 acres - 32%	-38,372 acres - 13%
LU-3	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 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
LU-4	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

Table 2
South Miami-Dade Watershed Study and Plan
Assessment Matrix 2050

Ref #	Parameter	Scope of Threshold	Measure	Baseline 2003	Test Scenario 1B 2050	Test Scenario 2B 2050	Test Scenario 3B 2050
	Assessment Matrix						
EC-1	Economic Base	Employment by industry (commercial, industrial, institutional and farm)	Percentage of Industry	Commercial 70% Industrial 10% Institutional 19% Farm .9%	Commercial 82% Industrial 6% Institutional 12% Farm .09%	Commercial 82% Industrial 6% Institutional 12% Farm .3%	Commercial 82% Industrial 6% Institutional 12% Farm .3%
EC-2	Cost of Housing	Comparison of future housing costs	2004 Dollars	$212,157	$399,603	$411,957	$430,562
EC-3	Mix of wages	Median household income	2000 Dollars	$52,551	$112,372	$109,225	$106,263

Table 2 South Miami-Dade Watershed Study and Plan Assessment Matrix – 2050							
Ref #	**Parameter**	**Scope of Threshold**	**Measure**	**Baseline 2003**	**Test Scenario 1B 2050**	**Test Scenario 2B 2050**	**Test Scenario 3B 2050**
	Infrastructure - Primary Parameters						
IS-1	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
IS-2	Schools	Schools Infrastructure Cost	Cost for Expansion (2004 Dollars)	N/A	$910,600,000	$696,800,000	$667,700,000
	Infrastructure - Secondary Parameters						
IS-3	Potable Water	Plant capacity and expansion costs	Distribution Expansion Costs (2003 Dollars)	N/A	$710,500,000	$590,000,000	$561,000,000
IS-4	Wastewater	Plant capacity and expansion costs	Collection Expansion Costs (2003 Dollars)	N/A	$2,862,300,000	2,377,200,000	2,822,600,000
IS-5	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

4.0 EVALUATION OF ASSESSMENT RESULTS

<u>WR-1 Stormwater Discharge Quality</u>

Assessment Results Year 2025

Table 3 describes the pollutant loads for all five basins in 2025. In general Test Scenario 1A created the largest increase in pollutant loads while Test Scenario 3A had the smallest increase.

Table 3
Pollutant Loads (Sum of all Basins)
2025

Pollutant	Baseline	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
5-day Biochemical Oxygen Demand (BOD_5)	203,034	262,131	260,090	251,104
Chemical Oxygen Demand (COD)	1,087,243	1,422,385	1,416,688	1,361,444
Total Suspended Solids (TSS)	895,850	1,128,356	1,121,116	1,094,857
Total Dissolved Solids (TDS)	7,868,403	12,120,083	11,901,551	11,370,741
Total Nitrogen (TN)	43,045	55,371	54,451	53,449
Nitrate-Nitrite (Nox-N)	12,857	19,622	18,618	18,610
Ammonia Nitrogen (NH3-N)	2,458	3,449	3,366	3,315
Total Kjeldahl Nitrogen (TKN)	26,488	35,011	34,508	33,342
Total Phosphorus (TP)	6,811	8,450	8,298	8,221
Dissolved Phosphorus (DP)	4,249	5,798	5,676	5,592
Total Cadmium (Cd)	58	91	88	83
Total Copper (Cu)	764	990	996	1,008
Total Lead (Pb)	2,531	3,815	3,711	3,537
Total Zinc (Zn)	1,810	2,480	2,483	2,389

Assessment Results Year 2050

Table 4 describes the pollutant loads for all five basins in 2050. In general Test Scenario 1B created the largest increase in pollutant loads while Test Scenario 3B had the smallest increase.

Table 4
Pollutant Loads (Sum of all Basins)
2050

Pollutant	Baseline	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
5-day Biochemical Oxygen Demand (BOD_5)	203,034	358,674	264,712	248,095
Chemical Oxygen Demand (COD)	1,087,243	1,941,088	1,446,700	1,348,420
Total Suspended Solids (TSS)	895,850	1,420,126	1,134,517	1,072,811
Total Dissolved Solids (TDS)	7,868,403	17,576,643	12,344,446	11,528,019
Total Nitrogen (TN)	43,045	66,636	55,357	52,778
Nitrate-Nitrite (Nox-N)	12,857	31,925	17,661	18,666
Ammonia Nitrogen (NH3-N)	2,458	4,516	3,524	3,259
Total Kjeldahl Nitrogen (TKN)	26,488	46,214	35,208	33,056
Total Phosphorus (TP)	6,811	9,880	8,423	8,115
Dissolved Phosphorus (DP)	4,249	7,319	5,881	5,573
Total Cadmium (Cd)	58	138	95	86
Total Copper (Cu)	764	1,076	992	985
Total Lead (Pb)	2,531	5,896	3,970	3,606
Total Zinc (Zn)	1,810	3,396	2,535	2,376

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

Scenario Development Actions to be Applied to the Preferred Scenario

As shown in Tables 3 and 4, land use distribution patterns in Test Scenario 1 resulted in the most adverse impacts on surface water quality. This was primarily due to the large amount of land needed to allocate single family residential units. These units create more pollutants than higher density units and decrease the amount of land available for stormwater treatment. Reducing pollutant loads to baseline will require a more efficient (high density) distribution of land uses, additional land for stormwater treatment and more aggressive stormwater best management practices.

WR-2 Groundwater Supply

Assessment Results Year 2025

Test Scenario 1A creates the least demand for groundwater approximately 13.3 mgd less than Test Scenario 3A. Table 5 describes the water calculations for the 2025 test scenarios.

Table 5
1-in-10 Year Water Demand Calculations (mgd)
2025

Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
437.5	443	450.8

Assessment Results Year 2050

Test Scenario 1B creates the least demand for groundwater approximately 35.3 mgd less than Test Scenario 3B. Table 6 describes the water calculations for the 2050 test scenarios.

Table 6
1-in-10 Year Water Demand Calculations (mgd)
2050

Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
495.9	520.5	531.2

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the

WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter. *According to Volume 1 – Appendix B of the LEC Regional Water Supply Plan*, "Section 373.0361(2)(a)1, Florida Statutes, states that the level of certainty planning goal associated with identifying demands shall be based upon meeting the needs of a 1-in-10 year drought event. Therefore, water demand projections for the year 2020 included analyses under both average rainfall conditions and 1-in-10 drought conditions. An average rainfall year is defined as rainfall with a 50 percent probability of being exceeded over a twelve month period. A 1-in-10 drought condition is defined as below normal rainfall with a 90 percent probability of being exceeded over a twelve-month period. This means that there is only a ten percent chance that less than this amount of rainfall will fall in any given year."

Scenario Development Actions to be Applied to the Preferred Scenario

As discussed at the November 9, 2005 WSAC the availability of water is not anticipated to be a major limiting factor in the future. Water is expected to be available but at what cost, both in terms of dollars and the environment. It will be important that the County ensure efficient use of water, including conservation and reuse. Potable water cost calculations have been incorporated into the infrastructure parameters.

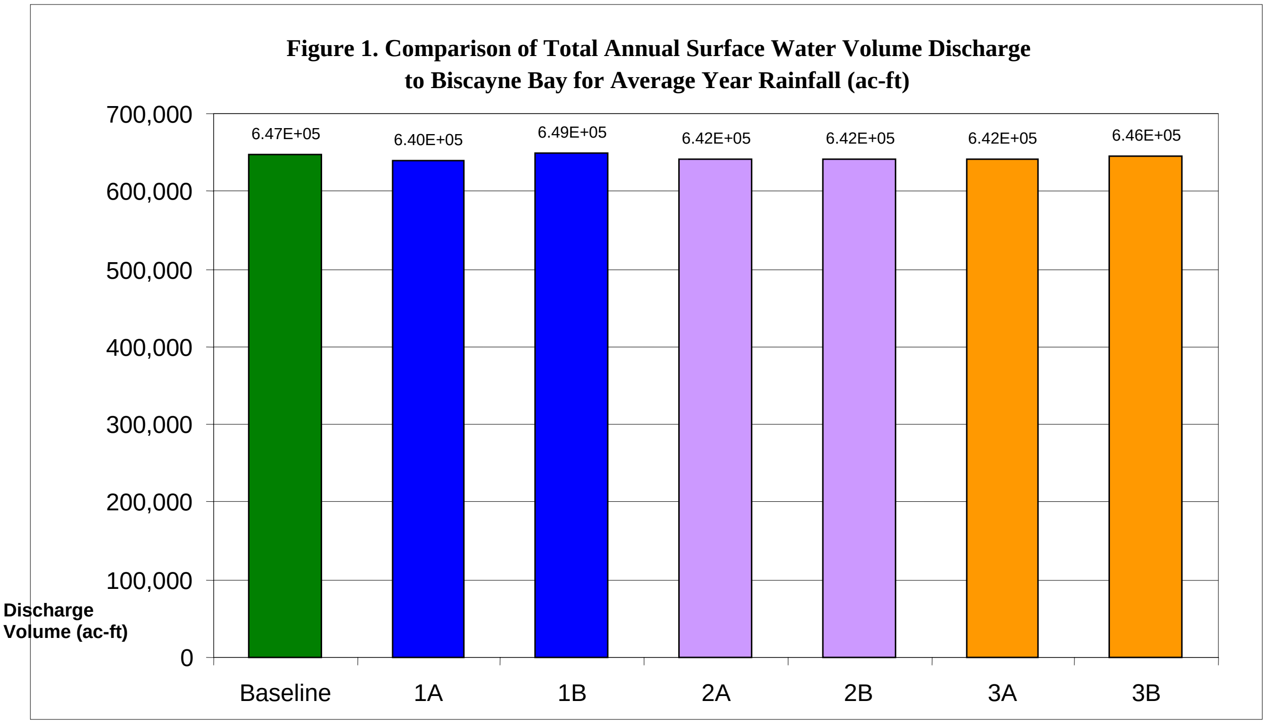
WR-3 Surface Water Flows

Assessment Results Year 2025

All of the test scenarios had a slight decrease from the baseline in flows to the Biscayne Bay in 2025. Figure 1 illustrates the total surface water flow volumes.

Assessment Results Year 2050

All of the test scenarios had a slight decrease from the baseline in flows to the Biscayne Bay in 2050 except for Test Scenario 1B. Figure 1 illustrates the total surface water flow volumes.



Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. The measure for this parameter is no net decrease in flows into Biscayne Bay.

Test Scenario 1B met the established threshold. The other five scenarios had a slight decrease in flows while Test Scenario 1B had a slight increase in flows to Biscayne Bay. However, this reduction does not appear to be significant.

Scenario Development Actions to be Applied to the Preferred Scenario

It does not appear that more dense development patterns will adversely impact flows to Biscayne Bay.

WR-4 Flood Protection

Assessment Results Year 2025

Table 7 describes nodes or monitoring points along canals not meeting the flooding level of service (LOS) for all basins. In general Test Scenario 1A created the greatest increase in flooding while Test Scenario 3A results in the smallest increase in 2025.

Table 7
Nodes Not Meeting Flooding LOS
2025

	Baseline	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Sum of all nodes not meeting Level of Service (Basins C-1, C-2, C-100,C-102,C-103)	350 nodes	427 nodes	422 nodes	394 nodes

Assessment Results Year 2050

Table 8 describes nodes or monitoring points along canals not meeting the flooding level of service (LOS) for all basins. In general Test Scenario 1B created the greatest increase in flooding while Test Scenario 3B results in the smallest increase in 2050.

Table 8
Nodes Not Meeting Flooding LOS
2050

	Baseline	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
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

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

The threshold for this parameter is the adopted flooding level of service. Level of service failures occur in the baseline and all test scenarios. The extent and location of these failures should also be considered when measuring test scenario success.

Scenario Development Actions to be Applied to the Preferred Scenario

In addition to considering macro factors such as total nodes that do not meet the adopted LOS, the development of the preferred scenario will require a consideration of the location of these failures. Where are the problems? How can they be avoided? The most useful application of the flooding results will be the geographic overlay of failures and land use data.

NC-1 Tidal Wetlands

Tidal wetlands are located primarily in protected areas where the test scenarios do not result in any land use changes. Consequently, there was no loss of tidal wetlands under any of the test scenarios. As such this parameter was not assessed.

NC-2 Transitional Wetlands

Transitional wetlands, as defined as brackish wetlands between tidal and freshwater wetlands, were included in the assessments of tidal wetlands (NC-1) and freshwater wetlands (NC-3).

NC-3 Freshwater Wetlands

Assessment Results Year 2025

Native-plant-dominated freshwater wetlands. The native-plant-dominated wetland losses are largest under Test Scenario 1A (2.5 percent) and smallest under Test Scenario 2A (0.9 percent). Test Scenario 1A losses were almost three times greater than Test Scenario 2A losses. The losses are largest under Test Scenario 1A due to the sprawling development pattern of Scenario 1. In general, the more compact the development pattern, the less impact to this natural community. The losses are smallest under Test Scenario 2A because, during development of that Test Scenario, native-plant-dominated freshwater wetlands were intentionally avoided to the extent practicable pursuant to the policy direction of the scenario.

Exotic-plant-dominated freshwater wetlands. The exotic-plant-dominated wetland losses were largest under 1A (17.1 percent), intermediate under 2A (15.6 percent), and smallest under 3A (6.3 percent). This trend indicates that the more compact the development pattern, the less impact to this natural community.

Transitional freshwater wetlands. The transitional wetland losses are largest under 1A (10 percent), intermediate under 2A (8.5 percent), and smallest under 3A (2 percent). This trend indicates that the more compact the development pattern, the less impact to this natural community.

Assessment Results Year 2050

Native-plant-dominated freshwater wetlands. The native-plant-dominated wetland losses are largest under 1B (2.7 percent) and smallest under 2B (1.0 percent). In general, the more compact the development pattern, the less impact to this natural community. The losses are smallest under Test Scenario 2B because, during development of that test scenario, native-plant-dominated freshwater wetlands were intentionally avoided to the extent practicable.

Exotic-plant-dominated freshwater wetlands. The exotic-plant-dominated wetland losses are similar for each Test Scenario: approximately 900 acres (17 percent). At year 2050, the advantage of a more compact development pattern is less apparent that at year 2025.

Transitional freshwater wetlands. The transitional wetland losses are similar for each Test Scenario: approximately 700 acres (10 percent). At year 2050, the advantage of a more compact development pattern is less apparent that at year 2025.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

Native dominated wetlands are critical to the environmental sustainability (WSAC Vision) of the watershed. Such wetlands can reduce flooding, improve water quality and provide important habitat. Test Scenario 2 performs best for this parameter.

Scenario Development Actions to be Applied to the Preferred Scenario

In developing the preferred scenario, losses to native freshwater wetlands should be avoided to the maximum extent practicable. Opportunities for environmental restoration may be viable in exotic and transitional wetlands.

NC-4 Remnant Natural Forests

Assessment Results Year 2025

At year 2025, remnant natural forest losses are similar for all Test Scenarios. Losses range from 162 to 207 acres (2.8 percent to 3.6 percent) from a baseline of 5,717 acres.

Assessment Results Year 2050

At year 2050, remnant natural forest losses for Scenario 1B (11.8 percent, 676 ac) are three times higher than Test Scenario 2B or 3B. This is primarily due to the sprawling development pattern of Scenario 1. In general, the more compact the development pattern, the less impact to this natural community.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

Remnant natural forests are critical to promoting environmental sustainability (WSAC Vision). Test Scenario 2 best accomplishes this goal.

Scenario Development Actions to be Applied to the Preferred Scenario

In developing the preferred scenario, losses to remnant natural forests should be avoided to the maximum extent practicable.

LU-1 Development Densities

Development patterns can be a measurable representation of an area's community character. By defining prototypical development patterns with attributes for four different types of land and then comparing them with each test scenario, a quantifiable and visual picture of the test scenarios can be generated. Development patterns have discreet attributes, such as land use type, infrastructure service, economic conditions and urban form that can be analyzed to evaluate community character. This information provides a basis for a comparative analysis and assessment of the test land use scenarios.

Assessment Results Year 2025

Test Scenario 1A (loss of 23 square miles) resulted in the most impact on Rural areas followed by Test Scenario 2A (loss of 17 square miles) and Test Scenario 3A (loss of 11 square miles). Urban development patterns increased in Test Scenarios 2A (four additional square miles) and 3A (three additional square miles). A comparison of development patterns for all test scenarios is provided in Table 9.

Table 9
Development Patterns 2025
Square Miles

Development Pattern Category	2003 Baseline Square Miles	Test Scenario 1A Square Miles	Test Scenario 2A Square Miles	Test Scenario 3A Square Miles
Rural	216	193	199	205
Ex-Urban	14	22	13	24
Suburban	163	178	177	161
Urban	3	3	7	6
Total	**396**	**396**	**396**	**396**
Development Pattern Category	**2003 Baseline Percentage of Study Area**	**Test Scenario 1A Percentage of Study Area**	**Test Scenario 2A Percentage of Study Area**	**Test Scenario 3A Percentage of Study Area**
Rural	55%	49%	50%	52%
Ex-Urban	4%	5%	3%	6%
Suburban	41%	45%	45%	41%
Urban	Less than 1%	Less than 1%	2%	2%
Total	**100%**	**100%**	**100%**	**100%**

Assessment Results Year 2050

The trend continued for Rural patterns in Test Scenario 1B resulted in a loss of 57 square miles of rural land. Test Scenario 3 retained the most rural character with a loss of only 15 square miles. Urban community character is increased in Test Scenario 2B (seven additional square miles) and 3B nine additional square miles). Test Scenario 1B provides the highest percentage (52 percent) of land with suburban character. Rural land is preserved in Test Scenario 3B because development takes place inside the UDB as opposed to Test Scenario 1B where development follows current development trends. On the other hand, urban development patterns increase with Test Scenario 3B because development is concentrated inside the UDB around transit corridors. A comparison of 2050 development patterns for all test scenarios is provided in Table 10.

Table 10
Development Patterns 2050
Square Miles

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%**

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

The community character of the Watershed Study Area is predominately Suburban in all the Test Scenarios. However, by concentrating new development and growth where infrastructure exists (urban area), rather than sprawling out to undeveloped lands, more of the existing community character can be retained. These areas are already urbanized, so intensifying development here has little or no effect on their community character. Distributing development in this manner supports vibrant and sustainable communities; honors private property rights; supports economically diverse agriculture, promotes a healthy and sustainable Biscayne Bay and Biscayne

National Park; supports compatible enterprises, and preserves rural character of community as identified in the vision and goals created by WSAC and Land Use Policy 3E of the Miami-Dade County Comprehensive Development Master Plan (CDMP).

Scenario Development Actions to be Applied to the Preferred Scenario

To some extent all of the test scenarios do not meet the WSAC vision statement and goal 7 which require the preservation of "rural character" but clearly the development patterns resulting in Test Scenarios 3A and 3B preserve the most rural land. The planning principles used to distribute land use under Test Scenario 3 can be further implemented in the preferred scenario and more specifically in those areas changing from rural to suburban.

LU-2 Rural Land

Rural land was measured in terms of the amount of agricultural land that was retained within the Watershed Study Area. The threshold for this parameter specifically references acres of agricultural and open land outside the urban development boundary. The baseline acreage for agricultural land was 44,020 acres. The Watershed Study Area accounts for approximately half of all the agricultural land in Miami-Dade County. Table 11 summarizes the amount of agricultural land in the baseline and each test scenario.

Table 11
Total Acres of Agriculture

	Total Agricultural Land (Acres)	Agricultural Land Remaining Inside UDB (Acres)	Agricultural Land Remaining Outside UDB (Acres)
2003 Land Use (Baseline)	44,020	7,789	36,231
Test Scenario 1A (2025)	30,089 (- 31.6 %)	509	29,580
Test Scenario 1B (2050)	11,538 (- 73.8 %)	249	11,289
Test Scenario 2A (2025)	35,903 (- 18.4%)	1,056	34,847
Test Scenario 2B (2050	30,157 (- 31.5%)	792	29,365
Test Scenario 3A (2025)	38,646 (- 12.2 %)	2,415	36,231
Test Scenario 3B (2050)	38,372 (- 12.8 %)	2,141	36,231

Assessment Results Year 2025

The percent loss of agricultural land was 32 percent for 1A, 18 percent for 2A, and 12 percent for 3A. All of the agricultural land outside of the UDB was retained in Test Scenario 3A. In Test Scenario 2A and 1A, respectively 1,384 and 6,651 acres were converted to other land uses.

Assessment Results Year 2050

The percent loss of agricultural land was 74 percent for 1B, 32 percent for 2B, and 13 percent for 3B. Outside of the UDB all of the agricultural land was retained in Test Scenario 3B, while

6,866 acres in Test Scenario 2B and 24,942 acres in Test Scenario 1B were converted to other uses.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

The more agricultural land is preserved, the more successful a scenario is at meeting the goals of supporting economically diverse agriculture; a healthy sustainable Biscayne Bay and National Parks; retention of rural character; and honoring private property rights as established by all vision and goals identified by the WSAC and Land Use Policy 3E of the CDMP.

The underlying reason for higher numbers of agricultural land loss in Test Scenario 1 is that development is allocated outside the UDB at low densities. For Test Scenario 3, development is concentrated inside the UDB, thus allowing higher preservation of agricultural land. By substantially reducing development outside the UDB and concentrating it in developed areas more, agricultural land is retained.

Scenario Development Actions to be Applied to the Preferred Scenario

Test Scenario 1B does clearly not meet the WSAC vision statement, Goal 3 which promotes economically diverse agriculture and Goal 7 which require the preservation of "rural character". The development patterns resulting in Test Scenarios 3A and 3B preserve the most rural land and should meet this goal. The planning principles used to distribute land use under Test Scenario 3 can be further implemented in the preferred scenario and more specifically in those areas where agricultural land was converted to a new use. Areas such as Redland and Horse Country have been identified by the WSAC as very important for conservation and can be preserved in the formulation of the preferred scenario.

LU-3 Proximity of Housing and Employment to Transit

Proximity of housing and employment to transit is conceptualized as additional allocations of dwelling units and acres of commercial, industrial, and institutional uses within ½ mile of major transit corridors. Major transit corridors such as US 1, Kendall Drive, Florida Turnpike (north of Kendall Drive), Palmetto Expressway, and Douglas Road, were selected for this parameter given Miami-Dade County's plan to extend transit services as described in the Miami-Dade Transportation Plan to the Year 2030 (Metropolitan Planning Organization, December 2004, Final Draft) and the People's Transportation Plan (Status Report, April 2004).

Assessment Results Year 2025

As shown in Table 12 Test Scenario 3A had the most dwelling units located near transit corridors.

Table 12
Year 2025 Land Uses within ½ Mile of Transit Corridors

Land Use	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Residential (additional dwelling units)	24,066	20,540	61,285
Commercial (additional acres)	550	1,403	1,098

NOTE: These figures do not include baseline land uses.

Assessment Results Year 2050

As shown in Table 13 Test Scenario 3B had the most dwelling units located near transit corridors.

Table 13
Year 2050 Land Uses within ½ Mile of Transit Corridors

Land Use	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Residential (additional dwelling units)	35,863	29,182	109,162
Commercial (additional acres)	573	2,635	2,694

NOTE: These figures do not include baseline land uses.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other. The test scenario which most improved resident access to transit was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

Mixed-use development near transportation corridors help reduce traffic congestion, promote efficient land use that supports infrastructure improvements, economic opportunities, and community character. This translates into accomplishing Goals 1, 2, and 6 of the WSAC. The number of people living in close proximity to work may translate into reduced cost for roadway expansion leading to travel time and trip reduction. The distribution of development in Test

Scenario 3 is most successful at meeting the vision and goals of the WSAC and Land Use Policy 3E.

Scenario Development Actions to be Applied to the Preferred Scenario

By implementing fully adopted plans and policies more new land uses will be distributed around transit corridors. Land use principles used in Test Scenarios 3 should be applied in the preferred scenario to consolidate uses around transit corridors, to promote transit use and reduce traffic. Another approach to creating more opportunities for transit ridership is to identify new transit corridors as part of the preferred scenario.

<u>LU-4 Parks, Recreation , and Open Space</u>

Assessment Results Year 2025

Total of 884 additional acres of park for all Test Scenarios.

Assessment Results Year 2050

Total of 875 additional acres of park for Test Scenario 1 and 2. Test Scenario 3B had 873 additional acres of park because there were no two acre parcels available to equal the 875 acres distributed in Test Scenarios 1 and 2.

The main difference among park allocations is the size of each park (i.e., 1-4 acres, 5-30 acres, 31-100 acres, and over 100 acres). For instance, Test Scenario 3 confines growth within the UDB, thus using land more efficiently and in a compact manner. This means that for Test Scenario 3B there were more parks allocated in the 1-4 acres size than there are in over 100 acres. Test Scenario 1B does not restrict development to the UDB. Using current development practices, many larger parcels of land (between 5 and 30 acres) outside the UDB were allocated in the low density, sprawling Test Scenario 1B.

Development just northeast of SW 232nd Street and 87th Avenue occurred after the Test Scenarios 1B and 3B were formulated. These Test Scenarios have a 555 acre park that was not allocated to Test Scenario 2. For this reason Test Scenario 2B has the most number of smaller acreage parks and the least parks in the above 100 acres than the other two Test Scenarios. This is true for both 2025 and 2050 park allocation projections. Test Scenario 2B has smaller parks scattered throughout the south and west portion inside the UDB.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

The threshold for this parameter was 2.75 acres of park space for every 1,000. All test scenarios satisfied this threshold. The primary difference was the varying park sizes associated with each test scenario. In some communities having a greater number of smaller parks may be better than having a few bigger parks. Having smaller parks spread throughout an area may be better since residents can easily access them. Smaller central located park spaces often create a common area for communities leading to more vibrant communities with strong identities which is consistent with WSAC Goal 1. Larger parks, however, may provide additional recreational opportunities such as ball fields, tennis courts, and water sports.

Locating parks in close proximity to canals and natural resources is supportive of WSAC Goal 5. To further support Goal 5, park acreage park acreages in the preferred scenario should be expanded beyond the threshold of 2.75 acres per 1,000 persons.

Scenario Development Actions to be Applied to the Preferred Scenario

Parks should be located around environmentally sensitive areas. These parks may also be utilized to filter pollutants and store water. Increasing the ratio of park acreage to population above 2.75 acres would require the designation of more park land in the preferred scenario than the test scenarios.

EC-1 Economic Base

Assessment Results Year 2025

Other than a few hundred farm jobs, the employment projections are identical in each of the scenarios. Farm jobs differed slightly due to the varying amounts of agricultural land remaining in each scenario. All other land uses are exactly the same. The location of these uses varies and other than farm jobs this has no effect on the total number of jobs.

Table 14
Employment
2025

Projected Employment	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Commercial	379,566	379,566	379,566
Industrial	39,004	39,004	39,004
Institutional	73,161	73,161	73,161
Farm	2,010	2,397	2,582
Total Employment	493,741	494,128	494,313

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

Assessment Results Year 2050

Other than a few hundred farm jobs, the employment projections are identical in each of the scenarios. Farm jobs differed slightly due to the varying amounts of agricultural land remaining in each scenario. All other land uses are exactly the same. The location of these uses varies and other than farm jobs this has no effect on the total number of jobs.

Table 15
Employment
2050

Projected Employment	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Commercial	529,876	529,876	529,876
Industrial	41,274	41,274	41,274
Institutional	75,636	75,636	75,636
Farm	633	1,652	2,103
Total Employment	647,419	648,438	648,889

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

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

The WSAC Vision and Goals both stress the importance of maintaining economically and diverse agriculture. Land Use Policy 3E also includes agriculture as part of a balanced economy. While the total number of jobs in each test scenario are very similar, there are estimated to be 1,470 more agricultural jobs in Test Scenario 3B than Test Scenario 1B.

Scenario Development Actions to be Applied to the Preferred Scenario

During the WSAC's discussions regarding the economic results it was clearly stated that this parameter provides very little guidance for crafting the preferred scenario. Distribution of land uses by itself does not play a major role in the creation of jobs. Agricultural land was evaluated as part of the land use parameters in the context of rural character. The outcome of this evaluation and its application to the preferred will impact the number of farm jobs.

EC-2 Cost of Housing

Assessment Results Year 2025

In 2025, housing costs are expected to range from a low of $251,869 for multi-family units in Test Scenario 1A to a high of $363,034 for single family units in Test Scenario 3A. As shown in Table 16 housing units are most expensive in Test Scenario 3A. These higher costs are primarily due to the constraints on land area imposed by Test Scenario 3A. In addition to variations in housing costs, the mix of unit types varies between scenarios. Test Scenario 3A contains 7% more multi-family units than Test Scenario 1A and 2% more than Test Scenario 2A. Table 17 describes the unit types distributed in each scenario. Although the multi-family costs are higher in Test Scenario 3A than the other two scenarios, there are more of these lower costs units available ($262,805 for 3A multi-family).

Table 16
Housing Costs
2025

Projected Employment	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Average Value, All Units	319,111	326,074	326,250
Single Family	347,928	360,953	363,034
Multi-family	251,869	261,298	262,805

NOTE: All monetary values are expressed in constant 2004 dollars.

Table 17
Description of Dwelling Unit Types
2025

Unit Type	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Single Family	70%	65%	63%
Multi-family	30%	35%	37%

NOTE: The above percentages include existing dwelling units.

Assessment Results Year 2050

In 2050, housing costs are expected to range from a low of $323,084 for multi-family units in Test Scenario 1A to a high of $430,562 for single family units in Test Scenario 3A. As shown in Table 18 housing units are most expensive in Test Scenario 3B. These higher costs are primarily due to the constraints on land area imposed by Test Scenario 3B. In addition to variations in housing costs, the mix of unit types varies between scenarios. Test Scenarios 2B and 3B contain 12% more multi-family units than Test Scenario 1B. Table 19 describes the unit types distributed in each scenario. Although the multi-family costs are higher in Test Scenario 2B and 3B, there are more of these lower costs units available ($345,538 for 2B multi-family and $361,491 for 3B multi-family). In 2025 the mix of unit types between Test Scenarios 2 and 3 were very similar in 2050 that mix is the same.

Table 18
Housing Costs
2050

Projected Employment	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Average Value, All Units	399,603	411,957	430,562
Single Family	446,303	477,321	499,358
Multi-family	323,084	345,538	361,491

NOTE: All monetary values are expressed in constant 2004 dollars.

Table 19
Description of Dwelling Unit Types
2050

Unit Type	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Single Family	62%	50%	50%
Multi-family	38%	50%	50%

NOTE: The above percentages include existing dwelling units.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which deviated the least from the baseline was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

Although maintaining affordable housing costs is not specifically referenced in the WSAC Vision, Goals or Land Use Policy 3E, the WSAC objectives include providing housing for the South Miami-Dade Community. Housing may not be a top priority but it is a priority that should be considered when developing the preferred scenario. It is difficult to differentiate between the test scenarios with regard to housing costs because Test Scenario 1 provides cheaper multi-family and single family housing but it does not provide as large of a supply of lower cost multi-family housing. Test Scenario 3 provides the most multi-family units in 2025 and equal numbers to Test Scenario 2 in 2050 but the costs per unit are the highest of the test scenarios. Test Scenario 2 appears to best provide housing to meet community's needs. It provides a 50/50 mix of single family and multi-family units and lower cost units than Test Scenario 3. As with all the housing percentages shown in Tables 17 and 19, the total unit counts are based on existing units in 2003 (280,728) and new units through the year 2050 (204,277) for a total of 485,005.

Scenario Development Actions to be Applied to the Preferred Scenario

Full implementing existing plans and policies is the best approach to providing housing for the entire South Miami-Dade community. Many of the principles used in Test Scenario 2 are contained in the WSAC's adopted objectives and should be applied to the preferred scenario.

EC-3 Mix of Wages

Assessment Results Year 2025

As shown in Table 20, median household income varies very little among the test scenarios. Test Scenario 1A results in the highest median household income which is $2,098 higher than Test Scenario 3 and $1,581 higher than Test Scenario 2A.

Table 20
Median Household Income
2025

	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Median Household Income	$77,714	$76,133	$75,616

Assessment Results Year 2050

As shown in Table 21, median household income varies very little among the test scenarios. Test Scenario 1B results in the highest median household income which is $6,109 higher than Test Scenario 3 and $3,147 higher than Test Scenario 2A. The difference between Test Scenarios 1 and 3 has tripled between 2025 and 2050; this is due to the fact that the predominance of single family homes in Test Scenario 1B attracts more affluent residents.

Table 21
Median Household Income
2050

Projected Employment	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Median Household Income	$112,372	$109,225	$106,263

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

As established in Sub-task 1.8 (Parameters and Thresholds), this parameter was assessed by comparing results from each test scenario against each other and an established baseline. The test scenario which provided the best opportunity to increase wages was generally more consistent with the WSAC Vision, Goals and Land Use Policy 3E. There is no absolute threshold for this parameter.

The WSAC Vision and Goals and Land Use policy 3E stress the importance of maintaining economic sustainability. Although providing adequate wages is a key component of a sustainable economy varying land use densities and uses has minimal impact on the creation of high quality jobs.

Scenario Development Actions to be Applied to the Preferred Scenario

During the WSAC's discussions regarding the economic results it was clearly stated that the this parameter provides very little guidance for crafting the preferred scenario. Distribution of land uses by itself does not play a major role in the creation of jobs.

IS-1 Transportation

Assessment Results Year 2025

As shown in Table 22, total vehicle miles traveled, volume to capacity and delays are the lowest in Test Scenario 2A, making it the best option for reducing congestion and reducing public costs.

Table 22
Summary of Countywide Transportation Model Results
2025

Model Results	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Total Vehicle Miles Traveled Per Day	56,073,760	52,387,484	54,615,068
Average Volume to Capacity	.86	.80	.84
Total Delays Due to Congestion - Hours	1,406,058	1,079,629	1,334,142
Total Costs to Improve Overcapacity Roads	$1,113,270,986	$880,139,053	$1,036,089,430

Assessment Results Year 2050

As shown in Table 23, total vehicle miles traveled, volume to capacity and delays are the lowest in Test Scenario 3B, making it the best option for reducing congestion and reducing public costs.

Table 23
Summary of Countywide Transportation Model Results
2050

Model Results	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Total Vehicle Miles Traveled Per Day	66,805,784	65,504,220	64,148,180
Average Volume to Capacity	1.02	1.0	.98
Total Delays Due to Congestion - Hours	5,250,634	5,179,572	5,030,644
Total Costs to Improve Overcapacity Roads	$2,100,392,876	$1,990,267,202	$1,902,454,123

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

The threshold for this parameter is the adopted roadway level of service. Level of service failures occur in the baseline and all test scenarios. The extent, location and costs for improving these failures are the primary measures of scenario success.

As stated in the Sub-task 3.2 report, the Miami Urban Area Transportation Study (MUATS) has inherent limitations that impact the accuracy of transportation demand forecasting for the various scenarios considered in this study. These limitations consist of the following:

- The magnitude of changes in development patterns, especially for Scenarios 3A and 3B, will likely result in different trip making and trip assignment characteristics than what the MUATS model was validated for.

- The MUATS 4-step modeling process does not create a realistic feedback relationship between trip distribution and trip assignment. In other words, the number of trips between each pair of zones is set before the level of congestion on the roadway system has been established in the equilibrium iterative process. As roadway congestion increases, trips are diverted to parallel roads resulting in longer trip lengths. This somewhat contradicts the logic of creating more dense developments that should reduce the reliance on car trips during rush hours.

- The mode choice nested logit module used to estimate the level of transit use, simply stated, prevents a direct competition between the car and transit modes causing less than adequate increase in transit use in response to increase transit service frequency and higher roadway congestion levels.

- The most important MUATS limitation as regard to this study is due to the fact that the model uses the same trip generation rates for urban, suburban and agricultural areas of Miami-Dade County. This is clearly not appropriate for Scenario 3 because residents in highly dense corridors tend to generate fewer trips during rush hours and rely more on public transportation.

To remedy model limitations that impact primarily Scenario 3, it was decided to re-run Scenario 3A with lower trip generations rates that more realistically reflect trip making patterns in dense corridors. The results of the revised run are provided Table 24.

Table 24
Comparison of Test Scenario 3A and Test Scenario 3A with Trip Reduction

	Test Scenario 3A	Test Scenario 3A with Trip Reduction to Account for Changes in Trip Making	Percent Change
Total Vehicle Miles Traveled Per Day	54,615068	49,977,504	8.5% reduction
Average Volume to Capacity	.84	.76	9.5% reduction
Total Delays Due to Congestion - Hours	1,334,142	1,089,035	18.4% reduction
Total Costs to Improve Overcapacity Roads	$1,036,089,430	$740,567,955	29% reduction

A 10 percent trip reduction factor was applied to account for the changes in behavior and trip making resulting from Test Scenario 3. Because the MUATS model is based on trip rates associated with current trends (Test Scenario 1), a reduced trip rate is a reasonable assumption in Test Scenarios 2 and 3 where development patterns have deviated from the current trends to more dense developments. Figures 2 – 5 illustrate the changes in level of service for the original 2025 model runs and the Test Scenario 3A "trip reduction' model run.

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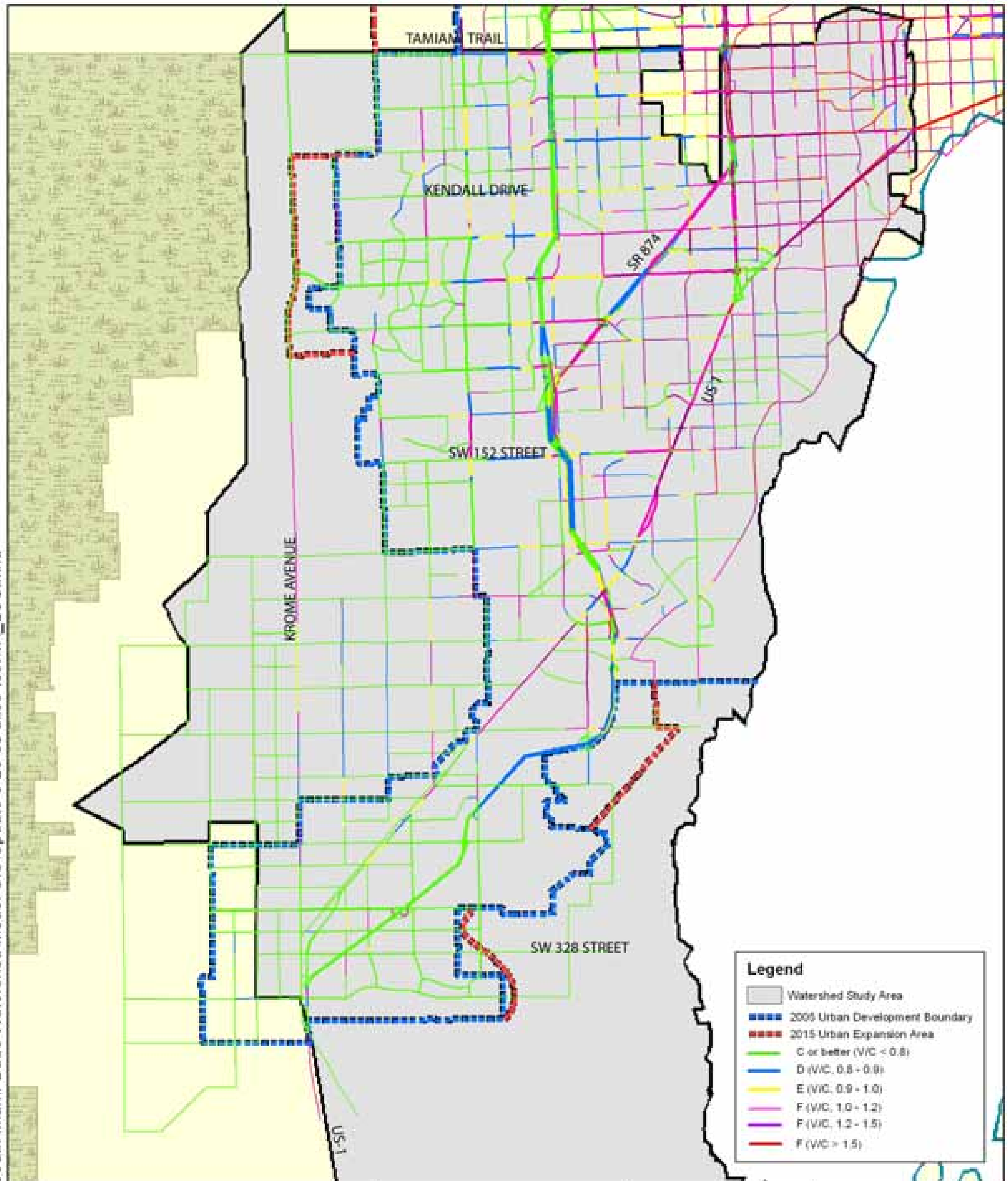

MIAMI DADE

KEITH and SCHNARS, P.A.
ENGINEERS, PLANNERS, SURVEYORS

Figure 2
Transportation
Level of Service
Test Scenario 1A (2025)

South Miami-Dade
Watershed Study and Plan

Source:
Miami-Dade MPO;
Keith and Schnars,
2005.

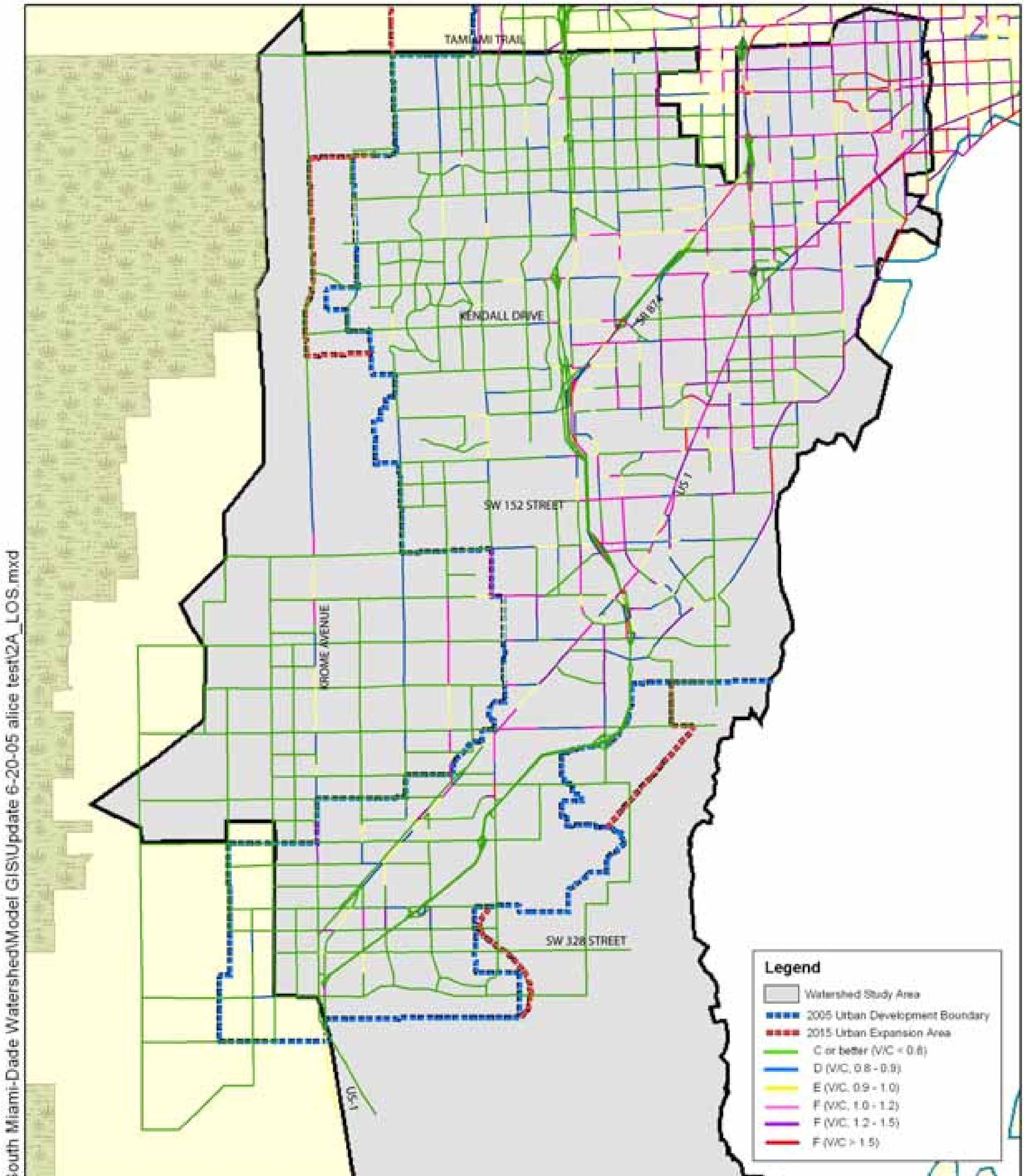

Figure 3
Transportation
Level of Service
Test Scenario 2A (2025)

South Miami-Dade
Watershed Study and Plan

Source:
Miami-Dade MPO;
Keith and Schnars,
2005.

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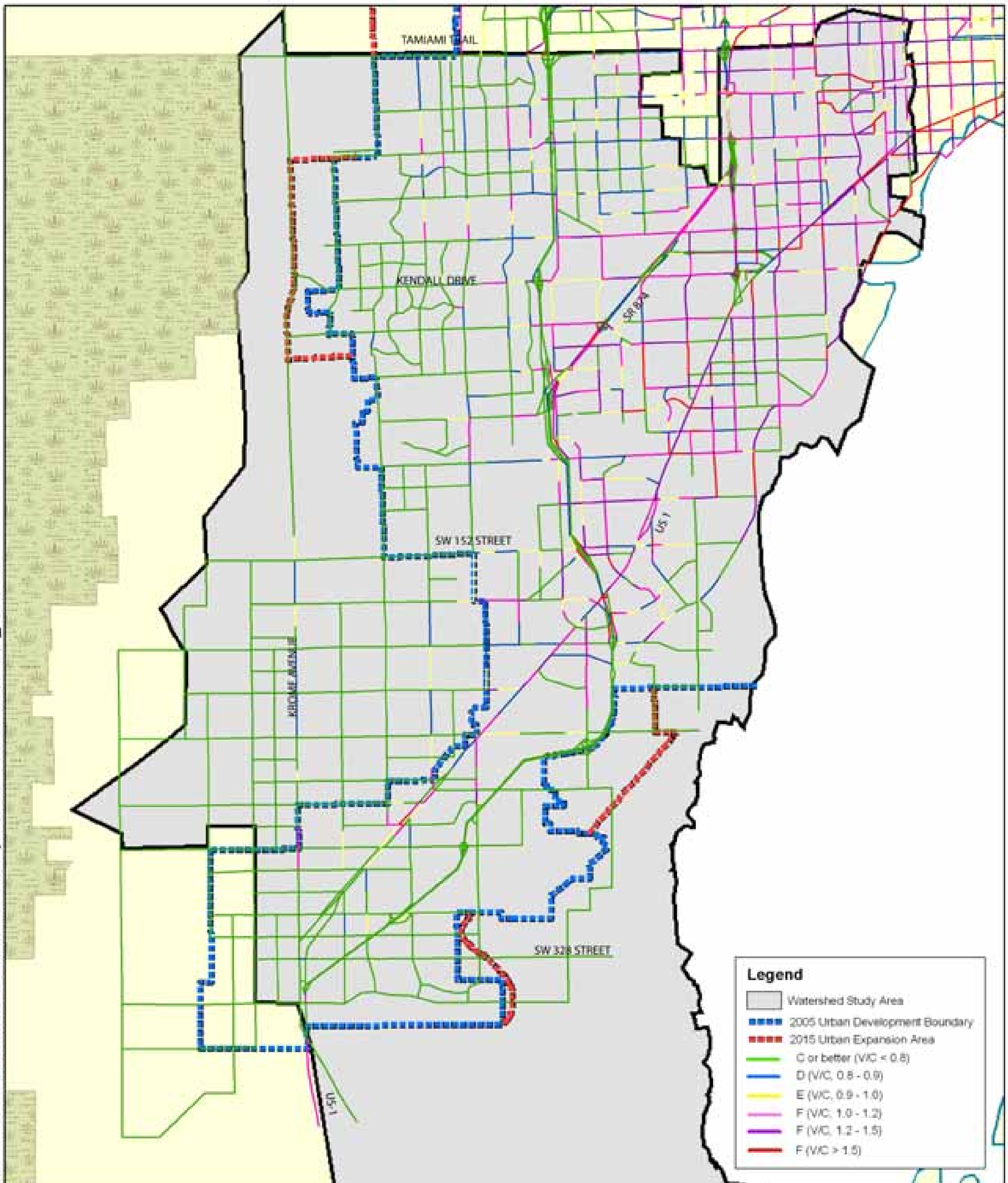


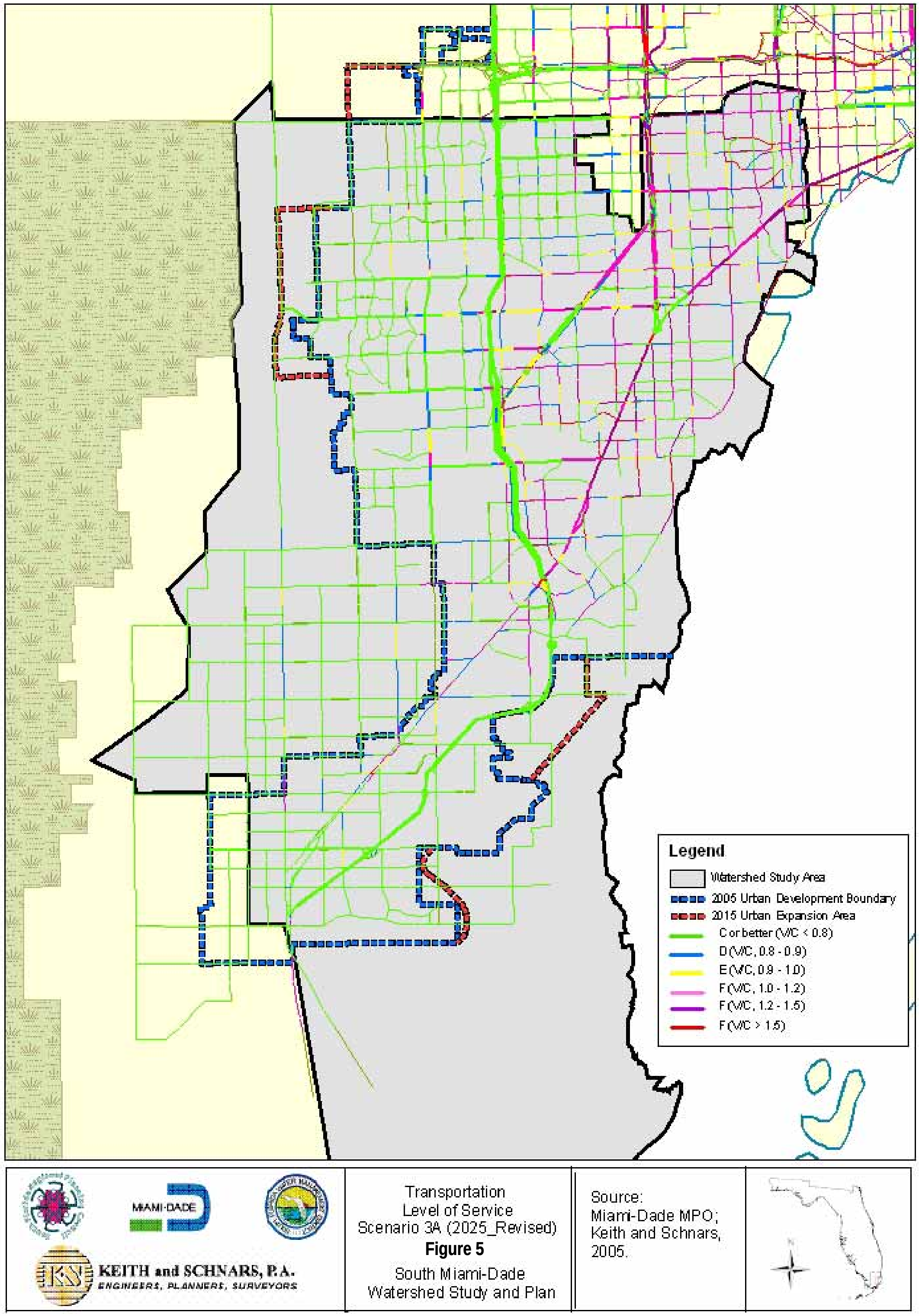
MIAMI-DADE

KEITH and SCHNARS, P.A.
ENGINEERS, PLANNERS, SURVEYORS

Figure 4
Transportation
Level of Service
Test Scenario 3A (2025)

South Miami-Dade
Watershed Study and Plan

Source:
Miami-Dade MPO;
Keith and Schnars,
2005.


Legend
Watershed Study Area
2005 Urban Development Boundary
2015 Urban Expansion Area
C or better (V/C < 0.8)
D (V/C, 0.8 - 0.9)
E (V/C, 0.9 - 1.0)
F (V/C, 1.0 - 1.2)
F (V/C, 1.2 - 1.5)
F (V/C > 1.5)
MIAMI-DADE
KEITH and SCHNARS, P.A.
ENGINEERS, PLANNERS, SURVEYORS
Transportation
Level of Service
Scenario 3A (2025_Revised)
Figure 5
South Miami-Dade
Watershed Study and Plan
Source:
Miami-Dade MPO;
Keith and Schnars,
2005.

Scenario Development Actions to be Applied to the Preferred Scenario

In addition to considering macro factors such as total vehicle miles traveled, the development of the preferred will require a consideration of the location of roadway failures. Where are the problems? How can they be avoided? The most useful application of the model results will be the geographic overlay of roadway failures and land use data.

IS-2 Schools

Assessment Results Year 2025

School infrastructure is defined in terms of cost to build new facilities and cost of new addition (extensions). The number of students was held constant for each test scenario. Results reveal that cost to build schools are cheaper for Test Scenario 3 and most expensive in Test Scenario 1. Infrastructure cost for schools Test Scenario 1A is 459.7 mil, 360.1 mil for 2A, and 306.5mil for 3A.

Assessment Results Year 2050

Infrastructure cost for schools Test Scenario 1B is 910.6 mil, 696.8 mil for 2B, and 667.7 mil for 3B. Test Scenario 3B is more cost effective because schools within the UDB may be expanded with additions rather than new facilities on vacant lots. Depending on the location of residential development, school costs were calculated using a blended cost average for additions and new facilities. According to the Miami-Dade County Public Schools Capital Plan for 2005-2009, the average cost for permanent additions is $13,918 as opposed to new facilities which average $18,383 per unit. This unit cost includes both site and estimated construction/capital costs for new facilities.

School capacities should be compared between scenarios and another threshold measurement. Potential counter measures may include additional land area and cost for constructing schools.

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

The threshold for this parameter is the adopted Florida Inventory of School Houses (FISH) capacity and associated costs for school facility improvements. The number of school age children generated by each scenario exceeds the FISH capacity. The costs for improving these failures is the primary measure of scenario success.

Scenario Development Actions to be Applied to the Preferred Scenario

The technology is available to construct schools under all three scenarios, the deciding factor is a matter of public costs. Test Scenario 1 is clearly more expensive than the other two scenarios. In order to limit the public costs associated with school facilities the land use distribution principles applied in Test Scenario 1 should be avoided in development of the preferred scenario.

IS-3 Potable Water and IS-3 Wastewater

Assessment Results Year 2025

As shown in Table 25, potable water and sewer infrastructure costs are most expensive in Test Scenario 1A and least expensive in Test Scenario 3A. Test Scenario 1A is over a billion dollars more expensive than Test Scenario 3A and $832 million more expensive than Test Scenario 2A.

Table 25
Water and Sewer Infrastructure Costs
2025

	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
Water and Sewer Infrastructure Costs	$2,764,200,000	$1,931,800,000	$1,664,900,000

Assessment Results Year 2050

As shown in Table 26, potable water and sewer infrastructure costs are most expensive in Test Scenario 1B and least expensive in Test Scenario 3B. Test Scenario 1B is almost $3.3 billion more expensive than Test Scenario 3A and $2.6 billion more expensive than Test Scenario 2A.

Table 26
Water and Sewer Infrastructure Costs
2050

	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
Water and Sewer Infrastructure Costs	$8,600,400,000	$6,031,100,000	$5,312,400,000

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

The threshold for this parameter is plant capacity and associated costs for facility improvements. The demand for potable water generated by each scenario exceeds plant capacity. Minimizing costs for improving these failures is the primary measure of scenario success. These two parameters are related to WSAC Vision, Goals and Land Use 3E statements related to maintaining economic sustainability and providing infrastructure facilities to all residents.

Scenario Development Actions to be Applied to the Preferred Scenario

The technology is available to service residents under all three scenarios, the deciding factor is a matter of public costs. Test Scenario 1 is clearly more expensive than the other two scenarios. In order to limit the public costs associated with water and sewer facilities the land use distribution principles applied in Test Scenario 1 should be avoided in development of the preferred scenario.

IS-5 Air Quality

Assessment Results Year 2025

Vehicle Miles Traveled (VMT) has a direct correlation to Volatile Organic Compounds (VOC), Nitrogen (NOx), and Carbon Monoxide (CO) levels of emission. Emissions are higher in Test Scenario 1A then 3A and 2A. Table 27 describes the level of air emissions resulting from the test scenarios.

Table 27
Miami-Dade County Emissions (tons per day)
2025

Pollutant	Test Scenario 1A	Test Scenario 2A	Test Scenario 3A
VOC	17.70	16.71	17.30
CO	324.30	306.13	316.97
NOx	15.19	14.34	14.85

Assessment Results Year 2025

Vehicle Miles Traveled (VMT) has a direct correlation to Volatile Organic Compounds (VOC), Nitrogen (NOx), and Carbon Monoxide (CO) levels of emission. Emissions are highest at 1B then 2B and 3B. Table 28 describes the level of air emissions resulting from the test scenarios.

Table 28
Miami-Dade County Emissions (tons per day)
2050

Pollutant	Test Scenario 1B	Test Scenario 2B	Test Scenario 3B
VOC	21.19	20.91	20.11
CO	388.23	383.01	368.41
NOx	18.19	17.94	17.26

Consistency with WSAC Vision, Goals and Land Use Policy 3E (Appendix A)

An absolute threshold was developed for this parameter based on the current State Implementation Plan agreed to by the Florida Department of Environmental Protection and U.S. Environmental Protection Agency. None of the test scenarios exceeded this threshold.

Scenario Development Actions to be Applied to the Preferred Scenario

The air quality assessment results do not provide any guidance to the creation of the preferred scenario. The application of any of the three development patterns would result in no problems for air quality.

Appendix A

SOUTH MIAMI DADE WATERSHED STUDY VISION AND GOALS
WATERSHED STUDY ADVISORY COMMITTEE

Watershed Study Advisory Committee's Vision Statement

"The South Miami-Dade Watershed Study 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."

– This vision statement was created by the Watershed Study Advisory Committee.

Watershed Study Advisory Committee's Goals

The goals adopted by consensus by the Watershed Study Advisory Committee are identified for reference below.

Goal l: 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

Miami-Dade County Comprehensive Development Master Plan, May 1997, as amended through April 2003
Land Use Objective 3 and Land Use Policy 3E

Objective 3

Upon the adoption of the CDMP, the location, design and management practices of development and redevelopment in Miami-Dade County shall ensure the protection of natural resources and systems by recognizing, and sensitively responding to constraints posed by soil conditions, topography, water table level, vegetation type, wildlife habitat, and hurricane and other flood hazards, and by reflecting the management policies contained in resource planning and management plans prepared pursuant to Chapter 380, Florida Statutes, and approved by the Governor and Cabinet.

Policy 3E

1. By January 1, 2002, 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 January 1, 2002, date may be extended as necessary by a subsequent CDMP amendment filed by the County. 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 2015, 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 from the C-2 canal basin south to U.S. Highway 1 as a primary emphasis, and the C-3 to C-2 canal basins as a secondary area.

2. This plan and study, to be known collectively as the South Dade Land Use and Water Management 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 "Land Bank Trust" Working Group (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 are consistent with long-term objectives for a sustainable South Miami-Dade.

4. The Study must project, examine, and analyze surface- and groundwater uses and corresponding land uses, including water uses for sustaining and restoring the environment, sustaining economically viable agriculture, providing flood protection, supplying and protecting drinking water, and other water uses pertinent to probable land uses. The Study must provide data and analysis necessary to thoroughly support the South Dade Land Use and Water Management Plan. The Study must include an examination and analysis of:

a) Examples and models of mechanisms of conservation;
b) All relevant studies pertaining to the Study Area;
c) Property rights of landowners as they relate to objectives of the plan;
d) Existing and needed numeric standards for quality, quantity, timing and distribution of waters into and of Biscayne National Park;
e) Existing and needed studies of freshwater and groundwater supply;
f) Methods and policies for best management practices of all sources of water runoff and levels of service for flood control in the Study Area;
g) Socioeconomic factors for optimization of the objectives to the Plan; and
h) Ways to integrate the Plan into the Central and Southern Florida Restudy.

5. It is recognized that the subject Plan will provide extensive information that will greatly assist in the consideration of proposed new development in the Study Area.
Until the plan is approved, the Board shall appoint a review committee, fairly representing the interests of the Working Group, to evaluate and make recommendations on all requested development approvals and CDMP amendments in the Study Area outside the UDB which require initial approval at a public hearing. The committee's recommendations shall specifically address potential impacts on Biscayne National Park and consistency with the relevant provisions of the CDMP. Until the Plan is completed and adopted, the appropriate County Boards will apply heightened scrutiny to proposed changes in the UDB, land use designations and, zoning, including unusual uses. If implementation of the Plan is not initiated by January 1, 2002, the BCC shall re-evaluate and adopt interim measures to further the objectives of the Plan upon recommendation by the review committee.