

URS

January 23, 2001

Mr. Randy Kautz
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600

Re: **Biological Assessment for Wastewater Treatment Plant Site - Mille Marker 100.5,
Key Largo, Florida**

Dear Mr. Kautz:

Per request of Ms. Science Kilner with the Federal Emergency Management Agency, Region IV, I've enclosed a copy of the Biological Assessment (BA) that URS completed in conjunction with Monroe County Department of Marine Resources.

This BA addresses the potential effects of constructing a proposed regional wastewater treatment system in Key Largo, Florida, with an emphasis on the specific site for a regional wastewater treatment plant selected by the Board of County Commissioners on May 18, 2000. This BA is based on existing documents and information, as well as site-specific information, for the treatment plant site that was developed by staff of the Monroe County Department of Marine Resources.

This document constitutes a Biological Assessment in accordance with the rules requiring federal agency consultation under the Endangered Species Act.

We welcome your comments on this document, if you so choose. Please send your comments to the address below. If you have any questions, please feel free to call me at (678) 356-8223.

Sincerely,

URS



Kenneth W. Branton
Senior Project Engineer

KWB/kwb
Enclosure



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DRAFT

**Biological Assessment for the Wastewater
Treatment Plant Site – Mile Marker 100.5
Key Largo, Florida**



Prepared for
Federal Emergency Management Agency, Region IV
3003 Chamblee-Tucker Road
Atlanta, Georgia 30341

October 25, 2000

URS

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Suite 400
Alpharetta, Georgia 30005
678.356-8300

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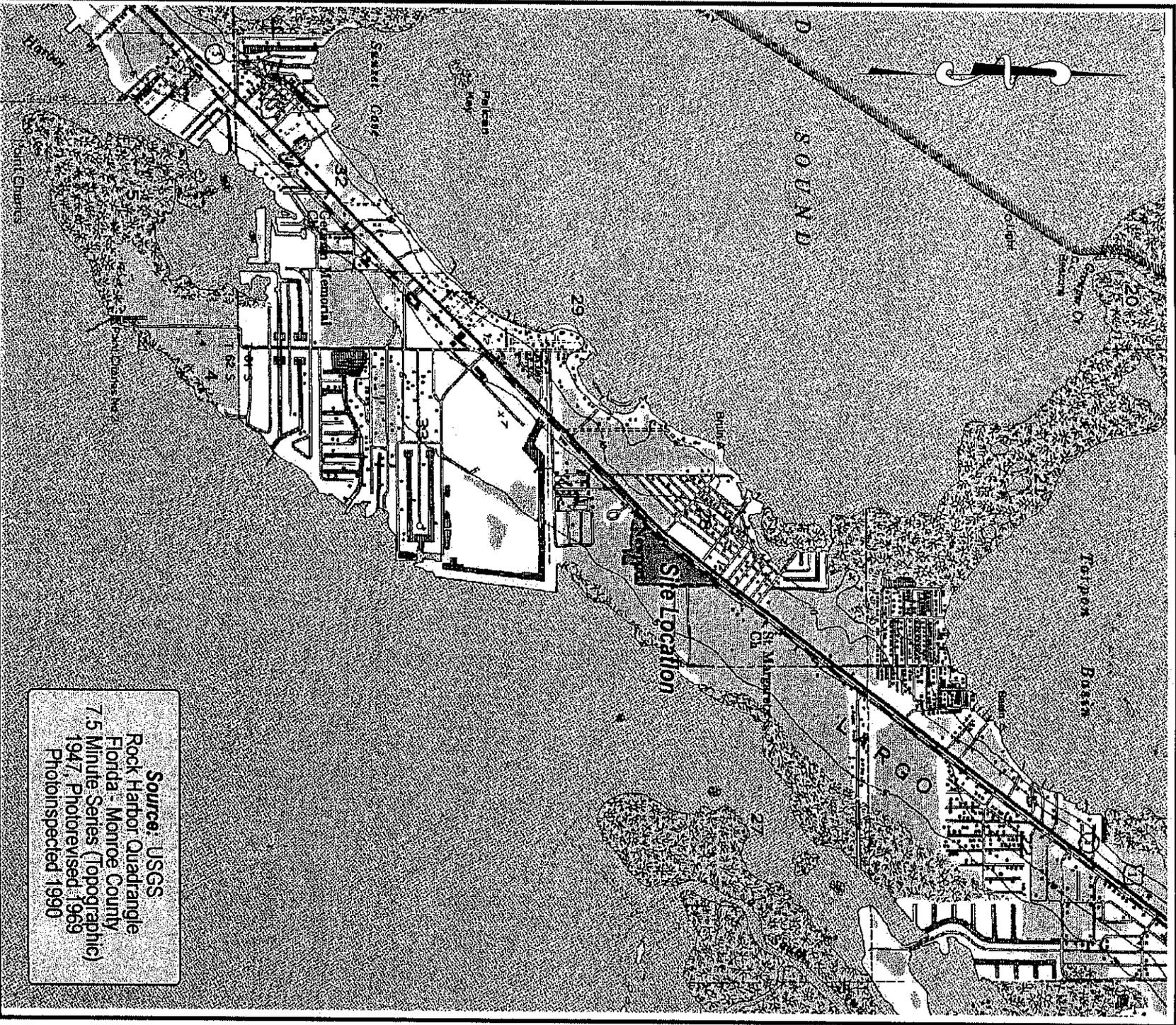
ACRONYMS

AWT	Ambient Water Treatment
CARL	Conservation and Recreation Lands
CBOD	Chemical Biological Oxygen Demand
DBH	diameter at breast height
FDACS	Florida Department of Agriculture and Consumer Services
FEMA	Federal Emergency Management Agency
FFWCC	Florida Fish and Wildlife Conservation Commission
FGFCC	Florida Game and Fresh Water Fish Commission
FKAA	Florida Keys Aqueduct Authority
FNAI	Florida Natural Areas Inventory
ha	hectare
ROGO	Rate of Growth Ordinance
SC	Suburban Commercial
SHCA	Strategic Habitat Conservation Area
SR	Suburban Residential
SRF	State Revolving Fund Program
TDR	Transferable Development Rights
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey

1.0 INTRODUCTION

This document is a Biological Assessment of the potential effects of constructing a proposed regional wastewater treatment system in Key Largo, Florida, with an emphasis on the specific site for a regional wastewater treatment plant selected by the Board of County Commissioners on 18 May 2000. The proposed 22-acre treatment plant site is located in Section 28, Range 39, Township 61 at Mile Marker 100.5 on the oceanside of U.S. Highway 1 (Figure 1.1). Figure 1.2 shows the location of the site in relation to the proposed service areas and the Key Largo Wastewater District.

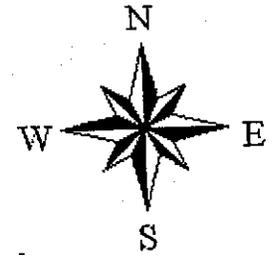
This Biological Assessment is being submitted by the Federal Emergency Management Agency (FEMA), and is based on existing documents and information, as well as site-specific information, for the treatment plant site that was developed by staff of the Monroe County Department of Marine Resources. This document constitutes a Biological Assessment in accordance with the rules requiring federal agency consultation under the Endangered Species Act.



Source: USGS
 Rock Harbor Quadrangle
 Florida: Monroe County
 7.5 Minute Series (Topographic)
 1947, Photorevised 1969
 Photoinspected 1990

CLIENT: Federal Emergency Management Agency		TITLE: Treatment Plant Site Vicinity Map	
PROJECT: Key Largo Wastewater Improvement Project		PROJ. NO.: 58FR54414.00	
REVISION NO.:		TASK: 061100	
SCALE: Approximate Scale 1"=2000'		FIGURE: 1.1	
FILE: E:\Project\EM\A\1\KeyLargoStem.mxd			
DESIGNED BY: J. Anderson			
DRAWN BY: J. Anderson			
CHECKED BY: K. Branton			

Key Largo Wastewater Improvement Project Treatment Plant Site Location Map



Gulf of Mexico

Florida Bay

Treatment Plant Site

Key Largo

Long Key

Marathon

Big Pine Key

Key West

Straights of Florida

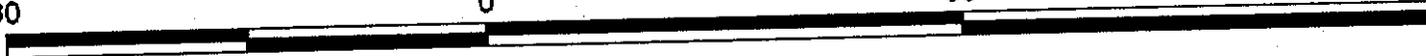
	Key Largo Wastewater District
	Treatment Plant Site
	Florida Keys
	Southeast Florida

30

0

30

60 Miles



2.0 BACKGROUND

2.1 NEED FOR AND HISTORY OF PROJECT

Monroe County has been actively pursuing options for constructing a wastewater collection, treatment, and disposal system in the Key Largo area of the Florida Keys. After analysis of numerous potential sites, the Monroe County Growth Management Division staff, in coordination with the staff of the Florida Keys Aqueduct Authority (FKAA), identified three candidate sites for the Key Largo wastewater treatment plant. The Board of County Commissioners selected the proposed site discussed below and gave its approval to begin negotiating for acquisition of the site. The Commission also requested that the staff assess the site for any potential environmental permitting concerns.

On 28 June 2000, the Board of County Commissioners finalized its review of contract documents to complete the project. The Board validated contract negotiations between FKAA and the selected firm of Ogden Water Systems. In parallel with the selection of Ogden Water Systems, the county staff has been actively working on a review of the treatment plant site noted above.

The county provided information from its site assessment as part of the application for project approval in the State Revolving Fund Program (SRF), and to FEMA as a funding agency for the overall Key Largo Wastewater project. FEMA and its consultants have reviewed this data as well as other sources in compiling a Biological Assessment for the proposed wastewater treatment system.

2.2 REGIONAL CHARACTERIZATION

Physiography

The Florida Keys extend in an arch from Soldier Key in Dade County to the Dry Tortugas, almost 200 miles to the southwest. They represent an emergent feature of a prehistoric (\pm 100,000 years old) tropical marine environment, including what were then high energy back reef areas and a coral reef. Today, two carbonate formations, the Key Largo Limestone and the Miami Oolite formations represent these prehistoric environments. Because of the porous, highly permeable carbonate composition of the islands, little soil exists in the Keys. What soil does exist lies in a very thin layer within the tropical forests that characterize the islands.

Natural ground waters are limited in the Florida Keys. In the Key Largo Limestone Formation of the Upper Keys, permeability and porosity of the rock is so high that little fresh water is retained in the rock before mixing with sub-surface waters affected principally by tide (and rain water during the rainy season).

Biota - Animal Community

A tropical flora and a temperate fauna characterize the Keys. Most of the mammalian species have come over land bridges formed during Pleistocene glacial periods. Florida Bay, with the current Florida mainland and the Keys became a contiguous landmass during these glacial periods. With easy access, the temperate animals of the mainland of Florida populated the Keys.

As, warmer climates prevailed through the present, sea level has risen to cut the Keys off, stranding the mammalian, amphibian, and reptilian species that have come to reside here.

As a result, similar to island archipelagos elsewhere in the world, the Keys represent a rich environment for speciation, particularly for terrestrial animals that have difficulty crossing water bodies, and whose gene pools thus become largely isolated. Several mammal and reptile species in the Keys are considered endemic. Many, because of their limited population sizes, are also considered threatened by both natural and human events. Thus, at least ten species that live in the Keys are listed by the federal government as threatened or endangered.

Avian (bird) species are represented by both temperate and tropical species as well as migratory species during the winter. No bird species are considered endemic to the Keys, because of their ability to cross large water bodies. Most live throughout the south Florida area or the immediate Caribbean basin. Others stop during migrations between eastern North America, the Caribbean, and South and Central America.

Many avian species native to the region have been listed by the state or federal government as threatened or endangered because of broad environmental threats, including hunting, poaching, and loss or change of primary habitats caused by human development.

Biota - Plant Community

The principal native plant communities in the Upper Keys include coastal mangrove forests, south Florida pine flatwoods, and hardwood forests or hammocks. The tropical forests of the Keys, ranging from the higher elevation hardwood hammocks to the mangroves that lie along the island margins, are unique within the continental United States. They are clearly representative of the character of the Caribbean basin from which most of the plant species of the Keys originated. Large expanses of water have provided the means for genetic isolation and speciation. Thus, the Keys also have many plant species unique to the area that are listed as threatened or endangered by the state or federal government. The major threat to these plant species and the forest habitats of the Keys is land clearing. Commercial harvest or poaching, in the cases of many of the airplants and orchids residing in the Keys and south Florida, is also a significant concern.

Biota - Protected Species

A total of nine animal and two plant species occurring in the northern Florida Keys have been designated as endangered or threatened by the U.S. Congress and U.S. Fish and Wildlife Service (USFWS). The Florida Fish and Wildlife Conservation Commission (FWCC) lists 16 non-marine animal species as endangered, threatened, or of special concern and the Florida Department of Agriculture has designated 83 plant species as endangered, threatened, or commercially exploited. Monroe County has also designated 68 plant species as being regionally important. Appendix A shows all of the terrestrial and inshore species within the northern Keys that are listed by these agencies. Species that may occur within the vicinity of the project site are identified in Section 4.0.

3.0 PROJECT DESCRIPTION

3.1 SITE LOCATION

The project location is shown on the USGS Rock Harbor Quadrangle Florida, Monroe County topographic map in Figure 1.1. Figure 3.1 is a 1995 color infrared aerial photograph showing the location of the site and surrounding natural habitats and developed areas. Surrounding land uses and major classes of property ownership are shown in Figure 3.2.

The treatment plant site is located near U.S. Highway 1 at approximately Mile Marker 100.5 in Key Largo. The treatment plant site is located on the oceanside of U.S. 1, the Overseas Highway, northeast of Waldorf Plaza and southwest of the Tradewinds Shopping Center. Adjacent to the site is a 2-acre property owned by the FKAA, used as a maintenance yard. Across U.S. 1 is Key Largo Park subdivision. State-owned lands, part of the Newport Hammock Conservation and Recreation Lands (CARL) purchase occur to the northeast, and several tracts of county-owned conservation lands are present south of the site. Figure 3.3 shows the land use and habitat cover in the surrounding region. Much of the site and the lands to the south and east are composed of hardwood hammock forest, while lands to the west and north are developed for residential and commercial use. The area immediately adjacent to the FKAA maintenance yard, which comprises the actual construction area, has been disturbed due to past clearing.

3.2 PROPOSED ACTION

General Project Description

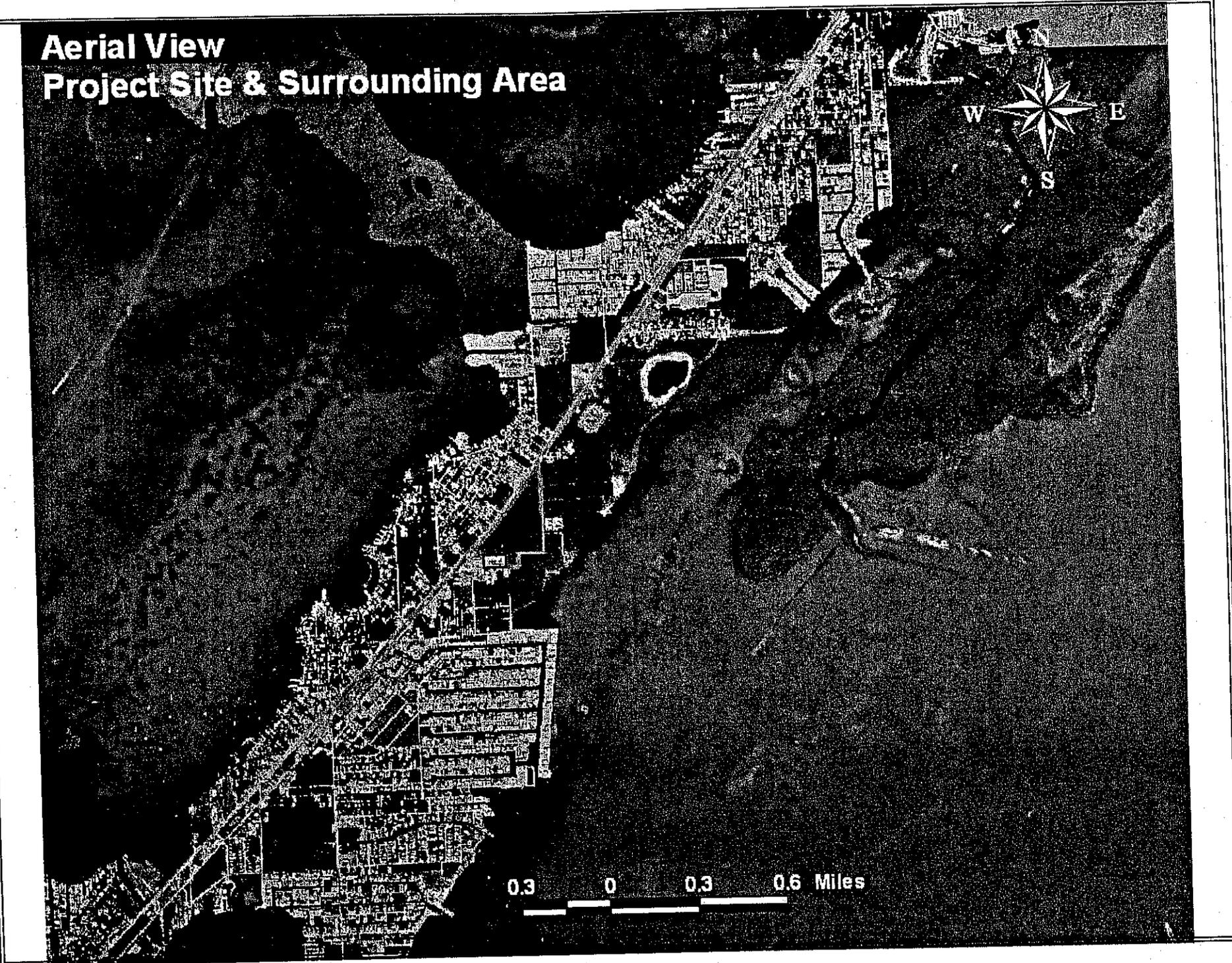
The project would involve construction of a 2.25 million gallon per day treatment plant, deep injection wells (~ 2,500 feet), cleared buffer areas, administration buildings and necessary parking areas. This facility would use a sequencing batch reactor with a Dual Sand filtration system. The project would also involve the construction and operation of a vacuum collection sanitary sewer system that would include approximately 15 vacuum pump stations, lift stations, and a vacuum sewer main. The project would serve approximately 13,602 existing residential units and 25,000 people in the Key Largo Wastewater District. This service area includes all lands east of Tavernier Creek from Tavernier to Key Largo with the exception of Ocean Reef. This area does not include approximately 114 residential units in a sparsely populated area north of the intersection of U.S. 1 and S.R. 905. These would be served by on-site units as part of a different (North Key Largo) project. Tertiary treated wastewater effluent would be disposed of through deep well injection. Digested and stabilized sludge would be hauled by truck to approved sludge facilities on the Florida mainland. Construction is expected to require approximately 12 months for the treatment plant, with an additional 12 months to complete hookup and testing. The operational life of the system is approximately 20 years.

The parcel of land that would be purchased for the project site (Figure 3.3) covers approximately 22 acres. The shape of the principal parcel is that of a right triangle with its hypotenuse, or long side, lying along the Overseas Highway in a northeast to southwest direction. The apex of the triangle points to the southeast toward the ocean. The principal parcel covers about 21 acres.

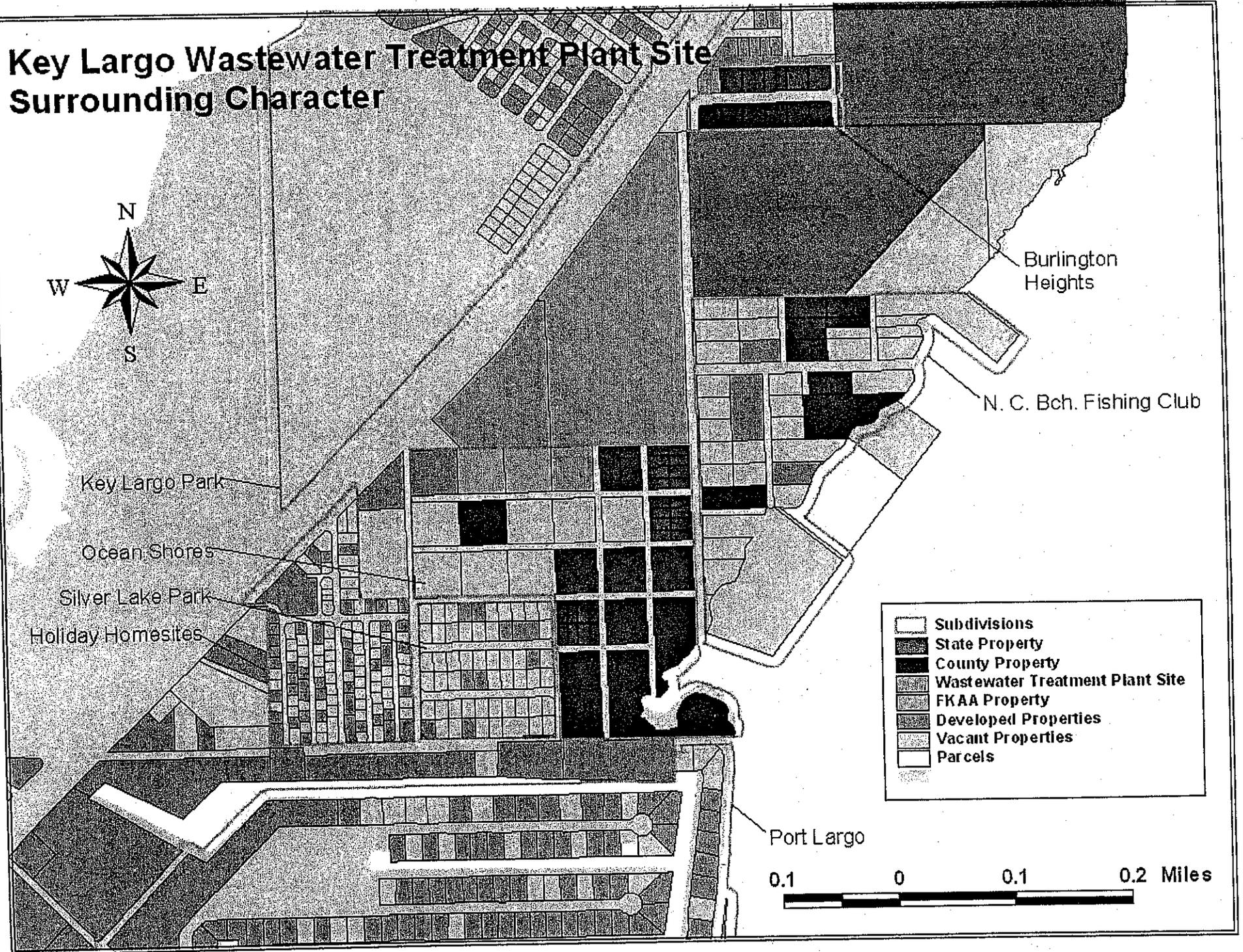
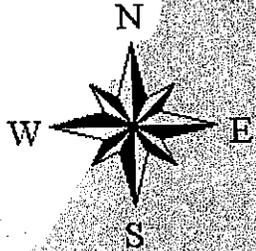
**Aerial View
Project Site & Surrounding Area**



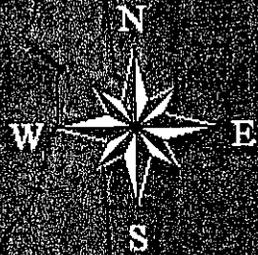
0.3 0 0.3 0.6 Miles



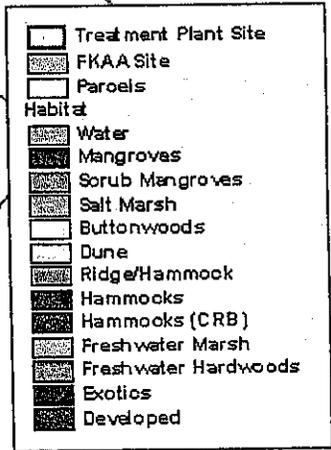
Key Largo Wastewater Treatment Plant Site Surrounding Character



Key Largo Wastewater Treatment Plant Surrounding Habitat



FKAA



In addition, a 1-acre parcel to the east of the existing FKAA maintenance area property would be included in the treatment plant site to better allow the project to integrate with the FKAA property. With the exception of a 20 to 50 foot strip along the southern property line (which runs east-west) on the principal parcel and clearing on easements along the southern and eastern property line, the project site is characterized by high quality hardwood hammock. Figure 3.4 is a large-scale blow-up of the 1995 aerial photo, showing the project site and the proposed construction area.

Approximately 2.62 acres in a roughly L-shaped configuration wrapped around the FKAA property would be required for the construction and operation area. The remaining 19.38 acres would remain in a natural condition. Although the entire area within the 2.62-acre construction boundary might be cleared, a 25-foot zone along the property boundary is intended to be a buffer, which may not be needed for construction. If this buffer is not needed, the affected construction area may be decreased by approximately 0.31 acres. Figure 3.5 identifies the general shape and dimensions of the project construction area in relation to the entire project site. The proposed construction area deliberately uses the area on the project site with the greatest existing disturbance. Coincidentally, this would also allow common access to the two facilities and limit the need to clear lengthy access roads into the treatment plant area. It would also allow common FKAA administration of its Key Largo projects.

Figure 3.6 provides a detailed view of the project footprint, including transect lines used to identify and locate plant species within the proposed project construction boundaries. Table 3.1 defines the area of the project site and surrounding county lands, as well as the approximate acreage of all habitats characterizing these properties.

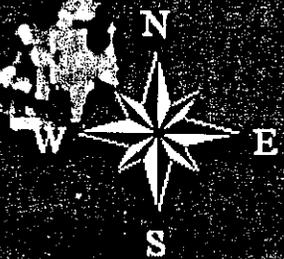
Land Use and Zoning Considerations

The wastewater treatment plant site and adjacent properties are zoned Suburban Residential (SR) and Suburban Commercial (SC). As such, the project can be permitted within either zoning district. Recent recommended text changes to the Monroe County Land Development Regulations provide more detail about the requirements of such a use within the SR or SC Districts. As proposed under current amendments to the County's Land Development Regulations, the project would require a Minor Conditional Use approval which entails a review by the Development Review Committee and final approval by the Director of Planning.

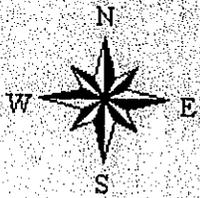
Surrounding Land Use Characteristics

An existing FKAA maintenance facility is on the immediate southwestern corner of the property along U.S. 1. In addition, there are several other public and private light industrial uses in that area. To the east, toward the ocean, are a number of private properties, including the Key Largo Gun Club, a waste handling facility, a private juvenile facility, and two or three private residences. The character of the area toward the ocean is one of rural or native character and little development. Surrounding the site are other parcels in state or county ownership, which provide ample buffering from adjacent uses. The state properties are a part of the Newport Hammocks CARL acquisition project.

Key Largo Wastewater Treatment Plant Construction Area Boundaries



Key Largo Wastewater Treatment Plant Site Large Scale View of Construction Area

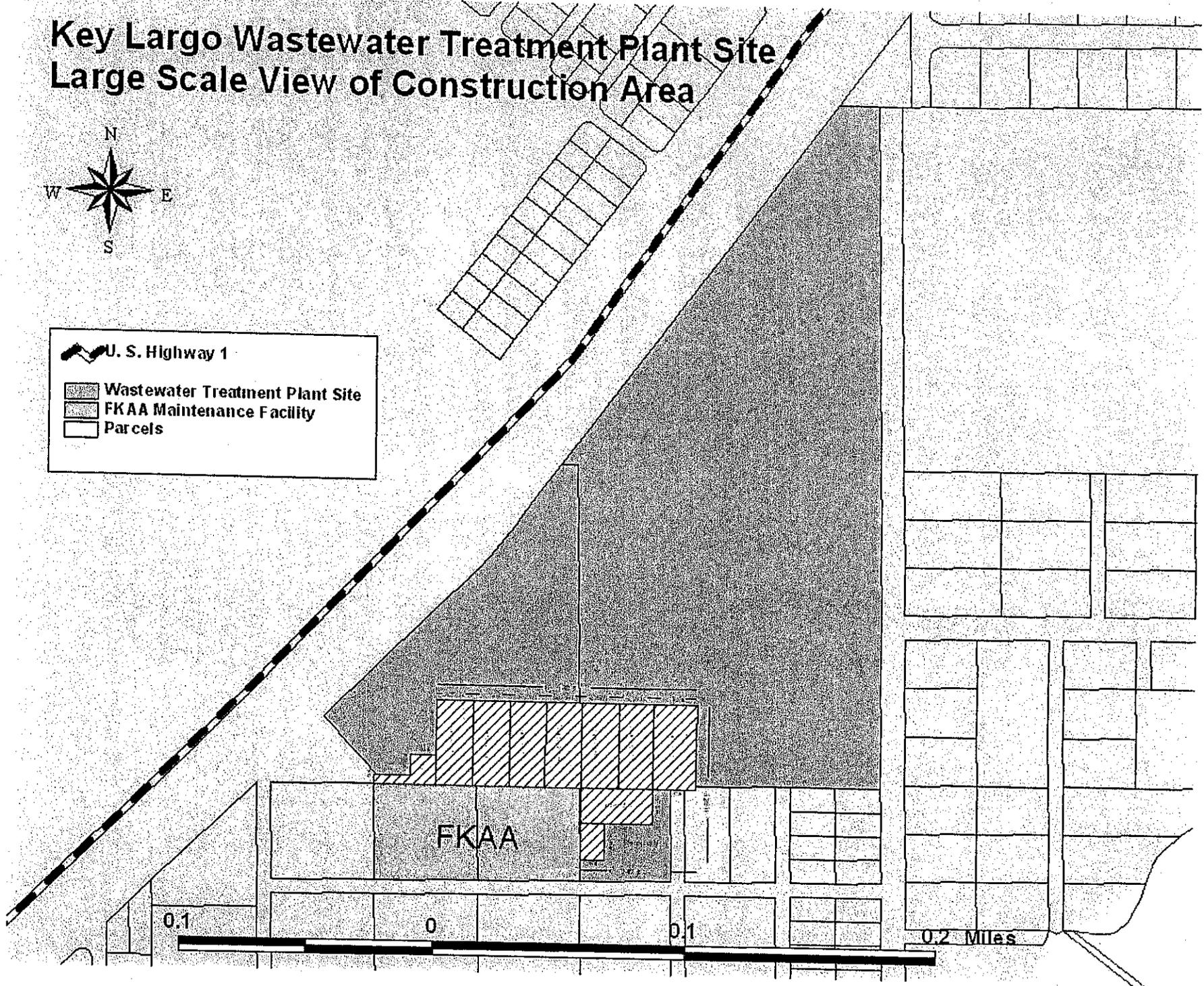


 U. S. Highway 1

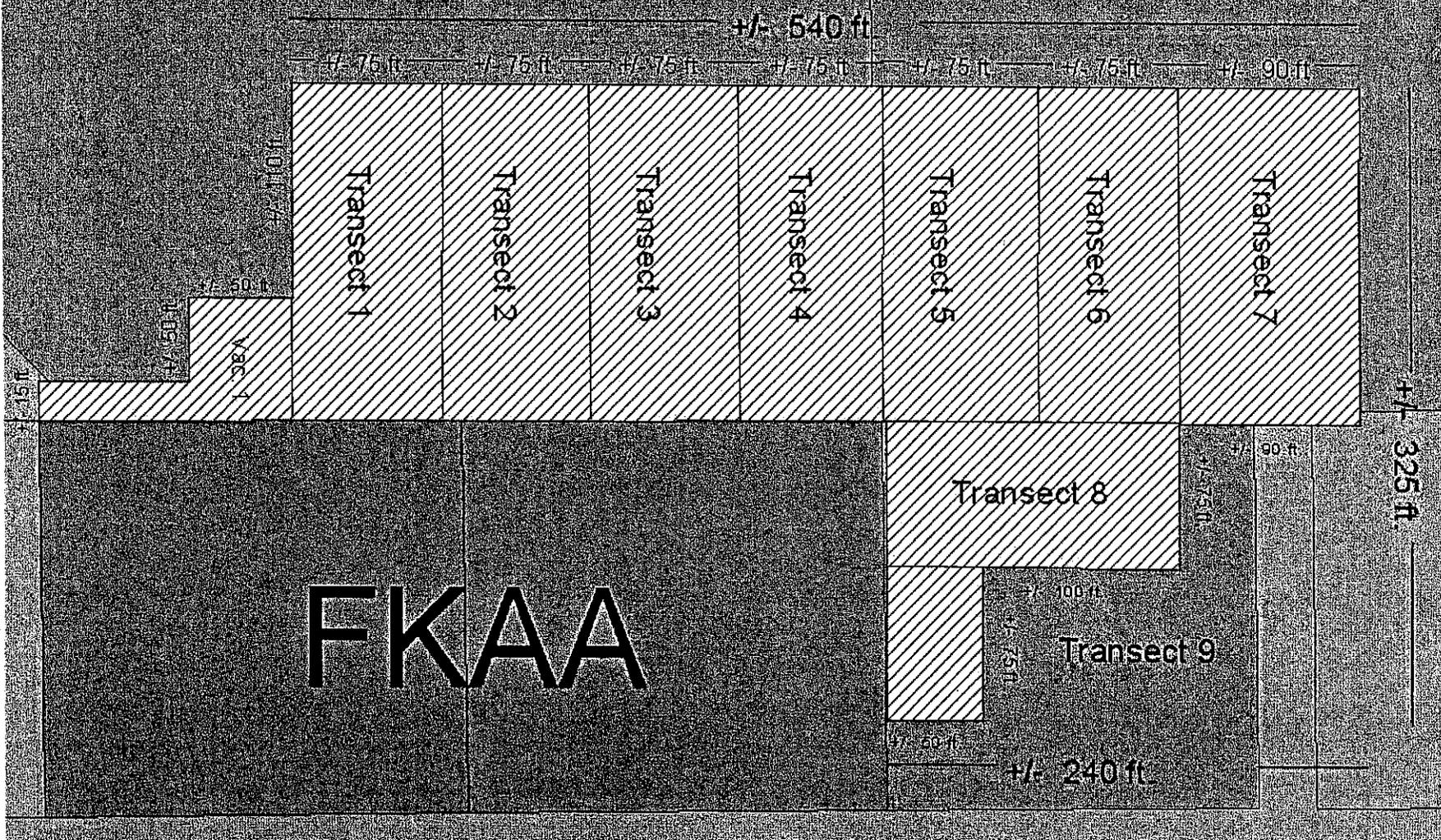
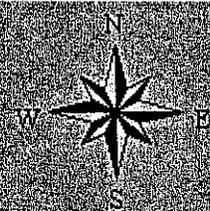
 Wastewater Treatment Plant Site

 FKAA Maintenance Facility

 Parcels



Key Largo Wastewater Treatment Plant Site Small Scale View of Construction Area



FKAA

Transect 1
Transect 2
Transect 3
Transect 4
Transect 5
Transect 6
Transect 7

Transect 8

Transect 9

- Wastewater Treatment Plant Site
- FKAA Maintenance Facility
- Parcels

100 0 100 200 Feet

Table 3.1
Proposed Site - LEF Properties.
Information Concerning Surrounding Properties

RENumeric	Name	Value	Area	Acres	Cleared	Exotics	Hammock	Buttonwood	Saltmarsh	Mangrove	Water	Total Upland Acreage	Max/Min Buildable	Total Acreage	Notes
87100.000100	LEFKey Largo	\$44,820	204876.813	4.703	0.000	0.000	4.703	0.000	0.000	0.000	0.000	4.703	0.941	4.703	
87100.000200	LEFKey Largo	\$101,475	700271.313	16.076	0.000	0.000	16.076	0.000	0.000	0.000	0.000	16.076	3.215	16.076	
454110.000000	All-Counties Recycling	\$11,400	37950.805	0.871	0.000	0.000	0.871	0.000	0.000	0.000	0.000	0.871	0.174	0.871	
454120.000000	Monroe County	\$5,700	18977.475	0.436	0.000	0.000	0.436	0.000	0.000	0.000	0.000	0.436	0.087	0.436	
454130.000000	Monroe County	\$5,700	18979.877	0.436	0.000	0.000	0.436	0.000	0.000	0.000	0.000	0.436	0.087	0.436	
454140.000000	Monroe County	\$1,425	4771.250	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454150.000000	Monroe County	\$1,425	4777.227	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454160.000000	Monroe County	\$1,425	4775.723	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454170.000000	Monroe County	\$1,425	4796.750	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454180.000000	Monroe County	\$1,425	4758.278	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454190.000000	Monroe County	\$1,425	4778.414	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454200.000000	Monroe County	\$1,425	4781.396	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454210.000000	Monroe County	\$1,425	4753.383	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454220.000000	All-Counties Recycling	\$11,400	37977.248	0.872	0.000	0.000	0.872	0.000	0.000	0.000	0.000	0.872	0.174	0.872	
454230.000000	All-Counties Recycling	\$11,400	38044.289	0.873	0.000	0.000	0.873	0.000	0.000	0.000	0.000	0.873	0.175	0.873	
454240.000000	Monroe County	\$1,425	4785.521	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454250.000000	Monroe County	\$1,425	4834.134	0.111	0.000	0.000	0.111	0.000	0.000	0.000	0.000	0.111	0.022	0.111	
454260.000000	Monroe County	\$1,425	4763.908	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454270.000000	Monroe County	\$1,425	4767.000	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454280.000000	Monroe County	\$1,425	4729.566	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454290.000000	Monroe County	\$1,425	4728.099	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454300.000000	Monroe County	\$1,425	4817.841	0.111	0.000	0.000	0.111	0.000	0.000	0.000	0.000	0.111	0.022	0.111	
454310.000000	Monroe County	\$1,425	4785.493	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454320.000000	Monroe County	\$11,400	38050.156	0.874	0.000	0.000	0.874	0.000	0.000	0.000	0.000	0.874	0.176	0.874	
454330.000000	Monroe County	\$11,400	37861.742	0.868	0.000	0.000	0.868	0.000	0.000	0.000	0.000	0.868	0.174	0.868	
454340.000000	Monroe County	\$11,400	37927.506	0.871	0.000	0.000	0.871	0.315	0.000	0.038	0.000	0.518	0.104	0.871	
454350.000000	Monroe County	\$1,410	4737.046	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454360.000000	Monroe County	\$1,410	4757.203	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454370.000000	Monroe County	\$1,410	4760.160	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454380.000000	Monroe County	\$1,410	4744.770	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454390.000000	Monroe County	\$1,410	4774.992	0.110	0.000	0.000	0.110	0.000	0.000	0.000	0.000	0.110	0.022	0.110	
454400.000000	Monroe County	\$1,410	4729.000	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454410.000000	Monroe County	\$1,410	4727.594	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454420.000000	Monroe County	\$1,410	4740.347	0.109	0.000	0.000	0.109	0.000	0.000	0.000	0.000	0.109	0.022	0.109	
454430.000000	Monroe County	\$12,255	38159.773	0.876	0.000	0.000	0.876	0.350	0.000	0.405	0.000	1.631	0.341	1.631	
454440.000000	Monroe County	\$15,105	59924.830	1.376	0.000	0.000	0.000	0.180	0.000	1.198	0.000	0.000	0.000	0.000	
454450.000000	Monroe County	\$23,130	76200.656	1.749	0.000	0.000	0.014	0.183	0.000	1.572	0.000	0.014	0.000	1.376	
454460.000000	Monroe County	\$12,837	120091.438	2.757	0.000	0.000	0.000	0.000	0.000	2.757	0.000	0.014	0.003	1.749	
454530.000000	Brophy Patricia Regen et. al	\$12,900	43221.242	0.992	0.000	0.000	0.992	0.000	0.000	0.000	0.000	0.992	0.000	0.992	
454540.000000	Speas Rand G.	\$12,900	43216.297	0.992	0.000	0.000	0.992	0.000	0.000	0.000	0.000	0.992	0.198	0.992	
454550.000000	Neat Bradford L.	\$12,900	43108.410	0.990	0.000	0.000	0.990	0.000	0.000	0.000	0.000	0.990	0.198	0.990	
506970.000000	Monroe County	\$50	12183.099	0.280	0.000	0.000	0.280	0.000	0.000	0.000	0.000	0.280	0.058	0.280	
506980.000000	Monroe County	\$50	12238.142	0.281	0.000	0.000	0.281	0.000	0.000	0.000	0.000	0.281	0.058	0.281	
506990.000000	Monroe County	\$50	12232.111	0.281	0.000	0.000	0.281	0.000	0.000	0.000	0.000	0.281	0.058	0.281	
507000.000000	Monroe County	\$50	12271.656	0.282	0.000	0.000	0.282	0.000	0.000	0.000	0.000	0.281	0.058	0.281	
507010.000000	Monroe County	\$50	12303.568	0.282	0.000	0.000	0.282	0.000	0.000	0.000	0.000	0.282	0.058	0.282	
507030.000000	Monroe County	\$50	12511.268	0.287	0.000	0.000	0.287	0.000	0.000	0.000	0.000	0.282	0.058	0.282	
507040.000000	Monroe County	\$50	12306.629	0.283	0.000	0.000	0.283	0.000	0.000	0.000	0.000	0.287	0.057	0.287	
507050.000000	Monroe County	\$50	12236.766	0.281	0.000	0.000	0.281	0.000	0.000	0.000	0.000	0.283	0.057	0.283	
507060.000000	Monroe County	\$50	12201.648	0.280	0.000	0.000	0.280	0.000	0.000	0.000	0.000	0.281	0.058	0.281	
507070.000000	Monroe County	\$50	12272.166	0.282	0.000	0.000	0.282	0.000	0.000	0.000	0.000	0.280	0.059	0.280	
507080.000000	Monroe County	\$50	12068.742	0.277	0.000	0.000	0.277	0.000	0.000	0.000	0.000	0.282	0.059	0.282	
541440.000000	Monroe County	\$3,000	10008.888	0.230	0.000	0.000	0.230	0.000	0.000	0.000	0.000	0.277	0.055	0.277	
541460.000000	Monroe County	\$6,000	20021.104	0.460	0.000	0.000	0.460	0.000	0.000	0.000	0.000	0.460	0.092	0.460	
541470.000000	Monroe County	\$5,550	18582.840	0.427	0.000	0.000	0.427	0.000	0.000	0.000	0.000	0.427	0.085	0.427	
541480.000000	Monroe County	\$5,550	18476.499	0.424	0.000	0.000	0.424	0.000	0.000	0.000	0.000	0.424	0.085	0.424	
541490.000000	Monroe County	\$5,550	18610.527	0.427	0.000	0.000	0.427	0.000	0.000	0.000	0.000	0.424	0.085	0.424	
541570.000000	Plummer Jessie	\$4,500	14949.254	0.343	0.000	0.000	0.343	0.000	0.000	0.000	0.000	0.343	0.069	0.343	
541580.000000	Daley Mary E.	\$4,500	14807.385	0.340	0.000	0.000	0.340	0.000	0.000	0.000	0.000	0.343	0.069	0.343	
541610.000000	Ducanis Paul	\$4,500	14880.289	0.341	0.000	0.000	0.341	0.000	0.000	0.000	0.000	0.340	0.068	0.340	
541620.000000	MacDougall Malcolm	\$4,500	14877.037	0.344	0.000	0.000	0.344	0.000	0.000	0.000	0.000	0.341	0.068	0.341	
541630.000000	Ducanis Paul	\$4,500	14856.886	0.342	0.000	0.000	0.342	0.000	0.000	0.000	0.000	0.344	0.069	0.344	
541640.000000	Mooney Michael C. et. al.	\$4,500	15041.049	0.345	0.000	0.000	0.345	0.000	0.000	0.000	0.000	0.342	0.068	0.342	
541650.000000	Skinger Laura Wheeler	\$4,500	14903.895	0.342	0.000	0.000	0.342	0.000	0.000	0.000	0.000	0.345	0.069	0.345	
541660.000000	Monroe County	\$4,500	14985.478	0.344	0.000	0.000	0.344	0.000	0.000	0.000	0.000	0.342	0.068	0.342	
54															

3.3 CONSTRUCTION AND OPERATION ACTIONS

The project would involve the construction and operation of an advanced wastewater treatment plant with deep well injection of tertiary treated water. The county has consulted with its proposed design firm to develop a site plan that has reduced the actual construction area (limit of disturbance) to the minimum possible. Although the original design concept required an estimated 7-acre construction area, the construction area in the revised plan has been reduced to 2.62 acres. The proposed construction area location also has been revised to locate the site so that disturbance of tropical hardwood hammock communities has been minimized, based on diligent attention to defining the best location on the project site. Approximately 0.41 acres of the revised project construction area is essentially composed of exotic vegetation along the fringes of the hammock. By including this area in the 2.62-acre construction area, loss of hammock habitat has been reduced to about 2.21 acres. In addition, Monroe County Land Development Regulations (Section 9.5-344) require significant transplantation and/or replacement of native protected plants found within the hammock area. As a result, the county would transplant or replant over 1600 trees to adjacent cleared rights-of-way (disturbed and unimproved) to recover about 0.39 acres of disturbed area to native species at the margins of the project site, thus providing potential new hammock habitat. After this restoration is complete, the net loss of hardwood hammock is estimated to be about 1.82 acres. If the buffer area is not used, the net area may be as low as 1.51 acres.

4.0 SITE SPECIFIC INFORMATION

4.1 SURVEY METHODS

The county staff met on site, both independently and with sister agencies, to review proposed construction area footprints and to assess potential impacts to the native habitat on the site and to endangered species in the area.

As part of an assessment of the environmental components of the project site, several site visits were made by county biologists. Biologist Sandra Lee completed a preliminary site visit on 29 June 2000, followed by a more detailed survey on 6 and 10 July 2000 by Niko Reisinger. County biologist Ralph Gouldy also visited the site, with biologist Niko Reisinger and staff from the USFWS, FFWCC, FEMA, and FKAA on 10 July 2000. Niko Reisinger spent another full day on the site on 20 July 2000. The list of plants and animals found on-site is based on these visits to the site.

Specifically, county biologists have spent over 100 hours completing an environmental evaluation of the project site and construction area. During this review and because of the environmental character, quality, and sensitivity of the site, significant reductions have been made to the proposed construction area.

In addition to previous site general site visits, on 1 and 2 August 2000 county biologist Niko Reisinger, consulting biologist Bob Smith, and two members of a survey crew cordoned off the proposed construction site with heavy polypropylene rope. A total of ten (10) belt transects were created within this overall construction area. These transects ranged from 50 to 90 feet in width, and divided the construction area into ten subsections. All of the construction area was thus included in the survey, providing a census of all trees over 4" diameter at breast height (DBH) and listed plant species in the affected area. The boundaries of each transect were delineated using a continuous line of survey flagging tape. George Garrett and Niko Reisinger surveyed an additional part of the site on October 11, 2000.

Within this area, as shown in detail in Figure 3.6, all threatened, endangered, or regionally important plant and all endangered or threatened animal species were identified. Particularly, for animal species, the presence of snails or signs of Schaus' swallowtail butterfly were noted.

Based on this extensive site evaluation of the construction area, some adjustments to the proposed construction boundary were made to provide the current proposed construction boundaries. The proposed adjustments were identified by Niko Reisinger on 11, 14 and 15 August 2000.

4.2 AFFECTED HABITATS

The construction area is located on the edge of the hardwood hammock, adjacent to the existing FKAA maintenance area (Figure 3.5). The project site is part of a large hammock area of more than 12.5 acres. Thus, it qualifies as a "high quality hammock" under the County's Land Development Regulations Environmental Design Criteria. High quality hammock regulations

require that 80 percent of the hammock within a site area be protected in its natural state as noted previously above.

Several of the adjacent and nearby county, state, and privately owned vacant properties are also characterized by high quality hardwood hammock. These extend to the east, north, and south, as far as the shoreline margins of waterfront properties, where there is a transition into buttonwood and mangrove forests and salt marshes. At property margins and in cleared road easements (unimproved), exotic plant species intrusion exists, and significant amounts of debris have been dumped. As seen in Figure 3.1, several unimproved roads occur throughout the hammock communities.

Much of the surrounding hammock community appears to be approximately 40 years old since last clearing, based on tree sizes, species mix, and the continued presence of willow bush. Willow bush can be a dominant canopy tree up to about 30 years of forest age, then begins to die out as slower, taller growing trees shade it out. Leaf litter development is moderate, estimated to be between 2 and 4 inches in depth. The forest has a typical patchy distribution of canopy dominants. Some areas, notably towards Central Avenue to the north, are almost entirely dominated by wild tamarind, while other portions are dominated by gumbo limbo, poisonwood, or pigeon plum. The hammock appears to be dominated by somewhat younger trees towards its southern end, adjacent to the FKAA site and the proposed treatment plant site.

Within the construction area, a 20- to 50-foot wide strip along the common property line shared with the FKAA maintenance area is vegetated with exotic or pest plant species. This strip continues for the remaining length of the southerly property line of the project site. The road curves to the northeast into the center of the proposed site and is considered heavily disturbed with numerous dumpsites along this road and the FKAA property boundary. Apparently, this area was previously cleared as a road easement. There is also a 30- to 40-foot wide strip of disturbed land along the FKAA eastern property line. These areas are dominated by exotic species such as Brazilian pepper and sapodillo. Exotic species such as Brazilian pepper and sapadillo also have invaded parts of the adjacent hammock, particularly within the proposed construction area. At the end of the road, there is a partial clearing in which the surface soil has been pushed into piles at the clearing margin. There are at least two abandoned boats in this area. Sapodilla occurs in scattered locations throughout the hammock; it appears to be somewhat more concentrated towards the northern end. This plant is a sign of old homesteads, and is spread readily throughout high elevation hammocks by larger mammals. The trees seen were not large, with most under 12" DBH (diameter at breast height), but fruit is obviously being produced, based on the presence of seedlings and saplings in the forest.

Table 4.1 lists all plant and animal species found within the 22-acre plant site by county biologists during the field surveys. The table includes common and scientific names, and the status of each under federal and state protection (Endangered Species Act and Chapters 39-27 and 5B-40, F.A.C.) and the Monroe County Code has been identified.

Table 4.2 shows the distribution of trees over 4" DBH that were identified on the construction site in the survey by county biologists between 29 June- and 15 August, and on October 11, 2000. Based on this table, the proposed construction area is dominated by gumbo limbo, poisonwood, and wild tamarind trees. Other common overstory species include Jamaica

dogwood, and loblolly *pine*. Other species occurring in the understory, shrub, and seedling strata include blackbead, black ironwood, mahogany, and inkwood. A total of 687 trees with DBH greater than four (4) inches were identified in the construction area, for a density of approximately 261 trees per acre. The three dominant species constitute approximately 80% of the total density.

Table 4.3 shows a list of all individuals of species which the county feels should be protected, or are federal, state, or county protected plant species found within the construction area. In total, fourteen (14) species of protected plants were identified and tallied within the ten (10) transect areas. These include six species on the state list, three species on the county list of Regionally Important plants, and six additional species deemed important by the county. A total of 708 individuals of plant species protected under state, federal, or county regulations were noted. Forty-three of these are torchwood and wild lime, which are not protected themselves, but constitute a key habitat need for the Schaus' swallowtail butterfly.

Approximately 705 seedlings of the protected plant species also were noted. Large trees and seedlings were distinguished in the counts principally because of the ultimate means by which County Code would require their transplantation, replanting, or other means of protection. All gumbo limbos and seedlings identified in the transects were "flagged" for transplantation as were all torchwood, wild lime, and *Rhynchosia* vine plants. All other plants would be replanted in accordance with the mitigation recommendations seen in the final section of this document.

Table 4.1: List of Plants and Animals Located on the Key
Largo Wastewater Treatment Plant Site

Common Name	Scientific Name	Status		
		St	Fed	MC
Insects				
Crab spider	<i>Gasteracantha cancriformis</i>			
Golden orb weaver	<i>Nephila clavipes</i>			
Green garden spider				
Cicadas	Family Cicadidae			
Grasshopper				
Orange Julia butterfly	<i>Dryas julia largo/celene</i>			
Yellow sulfur butterfly	<i>Pieridae family</i>			
Cabbage white butterfly	<i>Pieridae family</i>			
1/3" light blue butterfly	<i>Hemiaragus ceranus (?)</i>			
½" beige moth				
Brown dragonfly	Suborder Anisoptera			
Honey bees	<i>Apis mellifera</i>			
Mollusks				
Florida tree snail	<i>Liguus fasciatus</i> , possibly v. <i>pictus</i>	SSC		
Banded tree snail	<i>Orthalicus floridensis</i>			
Land hermit crab	<i>Cenobita clypeatus</i>			
Grey land crab	<i>Cardisoma guanhumi</i>			
Many-lined forest snail	<i>Drymaeus multilineatus</i>			
Cuban garden snail				
Reptiles				
Brown anole	<i>Anolis segrei</i>			
Green anole	<i>Anolis carolinensis</i>			
Black racer	<i>Coluber constrictor</i>			

Common Name	Scientific Name	Status		
		St	Fed	MC
Birds				
White crowned pigeon	<i>Columba leucocephala</i>	T		
Cardinal	<i>Cardinalis cardinalis</i>			
Red-bellied woodpecker	<i>Melanerpes carolinus</i>			
White-eyed vireo	<i>Vireo griseus</i>			
Plants				
Century plant	<i>Agave sisalana</i>			Exotic
Chaff flower	<i>Alternanthera ramosissima</i>			
Ragweed	<i>Ambrosia hispida</i>			
Torchwood	<i>Amyris elemifera</i>			
Marberry	<i>Ardisia escallonioides</i>			
Crabwood	<i>Ateramnus lucidus</i>			
White beggar ticks	<i>Bidens alba</i>			
Borreria	<i>Borreria verticillata</i>			
Strongbark	<i>Bourreria ovata</i>			
Saffron plum	<i>Bumelia celastrina</i>			
Willow bustic	<i>Bumelia salicifolia</i>			
Gumbo limbo	<i>Bursera simaruba</i>			
Gray nickerbean	<i>Caesalpinia bonduc</i>			
Spicewood or Pale lidflower	<i>Calyptranthes pallens</i>	T		
Cinnamon bark	<i>Canella winterana</i>	E		
Jamaica caper	<i>Capparis cynophallophora</i>			
Limber caper	<i>Capparis flexuosa</i>			
Goatweed	<i>Capraria biflora</i>			
Balloon vine	<i>Cardiospermum halicacabum</i>			
Papaya	<i>Carrica papaya</i>			Exotic
Cassia	<i>Cassia sp.</i>			Exotic

Common Name	Scientific Name	Status		
		St	Fed	MC
Spurge	<i>Chamaesyce</i> spp.			
Snowberry	<i>Chiococca alba</i>			
Pigeon plum	<i>Coccoloba diversifolia</i>			
Green buttonwood	<i>Conocarpus erectus</i>			
Rattlebox	<i>Crotalaria pumila</i> (?)			
Royal poinsianna	<i>Delonix regia</i>	Exotic		
Beggars tick or Tick trefoil	<i>Desmodium canum</i>			
Milkbark	<i>Drypetes diversifolia</i>	E		
Devil's potato vine	<i>Echites umbellata</i>			
White stopper	<i>Eugenia axillaris</i>			
Spanish stopper	<i>Eugenia foetida</i>			
Dog fennel	<i>Eupatorium</i> sp.			
Seaside gentian	<i>Eustoma exaltatum</i>			
Princewood	<i>Exostema caribaeum</i>	E		
Inkwood	<i>Exothea paniculata</i>			RI
Strangler fig	<i>Ficus aurea</i>			
Shortleaf fig	<i>Ficus citrifolia</i>			
Milkpea	<i>Galactia speciformis</i>			
Chew stick	<i>Gouania lupuloides</i>			
Blolly	<i>Guapira discolor</i>			
Everglades velvetseed	<i>Guettarda elliptica</i>			
Rough velvetseed	<i>Guettarda scabra</i>			
Scorpion tail	<i>Heliotropium angiospermum</i>			
Lantern vine	<i>Herissantia crispa</i>			
White ironwood	<i>Hypelate trifoliata</i>	E		
Morning glory	<i>Ipomoea indica</i>			
Black ironwood	<i>Krugiodendron ferreum</i>			RI

Common Name	Scientific Name	Status		
		St	Fed	MC
Wild lantana	<i>Lantana involucrata</i>			
Wild bamboo	<i>Lasiacis divaricata</i>			
Peppergrass	<i>Lepedium virginianum</i>			
Lead tree	<i>Leucaena leucocephalla</i>	PEST		
Wild tamarind	<i>Lysiloma latissiliquum</i>			
Red pea	<i>Macroptilium lathyroides</i>			
Sapodilla	<i>Manilkara zapota</i>	PEST		
Melanthera	<i>Melanthera sp.</i>			
Poisonwood	<i>Metopium toxiferum</i>			
Mouse's pineapple	<i>Morinda royoc</i>			
Lancewood	<i>Nectandra coriacea</i>			RI
African ground orchid	<i>Oeceoclades maculata</i>	Exotic		
Prickly pear	<i>Opuntia stricta</i>	T		
Virginia creeper	<i>Parthenocissus quinquefolia</i>			
Many-flowered passion vine	<i>Passiflora multiflora</i>			
Corky-stemmed passion vine	<i>Passiflora suberosa</i>	E*		
Capweed	<i>Phyla nodiflora</i>			RI
Jamaican dogwood	<i>Piscidia piscipula</i>			
Cockspur	<i>Pisonia aculeata</i>			
Blackbead	<i>Pithecellobium keyensis</i>	T*		
Cat's claw	<i>Pithecellobium unguis-cati</i>			
Wild poinsettia	<i>Poinsettia heterophylla</i>			
Wild coffee	<i>Psychotria nervosa</i>			
Randia or White indigoberry	<i>Randia aculeata</i>			
Red Ironwood	<i>Reynosia septentrionalis</i>	T*		
Purple oysterplant	<i>Rhoeo discolor</i>	Exotic		

Common Name	Scientific Name	Status		
		St	Fed	MC
Plants				
Hammock snout pea	<i>Rhynchosia swartzii</i>	E		
Rougeplant	<i>Rivina humilis</i>			
Brazilian pepper	<i>Schinus terebinthifolius</i>	PEST		
Snake cactus	<i>Selinicereus spp. (?)</i>	Exotic		
Wireweed	<i>Sida acuta</i>			
Paradise tree	<i>Simarouba glauca</i>			RI
Spiny greenbriar	<i>Smilax havanensis</i>	T		
Smooth greenbriar	<i>Smilax laurifolia</i>			
Bahama nightshade	<i>Solanum bahamense</i>			
Potato tree	<i>Solanum erianthum</i>			
Blue porter weed	<i>Stachytarpheta jamaicensis</i>			
Pencil flower	<i>Stylosanthes hamata</i>			
Mahogany	<i>Swietenia mahogani</i>	E		
Yellow elder	<i>Tecoma stans</i>	Exotic		
Thatch palm	<i>Thrinax radiata</i>	E		
Soldier vine	<i>Tournefortia volubilis</i>			
Caltrop or Puncture vine	<i>Tribulus cistoides</i>			
Florida trema	<i>Tream micranthum</i>			
Wild grape	<i>Vitis rotundifolia</i>			
Sleepy morning	<i>Waltheria indica</i>			
Hog plum or Tallowood	<i>Ximenea americana</i>			RI
Wild lime	<i>Zanthoxylum fagara</i>			

E = Endangered

T = Threatened

SSC = Species of Special Concern

C = Commercially Exploited

RI = Regionally Important

Table 4.2: Overstory (>4" DBH) Trees Found Within Proposed Construction Site

SPECIES	NUMBER OF PLANTS WITHIN AREA										
	TRANSECT NUMBER										
Plants - >4" DBH	T1	T2	T3	T4	T5	T6	T7	T8	T9	V1	Total
Gumbo Limbo	43	46	24	32	31	11	25	10	4	1	227
Poisonwood	12	8	19	38	29	9	28	15	2	0	160
Jamaica Dogwood	4	8	10	25	6	2	6	2	4	0	67
Wild Tamarind	18	7	9	9	22	22	47	6	1	16	157
Pigeon Plum	0	3	6	2	2	0	0	2	0	0	15
Blolly	10	6	9	7	8	1	3	4	0	1	49
Strongbark	0	1	0	0	0	0	0	0	0	0	1
Spanish Stopper	0	0	2	1	0	0	0	0	0	0	3
Strangler Fig	1	0	0	2	0	0	0	0	0	0	3
Short Leaf Fig	3	0	0	0	2	0	0	0	0	0	5
Total	91	79	79	116	100	45	109	39	11	18	687

Table 4.3: Protected Plant Species Identified for
Transplantation/Replanting

SPECIES	NUMBER OF PLANTS IN AREA											Total
	TRANSECT NUMBER											
Plant - Protected	T1	T2	T3	T4	T5	T6	T7	T8	T9	V1	Total	
Torchwood	3	2	3	0	0	4	0	3	0	0	15	
Wild lime	5	3	3	2	1	1	6	7	0	0	28	
Inkwood	3	0	33	8	8	0	3	4	0	0	59	
Spicewood	1	0	8	7	1	1	2	0	0	0	20	
Black ironwood	33	18	44	36	28	16	16	6	0	7	204	
Blackbead	23	7	29	49	33	14	12	1	0	0	168	
Cinnamonbark	0	0	0	1	7	1	6	11	0	0	26	
Mahogany	5	10	50	25	9	9	17	33	5	1	164	
Paradise tree	1	0	0	0	0	0	0	0	0	0	1	
Red ironwood	0	0	0	0	0	1	1	2	0	0	4	
Milkbark	6	0	0	0	0	0	0	0	0	0	6	
Hammock snout pea	0	0	2	0	0	0	0	1	6	0	9	
Corky passion flower	2	0	0	0	0	0	2	0	0	0	4	
Sub-total	82	40	172	128	87	47	65	68	11	8	708	
Plant - Seedlings												
Inkwood Seedlings	34	250	3	104	70	5	8	3	0	0	477	
Black Ironwood Seedlings	4	28	20	16	0	2	4	4	0	2	80	
Blackbead	0	0	0	5	5	0	0	0	0	0	10	
Cinnamonbark Seedlings	0	0	0	0	0	0	3	1	0	0	4	
Mahogany	1	11	46	27	0	2	1	0	0	0	88	
Paradise Tree	3	0	0	0	0	0	0	0	1	0	4	
Red Ironwood	0	0	0	0	5	29	2	0	0	0	36	
Milkbark	3	0	0	0	1	0	0	2	0	0	6	
Sub-total	45	289	69	152	81	38	18	10	1	2	705	
Total	12	329	241	280	168	85	83	78	12	10	1413	

Subtotal
Subtotal

MCC



4.3 PROTECTED SPECIES

Monroe County Land Development Regulations recognize all endangered and threatened plant and animal species and require protecting plant species through transplantation, replanting, or moving to off-site locations such as native plant nurseries.

The assessment of impacts following this section analyses specific and broad site impacts and provides the means to mitigate them.

Plant Species

Many of the plant species typical of tropical hardwood hammocks are unique to south Florida and the Florida Keys in particular. As such, the Florida Department of Agriculture and Consumer Services (FDACS) has identified many of the species found in these plant assemblages as endangered, threatened, or commercially exploited. Though the FDACS designation does not carry the weight of protection to afforded animal species, they are none-the-less important for providing native Keys and migratory animals with forage, shelter, and breeding habitat. In addition to the state and federal lists of protected species, the county has also identified a list of plants of regional importance.

No plant species on-site are listed as endangered or threatened by the USFWS (USFWS, 1999; FFWCC, 1997). Seven species are listed as endangered and three as threatened by FDACS (Table 4.2). Six other species are considered as regionally important by Monroe County. Monroe County's Comprehensive Land Use Plan requires that if these species are to be cut, they must be "transplanted". Currently, other trees with DBH of 4 inches or greater must also be "transplanted". By Code, transplanting requires either actual physical transplant, (usually cost-prohibitive) or replacement with the same or equally rare species. If actual transplant is not done, replacement plants are required in a two-for-one ratio for on-site "transplant".

In case of potential use of the site by Schaus swallowtail butterflies, both torchwood and wild lime should be protected or "transplanted" if they are found within the clearing area, since these are key food sources for the butterfly. Due to the improbable availability of torchwood from commercial nurseries, county biologists suggest that additional wild lime be used as replacement plants for any torchwood found within the clearing area. Wild lime is also much better suited to withstand dryer conditions than torchwood, which usually only occurs in more mature hammocks. The perfect on-site locations to plant the "transplanted" trees are the rear road/southern boundary area, and then the continuation of Central Avenue.

Animal Species

The list of state and federally protected animal species potentially occurring on the site is shorter than the plant list. The Keys are clearly one of the foci for species protection because of the unique nature of tropical hammocks in continental North America and

because of the insular nature of island plant and animal assemblages. The site is not within or near any designated Critical Habitat for any species (USFWS, 1999).

Although a total of over 15 listed terrestrial animal species occurs in the northern Keys (Appendix A), the project site has been identified as potential habitat for only six state or federally listed species. Each relies on the tropical hammock forests of the Keys as principal habitat for some portion of its life history. The state and/or federally listed animal species identified as having the potential to exist on the site, based on range and observed characteristics of the habitat, are the Schaus' swallowtail butterfly, Florida tree snail, Eastern indigo snake, Miami black-headed snake, and white crowned pigeon.

The site may also support a transplanted population of the Stock Island tree snail, but inquiry of persons known to have moved snails in the past reveals that none are known to have been moved to this hammock. No evidence of this snail has been seen in the hammock to date.

In addition, the site is shown as potential habitat for the Key Largo woodrat and the cotton mouse on the county's endangered species maps. This is largely because the area historically supported both species and could potentially be used for recovery of the species in the future. No recent sightings are known to have occurred further south and west than the Port Bougainville area of the north Key Largo CARL project. This area is about 6 miles away from the site. The USFWS and FFWCC believe these two species to have been extirpated south of the U.S. 1/S.R 905 intersection (USFWS, 1999; Cox and Kautz, 2000), and these species are believed not to have potential for occurrence on the site.

The following describes species that may have potential to occur within the project site:

1. Schaus' Swallowtail Butterfly - *Heracides aristodemus ponceanus*.

Schaus' swallowtail butterfly is listed as endangered by both the state and federal governments. It is an intermediate sized Papilionid butterfly ranging from 45 to 55 mm in size. It is distinguished from its near relatives by the generally narrow oblique yellow bands on the dorsal surface of its wings and in the washed out background coloration of the wings (brown as opposed to black found in relatives). The "tail" located at the base of each wing is also, characteristically, longer and narrower than relative species.

The historic range of the Schaus' is very limited, ranging from southern Dade County into the northern Keys to just north of Lower Matecumbe. Currently, the species is limited to north Key Largo and Elliot Key, with occasional sightings in Key Largo. The Schaus' lives in hardwood hammock areas. It lays its eggs only on torchwood (*Amyris elemifera*) and wild lime (*Zanthoxylum fagara*), both of which are typical hardwood hammock plants and have been noted on the project site.

Although neither the Schaus' swallowtail butterfly nor any egg masses were observed during several site visits, they may occur on the site due to the presence of suitable habitat and known occurrence within the general region. A release of captive-raised Schaus' swallowtail butterflies was made between 1995 and 1997 at John Pennecamp State Park, approximately 2 miles to the north of this tract, and another release area was near Point Charles, a similar distance south of this site (USFWS, 1999). It appears unlikely that the butterflies could have migrated to this site because they would have had to pass through several existing subdivisions that lack suitable habitat conditions. Several site visits by county biologists seem to confirm this. However, further investigation into potential presence would be required prior to land clearing. In any case, protective measures would be taken to protect the plant host species.

2. Stock Island Tree Snail (*Orthalicus reces reces*):

This subspecies is listed as threatened by the federal government and threatened by the state. The genus *Orthalicus* is represented, (almost not at all) by the subspecies *O. reces reces*, whose native range includes only Stock Island and formerly Key West. Both the state and federal government protect this subspecies. Only the State of Florida protects relatives of this subspecies, including *O. reces nesodyas*, which is also very rare. Over the past 30 years, various collectors and interested parties have transplanted some of these snails to other parts of the Keys, either to protect them from development in their native range or because of their colorful appearance. The Stock Island tree snail is known to have been transported to John Pennecamp State Park, Caloosa Cove Campground, and several subdivisions on Key Largo (USFWS, 1999). County biologists were unable to find any reports of transport to this site, and found no evidence of occurrence on the site during the field surveys. The Recovery Plan for the Stock Island tree snail emphasizes recovery within the native range in the lower Keys, but includes provisions for habitat acquisition and restoration in other areas (USFWS, 1999).

3. Florida Tree Snail (*Liguus fasciatus*):

This species is listed by the state government as threatened, but is not listed by the federal government. The preliminary investigations by county biologists indicate that tree snails do inhabit the treatment plant site in Key Largo. Individuals of the genus *Liguus* are more common in the Keys, and two were seen on the property during the 6 July, 10 July, and 20 July 2000 site visits. One dead *Liguus* snail shell was identified within one transect, but it was quite old and deteriorated. In addition, one live specimen of *Liguus fasciatus*, possibly *v. picus* was identified. The original site plan has since been modified so that the transect in which both of these were found is now out of the construction area. If additional snails were present on the site, their location must be in the higher limbs and branches of the hammock.

Tree snails generally are arboreal, although not exclusively, as they lay their eggs in the wet soil of the hardwood hammock leaf litter during the rainy season. Further

investigation would be required to determine the numbers and types of tree snails on the project site.

4. Eastern Indigo Snake (*Drymarchon corais couperi*):

The eastern indigo snake is listed by the both state and federal government as threatened. It is a large heavy bodied snake which is shiny black or bluish-black above and below. It is generally known as a docile animal that eats frogs, other amphibians, snakes (including rattlesnakes), birds, and small mammals such as rats.

Although the snake is found in an array of habitats in Florida, it tends toward moister habitats, such as pine flatwoods or tropical hardwood hammocks. Within the Florida Keys, it has been most prominently described from the Torch Keys to Big Pine Key, but it is also known to exist in Key Largo. Although two black racers were seen, no eastern indigo snakes were sighted during the preliminary inventory of the site. The eastern indigo snake generally has a requirement for a relatively large home range, generally in the range of 46 to 185 acres (USFWS, 1999). The Recovery Plan for the eastern indigo snake indicates that a minimum area of approximately 10,000 acres is needed to sustain a viable population of this species (USFWS, 1999), while the FFWCC habitat model for this species uses a 250-acre minimum size area to define potential habitat needs. Moler (1992) recommended that only areas >2,500 acres be proposed for conservation of the species. The site and adjoining hammock areas, including areas in private ownership, comprise an area of approximately 80 to 150 acres. Thus the site and adjoining habitat would not be expected to support a large population, and the probability of individuals occurring within the construction area at any particular time is believed to be low.

5. Miami Black-headed Snake (*Tamilla oolitica*):

This species is not listed by USFWS, but is listed by the State of Florida as threatened. Also known as the rimrock crowned snake, the Miami black-headed snake is a highly secretive fossorial (burrowing) species typically found in the deep leaf litter of hardwood hammocks. To date, very few of the species have actually been seen. In fact, its first description was in 1966. At that time only six specimens were known, five from the Miami area and one from Key Largo. Since then, three additional individuals have been collected on Key Largo and Grassy Key. The nearest Florida Natural Areas Inventory (FNAI) record of occurrence element is several miles north of this site.

Because few observations exist for this species, little is known about basic behavioral patterns, particularly feeding and reproductive characteristics. Relatives of the species typically eat termites, spiders, centipedes and other humus dwelling insects. This snake is believed to produce no more than three eggs at a time.

6. White Crowned Pigeon (*Columba leucocephala*):

The white crowned pigeon is listed by the State of Florida as threatened, but is not listed by USFWS. It generally resembles other pigeon relatives in shape, though with a

somewhat thinner head and neck than others. Its most prominent feature, from which it earns its name, is the white crown located on its head.

The species migrates to the Keys during the spring months. It makes nests amongst the isolated fringing mangrove areas. In the upper Keys, it can be seen moving back and forth in the early morning and late evenings, between the protective mangrove islands on which it nests to the hammock areas of the populated islands where it feeds on the many fruiting trees found there.

During the late summer into the fall, the species leaves the Florida Keys and nearby mainland areas migrating back into the Caribbean basin, including the Bahamas, Cuba, Puerto Rico, and the Dominican Republic. In those areas, lack of protection brings them under fire from hunters who relish them as food. A year round population of birds does seem to remain in the Keys in more limited numbers, particularly in the Lower Keys. Principal concern for the protection of the species in the Keys is for protection of its remaining mangrove and hammock habitats

The white crowned pigeon clearly inhabits the hammocks of the upper Keys. During the field surveys, approximately three pigeons were seen or heard entering or leaving the project site.

4.4 OTHER INFORMATION AND SOURCES

The proposed site is on the eastern edge of a relatively undisturbed tropical hardwood hammock habitat area that is one of the largest remaining examples of this community in the Florida Keys. A portion of the habitat, northeast of the project site has been purchased by the Florida Department of Environmental Protection under the CARL program, and is known as the "Newport Hammocks" site. Monroe County has also purchased smaller tracts of land in this system for conservation. These are generally to the south of the site in existing residential developments that have not reached "build-out" conditions. This system has been identified as a Strategic Habitat Conservation Area (SHCA) for the tropical hardwood hammock community and the white crowned pigeon by the Florida Game and Fresh Water Fish Commission (FGFCC) in *Closing the Gaps in Florida's Wildlife Habitat Conservation System* (Cox, et. al., 1994).

While the *South Florida Multi Species Recovery Plan* (USFWS, 1999) includes elements of identifying and conserving potential habitat areas for the Key Largo woodrat, Key Largo cotton mouse, eastern indigo snake, and Stock Island tree snail, the emphasis is placed on the North Key Largo area and other large blocks of land where these species are known to occur. Although the plan encourages acquisition of any available tropical hammock area, the project site is not identified as a critical or specific area for acquisition.

The *South Florida Multi Species Recovery Plan, Closing the Gaps in Florida's Wildlife Habitat Conservation System, and Habitat Conservation Needs of Rare and Imperiled Wildlife in Florida* are all sources of data used in preparing this Biological Assessment.

Much of the information in these reports is based on data maintained by the FNAI. The Federal and state status of species is based on *Florida's Endangered Species, Threatened Species, and Species of Special Concern* (Florida Game and Fresh Water Fish Commission, 1997) and the *South Florida Multi Species Recovery Plan*.

5.0 ANALYSIS OF POTENTIAL EFFECTS

5.1 DIRECT AND INDIRECT EFFECTS

Assessment of Construction and Operation Impacts

Some short-term adverse impacts can be expected in association with construction of the entire proposed project, primarily on the wastewater treatment plant site itself. In addition, some limited impacts may continue with the operation of the facility.

Impact to the remaining contiguous forest of the Keys and to the protected species associated permanently or seasonally must be noted. Construction of the project would require removing approximately 2.63 acres of forested area. However, based on current assessments, roughly 0.41 acres of this forested construction area consists of purely exotic pest plant species in a narrow boarder along two sides of the existing FKAA fence line. In addition, as further detailed below, the project would mitigate the loss of intact hammock area by removing additional exotics in previously cleared right-of-way areas along the margins of the property and transplanting or replanting protected species from the construction area. This transplantation area is approximately 0.39 acres in size.

Thus, as a result of the project, 2.63 acres would be cleared. Only 2.21 acres of this area would be tropical hardwood hammock. Offsetting the clearing of the 2.21 acres, the county would remove exotic plant species in adjacent area rights-of-way and would transplant/replant an area of approximately 0.39 acres. The minimal net reduction of hardwood hammock on the project site would total approximately 1.82 acres. If the potential buffer areas are not cleared, the reduction may be as low as 1.51 acres.

Indirect adverse effects are expected to be minimal. The primary potential indirect effect could be inducement of additional residential development in the area and resultant loss of hardwood hammock habitat. As discussed in Section 5.3, county growth management regulations would limit further hammock development. Coupled with the county's acquisition and conservation of additional hammock habitat in association with this project, it is expected that there would be no potential net effect or a slightly positive effect on hammock habitat area. Noise effects during operation may have potential to cause some disturbance to any foraging white crowned pigeons in the adjacent area, but the effect is considered to be minimal. Conversely, the presence of a county-maintained facility may discourage dumping of trash or other incursions by the public that may disturb the habitat.

Construction of this proposed facility would result in associated construction of sanitary sewer lines and pumping stations in the Key Largo service area and near the facility. It is expected that such facilities would be constructed in previously disturbed areas and existing easements. Construction effects would be temporary. Thus, no significant adverse impacts are expected from these associated facilities.

As discussed in Section 5.2, significant improvement in the quality of the discharge water is expected, and tertiary treated discharge waters would be disposed of through deep well injection. An indirect effect of this project thus should be an improvement in the quality of nearshore waters in the project area, and potential beneficial effects on species in these areas.

Some additional truck traffic would occur on U.S. 1 because of sludge disposal for the project. The number of trips is not currently known, but the total would represent an insignificant addition to the total traffic volume on U.S. 1. Thus this is not expected to significantly impact any listed species.

Project Land Area Requirements

For contiguous hardwood hammock areas, the Monroe County Land Development Regulations require that 80 percent (80 %) of the project site remains in its existing state. As such, the buildable area of the 22-acre project site is 4.4 acres. In addition, the county holds title to approximately 13.5 acres of contiguous property. Approximately 6.5 acres of these properties are hardwood hammock allowing an additional 1.3 buildable acres (at 80% open space/20% buildable area). Thus, up to 5.7 acres of buildable area are available cumulatively if necessary under county hammock protection regulations. The proposed action is expected to use less than 46% of the potentially buildable area of county lands. The project site and these adjacent county properties are shown in Figure 3.2 and Table 1.

The county would purchase the entire 22-acre tract for this project. The approximately 19 acres outside of the construction area would remain and be allowed to mature as natural tropical hardwood hammock. This would be dedicated as conservation land. The conservation portion of the site is adjacent to the larger portions of the undeveloped hammock and would provide a connection between state owned conservation lands northeast of the site and county owned conservation lands south of the site. Purchase and dedication of this site would result in an approximately 155% increase in county-purchased tropical hardwood hammock conservation lands in this area.

The site would also provide enough native habitat (required to remain by County Land Development Regulations) to provide visual, olfactory, and aesthetic buffering from adjacent subdivisions and uses in all directions, particularly the highway.

Based on the county's site surveys, no federally designated threatened or endangered animal species are believed to be present in or currently utilize the construction site. Thus the project is not expected to have significant impacts on any of these species.

Based on the habitat type and location, there is a possibility that other federal and state designated animal species may be present at times on the site. These include the eastern indigo snake, Florida tree snail, Miami black-headed snake, and white crowned pigeon. The county plans to use incremental land clearing procedures, described in Section 5.6 at this site. Such a process should minimize potential losses of these species. Some

displacement (approximately 1.82 acres) of habitat for these species would occur. This loss would be similar to or less than the amount of loss that would occur if the site were privately purchased and developed.

Interdependent and Interrelated Effects

Site impacts have been significantly minimized, in the construction design, attention to clearing requirements, site mitigation, actual construction, and in the development of operation and maintenance strategies. Some additional impacts would occur through construction of associated facilities, including sewer lines and lift stations. It is expected that almost all of this action would occur in existing right-of-way and in previously developed areas, so that impacts on protected species would be minimal.

Implementation of this project is expected to result in significant beneficial impacts to water quality and reduction of discharges of nutrients, bacteria, and other pollutants to the shallow aquifer and to nearshore waters of the Key Largo area. This is expected to result in improvements in habitat quality and reduction of stresses to nearby coral reefs, seagrass beds, and other marine communities.

Overall, the county believes that the benefits achieved from the project far outweigh the impacts in completing the project. Some 7,958 residential on-site wastewater systems along with approximately 1,133 equivalent commercial units would be replaced as part of the project. In addition, approximately 70 existing package plants equating to approximately 4,511 residential units would also be replaced. Amongst all of these units, an estimated 2,424 are cesspools. Thus, the wastewater systems in the entire area of Key Largo would be improved to meet the Ambient Water Treatment (AWT) Standard of 5 mg/l Chemical Biological Oxygen Demand (CBOD), 5 mg/l Total Suspended Solids (TSS), 3 mg/l Total Nitrogen (TN), and 1 mg/l Total Phosphorus (TP).

Total reduction in nutrient load as a result of project completion is significant. Within the project area, it is estimated that the current wastewater load of nitrogen is 113,300 pounds per year in the Key Largo project area. The estimated load reduction resulting from project completion is 96,950 pounds of nitrogen per year, an 86 percent reduction in nitrogen load. Similarly, the estimated phosphorous load is 27,680 pounds per year. The estimated load reduction resulting from project completion is 22,232 pounds of phosphorous per year, an 80 percent reduction in phosphorous load.

5.2 CUMULATIVE EFFECTS

Impacts to Endangered and Threatened Species

Reduction of remaining habitat in Florida and the Florida Keys is a problem facing most endangered or threatened species here, throughout the United States, and the world. The impact of an ever expanding and space and resource demanding human population is at the crux of the endangered species issue.

The Key Largo hardwood hammock system is one of the largest remaining expanses of this community type in the Keys. It has been estimated that there are about 4,000 hectares (ha) of tropical hardwood hammock remaining in the Keys and that most of this is now in publicly owned management areas. The project site represents less than 1% of the remaining hammock area of the Keys has been lost through development and clearing. The proposed project would represent an increase in loss of approximately 0.2%. Thus, this project represents no significant cumulative increase to existing losses. Additionally, the project is intended to serve existing development and no induced development is expected to occur as a result of the project. The unused portions of the property would be dedicated as conservation lands, resulting in an increase of over 100% in county-owned conservation lands in this system.

However, it is possible that the proposed facility would have capacity for serving additional units, and this could result in additional development pressures in the Key Largo area potential additional cumulative loss of natural habitats. However, county development regulations require preservation of 80% of hammock areas on any site, and the county Rate of Growth Ordinance (ROGO) also makes it unlikely that significant additional encroachments would occur as a result of development of the project. It is anticipated that any additional resultant development would occur in non-hammock areas within the limited service area of the project.

The county believes that it would be a good steward for the property in question, aside from the impacts that would initially be associated with construction of a wastewater treatment plant. Within the SR zoning category a minimum of eleven (11) single family homes could be permitted on the property. With the use of Transferable Development Rights (TDRs) as many as 22 units could be permitted within the buildable area of the site. Admittedly, the ROGO process would make it nearly impossible to place 22 homes on the site. However, the proposed project utilizes significantly less of the buildable area than allowed under County Code, and a similar level of impact can not be assured in the case of potential alternative uses of the site. The proposed project also restricts construction to the largely disturbed margins of the hammock adjacent to the existing maintenance area. Even under the habitat conservation constraints established in the Land Development Regulations as noted in Sections 9.5-344 and 345, it is unlikely that any alternative residential development of this site would result in a similar L-shaped clearing in the disturbed area adjacent to the existing maintenance.

In an island biogeography, space becomes all that more important, as in the Florida Keys. Area in such settings is limited and the impacts of habitat boundaries, or the clearing of habitat, creating new boundaries is significant. Frequently, the existence of "edges" is as important as the existence of sufficient necessary habitat. At the edges of a cleared hammock, additional light is allowed to penetrate, which may change animal behavior within the hammock area or at these new boundaries. There is additional opportunity for intrusion of exotic plant species, and overall changes in habitat structure and diversity can occur.

The project as designed minimizes edge impacts by locating the construction area near the FKAA site. In addition, transplantation and replanting would occur in areas that have been cleared in the past and currently contain significant numbers of exotic plant species and debris. This would reduce existing hammock disturbances and cleared edges.

5.3 CONSIDERATION OF MITIGATION AND CONSERVATION MEASURES

Protection of Endangered and Threatened Species

Minimal reduction of habitat would occur as a result of the completion of this project. However, some habitat loss is inevitable. Any similar project would do as much.

The project has been developed in such a way as to minimize habitat fragmentation, by avoiding the clearing of irregularly shaped areas within the project site. This would create greater than necessary boundary or edge effects within the hammock. Clearing would be carried out as close to adjacent developed areas as possible, thus minimizing the increase in the hammock area to edge length ratio. Hammock would be cleared so as to maintain the maximum hammock width and breadth, thus maintaining as much of the interior hammock character. Such site clearing constraints are clearly identified and required under the Monroe County Land Development Regulations, Sections 9.5-344 and 9.5-345. Both sections of the Code are provided for specific review in Attachment 1 and 2.

Some irregularities in edge boundaries have been recommended as seen in Figures 3.5 and 3.6. These occur in the areas of transects 8 and 9 where a "saw-tooth" clearing configuration was recommended. This results from the location and shape of the exotic plant species situated along the FKAA eastern fence boundary, the presence of large number of white ironwood in adjacent areas, and the presence of the two *Ligustrum* tree snails previously mentioned (also now outside the clearing area). The "saw-tooth" shape would maximally protect hammock in this area while eliminating exotics within the construction site.

The effort to minimize edge effect impacts in the hammock would also help maintain habitat and species integrity in the remaining hammock on site and in the surrounding area. This is particularly true for the white crowned pigeon, which relies on the unfragmented hammock areas as a source of food. Similarly, minimizing these impacts would leave the maximum habitat possible for the eastern indigo snake. Direct impacts to the white crowned pigeon can generally be avoided. Reduction in clearing area and minimization of fragmentation go a long way toward protecting the pigeon's habitat needs.

However, protection of any Schaus' swallowtail butterflies and tree snails that may be found on the site would be more difficult. Additional efforts would be made to avoid the host species of the Schaus' swallowtail butterfly, either by selective clearing or by restricting construction to areas where the host plant species do not occur. To further reduce construction impacts, all torchwood and wild lime plants within the clearing area

have been marked. These trees would be inspected for the presence of eggs, larvae or pupae prior to clearing. If any eggs, larvae or pupae are found, they would be allowed to hatch if possible, and fly away. Immediately prior to clearing, the plants would be re-inspected, and if unhatched larvae or pupae are found, the branch containing them would be removed and fastened to either existing torchwood or wild lime plants in the hammock preserve area. Finally, some replanting of these host species can be accomplished on the site or in adjacent cleared or disturbed hammock areas.

Although no tree snails were identified within the current construction boundary, an exhaustive effort would be made to locate any prior to clearing. It would be important to locate resident groups of the snail for potential removal. If found, snails would be moved to other areas of the project site or to adjacent hammock parcels during the rainy season when they aren't aestivating. All efforts would be made to locate tree snails and move them appropriately.

The Miami black-headed snake inhabits the deepest leaf litter; thus it is important to protect the oldest and best-developed portions of hammock areas. Because individuals of this species are difficult to find, it is important to construct the wastewater treatment plant in the youngest portions of the hammock where less humus exists. The selection of the area near the FKAA property and fence line in the area with most exotic plant species would assist in avoiding any potential snake habitat. Additionally, leaf litter from the native portions of the clearing area would be moved to replanting areas.

Evaluation of Site – Mitigation Measures

The project site was evaluated based on the availability of developable land, compatibility of adjacent land uses, critical environmental constraints, existence of known or probable endangered species or their habitat, and ease/cost of acquisition and site preparation. In addition, the county took significant public input on over seventeen sites throughout the Key Largo area. Concerns over placement of the facility near adjacent residential uses also was a significant concern for the County Commission, which ultimately led to the selection of this project site over others.

The county believes that the project can be completed on the project site and meet all applicable County Land Development Regulations. Serious concern for the protection of endangered and threatened species would be managed through prudent location and configuration of the construction boundaries within the project site as noted and shown in Figures 3.5 and 3.6. Additionally, species such as the tree snail would be moved, trees such as torchwood and wild lime would be avoided where possible, and these trees and well as other native fruit bearing trees would be replanted within landscape areas, adjacent disturbed areas, and perhaps on other adjacent properties. This would provide some mitigation for potential impacts to the Schaus' swallowtail butterfly, eastern indigo snake, Miami black-headed snake, and white crowned pigeon.

A number of mitigation measures would be undertaken to protect the integrity of the hammock, its species composition, and species diversity, and to ensure survival of the endangered and threatened species which inhabit the site. These include:

1. The recommended project construction area would be against the fence at the FKAA site. This would lessen hammock clearing, and comply with County Land Development Regulations clustering requirements, requiring the use of the most disturbed portions of the property first. In addition, from an aesthetic point of view, in its present recommended configuration would maintain the required U.S. 1 Scenic Corridor Buffer of 75 feet.
2. The area to be cleared has been marked with continuous flagging tape. A five-foot wide construction impact zone has been included in this area. As noted above, all trees to be "transplanted" (replanted) as well as all torchwood and wild lime plants within the construction area have been flagged for transplanting. The plants would be inspected for the presence of Schaus' swallowtail butterflies (all life stages) as well as the Florida tree snail and Stock Island tree snails just prior to preparation for clearing. The number of non-transplantable individuals of protected plant species identified in the construction area is approximately 1,100, thus requiring the replanting of 2,200 trees or seedlings in the transplantation/replanting area.

Snail transplant can be started immediately if the snails are not aestivating. In either case, any snails found would be moved on the branch of their host tree to the same species in other areas of the hammock. Butterfly removal, if needed, also would not occur until just before the clearing occurs, allowing any butterflies to hatch and fly off on their own. Flagging has already been done and an inventory of "transplantation" species has been completed.

3. All exotic vegetation on the road at the rear of the property and along the continuation of Central Avenue would be removed, as well as all previously dumped debris. These areas can then be prepared to receive the "transplanted" trees, including large gumbo limbo. Transplantation of these trees can be best accomplished by cutting, scoring the base, and removing part of the canopy. Preparation would require that trenched (preferably) holes be provided for all replacement plants, in a zigzag scattered pattern. In addition, all hummus, which has been collected as part of the clearing effort, would be spread in the prepared transplantation area to promote new hammock growth. The hummus is an excellent seed source for hammock species. No hummus from the areas containing exotic vegetation would be used. This would also provide additional protection for the Miami black-headed snake.

4. Replacement of the non-transplantable tree species (identified in Table 4.3) would be completed in the same cleared areas as noted immediately above. Additional disturbed areas in the remaining 19 acres may also be identified and used for restoration plantings. Trees "transplanted" or replaced in this fashion would be replaced in a two-to-one ratio with the same or equally rare species.

5. Transplant of the Rhyrchosia vines would be accomplished by hand, either into the hammock preserve, or pots for replanting into the hammock at a later date.
6. The county would contact a local native plant nurseryman to remove all tagged seedling-sized threatened, endangered or regionally important plants from the main treatment plant area. Similarly, any other seedlings desired by local nurseryman could also be removed from the construction area at the same time.
7. Within the construction area, the 20-foot wide area adjacent to the FKAA fence can be cleared by bulldozer. This area includes the southern edge of transects 1 through 6. All debris would be removed and soils from this area would be taken to a dump (after chipping if desired.) This area contains Brazilian pepper and leadtree that would otherwise tend to further invade the surrounding hammock. The initial 50 feet of transects 8 and 9 located along the FKAA easterly fence line would be cleared in the same way.
8. Immediately prior to clearing the remaining native hammock portions of the construction sites, the flagged wild lime and torchwood would be re-inspected for Schaus' swallowtail butterfly larvae, pupae or eggs.

The portion of the construction site would be hand cleared, leaving stumps intact. Once clearing is completed, the area would be left alone for at least 2 weeks to allow any snakes to leave the area, and to allow a biologist to re-inspect for tree snails.

After this waiting period, stumps would be removed, and the flagged gumbo limbo trees can be transplanted to the transplant areas. These large gumbo limbos would provide shade for other transplanted (mitigation) trees. The soils from the rear (northern) 70 feet of transects 1-7 should then be moved to the transplant areas. This would begin the normal soil building process, and hopefully preserve any Miami black-headed snakes that didn't leave the area.

The county would place conservation easements on the associated open space areas, which could be assumed to fit into the pattern of acquisition for the Newport Hammocks CARL project. This includes the unused area of over twenty acres within the project site and well over 28 acres in additional existing parcels in adjacent areas.

In addition, the county and the state would continue land acquisition efforts to expand the overall protection of endangered and threatened species and the habitat vital to their existence.

5.4 DETERMINATION OF EFFECT

Six state or federally listed animal species are believed to have potential for occurrence at or near the site. Only two, the Florida tree snail (state threatened) and the white crowned pigeon (state threatened) have been found at the site, and use appears to be limited. Field surveys conducted by county biologists found one live Florida tree snail specimen and

noticed a few white crowned pigeons entering the area to feed. Based on habitat characteristics of the site and range and presence data, the occurrence potential for the remaining potentially occurring species (Schaus' swallowtail butterfly, eastern indigo snake, Miami black-headed snake, and Stock Island tree snail) is considered to be low. Based on the proposed clearing guidelines and the relatively low occurrence potential and degree of use, impacts to these species are considered to be non-significant, and the proposed action should not jeopardize the existence of these species. No federally listed plant species are present on-site, but several species on the state or county lists are present. The county plans to transplant the individuals of these species or replace them with additional specimens on areas proposed for hammock restoration.

The project is considered Not Likely to Adversely Affect any of the species listed above, or any other federally listed species.

6.0 INCIDENTAL TAKE EVALUATION

There is a potential for incidental take for the Schaus' swallowtail butterfly (federally endangered), eastern indigo snake (federally threatened), and Stock Island tree snail (federally threatened). Based on field surveys conducted by county biologists, the potential for occurrence of the Schaus' swallowtail butterfly and Stock Island tree snail are considered to be very low. In addition, the county has proposed additional pre-construction surveys, relocation procedures, and sequential clearing designed to allow the eastern indigo snake time to re-locate before heavy equipment enters the site. Based on these factors, the potential for an incidental take for these species is low. Based on the small site and adjacent hammock area size and character and the large home range requirements of the eastern indigo snake, on a worst case basis, no more than one incidental take of an eastern indigo snake is likely. Since it is unlikely that any significant populations of the Schaus' swallowtail butterfly or Stock Island tree snail would remain undetected by the pre-construction surveys, any potential takes of these species should be minimal and limited to a few individuals.

7.0 CONCLUSIONS

The county firmly believes that the project fairly mitigates or offsets overall impacts that are occurring within the terrestrial and marine ecosystems of the Florida Keys because of the water quality improvements that would result from the project. The project would result in an 86 percent (96,950 lbs./year) reduction in wastewater nitrogen and an 80 percent (22,232 lbs./year) reduction in wastewater phosphorous.

The county has proposed mitigation and construction procedures intended to minimize habitat loss and to minimize the potential impacts to plant and animal species, particularly protected species. These include minimizing the impact area, siting the facility in the most disturbed portion of the site, restoration, and guidelines for clearing to minimize hazards to listed species.

Six state or federally listed animal species are believed to have potential for occurrence at or near the site. Only two, the Florida tree snail (state threatened) and the white crowned pigeon (state threatened) have been found at the site. Field surveys conducted by the county found one live Florida tree snail specimen and noticed a few white crowned pigeons entering the area to feed. Based on habitat characteristics of the site and range and presence data, the occurrence potential for the remaining potentially occurring species (Schaus' swallowtail butterfly, eastern indigo snake, Miami black-headed snake, and Stock Island tree snail) is considered to be low. Based on the proposed clearing guidelines and the relatively low occurrence potential and degree of use, impacts to these species are considered to be non-significant, and the proposed action should not jeopardize the existence of these species. The project is considered Not Likely to Adversely Effect any of these species.

Starting with an estimated 7-acre construction area, the construction area has been reduced to an area of 2.62 acres, with diligent attention to defining the best location on the project site for construction. Within this 2.62-acre construction area, approximately 0.41 acres is composed entirely of exotic vegetation. This reduces the direct impacts to tropical hardwood hammocks to about 2.21 acres. In addition, based on County Code requirements, significant transplantation or replanting of native protected plants found within the hammock area is required. The county would transplant or replace well over 2,000 trees and seedlings to adjacent cleared rights-of-way (currently disturbed and unimproved) to restore at 0.39 acres of disturbed area to hardwood hammock at the margins of the project site. The net impact to hardwood hammock is thus estimated to be about 1.82 acres.

The replanting effort would also reclaim disturbed areas within the overall "Newport Hammocks" area reducing existing fragmentation of this hammock area. The remaining portion of the property (approximately 19 acres) would be dedicated conservation land and would form a connection between the Newport Hammocks CARL property to the northeast and the county's existing conservation lands to the south of the site.

8.0 LITERATURE CITED

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APPENDIX A

List of Endangered, Threatened, and Regionally Important Species
Located in the Upper Florida Keys

Table A.1: List of Endangered, Threatened, and Regionally Important Species Found in the Upper Florida Keys

Common Name	Scientific Name	Status		
		St	Fed	MC
Insects				
Schaus' swallowtail butterfly	<i>Heracles aristodemus poneanus</i>	E	E	
Fish				
Key silverside	<i>Menidia conchorum</i>	T		
Mollusks				
Florida tree snail	<i>Liguus fasciatus</i>	SSC		
Stock Island tree snail	<i>Orthalicus reyes reyes</i>	E	E	
Mammals				
Key Largo woodrat	<i>Neotoma floridana smalli</i>	E	E	
Key Largo cotton mouse	<i>Peromyscus gossypinus allapaticola</i>	E	E	
Reptiles				
American alligator	<i>Alligator mississippiensis</i>	SSC	T	
American crocodile	<i>Crocodylus acutus</i>	E	E	
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T	T	
Miami black-headed snake	<i>Tantilla oolitica</i>	T		
Birds				
White-crowned pigeon	<i>Columba leucocephala</i>	T		
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>	T		
Southeast American kestrel	<i>Falco sparverius paulus</i>	T		
Southern bald eagle	<i>Haliaeetus leucocephalus</i>	T	T	

Common Name	Scientific Name	Status		
		St	Fed	MC
Least tern	<i>Sterna antillarum</i>	T		
Roseate tern	<i>Sterna dougallii</i>	T	T	
Plants				
Tamarindillo/Sweet acacia	<i>Acacia choriophylla</i>	E		
Long spined acacia	<i>Acacia micrantha</i>			RI
Sweet pine acacia	<i>Acacia pinetorum</i>			RI
Golden leather fern	<i>Acrostichum aureum</i>	E		
Giant leather fern	<i>Acrostichum danaeifolium</i>	C		
False foxglove	<i>Agalinis keyensis</i>			RI
Colic root	<i>Aletris farinosa</i>	T		
Pineland alamananda	<i>Angadenia berterii</i>	T		RI
Pond apple	<i>Ammona glabra</i>			RI
Blodgett's wild mercury	<i>Argythamnia blodgettii</i>	E		
Saltmarsh aster	<i>Aster tenuifolia</i>			RI
Pine pink	<i>Bletia purpurea</i>	T		
Borreria	<i>Borreria ocimoides</i>			RI
Borreria	<i>Borreria terminalis</i>			RI
Little strongback	<i>Borreria cassiniifolia</i>	E		
Rough strongback	<i>Borreria radula</i>	E		
Blue hearts	<i>Buchnera elongata</i>			RI
Locust berry	<i>Byrsonima lucida</i>	E		
Yellow nickerbean	<i>Caesalpinia major</i>	E		
Fewflower holdback	<i>Caesalpinia pauciflora</i>	E		
Spicewood/Pale liddflower	<i>Calyptranthes pallens</i>	T		
Myrtle of the river	<i>Calyptranthes zuzygium</i>	E		
Cinnamonbark	<i>Canella winterana</i>	E		

Common Name	Scientific Name	Status		
		St	Fed	MC
Big Pine partridge pea	<i>Cassia keyensis</i>	E		
Dune illy-thorn	<i>Catesbaea parviflora</i>	E		
Butterfly pea	<i>Centrosima virginianum</i>			RI
Prickly apple	<i>Cereus gracillus</i>	E		
Barbed wire cactus	<i>Cereus pentagonus</i>	T		
Key tree cactus	<i>Cereus robinii</i>	E	E	
Spurge	<i>Chamaesyce adenoptera</i>			RI
Spurge	<i>Chamaesyce deltoidea ssp deltoidea</i>	E	E	
Spurge	<i>Chamaesyce garberi</i>	E	T	
Spurge	<i>Chamaesyce porteriana v. porteriana</i>	E		
Spurge	<i>Chamaesyce porteriana v. scoparia</i>	E		
Satinleaf	<i>Chrysophyllum oliviforme</i>	T		
Small's thistle	<i>Cirsium horridulum</i>			RI
Bull thistle	<i>Cirsium vulgare</i>			RI
Fiddlewood	<i>Citharexylum fruticosum</i>			RI
Autograph tree	<i>Clusia rosea</i>	E		
Silver palm	<i>Coccothrinax argentata</i>	T		
Coffee colubrina	<i>Colubrina arborescens</i>	E*		
Cuba colubrina	<i>Colubrina cubensis</i>	E		
Soldierwood	<i>Colubrina elliptica</i>	E*		
Dayflower	<i>Commelina erecta</i>			RI
Cordia bush	<i>Cordia globosa</i>	E*		
Orange geiger	<i>Cordia sebestena</i>		E	
Tickseed	<i>Coreopsis gladiata</i>			RI
Quail berry	<i>Crossopetalum ilicifolium</i>	E		
Rhacoma	<i>Crossopetalum rhacoma</i>	E		
Wild croton	<i>Croton humilis</i>	E*		

Common Name	Scientific Name	Status		
		St	Fed	MC
Cupania	<i>Cupania glabra</i>	E		
Blodget's milkweed vine	<i>Gynanichum blodgettii</i>	T*		
Hairnet vine	<i>Gynanichum palustre</i>			RI
Mitterwort	<i>Gynoclonum mirreola</i>			RI
Coin vine	<i>Dalbergia brownii</i>	E*		
Whitetop sedge	<i>Dichromena floridensis</i>			RI
Caribbean crabgrass	<i>Digitaria dolichophylla</i>	T*		
Keys varnish leaf	<i>Dodonaea elaeagnoides</i>	E		
Milkbark	<i>Drypetes diversifolia</i>	E		
Guiana plum	<i>Drypetes lateriflora</i>	T		
Dollar orchid	<i>Encyclia boothiana</i>	E		
Clamshell orchid	<i>Encyclia cochleata</i>	E		
Butterfly orchid	<i>Encyclia tampensis</i>	C		
Night scented orchid	<i>Epidendrum nocturnum</i>	E		
Rigid epidendrum	<i>Epidendrum rigidum</i>	E		
Black torch	<i>Erithalis fruticosa</i>	T		
Golden beach creeper	<i>Ernodea littoralis</i>	T		
Coral bean	<i>Erythrina herbosa</i>			RI
Redberry stopper	<i>Eugenia confusa</i>	E		
Red stopper	<i>Eugenia rhombea</i>	E		
Creeping morning glory	<i>Evolvulus sericeus</i> v. <i>sericeus</i>			RI
Creeping morning glory	<i>Evolvulus serius</i> v. <i>averyi</i>			RI
Creeping morning glory	<i>Evolvulus serius</i> v. <i>glaberrimus</i>			RI
Princewood	<i>Exostema caribaeum</i>	E*		
Inkwood	<i>Exothea paniculata</i>			RI
Florida privet	<i>Forestiera segregata</i>			RI
Milkpea	<i>Galactia parvifolia</i>			RI

Common Name	Scientific Name	St	Status		
			Fed	MC	
Milkpea	<i>Galactia pinetorum</i>			RI	
Milkpea	<i>Galactia prostrata</i>			RI	
Milkpea	<i>Galactia regularis</i>			RI	
Milkpea	<i>Galactia smallii</i>	E	E		
Galium	<i>Galium hispidum</i>			RI	
Wild cotton	<i>Gossypium hirsutum</i>	E			
Lignum vitae	<i>Guaiacum sanctum</i>	E			
False boxwood	<i>Gyminda latifolia</i>	E			
Heliotrope	<i>Heliotropium polyphyllum</i>			RI	
Golden aster	<i>Heterotheca graminifolia</i>			RI	
Rose mallow	<i>Hibiscus poeppigii</i>	E			
Manchineel	<i>Hippomane mancinella</i>	E			
Diamond flower	<i>Houstonia nigricans v. floridana</i>			RI	
White ironwood	<i>Hypelate trifoliata</i>	E			
Fringed star grass	<i>Hypoxis wrightii</i>			RI	
Indigofera	<i>Indigofera keyensis</i>	E		RI	
Indigofera	<i>Indigofera miniata</i>			RI	
Curtis clustervine	<i>Jacquemontia curtissii</i>	T			
Havana clustervine	<i>Jacquemontia havanensis</i>	E*			
Bahama morning glory	<i>Jacquemontia pentanchos</i>	E*			
Joewood	<i>Jacquinia keyensis</i>	T			
Parasitic ghost plant	<i>Leiphaimos parasitica</i>	E*			
Blazing star	<i>Liatis chapmanii</i>			RI	
Blazing star	<i>Liatis tenuifolius v. aphyllus</i>			RI	
Sand flax	<i>Linum arenicola</i>	E			
Galdes lobelia	<i>Lobelia glandulosa</i>			RI	
Wild dilly	<i>Marrilkara jaimiqui</i>	T*			

Common Name	Scientific Name	Status		
		St	Fed	MC
Mastic	<i>Masticodendron foetidissimum</i>			RI
Mayten	<i>Maytenus phyllanthoides</i>	T*		
Melanthera	<i>Melanthera aspera</i> v. <i>glabriuscula</i>			RI
Poor man's patches	<i>Mentzelia floridana</i>			RI
Cutleaf morning glory	<i>Merremia dissecta</i>			RI
Simpson stopper	<i>Myrcianthes fragrans</i>	T		
Sensitive plant	<i>Neptunia pubescens</i> v. <i>pubescens</i>			RI
Semaphore cactus	<i>Opuntia spinosissima</i>	E		
Prickly pear cactus	<i>Opuntia stricta</i>	T	T	
Keys jumping cactus	<i>Opuntia triacantha</i>	E		
Corky passionflower	<i>Passiflora suberosa</i>	E*		
Pectis	<i>Pectis leptoccephala</i>			RI
Swamp bay	<i>Persea borbonica</i>			RI
Mahogany mistletoe	<i>Phoradendron rubrum</i>	E		
Five-petal leaf-flower	<i>Phyllanthus pentanvlus</i> v. <i>floridanus</i>			RI
Groundcherry	<i>Physalis angustifolia</i>			RI
Piriqueta	<i>Piriqueta caroliniana</i> v. <i>glabra</i>			RI
Piriqueta	<i>Piriqueta caroliniana</i> v. <i>tomentosa</i>			RI
Pineland pisonia	<i>Pisonia rotundata</i>	E*		
Blackbead	<i>Pithecellobium keyensis</i>	T*		
Everglades poinsettia	<i>Poinsettia pinetorum</i>	E		
Milkwort	<i>Polygala boykinii</i> v. <i>sparsifolia</i>			RI
Milkwort	<i>Polygala grandiflora</i>			RI
Bucaneer palm	<i>Pseudophoenix sargentii</i>	E		
Long-stalked stopper	<i>Psidium longipes</i>	T*		
Wild coffee/ Dull leaf	<i>Psychotria ligustrifolia</i>	E*		
Cretan break fern	<i>Pteris bahamensis</i>	T		

Common Name	Scientific Name	Status		
		St	Fed	MC
Rabbit tobacco	<i>Pterocaulon pycnostachyum</i>			RI
Red ironwood	<i>Reynosa septentrionalis</i>	T*		
Brown-nosed snout pea	<i>Rhynchosia cinera</i>			RI
Hammock snout pea	<i>Rhynchosia swartzii</i>	E*		
Royal palm	<i>Roystonea elata</i>	E		
Marsh pink	<i>Sabatia stellaris</i>			RI
Bahama saechsa	<i>Sachsia bahamensis</i>	E		
Pineland pimpernel	<i>Samolus parviflorus</i>			RI
Soapberry	<i>Sapindus saponaria</i>			RI
Maidenbush	<i>Savia bahamensis</i>	E*		
Inkberry	<i>Scaevola plumieri</i>	T		
Florida boxwood	<i>Schaefferia frutescens</i>	E*		
Scrub bluestem	<i>Schizachyrium sericeatum</i>	E*		
Gulf greytwig	<i>Schoepfia chrysophylloides</i>			RI
Skullcap	<i>Scutellaria havanensis</i>	E*		RI
Bahama cassia	<i>Senna mexicana</i>	T*		
Teaweed	<i>Sida rubromarginata</i>			RI
Paradise tree	<i>Simaruba glauca</i>			RI
Blue-eyed grass	<i>Sisyrinchium arenicola</i>			RI
Greenbriar	<i>Smilax havanensis</i>	T*		
Potato tree	<i>Solanum donianum</i>	T*		
Necklace pod	<i>Sophora tomentosa</i>			RI
Buttonweed	<i>Spermacoce terminalis</i>	T*		
Parsley fern	<i>Sphenomeris clavata</i>	E		
Ladies tresses	<i>Spiranthes polyantha</i>	E		
Pride of Big Pine	<i>Srumpfia maritima</i>	E		
Everglades pencil flower	<i>Stylosanthes calicicola</i>	E*		RI

Common Name	Scientific Name	Status		
		St	Fed	MC
Pencil flower	<i>Sylosanthes hamata</i>			RI
Mahogany	<i>Swietenia mahogani</i>	E		
Abrupt-tipped maiden fern	<i>Thelypteris angescens</i>	T		
Shield fern	<i>Thelypteris kunthii</i>			RI
Brittle thatch palm	<i>Thrinx morrisii</i>	E		
Florida thatch palm	<i>Thrinx radiata</i>	E		
Reflexed wild pine	<i>Tillandsia bahbisiانا</i>	T		
Stiff wild pine	<i>Tillandsia fasciculata</i>	E		
Twisted/Banded air plant	<i>Tillandsia flexuosa</i>	E		
Giant wild pine	<i>Tillandsia utriculata</i>	E		
Sea lavender	<i>Tournefortia gnaphalodes</i>	E		
Pineland noseburn	<i>Tragia saxicola</i>	T		
West Indies tremna	<i>Trema lamarkianum</i>	E*		
Florida gamma grass	<i>Tripsacum floridanum</i>	E		
Pearl berry/ Tear shrub	<i>Valesia antillana</i>	E*		
Worm-vine orchid	<i>Vanilla barbellata</i>	E		
Ironweed	<i>Vernonia blodgettii</i>	E*		RI
Tallowwood, Hogplum	<i>Ximenea americana</i>			RI
Florida coonite	<i>Zamia floridana</i>	C		
Florida arrowroot	<i>Zamia integrifolia</i>	C		
Satinwood/Yellow heart	<i>Zanthoxylum flavum</i>	E		

E = Endangered

T = Threatened

SSC = Species of Special Concern

C = Commercially Exploited

RI = Regionally Important

Attachment 1

Section 9.5-344, Land Development Regulations
Transplantation Plan

Sec. 9.5-344. Transplantation plan.

- (a) A transplantation plan shall contain the following:
 - (1) A survey indication the location, size and species to be transplanted;
 - (2) Identification of the transplantation site including the ultimate location, size and species of all plants to be transplanted;
 - (3) The transplantation method to be employed, including:
 - a. A schedule, by week, of each step of the transplantation process and a specific completion date;
 - b. Demonstration of the qualifications and experience of the individual or firm performing the transplanting;
 - c. The means of excavating the plant materials;
 - d. Preparation of the site to which the plant material will be transplanted; and
 - e. A schedule of maintenance of the plant material after it has been transplanted;
 - (4) A written narrative description of the likelihood of the success of transplantation including a description of other successful transplantation of the species proposed to be transplanted.
- (b) All transplantation plans shall meet the following standards:
 - (1) If, upon site evaluations and review of the narrative required in subsection (4) above, the proposed transplantation is deemed not feasible by the county biologist and preservation is not possible, replacement with nursery stock may be permitted pursuant to the standards listed below:
 - a. Nursery stock shall be of the same size as the plants required to be transplanted, or if of smaller size, shall be substituted at the ratio of two (2) nursery plants for every one (1) plant proposed for removal;
 - b. Nursery stock shall be of the same species whenever possible, or equally rare species as approved by the county biologist;
 - (2) All transplantation shall be on the development site unless there is no suitable planting area available;
 - (3) Transplantation plans shall be approved by the county biologist prior to issuance of a permit and shall be attached as a condition on the permit;
 - (4) All transplantation shall be completed prior to issuance of a certificate of occupancy (C.O.) for the site, or, where a C.O. is not applicable, within the time frame outlined in the transplantation plan.
 - (5) All transplantation shall meet a survival rate of eighty (80) percent.
- (c) Off site transplantation:
 - (1) Receiver sites eligible for off site transplantation shall be either:

- a. Located within an area of publicly-owned (local, federal, or state) land which is designated solely for the purpose of reforestation, restoration and/or preservation; or
 - b. Located within a site owned by a private non-profit conservation organization where the site is designated for the sole purpose of reforestation, restoration and/or preservation.
- (2) Sites not eligible as receiver sites for off site transplantation:
- a. Any area designated for landscaping that serves an architectural or aesthetic purpose only;
 - b. Any area which is a required landscape or buffer area by county code (however, required scenic corridors are eligible);
 - c. Any area which would require clearing of native trees or habitat to make room for plants; and
 - d. Any area which is required for planting, restoration, or mitigation under the county land development regulations as part of or as a result of a code violation case.
- (3) Additionally, the off site transplantation area shall be either:
- a. Suitable for restoration to the same habitat type as the applicant's property, as confirmed by the county biologist after site inspection; or
 - b. Suitable for establishing new habitat, provided that it can reasonably be expected to support the applicable habitat type based upon site history and characteristics and is approved by the county biologist.
- (4) Off site transplantation methods:
- a. The transplantation plan shall be part of a written tri-party agreement or memorandum of understanding (MOU) between the applicant, the receiving (transplantation) site owner, and the county. The agreement or MOU shall be prepared by the applicant in a for acceptable to the county and should state responsibilities and include a copy of the transplantation plan.
 - b. All initial costs of transplantation, including materials, installation and labor required to establish the plants (initial watering, etc.) and to remove exotic vegetation to prepare the site, shall be the responsibility of the applicant and shall be calculated as follows in accordance with the terms of the agreement:
 1. For transplantable plant material, the applicant shall pay to the owner of the receiver site an amount equal to one hundred (100) percent of the cost of transport and delivery of the plants plus one hundred (100) percent of two (2) times the cost of a substitute nursery plant material (according to the ratios in subsection (b)(1)a. above) to cover labor and installation, plus, fifteen (15) percent of the cost of substitute nursery plant material to cover maintenance for one (1) year.

2. For nursery stock, the applicant shall pay to the owner of the receiver site and amount equal to one hundred (100) percent of the cost of plant materials (including transportation and delivery), plus one hundred (100) percent of two (2) times the plant material cost to over labor and installation, plus fifteen (15) percent of the cost of substitute nursery plant material to cover maintenance for one (1) year.
 - c. All physical maintenance and guarantees required by the transplantation plan after installation and establishment of plants shall be the responsibility of the owner of the receiver site.
 - d. As part of the guaranteed maintenance, the owner of the receiver site shall agree to keep it free of invasive exotic vegetation in perpetuity.
 - (d) If none of the above alternatives are available then the applicant shall provide a fee equal to the cost of the replacement plants plus installation and maintenance, calculated in accordance with section (c)(4)b.2. above. This fee shall be held in an escrow account of similar instrument which shall be used by the county to restore and manage public lands in county or, at the discretion of the county, to a willing government agency or public or private conservation group for off-site replacement of the affected habitat. The county biologists shall prepare a fee schedule which shall be periodically revised based on the market costs for replacement plants and installation. The county shall adopt administrative procedures for management of the escrow account.
 - (e) Inability to locate eligible off site transplantation area. Until the administrative procedures referenced in section (d) above are adopted, the following procedure shall be used when no other alternative is available. If the applicant demonstrates to the county the he/she has exhausted attempts to locate an off site transplantation area which meets the criteria of section (c) above, and is unable to locate a suitable site, the following method shall be employed:
 - (1) The applicant shall submit to the county a transplantation plan which includes all of the items listed in subsection (a) above with the exception of the location of trees at the receiver site;
 - (2) The applicant should then arrange, with assistance from the county for removal of the plants from site by area nurseries, landscapers, and other individuals for future replanting;
 - (3) Prior to approval of final inspection for a certificate of occupancy, the applicant shall demonstrate that all of the required plants have been removed for transplantation by submitting receipts to the county from the above individuals which state the species and number of plants removed for transplantation.

(Ord. No. 33-1986, § 9-810; Amd. 1-2-96)

Attachment 2

Section 9.5-345, Land Development Regulations
Environmental Design Criteria
High Hammock (High Quality)

Sec. 9.5-345. Environmental design criteria.

No land, as designated on the existing conditions map and analyzed in accordance with the standards in section 9.5-339 and 9.5-340, shall be developed, used or occupied except in accordance with the following criteria unless the county biologist recommends an authorized deviation from the following criteria in order to better serve the purpose and objectives of the plan and the director of planning or planning commission approves the recommendation as a minor or major conditional use. No recommendation for an authorized deviation from these environmental design criteria shall be made unless the county biologist makes written findings of fact and conclusions of biological opinion which substantiate the need and/or benefits to be derived from the authorized deviation.

(a) *Clustering*: It is the purpose of this section to minimize the environmental impacts of development by encouraging design of a development on a parcel of land to incorporate clustering of the development away from the natural areas on the parcel that are the most susceptible to harmful development impacts. Clustering requirements shall apply to all development, including plat design, and shall be achieved in the following manner:

(1) When a parcel proposed for development contains more than one (1) habitat type, all development shall be clustered on the least sensitive portions of the parcel subject to the maximum net densities of section 9.5-262 and 9.5-269 and the performance standards of this section. For the purpose of this subsection, the relative sensitivity of separate habitat types shall be as listed below with subsection (a) being the most sensitive and subsection being the least sensitive. Development within the least sensitive habitat shall achieve the maximum density or intensity allowable by these regulations and shall fully utilize the buildable area of the habitat prior to expanding to the next least sensitive habitat type on the site. For proposed plats, these cluster requirements shall be applied such that the number of proposed lots are sized and configured to achieve the highest allowable density within the least sensitive habitat prior to locating additional lots within the next least sensitive habitat.

- a. High hammock (high-quality);
- b. Palm hammock;
- c. Cactus hammock;
- d. Beach/bern;
- e. Pinelands (high-quality);
- f. Salt marsh and buttonwood wetlands;
- g. High hammock (moderate-quality);
- h. Low hammock (high-quality);
- i. Low hammock (moderate-quality);
- j. Pinelands (low-quality);

- k. High hammock (low-quality);
 - l. Low hammock (low-quality);
 - m. Disturbed beach/berm;
 - n. Disturbed with slash pines;
 - o. Disturbed with salt marsh and buttonwood;
 - p. Disturbed with high hammock;
 - q. Disturbed with low hammock;
 - r. Disturbed;
 - s. Disturbed with exotics.
- (2) In addition to the requirements of subsection (1) above, when a parcel proposed for development contains more than one (1) habitat type, the development shall be clustered within the least ecologically valuable area of each habitat as determined by the county biologist.
- (3) When a parcel proposed for development contains only one (1) habitat type, the development shall be clustered within the least ecologically valuable area of the habitat as determined by the county biologist.
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(c) *High Hammock (High-Quality)*: All structures developed, used or occupied on parcels of land that are evaluated as high-quality high hammock according to the habitat evaluation index set out in section 9.5-339 shall be designed, located and constructed such that:

- (1) All listed threatened, endangered, commercially exploited, and regionally important native plant species are preserved, protected, relocated or replaced with nursery stock of the same species or equally rare species suitable to the site pursuant to a transplantation program approved in accordance with section 9.5-344 of this division.
- (2) The edges and general dome configuration of the hammock are preserved in their natural form;
- (3) All native trees with a diameter at breast height (DBH) of greater than three and one-half (3 ½) inches shall be preserved, relocated or replaced with nursery stock of the same species or equally rare species suitable to the site at a ratio of two (2) replacements for every one (1) tree removed pursuant to a transplantation program approved in accordance with section 9.5-344 of this division.
- (4) All specimen trees shall be preserved in their natural condition;
- (5) All areas of required open space shall be maintained in their natural condition, including the preservation of midstory and understory vegetation;
- (6) All areas of required open space shall have minimum dimensions of two hundred (200) feet and a minimum of at least one-half acre;

- (7) The habitat of threatened and endangered animals shall be preserved;
- (8) All areas of disturbance shall be managed to avoid the introduction and/or establishment of invasive exotic species; and
- (9) All invasive exotic species shall be removed from the parcel proposed for development.
- (10) A construction impact zone is provided and construction barriers are required at the outer edge of the construction impact zone and shall be visible and of durable material such as wood, fabric, wire fencing, rope or wire cable: Barriers shall remain in place until final inspection for a certificate of occupancy has been approved.