

**SANITARY SEWER, SOLID WASTE, DRAINAGE,
POTABLE WATER, AND NATURAL GROUNDWATER
AQUIFER RECHARGE ELEMENT**

4.0 SANITARY SEWER SUBELEMENT

4.0.0 Existing Conditions

4.0.0.0 Description of Facilities and Capacity Analysis

The City of Vero Beach owns and operates a 4.5 million gallon per day (mgd) activated sludge wastewater treatment plant located at Indian River Boulevard and 17th Street (see Figure 4.1). Florida Department of Environmental Regulation (FDER) assigns a code consisting of one digit and one letter indicating the type and size of a wastewater treatment plant. The Vero Beach facility is a Category 2, Class B wastewater treatment plant. Category 2 type facilities are activated sludge plants and Class B facilities are plant sizes 1.0 to 5.0 mgd.

Wastewater treatment facilities are permitted under Part I, Domestic Wastewater Facilities, of FDER's Chapter 17-6, FAC. The permit for this facility expires on October 15, 1990. The water management district is encouraging reuse of treated wastewater and has informed the City that it will require some reuse of treated wastewater in the future.

The Vero Beach wastewater treatment plant provides secondary plus treatment. The plus indicates that the effluent passes through a trickling filter and two sedimentation tanks after secondary treatment. This results in effluent with 97 percent of the biological oxygen demand (B.O.D) and suspended solids removed.

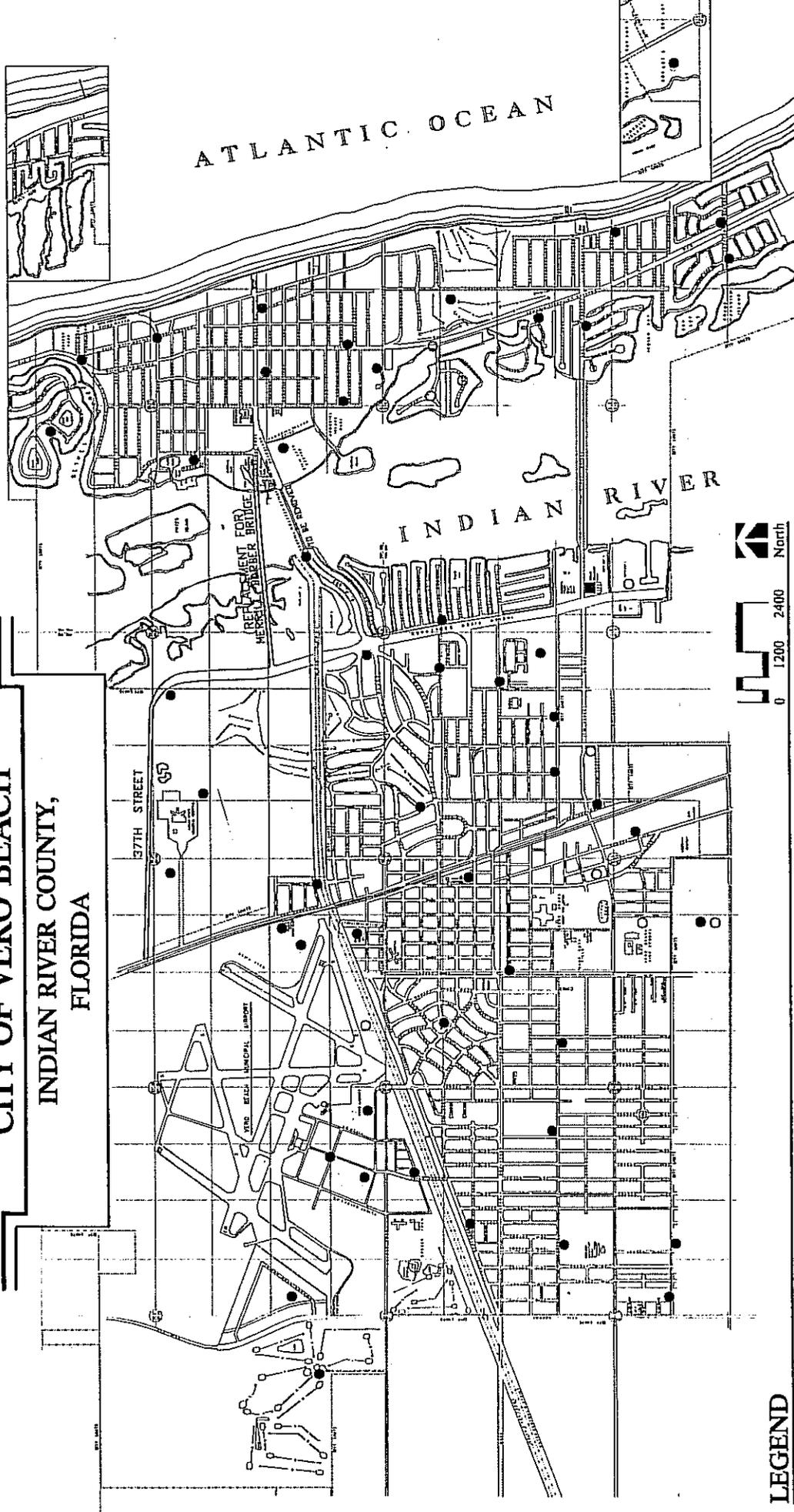
Treatment of industrial wastes has not been a problem in Vero Beach for two reasons. Heavy, pollution-generating industries are not common in the area and industrial waste in Vero Beach has special restrictions. Industrial wastes are required by Vero Beach to meet certain quality standards before they will be accepted for treatment by the City.

According to the wastewater treatment plant monthly operating reports for the first six months of 1988, the plant is currently running at 68 percent of capacity, averaging 3.05 mgd. The monthly four hour peak flow averaged 4.42 mgd, well below the four-hour peak flow designed capacity of 7.8 mgd. The average amount of wastewater treated per month was 92.54 million gallons. The permanent population served by the plant was estimated at 15,482. However, the seasonal nature of the area's peak population must be taken into consideration. The seasonal population served by the wastewater treatment plant totals 3,940 persons, bringing the peak functional population served by the wastewater treatment plant to 19,422 persons. This results in an average of 157 gallons of wastewater per person per day.

The plant currently has an excess capacity of 1.45 mgd. This excess capacity could serve an additional 9,236 people at the current level of service. The Vero Beach wastewater treatment plant has the capacity to serve a functional population of 28,658 at current per capita levels of wastewater service. Currently, the City is providing wastewater service to 49 percent of the City's residents and to eight percent of Indian River County's residents.

The Vero Beach wastewater treatment plant is currently performing well below the maximum monthly effluent limits set by the FDER permit as indicated in Table 4.1. With recent renovations to the plant headworks and considering the excess capacity available, it is reasonable to expect that with proper operation and maintenance, this plant will continue to perform within the existing permit limits beyond the

CITY OF VERO BEACH
INDIAN RIVER COUNTY,
FLORIDA



LEGEND

- Wastewater Treatment Plant
- Public Lift Stations
- Private Lift Stations

Sources: Vero Beach Water and Sewer Department, 1988
 RS&H, 1988

SEPTEMBER 1989

VERO BEACH WASTEWATER TREATMENT PLANT AND LIFT STATIONS

Figure 4.1

RS&H / PLANTEC

year 2000. However, the City anticipates a more stringent requirement for dechlorination of plant effluent upon the renewal of the present permit; this expenditure has been included in the City's Five-Year Capital Improvement Program. The removal of residual chlorine will further improve the quality of the effluent discharge into Indian River Lagoon. Sections 5.3.0.1 and 5.3.0.2 of the Coastal Element provide more information on the impact of the treatment plant upon the Indian River Lagoon system.

4.0.0.1 Effluent Disposal

Most of the effluent from the facility is conveyed via a pipe to a canal south of the wastewater treatment facility and then into the Indian River. The Vero Beach power plant, located across the street from the wastewater treatment plant, uses some effluent for cooling. The power plant's effluent usage in the first six months of 1988 ranged from 1.95 mgd in March to 46.37 million gallons in January, according to the wastewater treatment plant monthly operating reports. The average over the six month period was 22.06 million gallons. In addition, a small amount of effluent is used for irrigation at the power plant and wastewater treatment plant sites. An effluent irrigation system is currently being designed and is planned to be in service by mid-1991 which will eliminate discharge of effluent into the Indian River Lagoon.

Monthly operating reports from the wastewater treatment plant through February, 1990, indicate the plant is treating 2.68 mgd. The monthly four hour peak flow averages 4.42 mgd, well below the four hour peak flow designed capacity of 7.8 mgd. The average amount of waste water treated per month is 81.52 million gallons. The peak season population, including commercial and industrial equivalent residential units, is approximately 26,406 persons. This results in an average of 101 gallons of waste water per person per day.

4.0.0.2 Sludge Disposal

The disposal of sludge is regulated by FDER under Part IV of Chapter 17-7, FAC, Domestic Sludge Classification, Utilization and Disposal Criteria. Sludge from the Vero Beach wastewater treatment meets the chemical criteria to be classified as Grade I sludge. The parameters and concentrations for classifying sludge are listed in Table 4.1A.

The sludge drying beds are currently not being used. Sludge from the Vero Beach wastewater treatment is hauled away by private contractors on a two year contract approved by FDER. The sludge is disposed of on agricultural properties that have been approved by the FDER, including pastureland, citrus groves and sod farms.

4.0.0.3 Service Boundaries

The Vero Beach wastewater treatment plant serves the City of Vero Beach, the town of Indian River Shores excluding the Baytree development, the South Beach area, and some County areas on the mainland (see Figures 4.2 and 4.2A; see Appendix I for Lift Stations). As noted in the Future Land Use Section, the predominant land uses served are residential with a scattering of commercial and minor industrial uses. The areas outside the City limits also consist of residential land uses. An agreement on wastewater service between the City of Vero Beach and Indian River County was signed on January 11, 1973. In an annex to this agreement on November 6, 1973 the County was allotted a monthly daily average capacity of 1.39 mgd. This agreement forms the basis for all of the more recent agreements on wastewater treatment between the City and the County.

Table 4.1 City of Vero Beach Wastewater Treatment Plant Performance Data for the First Six Months of 1988

Parameter	FDER* Permit Limits-30-Day Maximum Average	Monthly Average	Maximum 30-Day Average
BOD ₅ -mg/l	17	6.0	7.0
Suspended Solids mg/l	--	4.0	6.0
Total Nitrogen mg/l	20	13.4	18.45
Total Phosphorus mg/l	7	5.5	6.7
Fecal Coliform #/100 ml	--	1.0	2.0
Flow-MGD	4.5	2.85	3.63
pH	--	--	--
Chlorine Residual mg/l	0.5 minimum @ peak flow	0.9	0.8 minimum 30-day avg

*FDER-Florida Department of Environmental Regulations.

Source: City of Vero Beach, 1990.

Table 4.1A Chemical Criteria for Classifying Sludge in mg/kg dry weight

Parameter	Grade		
	1	2	3
Cadmium	≤30	30 - 100	≥100
Copper	≤900	900 - 3000	≥3000
Lead	≤1000	1000 - 1500	≥1500
Nickel	≤100	100 - 500	≥500
Zinc	≤1800	1800 - 10,000	≥10,000

Sources: FDER, Chapter 17-7, FAC.
RS&H, 1988.

Vero Beach regulates wastewater service under Chapter 17 of the City Code, entitled Utilities Services. The City requires sewer connection whenever required by Florida Statutes (Section 381.272) and requires all commercial users and multifamily developments to hook into the City's sewer system. Single-family houses in areas where sewer lines do not exist are encouraged to use septic tanks, if they are located on a site which is a quarter acre or greater in size and if the soils on the site have good percolation. There are no plans at this time to expand sewer lines to areas of the City which are not currently served. The City requires that all septic tanks be permitted by the Indian River County Public Health Unit. Soil suitability for discharge of septic tank and drainfield effluent in Indian River County is Figure 4.2 discussed in detail in the Indian River County Comprehensive Plan and is summarized as follows:

According to the Indian River County Public Health Unit, Division of Environmental Health, Indian River is a difficult county in which to install on-site sewage disposal systems. There are several factors which account for this difficulty. These factors are:

- o A high water table found in almost all areas of the county; and
- o An underlying hardpan strata, a restrictive layer often comprised of sandy clay loam.

The presence of a high water table reduces the operating efficiency of septic systems. The layer of spodic horizons may prevent the infiltration of effluent.

Relative to the installation of septic systems, 93 percent of the soils of Indian River County are rated as severe. Most of the land area within the county is termed as being Central and Southern flatwoods. For the most part, the soil associated with Southern and Central flatwoods is poorly drained. There are, however, two areas of the county in which the soils are better suited for the installation of septic systems. These areas are as follows:

- o South Florida Coastal Strand on the barrier island
- o Areas on the mainland in the vicinity of the Florida Ridge

The areas of the County having "Excessively Drained Soils" and "Moderately Drained Soils" are areas in which the soil is most suitable for septic systems. Figure 4.2B identifies the soils within Vero Beach which are "excessively to moderately" well drained.

The County Public Health Unit, Division of Environmental Health, requires that a septic system have a minimum of at least 42 inches of good draining soil below the infiltrating surface of the drainfield system. During the months of June through October, the season of greatest rainfall, the water table may be only 24 inches below this infiltrating surface. In light of the limitations imposed by the existing soil, the normal procedure is to deposit fill material on top of the existing soil. This fill material, which provides the depth necessary for the proper operation of the septic system, is usually a sand that is highly porous and can facilitate the treatment of the sewage in the drainfield.

Degradation of the groundwater quality can be caused by septic tank effluent. According to the County Public Health Unit, Division of Environmental Health, there are numerous cases on record of well supplies becoming polluted due to septic tank discharges. Septic tank effluent is of poor quality by today's wastewater treatment standards. These effluent discharges can cause detrimental increases in nitrogen, chloride, sodium, other ions, total dissolved solids, and the microbiological level of the local groundwater.

Proper filtration of the septic tank effluent is accomplished by the leachate passing through a minimum of 42 inches of good draining soil prior to discharging into the groundwater. The County Public Health Unit, Division of Environmental Health requires that drainfields be situated so that the bottom of the drainfield is at least 42 inches above the water table. Fill material or an approved sand filter may be used to meet this requirement. Also, a minimum separation requirement between wells and septic tanks and a minimum lot size requirement must be met. With these modifications, septic tank performance is considered adequate where sewer service is unavailable.

4.0.1 Projections and Plans for the Future

4.0.1.0 Population Projections

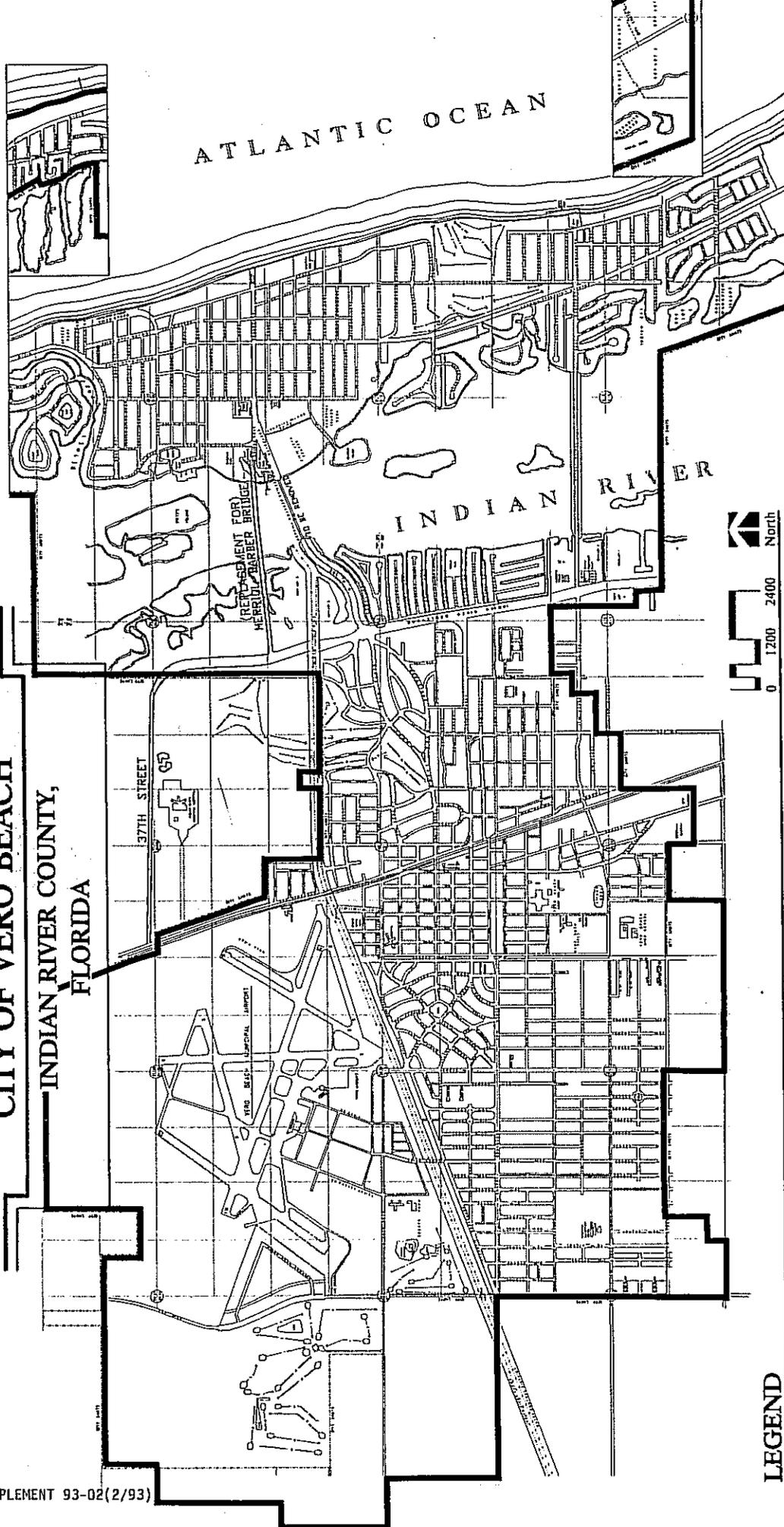
The Bureau of Economic and Business Research at the University of Florida estimates the population of Vero Beach will grow at a .43 percent growth rate for the period between 1990 and 1995. The rate of growth is expected to remain the same through the year 2000. Based on these estimates, the population of Vero Beach will reach 18,284 by 1995 and 18,668 by the year 2000. Since the City of Vero Beach provides wastewater treatment to many County residents, the growth in Indian River County must also be considered.

The County's population is expected to grow faster than the City's population, increasing from 92,600 in 1990 to 108,400 in 1995 and growing to 122,500 by the year 2000.

4.0.1.1 Level of Service and Future Capacity Analysis

The City of Vero Beach is currently providing a level of service of 101 gpcd to the wastewater treatment service area. Thus, the City of Vero Beach adopts a level of service of 101 gpcd for its level of service standard for the wastewater treatment service area.

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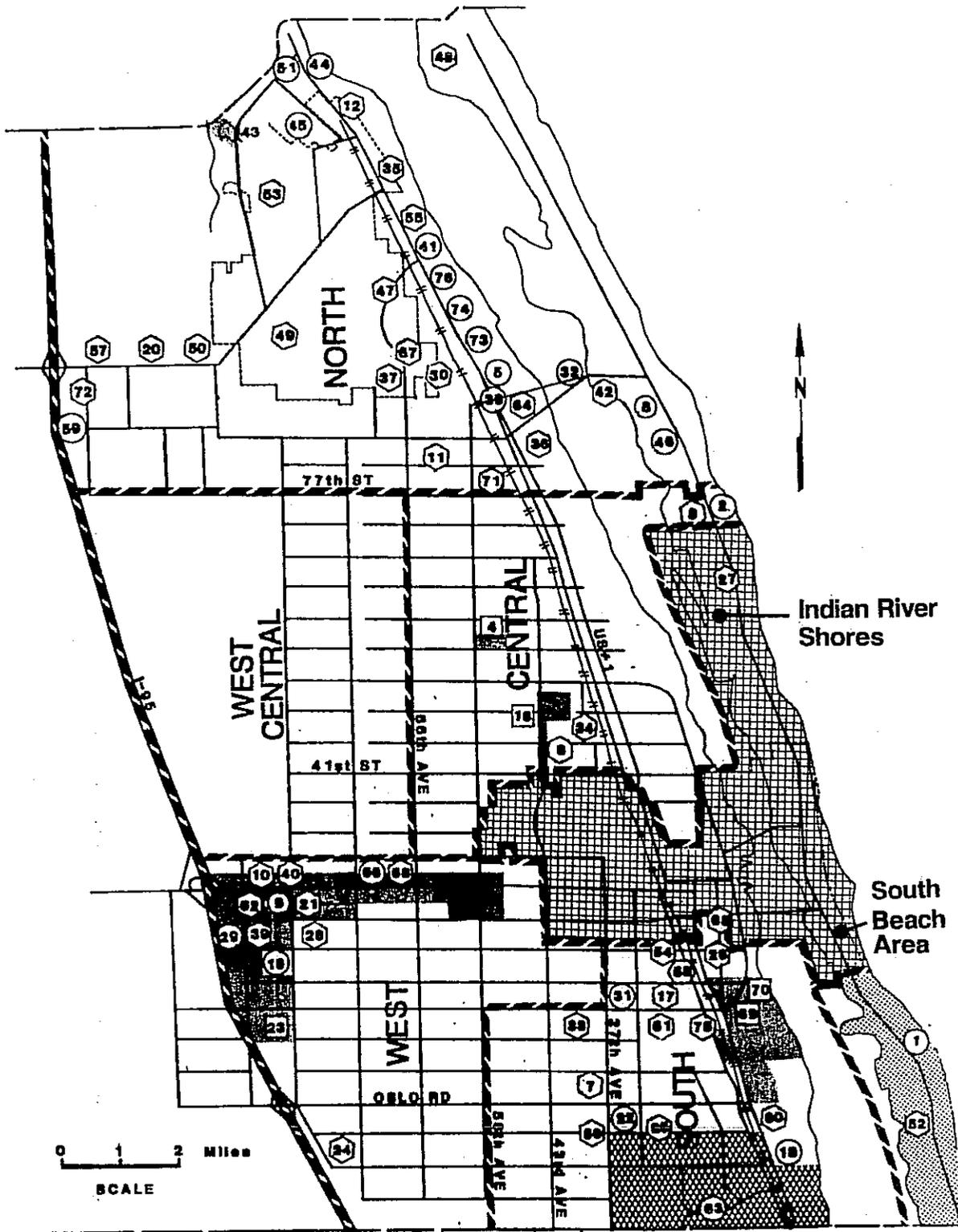
VERO BEACH WASTE WATER SERVICE AREA

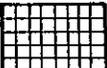
Figure 4.2

Sources: Vero Beach Water and Sewer Department, 1988
RS&H, 1988

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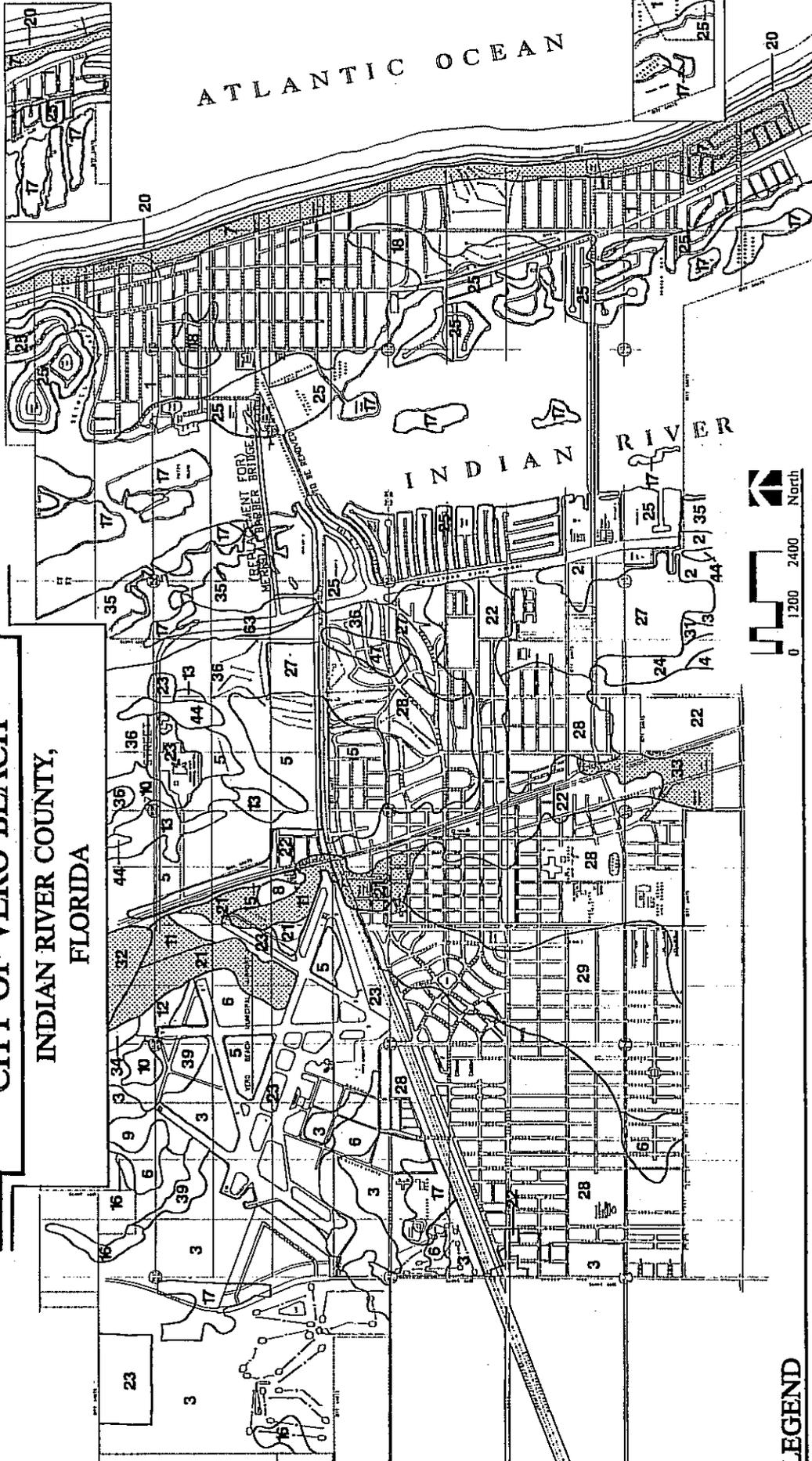



**City of Vero Beach
Sewer Service Area**

**VERO BEACH
WASTEWATER SERVICE AREA**

Figure 4.2A

CITY OF VERO BEACH
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LEGEND

- 1 Canaveral fine sand
- 2 Chohee loamy fine sand
- 3 Eau Gallie fine sand
- 4 Immokalee fine sand
- 5 Myakka fine sand
- 6 Oldemar fine sand
- 7 Palm Beach sand
- 8 Peels sand
- 9 Pepper sand
- 10 Riviera fine sand
- 11 St. Lucie sand
- 12 Archbold sand
- 13 Wabasso fine sand
- 16 Pineda fine sand
- 17 Quartzipsumments
- 18 Captiva fine sand
- 20 Beaches
- 21 Pomello sand
- 22 Urban land
- 23 Arents
- 24. Florida sand
- 25 St. Augustine sand
- 27 Boca-Urban land complex
- 28 EauGallie-Urban land complex
- 29 Immokalee-Urban land complex
- 31 Jupiter fine sand
- 32 Jonathan sand
- 33 Astatula sand
- 34 Satellite fine sand
- 35 McKea mucky clay loam
- 35 Boca fine sand
- 39 Maibor fine sand
- 44 Perrine Varlant fine sandy loam
- 47 Holopaw fine sand
- 63 Keason muck

Excessively to moderately well drained soils

SOIL DRAINAGE CHARACTERISTICS
 Figure 4.2B

IRSH / PLANTEC

Source: SCS, 1987; IRSH, 1990

The City currently provides wastewater service to residents within the City and some residents in the unincorporated County. Based on the number of City wastewater accounts, the City is currently serving approximately 49 percent of its estimated 1988 population. Based on individual County accounts and the number of connections on the County's master meter, the City currently serves eight percent of the unincorporated County's population. If the City continues to provide an LOS of 101 gpcd to its service population, wastewater flows will increase accordingly. In 1995, the service population, including equivalent residential units for commercial and industrial uses, will total approximately 28,156. This increasing service population will increase wastewater flows to 2.8 mgd in 1995, which is well under the existing capacity.

4.0.1.2 Planned Improvements

Indian River County is currently constructing a wastewater treatment plant to provide service to the area generally north of Vero Beach City limits, thus relieving the City of this service responsibility.

The Storm Water Improvement Management (SWIM) legislation authorizes St. Johns River Water Management District to design implementation strategies to improve the water quality of the Indian River and improve storm water management in the area. This could result in qualifications on the amount and quality of effluent that can be discharged into the Indian River. St. Johns River Water Management District has informally notified Vero Beach that it will require some reuse of wastewater. The amount of wastewater which will be required to be reused depends on the sites available for reuse, the amount of effluent produced and the economics of supplying the available sites.

The City is currently developing an effluent reuse master plan. Based on estimates from the plan, 2.0 mgd of effluent will be used for irrigation purposes.

The City has identified various additions and refurbishment projects for their sanitary sewer system in the Five-Year Capital Improvement Program. These improvements are summarized as follows:

- o Phase I and II sewer line replacement in the Moorings area and sewer line relining (7,900 ft.).
- o New pressure cleaning and vacuum truck.
- o Water and Sewer Department office expansion.
- o Phase I and II force mains improvements.
- o Power saving speed controllers for 100 hp blower motors at the wastewater treatment plant.
- o Wastewater treatment plant effluent dechlorination.
- o Replace transmission force main from Lift Station No. 2 to 18th Street along Victory and 20th Avenue.

These projects are scheduled to be completed by the end of 1991.

Additional costs for the effluent reuse system are provided by Boyle Engineering, Inc. in their Draft Report, "Effluent Reuse Master Plan; City of Vero Beach," (November 10, 1989). The proposed costs are for construction of the distribution system and modifications to the wastewater treatment plant and its ancillary facilities. Additional costs in terms of lost revenue will be incurred by the City due to customers using reclaimed water for irrigation instead of potable water. The following summary identifies the estimated costs associated with the reuse program.

The Vero Beach Five-Year Capital Improvement Program for 1989- 1994 has noted the need for an additional \$3,800,00 for the reuse system. This funding will be used for engineering and equipment costs for modifying the treatment plant and implementing the irrigation distribution system on the barrier island.

4.1 POTABLE WATER SUBELEMENT

4.1.0 Existing Conditions

4.1.0.0 Capacity Analysis and Description of Facilities

The City regulates water service under Chapter 17, Utilities Services, in the City Code. Section 17.12 requires all buildings in the City to connect to the City's water system. The City of Vero Beach owns a water treatment plant which has a permitted capacity for a maximum daily flow of 13.8 million gallons per day (mgd). It is permitted for an average daily flow of 7.5 mgd and a peak hour flow of 16.6 mgd. The water treatment plant averaged a maximum daily flow of 9.30 mgd for the first six months of 1988, according to the plant's monthly operating reports. The average daily flow was 8.13 mgd and the peak hour flow was 13.20 mgd.

The plant services approximately 28,227 people providing an average of 288 gallons per person per day. The service population is estimated to consist of the population of Vero Beach and the current service area in unincorporated Indian River County, which includes the Town of Indian River Shores and the South Beach area. The current level of service provided by the water system is 288 gpcd. The proportional capacity of the potable water system allocated to the service areas is as follows: the City of Vero Beach 69 percent; the Town of Indian River Shores 13 percent; and the unincorporated County 18 percent. This proportional capacity is based on the existing service provided to water consumers. As with the sanitary sewer system, the predominant land uses in the service areas are residential. Some commercial and industrial uses are within the service areas. Existing average daily flows for the service area are 5.62 mgd for the City of Vero Beach; 1.02 mgd for the Town of Indian River Shores and 1.49 mgd for unincorporated Indian River County.

The maximum daily flow rating of the water plant is 13.8 mgd. Given a total average daily flow of 8.13 mgd, there is a surplus capacity of 5.67 mgd. Under present conditions, no increase in facility capacity is needed.

The average raw water flow into the treatment plant averaged 274 million gallons (mg) per month in 1987. An average of 22 mg of the raw water was used in the plant itself. A monthly average of 252 mg of finished water was produced. Losses in the distribution system and withdrawals for firefighting resulted in a loss of approximately 27 mg per month or approximately ten percent of the finished water produced.

The raw water is chlorinated and treated with sodium phosphate, anhydrous ammonia and fluoride. Lime is used to soften the water. This treatment results in finished water with a hardness of 206 milligrams per liter (mg/l) from a level of 426 mg/l, a reduction of 48 percent. The finished water has an average

chlorine residual of 3.1 mg/l.

Based on the aforementioned information and the Boyle Engineering Corp. report, Evaluation of Existing and Future Water Supply Facilities, (July 1989), the existing potable water facilities are considered to be in fair to good condition. Minor problems exist and are planned for correction. The long-term life of the facilities is beyond the year 2000.

4.1.0.1 Water Supply and Quality

Vero Beach has a consumptive use permit from the St. Johns River Water Management District which allows them to withdraw 13.6 mgd from their system of wells.

Vero Beach receives its water supply from a system of 29 surficial aquifer wells and four Floridan aquifer wells (Table 4.2). Figure 4.3 shows the locations of the municipal wells. The surficial aquifer extends from the surface to a depth of approximately 150 feet. The water in this aquifer is of good quality and serves as the main source of water for the municipality. The shallow aquifer wells have a total rated capacity of 12,650 gallons per minute (gpm). Currently 11 of the 29 surficial aquifer wells are not being used for the City's potable water supply. The 14 wells currently in use have a total rated capacity of 7,900 gpm.

The Floridan aquifer lies at a depth of 300 to 600 feet below the surface. The quality of water in the Floridan aquifer is more variable than that in the shallow aquifer and it has been used primarily for irrigation. It was recommended that the City use the Floridan aquifer to increase its water supply. The City now has four deep wells into the Floridan aquifer with a rated capacity of 4,600 gpm. Combining the surficial wells with the Floridan aquifer wells, the City has 14,900 gpm of water available.

The City of Vero Beach maintains monitoring wells between the Indian River and the City's well fields to monitor saltwater intrusion. Samples from these wells are tested quarterly and a report on the results is sent to the St. Johns River Water Management District. There have been no problems with saltwater intrusion to this date. The Indian River County Soil Survey released in 1987 by the Soil Conservation Service states that there are impermeable materials between the Indian River and the shallow aquifer, protecting against saltwater intrusion.

The City has water storage facilities with a total capacity of 7.775 million gallons (mg). Ground storage capacity accounts for 7.25 mg of storage while elevated facilities have a capacity of 525,000 gallons (see Figure 4.4). A breakdown of storage facilities is listed in Table 4.3.

4.1.0.2 Service Boundaries

The City of Vero Beach provides water service to the City of Vero Beach and a number of areas outside the City limits (see Figure 4.5). Most of the water agreements are based on the water and wastewater service agreement between the City of Vero Beach and Indian River County signed in 1973. The City currently serves the South Beach area of the island which includes everything south of the City limits to the County line, and the entire town of Indian River Shores excluding Baytree which is provided water by the North Beach Water Company. On the mainland, the City provides water service to the Indian River Memorial Hospital area north of the City limits, the Gifford area north of the airport, an area along the southwest corner of the City limits and an area south of the western part of the south City limits.

Table 4.2 Vero Beach Wells and Ratings

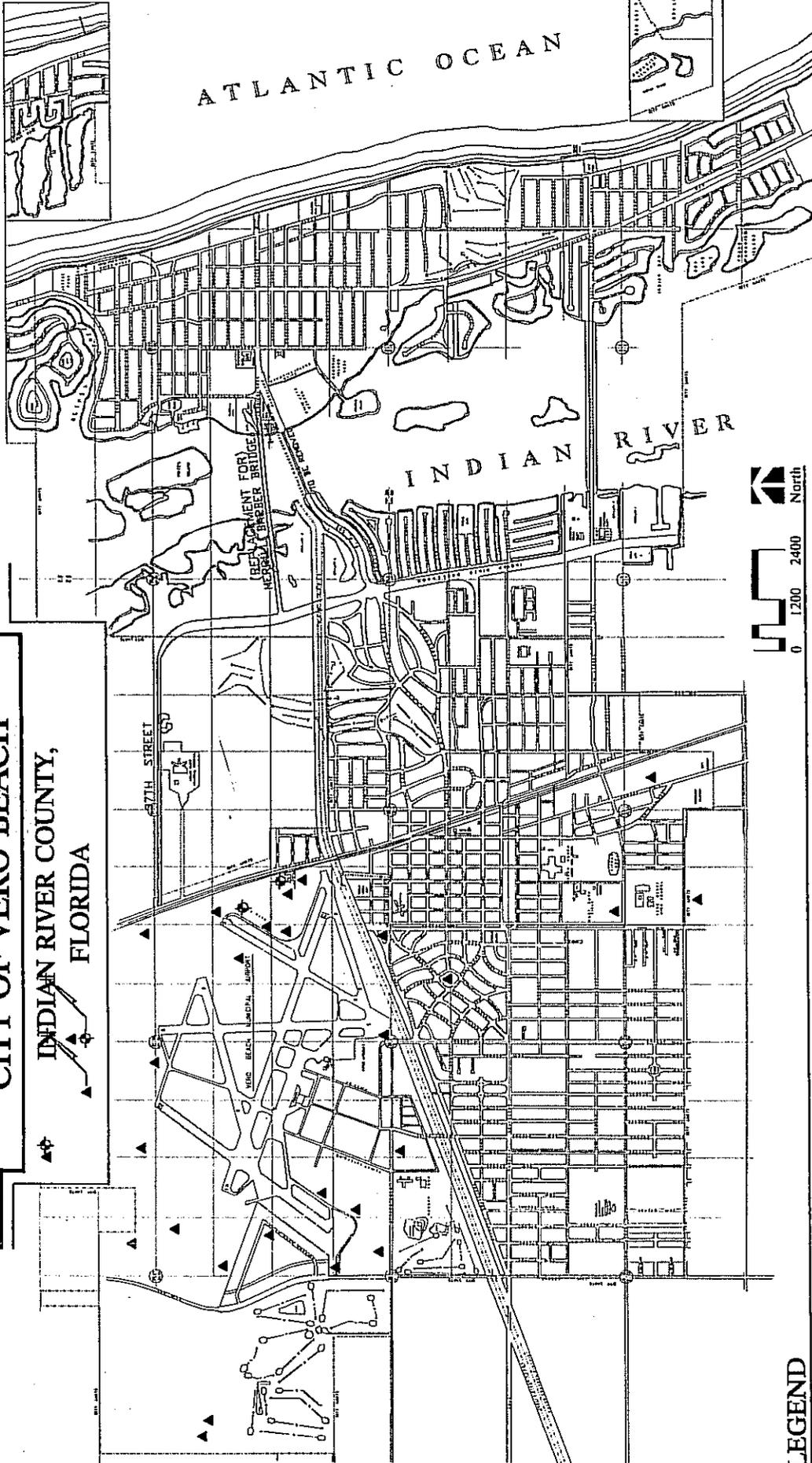
Well Number	Rating gal/min
Shallow Aquifer Wells	
1	400
2	150
3	150
4	200
6	400
7	400
8	400
9	700
10	600
11	600
12	400
13	250
15*	500
16*	400
17*	250
18*	500
19	700
20	400
22*	500
23*	450
24*	500
25	500
26	250
28*	500
29	700
30	700
C1*	450
C2*	350
C3*	<u>350</u>
Total	12,650
Floridan Aquifer Wells	
5	1,200
14	1,200
21	1,000
31	<u>1,200</u>
Total	4,600

Note: The rating for each well is the maximum safe yield.

*Well currently not being used for water supply.

Sources: Vero Beach Water and Sewer Department, 1988; RS&H, 1988

CITY OF VERO BEACH
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SUPPLEMENT 93-02 (2/93)

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- ▲ Surficial Aquifer Wells
- Floridan Aquifer Wells

7/92

VERO BEACH WELL LOCATIONS

Figure 4.3

Source: Vero Beach Water and Sewer Department, 1988
 RSH, 1988

RSH / PLANTEC

SEPTEMBER

Table 4.3 Vero Beach Water Storage Facilities

Facility	Capacity (gallons)
<u>GROUND STORAGE</u>	
Water Treatment Plant	
Tank A	1,000,000
Tank B	1,000,000
Tank C	2,000,000
Memorial Island Park	1,000,000
Vero Beach Airport	500,000
A1A and Fred Turek Dr.	1,000,000
The Moorings	<u>750,000</u>
 Total Ground Storage	 7,250,000
<u>ELEVATED STORAGE</u>	
Mainland	250,000
Indian River Shores	100,000
Memorial Island Park	75,000
The Moorings	<u>100,000</u>
 Total Elevated Storage	 525,000
 Total Water Storage	 7,775,000

Sources: Vero Beach Water and Sewer Department, 1988
RS&H, 1988

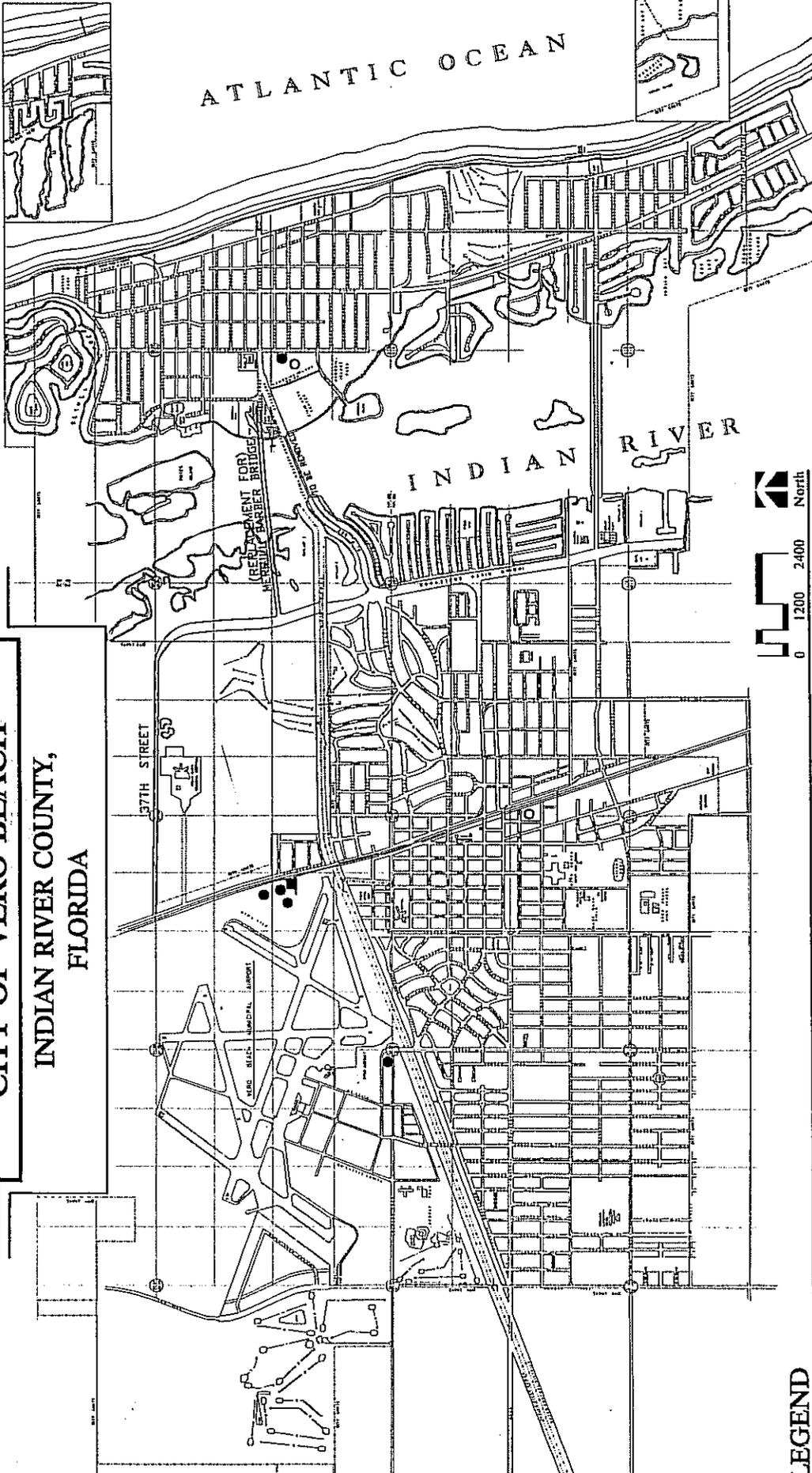
4.1.1 Projections and Plans for the Future

4.1.1.0 Level of Service and Future Capacity Analysis

The City's water system is currently providing a level of service of 288 gpcd to the service area. The City has adopted a level of service standard of 288 gpcd for the water service area for the future.

The City currently provides water to its residents and an area of the unincorporated County which contains about 12 percent of the County's population. Based on the population estimates by Hunter/RS&H, and assuming that the City continues to serve the same service area in the County, the service population would increase to 35,236 in 1995. The service population consisting of permanent and seasonal residents includes 21,302 persons in the City of Vero Beach; 4,443 persons in the Town of Indian River Shores; 4,707 persons in the South Beach area; and 4,784 persons in unincorporated Indian River County. At the present level of service, the average water demand in 1995 would be 10.15 mgd.

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SUPPLEMENT 93-02 (2/93)

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- Water Treatment Plant
- Ground Storage
- Elevated Storage

- Note: Locations of Facilities Outside The City Limits:
- The Moorings
- Fred Tuerk DR. & A-1-A
- Indian River Shores

VERO BEACH WATER TREATMENT PLANT AND WATER STORAGE FACILITIES

Figure 4.4

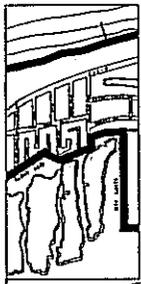
Sources: Vero Beach Water and Sewer Department, 1988
 RS&H 1988

RS&H / PLANTEC

SEPTEMBER 1989

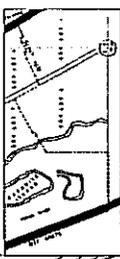


To Indian River Shores
North City Limits



ATLANTIC OCEAN

To Indian River Cou
South County Line



VERO BEACH WATER SERVICE AREA

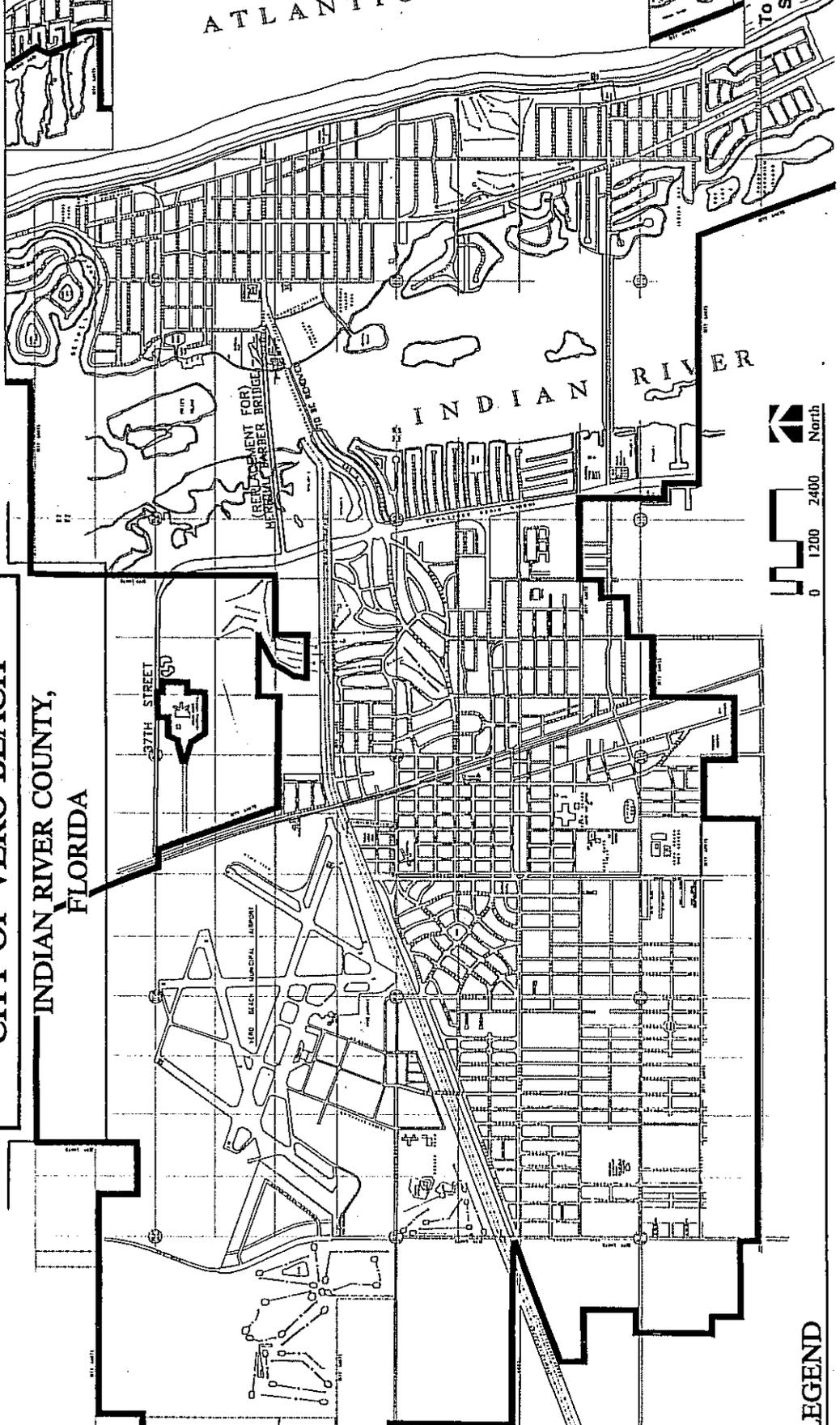
Figure 4.5

Sources: Vero Beach Water and Sewer Department, 1988
RS&H, 1988

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RS&H / PLANTEC

CITY OF VERO BEACH INDIAN RIVER COUNTY, FLORIDA



LEGEND

This would result in a capacity surplus of 3.65 mgd in 1995. The City effluent reuse program will create an approximate 2.0 mgd reduction in potable water demand. This reduction, coupled with the probable loss of the unincorporated Indian River County service area by 1995, will result in a reduction in demand of 3.38 mgd on the potable water system. A capacity surplus of 7.03 mgd would result.

In the year 2000, the service population will include 21,967 persons in the City of Vero Beach; 5,054 persons in the Town of Indian River Shores; 5,837 persons in the South Beach area; and 4,714 persons in unincorporated Indian River County for a total service population of 37,572. At the present level of service, the average water demand in 2000 will be 10.82 mgd. With the proposed effluent reuse program and loss of service area in unincorporated Indian River County, the average water demand in 2000 would be lowered to approximately 7.47 mgd. Based on the possible reductions in demand on the system, by the year 2000 a surplus capacity of 2.0 mgd to 6.5 mgd will exist.

In addition to repermitting the existing water plant, the City has plans to increase the capacity of its water plant by six mgd during the planning period. If the plant is expanded by six mgd, it would further ensure that sufficient capacity is available to serve the City and the County areas currently being served through the year 2000.

4.1.1.1 Planned Improvements

Indian River County is negotiating with the North Beach Water Company for the purchase of the company. This company currently serves an area on the northern barrier island. The County plans to begin providing water service to the Gifford area and the hospital area on the mainland concurrent with its provision of wastewater service.

The City has asked the Florida Department of Environmental Regulation (FDER) to re-permit its water treatment plant to a higher capacity. The City is also planning to build a reverse osmosis water treatment plant to supplement the current plant. Water from the reverse osmosis facility would be blended with water from the existing plant. The new facility would have a capacity of six mgd according to the City's water and sewer department. The City hopes to get the project under way in 1990 and the project is included in the City's five-year Capital Improvement Plan. Additionally, the City has recently completed an evaluation of its water supply facilities and plans to make minor updates to the system according to the evaluation.

The SJRWMD has expressed concerns about the level of water consumption per capita in the Vero Beach area. Vero Beach's per capita usage is one of the highest in the district. Vero Beach currently has a resource conservation program in place to promote conservation of electricity and water. One element of the program is a free resource conservation home survey. This entails an inspection of the house's hot water heater and sprinkler system for leaks, free installation of water saving shower heads and changes in the sprinkler system to make them more efficient. In addition, each month a computer program prints out a "high usage" list for those accounts which used more water during the month than usual. Notices are sent to those accounts encouraging them to have someone from the resource conservation program come out and check for leaks. In addition, the rate for water service is on an inverted scale so that the rate increases as water use increases in an effort to promote conservation.

In an effort to further reduce potable water demand, the City is studying the feasibility of implementing an effluent reuse system for irrigation purposes. The "Effluent Reuse Master Plan" was prepared by Boyle Engineering Corp. (November 10, 1989). The City intends to implement the report recommendations within the next five years. The plan evaluates the use of treated effluent for irrigation purposes in specific sections of the service area. The area considered for effluent reuse is the barrier island.

The study estimated that an immediate reduction of at least 0.37 mgd would result if all of the major uses connected to the system. It also estimated that when the City wastewater treatment plant reaches its rated design capacity of maximum effluent production, a potential reduction in potable water demand of 2.0 mgd is likely.

4.2 SOLID WASTE SUBELEMENT

4.2.0 Existing Conditions

4.2.0.0 Description of Service and Equipment

The City of Vero Beach provides solid waste collection only within the Vero Beach City limits. Solid waste collection and disposal are regulated under Chapter 15 of the City Code. Any resident within the City limits who has a utility meter is charged the minimum charge for garbage service. Residential garbage pick-up is provided twice a week on a Monday and Thursday schedule for those residences east of the Florida East Coast Railroad and on a Tuesday and Friday schedule for those west of the Railroad. There is an additional Wednesday trash pick-up of yard trimmings and tree limbs. The City has approximately 20 contracts for weekly Wednesday service and receives additional requests for one-time Wednesday service throughout the year.

Commercial garbage pick-up is provided five days a week for non-containerized garbage. Containerized garbage pick up varies from two to six days a week depending on the customer's needs. Extra pickups are available upon request. The City will not provide collection or disposal services for construction materials, industrial wastes, rubber tires, hazardous wastes, citrus pulp or oyster shells. The City has stated that it will refuse service to customers who dispose of tires in the City's containers.

The City of Vero Beach has 6,041 residential accounts for solid waste collection. There are an additional 235 multifamily housing units served by containers and 1,374 commercial customers. The City picked up a total of 20,004 tons of solid waste in the year ending April, 1986. This included 267 tons from the Wednesday trash service. Excluding Wednesday service, the population of Vero Beach produced 19,737 tons of solid waste in 1986. Using the planning department's estimate of the population in 1986, 1.14 tons of solid waste were generated by person per year. This results in an average daily production of 6.3 pounds of solid waste per person.

The City owns eight 25 cubic yard rear-loading garbage trucks and four 35 cubic yard front-loading garbage trucks. There are five residential routes on the mainland and five residential routes on the island. The residential routes are serviced by the rearloading garbage trucks. Three of the front-loading garbage trucks are required for commercial service. These trucks service commercial customers on the mainland and on the island. The fourth front-loading truck is a back-up truck.

4.2.0.1 Disposal Site

The City of Vero Beach disposes of its solid waste in the County landfill located in the southwest area of Indian River County. The landfill opened in 1978 to serve as the sole disposal area for all of Indian River County. The landfill as currently configured occupies 230 acres and has a design capacity of approximately 13.8 million cubic yards. The remaining capacity is 4.87 million cubic yards which will provide service until 2020.

The service area, which includes Indian River County in its entirety, consists of residential and commercial land uses in the eastern half of the County and rural and agricultural land uses in the western half of the County. The service area places a current demand of approximately 0.23 million cubic yards annually on the landfill facility.

The location of the landfill, far from major residential areas and from any potable water facility, has a minimal impact on the environment. Additionally, the operation of the landfill is of high quality, and the staff uses the existing facility in an efficient manner. These factors, coupled with sufficient capacity for the next 25-to-30-year period, preclude a need for any plans for the replacement, expansion or siting of a new facility within the planning period.

Vero Beach residents are presently charged \$31.50 per year for their per-capita share of landfill fees. This fee should not increase substantially throughout the planning period because Vero Beach's proportion of solid waste generation will remain below that amount generated by the County population.

4.2.0.2 Population Projections and Level of Service

If the amount of waste generated per capita remains the same, the City of Vero Beach can expect to generate an average of 136,483 pounds of solid waste per day in 1995 at a level of service of 6.3 pounds per capita per day (ppcd) or a total of 24,908 tons for the year. In the year 2000, the total solid waste generated in the year would total approximately 26,259 tons, an average of 143,885 pounds per day, at a 6.3 ppcd level of service.

4.2.0.3 Planned Improvements

The City is in the process of modernizing its Public Works Solid Waste Facility. This construction is planned to provide for the City's expansion during the next 20 years.

Resource recovery is currently being examined by the City in concert with Indian River County to reduce the volume of trash going to the landfills by 30 percent by 1994.

4.3 DRAINAGE SUBELEMENT

4.3.0 Regulatory Agencies

A description of governmental agencies having stormwater jurisdiction within the City of Vero Beach is contained in the Draft Drainage Element of the Comprehensive Plan for Indian River County (September 1, 1989) and is adapted to Vero Beach in Sections 4.3.0.0, 4.3.0.1 and 4.3.0.2.

4.3.0.0 Federal Agencies

The U.S. Federal Emergency Management Agency completed a Flood Insurance Rate Study for Indian River County in 1988. This study included a technical analysis (performed under contract by Gee and Jensen Consulting Engineers, West Palm Beach, Florida) of the entire County to determine the limits of Coastal Flood Zones, the 100-year floodplain, and the 500-year floodplain. Classical floodways and manmade channels were analyzed using the U.S. Army Corps of Engineers HECI and HECII Stormwater Computer Model. As a result of the study, this comprehensive analysis of flood elevations has provided useful data to regulate floodplain and floodway encroachment.

The U.S. Soil Conservation Service completed a detailed soil survey for Indian River County in 1987. This soil survey is useful in determining the drainage and percolation capacity of soils. The soil survey has recently been digitized and will be used to analyze watershed conditions.

The U.S. EPA reviews dredge and fill permit applications under the U.S. Army Corps of Engineers permitting authority. Both agencies monitor and permit fill activity along the Indian River Estuary where flood-prone wetlands provide floodwater storage.

4.3.0.1 State of Florida Agencies

The Florida DER, under the authority of FAC Chapter 17-25, reviews and permits stormwater discharge into waters of the State so that State water quality standards are not exceeded. In 1986, permit authority was delegated to the St. Johns River Water Management District.

St. Johns River Water Management District, under the authority of 40C-4, Florida Administrative Code, regulates the management and storage of surface waters within the St. Johns River Basin. The City of Vero Beach is located within the upper basin of the St. Johns River. Recently, the SJRWMD purchased 60,000 acres of land in western Indian River County for construction of a conservation reservoir to store fresh water. Florida Department of Transportation, under the authority of Florida Statutes Chapter 335.02, owns and maintains numerous drainage facilities which provide drainage for major arterial roads within Indian River County and the City of Vero Beach. The US Highway 1 corridor is drained by numerous outfall ditches and canals. These canals have defined many drainage basins east of the One Mile Coastal Ridge. The DOT reviews and approves permit connections to DOT drainage systems.

4.3.0.2 Local Agencies

Secondary drainage facilities within the City of Vero Beach are similarly maintained by the City. Chapter 73, Article II of the Code of Ordinances of the City of Vero Beach establishes the master drainage planning efforts by Reynolds, Smith and Hills as the Master Plan for the installation of drainage facilities providing for the proper drainage of water within the City.

FS Chapter 298 Drainage Districts have the authority to construct and maintain primary drainage facilities within their authorized boundaries. The Indian River Farms Water Control District (IRFWCD) is the only district applicable to the limits of the City of Vero Beach.

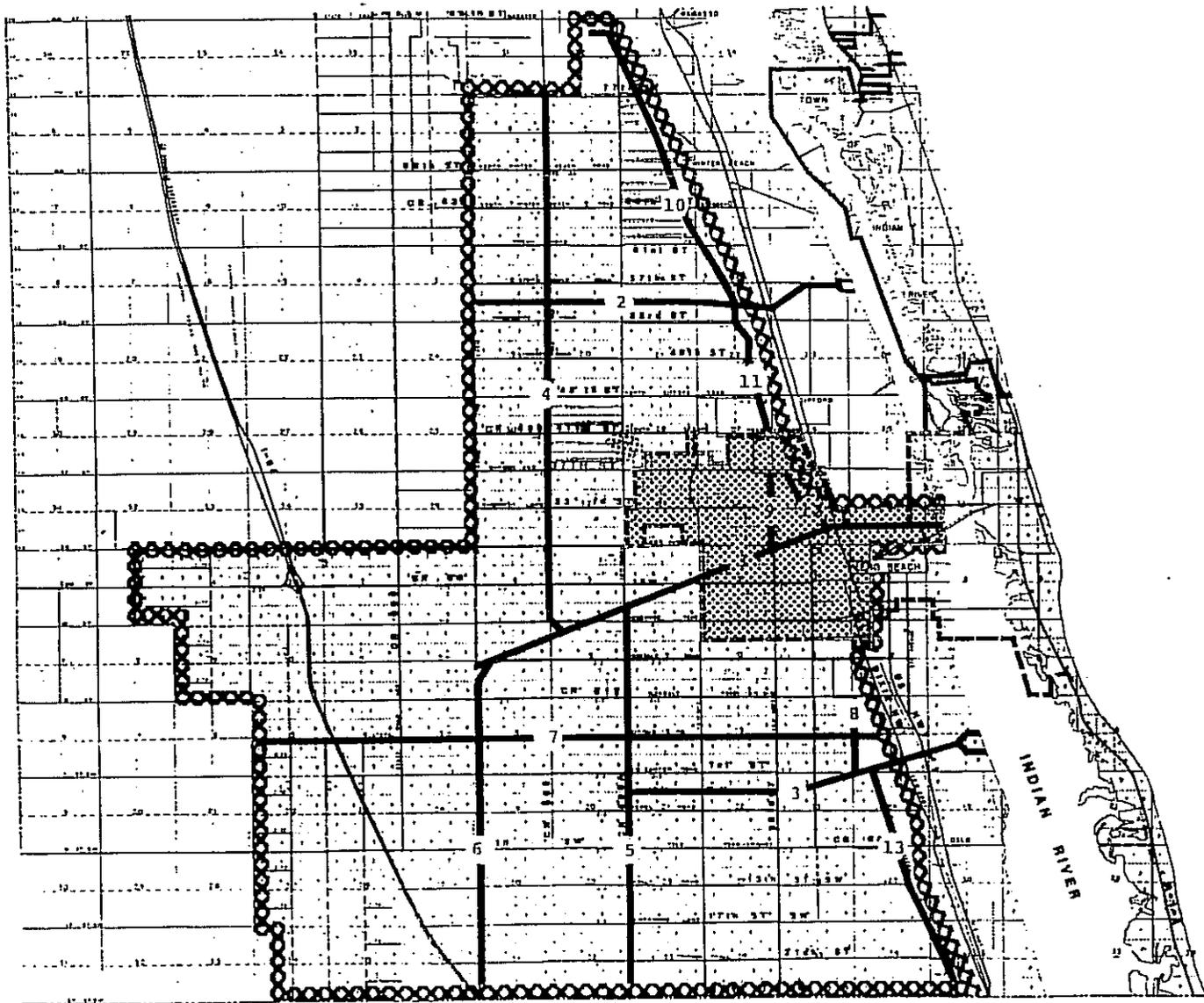
Incorporated municipalities have home rule powers to construct and maintain drainage facilities within their City-owned easements, rights-of-way and property.

Privately owned developments within both the City and County own and maintain private drainage systems. Most private drainage facilities were constructed after 1977 and state and local permits were obtained, thereby ensuring conformance with water quality and quantity standards. Proper maintenance of these facilities is required by Chapter 73 of the City code.

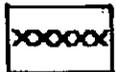
4.3.1 Existing Drainage System

Vero Beach is located between two large ridges which parallel the coast in eastern Indian River County. It is a wide, shallow, relatively flat area which serves as a natural drainage catchment area. The Vero Beach area lacks natural streams for storm water management and therefore depends on artificially created drainage facilities.

The existing stormwater drainage system for Vero Beach consists of three areas. The first is that area consisting of the Indian River Farms Water Control District (IRFWCD) conveyance network that serves the majority of the Vero Beach mainland (see Figure 4.6). This area will be referred to as the M-series basin. The second area is that portion of Vero Beach on the mainland outside the boundary of the IRFWCD (see Figure 4.7). This portion will be referred to as the R-series basin in which Vero Beach has primary jurisdiction for drainage facilities. The remaining section of Vero Beach jurisdiction is on the barrier island which is shown in Figure 4.8; this is referenced as the Beaches-series basin.



Vero Beach



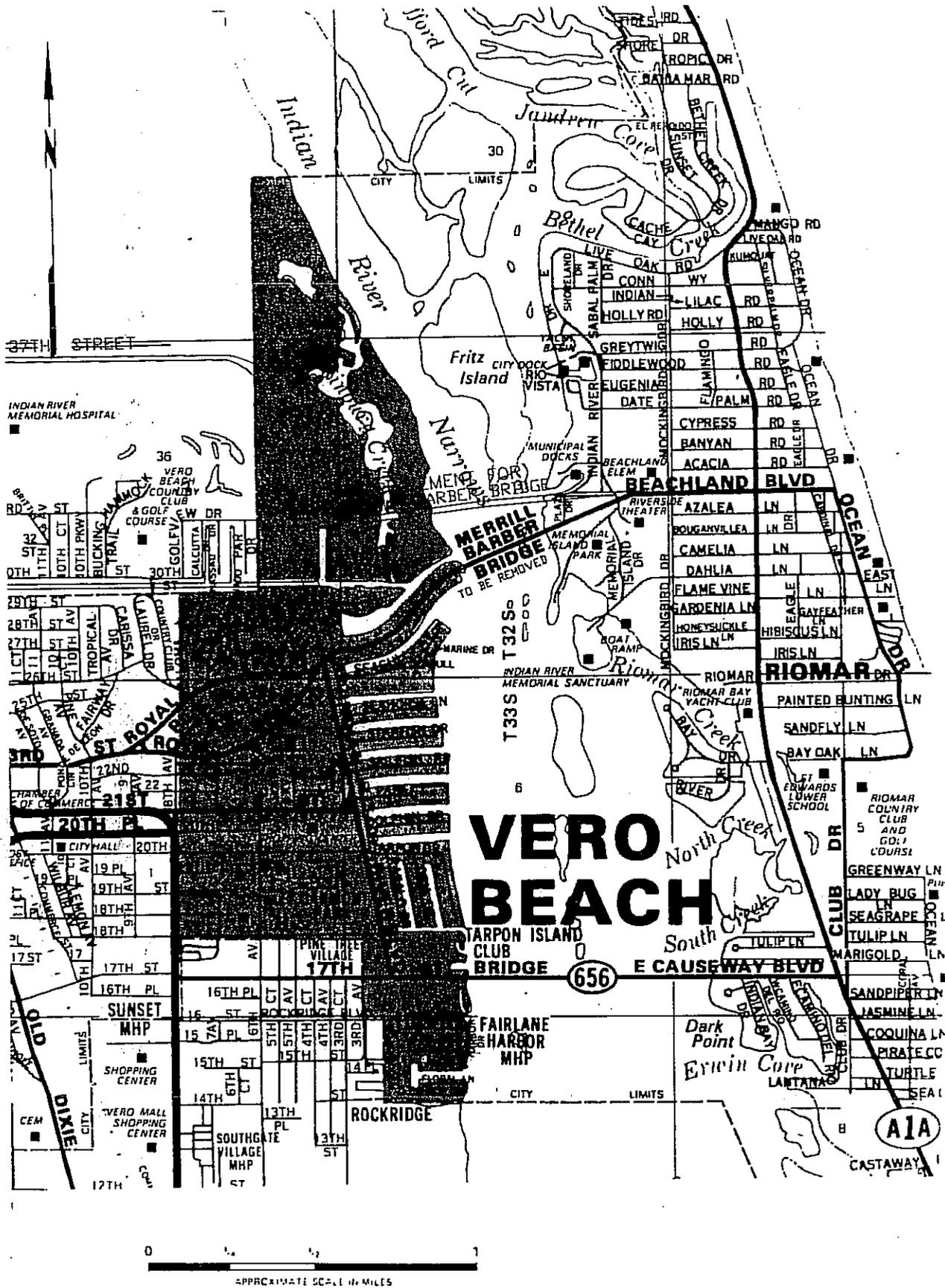
District Boundary

M-SERIES BASIN AND INDIAN RIVER FARMS WATER CONTROL DISTRICT

Figure 4.6

Primary Drainage Facilities

- | | |
|------------------------|--------------------|
| *1. Main Canal | |
| 2. North Relief Canal | *9. Lateral "F" |
| *3. South Relief Canal | 10. Lateral "G" |
| 4. Lateral "A" | 11. Lateral "H" |
| 5. Lateral "B" | *12. Lateral "I" |
| 6. Lateral "C" | 13. Lateral "J" |
| 7. Lateral "D" | |
| 8. Lateral "E" | *Within Vero Beach |



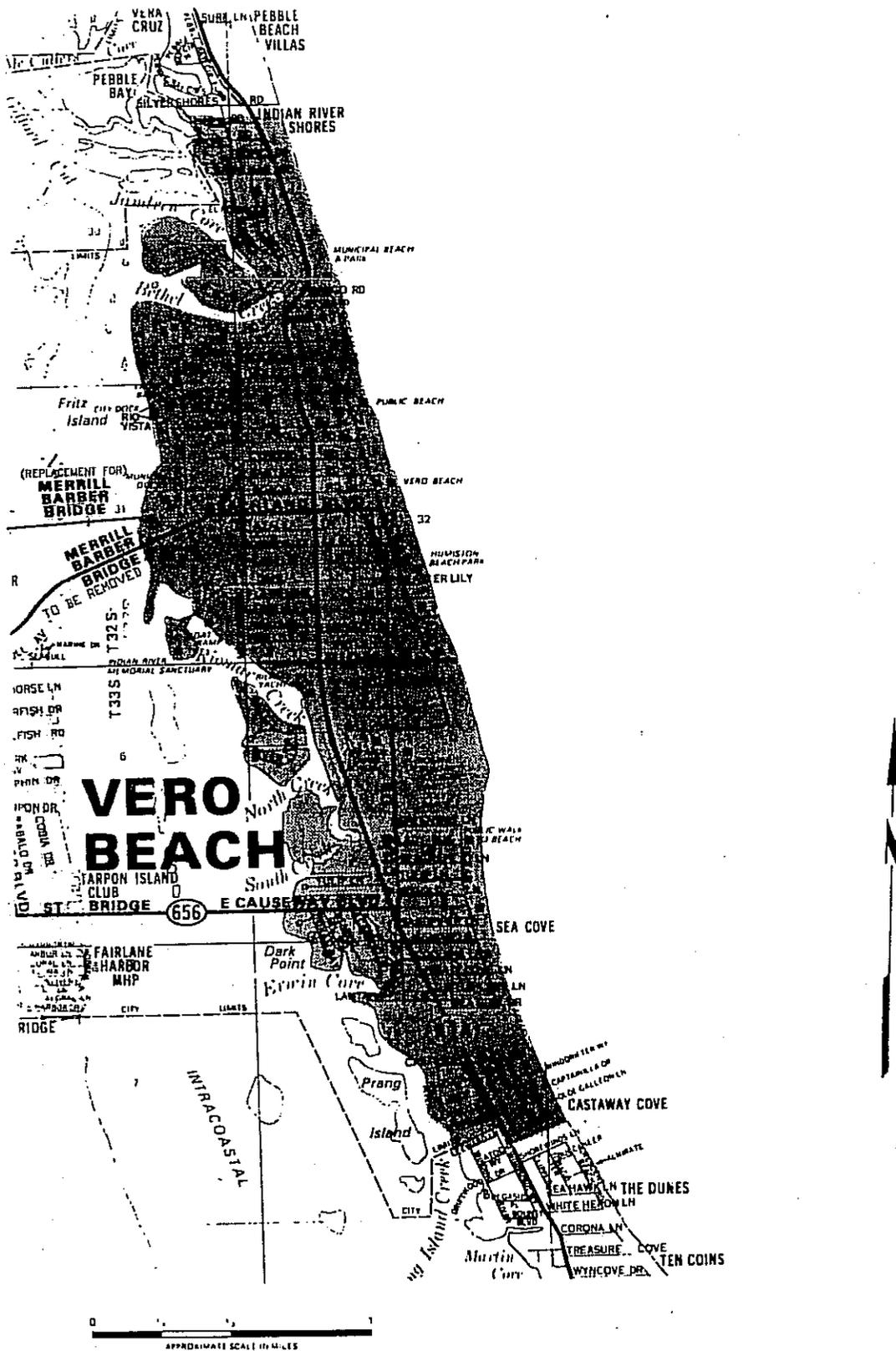
 City of Vero Beach Jurisdiction

Sources: Indian River County, 1989; RS&H, 1990

SUPPLEMENT 93-02 (2/93)

R-SERIES BASIN

Figure 4.7



 City of Vero Beach Jurisdiction

No County Facilities
or Jurisdiction Exists

Sources: Indian River County, 1989; RS&H, 1990

SUPPLEMENT 93-02 (2/93)

BEACH-SERIES BASIN

Figure 4.8

4.3.2 Drainage System Service Areas

4.3.2.0 M-Series Drainage Basin

The Indian River Farms Water Control District (an FS 298 Special Drainage District) geographically is one of the largest of the five water control districts in Indian River County and has the greatest number of miles of canals.

The district boundaries include 49,915 acres of land, within which 320 miles of drainage canals provide primary positive drainage to the Indian River Lagoon. Secondary swales, backlot ditches, and small channels discharge local watersheds into the canal system. The entire district is shielded from outside inflow by a system of levees. The overall basin is a composite of three individual watersheds connected by equalizing canals and of three individual watersheds connected by equalizing canals and drainageways. Outflow is by gravity through three major outfall canals; the Main Relief Canal, the North Relief Canal, and the South Relief Canal. The Main Relief Canal and South Relief Canal are the primary IRFWCD facilities to receive runoff from Vero Beach. The associated drainage area is approximately 1,805 acres. Only the Main Canal is within the City limits.

Although originally developed for the purpose of draining lands for agricultural production, Indian River Farms Water Control District currently has over two-thirds of Indian River County's urban canal system. Except for portions of the Main Relief Canal, the North Relief canal, and the South Relief Canal, the district is located west of the Atlantic Coastal Ridge

Figure 4.6 shows the jurisdiction of the District as related to the City boundaries as well as the layout of the District's canal system.

Primary drainage outfall canals within Basin M-1 are the jurisdiction and maintenance responsibility of the IRFWCD as authorized by Florida Statutes Section 298. The District has a regular maintenance program to clean the canal system and operate flood control gates. Within the District, the City of Vero Beach and Indian River County have jurisdiction and maintenance responsibilities for secondary drainage swales, ditches, and related culverts. Indian River County funds maintenance and minor construction activities through ad valorem taxes generated within the unincorporated area. Vero Beach funds maintenance of secondary facilities through general ad valorem taxes.

The IRFWCD, due to water quality concerns within the Indian River Lagoon, has not substantially increased outfall capacity from the District to the Indian River since 1930. The District's philosophy has been to maintain discharge on a status-quo basis.

The District's canal system is comprised of three different categories of canals. These are as follows:

- o Relief canals
- o Lateral canals
- o Sublateral canals

Sublateral canals are spaced at one-half mile intervals, run east and west, and connect to a lateral canal system. The sublateral canals drain an area approximately one-quarter mile north and south of the sublateral canal, and they drain specific land uses and transport the stormwater to the lateral canals.

The lateral canals connect the sublateral canals and the relief canals. Their main function is to transport the water from the sublateral canals to the relief canals. Presently, there are ten lateral canals, labeled "A" through "J" (see Figure 4.6).

There are three major water control structures on the relief canal system. The purpose of the flood control structures is to prevent saltwater intrusion into the western portion of the County and to control the level of the canal for agricultural irrigation purposes. There are two flood control structures on the Main Relief Canal. One is just east of 43rd Avenue and the second is located near the Vero Beach Country Club. There is one flood control structure on the South Relief Canal. It is located just east of 27th Avenue. There are no flood control structures on the North Relief Canal.

Land Use - A 1983 estimate provided the following percentage breakdown of land uses in the District:

Citrus Groves	45%
Improved Pasture	25%
Miscellaneous	17%
Range/Forest	<u>13%</u>
Total	100%

Within Vero Beach City limits, the land uses are predominantly urbanized with residential being the highest percentage (see Section 1.1.0).

Soils--There are five main soil types occurring. They are:

Astatula,	Immokalee,	Eau Gallie,
Archibold,	Myakka,	Oldsmar,
St. Lucie,	Satellite,	Wabasso,
Riviera,	Winder,	
Pineda,	Riviera	
Wabasso,	Manatee	

The surface soils are fine sands ranging in depth from 12 to 60 inches and having a very high permeability. Subsoils are organic hardpans, clays and marls of varying thickness and hardness.

The average elevation of the land is 22.0 feet NGVD. The steepest slopes are located along the west side of the Atlantic Coast Ridge, where the elevations change about one foot for every 1,000 feet in horizontal distance. The remaining areas of the District and Vero Beach are flat with slopes on the order of 0.1 feet per 1,000 feet.

Capacity Analysis--The recent IRFWCD study dated August 1988, analyzed the capacity of the entire basin. The EPA Stormwater Management Computer Model (SWMM 3) was used to evaluate capacity. The results of the modeling effort identified areas within the District where existing flooding occurs for the ten-year, 25-year and 100-year rainfall event. As a result of the study, the following evaluation is presented.

Evaluation of Existing System--It was determined that large sections of sublaterals in the District are constricted due to extensive culverting. These areas are indicated by low flow in the canals and areas that

have high head losses. The majority of these areas are, as expected, found in highly impervious urban areas where extensive culverting has taken place. Areas with canal constrictions and low ground elevations are subject to frequent flooding. The IRFWCD study also states that:

1. Design flow east of the spillway on the main canal are shown to be flooding the salinity control structure and stage elevations top the outfall canal bank. A redesign of the salinity weir and deepening of the outfall canal should be considered.

2. A list of flooding nodes with minimum 0.8 feet of maximum flooding in a ten-year storm is included within the report. The probable cause and the conduit associated with the flooding is also listed. Some of the culverts in the problem area should be replaced with recommended design sizes to eliminate flooding.

The total discharge for the District under various storms was found to be as follows:

Facility at Peak <u>24-Hour Discharge</u>	<u>100-Year</u>	<u>25-Year</u>	<u>Ten-Year</u>
South Canal Avg.	3706.9 CFS	3133.8 CFS	2576.2 CFS
Main Canal Avg.	3699.2 CFS	3079.2 CFS	2595.5 CFS
North Canal Avg.	2622.1 CFS	2138.3 CFS	1806.8 CFS
Total Volume Discharged in 96 Hours	33068 Ac-Ft	26854 Ac-Ft	22269 Ac-Ft

Overall, the average peak discharge capacity of the system is:

100-Year	4.8"/24 Hr.	(128.4 CSM)
25-Year	4.0"/24 Hr.	(106.9 CSM)
10-Year	3.3"/24 Hr.	(89.3 CSM)

The above flow capacities are achieved with the system experiencing some flooding. Generally speaking, locations east of the Coastal east ridge will not experience flooding because of the District's canals. Some areas between the coastal and western ridges show flooding due to general low ground conditions.

Recommendations and Level-of-Service Standards for the District--Based on the examination of the SWMM Model results as well as other information gathered on the District, the following recommendations are presented in the IRFWCD report.

1. For any culvert proposed to be installed in the District's sublaterals, the District should require the following sizes.

<u>Size of Pipe</u>	<u>Location</u>
84" RCP	On sublateral located within one-half mile of a lateral

72" RCP	On sublateral located between one-half mile to one mile of a lateral
60" RCP	On sublateral located beyond one mile of lateral

Exception to this would be for Sublateral D-4 and D-5 which should be the following:

<u>Size of Pipe</u>	<u>Location</u>
84" RCP	On sublateral within one mile of Lateral D
72" RCP	On sublateral between one and two miles of Lateral D
60" RCP	On sublateral beyond two miles of Lateral D

These sizes would give the sublaterals near their original design flow capacity. The District needs to be cautious of oversizing sublaterals which would increase flow to the laterals and cause additional flooding of the laterals as well as additional runoff for the District.

2. The inverts of proposed culverts in the sublaterals should be near their original design elevation. The invert of proposed culverts to be installed in the ridge area, i.e., areas between Lateral A and (Lateral G and Lateral H) and between Lateral B and (Lateral E and Lateral J) should have invert elevations of at least one foot above the control gate's high elevation (minimum high invert elevation 17.5 feet). This minimum elevation needs to be maintained to prevent flow bypassing the radial gates.

3. Because of road construction by Indian River County and others on right-of-way adjacent to canals, the existing canal side slopes are too steep from a safety, as well as aesthetic, standpoint. Many of the sublaterals will probably be culverted, thus eliminating their side slope problem. However, the laterals and outfall canals need to be studied to determine the best way to flatten side slopes if right-of-way is available for that purpose and is not being utilized by other public bodies for road and other utility purposes.

4. The District should seek additional storage area to improve water quality treatment in the canals and to provide storage for quantity abatement.

This end could be achieved through setting aside approximately four percent of all new development for Water Management downstream of the site discharge. This additional storage area for the District will provide water quality treatment in the system and reduction of discharge from the District, as well as providing additional irrigation water.

5. The allowable discharge for the district as a whole should be limited to 3.5 inches in 24 hours which will be 95 CSM (cubic feet per second per square mile) for the 25-year storm. New developments should be designing for this allowable discharge. However, if the additional storage area of four percent, mentioned in 4, above, is not set aside, then the discharge should be limited to 1.5 inches in 24 hours for the 25-year storm.

6. No net floodplain encroachment should be allowed below elevations shown on 100-year stage/contour map. Any fill added under this elevation should be cut at a different location to provide the same storage for flood protection.

Information for this section was taken from the Draft Indian River Comprehensive Plan (September 1989).

4.3.2.1 R-Series Drainage Basin

This drainage basin is comprised of the lands within the City of Vero Beach, east of the IRFWCD and west of the Indian River Lagoon (see Figure 4.7). The area of the basin is approximately 840 acres and is irregular in shape. The lands in the basin are quite developed urban areas with a mix of residential and commercial along several major streets passing through the area. The eastern 1,000-2,000 feet of the area is largely wetlands and marshes except in areas which have been modified by dredging and filling. Substantial portions of the area south of SR 60 have been filled in this manner and now are mainly residential canal subdivisions. The Main Relief Canal of the IRFWCD bisects this basin.

The topography of this basin is low and very flat. The highest ground elevation in the basin is about ten feet above MSL.

Soils in the basin include St. Augustine, Boca, Eau Gallie, and Holopaw south of SR 60 and Kesson, McKee and Quartzipsammets to the north. These soil types are typical near the Indian River Lagoon and have common characteristics including low elevations, wetness, poor drainage and are underlain by limestone three to four feet deep in some areas.

Stormwater management jurisdiction and operational responsibility lies with the City of Vero Beach for drainage facilities within this basin. Indian River County has only stormwater jurisdiction and responsibility within County collector/arterial road right-of-way and within County-owned lands.

The majority of the basin was developed prior to water management regulations requiring retention and treatment. The drainage flows through a system of ditches and pipes into the Indian River Lagoon. These systems are generally designed for the ten-year/24-hour rainfall event. New development is required to treat the "first one inch" of any rainfall event on site. The IRFWCD Main Relief Canal is capable of conveying 3.3 inches of runoff in a 24-hour period for the ten-year rainfall event (2,600 cfs). Major flooding problems occur in the event of storm surge caused by hurricane or tropical storm. The drainage system is ineffective during such an event.

Land Use--Current land use is largely urban development with mixed commercial and residential components. The area in the northern portion of the basin north of SR 60 is undeveloped wetlands which have been modified by placement of dredge spoil and construction of ditches. This area is now serving as mosquito coastal impoundments. The planned extension of Indian River Boulevard is expected to result in converting some of the area to true functioning wetlands as part of an impact mitigation plan.

Capacity Analysis--All improvements designed in conjunction with Indian River Boulevard will mitigate the impacts of the 100-year/72-hour storm event. Indian River County has jurisdiction and maintenance responsibility for only these facilities. Vero maintains jurisdiction and responsibility for the remaining facilities. All impacts from a ten-year/24-hour storm event will require design mitigations, based on Vero City Ordinance #73.

4.3.2.2 Beach-Series Drainage Basin

The basin is located entirely within the incorporated area of the City of Vero Beach, along the Coastal Barrier Island, between the Atlantic Ocean and Indian River. The area is intensely developed with tourist/commercial along Ocean Drive and residential uses making up the majority of the remaining development. The island is at its widest, approximately one mile, in the vicinity of the Merrill Barber Bridge.

Topography--The area is typical of a Coastal Barrier Island. Elevations range from Mean Sea Level along the eastern Atlantic Ocean, to elevation 13'-17' NGVD along the primary dune located approximately 300 feet west of the coastline, and sloping westerly to Mean Sea Level at the Indian River shoreline.

Soils--In the area, there are Canaveral - Captiva - Palm Beach sands. These sandridge type soils are excessively drained with high percolation rates.

The drainage system on the island is a network of storm series and roadside swales. The primary jurisdiction and maintenance responsibility belongs to Vero Beach. Indian River County has no drainage facilities within the basin and has no jurisdiction. Indian River County will assist in funding drainage improvements at the 17th Street/SR A1A intersection in conjunction with road improvements planned for 1991. The capacity analysis of the basin is based on the ten-year/24-hour storm event. The existing drainage system of the beach study area is not completely capable of handling a ten-year/24-hour storm event without experiencing flooding throughout the study area (RS&H, 1982).

4.3.3 Existing and Future Capacity

It is the intent of this subelement to fulfill the requirements of 9J-5.011 (1) (e), specifically those addressing facility design capacities. However, this data is currently unavailable for the facilities within Vero Beach jurisdiction. The data for IRFWCD in Section 4.3.2.0 does not separate other Vero Beach facilities. The 1982 Master Drainage Plan (RS&H does not identify this information relative to the City or to IRFWCD.

4.3.4 General Performance of Existing Facilities

The 1982 Master Drainage Plan identified flooding problems within the City. Since that time, the City has been implementing the recommendations of the plan to improve the drainage conditions in the City.

The Capital Improvement Program was developed to implement the recommendations of the Master Plan. The design event selected by the City for use in level-of-service determination is the ten-year/24-hour storm. This is the event upon which the Master Plan and recommended improvements are based.

The master planning effort included an existing condition analysis in order to obtain baseline discharges to the Indian River. This analysis identified areas within the City containing "out of bank storage," or flooding. This modeling effort, contained in the City-adopted Master Plan forms the basis for drainage facility capacity analysis, by geographic area, for the purposes of comprehensive planning. The Master Plan by Reynolds, Smith and Hills is by City Code the plan which shall be adhered to in connection with the installation of drains, ditches and storm sewers within the City (Section 73.20 City Code). By reference, this Master Plan is made a part hereof in its entirety. Following are certain selected and/or edited excerpts from the Master Plan (which should be reviewed in its entirety to maintain full context) to clarify responses to state comprehensive planning requirements.

The Master Plan identified four major causes of flooding within the City:

- o Inadequacy of IRFWCD Canal Capacities. [These were sized to convey one inch in 24 hours, City standard LOS is the ten-year/24-hour event for which total rainfall is 8.2 inches.]
- o Culvert Obstructions. [There are approximately 200 culverts in the study area; many are undersized.]
- o Maintenance.

o Underdesigned, or Nonexistent Secondary Drainage Systems.

The City has taken and will continue to take (as addressed in part in Table 4.4) steps to alleviate all four major causes of flooding within the City.

Twelve special drainage problem areas were identified by the City of Vero Beach and Indian River County at the initiation of the Engineering Drainage Study (RS&H, 1982). The objective was to assess the drainage problem and to recommend a solution approach. These areas, as reported in the Phase I report include:

- V1 - Royal Park
- V2 - Pine Terrace
- V3 - 18th Street
- V4 - Oakmont Park
- V5 - Highland Park
- V6 - Riverside Park
- V7 - Village Spires
- I1 - Area bounded by 12th Street, Old Dixie Hwy,
8th Street and FEC Railroad
- I2 - Rock Ridge
- I3 - Melrose Garden
- I4 - Northeast Study Area - Mainland
- I5 - Southeast Study Area - Mainland

At the completion of Phase I, all of the above, except Riverside Park (V6), were recommended for further evaluation based on completion of aerial photogrammetry (Phase II) and/or development of the Master Plan (Phase III). Riverside Park (V6) is located outside of the study area and is recommended for separate secondary drainage analysis.

Of the remaining 11 sites, nine experience flood problems due to the inability of the primary drainage facilities to convey excess runoff from the sites in question. These sites include all but the last two listed, (I4) Northeast and (I5) Southeast Study Area - Mainland. Development of the Master Plan, as reported in this document, will provide the primary flood relief for Royal Park (V1), Pine Terrace (V2), 18th Street (V3), Oakmont Park (V4), Highland Park (V5), Village Spires (V7), the area bounded by 12th Street, Old Dixie Hwy, 8th Street and the railroad (I1), Rock Ridge (I2), and Melrose Garden (I3). Additional secondary improvements, not presented as part of the Master Plan, may be required for portions of Royal Park (V1), Pine Terrace (V2), Village Spires (V7), Rock Ridge (I2), and Melrose Garden (I3). These would include improvement maintenance of existing roadside swales and driveway culverts, improved or new storm sewer laterals, and in the case of the Village Spires, continuation of the backup pump system (used, however, on a less frequent basis).

As the concept of the Master Plan is to accept and convey the full complement of existing secondary drainage, specific flood-related problems within existing developments can be solved, upon implementation of the Master Plan, by providing sufficient capacity to move the water off the site to the primary facility. Future development should also incorporate on-site storage as part of the delivery system such that the primary channel receives no more runoff than generated under existing land use conditions.

The Northeast Study Area - Mainland (I4), the Indian River Memorial Hospital area north of the Main Canal is not subject to significant flooding except in the natural low areas along the Indian River, normally subject to tidal flooding. Development along the Main Canal is subject to flooding as a function of stages within the Main Canal and existing ground elevations. Proposed modifications to the Main Canal will

reduce the flood stage impact. The Indian River Boulevard extensions will not impact this area relative to flood hazards for the design storm criteria.

Table 4.4. City of Vero Beach Drainage Capital Improvements

Project	Year	Cost
Canal Box culverts, 23rd St. and 20th Ave.	1989	\$165,000
Canal Box culverts, 21st St. and 20th Ave.	1989	170,000
Culvert Improvements to 16th St. Ditch at 26th Ave.	1989	79,000
Culvert Improvements to 16th St. Ditch at 29th Ave.	1989	81,000
Culvert Improvements to 16th St. Ditch at 35th Ave.	1989	85,000
Culvert Improvements to 16th St. Crossing-- 43rd Ave. to 20th Ave.	1989	62,000
Drainage Improvements on A1A: Banyan to Date Palm and Bougainvillea to Camelia	1992	84,000
Culvert Improvements to 16th St. Ditch at 25th Ave.	1993	77,000
Culvert Improvements to 16th St. Ditch at 32nd Ave.	1993	76,000
Headwall Improvements--26th St. and 20th Ave. Ditch	1992	65,000
Culvert Replacement: 36th Ave. at 16th St. Ditch	1992	85,000
Culvert Replacement: 40th Ave.	1993	85,000
Drainage Improvements for Twin Pairs Project	1989	250,000
Secondary Drainage Work Throughout the City	1989/90	<u>100,000</u>
		\$1,464,000

The Southeast Study Area - Mainland (15), as reported in Phase I, experiences flooding in the eastern reaches due to the impact of urban development west of 6th Avenue. Primary flood relief for the urban development has been provided by the Master Plan. Future development in this area can be accommodated within the framework of the Master Plan.

The designs and discussions and the Technical Appendix data in the 1982 Master Drainage Plan (RS&H) provide what are considered to be reasonable solutions to current and potential flood hazard problems faced by the City of Vero Beach and Indian River County. Furthermore, they provide a sound basis for water management, consistent with the needs of people and the environment.

The Master Plan acknowledges that flood hazards do exist. The Plan provides for a reduction in that hazard but does not solve all the problems associated with stormwater runoff. The extensive hydrologic/hydraulic analysis of the study area, as presented in this document, indicates that:

1. The network of existing canals and storm sewer systems are of insufficient size and capacity to adequately provide flood protection from the runoff generated by the ten-year, 24-hour storm event.
2. The extent of flood damage is the most severe within the central portion of the mainland canal system due to the duration of flooding.
3. Flood relief is most effectively provided by directing excess flows eastward. Diversion of the west will require extensive analysis of Indian River Farms Water Control District operation to ensure compatibility with both urban and rural water management needs.
4. The impact of IRFWCD control structure operation, at the time of design storm magnitude events, cannot be adequately predicted.
5. Impacts on the Main and South Relief Canals are functions of the urban discharges and subsequent rural discharges. These impact separately and results are of similar order of magnitude.
6. Future development impacts must be moderated by stormwater management facilities which are in keeping with today's regulatory criteria, good water management, and existing concepts established by the City of Vero Beach and Indian River County.

The IRFWCD has developed its own Master Plan prepared by Carter Associates, Inc.; Williams, Hatfield & Stoner, Inc., dated 8/10/88 which differs significantly from the City's Master Plan. Attempts to coordinate the two plans are incomplete. However, the City commits itself to continuing such coordination within the current planning increment. At any rate, since the City's Master Plan typically calls for larger culverts than the IRFWCD's, the City's replacement program will have no adverse effect on the ultimate program.

As noted previously, the City's Master Plan includes recommendations for improvements to drainage facilities. These improvements will be made as follows:

- o New development will be required to put in new facilities or upgrade existing facilities in accordance with Master Plan recommendations, and as required by Section 73 of the City Code.
- o The City of Vero Beach will continue to make improvements in accordance with the recommendations of the Master Plan as facilities wear out or need replacement, and in accordance with capital improvement programming. The City has not funded all of the improvements listed in the Master Plan and does not have a schedule for implementation of all of these improvements. The City, County and IRFWCD have not agreed as to proportionate or fair-share contributions to this program, and the County and

IRFWCD have not agreed to the program. The City commits itself to doing all it can do to resolve these issues within the next five-year period.

Indian River County contemplates drainage improvements within the city limits as listed in Table 4.5 from the County's Draft Comprehensive Plan (September 1989).

In development of the Master Plan for the City of Vero Beach and Indian River County study area, emphasis was placed on provision of flood control for existing development. Water quality management is incorporated into the plan through proposed design standards and implementation of best management practices (BMP). The following section describes some of the mechanisms proposed in the design and concept of the Master Plan. The existing drainage systems serving the study area connect to Class III "waters of the state" as defined by the Florida Department of Environment Regulation Chapter 17-3.

Previous studies, as reported in Phase I (also see Coastal Element), indicate that water quality in the Indian River is generally good but recognizes concern over potential increases of point and nonpoint source loadings normally associated with increased development. The Master Plan, as proposed for implementation, will not significantly alter that condition in that land use changes are not incorporated into the plan. The water quality management concepts and designs will help to maintain existing water quality while providing the mechanism for controlling the potential increases normally associated with growth. It is also important to note that water quality "best management practices" will have little impact on flood control.

In development of a master drainage plan for an urbanized area involving extensive "retrofitting" to solve existing flooding problems, the concepts of water quality design features are generally limited in scope. The primary design utilized in Florida today, is the retention/detention pond which is land intensive for major drainage systems.

The Master Plan, in addressing remedial flood control measures for existing development, serves to solve first the flooding problem. The primary drainage facilities of the mainland canal system are graded towards the central detention pond to control discharges to the Indian River to levels occurring under existing conditions. This feature provides for increased contact time with vegetation to maximize nutrient uptake and for detention storage to increase settling. The net impact, relative to water quality, is unchanged. For the mainland coastal and beach areas, retention/detention storage through ponding or percolation has been suggested in the text and should be further evaluated for any revisions to the Master Plan.

The Master Plan, in addressing flood control measures for future development, sets the standards for retention capacity compatible with state requirements, detention capacity compatible with the Master Plan, and erosion and sedimentation control guidelines. These features, in addition to the recommended "best management practices" in the following paragraph, will enable the City of Vero Beach and Indian River County to provide the flood control required within the framework of good water quality and environmental protection practices.

Separating design criteria from best management practices for water quality enhancement of stormwater runoff does not follow any clear-cut guideline. The following recommendations are made to illustrate general management techniques available in the planning and design of stormwater management for future development projects.

1. Drainage systems should utilize swales and greenbelts in place of storm drains and curb/gutter to maximum extent possible to increase water contact with vegetation and to reduce discharge velocities.

Table 4.5. Capital Improvements Program for Indian River County for Basin Projects and Revenue Sources

Basin Description	Improvement	Planning Period			
		1990-1995	1995-2000	2000-2005	2005-2010
B-2	Drainage improvements to SR A1A/17th Street	150,000 (T)			
R-3	Indian River Blvd. Phase III Purchase Impoundment #22 Stormwater Treatment	300,000 (T)			
M-1	Upgrade to recommended sizes all bridges and culverts within the IRFWCD Canal System as existing culverts deteriorate	800,000 (R,U,T)	800,000 (R,U,T)	1,300,000 (R,U,T)	1,300,000 (R,U,T)
	Secondary Drainage Improvements 15" to 36" drainage pipes to serve existing development	300,000 (A,U)	400,000 (A,U)	500,000 (A,U)	500,000 (A,U)

(A)Special Assessments/MSTU
(T)Transportation Improvements Revenue
(R)Road and Bridge Dept. Funds/MSTU
(U)Stormwater Utility

2. Use of retention/detention/sedimentation storage facilities to increase water contact with vegetation, reduce discharge rates and velocities, and increase particle settling capabilities.

3. Infiltration and percolation serve to provide for water quality enhancement through use of the soil column as filter agent.

4. For large, highly impervious areas such as parking lots, catch basins to collect and remove oils, grease and other deposits enhance downstream water quality. A regular street sweeping or vacuuming program will further improve water quality control. The South Florida Water Management District has been recommending regenerative air or vacuum-type sweepers.

5. Consideration for pervious parking areas where new pavement is planned. This can be accommodated through use of open space concrete block which provides the surface requirement while minimizing the amount of runoff producing impervious cover.

6. Erosion and sedimentation controls can effectively reduce the input of sediment into the drainage system. This reduces a pollution source and a potential pollution carrier.

4.3.5 Planned Improvements

The City of Vero Beach has adopted a Five-Year Capital Improvement Program (FY 1989-FY 1994) for improvements by the City which address many of the essential capital improvements identified in the master drainage plan. Excerpts from the City's Capital Improvement Program relative to drainage are contained in Table 4.4. Improvements planned by Indian River County are listed in Table 4.5.

4.3.6 References

The following studies, reports and local ordinances have influenced the content of this subelement:

- o Engineering Drainage Study, Phase I, Preliminary Report, City of Vero Beach, Indian River County, by Reynolds, Smith and Hills, August 1980.
- o Engineering Drainage Study, Phase III Final Report, prepared for the City of Vero Beach and Indian River County, by Reynolds, Smith and Hills, December 1982.
- o Capital Improvement Program, 1988-1993, City of Vero Beach, adopted 1989.
- o Capital Improvement Program, 1990-1995, Indian River Farms Water Control District.
- o Drainage Element, Comprehensive Plan of Indian River County (Draft), September 1, 1989.
- o State of Florida, Stormwater Discharge Rule (Chapter 17-25, FAC).
- o City of Vero Beach, Flood Damage Prevention and Drainage Ordinance (Chapter 73, Vero Beach Code).
- o City of Vero Beach, Subdivision Regulations (Section 34-18.2, Vero Beach Code).
- o City of Vero Beach, Site Drainage Plans Regulations (Ordinance #1419).
- o City of Vero Beach, Landscaping and Tree Protection Ordinance (Ordinance #72).

4.3.7 Natural Groundwater Aquifer Recharge

4.3.7.0 Existing Conditions

The groundwater system within Vero Beach generally consists of two aquifers, the surficial and the Floridan. The shallow surficial aquifer is the main source of water for the City. The deeper Floridan aquifer provides water for two wells in daily use and two wells for back-up. To date, the St. Johns River Water Management District has not mapped Indian River County or Vero Beach for recharge areas to the Floridan or surficial aquifers. A USGS Water Resources Inventory (WRI) Report #88-4057 includes a map by Walter R. Aucott, "Areal Variation in Recharge To and From the Floridan Aquifer System in Florida." This map does not indicate any Floridan recharge areas in Vero Beach. Some recharge occurs in the westernmost portion of the County but the significant recharge area is further west near Winter Haven.

A generalized assessment for surficial aquifer recharge areas may be made from the soils maps. In open areas with highly permeable soils, some recharge is likely to occur. Only the airport has open areas of significant size that also have highly permeable soils (see Figure 1.4).

4.3.7.1 Regulatory Conditions

Federal and state regulations have been created to protect groundwater quality. Locally, Indian River County and Vero Beach do not have specific regulations to protect groundwater quality and recharge areas. Federal and state regulations are discussed in the following sections.

4.3.7.2 Federal

In 1986, the Federal Safe Drinking Water Act (P1 93-523) was amended to strengthen protection of public water system wellfields and aquifers that are the sole source of drinking water for a community. The amendments for wellfield protection require states to work with local governments to map wellhead areas and develop land use controls that will provide long-term protection from contamination for these areas. The aquifer protection amendments require EPA to develop criteria for selecting critical aquifer protection areas. The program calls for state and local governments to map these areas and develop protection plans, subject to EPA review and approval. Once a plan is approved, EPA may enter into an agreement with the local government to implement the plan (Indian River Draft Comprehensive Plan, September 1989).

4.3.7.3 State

In implementing the Florida Safe Drinking Water Act (Chapter 403, FS), DER has developed rules classifying aquifers and regulating their use (Chapter 17-22, Part III, FAC). These rules are currently being amended to strengthen protection of sole source aquifers and wellfields tapping them. DER has also established regulatory requirements for facilities which discharge to groundwater (Section 17-4.245, FAC) and which inject materials directly underground (Chapter 17-28, FAC).

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

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

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

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

The Florida Legislature has also directed local governments to include topographic maps of areas designated by the water management districts as prime recharge areas for the Floridan or Biscayne aquifers in local comprehensive plans, and to give special consideration to these areas in zoning and land use decisions (Section 163.3177 (6) (c), FS).

In 1987, the Environmental Regulation Commission, the decision making body for the State of Florida Department of Environmental Regulation (DER), adopted the G-I Rule. The intent of the G-I Rule is to protect the quality of potable groundwater, especially in regard to wellfields. This protection was to be accomplished by regulating the types of land use activities which would be permitted within a certain radius of wellfields. Although the G-I Rule was adopted in 1987, it is not presently being enforced by the Department of Environmental Regulation. Because of several challenges to specific provisions contained within the G-I Rule, the entire rule has been sent back to the Rulemaking Committee. The specific portions of the Rule which are being challenged are as follows:

- o The porosity value of five percent for the Floridan aquifer is being questioned.
- o The five-year travel time for the radius of influence is felt to be too short a length in time.

According to DER, the G-I Rule will be tied up in the Rulemaking Committee until late 1989 or early 1990. At this point, it is unclear what revision will be made to the existing G-I Rule. Therefore, at this point, the provisions of the G-I Rule are not applicable to the County or the City of Vero Beach (Indian River Draft Comprehensive Plan, September 1989).

4.4 GOALS, OBJECTIVES AND POLICIES

4.4.0 Sanitary Sewer and Potable Water

4.4.0.0. Goal 1: Provide efficient wastewater and potable water service compatible with conservation of natural resources.

Objective 1:

Develop and implement a comprehensive utilities facilities plan to meet future growth needs. The plan will include projections of the capacity needed for future population growth within the service area and when expansion will need to take place.

Policies:

- 1.1 The City will maintain and update annually an inventory of existing facilities and their capacities. A life expectancy schedule of each facility will be maintained to help schedule maintenance, repairs and replacement. For each facility, the schedule will identify the demands upon it and will update this list continually as development occurs. The plan will include projections of the

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capacity needed for future population growth within the service area and project when expansion will need to take place.

- 1.2 The facilities plan will be updated annually to be in coordination with the future land use plan so that development will occur where facilities exist or are planned for in the future. Future facility sites and rights-of-way will be identified in the future land use plan. These sites will be acquired and preserved by means of new developments, donations, or easements.
- 1.3 The facilities plan will continue to be coordinated with the capital improvements plan. The facility plan should be updated at least annually so that plans for expansion or new facilities can be accounted for in the annual update of the capital improvements plan. Additions to the capital improvements plan will be ranked in order of importance with public health considerations given the most importance and improvements to existing service areas second.
- 1.4 The City shall establish and maintain the following level-of-service standards for sanitary sewer and potable water:

Sanitary Sewer:	Average Flow	99 gpcd
	Maximum Flow	259 gpcd
Potable Water:	Average Pressure	60 psi
	Minimum Pressure	40 psi
	Average Flow	181 gpcd
	Maximum Flow	223 gpcd
	Storage Capacity	5.75 MG
- 1.5 The level-of-service standards for sanitary sewer and potable water shall be reconsidered during the preparation of the Evaluation and Appraisal Report due by September 1, 2010, to replace the “gallons per capita per day” with an “equivalent residential/dwelling unit” gallons per day or similar standard to more appropriately address non-residential demand for services.
- 1.6 The City shall maintain level-of-service standards for sanitary sewer and potable water consistent with the Comprehensive Plan through the concurrency management system of its land development regulations.

Objective 2:

On an ongoing basis, required the use of new technology and management practices, to increase water use efficiency and promote conservation of natural resources.

Policies:

- 2.1 Continue to explore, in conjunction with other local governments and agencies, new technologies and management practices which lower costs and/or better protect natural resources.
- 2.2 Promote effluent reuse in conjunction with the development of the reuse system. The City shall create public service announcements and work with the local paper to provide informative articles. The Engineering Department shall develop an information brochure to be included in the utility bills of customers in the proposed effluent reuse service area at the time the system is operational.

- 2.3 By 1991, require conservation programs for potable water. These programs should promote water conservation through public education and public involvement.
- 2.4 By 1991, implement the effluent reuse program master plan and use all effluent generated in for irrigation, thereby, eliminating all discharge into the Indian River Lagoon and reducing potable water demands.
- 2.5 By 1995, implement the recommendations listed in the "Evaluation of Existing and Future Water Supply Facilities."
- 2.6 In an effort to further lower levels of service, continue to promote water conservation through the City Resource Conservation Program which provides educational materials relative to reduced water consumption and installation of low flow shower heads free of charge. It is anticipated that the program will reduce the level of service by up to five percent by the year 2000.
- 2.7 Continue to require drought tolerant vegetation and mulch in landscape installations in order to reduce water consumption for irrigation purposes.

Objective 3:

Continue to allow septic tanks for single-family residences and for small retail establishments in areas where centralized service is not available. By 1992, the City in coordination with the County Public Health Unit, Division of Environmental Health as part of the permitting process, will have a set of adopted requirements governing the use of septic tanks to protect surface water and groundwater quality.

Policies:

- 3.1 Existing septic tank systems may remain in service until such time as centralized service is made available; at such time the City shall enforce City Code Section 33-23(e) *Connection with City System*. At such times as a public sewer becomes available to a property served by a private sewage disposal system, a direct connection shall be made to the public sewer in compliance with this article, and any septic tanks, cesspools and similar and private sewage disposal facilities shall be abandoned and sealed off by approved method.
- 3.2 The use of septic tank systems for new development shall be permitted by the County Public Health Unit, Division of Environmental Health.
- 3.3 By 1991, designate a representative of the City to coordinate and assist Indian River County Public Health Unit, Division of Environmental Health in the development and adoption of regulations governing the use of septic tanks. The County Public Health Unit will also establish a program for continual monitoring of septic tanks reported to have problems.

Objective 4:

Continue to promote potable water conservation and decrease per capita potable water consumption through the use of inverted rate structure and effluent reuse program.

Policies:

- 4.1 Require the use of water conserving plumbing fixtures in the Land Development Regulations to be adopted by September 1, 1990.

- 4.2 Through the implementation of the Effluent Reuse Master Plan by 1991, encourage the use of shallow wells and/or treated effluent for irrigation.
- 4.3 Discourage wasteful potable water consumption by imposing penalties on excessively high water use as defined by the Water Management District. These penalties could include fines, mandatory water restrictions, and inverted rate structures.
- 4.4 Reduce the potable water level of service by implementing the Effluent Reuse Master Plan by 1991 to reduce per capita potable water consumption.

Objective 5:

Continue to prevent urban sprawl through the maximization of use of existing potable water and wastewater facilities

Policies:

- 5.1 By 1995, develop and implement the comprehensive utilities facilities plan to ensure adequate facilities exist to serve the service population.
- 5.2 Maintain and update interlocal agreements which set specific service standards and service boundaries to ensure that urban sprawl is not created.

4.4.0.1. Goal 2: Promote coordination with other local governments and agencies to develop efficient regional plans for wastewater and water resource management.

Objective 6:

Participate in and coordinate through interlocal agreements with other governments on studies of new technologies which may be too expensive for one local government to consider on its own by 1995.

Policies:

- 6.1 The Water quality Board discussed in Policy 1.2 (p. 5-107) of the Coastal Element shall also coordinate with regional resource groups to investigate, evaluate and promote resource conservation through new technologies, local policies and public awareness campaigns. These regional resource groups should include representatives from the local planning agencies in the area, the Public Works Department and citizens from various areas in the region.

Objective 7:

Develop with the County, a regional wastewater treatment strategy and a water resource management policy.

Policies:

- 7.1 Establish an interlocal agreement with Indian River County to develop a regional wastewater treatment strategy and a water resource management plan. The water resource management plan should include protection of regional groundwater recharge areas and improvement of the water quality of common waters.

Objective 8:

Identify the agencies regulating natural resources in the area and support and implement regulations regarding effluent and sludge disposal and stormwater management.

Policies:

- 8.1 Comply with the Water Management District, the Regional Planning Council, the Department of Environmental Regulation and the Environmental Protection Agency regulations and policies during all phases of wastewater and potable water management planning.
- 8.2 Amend local ordinances as necessary to support future DER and SJRWMD regulations affecting wastewater and potable water management. These include policies on water quality and effluent and sludge disposal.
- 8.3 Coordinate with regional agencies in establishing regional goals for water quality improvement.
- 8.4 Identify in the Utilities Facilities Plan areas which may have groundwater recharge potential and where feasible protect such areas. Continue to monitor effluent discharge systems to ensure the quality of the groundwater is not degraded.

4.4.0.2. Goal 3: Continue to identify and develop stable sources of funding for wastewater and potable water facility improvements and expansions.

Objective 9:

Continue to require developers to cover costs incurred in expanding facilities to meet their needs.

Policies:

- 9.1 Continue to require developers to mitigate their impact on facilities by providing land or fees as specified in local impact ordinances. Impact fees are to be reviewed on a regular basis to ensure that the fees adequately cover the costs of expanding the system for new development.

Objective 10:

Identify and seek new and innovative methods of financing public facilities.

Policies:

- 10.1 Initiate development of innovative funding programs including intergovernmental coordination at the local, regional and state levels and coordination between the public and private sectors at the local level.

4.4.1. Solid Waste

4.4.1.0. Goal 4: Provide a safe and sanitary method of solid waste collection and disposal, consistent with maintaining public health.

Objective 11:

Continue to provide timely and efficient solid waste collection service.

Policies:

- 11.1 Maintain sufficient equipment to provide collection a minimum of two time each weed for residential areas and as needed for commercial areas.
- 11.2 Implement an equipment replacement and expansion plan based on equipment usage and service records and plan for future expansions.
- 11.3 Regulate the responsibilities and procedures for disposal of industrial wastes in accordance with state and federal regulations.
- 11.4 The City hereby establishes an LOS of 6.3 ppcd for solid waste.

Objective 12:

Continue to prohibit the improper storage and disposal of solid waste.

Policies:

- 12.1 Continue to regulate the proper storage of solid waste and storage standards for collection. Specify the containers required, access for collection and other details.
- 12.2 Continue to prohibit all burying and/or burning of solid waste except where special approval has been granted by the City.
- 12.3 Continue to prohibit the collection, transportation, and/or disposal of solid waste by any agent not so designated by the City.

4.4.1.1. Goal 5: Cooperate with the County to promote recycling and resource recovery to reduce solid waste volumes.

Objective 13:

By 1995, determine how recycling, resource recovery and conservation programs in the City can be used to decrease the amount of solid waste, conserve resources and provide additional revenue.

Policies:

- 13.1 By 1994, establish the feasibility of recycling programs which require household refuse to be segregated into recyclable refuse and non-recyclable refuse.
- 13.2 Require recycling programs in school, civic and business organization programs by 2000.
- 13.3 Meet the County time frame for coordinating with the Quad-County Council of Governments to study the formation of a Quad-County Recovery Unit/Electrical Generator Facility.

Objective 14:

By 1994, reduce the City's solid waste volume buried in the landfill by 30 percent.

Policies:

- 14.1 Prepare a solid waste reduction plan based on regional, County and local solid waste objectives to be implemented by 1995.

4.4.2. Drainage

- 4.4.2.0. Goal 6:** Provide a stormwater management system which protects real and personal properties and promotes and protects surface and groundwater water quality.

Objective 15:

Ensure that existing and future development is protected from undue flooding with a level-of-service design standard for drainage systems that accommodates at a minimum a ten-year/24-hour design rainfall event.

Policies:

- 15.1 Maintain the requirements of Chapter 73 of the City Code which addresses flood prevention and drainage.
- 15.2 Maintain the drainage improvements program based on the 1982 Engineering Drainage Study as incorporated into Section 73.20 of the City Code to meet existing and future needs.
- 15.3 By 1993, the City shall develop an interlocal agreement with the Indian River Farms Water control District to coordinate improvements within Vero Beach that are also within the jurisdiction of the IRFWCD.
- 15.4 The City shall maintain level-of-service standards for drainage facilities consistent with the Comprehensive Plan through the concurrency management system of its land development regulations.

Objective 16:

The City will improve or modify existing drainage systems to reduce flooding, maximize the use of existing drainage facilities, and to protect and enhance water quality.

Policies:

- 16.1 The City shall continue to require development to utilize existing drainage facilities and meet the design requirements of the City in its land development regulations.
- 16.2 The City shall maintain its existing improvements program for drainage facilities as outlined in the Capital Improvements Element and the annual Capital Improvements Schedule for replacing or modifying different facilities including the retrofitting of existing stormwater outfalls to improve and protect the water quality of the Indian River Lagoon as called for in Policy 20.3.
- 16.3 The City shall operate and maintain its municipal storm drainage system pursuant to the requirements of its NPDES permit.

Objective 17:

By 1995, the City shall reduce its potable water consumption by reducing irrigation demands on potable water.

Policies:

- 17.1 The City will develop a plan to use stormwater from the drainage canals for irrigation supply. This program will be developed to address the following at a minimum:
- o Evaluate the possibility of using the wastewater effluent reuse distribution system.
 - o Prioritize the system availability so that the areas of greatest demand are served first.

Objective 18:

By 1995, the City shall reduce the discharge of stormwater to the Indian River Lagoon.

Policies:

- 18.1 The City will develop a plan to use stormwater from the drainage canals for irrigation supply to reduce the amount discharged into the Lagoon.
- 18.2 The Land Development Regulations to be adopted by the City by September 1, 1990, will include criteria to require best management practices for on-site detention/retention facilities.
- 18.3 The City shall develop a plan which determines how much stormwater can be removed from the canals.

Objective 19:

Ensure that at the time a building permit is issued adequate stormwater management facilities are or shall be available at the adopted level-of-service standards concurrent with development.

Policies:

- 19.1 Drainage plans will continue to include a hydrological survey of the site showing natural and manmade drainage systems, a survey of drainage systems on adjacent properties and the calculations used to estimate stormwater runoff.
- 19.2 Drainage plans shall incorporate stormwater detention and/or retention pursuant to Policy 20.5.
- 19.3 Post-development runoff shall not exceed the predevelopment runoff in terms of discharge rate or volume.
- 19.4 No stormwater runoff should be discharged into common waters unless it has been detained on the site and conveyed to the receiving water in an approved manner consistent with the level-of-service design standards of Policy 20.5.

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19.5 The City shall maintain level-of-service standards for stormwater design consistent with the Comprehensive Plan and Capital Improvements Element through the concurrency management system of its land development regulations.

Objective 20:

Protect and improve surface and groundwater water quality from the impacts of stormwater runoff with enhancements to existing public drainage system and application of level-of-service design standards for on-site stormwater detention and/or-retention.

Policies:

- 20.1 Where wet retention must be a part of the stormwater management plan, incorporate stormwater retention ponds into on-site irrigation systems and fire fighting systems whenever practical, as a means of conserving potable water supplies.
- 20.2 Continue to promote stormwater detention and retention through public education on stormwater quality and uses.
- 20.3 The City shall continue to implement its plan to retrofit its existing stormwater drainage system outfalls to incorporate sediment boxes and other appropriate mechanisms to improve quality of stormwater discharges to the Indian River Lagoon. A specific improvements plan and schedule for these improvements shall be incorporated in any updates to the Capital Improvements Element and annual Capital Improvements Schedule.
- 20.4 All stormwater projects shall be so designed that any stormwater run-off does not degrade the receiving waters and meets State Water Quality Standards as set forth in Chapter 17-302, F.A.C. incorporated herein by reference.
- 20.5 The City establishes a stormwater design level of service for water quality protection that all new development and substantial redevelopment projects shall be required to retain/detain, as a minimum, the first one inch of rainfall prior to off-site discharge, except that in the case of stormwater run-off with direct discharges to the Indian River Lagoon and any of its connecting water bodies, the retention/detention requirement shall be the first 1.5 inches.
- 20.6 The City shall amend its land development regulations by July 2008 to incorporate Policy 20.5 for single family and other development exempt from SJRWMD regulations.
- 20.7 No site plan or other development approval shall be issued for construction of a project prior to the City receiving a copy of the FDEP Notice of Intent for a generic permit for stormwater discharge and/or St. John's River Water Management District stormwater management permit if applicable.
- 20.8 Any site plan or other development approval shall be compliant with applicable FDEP and SJRWMD permits and subject to any conditions of these permits.

4.4.3. Aquifer Recharge

4.4.3.0. Goal 7: Protect surficial aquifer recharge areas from degradation and depletion.

Objective 21:

Establish specific policies and regulations by December 2008 to protect surficial aquifer recharge areas.

Policies:

- 21.1 The City shall in cooperation with the SJRWMD and Indian River County delineate and map appropriate surficial aquifer recharge areas using a geographic information systems format that warrant special development standards and regulations to protect the quantity and quality of the groundwater resources by no later than September 2008. This map shall be incorporated into the Comprehensive Plan as part of the Evaluation and Appraisal Report update due by September 1, 2010.
- 21.2 The City shall continue to protect any areas with significant recharge potential whenever feasible through purchases, donations, and easements.
- 21.3 The City shall adopt amendments by no later than December 2008 to the land development regulations to protect and enhance the quantity and quality of natural groundwater prime aquifer recharge areas. Such regulations may include the establishment of an overlay zoning district, and site design requirements that minimize impervious coverage, clusters development onto less vulnerable areas and, at a minimum, maintains the groundwater flow rates and volumes at predevelopment rates and regulates substances that may adversely impact the water quality.
- 21.4 The City designates an Area of Special Concern for Groundwater Protection all areas with moderately well drained to excessively well drained soils as depicted on Addendum Figure A-4.02 to this Comprehensive Plan until the surficial recharge area map is prepared pursuant to Policy 21.1.
- 21.5 As an interim measure until such time as regulations are enacted pursuant to Policy 21.3, the City institutes the following policies for development on public lands designated within the Area of Special Concern for Groundwater Protection:
- Stormwater management facilities shall not be allowed to penetrate the water table.
 - Septic tanks shall be prohibited.
 - Any non-residential land use or activity that may pollute the groundwater used as a potable water supply source for a public water production well shall comply with the provisions of Chapter 62-521, FAC.
 - The amount of impervious surface in any development shall be minimized to the maximum extent practicable with any development clustered onto less vulnerable areas.
 - No filling of wetlands shall be allowed and a 25 foot vegetated buffer shall be required between the wetlands and any disturbed lands and development on the site to prevent direct stormwater runoff to wetlands.
 - Excavation that results in an average elevation of less than 25 feet above mean sea level.

4.5 CONCURRENCY MANAGEMENT SYSTEM

As stated in the Future Land Use Element, the City of Vero Beach will soon reach its buildout level. The potable water, sewer, solid waste and drainage facilities needed to accommodate development through buildout are presently operating under capacity. These facilities, with the adopted Levels of Service outlined in this element, have sufficient capacity and will be able to accommodate the service demands of the City of Vero Beach through buildout. Therefore, the concurrency requirements of Chapter 9J-5 FAC will be met with regard to potable water, sewer, solid waste and drainage service.