WATER USE AND WATER SUPPLY DEVELOPMENT PLAN

(ROUGH DRAFT OF PART II)

RESOURCE PLANNING DEPARTMENT

JUNE 4, 1975

M E M O R A N D U M

9-8-1 June 4, 1975

TO: Executive Director

FROM: Director, Resource Planning Department

SUBJECT: Water Use and Water Supply Development Plan

Attached are three documents which represent three stages in the development of a written presentation of a portion of the District's "Water Use and Water Supply Development Plan", as follows:

Exhibit A: "Notes on Water Use Plan", prepared by me. This was intended to kick off the writing process by offering some general guidelines for format and content of the final written product.

Exhibit B: Memorandum of January 28, 1975 from Ed Dail, presenting a detailed preliminary outline for Part II of the proposed final end product.

Exhibit C: Preliminary un-edited rough draft of a major portion of Part II of the proposed final end product.

Work on Parts I and III, as generally described in Exhibit A, is being carried forward. Initial emphasis in the drafting of textual material was placed on Part II, however, because it was felt to be the essential key to Part III (the presentation and evaluation of alternatives).

Everything done up to date has been developed within the Resource Planning Department. At this point we now believe that our product should be closely examined and questioned by you, other senior staff members, and most particularly by the Governing Board. Part II is intended to both present the rationale for the Water Use and Water Supply Development Plan to be expressed as alternatives in Part III, and to articulate the goals and objectives of the District in this regard. In view of this, it is necessary to now have a top-level review in order to either confirm or re-shape the direction of our further effort.

It should be recognized that Exhibit C is in rough, un-edited form. Connective text will have to be inserted in order to provide sequential coherence. The sequence of the several sections may have to be re-ordered for purposes of logical presentation. It is quite probable that some material will be eliminated and other material added in the process of editing. It is obvious that a section covering the Environmental Reorganization will have to be added, which may require some alteration of the draft text with regard to DNR and DPC.

Nevertheless, we have advanced sufficiently in the writing of Part II to believe that the rough product we now have be subjected to critical examination and comment, together with the approach we have taken.

I do not expect that this material can be assimilated in time for discussion with the Board at the June 12 workshop, unless you and the Board wish to address it at that time. This is your choice. At any event, it should be scheduled for discussion no later than the July workshop meeting.

W. V. Storch, Director
Resource Planning Department

WVS:et

3 Encl.

EXHIBIT "A"

EXHIBIT "A"

Notes on Water Use Plan

Chapter 373 mandates the preparation of a "Water Use Plan" and also instructs the water management districts to investigate those means whereby the water resource can be "developed, conserved and augmented." The term "Water Use Plan" is perhaps an unfortunate misnomer. We have chosen to interpret this term in such fashion as to place all emphasis on the corollary instruction of Ch. 373 to "develop, conserve and augment" the water resources of the District. Thus we have made the "Water Use Plan" of Ch. 373 into what is more appropriately termed a "Water Supply Development Plan" oriented principally toward capturing and storing the seasonal water surpluses which usually occur throughout the District area. The concept of "water supply development", however, is not strictly limited (as our thinking up to this point has developed) to capture and storage; the element of management is also incorporated within this concept.

Broadly speaking, and staying within the water supply development concept, the capture and storage element has the connotation of expansion and the management element has the connotation of a status quo. This is obviously an over-simplification, but at the outset it may be useful to think in such black and white terms. In these terms, then, expansion implies "construction" and the status quo implies "regulation." It is of more than just passing interest to note that Ch. 373 places considerable and detailed emphasis on regulation, whereas it is completely silent on construction.

Accordingly, a different approach could be taken to the mandates and instructions of Chapter 373; one which would more closely fit the terminology "Water Use Plan" and which would take its cue from the emphasis of the language of Ch. 373. This would be to accept the existing time-place constraints on water resource availability, and to construct a plan for regulating the use of water within those limits.

I went through this thought process about a year ago and exposed the alternatives for consideration and discussion. The decision was taken to adopt a broader interpretation and view of the "Water Use Plan"; one which would embrace the concept of water supply development with its connotation of expansion. The basis for this decision appeared to be a concensus that: (a) regional water demands will increase with or without other growth regulation controls, (b) expanded water supply capabilities would consequently be required; (c) the planning for such expanded capabilities is the responsibility of the District, and (d) the District would be derelict to proceed on the basis of any other set of assumptions.

This decision established a policy for guiding this effort. Within the framework of this policy determination only one constraint was clearly defined; the constraint that water supply development planning would be limited to consideration of that portion of the total water resource which is expressed in its surface water and water table aquifer manifestations.

Our interpretation of the meaning and purpose of a "Water Use Plan" does not seem to differ greatly from that of SWFWMD. At least, they have not accepted a status quo attitude. Because of substantial differences in such factors as physical system configurations, nature and amounts of demand, political framework, nature of environmental concerns, etc., it may be that there will be a heavier emphasis by SWFWMD on "regulation" as distinct from "construction." But there is no question that the latter is an important element in their planning, as we understand it at this point.

Finally, if Jim Stidham can be considered the DNR spokesman in this regard, as I understood Stidham's latest utterance on this matter at Tampa last month DNR conceives the Water Use Plan to be a "compilation of data and

information on water resources which the decision-makers can use in making their decisions" (paraphrased). It is obvious from this that we cannot expect any useful guidance, but only obfuscation, from this source.

With the foregoing as general preamble for the purposes of fixing our effort to date more precisely within the envelope provided by Ch. 373, we can consider the general outline of a formal organization of the total effort. This effort can, at first cut, be separated into two elements:

1. Assembly, collection, analysis and evaluation of information; selection and assessment of alternatives; etc.

2. Presentation of material accumulated under item 1.

It is obvious that the nature and quality of the information accumulated will shape the manner, form and content of the presentation made of that information; just as a pre-conceived notion of the presentation to be made will govern the type, quality and scope of the information to be accumulated and evaluated.

Up to this point we have given little attention collectively (although we may have done so individually) to the "presentation" effort. A judgment has been made, conditioned by past water supply planning efforts in the region and responses thereto, as to the types of information to be assembled, collected and evaluated (in specific domains); these activities being related to pre-selected broad categories of alternatives which, as noted earlier, contain elements of both "capture and storage" and "management." A very generalized shape has consequently been given to this portion of the effort. But partially because of the necessary segmentation of this effort to date, it is perceived by most involved to be highly amorphous and unorganized.

Therefore, it will be useful to now look at the "presentation" portion of the total effort to determine if the organization of that feature will provide structure for the "accumulation" portion of the total effort. This is one of the two reasons for my initiation of the "presentation" effort at this time; the other being that, in itself, the task of writing, editing and preparing the presentation is enormous.

It is logical for us to consider at this point, after 18 months of "accumulation" effort, the matter of presentation. The end product of the total effort is a "presentation" and, with two years still to go, it is now appropriate and timely to evaluate one in terms of the other.

From this standpoint, the end product of the District's water planning effort should be a document, or set of documents, which presents two basic bodies of information with respect to water resource management:

1. Where we are now; and
2. Where we can go in the future.

The first item is one which is always incorporated in the classic engineering solution approach to the water supply planning problem. It is a snapshot in time. It serves as a point of departure for considering item 2. But it also represents a condition which in and of itself requires assessment and evaluation.

The approach to item 2 which we have elected to take also incorporates an essential feature of the classic approach; i.e., the examination of alternative solutions. Our approach, however, departs from the classical in the following respects:

(a) we do not intend to work from a fixed figure for water demand, predicating plan selection largely, if not entirely, on cost-effectiveness in terms of that demand.

(b) we do not intend that the staff make the alternative solution selection, or even a recommendation for such selection.

Selection of a solution will be based only partially on technical and cost considerations. Major public policy considerations are involved and the weighing of these factors is not a staff responsibility.

If the body of information identified under item 1 is a single snapshot representing the present, then the body of information contained in item 2 is an array of snapshots displaying a variety of "alternative futures."

Aside from what is included within the "snapshots", the item 1 information will include "how we got where we are" and the item 2 information will include "how we get from here to there."

Within the specific framework characterized by the phrases "where we are now", and "where we can go in the future" (with their accompanying road maps) the two concepts of water use (management, regulation) and water supply development (capture and storage, construction) must be exposed and related to each other. Basically, a water use philosophy must be developed which then is expressed in a set of water use rules, regulations and administrative procedures. Initially, these rules, regulations and procedures are predicated on existing conditions of natural water availability, land use (demand), and physical system ability to modulate the natural time-space occurrence of water. When and as water supply development features are added, these rules, regulations and procedures may be adjusted or revised; in fact, the philosophy underlying the initial set of rules, regulations and procedures may change as well (with or without water supply system changes).

Accordingly, the document we produce must adequately explain the potentially dynamic nature of the regulatory aspect of the "Water Use Plan" as well as enunciate the philosophy which informs the regulatory measures adopted and

present those measures applicable to the current state of the system. The depth and detail to which these three aspects of the regulatory element of the "Water Use and Water Supply Development Plan" are to be covered in the final document are yet to be decided. But there can be no question that a thorough exposition of this element is required because:

(a) Ch. 373 has itself emphasized regulation of water use; and

(b) a body of opinion exists which believes regulation of water use provides the means whereby a larger mass of growth problems can be solved.

In fact a good case can be made that it will be necessary for us to consider regulation alone as an alternative answer to "where we can go in the future."

The foregoing has identified a number of concepts: "where we are now", "where we can go in the future", "regulation-management" and "expansion-construction." These concepts, together with the pre-selection of alternative solutions, features of which are already being pursued, and steps already taken in the development of water use rules and regulations, suggest to me a general form for the "presentation" element of the District's water planning effort. (The following excludes consideration of: (a) Upper St.Johns Area, and (b) Southwest Coast Area).

If we consider the end product as a single document it would have the following major sections:

I Present status of the system

II Rationale for "Water Use and Water Supply Development Plan"

III Alternative futures

On the next level of refinement there would be the following breakdown (partial):

I A. Description of physical characteristics of the region.

B. Description of land use and land use intensity within the region.

C. Social and economic characteristics of the region.

D. Delineation of environmentally sensitive areas.

E. Description of Project system.

F. Delineation and description of water management and water supply systems.

G. Description of institutional framework governing water management and supply systems.

H. Water demands, their location and relationship to Project systems.

I. Land use history and trends.

J. Water use history and trends.

K. Description of water supply performance of the Project system.

II A. Chapter 373 and its interpretation.

B. Related environmental and land use legislation, and its implementation.

C. Extrapolation of land use and population curves assuming no regulation of growth; discussion of impact.

D. Discussion of water use regulation and water supply development as concepts.

E. Basis for District's water use regulations.

F. Description of water supply planning areas, and basis thereof.

G. Manner of selection of alternatives for evaluation, and basis thereof.

H. Exposition of water use regulations based on current state of system.

I. Goals and objectives of "water use regulation" and "water supply development."

III (by water supply planning areas and for each alternative)

A. Description of major alternative being considered.

B. Discussion of range of possibilities within the alternative.

C. Water supply performance under some fixed set of assumptions with respect to land use and land use intensity; critical period performance testing.

D. Establishment of approximate land use type and intensity configuration which matches satisfactory critical period performance.

E. Based on D, determination of social, economic impacts of land use type and intensity.

F. Based on D, assessment of environmental (water quality, vegetation, etc.) consequences.

G. Means of implementation.

H. Financial costs.

I. Indentification of beneficiaries.

J. Benefits versus costs; cost-effectiveness.

K. Description and evaluation of mixes of alternatives; consideration of sequential treatment.

L. Compilation on regional level.

Selecting only some of the above for examples here, a further level of refinement would produce the following:

I A 1. Topography

2. Morphology - land forms

3. Rainfall - isohyets (normal), ranges, extremes.

4. Streamflows - at all key locations; seasonal medians, peaks and lows.

5. Approx. water budgets - by planning area.

6. Aquifer systems - maps, characteristics.

7. Soils

8. Vegetation

9. Groundwater levels - contours; medians, max. & min.

10. Water storage areas - characteristics; water levels, range, medians; regulation schedules.

11. Water quality - descriptive; quantitative.

I D 1. Basis for definition - wetlands, mangroves.

2. History, past trends.

3. Present pressures.

I F 1. Water management districts.

2. Public water supply purveyors.

3. County and municipal governments.

I H 1. Approximate quantification by water supply area and source.

2. Range; relationship to rainfall.

3. Delineation of sub-areas, or other units, served by Project system.

4. How above are served by Project system; physical constraints on service.

5. Description of water use practices and methods. (primarily by agricultural users)

I K 1. Quantification of water use and movement within system during past several dry seasons, including 1970-71.

2. Map delineation of areas served by Project system during critical periods.

3. Discussion and presentation of surface water supply/demand relationships within the system.

4. Identification and discussion of critical points within present system; degree of criticality.

II C 1. Discussion and map delineation of local land use plans.

2. Mapping and/or tabulation of zoning; population numbers at maximum zoned density.

3. Standard population projections.

4. Short-term and long term agricultural land use projections.

5. Water demand projections at selected points in time based on several possible projections of land use/population.

III Within the body of this section of the document the more precise relationships between the various elements of the system would be described and quantified to the extent possible; modeled. The information presented in Section I represents an inventory, a more or less detailed summary of the present condition of the total system; the interactions within the system will be described there but only in general terms. Section I sets the stage for Section III and produces Section III through the mechanism of, and under the rationale described in, Section II.

Included within this Section, as an alternative, will be the "do nothing" alternative. In reality, it is much more than "do nothing." It is the alternative which assumes no further additions to the regional storage/distribution system (no further infusions of Federal and/or State funds for construction of District works) and which will rely on refinements in the management of what we have, principally through the application of water use regulations. As a potential alternative, it will be analyzed and evaluated in the same fashion as all others.

The above is, of course, by no means exhaustive. It is intended to provide a guide for some further hard thinking concerning the content of the final document within the basic framework outlined above. What is outlined there may, in fact, prove to be over-kill in some instances and impossible to produce in other instances as we progress.

Assuming the foregoing broad framework for the final product as a unit, the more exact nature of the "presentation" format can be considered. It is my opinion that Section I can stand pretty much on its own bottom as a separate report, complete in itself without any supporting or ancillary documents prepared by the District. Since it will rely heavily on outside sources, it must include detailed bibliographies (preferably by chapter), and must be foot-noted.

Section II can be prepared also as a separate report, although it may prove necessary to refer at several points to data, information and textual material contained in Section I. Bibliographies will be required, but to a lesser extent than for Section I. District water use rules and regulations will be attached as appendices. Aside from this, the need for ancillary or support documents is not foreseen.

Section III format should be a series of separate reports by water supply planning area. A logical approach would be a detailed summary report for each area, supported by technical appendices, and an overall Section III summary for the region. Since Section III follows from Section I and II, each area report will include an introductory statement referring to the applicable sources in the earlier sections. The precise form of presentation of Section III information and material requires considerably more thought.

The writing of Sections I and II can start at an early date; the writing of Section II in particular can start at once. Since Section II sets the "goals and objectives" and it is imperative that these be developed for staff examination and Board acceptance at an early date,it is apparent that first priority be given to writing Section II. I will want to see Section II fleshed out in some detail in order that the goals and objectives are perceived within an appropriate framework rather than as isolated concepts. Target date for first draft of Section II (recognizing there will be certain data and information gaps) sufficient to define goals and objectives, for review by RPD staff: April 1, 1975. Final draft for District staff review: May 15, 1975, (again, there will be information gaps in this "final" draft).

The writing of Section I must be preceded, in many of its aspects, by a substantial literature search. This, in turn, must be preceded by preparation of a chapter outline. Target date for the completion of a detailed chapter outline in assumed complete and final form is February 1,1975. Once this is completed,assignments can be given for literature search, data assembly, map preparation, and chapter rought drafts. Further target dates will be set at that time.

The first effort in regard to Section III will be to achieve definition of the form of presentation of Section III information. To get properly focused on this problem a single major alternative will be taken as an example; i.e.,"backpumping." A detailed outline for the presentation of this alternative is to be prepared for RPD staff review, discussion and critique with a target date of February 1, 1975.

BACKPUMPING

1. Description of backpumping concept. Identification of considered backpumping locations (W.P.B. Canal, Hillsboro Canal, North New River Canal, Tamiami Canal). Flow-duration curves. Basin land use. Basin runoff characteristics, related to percent impervious.{ Text, land use maps and tables, location maps, curves}.

   Presentation of options available; backpumping at all locations, backpumping at combinations of lesser number of locations. Discussion of options available at each location; minimum-maximum flood control operation at C-51, flood control or water supply at Hillsboro, flood control or water supply at NNR, and maximum-minimum flood control at Tamiami. { Text }

   Selection of options for detailed consideration. All options to include only water supply pumping at Hillsboro and NNR.

   A. All locations: max. at C-51 and max. at Tamiami; min. at C-51 and min. at Tamiami (4).
   B. Eliminate Hillsboro; either max. at C-51 and Tamiami or min. at C-51 and Tamiami (1).
   C. Eliminate Hillsboro and NNR; same as B for C-51 and Tamiami (1).
   D. C-51 alone; maximum and minimum (2).
   E. Tamiami alone; maximum and minimum (2).

   thus producing a total of 10 options which should permit satisfactory bracketing of remaining options in terms of performance and consequence. { Text, table listing options }

4. Methodology for evaluating water supply performance of each option.

* (a) Selection of record period for performance evaluation; to include short term critical period (1970-71) and longer term critical periods (1961-63) and (1970-74). Associate critical periods with return interval. (Text, meteorological drought frequency plot).

(b) Demand values. Pre-select several (4-5?) total municipal water supply demand values for Dade, Broward and Palm Beach Counties -those being the only water supply areas for the Conservation Areas. (Exclude City of WPB, Jupiter area, and Glades). Distribute these among the 3 Counties in accordance with standard population projection distribution. Assume M & I water comes directly from the C.A.'s; i.e., P.B.Co. - C.A. #1; N. Broward County - C.A.#2; Dade County and S. Broward County - C.A. #3.

Add ENP min. demands from C.A.#3. Add agricultural demand using county master L.U. plans, or Corps projections, or our own. projections; use 25-year (?) period. (Text, tables, curves)

** (c) Supply values. Associate pre-selected municipal demand values with population numbers, using Kreitman's and Khanal's information and models (?) Distribute populations within the 3 counties and disaggregate further to the backpumping basins.

Use county land use plans and associated densities to make distribution. Make estimate of impervious areas. Use Khanal's urban runoff model (?) to determine increase in R/O with increased urbanization. Adjust historical period of record discharges to reflect increase in impervious areas.

For water supply only backpumping areas (NNR and Hillsboro) use Corps' design size for pumping stations. Again, adjust historical discharge values for increased urbanization.

{Text, backpumping basin land use maps, tables of land use and impervious areas, adjusted flow-frequency curves}.

(d) Routings. Use present regulation schedules for the three C.A.'s. Route each option for each one of the 4-5 pre-selected demand values with its associated supply value (40-50 routings). Assume satisfactory performance to be 85% satisfaction of demand - 15% reduction in supply - for maximum period of 30 days during most critical occurrence ('70-'71 drought?) of short duration and for 60 days during most critical occurrence of 3 years duration ('70-'74?). (Other criteria can be developed, but we must come up with something soon). ENP demand to be met 100% - off the top, as are salinity control demands. {Text; technical appendix describing routing model and containing selected printouts and C.A. stage hydrographs; tabular summary of technical appendix material}.

*** (e) Performance evaluation. Prepare a performance curve or curves for each of the 10 options for which routings were made. These might take the form of plotting demand level (4-5 points) against a % satisfaction/duration factor for both the short-term and long-term

critical periods. A demand level meeting the established demand satisfaction criteria would then be selected; level of demand equating to level of satisfactory performance.

From these 10 curves, similar performance curves for the other possible options could be prepared, if deemed necessary (significant). {Text, curves, tabular summary of satisfactory demand level for each option}.

(f) Feedback. Above performance evaluation is based on satisfaction of a total 3-county demand distributed more or less arbitrarily on standard projections of distribution. They are also based on existing regulation schedules for the C.A.'s. Examination of the results of the routings may well indicate that some shifts in demand will result in the "improvement" of certain of the options. Some judgment will have to be exercised here in selecting and presenting the most obvious of the options on the options, since the possibilities, although not infinite, are enormous. This will warrant some textual discussion and the display of selected shifts of demands in a fashion similar to those described in sub-paragraph (e).

Concerning regulation schedules a sensitivity analysis is to be made for the 3 regulation schedules proposed by Dineen for C.A. #2A in his In Depth Report. Three of the ten options originally routed are to be routed again using the 2 alternative C.A.#2A schedules proposed. The three selected are to be at high, low and intermediate levels of demand. If any of these alternate schedules result in material changes in demand levels, these should also be displayed as options, as in sub-paragraph (e).

This same sort of analysis may have to be made for the F&WLS's proposed change in C.A. #1 regulation schedule.

NOTES: * This implies use of meteorological drought, and "drought of record." I have throughout the above used historical flows and thus historical rainfall; therefore use of the "drought of record" follows logically. Another approach is possible for the generation of flows

and determination of drought severity for critical period performance evaluation. Presentation as outlined above would be approximately the same.

** The population numbers associated here with the pre-selected demand values to be tested are incremental population numbers. This presupposes (and we have approached the problem in this fashion in my discussions with Bob Hamrick) that a determination has first been made as to the numbers (or demand) which the shallow groundwater resources in the three counties can sustain. This means that the "backpumping alternative" will have to follow the "aquifer development alternative" in the report document.

*** This performance evaluation is based on a fixed demand, or "worst condition", throughout the period used for performance testing. It puts us at a point of maximum resource development at some undeterminate time in the future. The dynamic features of increasing demands with time, up to the indicated maximum, will be treated elsewhere.

5. Determination of water quantity impacts on Conservation Areas. For this evaluation all backpumping options which involve water supply only backpumping (Hillsboro and NNR) can be eliminated fron consideration because:

(a) Backpumping at these locations can be terminated at any time there are quantity problems in the C.A.'s; and

(b) In any event, the quantities are small in comparison with the flood control volumes which can be generated at C-51 and Tamiami Canal.

Therefore, the only options to be evaluated here are those involving flood control backpumping; i.e., four in number, for all combinations of max. and min. backpumping at the two locations. For each of these options the appropriate ultimate demand level will be taken off the performance curves developed earlier.

Population numbers associated with the several ultimate demand levels will have to be examined to make a judgment as to when those demand levels would be reached. The standard population projections might serve as a useful guide both for determining the total time span and for determining the annual demand increment.

To be consistent with the approach outlined earlier for performance testing, historical flows, adjusted for urbanization, would be used for the routings (as noted, another approach is possible). The historical flows for the record period would be repeated as often as necessary to cover the requisite time span. Present regulation schedules would be used, with alternates as indicated by the performance testing.

For those options which include maximum backpumping at either location (3 options), a routing program should be devised which will permit a scaling up of backpumping from minimum to maximum to meet increasing demands.

Stage hydrographs for the three C.A.'s will be produced at selected key locations using the H-H receiving water model. Vegetation maps based on these hydrographs will be produced. Qualitative evaluation of vegetative changes, if any, will be presented.

{ Text; technical appendix describing receiving water model and displaying selected data printouts and hydrographs; vegetative maps; tabular summaries of pertinent data; tabular estimates of acreage in major vegetative communities by option.}

EXHIBIT "B"

EXHIBIT "B"

M E M O R A N D U M

9-8-1

TO: Staff

FROM: G. E. DAIL, JR.

SUBJECT: Water Use and Water Supply Development Plan - Section II

The outline for Section II has now been synthesized and we are ready to go with the detail. Attached hereto is a copy of the complete outline for your information and use.

As you know, we are expected to have the complete written draft in shape for RPD staff review by April 1. I will appreciate your sending portions of your part of the text material as you complete them, so that we don't have to edit the whole thing during the last week or so. I would suggest that you not attempt, at this stage, to have final copies of Plates, Exhibits, Figures and Schedules, but certainly indicate what you are proposing to have.

I'll be keeping in touch so that we can keep a handle on our progress.

G.E.DAIL, JR.
January 28, 1975

GED:et

Encl.

cc: W. V. Storch
R. L. Taylor
R. Hamrick
W. Dineen
P. Rhoads
B. Jenkins
A. Kreitman
J. Schweigart
S. Reel
J. Wodraska

II A Introduction

II B. Water Resources and Related Legislation

1. Water Resources - Chapter 373, Florida Statutes

a. Part I - Water Resources

(1) General

(2) Declaration of policy

(3) Regulatory emphasis

(4) State water use plan

(5) State water plan

(6) Creation of water management districts

(7) Responsibilities of Governing Board

b. Part II - Permitting of Consumptive Uses of Water

c. Part III - Regulation of Wells

d. Part IV - Management and Storage of Surface Waters

e. Part V - Finance and Taxation

f. Part VI - Miscellaneous

2. Drainage and Water Management, Chapter 298, Florida Statutes

3. Environmental Land and Water Management Act (Chapter 380)

a. History of legislation

b. Areas of Critical State Concern

II B 4. Comprehensive Planning Act of 1972, Chapter 373, Florida Statutes

a. Division of State Planning

b. State comprehensive plan

c. Annual report on state and regional plannning

d. Status of comprehensive planning

II B 5. Environmental Control, Chapter 303, Florida Statutes

a. Introduction

b. Part I - Pollution Control

c. Part II - Florida Electrical Power Plant Siting Law

d. Recent Amendments

e. Rules of the Florida Department of Pollution Control

(1) Chapter 17-3, Pollution of Waters

(2) Chapter 17-4, Permits

(3) Chapter 17-6, Sewage Works

(4) Chapter 17-7, Resource Recovery and Management, Part I - Solid Waste Facilities

(5) Chapter 17-9, Minimum Requirements for Earthen Dams, Phosphate Mining and Processing Operations

II B 6. Land Conservation Act of 1972, Chapter 259, Florida Statutes

a. Authorization of full faith and credit bonds

b. Executive Board of Department of Natural Resources - powers and duties

c. Status of acquisitions

II B 7. Public Law 92-500 (Water Pollution Control Amendments of 1972)

a. Introduction

b. Water Quality Planning

(1) 106 Program

(2) 303 Program

(3) 201 Plans (Facilities Plans)

(4) Section 208

c. Status of 303(a) and 208 Activities

(1) 303(e) Plans

(2) 208 Programs

II. B 8 National Environmental Policy Act of 1969

a. History and Intent

b. Impact on District Activities

c. Permitting and Regulation

(1) NPDES program

(2) Dredge and fill permits

(3) Monitoring programs

(4) Other regulatory programs

(5) Construction Grants

(6) Research Activities

II C Potential Growth and Future Water Demand

1. Introduction

2. Methods

(1) Agricultural Land Use

(2) General Land Use

(3) Future Water Demand

(a) Municipal Water Demand

(b) Agricultural Water Demand

3. Presentation and analysis of population, land use and water demand data.

4. Nature and Impact of population growth

a. Current trends in major urban development

(1) Lower East Coast

(2) Central Florida Region

(3) South Central Region

(4) Upper East Coast

b. Economics of growth

(1) Economics of Urban Growth

(2) Agricultural Economics

II C c. Potential Impact of growth on natural resources

(1) Environmentally sensitive areas

(a) Wetlands

(b) Surface Water bodies

(c) Unique areas

D. Discussion of Water Use regulation and water supply development as concepts.

1. Regulation

2. Development

3. Interrelationship of Regulation and Development

E. Basis for District's Water Use Regulation

1. Establishing minimum flows and levels for surface watercourses

2. Establishing Allocation from Surface Water and Shallow Groundwater Sources

3. Developing a system of permit classification and use priority for water shortage periods

4. Maintaining a Viable Flood Control and Water Supply System

5. Regulation and Monitoring Artificial Recharge

6. Maintaining Sound Water Quality Objectives

a. Introduction

b. Existing State-Federal Water Quality Standards

c. Anticipated Changes in State-Federal Water Quality Standards

d. Existing District Policies

e. Water Quality Management Strategy

(1) Research and Planning Activities

(2)Evaluation and Permitting Activities

f. Summary

II F. Description of the Planning Area

G. Manner of Selection of Alternatives and Basis for Evaluation

1. Principles for the Selection of Alternatives

2. Methodology for the Evaluation of Alternatives

H. Presentation of Water Use Regulations Based on Current Status of the System

1. Salient features of the law

a. Permitting of consumptive uses of water

b. Regulation of Wells

c. Management and storage of surface waters

2. Implementation

a. Rules and Regulations

b. Permit System

c. Part II - Consumptive Uses of Water

d. Part III - Regulation of Wells

e. Part IV - Management and Storage of Surface Waters

(1) Permit Applications for Construction

(2) Hearing Procedures

(3) Permit Issuance

I. Goals and Objectives of the Water Use and Water Supply Development Plan

EXHIBIT "C"

II A. Introduction

In the initial section of this planning document the classic tools of planners were employed. An inventory of the physical environment and the social and economic characteristics of the region was displayed. The governing factors in water management and supply systems in south Florida were analyzed. Land wand water use history and trends were examined along with present state of water supply performance of the Central and Southern Florida Project.

If we were to extend those data assembled in Section 1 in the usual manner, a growth pattern based on historical data would be developed and, in turn, the District would develop a plan for meeting the anticipated water demand in time and location. With this type of planning, assuming structural means can be employed to meet the anticipated water demand, the only constraint is cost. It is not the intent, however, of this plan to work from a fixed figure for water demand. Rather, a series of supply values will be revealed and the development levels that could be supported by those values will be delineated. In this manner a series of alternative futures will be exposed.

Passage of the 1972 Water Resources Act placed an emphasis on regulation of water use not theretofore expressed in law.

Conversely, prior law, which is still contained in the statutes, dealt largely in terms of water supply development, drainage and flood control, no doubt assuming that such measures were necessary to insure the continued development of Florida and to provide the water needs of a growing population.

The 1972 Water Resources Act came into being as a consequence of changing values on the part of the citizens of Florida. During the latter years of the 1960's a growing concern emerged with respect to the quality of life which might result if development and in-migration continued at the dizzy pace of the 1950's and 60's. Serious questions arose with respect to deterioration of environmental health and destruction of natural resources as a result of massive development schemes, particularly in peninsular Florida.

The Water Resources Act was only one of a series of landmark acts by which the legislature responded to the will of its constituents. It and other relevant legislation will be presented in this section.

Why, then, have we chosen to display this variety of alternative futures? We believe that future course of water use regulation and water supply development involves major public policy decisions. The weighing of the factors involved in reaching those decisions should be done by the policy makers, rather than by a planning and engineering staff. In the final analysis, policy makers will then develop a water resource philosophy which not only considers water use as expressed by rules and regulations but also water supply as expressed by development (structural improvement). To be effective, however, it would seem that water management policy must be coordinated with land use policy.

The following pages will set down the guidelines establishing the rationale employed for a "Water Use and Water Supply Development Plan" for the area encompassed by the South Florida Water Management District.

II B. Water Resources and Related Legislation

1. Water Resources - Chapter 373, Florida Statutes

a. Part I - Water Resources

(1) In the 1972 session, the Florida Legislature created the Water Resources Act. It was subsequently amended during both the 1973 and 1974 sessions, but the amendments did not materially change the intent of the original legislation. The Act and amendments thereto were codified as Chapter 373, Florida Statutes, together with portions of previously existing law not repealed, which had been part of Chapter 378, Florida Statutes dealing with flood control districts.

Chapter 373, then, is the statute which outlines and sets forth the duties of the water management districts of Florida, operating under delegation of authority from the Department of Natural Resources.

(2) Broadly, this legislation recast in rather sweeping fashion the means and methods by which Florida was to deal with its water resources. In its declaration of policy it sets forth that:

(a) The waters in the state are among its basic resources. Such waters have not heretofore been conserved or fully controlled so as to realize their full beneficial use.

(b) It is further declared to be the policy of the legislature:

i. To provide for the management of water and related land resources;

ii. To promote the conservation, development, and proper utilization of surface and groundwater;

iii. To develop and regulate dams, impoundments, reservoirs, and other works and to provide water storage for beneficial purposes;

iv. To prevent damage from floods, soil erosion, and excessive drainage;

v. To preserve natural resources, fish and wildlife;

vi. To promote recreational development, protect public lands, and assist in maintaining the navigability of rivers and harbors; and

vii. Otherwise to promote the health, safety, and general welfare of the people of this state.

(c) The legislature recognizes that the water resource problems of the state vary from region to region, both in magnitude and complexity. It is therefore the intent of the legislature to vest in the department of natural resources or its successor agency the power and responsibility to accomplish the conservation, protection, management, and control of the waters of the state and with sufficient flexibility and discretion to accomplish these

ends through delegation of appropriate powers to the various water management districts. The department may exercise any power herein authorized to be exercised by a water management district; however, to the greatest extent practicable, such power should be delegated to the governing board of a water management district.

(3) The law further expanded the water regulatory powers of the State through the water management districts. It provided for permitting consumptive uses of both surface and underground waters, for the regulation of wells and for the regulation and permitting of impoundments, reservoirs and drainage systems.

(4) The law mandates the preparation of a state water use plan. The Department of Natural Resources,responsible for development of the plan, has delegated to the South Florida Water Management District the task of preparing that segment of the plan within its boundaries.

With respect to the development of the water use plan, the law sets forth two distinct avenues of approach - that of regulation of water use and that of improvement of facilities to better provide for present and future needs and uses of water for an expanding society. To incorporate these two purposes, we have chosen to call that combined purpose the water use and water supply development plan. It would appear that both approaches are dynamic and are subject to a considerable mix and, thereby, to an examination of an

array of alternative actions which can be considered. The law also acknowledges that this planning, to be effective, shall be subject to "such amendments, supplements and additions as may be necessary from time to time...." clearly indicating that the dynamic nature of such a plan in any time relationship is implicit.

(5) It is expected that the Department of Natural Resources, after combining all the water use and water supply development plans will coordinate with the Department of Pollution Control to include, as provided by the statute, the water quality standards and classifications developed by that department, which together shall constitute the Florida water plan.

(6) The 1972 Act provided for the creation of five water management districts to encompass the entire state of Florida. The law also recognized the prior existence of the two legislatively established districts, Southwest Florida Water Management District (1961) and Central and Southern Florida Flood Control District (1949), withholding any action to alter their political boundaries.

In 1973 the act was amended, due to legal problems encountered when attempts to transfer ad valorem taxing authority were made. The original boundaries of the two older districts were maintained, while a sixth temporary district entitled "Ridge and Lower Gulf Coast Water Management District" was established. These provisions were to be operative until July 1, 1975. On that date the law

provides that Central and Southern Florida Flood Control District shall be renamed South Florida Water Management District and that the boundaries of the five original districts as determined by the Department of Natural Resources take effect. In so doing, this district would transfer the upper St.John's basin to the St.John's Water Management District and would assume jurisdiction over the Ridge, Big Cypress and Keys Basins of the Ridge and Lower Gulf Coast Water Management District. (As of this writing, however, the legal problems have not been resolved.) The 1972 (and present) boundaries of the District are shown on Plate , boundaries proposed by the Department of Natural Resources on Plate ,and 1973-75 boundaries of the Ridge and Lower Gulf Coast Water Management District on Plate .

(7) The Governing Board of the District is composed of nine members. Terms of five members expire in July 1975; four members' terms expire in July 1977; thereafter terms shall be of four year duration. Members are appointed by the Governor and confirmed by the Senate. They receive no compensation for services, but are entitled to reimbursement for expenses at the statutory amounts.

(a) The Board is authorized to contract with public agencies, private corporations or other persons, to sue and be sued.

(b) The Board may issue orders to implement or enforce any of the provisions of the law or regulations thereunder.

(c) The Board may make surveys and investigations of the water supply and resources of the district and cooperate with other governmental agencies in similar activities.

(d) The governing board has broad powers to construct, operate and maintain works of the district. It also has the authority to designate what shall constitute "works" of the district. In the operation of such works the board is authorized to establish, maintain and regulate water levels in all bodies of water owned or maintained by the district. In performance of its functions, the board is authorized to acquire such lands as are needed for rights of way and water storage by donation, lease or purchase or to condemn any such land.

Except for that which the department may reserve unto itself, the board is also authorized to:

(a) Administer and enforce all provisions of this chapter, including the permit systems established in parts II, III, and IV of this chapter.

(b) Cooperate with the United States in the manner provided by Congress for flood control, reclamation, conservation, and allied purposes in protecting the inhabitants, the land, and other property within the district from the effects of a surplus or a deficiency of water when the same may be beneficial to the public health, welfare, safety, and utility.

(c) Plan, construct, operate, and maintain works of the district as hereinafter defined.

(d) Determine, establish, and control the level of waters to be maintained in all canals, lakes, rivers, channels, reservoirs, streams, or other bodies of water controlled by the district; to maintain such waters at the levels so determined and established by means of dams, locks, flood gates, dikes, and other structures; and to regulate the discharge into, or withdrawal from, the canals, lakes, rivers, channels, reservoirs, streams, or other bodies of water controlled by the district or which are a work of the district, including review of small watershed projects (Public Law 83-566).

(e) Expend, at the discretion of the governing board, for purposes of promotion, advertisement, and improvement of the program and objectives of the district, a yearly sum not to exceed one fourth of one percent of the moneys collected by taxation within the district.

(f) Exercise such additional power and authority compatible with this chapter and other statutes and federal laws affecting the district as may be necessary to perform such duties and acts and to decide such matters and dispose of the same as are not specifically defined in or covered by statute.

(g) Prepare, in cooperation with the department, that part of the state water use plan applicable to the district.

The Board has the power to grant permission for any project involving artificial recharge.

The Board is required to adopt, promulate and enforce such regulations as may be reasonably necessary to effectuate its powers, duties and functions.

As provided by law, the board shall conduct quasi-judicial hearings in accordance with Chapter 120, Florida Statutes, where required under Chapter 373. The board is also authorized to take such steps as may be necessary in a court of competent jurisdiction to maintain its actions taken under the law.

b. Part II - Permitting of Consumptive Uses of Water

Under the provisions of this part of the law the governing board has implemented a program for issuance of permits authorizing the consumptive use of particular quantities of water. Permits are required for all consumptive uses of water except for domestic use by individuals. Details of that program will be discussed in a later chapter.

The law provides that the board shall issue initial permits for the continuation of all existing uses prior to implementation of the district's rules and regulations, if the use is reasonable-beneficial and is allowable under common law.

This section of the law sets forth minimum requirements for permit applications, requirements concerning objections and for holding public hearings. It deals with such matters as competing applications, duration of permits, modifications, renewals, and revocation of permits. It sets up a methodology to be followed by the district in the event of declaration of water shortage or emergency.

c. Part III - Regulation of Wells

d. Part IV - Management and Storage of Surface Waters

This part of the law provides that the governing board may require permits and impose reasonable conditions to assure that the construction or alteration of any dam, impoundment, reservoir, appurtenant work or works will not be harmful to the water resources of the district, and sets forth the procedures governing the application for and the granting of such permits.

Also provided is permission for the district to require permits and impose reasonable conditions to assure the proper operation and maintenance of those dams, impoundments, reservoirs and appurtenant works. The board by regulation may require the owner of any such impoundments and appurtenant works to install and maintain headgates, valves or other measuring devices.

The board has the right to require a permit for abandonment of any of the previously referred to facilities. It further may revoke or modify such permits by reason of danger to public health or safety, or if such operations have become inconsistent with the objectives of the District.

e. Part V - Finance and Taxation

This section of the law provides for the three major fund sources which now accrue to the district. (1) Water Resources Development Account, (2) Department of Natural Resources for administrative, regulatory and other activities, and (3) ad valorem taxation. The district is also authorized to charge fees for permit applications, but has not yet done so.

A number of other provisions concerning revenue sources appear in this portion of the law, but these stem from the original enactment of flood control law and have never been used.

The balance of this part deals with standard financial matters such as investment of funds, depositories, loans and audit provisions.

f. Part VI - Miscellaneous provisions

This part grants to the district the power to enforce any provision of this law to the same extent any peace officer is authorized to enforce the law.

The creation of sub-districts under Chapter 298, Florida Statutes is authorized for the purpose of obtaining additional and more localized benefits.

City and county officers are directed to assist in enforcement of this law, penalties are provided for violation of the law, and the governing board is authorized to pay rewards to any person furnishing information leading to the arrest and conviction of anyone committing an unlawful act on district property, including damage or destruction of district property.

2. Drainage and Water Management, Chapter 298, Florida Statutes

The State of Florida first enacted legislation providing for the creation of drainage districts in 1913. This law was codified as Chapter 298, Florida Statutes. It provided basically that a group of landowners could petition the circuit court to establish a public corporation with the power to levy an acreage tax for both the purpose of paying bond

principal and interest used to construct works and to operate and maintain those works. Such districts were organized primarily to construct, operate and maintain works designed to make wetlands or overflow lands agriculturally productive by providing drainage and frequently, in the alternative, irrigation water.

In 1972 the legislature overhauled this somewhat obsolete law, to make it more responsive to concerns of the eighth decade of the twentieth century. The first change was to discard the name "drainage district" and substitute the title "water management district." This has caused some confusion since that title is the same as given to the major water management districts created under Chapter 373, Florida Statutes. Where heretofore only the landowners holding the majority of the contemplated acreage had to concur, now it must be a majority of the landowners and the law requires that each landowner within the proposed district boundaries and landowners contiguous to those boundaries be officially notified. It further provides that any such landowner may file an objection to formation of the district if he feels that his interests will be adversely affected.

Under the 1972 Act, the Department of Natural Resources may also petition the court for formation of a district, or may do so jointly with a majority of the landowners.

The South Florida Water Management District (C&SFFCD) now must also be served with a copy of the petition and may file with the court objections, recommendations, or proposed amendments to the petition.

Once a district has been authorized by the court, the clerk of the circuit court in which the petition was filed is to call a meeting of the landowners by insertion of a legal notice in a newspaper in each county in which district lands are situated. At the meeting, the landowners will elect a board of supervisors of three persons. The landowners are entitled to one vote for each acre owned. Owners of land of less than one acre are entitled to one.vote. Once elected, the board of supervisors shall appoint a chief engineer. His primary initial function shall be to produce a water management plan (formerly called "plan of reclamation") which will describe in detail the works necessary to drain and reclaim the lands in question.

Although not required by Chapter 298, this water management plan is subject to scrutiny and approval by this district under its regulatory powers found in Chapter 373.

As alluded to earlier in this section, the water management districts under Chapter 298 are authorized to levy taxes on the land within the district. Such tax levies are made on an acreage basis. For the purpose of assuring equity in this taxation, the law provides that the court shall appoint three commissioners to assess the benefits which will accrue to all lands within the district. As a consequence, certain lands may have a greater acreage tax than others. The initial tax levied by a district to pay for the costs of organizing and producing a water management plan, however, is a uniform acreage tax not to exceed one dollar per acre.

Other taxes which may be levied are known as (1) an installment tax and (2) a maintenance tax. The installment tax is used to pay the principal and interest on bonds or notes issued by the district. The district is authorized to issue bonds to provide the funds for the construction of works as detailed in an approved water management plan. The maintenance tax is levied to provide for operation and upkeep of the works after construction.

II B. 3. Environmental Land and Water Management Act (Chapter 380)

The passage of the Environmental Land and Water Management Act, Chapter 380, F.S., has elevated Florida to a position as a leader in directing and controlling growth, land use and development on a statewide basis. The reaction to past development practices and trends, coupled with the projections of Florida having the country's highest growth rate, prompted the state to require a statewide land use plan, regional impact statements, state review of large developments and developments in critical areas. Undoubtedly this is a significant action in that it represented state government's recognition that local government was not necessarily properly equipped or capable of making decisions of regional import. And secondly, in certain instances, to protect the health, safety, and welfare of the citizens, land use management decisions were better vested in state government.

Implicit in this statute, however, are two qualifying conditions. For one, local government still represents the decision making level. In the event the local government decision should be contrary to regional

or state position, the latter has administrative and legal recourse to reverse such decision. Also by statute, regulation by the state in no way infringes upon private property rights.

The two primary elements and processes of the legislation, "Areas of Critical State Concern" (ACSC) and "Developments of Regional Impact" (DRI), became effective July of 1973. Since that time DRIs have been submitted and ACSCs have been nominated for consideration. The purpose of this appraisal is to determine the functioning effectiveness of the legislation with respect to management of water use and water supply development in South Florida.

Unlike the DRI program which places reviewing function on the regional level, "Areas of Critical State Concern" represent a combination of local and state responsibilities. According to Chapter 380, an "Area of Critical State Concern" may be designated only for:

(a) An area containing, or having a significant impact upon environmental, historical, natural, or archaeological resources of regional or statewide importance.

(b) An area significantly affected by, or having a significant effect upon, an existing or proposed major public facility or other area of major public investment.

(c) A proposed area of major development potential, which may include a proposed site of a new community, designated in a state land development plan.

From the above possibilities, it is self-evident how the planning and operation of a complex water management system could be augmented by the land use regulation tools provided for in this legislation.

The implementation of the program rests with the Division of State Planning. Although the administrative path for preparing and reviewing

ACSCs has evolved with the implementation of the process, the final decisions whether or not to designate are determined by the governor and cabinet and/or the legislature. Upon affirmative designation, local government has up to 180 days to develop land development regulations which comply with the principles for guiding development set out in the rule designating the area of critical state concern. The failure to do so on the part of local government, results in state intervention and regulation.

From a management standpoint, ACSC has proven to be popular, but not effective as a tool. The thrust of the program to date has been conservation/preservation oriented rather than as an instrument for controlling growth. Two of the ACSC areas, the Big Cypress and the Green Swamp, are primarily aimed at preserving and protecting the valuable water resources within a critical area.

The third and most recent designation, the Florida Keys, reflects the states broadened interest from the swamp and water management business into the potpourri of growth control and its tangential issues. In the case of the Big Cypress, the federal acquisition and strict land use control on tributary lands is intended to insure the continuance of a historical and acceptable quality inflow into Everglades National Park. The Green Swamp is the recharge area for the upper Floridan Aquifer and here again, the designation qualifies under the environmental spectrum of ACSC criteria. The direction of the state on these two cases support a position that ACSC will be used for preserving the resources of statewide importance that are directly threatened by growth and development pressures. Obviously the same can be said for the Keys

designation, however, the array of principles and objectives underlying this action, exceeds the arena of water resource management and focuses upon the amenities of the area having national importance.

The experiences of the FCD with ACSC reinforce this preservation approach. The nominated areas by the District (C-51 and Jetport Site 14) have been prompted by water resource concerns, with the intent being to control the direct and indirect pressures invoked upon both a mainstay of the water management system and a unique environmental area of world-wide importance, the Conservation Areas. The first example represents the first ACSC nominated in the state, the C-51 basin. The background of this case involves a public canal requiring authorized improvements in the neighborhood of $20 million to enable water to be diverted into the Conservation Areas. The potential impact upon the environment from backpumping into the Conservation Area as well as the inherent increase in flood protection has served to defer this project. Exhibit 1 is a copy of the resolution adopted by the Governing Board of the C&SFFCD nominating the C-51 basin as an ACSC. From a water resource planning position, ACSC designation offered a viable vehicle to coordinate and integrate the water resource capability with the land use practices of autonomous units of local government. The National Water Resources report of 1972 has clearly shown that over the long run, water control improvement projects were not successful without accompanying land use controls. The objective of assuring an acceptable quality storm water runoff, increasing water supply, and creating flood protection while minimizing land enhancement and intensive growth potential, could only be realized by the development and adherence to a set of land development regulations in concert with the proposed water resources capability.

The C-51 basin was never designated an ACSC, but rather the units of local government were instructed by the Division of State Planning to cooperate and develop a set of land development regulations. Failing to resolve the problem with state or local government initiative, at the present time, the District as the lead agency is coordinating local government toward the resolution of this problem.

The other area nominated for "ACSC" by the FCD is "Site 14" of the proposed jetport. Once again, the intent of this nomination was directed to controlling growth to minimize the impact upon the Conservation Areas.

To date these nominations have not received designations and it appears the state has adopted the posture that local government should control growth, whereas the state will use ACSC in those cases where preservation of a state resource directly threatened by development pressures is at question. Given this to be the case, the ACSC designation has not proven to be an effective management tool to the water use planning for South Florida. Rather, it has been used in a broader sense to function as an institutional preservant for the Big Cypress (Everglades National Park), the Green Swamp (Floridan Aquifer) and the Florida Keys. Adhering to this policy direction in the future will assist in identifying the preservation areas under the state development plan, however, it does not appear to be a functional mechanism of water management except in those defined areas.

Turning from ACSC, the other major provision within Chapter 380 deals with Developments of Regional Impact (DRIs). These are defined as any development which, because of its character, magnitude, or location, would have a substantial effect upon the health, safety, or

welfare of citizens of more than one county. The guidelines and thresholds for the DRI process have been identified in Chapter 22F of the Administrative Code.

As with the ACSC process, the Division of State Planning also has implementation responsibilities with the DRI process. However, due to the emphasis upon "regional", the Division of State Planning has delegated implementation responsibilities to the regional planning agencies around the state. In the first year of the program there were two functional regional planning agencies within District boundaries, the South Florida Regional Planning Council and the East Central Florida Regional Planning Council (Exhibit 2). Through an interagency agreement the District reviewed DRIs for the fiscal year 1973-74. In 1974-75 two additional Regional Planning Agencies were established, and under a Division of State Planning edict, water management districts were included in the DRI review. Currently, the FCD has interagency agreements with four Regional Planning Agencies. Besides the above-mentioned, the Southwest Florida Regional Planning Council and the Central Florida Regional Planning Council (Exhibit 3) utilize the District in DRI reviews. Compared to last year, 1974-75 has produced only a smattering of DRIs for an area twice as large. (See Table 2).

In all cases, except those DRIs located in Collier and Lee Counties, the District has regulatory responsibilities once the project passes through the DRI stage. Aside from the specific DRIs and the District's action on each proposal, the germane point in this discussion focuses on why the District participates in the program and how effective a tool is the DRI process in the management of south Florida water resources. To understand and evaluate the above, it is necessary to explain the chronological order of development processes and the District's involvement in those processes.

A development proposal would initiate with a rezoning or special exception request, basically heretofore a politically or philosophically motivated decision, along the lines of how the community should develop. Assuming zoning was granted, plat approval, building permits and certificates of occupancy would follow, in that order. The three later processes involve technical evaluation as to compliance with criteria. It is within or prior to these functions that the District becomes involved through its regulatory responsibilities of Chapter 373 (Exhibit 3).

The DRI process is basically a technical evaluation, injecting advisory input at the rezoning stage, commenting on the capability of the community to develop, while the regional planning agency is instructed to comment on the extent to which:

(a) The development will have a favorable or unfavorable impact on the environment and natural resources of the region;

(b) The development will have a favorable or unfavorable impact on the economy of the region;

(c) The development will efficiently use or unduly burden water, sewer, solid waste disposal, or other necessary public facilities;

(d) The development will efficiently use or unduly burden public transportation facilities.

(e) The development will favorably or adversely affect the ability of people to find adequate housing reasonably accessible to their places of employment; and

(f) The development complies or does not comply with such other criteria for determining regional impact as the regional planning agency shall deem appropriate.

The District, by contractual agreement with the regional planning agencies, comments on water and environmentally related matters. The benefits of regulatory input at this stage of development can be considered three-fold.

1. Local government is provided with a resource compatibility assessment indicating what stress the proposed land use change would create on existing water resource systems.
2. The applicant or developer is provided with a prima facie approximation of what the technical evaluation review in the latter development stages will require. This has served to define, at the preliminary stages, the planning objectives and secondly, it has facilitated project financing.
3. The regulatory agency does not find itself in a position where the applicant claims vested rights, or having to respond to the legitimate question of "why wasn't this restriction identified earlier?"

Because of the above, and local government's desire to control growth to the compatible limits of available resources as well as public facilities, the District has found the DRI process to represent a viable tool for coordinating water and land management. The primary shortcoming of the process being each DRI is reviewed independently without the aid of a state land use plan. With some overall guidance concerning Florida growth objectives and "the quality of life" sought for in the future, the review of DRIs could represent a planning function or a directive rather than the reactionary adversary relationship currently experienced with the submission of an "Application for Development Approval" (ADA).

Stemming from the DRI process, the District has initiated a voluntary program with local government in which the District will provide impact assessment during the rezoning process for those proposals which do not qualify under DRI thresholds but could have an impact upon the water resources of the area. In that this program is tied to District regulatory responsibilities, the thresholds for involvement in rezonings are similar to our involvement in permitting. Besides rezonings, this program has been expanded to include those projects qualifying under Florida Subdivision Land Sales Offerings. Here again, the basis for District input is to advise the prospective buyer, the developer and the Land Sales Board of the potential "permittability" of the propsoed alteration or use of existing resources.

In summarizing the use of Chapter 380, the "Environmental Land and Water Management Act", or its applicability to water use and water supply development in South Florida, it has been used in a restrictive sense in the ACSC process to preserve areas not for development of the resource, but rather to protect the natural amenities of the area from encroachment and/or alteration. Regulation, while an important element of the process, has not been adopted heretofore as the controlling element of growth. The DRI process assumes somewhat of a different posture with respect to applicability to planning. Under current implementation practices, water management district involvement augments and coordinates land and water management practices. In and of itself, the process does not improve the regulation of water resources, however, it makes the development processes more responsive to the parties involved.

I B. 4. Comprehensive Planning Act of 1972, Chapter 373, Florida Statutes

a. This legislation was enacted as part of a "package" of environmental and planning proposals which came before the 1972 Legislature. It made substantial changes to Chapter 23, Florida Statutes in the area of state planning.

The state planning function had previously been grouped with the budgeting function in the Department of Administration. It now became a separate division.

The Division of State Planning is direct to:

(1) Prepare and revise from time to time as necessary, the state comprehensive plan.

(2) Assist in the preparation of the annual executive budget and legislative program of the governor.

(3) Coordinate planning among federal, state and local levels of government and between the State of Florida and other states.

(4) Coordinate all state agency planning and programming act activities, including but not limited to the following areas: economy, employment, education, social welfare, agriculture, industrial development, commerce and trade, transportation and safety, oceanic and water resources, pollution and environmental health, fish and wildlife, housing and urban development, crime and corrections, parks, recreation and cultural development, physical and mental health,public utilities and services.

(5) Prepare or cause to be prepared any studies and reports, or interim and functional plans necessary or useful in the preparation and revision of the state comprehensive plan.

(6) Serve as the state planning and development clearinghouse and designate regional and area-wide clearinghouses.

(7) Make available basic demographic, geographic and economic data and projections to all public and private agencies concerned with development within the state.

b. The State Comprehensive Plan is set forth under Section 23.0121, which reads as follows:

> "Preparation and revision of the state comprehensive plan shall be a continuing process. Such process shall, to the extent feasible, consider studies, reports and plans of every department, agency and institution of state and local governments, regional planning agencies and the federal government, and shall take into account the existing and prospective resources, capabilities and needs of state and local levels of government. The state comprehensive plan shall be based on the best available data and shall provide long-range guidance for the orderly social, economic, and physical growth of the state by setting forth goals, objectives and policies. To the extent feasible, the division shall utilize the services and plans of local governments and regional planning agencies."

c. Provided in the law is that the plan shall be first approved by the governor, as chief planning officer and then transmitted to both houses of legislature for review and approval. This being done, the plan becomes effective as state policy.

An annual report is required to be made to the legislature by December 31 of each year on the progress made in developing the state comprehensive plan, functional plans and planning studies and reports.

d. At the present time, it is not known what the state of progress is in preparation of the overall comprehensive plan.

II B. 5. Environmental Control, Chapter 403, Florida Statues

a. Introduction

Chapter 403, Florida Statutes, as declared by the legislature, is the Florida Air and Water Pollution Control Act. The Act is presented in three parts, (a) Part I Pollution Control, (b) Part II Florida Electrical Power Plant Siting Act, and (c) Part III Interstate Environmental Control Compact. Attention in this discussion will focus on Parts I and II. In addition, due to the comprehensive nature of this legislation and the broad scope of powers and duties granted under it, discussion will be limited to major provisions that impact the District's activities.

b. Part I-Pollution Control

Sections 403.021 through 403.061 delineate public pollution control policies and definitions, establish the Florida Pollution Control Board, and outline procedures, powers, and duties of said Board. In section 403.062, the department's general responsibility for supervision over water quality matters is given. Sections 403.085 and 403.086 outline requirements for secondary and advanced treatment for both domestic and industrial discharges.

Of significant importance are sections 403.087 and 403.088, which delineate requirements for temporary operation permits and operation permits for stationary pollution sources, including filing and processing fees, time constraints for permit application review and evaluation, compliance with water quality standards, required monitoring equipment, and other items. Requirements for inspections, reporting and judicial review, and

procedures, both administrative and judicial, for enforcement actions are presented in sections 403.091 - 403.171.

In section 403.182, the framework for local pollution control programs is set forth, including continuation and approval of programs in existence at the time the legislation was enacted. Local programs currently approved by FDPC and in operation within the District include (1) Dade County Pollution Control, (2) Broward County Environmental Quality Board, (3) Palm Beach County Health Department (Environmental Engineering Division), (4) Brevard County Health Department, and (5) Orange County Pollution Control Department. These local agencies assume most of the responsibility for review and evaluation of applications for permits to construct wastewater collection, treatment, and disposal facilities prior to the issuance of such permits by the FDPC.

Sections 403.1821 - 403.1933, designated as "the Florida water pollution control and sewage treatment plant grant act of 1970," establish a state trust fund and administrative procedures for receiving federal funds and disbursing funds in appropriate amounts to local agencies for sewage facilities construction. Of particular importance is part 403.1926(9), which requires that prior to the state's action in making a grant to a local agency for such construction, a long range comprehensive plan for water quality management for the area that includes the proposed project must be approved by the affected units of local government and submitted to the FDPC. Said plan shall include a program, based on sound land use, population, engineering, and economic assessments, for orderly construction of wastewater collection,

treatment, and disposal facilities adequate to serve the area's needs for ten (10) and twenty (20) year time frames. In addition the local plans must be in compliance with the State's plans and plans of the applicable regional planning agency. Section 403.1827 authorizes the state to make grants to local agencies to conduct water quality management planning, up to fifty (50) percent of the planning costs, and part 403.1828 authorizes the state to provide technical assistance and to cooperate with other agencies in developing the area plan. If the local plan is deemed to be unacceptable to FDPC and the local units do not agree to FDPC's recommended changes, then the state is authorized to develop the area plan. Finally, sections 403.1828 - 403.1833 set forth the requirements for priorities of project funding, receipt of federal aid, and state fund advances. Federal grants made under PL92-500 (to be discussed later) are managed and disbursed via this system.

Due to the unavailability of federal funds in 1971-1972 to cover all wastewater projects in the state, the legislature amended Ch. 403 to include the establishment of the State revolving loan program. The FDPC, under this provision, is authorized to grant loans to local agencies for acquisition of land and planning and construction costs of wastewater facilities. To date, extensive use of these funds has been made in instances where sources of funds in addition to federal grants were needed.

c. Part II - Florida Electrical Power Plant Siting Law

Enacted by the legislature in 1973, this legislation essentially centralizes all permitting processes for new electrical power plants and expansions of existing power plants at the state level,

with final permitting authority vested in the Florida Department of Pollution Control. A "certification" is issued to an applicant by the Pollution Control Board for the new or expanded site and facilities, which stipulates the conditions to be met by the applicant during construction and operation of the facilities. This order is issued in lieu of several different permits for various parts of the system.

The legislative intent in regard to power plant siting is delineated in section 403.502, followed by appropriate definitions in section 403.503. Duties and powers of FDPC under this act are set forth in section 403.504, including rule making powers, public hearing requirements, power to contract for studies of proposed sites, and provision for requiring a $25,000 fee for application review, evaluation, and processing. Ten-year site plans are required from all electrical utility companies under section 403.505. Such plans are to be reviewed by the state at least once every two years, beginning January 1, 1974. Detailed input from the Division of State Planning and the Public Service Commission is required under section 403.507. In addition, this section also outlines the minimum site criteria that must be evaluated, as indicated below (emphasis added):

"(a) Cooling system requirements;

(b) Proximity to load centers;

(c) Proximity to navigable water and other transportation systems;

(d) Soil and foundation conditions;

(e) Availability of water;

(f) Land use;

(g) Accessibility to transmission; and

(h) Environmental impact."

The FDPC is authorized to perform the above evaluations in-house, or contract the work to another entity.

Public hearing procedures and procedures for making recommendations to the Pollution Control Board are enumerated in Sections 403.508 and 403.509.

Of major importance to the District are Sections 403.510 and 403.511. Under these provisions, actions in accordance with the Power Plant Siting Act supersede actions of other state and local agencies. This is specifically delineated in 403.511 (3), as follows:

> "(3) The issuance of a site certification shall be in lieu of any permit, certificate, or similar document required by any other department, agency, bureau, commission, district, or board of this state or any local agency, including, but not limited to, those documents, permits, or certificates which may be required under chapters 161, 253, 298, 370, 373, 378, 380, 381, and 387 but shall not affect in any way the rate-making powers of the public service commission under chapter 366, nor shall this act in any way affect the right of any local government to charge appropriate fees or require that construction be in compliance with local building codes, standards, and regulations."

d. Recent Amendments

The most notable recent amendment to Chapter 403 is the Resource Recovery and Management Act of 1974, which establishes state policies and procedures for permitting, construction, operation, maintenance, inspection, and enforcement in regard to solid waste disposal and preprocessing facilities, including sanitary landfills, incinerators, and others. Chapter 17-7 FAC, which became effective January 1, 1975, outlines the specific requirements for such facilities, as will be discussed in part e.

e. Rules of the Florida Department of Pollution Control

Rules promulgated under Chapter 403, Florida Statutes, are the responsibility of the Florida Department of Pollution Control, and are included as Chapter 17 of the Florida Administrative Code. Discussion in this section will include only those rules having a major impact on District planning and permitting activities, which include Chapters 17-3, 4, 6, 7, 9 and 19.

(1) Chapter 17-3, Pollution of Waters

Stream classifications, water quality standards, water quality criteria, water quality testing procedures, and requirements for drainage well are delineated in Chapter 17-3. General and specific standards, including physical (thermal and others), chemical, and biological parameters, for all waters are presented in 17-3.02, 3.04, and 3.05. Section 17-3.06 sets forth the five classifications and the uses associated with each classification. Specific standards for each classification are delineated in 17-3.07 through 3.11. Water quality testing procedures (approved methods) are outlined in 17-3.03. Permit, construction, and operation requirements are set forth in Sections 17-3.12 through 17-3.19. Further discussion in regard to the impact of this rule on the District's planning, evaluation, and permitting activities is included in Part II. E.1.i. Maintaining Sound Water Quality Objectives.

(2) Chapter 17-4, Permits

The purpose of the rule is succinctly stated in 17-4.01, as follows:

> "This Chapter provides the requirements and procedures for the issuance, denial, renewal, modification, suspension, and revocation of any permit required by the State of Florida Department of Pollution Control."

Definitions, prohibitions, and exemptions are delineated in 17-4.02, 4.03, and 4.04. Procedures for applying for permits are outlined in 17-4.05, and standards for issuance or denial of permits are presented in 17-4.07.

Part II of 17-4, which includes 17-4.20 through 4.28, sets forth the specific requirements for various FDPC permits. Information and data requirements to support applications for construction permits are presented in 17-4.21. Requirements for obtaining operation permits for wastewater facilities (domestic, industrial, agricultural, commercial, others) are delineated in 17-4.22, 4.24 and 4.25. The requirements for compliance with 17-6 and compliance with the phase out stipulation of approved metropolitan or basin water quality management plans are included in 17-4.26. Requirements for drainage well permits, in addition to those requirements given in 17-3, are outlined in 17-4.27.

Specific requirements for non-point source permits, including urban runoff, agricultural runoff, dredge and fill activities, and runoff resulting from construction activities, are not presented in 17-4. However, some permits for these activities are being issued under the general provisions of Part I of Ch. 17-4, and the general provisions of Ch.403, Florida Statutes. According to an FDPC staff report of November 12, 1974, FDPC has only exercised its permit authority over dredge and fill projects as a result of enforcement actions (approximately 50 such actions in the last four years). FDPC, however, does provide commentary to the Trustees on dredge and fill proposals, and issues water quality certifications under PL 92-500. Concerning other non-point sources, FDPC provides commentary to local agencies in regard to proposed drainage system construction. In addition, FDPC is involved in the review process of NPDES permits issued under PL 92-500.

(3) Chapter 17-6, Sewage Works

This rule delineates requirements, in addition to those listed in 17-4, for wastewater works, including standards for outfall locations, grease traps, connections to existing collection systems, and further data and support information required in permit applications.

(4) Chapter 17-7, Resource Recovery and Management, Part I-Solid Waste Facilities.

State policies and definitions in regard to solid waste management are provided in 17-7.01 and 7.02. General requirements for all facilities are given in 17-7.03, including management

responsibilities, performance bonds, certifications of plans and specifications by registered engineers, and deadlines for applying for permits for existing and new solid waste facilities. Section 17-7.04 sets forth prohibitions in regard to facilities location, transport of wastes, disposal and transport of hazardous and infectious wastes, and construction practices.

Section 17-7.05 has the greatest impact in terms of District regulation activities. Specific location, construction, operation, and maintenance requirements for sanitary landfill facilities are delineated in this part. A report discussing proposed site and area specifics is required to accompany each permit application. This report is also required to include a study of ground and surface water hydrology and water quality in the site area, and proposed drainage works required. This latter point is particularly important since one of the operational requirements is the maintenance of "a minimum separation of five (5) feet...between putrescible solid waste and anticipated high ground water table." In addition, runoff from the site must meet the appropriate water quality standards of the receiving water, and groundwater contamination must be minimized.

(5) Chapter 17-9, Minimum Requirements for Earthen Dams, Phosphate Mining and Processing Operations

General requirements and definitions are set forth in 17-9.01 and 9.02. Construction criteria for dams and drainage works are delineated in 17-9.03, including acceptable materials for impoundments, construction practices, and water control measures.

Operational criteria are specified in 17-9.04, followed by inspection procedures in 17-9.05.

Chapter 17-19, Domestic Wastewater Treatment Plant Monitoring

This rule, effective 1-1-75, sets forth reporting procedures, sampling methods, analysis methods, parametric coverage and sampling points (including polishing ponds, injection wells, and disposal ponds), for monitoring municipal and private domestic wastewater treatment plants. The burden of monitoring effluent discharge is placed on the applicant, provided that sampling and analysis methods are methods which are approved by FDPC and the federal Environmental Protection Agency. However, no procedures or requirements are delineated for certification or approval of water quality testing laboratories.

II B. 6. Land Conservation Act of 1972, Chapter 259, Florida Statutes

a. This was another of the proposals submitted to the 1972 session of the legislature covering an environmental and land and water planning package. The law gives authority for the issuance of bonds pledging the full faith and credit of the state in the amount of $200 million for acquisition of environmentally endangered lands and $40 million for acquisition of outdoor recreation lands. The Constitution of the state of Florida provides that such proposals must be submitted to the electors for approval. This was approved in the 1972 general election.

b. The Executive Board of the Department of Natural Resources (Governor and Cabinet) is given the responsibility and authority to develop and execute a comprehensive plan to conserve and protect environmentally endangered lands. The Board is authorized to

to contract with any governmental entity or any persons relating to the conservation or protection of lands. The Board is authorized to purchase in fee or lesser interest any environmentally endangered lands or outdoor recreation lands.

c. As of January 1975, the Department of Natural Resources had disbursed or committed over $89.6 million for acquisition of environmentally endangered lands, of which over $64.8 million was for land expected to be within the boundaries of the South Florida Water Management District. Under the recreation bond program $36.7 million has been disbursed or committed, of which $22.7 million was for lands within the District.

II. B 7. Public Law 92-500 (Water Pollution Control Amendments of 1972)

a. Introduction

Enacted by Congress in November 1972, Public Law 92-500 is the latest, and most comprehensive, set of amendments to Public Law 84-660, the first federal water pollution control legislation in the U. S. Due to its comprehensive nature, emphasis in this discussion will center on those portions of the legislation that are anticipated to have the most impact on the District's planning, evaluation, and regulatory activities.

b. Water Quality Planning

(1) 106 Program

Under Section 106 of the Act, the federal government, through the Environmental Protection Agency, is authorized to make grants for the conduct of the state's pollution control program. The state is required to submit an annual report to EPA, which summarizes the preceding year's accomplishments and sets forth the state strategy and program, including estimates of personnel

requirements and costs, for water pollution control for the upcoming fiscal year (the report is submitted in April of each year for review). The program should outline state strategy for water quality management, including (1) a system for ranking basins in terms of the severity of water quality problems; (2) ranking wastewater management projects to determine funding priorities for collection treatment, and disposal facilities; (3) a summary of state permitting activities; (4) a status report and a projection of anticipated efforts in water quality planning and standards revisions; (5) the monitoring and enforcement strategies; (6) an estimate of needed manpower for the program; and (7) an indication of how public participation is included in the program.

(2) 303 Programs

Water quality standards and river basin planning activities are covered under Section 303 of the Act. Subsections (a), (b), and (c) require the states to adopt water quality standards, subject to EPA concurrence, and review such standards at least once each three years. Under subsection (d), the states are required to classify all stream segments into effluent segments and water quality segments. Effluent segments are those water bodies which will meet water quality standards upon the application of secondary treatment for domestic wastewater treatment plants and best practicable control technology currently achievable (BPT) for other discharges. On the other hand, water quality segments are those water

bodies which will not meet water quality standards with the above treatment levels, but will require advanced levels of treatment or no discharge. All waters in the Kissimmee River Basin (Basin No. 26) are water quality segments. In the Lower Florida Basin (Basin No. 28), all water bodies in Dade, Broward, and Palm Beach counties are water quality limited. Other water quality class segments in Basin No. 28 include Matlacha Pass, San Carlos Bay, Caloosahatchee River downstream of the Olga Locks, Estero Bay, Immokalee urban area, Gordon River, Lake Okeechobee and tributaries, St.Lucie River (North Fork and South Fork below locks), Loxahatchee River, Fakahatchee Strand, and Big Cypress Creek in the Big Cypress Swamp.

Actual basin planning is to be done by the states under subsection (e). These basin investigations are continuous planning processes which are required to include the following:

(a) Delineation of effluent limitations required to meet water quality standards for all stream segments;

(b) Establishment of total maximum daily loads of pollutants to receiving bodies;

(c) Establishment of compliance schedules for discharges to upgrade treatment levels to meet water quality standards;

(d) Mechanisms to incorporate areawide planning under Section 208;

(e) Measures for management of sludge and other residuals;

(f) An inventory and ranking of dischargers, in terms of the priority for receipt of construction grants for wastewater facilities;

(g) A mechanism for cooperation of agencies at all levels.

(3) 201 Plans (Facilities Plans)

Efforts under Section 201 are primarily oriented toward development of cost-effective configurations of collection, treatment, and disposal facilities, rather than development of receiving water constraints. Thus, further discussion of this section is not warranted.

(4) Section 208 of the Act establishes the most comprehensive planning program of all the water quality planning efforts. Planning grants of 100% federal funds are authorized for areawide organizations to conduct 208 planning, designated in the act as Areawide Waste Treatment Management Planning. Emphasis under 208 is directed to urban areas (Standard Metropolitan Statistical Area in particular), since water quality management procedures in these areas are more complex and require detailed evaluation of numerous factors, including land development impacts on water quality. Plans produced under Section 208 are required to include the following:

(a) Identification of anticipated treatment works-construction over the 20 year planning period, including priorities for construction over 5 year periods up to 20 years.

(b) Planning for facilities that are eligible for step 2 or step 3 grants during the 5 year period after approval of the 208 Plan (facilities planning under 201).

(c) Identification of non-point sources of pollution - including urban runoff, agricultural runoff, construction activities, land disposal of wastewater, sanitary landfills, sludge disposal, saltwater intrusion, and hydrographic modifications,

followed by methods and procedures to control such sources to the extent feasible.

(d) Identification of a management system necessary to implement the Plan.

(e) Identification of an implementing schedule, including anticipated implementation costs and sources of revenue.

(f) Required certifications relating to compliance with other plans, public participation, and plan adoption.

(g) Identification of methods and procedures for monitoring effects of plan implementation.

(h) Identification of methods and procedures for 208 Plan update and revision.

(i) Recommendations of appropriate local governments for state and EPA certification of the Plan.

c. Status of 303(e) and 208 Activities

(1) 303(e) Plans

As discussed earlier there are two major basin planning efforts underway, covering the Kissimmee Basin (No. 26) and Lower Florida Basin (No. 28). These programs are being conducted by the Florida Department of Pollution Control staff located in Tallahassee. As of May 15, the Basin plans had not been released for public review and comment but draft copies are being reviewed by the Environmental Protection Agency for possible revisions prior to release to the public. The projected time frame for public release is summer 1975,followed by public hearings in late summer. It is anticipated that these hearings will be held in appropriate locations within the District.

(2) 208 Programs

As of May 15, 1975 six 208 agencies within the District were anticipated to be designated to perform 208 planning. These agencies include (a) East Central Florida Regional Planning Council (metropolitan Orlando); (b) Central Florida Regional Planning Council (Polk County); (c) Southwest Florida Regional Planning Council (Glades, Hendry, Lee and Collier Counties); (d) Palm Beach County Area Planning Board; (e) Broward County Planning Council, and (f) Metropolitan Dade County Commission.

Designation packages for each of these agencies have been submitted through the state (FDPC) and EPA, except for Polk County. Grant applications have been submitted to EPA and FDPC from the ECFRPC and the Palm Beach County Area Planning Board, and applications for the other areas are anticipated to be submitted by early June. A substantial degree of District involvement is anticipated in the 208 programs, primarily for those areas in southwest and southeast Florida, in terms of technical and management support.

II B. 8. National Environmental Policy Act of 1969

a. History and Intent

The National Environmental Policy Act (NEPA) was signed by the President January 1, 1970. Since then much technical and social review under NEPA has occurred to prepare and review environmental impact statements (EIS). Once Federal monies have been committed to a project and a potential environmental impact exists, detailed

environmental assessments or reports must be completed. The assessments or reports form the basis of the EIS.

The Congress recognizing the impact of man's activity on the environment, created NEPA to be used in the conservation of the environment. This act established a national policy and created the Council on Environmental Quality (CEQ) - the environmental advisor to the President. In essence, that policy is that all federal agencies have a continuing responsibility to insure that consideration of environmental amenities and values are equal to the technological and economic factors in government decision-making.

Shortly after the passage of NEPA, the President issued an executive order which requires agencies to implement the Act and, in specific terms, directs CEQ to issue guidelines to federal agencies for the preparation of impact statements. As a result two (2) sets of guidelines exist. The first set was issued on April 23, 1971, which set up the impact process, and in particular, the concept of draft and final statements. These concepts were developed by the CEQ to facilitate consultation among federal, state and local agencies and citizenry that the Act requires. The guidelines set up a comprehensive procedural structure for the impact statement process.

These guidelines were somewhat dated, however, and this resulted in a second set of guidelines issued by CEQ on May 16, 1972. This second set is supplementary to the first, and is in the form of recommendations to agencies rather than formal regulations. The

second set answers in essence a number of questions on procedure and on the content of an impact statement that arose in the first year's experience.

An EIS, as CEQ's guidelines state, should include:

1. A description of the proposed project action, information and technical data adequate to permit a careful assessment of environmental impact by other agencies;
2. The probable impact of the proposed action on the environment, including the impact on ecological systems;
3. Any adverse effects which cannot be avoided, such as water or air pollution, undesirable land use impacts, damage to life systems, urban congestion, threats to health, or other adverse impacts.
4. Alternatives to the proposed action that might avoid some or all adverse impacts;
5. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity;
6. Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented;
7. Where appropriate, a discussion of problems and objectives raised by other federal, state, and local agencies and by private organizations and individuals, and the disposition of the issues involved.

b. Impact on District Activities

Water resource projects undertaken by the Army Corps of Engineers or projects that are partially financed by federal funds are subject to NEPA requirements, as outlined above. As of March 1, 1975, draft impact statements prepared by the Corps (Jacksonville office) on District projects include:

1. Lake Okeechobee (raising regulation stage);
2. Partial statement on the St.John's project (Upper St.John's river basin;
3. Flood control facilities in Hendry County;
4. Backpumping proposals for the lower east coast planning area;
5. South Dade conveyance system

Comments on these statements from various agencies, including the District, have been submitted to the Corps for review and possible incorporation into any subsequent statements. To date, only the Lake Okeechobee final Environmental Impact Statement has been filed by the Corps with the Council on Environmental Quality.

In terms of future projects, any major federal expenditure proposed as part of the recommendations in the District's water use plan will probably require that environmental impact statements be prepared by the Corps on such projects. In anticipation of this event, the District's current programs, as part of the water use planning effort, should provide the necessary support information to ease the burden in preparing such statements, and provide necessary input into the planning process, in terms of environmental, land use, and economic impacts of proposed alternatives.

c. Permitting and Regulation

(1) NPDES program

Section 402 PL 92-500 established the National Pollutant Discharge Elimination System to bring under federal permit all point sources of pollution and certain non-point sources (primarily sewered urban runoff, feedlot runoff and some others). Essentailly, this portion of the Act gives to EPA the responsibility to issue permits for discharges to navigable waters, and is an expansion of federal authority from the Rivers and Harbors Act of 1899. However, the statute is unclear concerning the necessity for an NPDES permit for injection wells and land disposal facilities for wastewater. Recent interpretations by EPA indicate that NPDES permits will be issued to those entities which currently discharge wastewater to navigable waters and will utilize injection wells and/or some mode of land disposal to meet the disposal requirements of PL 92-500.

States are authorized to administer this portion of the Act, if EPA approves the state's permitting program and EPA's legal staff determines that the state has the appropriate legal authority to issue NPDES permits.

(2) Dredge and fill permits

The Army Corps of Engineers, under Section 404, is authorized to issue permits for dredge and fill activities in navigable waters. However, EPA must certify that the proposed activity will not adversely affect water quality.

(3) Monitoring programs

Two basic water quality monitoring programs are being set up in conformance with the Act. EPA is in the process of establishing a National Water Quality Surveillance System (NWQSS) to monitor water quality trends in terms of national significance. An annual report on water quality will be produced by EPA, highlighting the results of the NWQSS.

A more detailed monitoring program is to be established under each state's 106 program. According to EPA's Water Quality Strategy Paper (March 15, 1974), the efforts under 106 should focus on (1) base line water quality conditions, including groundwater; (2) sources of water quality degradation; and (3) permit compliance monitoring. Initial efforts by the states should be in terms of development of (1) laboratory and support capabilities, (2) a quality assurance program, and (3) a data storage and handling system.

(4) Other regulatory programs

Control programs of hazardous materials and oil spills to reduce water quality degradation are authorized under Section 311 of the Act. Regulations for hazardous materials programs are anticipated to be promulgated by EPA in 1976, while similar regulations for oil spill prevention were promulgated in 1974. Permits for ocean discharge of wastewater and disposal of other materials are authorized under Section 403 of the Act.

(5) Construction Grants

Section 201 authorizes federal grants to local government entities for construction of wastewater collection, treatment, and disposal facilities. Such grants are authorized to pay up to 75% of the eligible costs of treatment works. Although funds can be used for construction of storm water works, current priorities of EPA and the states (states set priorities within their jurisdiction) are for construction of treatment and disposal facilities and major interceptor sewers. Local collection systems are next, followed by urban storm sewers.

(6) Research Activities

Under Section 304, EPA is required to develop information and guidelines for problem definition and control measures for non-point sources of water pollution, including urban runoff, agricultural runoff, construction activity, dredge and fill projects, salt water intrusion, and several other activities. This information is to be used in the 208 and 303 (e) planning efforts.

In the area of environmental processes and effects, criteria are to be developed for toxic/hazardous substances, ocean disposal, and basic water quality requirements for aquatic life. A revised criteria document is scheduled for publication in 1977-1978. Water quality standards, based on the revised criteria, will be revised shortly thereafter. These revised standards will form the basis for planning and programming to meet the 1983 goals of the Act.

Another important area of research is the field of cost-benefit analysis. Analyses will be made of cost-effectiveness criteria, methods of setting standards (economic impacts), quantifying recreational and aesthetic values, and means of assessing the overall economic, social, and environmental impacts of the federal-state strategies for water quality management.

Finally, EPA and the states, in conformance with the general requirements of the Act, are implementing a quality assurance program for water quality data.

II C. Potential Growth and Future Water Demand

1. Introduction

Rapid growth has been an integral part of the recent history of central and southern Florida. Of the two factors governing population increase, net migration and net natural increase, net migration is by far the most important. For the period 1960 to 1970, the excess of resident births above resident deaths, in the State as a whole, accounted for only 27.1% of the population increase. In contrast, the increase resulting from net migration accounted for the remaining 72.9%. The faster growing counties of the District have shown the effect of this migration quite dramatically. Broward County, for example, experienced an increase of 90% attributable to net migration for the decade of the 1960s.

Among the factors which have contributed to this increase has been tourism. Of the many million visitors to Florida, a large number return to become permanent residents. The new residents have shown a strong preference for the urban areas near the coastline. This preference for coastal urban development has been the main factor in the rapid urbanization of the Gold Coast in Southeast Florida. Urban development

grew at a very fast pace in Dade County in the 1950s. It continued north to Broward during the 1960s and eventually to Palm Beach and Martin Counties. Should the existing trend continue, by the year 2000 a large urban area extending along the east and west coasts of Florida and crossing at the Orlando urban area is expected.

The attractive environment and the comfortable climate which make Florida a desirable place to reside have encouraged high growth, high migration rates and a tendency to concentrate in large, urban coastal zones.

Although rapid growth has become a basic part of the way of life in much of the District and particularly South Florida, recent events show that planned growth policies have been adopted in several areas. The most recent example of the application of a planned growth concept was the passage of the Dade County Comprehensive Development Master Plan. Moreover, Broward County is currently conducting a major land use planning effort, and Palm Beach County has an adopted land use plan. It is apparent that public policy measures do exist whereby trends in land use and population growth may be altered. The long-term viability of these planned growth approaches in modifying the historical trends remains to be documented, however.

The future trend of development in the central and southern Florida area is of paramount importance to the preparation of this water use plan, for it is a primary determinant of future water demand and hence water supply needs. Unlike conventional water supply planning efforts, however, the approach selected for the development of this plan: (1) recognizes the existence of possible institutional means whereby historical trends in land use, population growth, water consumption, and hence water supply needs, can be modified without stopping economic growth; and

(2) provides that environmental impact assessment can be an integral part of the process of evaluating the selecting alternative plan elements.

Extrapolation of current trends to a specific date in the future may yield unrealistically high results, should planned growth policies be effectively implemented. In addition, it is readily apparent that the ultimate selection of a water supply development alternative as a part of this plan could also play a role in determining the future trend of growth.

In addition to the direct relationship between growth and future water demand, the alternative ultimate levels of development which will be supported by the adopted Water Use Plan will have significant economic and environmental ramifications which should be examined.

The succeeding pages of this chapter present: (a) an examination of several alternative future levels of development (land use and population) ranging from the traditional extrapolation of existing trends to the land use plans which exercise contol over the historical growth factors, together with an examination of related water demand levels and; (b) an examination of the potential impact of future development on the economic and environmental characteristics of the area.

2. Methods

This section presents a discussion of the methods used in preparing the projections of population, land use and water demand.

a. Population Projections

Population projections are not permanent or binding figures but educated guesses based on historical and present population trends. Constant evaluation and revision of population projections are required as developments occur which affect the existing growth patterns.

The population projections examine three future levels of growth and were derived by: (1) extrapolation of 1950-1970 population trends; (2) the staging of population according to existing Land Use plans or development guides; and (3) the standard population projections as developed by the Bureau of Economic and Business Research of the University of Florida.

The extrapolation of 1950-1970 population trends represents a future level achieved by the year 2000. This assumes that the growth will come about as a result of little or no restrictions and that it will follow an exponential population growth trend. The exponential growth curve was applied to each county individually; the coefficient of determination (r^2) ranged from .94 to 1.00. This population series shows less agreement to the two other population projections.

Population projections according to land use plans or development guides represent future population growth within the constraints of the land use plans. The restrictions of location and rate of growth of population varies greatly with the different county plans. This population series closely approximates the existing growth philosophy of the local governmental units.

The standard population projections as developed by the Bureau of Economic and Business Research of the University of Florida are baseline projections. These projections are base line reference points based on historical, current, and limited future information. Several growth assumption curves (linear, exponential, and logarithmic) are fit to the state's and each county's historical population series using 1950, 1960 and 1970 census data. These base line projections

result from a best fit extrapolation to a curve or a combination of curves. The historically based projections for each county were corrected for inconsistencies and for special growth changes where the most recent population trends deviate radically from those of the past. Projections for groups of counties are examined to account for possible spill-over effects to less dense areas from dense areas.

(1) Agricultural Land Use

The information concerning agriculture for Part II of the District Water Use Plan was abstracted from the Agricultural Growth in an Urban Age report prepared by the Institute of Food and Agricultural Science, University of Florida, Gainesville, Florida

This report reflects the work of many people. More than a year ago under the leadership of county extension directors, groups in each county of the state began preparing reports that described the present agriculture (1974) situation, summarized problems, projected the future and suggested actions.

Later, state-wide commodity committees composed of leaders in agricultural businesses and members of the faculty of the Institute of Food and Agricultural Sciences (IFAS), examined each of the major agricultural enterprises of the state.

In addition, eleven "support committees" were formed to study such special topics as energy, environment, land use and taxation, man power, water and others. These committees prepared information for use by the commodity committees, responded to special requests for help from the commodity committees, reviewed the commodity committee reports, and advised on the preparation of the report.

(2) General Land Use

It was attempted to include the best and most up-to-date information available. Most of the existing land use surveys were conducted during the beginning of the 1970s. A few isolated cases can be found where the data on existing land use are from the late 1960s, but these counties are in the process of updating their land use plans and hopefully the updated figures can be reflected in the final draft of this text. Each county planning office was contacted personally for any information on existing land use as well as on the proposed plans. Some counties have well-documented land use plans, some have adopted development guidelines and some are in the process of developing a land use plan/development policy guide for the near future. Except for counties in the east-central Florida region, all the projections of land use were done on an individual county level. In the east-central region the figures on land use projections reflect the projections of regional planning agencies and that of the counties combined.

(3) Future Water Demand

Various sections of this report deal with the water demands which are projected to be generated in each of the counties within the District. As is the goal throughout Section C of this report, the primary objective here is to give some understanding of the range of possible future water demand.

(a) Municipal Water Demand

Municipal water demand projections were based on three alternate population projections: (1) current land use or development plans of the respective counties; (2) the official population projections of the Bureau of Economic and Business Research, University of Florida; and (3) a projection based upon historical trends between 1950 and 1970.

Water demand projections were prepared from these population figures by applying the demand regression equations presented in Table .

(b) Agricultural Water Demand

It is the future intent of this section to present at least two alternate agricultural water demand projections. At the current time, the only available data have been extracted from the Report for Kissimmee-Everglades Area Florida, U. S. Department of Agriculture, Soil Conservation Service. The demand figures for the years of interest have been graphically interpolated by the straight line method for intervals between the published data for 1968, 1980 and 2020.

The primary set of water demand projections to be presented later will be based on agricultural acreage forecasts prepared by the Institute of Food and Agricultural Sciences, and rationally extrapolated through the year 2000.

Figure presents the average yearly supplemental consumptive use data, which were used in developing agricultural water demands for each county.

3. The presentation and analysis of population, land use and water demand data.

(IS NOT INCLUDED IN THIS DRAFT)

4. Nature and impact of potential growth

The previous pages of this chapter examined several potential future levels of population, land use and water demand. Depending on the validity of the assumptions underpinning the various projections, it is apparent that the magnitude of future growth could vary considerably. The level of urban and agricultural development which actually occurs will be the net result of a large number of social, economic and political factors, of which the provision of water supply under this plan is one.

Although the future level of urban and agricultural growth is directly related to water demand, which is a basic consideration in development of this plan, the potential economic and environmental impacts of future development itself are the focus of this section. While the water use and water supply development plan will have associated with it certain primary economic and environmental impacts, the effects of the accompanying growth on the economy and natural resources of the area are potentially greater and require recognition and consideration as part of the plan.

Regardless of the actual level of future development, certain general impacts will likely result. In examining these effects, the following presents an analysis of the current major trends in urban development within the framework of urban growth.

The future direction of agricultural development and its associated impacts are examined in a subsequent section. The key economic importance of this sector of the economy and the potential conflicts of the urban and agricultural sectors in matters of land use and water supply are addressed.

Following these sections, the potential impact of future growth on environmentally sensitive areas is examined to provide an overview of matters requiring detailed examination later in the plan.

a. Current trends in major urban development

Several regions within the District have felt the pressure of urban growth. These growth regions are considered to be composed of several counties in the same geographical region which are similar with respect to their past growth rates, present growth pressures and anticipated future trends. These growth regions and certain of the issues related to the impact of growth in these areas are examined in the following paragraphs.

Using information sources which include recent population growth, Development of Regional Impact projects and various local information sources, four growth regions within the District have been identified as:

Lower East Coast Region - Dade, Broward and Palm Beach Counties
Central Florida Region - Orange, Osceola and Polk Counties
South Central Florida Region - Hendry and Glades Counties
Upper East Coast Region - Martin and St.Lucie Counties

(1) Lower East Coast

This growth region which is commonly known as the Gold Coast comprises Palm Beach County to the north, Broward County in the middle, and Dade County to the south. Although phenomenal growth that occurred in Dade County in the sixties has decreased somewhat, strong pressures are continuing in Broward and Palm Beach Counties. Broward County ranked first, Dade County second, Pinellas County (outside FCD area) third, and Palm Beach County ranked fourth in the State, in terms of population increase from the census figure of April 1970 to the estimates of July 1974. These figures are presented in a tabular form below:

	April 1 1970 Census	July 1 1974 (est)	Change 1970 1974	Average Yearly Percent Change 1970 - 1974
Florida	6,790,929	8,248,851	1,457,922	5.05
Lower East Coast				
Dade County	1,267,792	1,413,102	145,310	2.70
Broward County	620,100	828,169	208,069	7.90
Palm Beach County	348,993	459,167	110,174	7.43
Total-Lower East Coast	2,236,885	2,700,438	463,553	21% increase from 1970 base figure

Application for Development Approval submitted as a part of the Development of Regional Impact process provide an indication of the location, character and magnitude of future major developments in the Lower East Coast Region.

The following table presents a summary of the DRIs in this area since July, 1973:

Dade County

DRI Residential Threshold - 3,000 units

1973 Existing Population - 1,371,847

DRI Nos.	Type	Total Potential Acreage (DRI)	Total Potential Population (DRI)	% of Exist. (1973) Population
6	Residential	3194	88,621	6%
2	Commercial	210	-	
8		3404	88,621	6%

Broward County

DRI Residential Threshold - 3,000 units

1973 Existing Population - 767,938

11	Residential	26,312	439,381	57%
1	Commercial	71	-	
12		26,383	439,381	57%

DRI Nos.	Type	Total Potential Acreage (DRI)	Total Potential Population (DRI)	% of Exist. (1973) Population
Palm Beach County				
DRI Residential Threshold - 2,000 units				
1973 Existing Population - 426,936				
10	Residential	12, 167	161,544	38%
3	Commercial	282	-	
13		12,449	161,544	38%
Grand Total - Dade, Broward and Palm Beach Counties				
33		42,236	689,546	27% of Tri. Co. 1973 Population

The above developments are only those which have qualified for the DRI process. According to the Division of State Planning records, almost an equal number of proposed developments in South Florida have received vested rights interpretations and about half of the number have received binding letters of determination disqualifying them from the process over the first year since the law was enacted.

The gravity of the situation can be focused by going over details of major (PUDs, DRIs, etc.) residential proposals in Broward County in the past year and a half. If all the major residential proposals were to be developed to saturation (according to revised lower densities) then some 605,837 persons will be added by these projects alone. That means an increase of 79% over the 1973 county population estimates. This figure shows a 22% increase over total of potential population as per the DRIs in the county. Similar situations exist in Palm Beach County and in Dade County also.

In the State as a whole only 8.78% of the growth was due to natural increase, the remaining 91.22% was the result of net migration. In Dade County 12.76% of the growth is credited to natural increase and the remaining

87.24% of it is due to net migration. In Broward County only 2.57% of the total growth is by virtue of natural increase and the rest 97.44% is filled by net migration. Palm Beach County follows the same pattern of Broward County and boasts 2.80% of total growth to natural increase and 97.20% to net migration

Residential developments have followed two distinct directions. With the exception of a limited number of coastal developments, primarily in northern Palm Beach County, the bulk of major development has involved westward expansion. In Broward County much of the land east of the dikes has been committed to development. If not properly managed, the agricultural land, natural wetlands, and pasture lands of the Lower East Coast will be lost to residential development. In its natural condition, most of the land in this region (except for the coastal ridge) was not suitable for urban development. Low relief, improper drainage, high water table, flooding and organic soils constituted major limitations. Since the turn of the century, the water management system has evolved to provide drainage, flood protection to the coastal settlements, recharge to the wells during the drought period, irrigation to fertile muck soils in the westward inland of the settlement and also to stop salt water intrusion. In the beginning land development followed the water management. Now the unprecedented growth of this region has made the opposite true. Many drainage canals are utilized to maximum capacity. Land which was expected to be in agricultural or rural state is suddenly urbanized creating more storm water runoff and at the same time less pervious area for the recharge.

Although most of South Florida is a water surplus area, unless properly managed, water availability may become a critical constraint. South Florida is one of the few places in the world that may go from periods of severe drought to the periods of severe flooding in a very short period of time. Until few years ago the majority of the houses had individual water wells and septic tanks, although major efforts have been undertaken to phase out such situations. However, sewage treatment plants and water supply plants are far behind the growth

race. These main issues appear in other growth regions, although sometimes in a slightly different guise, but the main problems remain the same.

(2) Central Florida Region

This growth region, commonly referred to as the "recreation kingdom" of the world consists mainly of Orange County, Osceola County, and Polk County. Growth during the 1900s was moderate in this area. The early 1970s, however, brought growth so rapid that it was recognized as one of the fastest growing metropolitan regions of the nation. The population expansion of these counties is reflected in the table below.

County	April 1 1970 Census	July 1 1974 Estimate	Change 70 - 74	Average Yearly Percent Change
Orange	344,311	423,981	79,670	5.44%
Osceola	25,267	36,889	11,622	10.82%
Polk	228,026	268,343	40,317	4.16%
*Seminole	83,692	134,336	50,644	14.24%

* Although Seminole County is outside the water management jurisdiction of FCD (SFWMD), this growth data is included here as this county is in the metropolitan Orlando growth region.

Since the enactment of DRI process, only eight projects have been proposed in Orange County, Osceola County and eastern area of Polk County. Six projects out of the eight were residential development. The plans are to develop 3,172 acres with potential 15,705 dwelling units which may carry some 40,833 persons, if and when fully developed. This figure really does not reflect the growth trend fully. A study was conducted by East Central Florida Regional Planning Council to calculate the potential acreage and population based on proposed developments (PUDs, DRIs, etc.) as of January 1974. The study shows that if all the projects

taken into account in Orange and Osceola counties were to be developed they would total 67 in number (mostly residential), would comprise 42,637 acres of land and the anticipated number of dwelling units would be 66,770 which would carry some 173,602 persons. Most of these people would be in-migrants. The figure below shows that the percentage of growth from natural increase is very low in comparison to growth from net migration.

County	April 1 1970 Census	July 1 1974 Estimate	Total Change	Percent of Natural Increase	Change Due to Net Migration
Orange	344,311	423,981	79,670	16.59	83.41
Osceola	25,267	36,889	11,622	1.49	98.51
Polk	228,026	268,343	40,317	17.33	82.67

Disney World has been the nucleus as well as the catalyzing agent for the growth in the Central Florida Region. Sea World, Circus World and other attractions appear to be following a similar pattern. More tourism means addition of more recreation oriented attractions which in turn will need a larger labor force, and more housing which means more commercial activites. There have been successful trials in bringing conventions, seminars and business/ professional meetings to the area. Currently a huge research park complex is in planning stage. This could attract a large number of professionals and white collar workers to supplement the typical Disney World employees and the service oriented work force.

The major impact of the growth will be the same as outlined in the previous section and the problems remain about the same regarding more runoff from built up area, flood protection, water supply, less recharge area and possibility of contamination of groundwater and more pollution in surface waters.

Here, the urban development is taking place at the expense of citrus and other agricultural land (dairy and pasture). Usually land in citrus cultivation is well-drained, elevated and, with little effort, can be made suitable for the intensive development such as mentioned above. Despite the converseion of some of land from citrus, dairy and pasture to urban development (residential and recreational use), it is not anticipated that the agricultural, particularly citrus products will fall short. The loss of land to urban development and a rising cost of fertilization, maintenance and operation of farm machinery is forcing the farmers to more intensive farming on less but more productive acreage.

(3) South Central Region

This growth region is composed of two counties in the south central region of the Florida peninsula, Hendry and Glades counties. Although these two counties have a relatively small population in relation to their coastal neighbors and have been growing slowly, recent development pressures qualify this region as a growth center. The past relatively slow growth of these counties is reflected by the figures below:

County	April 1,1970 Census	July 1, 1974 Estimate	Change	Av.Yearly % Change 1970-74
Hendry	11,859	15,098	3,239	6.43
Glades	3,669	4,747	1,078	6.91

Since the enactment of the Environmental Land and Water Management Act of 1972, there have been two major Developments of Regional Impact proposed for this region. Both these developments are adjoining and located in northern Hendry and southern Glades County. As a matter of fact, the first development, called Port La Belle, is situated in both the counties. The statistics of the developments (DRIs) are as below:

		Potential Acreage		Potential Population	
Port La Belle					
Hendry County	-	28,043		106,290	
Glades County	-	3,487	31,530	22,735	129,025
ACS - Hendry					
Hendry County	-	1,386	1,386	2,500	2,500
Total	-		32,916		131,525

The potential population of these two DRIs alone represents a 663% increase in the combined population base of the two counties. It seems likely that other smaller projects will follow in the vicinity of Port La Belle. Glades County is determined to remain primarily agriculturally oriented and is currently revising its planning and zoning ordinances.

Although there exists the possibility of secondary growth in the surrounding area, the current economy is restraining additional development. With an economic upturn, however, there is a substantial chance of additional development in this growth region. The determining factors of the growth in this region can be summarized to be (a) sandy soils suitable for intensive development, (b) cheaper land in comparison to the neighboring coastal counties, and (3) large areas of land under single ownership.

In terms of services, such as approach road network, schools, hospital facilities, water supply, sewer system, drainage, etc., either existing facilities will require expansion, or, in most cases, new facilities will be needed. The need for a managed growth program is obvious.

(4) Upper East Coast

The upper east coast region, comprising Martin County and St.Lucie County, constitutes the fourth growth region identified in the area under FCD

jurisdiction. These two counties lie immediately north of the lower east coast which has been identified as the fastest growing region in the State and also in the country. From 1950 to 1970, Martin County grew at the rate of 8% per year and similarly St.Lucie county's growth rate was 7.5% per year. Martin County, since last census in 1970 has seen an increased growth rate, whereas St.Lucie County is continuing the steady growth rate of the 1950 to 1970 era. The following figures reinforce the above statement:

County	April 1, 1970 Census	July 1,1974 Estimated	Change	Average Yearly Percentage Change 1970-74
Martin	28,035	45,097	17,062	14.32
St.Lucie	50,836	67,035	16,198	7.50

A study conducted by DOA and the University of Florida further states that in Martin County, 99.06% of the growth is contributed by net migration and the remaining 0.94% is by virtue of natural increase. In St.Lucie County, 90.71% of the growth is from net migration and 9.29% is from natural growth. Although both these counties have been grouped together, it is apparent that Martin County being the southern county of the two and also being north of Palm Beach County, is experiencing more growth pressure than neighboring St.Lucie County.

Since the enactment of the DRI process, five Developments of Regional Impact have been filed in Martin County. Only one project was for a commercial (shopping mall) development, while the other four projects were residential development proposals. If all of the four projects were to be fully developed, a total area of 1,586 acres would be covered and a potential population of 13,343 persons would be reached. This potential population alone would be an increase of 36% over the base population figure for 1973. In addition, numerous other residential development (PUDs, etc) proposals smaller than DRI magnitude are processed through the rezoning and permitting channels.

There has been only one DRI proposal in St.Lucie County. This called for development on 230 acres of land with a potential population of 5,520 persons.

Lately both of these counties have reported an increasing number of retirees moving into the area and a significantly increasing percentage of senior citizens. At the same time there has been a reduction in the proportion of young adults in relation to market strength and labor force participations. Another significant trend is the suburban shift of county residents, with Ft.Pierce and Stuart both experiencing a reduction in their share of county populace.

The growth in this region, especially in Martin County can be easily summed up as the "spill-over" from the "Gold Coast" (lower east coast). The same natural features that attracted people to the lower east coast is available in the upper east coast region.

Both of the counties have been trying to develop effective land use plans and implementing procedures to manage the growth. The basic impact and problems are the same as detailed in the chapter dealing with the lower east coast. However, with proper planning there is a good potential to protect still unspoiled natural savannas, estuaries, lush natural vegetation, intra-coastal water and the surrounding unaltered sandy beaches.

b. Economics of growth

(1) Economics of Urban Growth

Although Florida's population increased by about 5 percent a year during the 1970s, projections of population are hazardous under present economic conditions. Rising unemployment will discourage some families in the working age groups from migrating to the State and the rising cost of housing and services may discourage the retirement decision of in-migrants. The effects of the current economic conditions, however, could just as likely result in an increase of migration. The growing unemployment may force earlier retirement for some workers, industrial unemployment may encourage younger families to migrate

into Florida where trade and service employment jobs are available. It is apparent, however, that the exponential growth rates that Florida is experiencing cannot be endured much longer.

While growth benefits many people and even society, as a whole, the costs of growth can be heavy and long-term. Some of the costs of growth are obvious, such as increased pollution, noise and congestion. But because of the lack of interest in the costs of growth, there has been little effort to compute and compile them until recently.

Traditionally the argument for growth has been an economic one of helping local government pay its bills. The underlying philosophy stated that as the growth occurs, more revenues are brought in. The problem with this is that the new taxpayers need services - roads, utilities, sewers, schools, police and fire protection - government must spend additional money to provide these services.

Mr. Richard Bradley in his report of "The Costs of Urban Growth: Observations and Judgments", demonstrates the cost of growth.

He states that if growth were really an economic blessing to local governments, we would expect to find declining tax rates in more rapidly growing cities. In fact, the opposite was true. Total general expenditures per capita in 1967 by local government in SMSAs increase as a function of population growth rate. Average public expenditures per capita in 1967 for parks and recreation increased as a function of population size.

Of particular importance is the observation that per capita expenditures as a function of population size shows no evidence of any economy of scale. Large cities are more expensive per capita to pperate. Economies of scale in local government seems to work only for communities smaller than 25,000 people.

The costs of urban services for fast growing cities and large cities are higher because of high per capita costs and tax rates. The larger the size, the greater per capita expenditures. The big city taxpayer receives in return for higher tax assessment, fewer recreational facilities and fewer acres of public parklands.

When considering another urban service, police protection, we find that the city taxpayer pays more for his personal safety than does the small town taxpayer, but ends up being considerably less safe.

For education the most populous counties spend more per capita than less populous ones, but have fewer teachers per student and less school space per student.

The average public expenditures per capita by local governments for health and hospitals in SMSAs increase with population size. Fast growing SMSAs tend to fall behind in providing hospital facilities.

Even in the private sector there is evidence that growth is not an economic blessing for the average person. The SMSAs which experienced the largest population growth during the decade of the 1960s also showed the smallest gain in average per capita income. The ones with the smallest growth showed the highest gain.

The difference between total tax revenues per capita of municipal governments and total general expenditures per capita becomes greater as a function of population size. The new revenues do not seem to exceed the new expenditures as the argument for economics of scale does not seem to hold. Data published by the Bureau of the Census indicates that local governments in the smallest and largest counties tend to have the highest per capita revenues and expenditures. These are the units experiencing the greatest financial problems.

Basic to this problem is the usual situation in which local government must extend services as soon as new residents arrive, but in some cases it is almost two years before the new revenues can be used. The local government unit thus must look to existing residents for the needed revenue.

(2) Agricultural economics

The role of agriculture in the economic and social life of all Floridians is a matter of extreme importance. Total value of farm, forest and fishery products approached $2.4 billion in 1973 and a total of $7.5 billion at the consumer level.

Estimated value of farm, forest, and fishery products - 1973

($1,000,000)

Product	Cash Receipts From Primary Marketing	Retail Value Wherever Sold
Fruits and nuts	611	1,844
Vegetables	406	1,013
Ornamentals	216	492
All other crops	303	739
Livestock and products	709	1,371
Forest products	63	1,728
Marine products	108	244
Total	2,416	7,431

Florida agriculture is in a crucial period. The U. S. and world demand for food is growing rapidly. Moreover, an increase of some 2.7 million people in Florida itself is anticipated within the next decade, nearly all of whom will be consumers rather than producers of food.

To maintain a balance between a growing agricultural and urban society several problems must be dealt with. Factors such as production technology, labor, fuel, transportation, production itself, and ultimately the growing need for land and water for urban purposes will determine the stage within which the agricultural industry will develop.

Agricultural producers in the future will continually face the need to increase the productivity and efficiency of the resources they control. With rising costs for nearly all production inputs, superior management will be vital to sustain the prosperity of the agricultural industry. Improvements in management are tied directly to several production problems. These include the need for more productive and more efficient plants, animals and fertilizers; more effective and less environmentally damaging methods of pest control; more efficient production machinery and equipment systems geared to the changing economic, social and institutional conditions faced by agricultural producers and processors will be needed.

The number of farm operators, family workers and hired farm workers in Florida has remained at a fairly constant 115,000 since 1966. And these numbers are not expected to change much over the next decade. However, the skills of future farm workers must be substantially above the current skills of the agricultural labor force. Consequently, competition for skilled farm workers is likely to be much greater in the future. Farmers will be forced to pay competitive wages to get labor. Even with increased farm wages, the farm labor force possessing higher skills will find it much easier to move in and out of the industrial labor force. Agricultural producers will have to provide workers with employee benefits similar to those provided by non-farm industries in order to retain them.

The need for labor-saving methods and machinery will increase during the coming decade as farm labor becomes more costly and more selective in the type of farm work considered acceptable. The trend toward fewer and larger farms using more complicated specialized machinery is expected to continue. Further mechanization of the harvesting of citrus, vegetables, flue-cured tobacco, sugar cane and other crops will be required. Larger acreage per farm for field crops will require more use of farm power and machinery.

Florida's agriculture in the coming decade will rely heavily on power, particularly petroleum and electricity, to support farm mechanization, greater use of chemicals, increased irrigation and expanded transportation services. Fuel is an important element to the industry and the economy even though primary agriculture production accounts for less than five percent of total state energy requirements and related production activities account for only 12 to 15 percent.

Agriculture must remain high on the list of fuel allocations. Cutbacks in fuel supplies to farm producers, food processors, and those engaged in the transportation of agricultural inputs and products are certain to have far reaching effects on the state's economy and on the availability and cost of food.

Florida's location and geography make the agricultural industry sensitive to changes in the cost of transporting agricultural products and purchased farm inputs. Fuel shortages and rising fuel prices can have a long term effect upon the location of agricultural production, processing and marketing firms. Evaluation of the impact of transportation costs on location alternatives for these firms is required to assess the competitive position of Florida agriculture relative to other regions in the years ahead.

The total volume of agricultural production has grown rapidly in recent years. The trend is likely to continue, if the industry continues to develop better plants and animals, to control pests, to develop markets, and to improve efficiency in processing and marketing. A successful and growing agriculture means a continuing struggle to overcome the obstacles to efficient production. A look at the direction and magnitude of growth will now be given.

Citrus is Florida's largest agricultural enterprise. Although Florida has produced citrus for many years, the industry really began to grow rapidly after the development of frozen concentrate juice processing in the 1940s. Production of fruit for processing now dominates the industry. The fresh market, while important, takes a small part of the orange crop. Florida supplies 95 percent of the U.S. market with processed citrus products. The estimated on-tree value of all citrus in 1973 was 371 million. By the time this fruit is picked, processed, packed and marketed, its retail value has grown to about $1.7 billion.

Citrus acreage reached its peak in Florida about 1970 with a total of 941,000 acres. Since then acreage has declined to 872,200 acres in 1973, due to shifts of citrus land to urban use, particularly in the Orlando area, tree diseases that have taken some land out of production, and to a relatively weak market that has not encouraged large investments in new groves in recent years.

The years ahead promise some important changes in the citrus industry. Total acreage in citrus is likely to decline a little with some shifts in acreage away from the central highlands to Indian River, Collier, and Hendry Counties. Establishment of profitable groves in these areas will require substantial investments in drainage and irrigation. Citrus production everywhere will become more intensive, that is, more investment in grove management and care with resulting increased yields per acre. Total output

in the next decade may increase by more than 15 percent, most of the increase being in oranges and grapefruit. Some areas of minor production, such as tangerines and murcotts, may decline.

Florida has long been an important producer of tropical fruits for the U.S. market, chiefly avocados, limes, and mangoes in Dade County.

Florida is the leading producer of fresh winter vegetables for the U. S. market, with the majority in a relatively few counties in central and south Florida. Palm Beach County alone accounts for more than 25 percent of all vegetables produced in the state.

It would be difficult to characterize Florida growers as to size or type of operation. The size of operation ranges from 30,000 acres to growers with less than 20 acres.

Much of the growth of the vegetable industry parallelled a tremendous increase in urban growth and until recently urbanization has not seriously competed for land valuable for vegetables. Recently, as agricultural land has been converted into cities, vegetable acreage has not been replaced in kind or in quantity. Almost without exception, the best vegetable land - the warm areas - have been the first to be developed. New areas have been brought into production, notably in southwest Florida, but the cost of developing such new land has limited such ventures. So long as plenty of good land existed, the vegetable industry had been able to relocate, to adjust to land-use changes. Acreage reductions in specific areas may still be partially offset by increases in other areas.

Florida's ornamentals industry is one of the fastest expanding parts of agriculture and is comprised of floral products, tropical foliage, turf grass and woody ornamentals.

The main winter production areas for floral products are located in the warmer coastal areas from Tampa south along the Gulf Coast and from Vero Beach south along the Atlantic Coast. With increasing urbanization of these areas and other problems, the future of this industry may be questioned.

Tropical foliage is produced primarily in two areas: central Florida - Apopka, Plymouth and Zellwood areas with an estimated 420 acres; and south east Florida - Palm Beach, Broward, and Dade Counties with an estimated 325 acres. Generally, the industry in these two areas is quite different because of climate and the mix of crops grown. Although there is little difference in acreage, there is a large difference in crop value with central Florida growers obtaining twice the gross income per acre compared to south Florida growers.

Production of foliage stock plants outside of Florida in Central and South America is a major recent change in the industry. Approximately 25 percent of foliage stocks are now produced in these areas and this is expected to increase. Major changes in production of finished plants are also occurring with construction of modern physical plants.

Continued growth of the Florida foliage industry will create need for additional land, but amounts will be relatively insignificant. Land needs are estimated to be 500 additional acres by 1980 and 1,000 by 1985. Much of the land needed will be due to relocation of present production units because of urbanization pressures. Volume of water required in 1985 will not increase more than 20 percent above present usage because of the trend toward individual pot and other low volume irrigation systems. Water quality will be adequate in central Florida, but may become a problem in the southern part of the state.

Turfgrass sod production has grown from a few acres in 1950 to an estimated 25,000 acres in 1974 with a retail sales value in excess of $30 million. The value of the turfgrass industry should keep pace with the state's population which is increasing at the rate of 3.5 percent per year, unless inflation or decreasing incomes have an adverse effect on monies spent on turf maintenance.

Water is not an unlimited resource and large quantities are required as supplemental irrigation for proper maintenance and survival of turfgrasses. Regulations regarding water usage and quantity limitations could seriously affect the turf industry in such areas as golf turf where the dollar volume of business is largely dependent upon the quality, aesthetic and intrinsic value of turfgrass.

Woody nurseries historically have been located near urban centers on desirable land. However, most plants are now grown in containers rather than in the soil, so many types of land can be utilized. Urban pressure, rezoning and building restrictions are forcing some central and south Florida nurseries to move. Urbanization is not yet a serious problem for nurseries away from metropolitan centers or in north Florida. Undoubtedly land in the panhandle and central peninsular regions will be the new areas for concentrated nursery expansion.

Total acreage required for grazing beef and dairy cattle, horses, and other animals in Florida will decline slightly from present acreage, if other projected agricultural and non-agricultural uses are realized. Current acreage does not consider the extent to which land now grazed is fully utilized or to which land can be converted to grazing. Projected increases in meat and dairy production and pleasure horse numbers will require improved pasture and range productivity, and increased pasture production by converting to pasture some native range acreage, low productive woodland and idle farmland. Improved permanent grass and grass - legume pasture and temporary pasture will increase.

The concentration of beef and dairy cattle and horses in central and south Florida means that most projected land requirements will be concentrated in this area of the state. There are no indicators presently that these industries will shift geographically by 1985. Thus, forestry, citrus, vegetable and sugar cane production may compete strongly with animal industries for land in this part of the state.

Florida long has been a producer of such common field crops as corn, cotton, small grains and peanuts. Grain sorghum, soybeans and sugar cane are more recent crops in the state's farming system. Production of these crops will increase substantially in the years ahead. The outlook appears promising, particularly for corn, soybeans and sugarcane.

Sugarcane grew from a modest beginning in the 1930s until the early 1960s when increased plantings were sparked by the withdrawal of Cuban sugar from the U. S. market. The industry is currently in another period of rapid growth now, stimulated by the abnormally high price of sugar and apparent shortages on the world market.

All Florida sugarcane is grown on the much soils around the lower end of Lake Okeechobee and on nearby sandy soils. Growth in the industry appears to be limited to the extent that muck soils are available for cane the degree to which production can be profitably developed on the sandy soils, and by plant capacity for processing cane.

The years ahead will see some decrease in the total acreage in commercial timber production but like other agricultural enterprises, production will become more intensive with both the annual harvest and growing inventory increasing. The trend has been for more and more of our better commercial forest land to pass into the hands of the larger timber companies.

The question remains where will the main growth in agriculture occur, in beef through better breeding and management of beef herds, better pastures and more grain production; in sugar, through development of additional muck lands for sugarcane, development of profitable production on sandy lands and improved yields on all acreages; in corn and soybeans, through developing better varieties and more intensive production practices; in the ornamentals, especially the foliages, through intensive investment in production facilities and better marketing practices; in citrus, through improved production practices and pest control; in forestry, through more intensive management of the better forest sites.

c. Potential Impact of Growth on Natural Resources

(1) Environmentally Sensitive Areas

(a) Wetlands

Most of South Florida and the area within the District is very flat with little or no local relief. The natural drainage system was poorly developed and consisted primarily of broad overland flow and ponding through areas such as the Everglades. As a result of this natural setting there were extensive areas with wet soil conditions where the water was near or above the ground surface for at least 15-20% of the year.

Because of the climate with its wet season/dry season rainfall pattern, these areas have a typical hydrologic cycle characterized by flooding to relatively shallow depths in the wet season and dryness during times of low rainfall. The natural vegetation, primarily sedges and grasses, adapted to these fluctuations. The distribution patterns within a marsh of different aquatic plant communities is in fact often controlled by the innundation

patterns peculiar to different bottom elevations. Therefore, the entire wetlands vegetation association depends heavily upon there being a particular amount of water present at a particular time of year. Herein lies also one of the points of vulnerability of these areas, for if this natural regime of water levels is altered, it also alters the existing plant communities. (Wetland map).

These wetlands are extremely productive of wildlife which depends heavily upon the vegetation for habitat. Many birds, including rare and endangered species such as the Everglade Kite, use the vegetation for nesting and cover. These areas provide habitat for a tremendous variety of animals including reptiles, amphibians, mammals, and insects which are, in fact, unique to South Florida wetlands.

An important and unique component of this wetlands category exists along shorelines of South Florida which are tidal, but not subject to high wave energy. This category, mangrove swamps, consists primarily of the red mangrove, Rhizophora mangle, with black and white mangroves present also. This community has been seriously decimated on the Southeast coast of Florida, being replaced almost entirely by urban development. This plant community provides important habitatfor many animals. Since it is a detrital type of community providing food and cover for many detritus feeding marine organisms, it is an area of tremendous biological productivity. In many cases these smaller organisms provide the basic food in a system that supports important estuarine and marine organisms. Many of these larger organisms are important to man economically by supporting certain tourist activities such as sport fishing. Of particular interest to the visiting fisherman are species such as tarpon, spotted weakfish, pompano, and snook. Many shellfish of great commercial value also depend on this community for their existence. (Mangrove map).

(b) Surface Water Bodies

Lakes are extremely numerous in that area of the District north of Lake Okeechobee. These surface water bodies are a result of a Karst topography. This sinkhole topography is created where numerous underground caverns in limestones have collapsed creating large circular depressions. The high water table fills these depressions and in central Florida in particular, thousands of circular lakes typify the scenery.

Some of the larger lakes such as Okeechobee and Istokpoga occupy depressions that were created when the sea covered that area. The drainage outlets of these depressions were blocked by vegetation and they filled with fresh water.

All of these lakes are typically very shallow, rarely being over 3 meters in depth and receive tremendous amounts of energy from sunlight due to the southerly location of the area. As a result, these waters are extremely productive biologically. This same high productivity also results in their being tremendously susceptible to augmented eutrophication through increased nutrient levels due to some adjacent activity by man.

Bays and estuaries are bodies of water partially enclosed by land and yet connected to the sea in some way. The east coast of Florida contains some important bays and estuaries such as Biscayne Bay, Lake Worth, the Indian River, and the St. Lucie Inlet. These bodies of water are brackish water environments which are influenced both by tides and an inflow of fresh water. These areas provide a transition between adjacent mangrove marshes and the offshore waters of the sea. Many of the organisms of the mangrove swamps are linked by means of the bays and estuaries that support juveniles of larger species. Shellfish such as the oyster are adapted specifically to this brackish environment.

(c) Unique areas

There are some areas within the District that are unique because of their geology, plant communities, or the animals they support. One of these areas falls under the previouly mentioned wetlands category, but bears mention here because of its uniqueness. This is the Everglades. This huge sawgrass marsh has no counterpart anywhere else in the world. It is contained almost in entirety within the Flood Control District's conservation areas. The preservation of this unique area is subject to water management decisions concerning regulation schedules within these conservation areas. Fire, flooding, and drying out within certain specific limits are vital to the viability of this immense natural system.(Map)

An area outside the District but dependent upon it should be mentioned at this point and this is Everglades National Park. The area within the Park represents a transition zone between the Everglades to the north and the marine environment of Florida Bay. The Park contains tropical hardwood hammocks, extensive wet prairies, mangrove swamps and other unique habitats. Many rare plants and animals are protected and given habitat here.

It is important to mention the Park because of its uniqueness, of course, but also because it can be impacted by management decisions or poor land use controls further north. Any alterations or degradation of the Conservation Areas and their water quality or quantity could impact the Park unfavorably. It is apparent then that any decisions regarding water management should intimately involve the Park since the majority of the fresh water supply for the Park other than rainfall comes from the Conservation Areas.

Another unique community and natural feature is that of the sand pine association. These areas, dominated by the sand pine, Pinus clausa, are unique and in fact found only in Florida and a small area in Alabama. This is an area of harsh conditions occurring on deep sandy soils almost devoid of nutrients and an area subject to frequent fires. In fact, the sand pine depends upon fire for its own reproduction.

These areas are extremely endangered due to their location of high, well drained locations which makes them easy to develop by man. Citrus groves have replaced great expanses of this habitat in central Florida, and the coastal ridge in southeast Florida, which was largely sand pine scrub, has been almost totally developed. These areas, because of their location on deep sandy soils may be vital water recharge areas as almost no runoff occurs here. They are therefore extremely high on any priority list for preservation. (See map for sand pine association).

These natural systems have all been greatly reduced in area by direct replacement through urban or agricultural development. Extensive fresh water marshes have been eliminated in the southeastern counties of Broward, Dade and Palm Beach Counties. The areas which remain are subject to very intensive pressures for development. Even if growth were properly directed to avoid total elimination of these natural systems, they would still be subject to secondary effects from existing adjacent development through alterations of water quality and quantity.

Since areas that are urban require maintenance of much lower groundwater levels than existed under natural conditions, they create lowered levels in adjacent wetlands. As discussed previously, the natural vegetation depends upon certain water levels at certain times of the year and alteration of this natural cycle creates changes in the vegetation. Lowered water levels allow invasion by more terrestrial plants including aggressive

exotics such as the Melaleuca. Thus, it is apparent that protection from elimination is not a guarantee of preservation of an area. There are difficult management decisions required in maintaining wetlands in an area of generally lowered groundwater levels.

Where a wetland is used as a water storage area such as the conservation areas, the opposite problem may exist, that is, maintenance of consistently higher water levels which actually drowns out the natural vegetation. This problem will be discussed in considerable detail in the section concerning backpumping of the urban areas into the conservation areas. It may be possible through periodic drawdowns in these areas to maintain the natural vegetation.

Surface water bodies, lakes rivers and streams are particularly vulnerable to degradation through man's activities on adjacent lands. A primary input into these bodies is from water that runs off the adjacent land areas after precipitation occurs. Agricultural activities in particular involve concentrating nutrients on the land in the form of fertilizers or animal wastes. The runoff water from these areas contains many of these nutrients. To further aggravate the situation, many agricultural activities require extensive drainage systems in the form of canals and ditches. These drainage systems spped the removal of surface waters from the fields and pastures into the receiving surface waters. Therefore, this highly nutrified water is rapidly introduced into the lakes or streams in a sudden slug rather than slowly and steadily. Some of these waters, which are naturally highly productive due to the climate, are apparently very sensitive to increased nutrient loadings. The visible effect of this are numerous, but include large plankton blooms, reduced water clarity, reduced dissolved oxygen levels and elimination of native emergent vegetation. In fact there are some indications that these increased nutrient

levels are the mechanisms that make possible the invasion of some marshes such as Lake Okeechobee by exotic plants such as Hydrilla verticillata.

The impact of this type of loading of surface waters becomes an even more critical issue in light of the backpumping of adjacent developed areas into receiving bodies such as Lake Okeechobee from the Everglades Agricultural Area and into the Conservation Areas from the coastal urban areas. Studies have shown, for example, that the Everglades Agricultural Area contributes 38% of the nitrogen loading to Lake Okeechobee. There are also significant loadings from other controllable sources around the lake. These are important issues to be considered when analyzing the impacts of back-pumping the southeastern urban areas into the Conservation Areas. Increased nutrient loadings of this magnitude into a marsh situation such as the Everglades could have a significant impact on the natural systems. It could conceivably alter this unique area into a totally different system of greatly reduced value to man.

Wetland ecosystems are often based on the habitat and detrital contribution of the vegetation. Many higher organisms depend on the vegetation for cover and protection for themselves as well as for the organisms upon which they feed. The vegetation is an indicator of the relative good health of these systems. If the proper management decisions are made and the vegetation is maintained, then many of the requirements for the other inhabitants of the wetlands will be met. It is apparent then that any recommendations for protection of a natural system from destruction must also include recommendations to maintain its good health.

There is no guarantee that preserving and protecting the natural system within which we live will provide any particular quality of life. There is

no "magic" connected with fulfilling these suggestions. The points we have discussed are simple facts. We live here in South Florida between opposing forces of nature which must be balanced, on a regional scale, if we are to be successful. Natural communities respond to these forces in various ways but man himself does not. In fact man can be thought of as a force which acts upon not only the natural forces themselves but also influences the plant and animal communities as an additional force. If population is a measure of this force then it is rapidly increasing and along with it the power to affect change on the natural systems.

Here in South Florida the natural systems are indicators of our success in maintaining the balance of forces. The rapid elimination of many components of the overall system and the deterioration of the remaining elements are not signs of maintaining this balance. This is why we must carefully weigh water demand against available supply and the costs, not only economic but the functional cost to the system of developing additional supplies. It has become apparent, for example, that to provide more water supply and to handle the additional runoff created by urban development, we must reduce the losses to the sea. We must in fact reverse the route of this water to store it in the interior. What are the costs to the Everglades, to the bays and estuaries, and to the surface waters? These are questions for which we have the responsibility of attempting to answer.

We know on a smaller scale that elimination of wetlands by urban or agricultural development speeds the water off the land and reduces recharge rates to groundwater. We know that it reduces a natural surface storage capacity for precipitation and that we must build canals and pumps to move

the water elsewhere. We know that development has secondary effects on water quality as well as quantity through increase nutrient loadings of the surface waters in canals, lakes and streams. These impacts can be minimized by directing growth to avoid valuable recharge areas and by certain design considerations such as on site storage to reduce the impact of agricultural and urban development on receiving waters. It is obvious at this point that decisions concerning land use greatly effect water resource development requirements and the reverse should also be true if we are to properly cope with future growth.

II D. Discussion of water use regulation and water supply development as concepts.

1. Regulation

Conceptually, regulation implies the management of water resources under certain time-place constraints. With this in mind alone, a plan would be devised to regulate water use within whatever limits might be imposed. If we accept regulation as the only means available to deal with our water resource allocations, then it must be presupposed that we are dealing with that presently available within the physical system.

2. Development

Development implies augmentation of water supplies which, in turn, presumes that improvement of the physical system is necessary. That alteration of the physical system would involve construction of works to enable the system to capture and store a greater quantity of water than at present. It may also mean construction of works to convey such stored water to points of use.

3. Interrelationship of Regulation and Development

The District has adopted the position that water demands within its region will continue to increase, irrespective of actions which may be taken to manage growth. With this postulate, it readily can be seen that water management must consist of both regulation and development. The extent and nature of this interrelationship is a function of policy. This plan will present options, covering several mixes of regulatory and development alternatives from which, ultimately, a choice can be made.

II E. Basis for District's Water Use Regulations

1. Establishing minimum flows and levels for surface watercourses

The Act's directive is found in 373.042 F.S., "Minimum flows and levels" and is stated in District Rules under Chapter 16K-1.03, "Powers and Duties" item (13) "...to establish the minim flow of all surface watercourses and the minimum level of all ground and surface water in the District...." In part, the Act states the following as definitive of minimum flows and levels: "...the minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area (and)... the minimum water level shall be the level of groundwater in an aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area."

These requirements provide an important framework for sound water resource management and accordingly have commanded the District's attention through the formulation of surface water availability reports which must inherently address the questions related to minimum flows and levels. It is recognized, for instance, that establishing minimum flows and levels. It is recognized, for instance, that establishing minimum flows can, depending upon the area:

a. Safeguard against possible environmental changes in estuarine environments and, in addition, provide a means for upgrading of estuarine environments, when such is necessary and practical.

b. Offset salinity intrusion through locks or other salt water barriers.

c. Provide for flushing of built-up salt loads.

d. Facilitate maintenance of minimum levels

e. Aid in groundwater recharge

f. Assist in the assimilation of pollution loads

g. Facilitate reasonable - beneficial water use

h. Preserve water-class integrity

Similarly, the establishment of minimum levels in surface watercourses can, depending upon the area:

a. Assist in retarding aquatic weed growth

b. Maintain bank integrity of natural and man-made waterbodies (i.e., erosion control)

c. Facilitate water recreation

d. Aid in preserving aesthetics

e. Allow for the utility of transportation in navigable watercourses

f. Assist in supporting wildlife and plant habitat

g. Facilitate water table management in terms of:

   (1) Preventing overdrainage

   (2) Ensuring recharge conditions

   (3) Maintaining effective salinity barriers

The foregoing is not purported to be an exhaustive cataloguing of factors pertinent to the establishment of minimum flows and levels. Rather, a highlighting is made of what is considered to be the more essential needs of the surface water regimes within the District, thereby characterizing the rationale which serves to formulate the District's development of minimum flows and levels in keeping with the State's Water Resurces Act of 1972.

II E.

2. Establishing Allocation from Surface Water and Shallow Groundwater Sources

Our attention to this matter is a requirement stemming from Part II of Chapter 373, Florida Statutes, "Permitting of Consumptive Uses of Water." More specifically, before the District can issue permits for water-use consumption a basis for allocation must be established in harmony with the objectives of the Water Resources Act. The Act itself requires in Section 373.223, F.S., that "...the applicant must establish that the proposed use of water:

a. Is a reasonable-beneficial use as defined in Section 373.019 (5); and

b. Will not interfere with any presently existing legal use of water; and

c. Is consistent with the public interest."

Reasonable-beneficial use is defined as "...the use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest." At the present time, and under the present general condition of water supply development throughout the District area, the term "public interest" can be equated with protection and preservation of the water resource itself (quality and quantity), and protection of natural environmental features. In line with the foregoing, a use that impairs, restricts, or damages a neighbor's use of water is considered unreasonable. In this same context, any use whose net effect is to degrade the quality of

the water or which could result in salt water intrusion is similarly considered to be unreasonable. Further, any use that significantly exceeds the long term sustained yield of the resources is also considered to be in violation of the reasonable-beneficial use doctrine. The District's Rules under Chapter 16 CA-2 "Permitting of Uses of Water" lay the foundation for Act implementation in this subject area.

At the present time, irrigation withdrawals account for approximately_____% of the total water withdrawn from surface water and shallow ground water sources within the District. It is, therefore, paramount that the District develop and apply specific criteria for water-use allocations from these water-bearing reservoirs. In our analysis we have defined the "Water Crop" as the maximum quantity of water available for supplemental consumptive use, on a unit area basis, which will not create a long term deficit between water input and use. For areas in which project storage is not available, water crop reduces to the basin yield.

The basic philosophy underlying the criteria developed for irrigation consumptive uses is built upon each land holder in a given service area being entitled to use an equal share on a unit area basis of usable water generated within that service area and an equitable portion of project storage if such is available. This approach is not meant to imply consent by the District of any option by the land holder to buy or sell water rights.

The criteria for determining the amount of usable water generated within a service area is based on an analysis of historical records to determine the amount of additional water which could be consumptively used without creating a long-term deficit between supply and use. This figure is then adjusted to allow for maintenance of downstream flows and a contingency reservation thereby producing the"Basin Yield" or water crop figure. The constraint of reasonable-beneficial use is then imposed to insure that water is not wasted and excess water can be used at a future date or in other service areas, as specific needs arise.

The allocation amount represents the amount of water available for supplemental consumptive use in a normal year. This is not to be confused with a pumping or withdrawal rate. Supplemental consumptive use, in this context, refers to that portion of the irrigation water applied that is lost from the system by such processes as direct evaporation, transpiration by plants, evaporation from the soil surface, and excess water applied which is transferred out of the service area, or whose quality has degraded to the extent that it is no longer economically usable. It does not include excess water which re-enters the surface water or groundwater systems at such time or in such manner as to make possible its reuse within the service area. Aside from the fact that more water is expected to be withdrawn than is consumptively used, the value allocated is for a normal water year. During drier than normal periods more supplemental consumptive use than is allocated is likely to occur. However, this deficit can usually be more than offset during above-normal water years. In addition, the establishment of minimum surface and groundwater levels, pursuant to Section 373.042 F.S., provides another safeguard in protecting the resource on a seasonal and short-term basis.

In applying the irrigation allocation rationale noted above, the District recognized the following:

a. Existing literature indicates that supplemental water requirements can exceed the basin yield.
b. A study of current irrigation practice indicates that water in excess of optimum crop requirements is being used.
c. Every potential user in the basin is not presently using his allocable share of water and indeed may not do so for the foreseeable future.

Accordingly, in consideration of these constraints and in an effort to put this water to reasonable and beneficial use, the District has calculated the total quantity of water necessary to maintain optimum plant growth during the growing season, for a two in ten year drought condition. The highest monthly water deficit during the growing season is used as a basis for this calculation, leading to a specified absolute maximum monthly quantiy which may be withdrawn by the water-user. However, it is pointed out that this figure is not an allocation quantity, but more precisely a withdrawal quantity which may vary within the scope of various cultural practices, hydrological conditions and geophysical characteristics of any area.

No matter what the intended use, the water budget serves as the District's logical basis in treating the allocation requests of water users applying for diversionary approval. In simplified terms, a water budget may be defined as an accounting procedure for any identified water system taken over any fixed time span specifying where water comes from and where it goes. Taking a surface water system, for

example, rainfall on the basin and surface water runoff which reaches the basin are the most obvious inputs. A less obvious input is groundwater inflow. On the outgo side there is water runoff or discharge, and water consumption for such uses as domestic water supply and irrigation. Evaporation and evapotranspiration (water released to the atmosphere as part of the life process of vegetation) are large outflows and are to be accounted for. So must be surface water seepage into the ground water. Additionally, there are changes that occur in water storage, which may be either plus or minus in "input equals output" equation.

From the standpoint of allocation from shallow groundwater sources, an additional and essential constraint is concerned with the problems and dangers inherent in extracting quantities of water that could cause salt water intrusion or contamination of the water resource to the extent that it becomes unusable. That type of use would severely violate the reasonable-beneficial doctrine and consequently be an unpermittable request. The quantities of water that can be safely withdrawn from the aquifer are essentially limited by precipitation, the aquifer's permeability, its areal and vertical extent, and the distance to a source of recharge. If this source is salt water, and the aquifer coefficients are violated, salt water contamination is a sure and inevitable consequence. The District intends to continue to place a cautious eye on coastal withdrawals and to vigorously exercise its regulatory powers in order to prevent a disturbance of the long-term stability of the salt water wedge. In other words, gradual inland movement of the salt water front

resulting from excessive groundwater withdrawals (or fresh water mining) would be a trespass of the Water Resources Act and, in any event, would not be tolerated by the District.

Finally, water use allocation may, in certain areas, result in a stimulus created by the District for the construction of private off-line reservoirs or impoundments. That is, those users who elect to capture and store water (runoff) during the rainy season will not be constrained in their use of this water as a part of their allocable share, thereby producing a potential for favorable cost-benefits to the user. This approach, in effect, has a tendency to encourage more efficient practices in water consumption, which of itself is in keeping with District objectives to protect the finite water resources.

3. Developing a system of permit classification and use priority for water shortage periods

The Act under Section 373.246 states, in part, that the Governing Board "...shall adopt a reasonable system of permit classification according to source of water supply, method of extraction or diversion, use of water, or a combination thereof." This is carried forward in the District's Rules Section 16 CA-2.12 wherein it is specified that each permit shall be given one or both of the following source classification: groundwater and surface water. The Rules further specify that each permit be given one or more of the following classifications as to use: domestic, essential services, public supply, livestock, agricultural, industrial, mining, power and recreational.

A water shortage condition is normally considered as being applicable to a geographical area. However, a water shortage can occur with respect to a particular source as well. Consequently, it is entirely possible that within any geographical area there may be a shortage of water in one water source located within that area and no shortage in another water source. The classic example is a water shortage in a surface water/water table aquifer system separated by an aquiclude from a deep aquifer system in which there is ample water. The controlling factor is the degree of hydraulic interconnection between the several elements of the surface water system, the surface water system and the groundwater table aquifers, and the deeper aquifers.

Therefore, a declaration of water shortage must, in most cases, describe not only the geographical area in which the shortages exists but the source which is deficient. The classification of permits as to "source" must also take this into account. This means that, generally speaking, a simple source classification distinction between "ground" and "surface" sources is insufficient. Adequate qualifiers must be applied to the two basic source descriptions to clearly and sufficiently define the separable sources which may possibly be treated differently under a water shortage declaration. The District has taken this approach in the classifying of water sources.

For example, in the District's Rules governing water withdrawals, minimum flows and minimum levels in the Lake Istokpoga-Indian Prairie Area (Chapter 16K-30), source classifications are divided into:

a. Source Classification "S"

(1) Lake Istokpoga including Lake Istokpoga Canal between Lake Istokpoga and the Lake Istokpoga Canal Structure

(2) Canals 39-A, 40, 41 and 41-A

(3) The borrow canals of Interceptor levees 59, 60 and 61

(4) Any ditches and canals connecting with items (1), (2) and (3)

b. Source Classification "G-1"

(1) That portion of the water table aquifer lying within 2000 feet of the shore line of Lake Istokpoga, including the Lake Istokpoga Canal between Lake Istokpoga and the Lake Istokpoga Canal structure, or within 2000 feet of any of the following:

(a) Canals 39-A, 40, 41 or 41-A

(b) The borrow canals of Interceptor Levees 59, 60 or 61

(c) Any ditch or canal connecting with items (a), (b) and having a depth below ground level in excess of 15 feet.

c. Source Classification "G-2"

(1) The water table aquifer other than that portion covered under the "G-1" Classification.

d. Source Classification "G-3"

(1) The water body that has the generic name "Floridan Aquifer" (Artesian).

Considering the "source" factor of the classification system as being the practical equivalent of a geographical description for purposes of a water shortage declaration, "use" becomes the primary factor of the classification system which bears on the manner in which use restrictions are to be applied. For example, under present

conditions of water use in the previously referred to Lake Istokpoga-Indian Prairie Area, if there is a deficiency of stored water in Lake Istokpoga a water shortage would be declared for the area with restrictions to be applied only to those permits designated "S" and "G-1". The "G-2" and "G-3" permits would not be affected. The nature of the restrictions in the area defined by geography and source, would be dependent only on use.

The methodology used in applying restrictions during periods of water shortage will vary between major basins to a degree that is dependent upon the dissimilarity of usages, practices and water regimes within the basins. For instance, in the St.Lucie County Agricultural Area, the District may issue a water shortage warning for agricultural users whenever the stages above S-97, S-49, and S-99 reach 14.5, 14.5 and 14.9 feet msl., respectively. However, in this case, such a warning does not carry with it the requirements for water use restriction. What is involved is the complete termination of use upon the actual declaration of a water shortage which will occur when the stage reaches 14.0 ft.msl., (minimum level). Therefore, the issuance of a water shortage warning merely serves as an indicator to agricultural users that should drought conditions continue complete terminations of certain source withdrawals would be imminent.

On the other hand, in the Lake Istokpoga-Indian Prairie Area a general ordering of priority has been established, to wit:

a. Domestic and Essential Services (Group 1)

b. Public Supply (Group 2)

c. Livestock and Agricultural (Group 3)

d. Industrial and Mining (Group 4)

Water restrictions are then imposed during water shortage periods in accordance with a fixed set of criteria dependent upon the severity of the forecast shortage relative to the estimated demand. The degree of water-use restriction is applied based on the order of priority noted above; that is, the more stringent water withdrawal limitations applied during a water shortage period the lower the water-use grouping. In this case, however, no restrictions are to be made upon water users classified under Group 1 during the water shortage period.

4. Maintaining a Viable Flood Control and Water Supply System

In Section 373.103 (2) and (3), F.S., the following is stated: "Cooperate with the United States in the manner provided by Congress for flood control, reclamation, conservation, and allied purposes in protecting the inhabitants, the land, and other property within the district from the effects of a surplus or a deficiency of water when the same may be beneficial to the public health, welfare, safety, and utility (and) plan, construct, operate, and maintain works of the district as hereinafter defined." This is, in effect, reiterated in District Rules, Section 16K-1.03 (7) and (8) along with an additional item "to expend District tax moneys for provision of recreational facilities." In addition, a District booklet entitled "Criteria Manual for Utilization of Project Works and Lands" identifies the ground rules necessary for protecting the integrity of project facilities.

As previously mentioned in the introduction to Part II E, the original water resource program for central and southern Florida

authorized by Congress in 1948 was not silent with regard to water supply features for the Central and Southern Florida Flood Control Project. Likewise, supplements to the Project by Congress between 1948 and 1968 recognized the need for inclusive water supply measures along with the predominating increments of flood control improvement. However, from the standpoint of water supply the shortcoming was one of degree, not of kind. That is, while future water supply needs were recognized, they were underestimated.

A study of water supply needs of South Florida, including Everglades National Park was authorized by Congress in 1962 and 1963. This study, performed by the Corps of Engineers, resulted in a water supply plan for South Florida which was authorized for construction by the Congress in 1968. As in the original plan the 1968 plan considered raising Lake Okeechobee stages to be the key water supply feature. In short, the plan's basic features are those facilities needed to increase the water storage capability of the Lake and those needed to recover storm water runoff from the lower east coast by backpumping to the Everglades water conservation areas in Palm Beach, Broward and Dade Counties. In developing the 1968 plan a much better assessment of projected water needs was made and, for the first time, the supplemental water needs of Everglades National Park were recognized as a demand to be supplied by the system.

Cogent ecological and water quality-related questions have been raised with respect to the backpumping and added water storage features of the 1968 water supply plan. These are being addressed by the District, in cooperation with other echelons of the State, as well as the Corps of Engineers, through the means of environmental impact assessment

studies and research programs aimed at providing the input that will attack the root concern and establish a sound basis for Plan implementation satisfactory to the major interests.

Based on the foregoing, it seems clear that it is incumbent upon the District, using federal, state and local initiatives to:

a. Protect and further develop Project water storage capabilities.

b. Improve and insure water supply transport capability.

c. Strive towards flood control protection that will be consistent with the burgeoning urbanization and land-use dynamics taking place within central and south Florida.

d. Provide for an adequate aquatic weed control and channel maintenance program in the District's primary waterways in the predominating interest of both water supply and flood control.

e. Promote and support the development of sound flood plain management programs.

f. Provide safeguards aimed at maintaining satisfactory water quality.

5. Regulation and Monitoring Artificial Recharge

In this area, the Act under Section 373.106, F.S., "Permit required for construction involving underground formation," stipulates in part that:"(1) No construction may be begun on a project involving artificial recharge or the intentional introduction of water into any underground formation except as permitted in Chapter 377, without the written permission of the governing board of any water management district within which the construction will take place." This has been implemented by the District under Section 16CA-2.02, "Permits for Artificial Recharge."

It follows that since the District has a responsibility for protection of the groundwater resource, it must have control over the sources of artificial recharge as well as the sources of withdrawal. It is also important that natural recharge areas be protected from abuse through the District's regulatory powers.

District Rules in Section 16K-1.05 (as amended) states in part: "Artificial recharge means the intentional introduction of any fluid substance into any underground formation. This definition includes fluid substances from facilities such as injection wells, percolation ponds, land spreading, but does not include fluid substances from septic tanks for residential use." Artificial recharge may be useful in terms of conserving runoff and increasing groundwater supplies. On the other hand, introduction of objectional fluid into a groundwater system through the recharge process could be irreparable in its effect on the receiving water bearing strata, thereby resulting in a clear violation of the Water Resources Act of 1972.

Some further examples of artificial recharge lying within the purview of the District are:

a. Water Spreading
   (1) Supplementing well field infiltration
b. Deep and Shallow well injection
   (1) Air conditioning returns
   (2) Industrial wastes
   (3) Treated sewage
   (4) Storm water disposal
   (5) Water supply storage

c. Wastewater disposal

(1) Evaporation - Percolatipn ponds

(2) Land Spreading (Spray irrigation, spray runoff, etc.)

(3) Subsurface drainfields

The incidental recharge of the water-table aquifer by means of farm irrigation is, of course, a by-product of normal water utilization and would not come within the scope of District artificial recharge permitting requirements, as previously defined. Irrigation is primarily dealt with by the District under the consumptive-use aspects of the Act. However, this is not to say that recharge factors are not addressed in the District's evaluation process. Water budget accounting alone requires it to be taken into consideration, but, in addition, water quality aspects are confronted, especially in those cases where an exchange between water bearing formations takes place.

Another more subtle form of incidental artificial recharge which does not result from normal water utilization is that taking the form of Leachate. This fluid substance commonly occurs as outseepage from areas utilized for sanitary landfilling and industrial waste disposal and, if not controlled properly, has a potential for creating quality damage to the shallow groundwater aquifer as well as contaminating nearby surface water bodies. Although projects of this type do not directly come under the regulatory jurisdiction of the District, they do constitute a possible threat to the water-bearing formations and must be addressed by the District in keeping with its responsibilities to protect the water resources of any area within its jurisdiction. For example proper sanitary landfill siting and adequate

construction features aimed at minimizing and controlling leachate would be prerequisites in the interest of District water resource responsibility. Furthermore, a perimeter groundwater monitoring system would be a possible addition as a check on project effectiveness in preventing contamination of the surrounding water resources. In dealing with matters of this nature it is the intent of the District to work closely and cooperate fully with those agencies (federal, state and local) having primary responsibilities in the subject area.

In summary, the District has a sound basis for involvement in regulating and monitoring artificial recharge stemming from the requirements of the Water Resource Act of 1972. Moreover, in the protection of the water resources, it is a logical and practical requirement for the District to evaluate the merits of artificial recharge in addition to water withdrawals affecting the groundwater systems.

6. Maintaining Sound Water Quality Objectives

a. Introduction

Although the primary authority for water quality control is vested in the Florida Department of Pollution Control, water management decisions made by the District must include water Quality considerations. This view has been substantiated by the recent Attorney General's Opinion in regard to the water quality authority of water management districts under Chapter 373, Florida Statutes. (See Attachment A). Further, Chapter 373 clearly states (Part 373.039) that the water quality standards and stream classifications of the Department of Pollution Control will be meshed with the water use plan for the state to form the Florida water plan. Thus, any

water use regulations developed and implemented by the District for the control of ground and surface water withdrawals and discharges must take cognizance of applicable water quality standards.

b. Existing State-Federal Water Quality Standards

Currently, there are two sets of standards which must be considered in development of regulations for discharges and withdrawals. Both groups delineate criteria for specific physical, chemical and biological parameters for the receiving body of water, or raw water source in the case of a withdrawal, rather than specific effluent limitations. Surface water bodies are primarily governed by the standards and use classifications given in Chapter 17-3, Florida Administrative Code (Attachment B). All water bodies in the District have been placed in one of five categories: Class I, public water supply; Class II, shellfish propagation and harvesting; Class III, recreation and propagation and management of fish and wildlife; Class IV, agricultural and industrial water supply; and Class V, navigation, utility and industrial use. A listing of water bodies and the existing use classification of each is included as Attachment C. In terms of specific criteria, there is no substantial difference between Classes I, II, and III, with the exception of a more stringent standard for coliform organisms in Class II waters.

As of this date, no specific standards have been promulgated for groundwater in terms of a groundwater system as a receiving body for wastewater discharges. However, the Public Health Service Drinking Water Standards (Attachment D), promulgated in

1962 and incorporated into Florida regulations, are considered in evaluations of permits for discharges to and withdrawals from groundwater systems which are currently being used or have the potential for use as potable water supply sources. Within the District, these groundwater systems are generally described as (1) the upper Floridan aquifer, and (2) the shallow aquifer system (Biscayne, Anastasia formation, etc.).

c. Anticipated Changes in State-Federal Water Quality Standards

With the enactment of the Water Pollution Control Amendments of 1972 (PL 92-500) and the Safe Drinking Water Act (PL 92-523), revisions to the existing standards are anticipated within the next several years. Changes under PL 92-500 will be directed toward surface water systems, whereas modifications as a result of PL 92-523 are aimed at two areas: (1) water supply treatment and distribution facilities, and (2) groundwater protection. As a water resource management agency, the District is primarily interested in the latter aspect of PL 92-523.

While existing water quality standards were promulgated to aide in establishing limits for point source discharges, primarily in terms of dissolved oxygen levels, temperature, coliform organisms, and certain other parameters, the emphasis has recently changed. PL 92-500 has established a 1983 objective as follows:

> "It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the waters be achieved by July 1, 1983."

Therefore, specific numerical criteria for parameters in addition to those now in effect will be established. The question of allowable concentrations of micronutrients (nitrogren, phosphorous, certain trace metals, and other) and toxic compounds (certain trace metals, herbicides, pesticides, phenolic compounds, and others), as a minimum, must be addressed. Evidence in recent literature and on-going programs indicate that non-point sources contribute to loadings of these substances to receiving waters, and are therefore potential sources of water quality degradation. These non-point sources, in terms of surface water management, include urban runoff, agricultural runoff, runoff from construction activities, and dredge and fill projects. Therefore, any regulations developed for management of point and non-point waste sources within the near future must take cognizance of these additional requirements.

In regard to groundwater protection, interim primary drinking water standards have been proposed (March, 1975) by the Environmental Protection Agency, with a projected promulgation date in spring,1975, and an effective date of 18 months after that (Attachment E). Standards for specific parameters in raw water sources are proposed, based on the criteria presented in Water Quality Criteria 1972, National Academy of Engineering, Washington, D.C., 1972, pages 48-104. Regulations developed for management of groundwater discharges, including artificial recharge projects (land disposal of wastewater and injection and drainage wells), santiary landfill operations, and sludge disposal operations, and groundwater withdrawals must take these requirements into consideration,

d. Existing District Policies

In terms of point source discharges to surface water, the District currently operates under the guidance of Resolution 976, adopted in September, 1971, which essentially established a non-degradation policy for waters under the District's jurisdiction. Said resolution states, in part,

> "1. No permit will be granted for the discharge of wastewater from a new wastewater source into any waterway under the jurisdiction of the Central and Southern Florida Flood Control District.
>
> 2. Permits will be issued to existing wastewater sources which now discharge into waterways under the jurisdiction of the Central and Southern Florida Flood Control District and which desire to increase the volume of wastewater discharge, only under the condition that the total BOD and suspended solids load contributed to the receiving waterway, as a minimum requirement, not be increased."

Although this resolution at the time of adoption only applied to waterways that were part of the Central and Southern Florida Project, it is now applied to all surface water bodies in the District as a consequence of Chapter 373, Florida Statues.

Management of non-point surface discharges is guided by the policies in the District's Criteria Manual for Utilization of Project Works and Lands. Specifically, on page 3 of said document under Obligations of Permittee, condition 11) delineates the quality requirements of permits for discharges to Project waterways:

"to assure that discharges of water are, at a minimum, of such quality that will not degrade the quality of the receiving body or will meet the standards of the Florida Department of Pollution Control for the receiving body, whichever is higher; provided, however, that the Board may waive the strict enforcement of this provision upon application of any affected party."

e. Water Quality Management Strategy

The two major categories of activities necessary to develop and implement an effective water quality management strategy are (a) research and planning activities, and (b) evaluation and permitting activities. In both of the categories, concurrent jurisdiction exists between the District and the Florida Department of Pollution Control. In light of these overlapping responsibilities and the Attorney General's Opinion referenced earlier herein, the following approach is being taken to minimize duplication of effort between the two agencies.

(1) Research and Planning Activities

In regard to research activities, water quality investigations are being conducted by both agencies in surface waters under the District's jurisdiction to determine existing conditions and problem areas. Exchange of data and information from these efforts is continuing on an informal cooperative basis. In addition to "in-stream" studies, the District is also in the process of developing a data base to determine rainfall-runoff-quality relationships for various types of urban and agricultural land uses, both through use of in-house staff and resources and through cooperative arrangements with the U.S. Geological Survey. Similar investigations are being made by FDPC.

Data and information derived from these research efforts will be utilized in three major planning efforts within the near future. These planning activities include (a) under PL 92-500: 303(e) basin plans and 208 (areawide waste treatment management) plans; and (b) the District's water use planning effort, including data to support water resource project decisions and water management regulations. Activities conducted under 303(e) are the responsibility of FDPC, but close coordination must be maintained with the District since supporting data and information is critical to both water quality management strategies developed under the 303(e) planning efforts and development of the District water use plan (primarily project decisions). In the Kissimmee and South Florida basins (coterminous with the District's proposed 1975 boundaries), it now appears that the 303(e) efforts will concentrate on water quality management problems outside of the designated 208 areas. Thus, in order to meet the 1983 goal, FDPC will have to perform "208 type" analyses for those non-designated areas. Again, close coordination must be maintained in this area also, since the District is embarking on a program of establishing mutually acceptable drainage criteria with each county under its jurisdiction. These criteria will include measures for quality control of urban runoff, as will be discussed later herein.

In terms of 208 planning programs, it is anticipated that there will be five designated 208 areas within the District, as follows: (a) Metropolitan Orlando area (Orange and Osceola Counties); (b) Southwest Florida Regional Planning Council area (Hendry, Glades, Charlotte, Lee, and Collier Counties); (c) Palm Beach County; (d) Broward County; and (e) Dade County. Assistance has been provided to the SWFRPC, the Palm

Beach County Area Planning Board, the Broward County Planning Council, and the Metropolitan Dade County Planning Department in preparation of area and agency designation packages, preliminary work plans, public hearings, and other 208 work items. The District, by providing this technical assistance in each area, is actively coordinating the activities of each lead agency in terms of water management. Data and support information developed under the District's water use planning effort will provide useful input into the 208 programs, in addition to the technical assistance District staff can provide in regard to non-point source management.

(2) Evaluation and Permitting Activities

Water quality impacts are taken into consideration in several District evaluation and permitting processes, including (a) review of Developments of Regional Impact; (b) review of rezoning proposals, in response to local government requests; (c) permits for consumptive water use under Part II, Chapter 373; (d) permits for management of surface water under Part IV, Chapter 373; (e) permits for artificial recharge; and (f) evaluation of sanitary landfill sites. Items (a), (b) and (f) are essentailly advisory in nature since District evaluations of the proposals are submitted to the jurisdiction which has the authority for the land use decision. However, certain elements related to water resource management of these proposals are subject to the District's permitting procedures later in the land development process. Consumptive use permit evaluations (item c) are discussed in earlier sections.

In regard to permits for management of surface waters, two groups of permits are involved: point source discharges (domestic waste-water treatment plants, industrial discharges, water plant discharges, and cooling water discharges), and non-point source discharges (urban

runoff, agricultural runoff, dredge and fill activities, and runoff resulting from construction activities). The current approach being pursued is to enter into an interagency agreement with FDPC which will stipulate that the District will review, evaluate, and signoff on point source discharges, in terms of District polcies and criteria for water quality control, prior to the issuance of a permit by FDPC. The District's permit would be issued for the quantity of discharge only, after an FDPC permit is issued. For non-point source management, the District is requesting a delegation of authority from FDPC for water quality control, which will include development of criteria, control measures, monitoring procedures, and enforcement responsibilities. In addition to coordination and assistance in 208 programs for the major urban areas, District staff will be working with counties and municipalities to establish mutually acceptable drainage criteria and regulations for urban developments, such criteria and regulations to include measures for water quality control.

f. In summary, the District's water quality objectives are to:

(1) Develop the necessary data and information base to determine existing and potential water quality problems and major non-point sources of water quality degradation, while maintaining cooperation with other entities engaged in similar work.

(2) Incorporate the information derived from the research effort in (a) and information from other on-going programs into the three major water planning efforts being initiated or underway.

(3) Maintain sound coordination between the research programs, planning programs, and regulatory programs of the District, the FDPC, and other applicable agencies to minimize duplication of effort and develop a cooperative framework for water quality management.

District regulations under this section also provide for abatement of nuisances, remedial measures, halting of construction or operation because of imminent danger, emergency authorization for construction, and emergency measures to protect life and property.

II F. Description of the Planning Areas

The detailed description of the Planning Areas is given in Part I and will not be repeated here. The basis for these particular boundaries flows from several different concepts. The idea of a drainage basin is basic, and is the first consideration. However, it is not always easy to fit drainage basins into the proper size categories for easy use. Consequently, there are some of these planning boundaries that are drawn across drainage basins in a manner to provide some degree of homogeneity in the areas, and in some cases to provide for easy measurement of quantities transferred from one area to another.

The Lower East Coast area is drained either to the Atlantic Ocean, or to the Conservation Areas. It is also the area bearing the brunt of urban expansion at the present. The conservation areas are the most readily available surface water supply to this area. Transfers to this area from the Lake Okeechobee area is readily quantified at the transfer points.

The Upper East Coast area is largely drained to the Atlantic Ocean, but the water from the area may be placed in Lake Okeechobee in the future. This is related to the fact that Lake Okeechobee is the only external source of water that may be made available. The development in this area is more agriculturally oriented than that of the Lower East Coast area.

Lake Okeechobee serves as source and/or a sink to all of the other areas; at least potentially if not in current fact. It serves directly, as a supply source, the Caloosahatchee River and the Everglades Agricultural Area. The input and output points to the other areas are at readily definable points.

The Indian Prairie Area is again derived from a drainage basin concept. Like the Kissimmee basin, it must depend on internally generated sources of supply.

II G 1. Principles for the Selection of Alternatives

The problem of selecting a suitable set of alternatives for evaluation from the very large universe of possible sets is not a trivial problem. Ideally, the selected set will be such that much can be inferred about intermediate, unselected alternatives from the analysis and evaluation of those selected. There will be, of course, possible alternatives that will lie outside the range of the selected set and will require additional work for even rough estimates. Hopefully, the originally chosen set will largely cover the region of feasibility.

In order to make a first estimate of the extent of this region of feasibility, we need a concise presentation of several factors. We need to know the nature and distribution in time and space of our possible sources of supply, our demands, our water quality problems, and our environmental problems. Other required preliminary information is knowledge of the existing facilities for management, and the institutional realities that must be faced. Once this is established, the judicious use of a few principles, and much imagination should establish a reasonable group of alternatives for initial evaluation.

As a matter of common sense, it is clear that one should attempt to get sources of supply and demand as close together as possible. Problems of quality, environment, and institutional realities sometimes dictate that a degree of separation be imposed, but once these requirements are satisfied, the general proposition holds. A second general principle indicates that optimum use be made of existing facilities by proper management before going to the expense of providing new or different facilities.

Use of these principles will tend to select alternatives that minimize competition with other regions for water, keep deleterious effects near those reaping the benefits, localize the allocation problems, and tend to minimize the scope of the structural measures required.

The general procedure will be to first delineate the particular set of land use scenarios that will provide the time and space dimensions of the water use demand. A parallel effort will provide similar dimensions for supply as it currently may be provided with existing facilities and techniques.

Once this is accomplished, the stage is set to begin looking at alternative management techniques to enhance the performance of the system with little or no structural improvements. These selected management techniques should cover those aimed at improving the quality and environmental performance as well as water supply performance. Evaluation of these selected techniques should give a measure of the degree of development, etc., that can be supported by management modifications alone.

The next level examined should be the further development of supplies that are local to the demand at the various scenario levels until they are fully utilized at some maximum level. Again quality and environmental factors should be heavily represented in some portion of the developed alternatives.

The succeeding levels to be examined are related to successively more distant sources of supply. The same general rules pertain to the selection of alternatives here as suggested above on the earlier levels. The basic difference being that, since there may be relatively little local demand, much of the trade-offs may be oriented around larger scale allocation problems, and the provision of large scale transport facilities.

At the higher water use level scenarios, it will probably be necessary to utilize schemes to minimize the loss of fresh water to the sea and possibly to the atmosphere.

II G 2. Methodology for the Evaluation of Alternatives

The evaluation of alternatives as viewed here is much more than specifically finding the least cost method of supplying a given water demand. While this is very definitely a major factor in the total picture, the requirements for water quality management are not to be ignored, and environmental considerations, however hard to quantify, must also be placed in the balance.

To take a very broad view of what is involved here, one must revert back to very basic and over-simplified general considerations. The total water supply input in one way or another is represented by the rainfall budget for the area in question. The rainfall itself has a considerable temporal and spatial variation. Storage considerations of one kind or another may cause a greater or lesser time lag between rainfall occurrence and final water use or disposal but the fact remains that it all originates as rainfall somewhere, some time. The next general consideration is that the total environment of the region is in a state of dynamically adjusting to or is in a state of dynamic balance with the rainfall, storage, and water transport system of the region. The same sort of statements can be made in regard to the various nutrients and other chemical constituents in the system, though the paths, transformations, and storage mechanisms are much more varied.

Again, to over-simplify for the purposes of painting a broad picture, if one goes back to the time when the human impact on the overall

system was limited to the early tribal population, the entire system was probably very near a state of dynamic balance. The topographic nature of the area and the associated minimal surface drainage facilities dictated that most of the water that fell on the area left by means of evapotranspiration. This type of regime tends toward very high water table levels and toward vegetative cover that have high transpiration rates, i.e., extensive wetlands.

When modern man came upon the scene, things began to happen that always happen when one element in a balanced system begins to expand relative to the other elements. Imbalances begin to show up and the system begins to move toward some new balance. The primeval system in South Florida offered very little area that was amenable to the habitation and support of modern man. Much of the story of South Florida in the last hundred years has been a steadily increasing rate of conversion of land from the primeval state to some degree of use by man. A major portion of this has dealt with the plumbing system of the region. In the course of this development, major changes in the chemical input has also occurred. Large importations of various elements and changes on the environmental system.

The net result of all this is very difficult to assess. For instance, it would be very difficult to say what the final balanced system would look like if we could halt the human development efforts at the current level. It is quite probable that changes would continue to occur for a long period. At the present, the outlook for halting human development in this region is not optimistic to say the least. Consequently, we must make every effort to look intelligently at the changes that are necessarily going to be made and try to guide them to some environmentally constructive paths, at best, and to cause minimum damage at worst.

From this particular point of view, a couple of conclusions can be drawn. First, a return to primitive conditions is an impossible dream in a modern context. Second, we must redouble our efforts to learn enough to be able to reliably predict the environmental outcome of our actions. In the interim we must use to the limit of our ability the tools that we do have to predict environmental effects. The following material will attempt to provide a framework to use these tools for evaluation of various water supply development alternatives.

The general approach will be to attempt to provide some figure of merit number for each alternative in several different evaluation factors. These are proposed as follows:

1. Performance - How well does the alternative meet the need in terms of water supply, flood hazard, and water quality?
2. Cost effectiveness - Considering both capital and on-going costs, what is the unit cost of water delivered to the demand?
3. Interaction - What are the impacts, both positive and negative on other water systems, agencies, and jurisdictions?
4. Flexibility - What capability exists to meet changing conditions? Does this particular alternative irreversibly close off other possibilities?
5. Impact Assessment - At least three areas must be addressed. Fauna, Flora, and socio-economic factors.
6. Quality of Life - This factor is the weighted synthesis of the preceding five factors. This weighting and combination must be performed in the political arena, since it is almost entirely a value judgment process.

In general, the evaluation process for a particular alternative methodology will begin by selecting a range of levels of implementation. This will

begin by selecting a range of levels of implementation. This will range from some minimum feasible level to a maximum in a series of selected intervals. Each of these intervals will be processed for all of the five evaluation factors. Once this is done a "region of feasibility" for this particular alternative can be delineated.

It must be recognized that in many cases "pure" alternatives will not be the best answer. Some combination of alternatives will be preferable. This should not be particularly difficult to manage since the evaluation for various levels of implementation are already in the process. Only the interaction effects between the alternatives need be re-evaluated for the factors affected.

II H. Presentation of Water Use Regulations Based on Current Status of the System

1. Salient features of the law

a. Permitting of consumptive uses of water: The use diversion or withdrawal of surface or groundwater in the District falls within the permitting responsibilities mandated by law and as delegated by the Department of Natural Resources. In its initial effort, the District has specifically exempted from permit those uses less than 100,000 gallsons per day. For diversion in excess of this quantity, specific criteria have been established which are designed to meet the three tests defined in the Act that must be satisfied before a water use permit can be issued. Specifically an applicant proposing to withdraw water must demonstrate that:

(1) His use is reasonable and beneficial, both with regard to the source and the use.

(2) A proposed use will not interfere with any presently existing legal use of water.

(3) His use is consistent with the public interest.

b. Regulation of Wells: Chapter III of the Water Resources Act addresses several areas of concern relative to water resources management. The essential element in this part relates to the repair, construction, or abandonment of wells; the development of minimum standards of construction; and acceptable abandonment procedures as related to abandoned wells. The Water Resources Act gives to the Department of Natural Resources the sole responsibility to promulgate rules and regulations pertaining to those matters which then may be delegated to the Water Management District for implementation and administration. The District to date has not implemented any such delegation from the Department of Natural Resources.

c. Management and storage of surface waters: The management and storage of surface waters of the Water Resources Act mandates to the District permit responsibilities relating to construction or altering a dam, impoundment, reservoir, or appurtenant works. The details in this part are interpreted to comprise several basic type structures.

(1) Off line impoundments wherein water is captured or pumped into a reservoir during periods of availability of surplus water for carryover and consequent use during periods of need at a time when water would otherwise be unavailable. Agricultural interests are the major users of this type water management tool. All type of impoundments as described above in excess of 320 acres are subject to permit approval by the District. Impoundments over 640 acres will require permit approval preceded by a public hearing.

(2) Drainage systems: Essentially, drainage systems can be broken down into two basic types; 1) those that are essentially agriculturally based and that are used to provide drainage relief. These systems also serve to supply water for large scale irrigation needs, and 2) a drainage facility essentially related to urbanization. In the former, permit approval is required for connections to the District project works, control structures and appurtenant works. In addition, inflow and outflow capacities are subject to regulatory releases, and the maintenance of minimum flows and levels established in each basin by the District. In the latter, the District concerns itself with stormwater routing, retention facilities, and regulatory releases essentially to prevent flooding of undue stress on downstream facilities and users.

2. Implementation

a. Rules and Regulations: The purpose of the Rules and Regulations under the Florida Water Resources Act of 1972, Chapter 373, is to effect the maximum utilization of the waters in the District by managing, regulating and controlling the uses of waters.

b. The Permit System: Except as provided by law or District regulation, no person shall, without obtaining a permit from the Governing Board:

(1) Use, divert, or withdraw any water in the District

(2) Construct, alter, operate, maintain, or abandon any dam, impoundment, reservoir, appurtenant work, or work in the District.

(3) Begin construction on any project involving artificial recharge or the intentional introduction of water into any underground water formation in the District.

(4) Discharge into the waters in the District.

(5) Connect to, place structures in or across project works, or otherwise make use of project works or lands of the District.

(6) Perform any other act in the District for which a permit from the Board may be required by law or District regulation.

Rules and Regulations were adopted by the Governing Board of the District on December 14, 1973 and implemented on March 1, 1974.

c. Part II - Consumptive Uses of Water

(1) Detailed criterion used for evaluation of permit applications: Essentially, the methodology of evaluation is predicated on equity criteria in conformance with the basic provisions of the law which require that each applicant's use; a) meets the test of reasonable and beneficial use, b) does not harm other legal users of water, and c) is consistent with the public interest.

To meet these constraints, an applicant must demonstrate that his use is not significantly in excess of those quantities that are available to him as a consequence of recharge from rainfall on a long term average annual basis.

The water budget then becomes an important element in an evaluative process. A breakdown of the routing of precipitation represents the supply side of the supply-demand equation. The demand side is quantified by displaying past, present, and future population in the service area accompanied by a history of water consumption designed to indicate how each grew incrementally with time. The pattern of increasing demands is related to consequent stress on the aquifer. In those areas where it is pertinent, a detailed hydrologic evaluation concerning salt water intrusion and impact on adjacent surface water, lakes, and canals, storage and environmentally sensitive areas must be supplied. All these impacts are best displayed by past studies, exploratory drilling, and test pumping of existing as well as proposed new withdrawals.

Adding to the demand picture, an applicant is required to quantify other major users of water within his service area.

Large irrigation projects and commerical or industrial establishments, all having their own source of supply, are examples of this type of use. Associated with existing as well as proposed future withdrawals, the applicant is required to provide data relative to existing land use plans and zoning in order to demonstrate that such future plans for expansion of water supply facilities is consonant with those land use plans and is consistent with the availability of water on a long term sustained basis.

In the agricultural sector, groundwater extractions are evaluated against three basic constraints. These may be summarized as follows:

(a) The yield of water in a particular basin on a long term average annual basis consistent with minimum regulatory flows and levels established by the District and allowing for certain minimum flows for downstream beneficial use and regulatory purposes.

(b) The calculated supplemental water requirement of the crops to be irrigated on an average annual basis.

(c) The quantities of water requested by the applicant.

In each of these three constraints, the allocable quantities of water will be based on the lowest of the three values. As a special condition to a water use permit, the District will recognize that all waters in a basin are not being used. The maximum allocable quantities of water will be calculated on the supplemental water requirement of the crop during the month of highest demand during a two in ten year drought condition. The District will add to this quantity a value predicated on an irrigation system being 80 percent efficient. This quantity represents the maximum monthly withdrawals allowed subject to availability of surplus water in the basin and consistent with minimum flows and levels established by the District.

(2) Hearing Procedures: When applicantions for water use is made, the use is reviewed using the general criteria outlined above. The result is a written technical staff evaluation which represents an analysis of the permit request and concludes in a set of recommendations. This report becomes the basis of the District's

testimony at a public hearing and is submitted in evidence at that time. On completion of the District's evaluation of water use application, the application is public noticed in a newspaper having general circulation in the area of the proposed use. All proponents or objectors to the permit request are thereby notified and afforded an opportunity to present testimony in open public hearing; or if the use falls below the public hearing threshold (100,000 gallons per day use) he may provide written comments or request that a public hearing be held.

Public hearings are held by independent hearing examiners. The general format requires that the applicant present his petition for use providing such testimony, witnesses, and documentation as he deems necessary. At the conclusion of the applicant's testimony, objectors are heard, and finally the District presents its testimony. The hearing procedure is quasi-judicial and adversary in nature. Cross examination of all witnesses by all parties is the thread common to the entire procedure. On conclusion of all testimony, the hearing examiner prepares his report of findings of fact and makes his recommendations in writing to the Governing Board of the District.

(3) Issuing of permits: The Board, having at its disposal, the District staff evaluation, testimony presented in public hearing, and the hearing examiner's report and recommendations, makes a final determination concerning issuance of a permit specifying any conditions or limitations associated with such approval.

d. Part III - Regulation of Wells: Part three of the Water Resources Act addresses itself to several aspects of water resources management on a statewide basis. These areas of concern can be summarized as follows:

(1) Licensing of contractors: A requirement whereby water well contractors are required to obtain occupational licenses to construct water wells.

(2) Minimum construction standards: Preparation of minimum standards of construction related to water wells and wells whose primary purpose or net effect is to inject or recharge any fluid into the subsurface strata.

(3) The permit system for repair, construction or abandonment of wells: Preparation of rules and regulations associated with permitting the repair construction or abandonment of wells.

Once completed, the authority to administer the responsibilities as outlined in "b" and"c" above, may be delegated to the several water management districts. At this point in time such delegation and implementation by the District has not been consummated.

e. Part IV - Management and Storage of Surface Waters

(1) Permit Applications for Construction

To further define 2.b.(2) the District Rules set forth that no person shall, without a permit, construct or alter any dam, impoundment, reservoir or appurtenant works thereof where such impoundment is located on a surface watercourse or relies on a surface watercourse for its supply, or in any case where the impoundment is greater than 320 acres.

In addition, District Rules stipulate that no person shall construct or alter any works within the District without having obtained a permit from the Governing Board. In this connection, "works" is defined as meaning all artificial structures not included in the definition of dams and appurtenant works, and including but not limited to, ditches, canals, conduits, channels, culverts, pipes, and other construction that connects to, draws water from, drains water into, or is placed in or across the waters in the District, but shall not include wells. Accordingly, it is construed from the Rules that permits for most drainage systems are required, and application for permit must be made.

To offset non-productive and duplicating efforts in water resource permitting, the District Rules specifically provide for exempting any construction, alteration, operation, maintenance or abandonment of works which do not connect to project works and which are subject to regulation through a permitting process of another state agency which has affirmatively taken action by granting a permit for such activity and which:

(a) drain to or involve physical connection (by means of channels, ditches, culverts or similar facilities) with the Atlantic Ocean; or

(b) are in other coastal zones and are to be located within 500 feet of the mean high water line, unless said works;

1. are proposed to serve a gross land area in excess of 100 acres; or
2. involve excavation to a depth greater than six feet below mean sea level.

Where impounded or diverted waters exceed 640 acres in area, the Board shall, within 45 days of receipt of application, cause notice thereof to be published and hearing on the same to be held. Where impounded or diverted waters do not exceed 640 acres, the Board may approve without a hearing any application for permit, if no substantial objection is received.

The basic types of impoundments and drainage systems previously have been described. All which require permitting must disclose on permit application construction details and hydrologic implications. Depending upon the nature of the application the Board may require that the plans and specifications be prepared by a professional engineer registered in Florida and such additional information as may be deemed necessary to evaluate the permit request. In issuing a permit the Board may impose such reasonable conditions to assure that the construction or alteration will not be harmful to the water resources of the District.

In the case of proposed major development projects, a master drainage plan along with essential backup data specified by the District is required in support of the prospective developer's permit application. In addition certain supplemental information is required; such as: existing and proposed land use, density, character of property after development (percentage in impervious surfaces, green areas, water areas, etc.), entity to be responsible for operation and maintenance of drainage system, and identity of adjoining property owners. No drainage system construction may begin until a valid District permit has been issued by the Board. Upon completion of the major drainage system, a District permit for operation and maintenance is required. The latter permit provides a safeguard against drainage system failure due to improper maintenance and/or facility operation. The operation and maintenance permit is described later herein.

(2) Hearing Procedures

The hearing procedure essent lly has been described in 2.c.(2) above with respect to consumptive use. The hearing requirement threshold has also been identified in a previous paragraph (640 acres). In the case of impoundments, drainage systems and the like, a staff evaluation of the proposed construction becomes the basis of the District's testimony at the hearing.

(3) Permit Issuance

The Board, having a staff evaluation and recommendation of those applications not requiring public hearing, makes the determination with respect to permit issuance. In those cases subjected to public hearing, it has in hand the District staff evaluation, testimony presented in public hearing, and the hearing examiner's report and recommendations, and makes a final determination concerning issuance of a permit. In either case, it may specify any conditions or limitations to such approval. It also may deny the permit request or defer action and request a reopening of the public hearing in order to seek out additional information.

After a permit is granted, the Board has the right to make periodic inspections during construction to insure compliance with plans and specifications. In the event of non-compliance, after notice, the Board may initiate revocation proceedings.

The Board may revoke or modify a permit should it determine that any impoundment or appurtenant works has become a danger to public health or safety, is inconsistent with the objectives of the District, or is in violation of permit conditions, order or regulation of the District.

II I. Goals and Objectives of the Water Use and Water Supply Development Plan. The Water Resources Act of 1972, as amended, in Chapter 373.036 instructs the Department of Natural Resources and the water management districts as to the types of studies to be conducted in connection with the State Water Use Plan. Additionally, Chapter 373.036 enumerates those factors which shall be given due consideration in the formulation of the State Water Use Plan.

Among the enumerated factors is the State water resources policy as expressed by the statute. This factor is, of course, the over-riding consideration. The enunciation of the State's water resources policy is contained in Chapter 373.016. The pertinent elements of that declaration of policy are:

1. To provide for the management of water and related land resources;
2. To promote the conservation, development, and proper utilization of surface and ground water;
3. To develop and regulate dams, impoundments, reservoirs, and other works and to provide water storage for beneficial purposes;
4. To prevent damage from floods, soil erosion, and excessive drainage;
5. To preserve natural resources, fish and wildlife;
6. To promote recreational development, protect public lands, and assist in maintaining the navigability of rivers and harbors; and
7. Otherwise to promote the health, safety, and general welfare of the people of this state.

These specify policy statements are amplified by the more general language of a subsequent section of Chapter 373.016 which vests in the Department of Natural Resources and the water management districts:

"...the power and responsibility to accomplish the conservation, protection, management and control of the waters of the state...." (underscoring supplied).

The declared policy of the State as expressed by both the specific policy statements and the more general policy articulation of Chapter 373.016, obviously and necessarily becomes the policy of the District. To carry out that policy the District has established as its goals:

1. The development and implementation of a program for the continuing assessment of the status of the District's water resources in terms of quantity availability, in time and space, and quality; and the status of related land resources in terms of environmental quality, use and occupancy.

2. The development, implementation and administration of a program for the regulation and control of the use of both surface and ground waters.

3. The development, implementation and administration of a program for the regulation and control in terms of both quantity and quality, of the construction, alteration, operation and maintenance of surface water management systems.

4. The institution of a program for the examination, selection and evaluation of alternative plans for the development, conservation, augmentation and management of the water resources within the District.

5. The continued evaluation of the operation and performance of the primary water control system under its management and direction in terms of its conformance with the declared water resources policy of the State and District.

6. The effective and efficient operation and maintenance of the works of the District's primary water control system to serve the purposes for which provided.

7. The continued cooperation with the Federal Government through the U.S. Army Corps of Engineers in the planning, design, construction and funding of those primary water control works which are consistent with the declared water resources policy of the State and District.

8. The development and implementation of a program designed to ensure to the maximum possible extent that land use decisions made by local governments are consistent with the District's water use and water management goals, and with the capabilities of the District's primary water management system.

As of this date the District has taken those actions, or continued those actions initiated in earlier years, designed to achieve each of the above enumerated goals. The District's "Water Use and Water Supply Development Plan" is the vehicle whereby Goals 1, 2, 3 and 4 are specifically articulated. More precisely, it is the umbrella under which Goals 1, 2, 3 and 4 can be consolidated into a coherent, integrated, mutually supportive whole. This consolidation, then, is the purpose and function of the District's Water Use and Water Supply Development Plan.