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FINAL REPORT
CONCEPTUAL WATER MANAGEMENT PLAN
WATER CONTROL DISTRICT OF SOUTH BREVARD

to fulfill
DER Contract No. CM - 220
DEPARTMENT OF ENVIRONMENTAL REGULATION

"AGREEMENT FOR ASSISTANCE IN DEVELOPMENT OF A MANAGEMENT PLAN FOR THE TURKEY CREEK BASIN"

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Water Control District of South Brevard (WCDSB) participated in the Turkey Creek Watershed Management Program during the period October 1988 through December 1989. This Final Report and Technical Appendix details the Conceptual Water Management Plan developed by the WCDSB and its use of a Geographic Information System (GIS) to store and utilize data.

THE PLAN

The WCDSB is a 100 square mile drainage system located in south Brevard County, Florida formed in the 1920's. The City of Palm Bay lies predominantly within the WCDSB boundaries. The WCDSB has legislative direction to "secure, operate, and maintain an adequate, dependable, surface water management system within [its] ... boundaries".

Participation in the Turkey Creek Watershed Management Program was important to the WCDSB as well as other participating agencies as over 80 percent of the Turkey Creek watershed lies within the WCDSB.

The WCDSB is drained by a network of over 200 miles of canals with a single existing control structure regulating flows out of the WCDSB to Turkey Creek. Existing hydrologic conditions within the WCDSB are defined by permit limitations on discharges at the outfall structure, the increased level of development within the WCDSB, and the physical limitations of a canal network designed for the agricultural needs of the 1920's.

Various design potential alternatives were evaluated using general hydrologic reaponse modeling. This modeling was not intended as a design tool but rather a means of quickly and economically evaluating the relative merits of a large number of alternatives. Evaluations were made on various combinations of the following features:

- channel improvements to the canals
- removal of portions of the district
- rerouting existing canal flow directions
- excavation of ponds in several locations
- placement of additional control structures within the district
- utilization of surface storage

Analysis indicated that improvements to flood control and water quality within the WCDSB while meeting the permit conditions of the existing outfall structure and the desired improvement to water quality to the receiving waters, Turkey Creek and the Indian River Lagoon, could be best met by activities that would reduce flows within the eastern (downstream) end of the WCDSB's main canal.

The Final Conceptual Plan, which will require further detailed engineering design, will contain the following features:

CHANNEL IMPROVEMENTS: Canals will be regraded to flatter sideslopes to improve maintain, reduce erosion, enhance water quality and wildlife habitat.

EXCAVATED STORAGE: Excess runoff to be detained in one or more storage areas to reduce flows to Turkey Creek and to improve water quality.

ADDITIONAL WATER CONTROL STRUCTURES: Placement of one or more intermediate structures will better enable the WCDSB to move runoff waters within the canal network to areas of available treatment and storage.

Short-term implementation activities by the WCDSB will consist of channel improvements to existing canals as their design will be based on maintaince requirements, improvements to district-wide permit procedures, and possibly initiation of storage area excavation. Short-term action cost estimates range from $102,000 per mile of canal for channel improvements up to #23.5 million for excavated storage. Funding sources will include general revenues, special assessments, grants, and coordination with other public/private organizations.

Long-range implementation activities will incorporate those short-term actions still pending and intermediate structures. It is anticipated that both channel improvements and storage excavation activities will extend well into long-range planning time periods. Structure costs are estimated at $100,000 to $150,000.

THE GIS

The WCDSB elected to use PC ARC/INFO GIS software on IBM compatible PC's for the development of their database based on its compatibility with other Turkey Creek Watershed Management Program participants. Use of the GIS enabled the WCDSB to save money in accessing readily available information, improve efficiency data storage and retrival, and to implement better management and operational activities for the WCDSB on a day-to-day basis.

The Water Control District of South Brevard wishes to thank all participants in the Turkey Creek Watershed Management Program and others for their assistance with this effort.

I. INTRODUCTION

The Water Control District of South Brevard (WCDSB), containing 100.88 square miles within its boundaries, approximately 64,560 acres, is located in south Brevard County, Florida and includes portions of the City of Palm Bay and the City of West Melbourne. It is bounded on the north by U.S. Highway 192, on the east by State Road 507 (approximately), and on the south and west by unnamed levees. The western levee, with some alignment modification, is identified as levee L-74N in the General Design Memorandum (GDM) prepared by the U.S. Army Corps of Engineers (COE) for the Upper St. Johns River Basin Plan.

The WCDSB includes the following:

> All of Township 29 South, Range 36 East, and portions of Township 29 South, Range 37 East, Township 28 South, Range 36 East and Township 28 South, Range 37 East being more particularly described as follows:
>
> Township 29 South, Range 37 East:
>
> The West 1/2 of Sections 3, 27, and 34, and all of Sections 4 through 9, 16 through 21, and 28 through 33.
>
> Township 28 South, Range 36 East:
>
> The South 1/2 of Sections 1 through 5, the Southeast 1/4 of Section 6, and all of Sections 7 through 36.

Township 28 South, Range 37 East:

The Southwest 1/4 of Section 6, the West 1/2 and Southwest 1/4 of Section 7, the West 1/2 of Section 17, the South 1/2 of Section 21, a portion of the Southwest 1/4 of Section 22 described as the Northwest 1/4 of Southwest 1/4, the South 1/2 of Section 27, the West 1/2, Northeast 1/4 and a portion of the Southeast 1/4 described as the North 1/2 of the Southeast 1/4 of Section 34, the West 1/2 of the Northwest 1/4 and Northwest 1/4 of the Southwest 1/4 of Section 35, and all of Sections 18 through 20, and 28 through 33.

II. PROJECT SCOPE

This conceptual water management plan document will serve to specify both short-term and long-term management actions to be implemented by the WCDSB to provide flood control, water quality protection, and habitat enhancement within the District and receiving waters. Short-term actions will be designated for one-year to five-year planning timeframes. Long-term actions will be designed for a twenty-year planning timeframe. Each action will include estimated implementation costs, associated scheduling, and funding alternatives where possible.

A. Legislative Intent:

Chapter 86-418 Florida Statutes, enacted in 1986, state that the Legislative intent is that the WCDSB

"shall possess the full power and authority to implement, finance,

and operate all existing surface water management system facilities and those to be constructed." The WCDSB would be the "local government entity to secure, operate, and maintain an adequate, dependable, surface water management system within the boundaries..." of the district.

B. WCDSB History

The WCDSB was formed in the 1920's under the name Melbourne-Tillman Drainage District as a Chapter 298 district for the purpose of land reclamation for agricultural development. The 100 square mile district was leveed off from the St. Johns River (the natural outlet for about 2/3 of the WCDSB) and, through a network of canals, drained eastward to the Indian River.

As the surrounding community began its growth, it became apparent in the late 1960's that the agricultural-based drainage network was not sufficient to meet the needs of an urbanizing environment. A Master Plan was prepared in 1969 which was not implemented. A Revised Plan of Reclamation was prepared in 1977 which was not carried through the required legal proceedings and not implemented.

Over the past twenty years the Palm Bay area has continued to grow and environmental and regulatory rules and regulations have further evolved to guide and direct such master planning efforts previously attempted and aborted.

C. WCDSB Objectives:

The WCDSB, now unencumbered by the limitations of

Chapter 298, is proceeding with the development of a Surface Water Management Plan (SWMP) to provide water quality treatment, water quantity treatment and flood control, consistent with State and Local criteria and overall water management policies.

The WCDSB recognizes that limitations brought about by land use, channel geometry, access, ownership and costs (among other things) may require variances within portions of the WCDSB. Nevertheless, it is the goal of the WCDSB to have an effective SWMP undergoing regulatory approvals in 1989-1990.

D. Preliminary Assessment:

An assessment of the existing canal network and structures that make up the WCDSB indicate that, in response to the standard design storm events (the 10-year frequency and 25-year frequency, 24-hour duration rainfall), the system is slow to respond and is very storage oriented (as opposed to conveyance oriented). Peak stages within the canals and peak discharges from the WCDSB occur late in the twenty-four hour storm and do not rapidly recede. Many areas of the WCDSB are subject to flooding during such events but depth, duration and frequency have not been adequately documented.

To this end, the WCDSB evaluated alternatives that would enable discharges to the Indian River to be reduced while controlling flood elevations to acceptable limits; provide a measure of water quality enhancement and a system for improved maintenance operations. Alternatives evaluated included canal improvements, canal reorientation, surface storage, excavated pond storage, pump

discharge to the St. Johns River and MS-1 operational schedules (MS-1 is the existing outfall structure for the WCDSB).

III. EXISTING HYDROLOGIC LIMITATIONS

Surface drainage within the WCDSB is provided by a network of over 200 miles of canals. The primary canal (WCDSB C-1) traverses the District from the west levee eastward for over ten miles to the primary water control structure, MS-1. MS-1 is a multiple structure consisting of two (2) radial gates and two (2) Amil gates with a navigation lock. The structure is normally operated with one radial gate set at an opening of 3 to 6 inches. This gate is operated at an opening of 2 feet +/- when water levels rise significantly (determined onsite based upon weather conditions). The gate is opened to maximum setting under major storm event conditions, the permit limiting operation to a single radial gate. The Amil gates operate automatically when headwater levels reach elevation 8.5 feet MSL. Discharges through this structure are into Turkey Creek thence the Indian River.

Approximately 3 percent of the WCDSB, roughly 2,000 acres, drains to Turkey Creek downstream of MS-1 through an unregulated canal, WCDSB C-82.

Permit No.4-009-0030E was issued by St. Johns River Water Management District (SJRWMD) on 12 July 1983 authorizing the "extension of time for the operation of lock and dam structure MS-1". This permit updated the original construction permit (No. 4-009-0001) and the original temporary operating permit (No. 4-009-0009). This permit calls for the structure to be operated such that:

A. "A combined maximum discharge limitation on the navigation lock and water control structure of 3,000 cubic feet per second (cfs) [be met] during storm events equal to or exceeding the 1-in-10 year, 24 hour duration design storm."

B. A minimum daily discharge requirement not less than 25 cfs for the dry season and 35 cfs for the wet season and a minimum monthly discharge requirement not less than 60 cfs and 130 cfs, respectively.

C. A regulation schedule to maintain water surface elevations at +8.0 feet MSL for the dry season and at +4.0 feet MSL for the wet season.

Four major lateral canals, serving the eastern two-thirds of the WCDSB, extend north and south from canal WCDSB C-1, each having several tributaries. These are Canals C-37, C-69, C-61, and C-10. A number of smaller canals connect directly to WCDSB C-1 in the western third of the District; those from the southwest having restricted capacity due to canal blocks and local pumping operations.

Aquifer recharge in the area is limited as reported in several USGS investigations. There may, in fact, be some isolated areas within the WCDSB where potentiometric head elevations do not exceed land surface elevations but general soils data indicate relatively low permeability rates which will limit functional capabilities.

Water quality conditions within the WCDSB are presently being evaluated as part of the ongoing Turkey Creek Watershed Study. The proposed plan for surface water management by the WCDSB recognizes that construction activities within the canal network have a high potential for erosion and sedimentation and, as such, special care will be given during final design and construction phases to

minimize and control this impact. It is the intent of the WCDSB to utilize data and recommendations received from the Turkey Creek Watershed Study team to ascertain ways and means to alleviate, as necessary and reasonable to do so, identified water quality problems. Powers given the WCDSB by the State of Florida require that the WCDSB "maintain water quality in the district and the receiving waters from the district". A second year FDER/Coastal Zone Management grant authorizes the District in Fiscal Year 1990 to further investigate water quality within the District and to establish a water quality monitoring plan.

IV. ALTERNATIVE EVALUATION

The WCDSB was modeled for general hydrologic response to the 25-year frequency, 24-hour duration rainfall event for the purpose of arriving at an "order-of-magnitude" response to several possible design alternatives. The objective of the modeling was to arrive at inexpensive conclusions as to the relative merits of any one of a number of possible solution alternatives. Further discussion on the parameters and model is contained later in this section.

Potential alternatives (or combinations thereof) evaluated include the following:

A. <u>Channel Improvements</u>

All canals within the WCDSB are widened under the criteria that (a) existing depths are not increased, control retained by existing structures; (b) a 20- to 30-foot maintenance berm is maintained on one or both sides; and (c) side slopes are maintained at 2:1 or 3:1 where feasible.

B. <u>Upper Basin Loss</u>

Removal of 10- to 15-square miles from the WCDSB in the southwest area to account for SJRWMD's purchase

and eventual inclusion in the Upper Basin Plan a portion of the historical (pre 1920's) floodplain. Planned construction of a levee will separate this area from the WCDSB.

C. Rerouting of WCDSB C-37 Basin

Redirection of WCDSB Canal C-37 to flow south, away from C-1, to canal C-9-R which will take the flows westerly and then north to C-1. This connection can be made by excavating a short (a few hundred yards) section at the south (upstream) end of C-37 and blocking the north (downstream) end. This diversion brings flows into C-1 some 2.5 miles upstream several hours later in the storm runoff event. The C-37 watershed is more densely developed than the rest of the District and produces a higher proportion of existing discharges to C-1.

D. Excavation of a C-2 Pond

Excavate approximately 600 acres at the vicinity of the junction of C-2 with C-1 (the extreme western end of C-1). This is similar in concept to the "Big Pond" design of the late 1970's. Western storage continues to be an alternative due simply to the availability of land.

E. Levee Pond

The COE will need a source of material when the time comes to improve the western levee (Levee L-74N) as part of the Upper Basin Plan. Excavation of an estimated 200-foot easement adjacent to the proposed levee reconstruction would result in a 300-acre pond stretching 12 miles north to south incorporating all or portions of WCDSB Canals C-1, C-2, C-4, C-5, C-

6 and C-7. Similar to the C-2 Pond, this storage facility would also be directly connected to C-1 at its western end.

F. Airport Pond

This utilizes the one square mile "airport radar farm" in the northwest quadrant of the junction of Canals C-69 and C-1. This is Section 25 of T28S, R36E. Flows would be diverted into this area only under high flow conditions. No consideration is given at this time as to availability of this property or of conditions relating to its use although unconfirmed reports indicate its use as a stormwater management facility are highly unlikely.

G. Intermediate Structures

Placement of simple sheetpile weirs (or related structures) at one or more locations in C-1 to increase western storage capacity and to regulate flows to MS-1. This alternative will include the provision of added storage (i.e. ponds) in the western reaches. Structure placement in C-1 includes a point west of the C-61/C-10 junction; east of the C-69/C-37 junction; and some point in between.

H. Southweat Surface Storage

Utilization of topographically low areas adjacent to Upper Basin Plan tracts for surface storage. Storage augmented by smaller levee construction and pump station(s) to include pumped discharge to the St. Johns River under certain limiting conditions. These conditions would be related to flows and stages within the St. Johns River and subject to approval by the SJRWMD.

Preliminary computer routings indicate that the impact of channel improvements alone, the loss of 10- to 15-square miles in the southwest, and the rerouting of WCDSB basin C-37 are relatively insignificant to projected discharges to Turkey Creek. This determination is based on a computed peak discharge reduction of less than five (5) percent compared to an estimated peak discharge reduction requirement in excess of 33 percent. This requirement is based on an anticipated existing condition discharge in excess of 4,500 cfs.

The anticipated existing condition is defined for purposes of this evaluation as land use conditions where projected homesites are treated as built-out provided all known permit requirements have been satisfied. There are many acres of residential development for which no further permitting requirements exist that the WCDSB is aware of which are not presently built. Development of a surface water management plan without consideration of this future, unrestricted development will immediately put the District in an underdesign situation.

Excavated or surface storage alternatives all provide a greater degree of reduction in peak discharge as well a measure of water quality improvement (inherent, not calculated). Relative peak stages would indicate the potential to improve storage capacity through the utilization of one or more intermediate structures in C-1. The structures serve to enhance the westward flow of water to the storage areas which, in turn, reduce flows to MS-1 and Turkey Creek. These structures are anticipated to be simple sheetpile weirs on the order of 100 to 150 feet in crest length.

Utilization of a combination of excavated storage and intermediate structures reflect the most promising alternative solutions. Although channel improvements do not have a significant impact on the overall flow pattern, they will greatly improve canal maintenance operations, reduce erosion potential and enhance basic

water quality within the WCDSB, as such, all alternatives considered for final adoption by the WCDSB will include channel improvement.

V. FINAL CONCEPTUAL DESIGN

Results obtained from the preliminary investigation indicate that alternatives discussed in Section IV above that do not directly impact WCDSB Canal C-1 do not have a significant impact on discharge reduction to Turkey Creek. Discharges must be reduced by as much as 1,500 to 2,000 cfs to reach the permitted cap of 3,000 cfs. This cap is exceeded for an estimated time period of 44 to 57 hours. To reduce this discharge to the permitted range, an estimated 11,000 to 13,000 acre-feet of additional storage will be required within the WCDSB. The WCDSB recognizes that these numbers are based on imprecise modeling and gross order of magnitude estimates but do represent a direction of approach for final design.

The elements of the proposed drainage network will contain the following features:

A. Existing Channel Improvements

All existing canals within the WCDSB will be widened and reshaped within the limits of existing rights-of-way to achieve maximum cross-sectional area for flow and storage. Sufficient maintenance berms of 20 to 30 feet will be provided on one or both sides, depending on canal depth and width, to enable WCDSB vehicles to move and operate. Side slopes will graded to 2:1 or 3:1 for ease of maintenance and a reduction in erosion potential.

PROS:

- Stand-alone element based on maintenance needs.
- Improvements will reduce maintenance costs and improve water quality.

CONS:

- o Insignificant in overall storage needs.

B. Excavated Storage

Excavation will occur along the western one-third of canal C-1 with connection to C-1 through non-restrictive easements of relatively short hydraulic distances. Economic considerations will include the potential to incorporate the COE needs for levee reconstruction. Paragraph 55.03 of the General Design Memorandum (GDM) for the Upper Basin Plan reads "Materials for construction of proposed new levees and reinforcement of existing levees will be obtained by excavating new or by deepening existing borrow canals parallel to the levee alignment."

The levee alignment parallels four (4) miles of WCDSB Canal C-2 with an average right-of-way of 140 feet and 3.5 miles of Canal C-7 (average of 87 feet of right-of-way). Approximately 3 miles of new canal would be required.

Estimated COE requirements for levee L-74N include 1.1 million cubic yards of fill. Assuming upwards of 50 percent for waste and compaction, the WCDSB could provide this requirement in an excavated width of 77 to 88 feet. This is based on an excavated depth limited to the existing range of 9 to 10 feet and final grading of side slopes at 2:1 or 3:1.

Storage volumes in addition to that required for levee reconstruction will call for land acreage upwards of 900 acres based on average ground elevations of 20 feet in the western reaches of C-1. Excavation of such a large facility will require

construction over an extended period of time and will require that the WCDSB acquire lands that it presently does not own or otherwise have access to. It is understood through the conceptual permitting phase that said lands may not be under WCDSB ownership but that final permitting will require some form of ownership or use agreement.

PROS:

- Single regional facility ultimately cheaper to construct and maintain.
- May be constructed in phases over an extended period of time.
- Land may be available by other means than outright purchase.
- Excavation of portion of storage requirment may be handled by COE for levee reconstruction and local fill dirt providers.

CONS:

- Excavation costs may be single bigeest element of final cost package depending on land availability.
- Ability to acquire sufficient contiguous acreage.
- Access must be provided if land not readily adjacent to Canal C-1.

C. Intermediate C-1 Structure(s)

Discharge from Canal C-1 at Structure MS-1 is a function of the gate settings, tailwater (downstream) elevations, and water surface elevations in C-1. As gate operations are "seat-of-the-pants" and tailwater elevations are controlled by both flows and downstream conditions, to effectively reduce discharges from MS-1 it

becomes paramount that peak stages in C-1 are reduced. As pond excavation to provide the additional storage volume can only be significantly provided in the western reaches of the WCDSB, intermediate structures, designed to enhance flow direction towards the western region, will be required. This alternative is desireable compared with extending the width of western reaches of C-1 (as in the "Big Pond" concept). The extended widths would require additional land acquisition and excavation, both of which are the major cost elements of any plan or derivation thereto. Potential locations for simple sharp-crested weirs would include locations east and/or west of the major lateral canal junctions with C-1 (C-69/C-37 at Minton Road (SR 507) and C-61/C-10 at a point 2.5 miles upstream of Minton Road).

PROS:

- No land acquisition required.
- Minimum maintenance required.

CONS:

- Reduces accessibility of upper reaches of canal network by boat.

Final design will utilize the results obtained from the above investigation, based on standards and criteria adopted by SJRWMD (Applicant's Handbook Sections 10.0 and 11.0), through use of more sophisticated modeling techniques to arrive at an acceptable design solution(s).

VI. PHASING AND ESTIMATED COSTS

A. Short-Term Actions

Short-term actions are defined as those which will be implemented in a one-year to five-year timeframe.

Under the Conceptual Plan described in this document, short-term actions are as follows:

i. Existing Channel Improvements.

With over 200 miles of channels within the District and being relatively independent of other stormwater management facility elements, work can begin immediately and proceed for several years. It is anticipated that this action will continue into the long-range timeframe only because of the extent of work required.

Cost estimate:

Clearing - 12 acres/mile @ $1,000/acre
Excavation - 60,000 cy/mile @ $1.25/cy
Seeding - 60,000 sy/mile @ $0.25/sy

Estimated cost is $102,000 per mile of canal. Funding sources will include general revenue funds, special assessments, possible grants relating to Indian River SWIM Program, and interaction with local and state roadway construction and local fill dirt providers.

ii. Excavated storage.

This alternative will begin in the short-term action items and carry over into long-range actions. The magnitude of excavation and uncertain timeframes required for land acquisition will dictate the scheduling. The potential for upwards of 20 million cubic yards of excavation would require over 20 years of work if limited to $1 million per year. For purposes of the Conceptual Plan, short-term action will be limited to land acquisition only.

Cost estimate:

Acquisition - 1,250 to 2,500 acres @ $2,000/acre

Estimated cost is $2.5 to 5.0 million.

Funding sources will include general revenue funds, special assessments, possible grants relating to Indian River SWIM Program, coordination with US Army COE for levee reconstruction, and interaction with local and state roadway construction and local fill dirt providers.

iii. District-wide Permit Procedures

An immediate, non-construction short-term action item that will be critical to the success of a long-range program such as this plan will be the development of District-wide permitting procedures. Permitting procedures will assist in maintaining the integrity and flexibility of a long-range stormwater mangement plan. Elements must include restrictions on connections to the District, utilization of land, construction limitations, erosion control measures, water quality protection/monitoring, and related items.

B. Long-Range Actions

Long-range actions are defined as those which will be implemented in a twenty-year timeframe. Under the Conceptual Plan described in this document, long-range actions are as follows:

i. Existing Channel Improvements.

As noted above, this action item is anticipated to extend into long-range timeframes.

Cost estimate:

Clearing - 12 acres/mile @ $1,000/acre

Excavation - 60,000 cy/mile @ $1.25/cy

Seeding - 60,000 sy/mile @ $0.25/sy

Estimated cost is $102,000 per mile of canal.

Funding sources will include general revenue funds, special assessments, possible grants relating to Indian River SWIM Program, and interaction with local and state roadway construction and local fill dirt providers.

ii. Excavated storage.

Construction of the facility will include land clearing, excavation, and seeding.

Cost estimate:

Clearing - 2,500 acres @ $1,000/acre

Excavation - 20,000,000 cy @ $1.00/cy

Seeding - 4,000,000 sy @ $0.25/sy

Estimated cost is $23.5 million.

Funding sources will include general revenue funds, special assessments, possible grants relating to Indian River SWIM Program, coordination with US Army COE for levee reconstruction, and interaction with local and state roadway construction and local fill dirt providers.

iii. Intermediate Structures

This will be a long-range action in that construction will not be required until excavation begins on the western storage area.

Cost estimate:

1-3 structures @ $50,000/ea

Estimated cost is $100,000 to $150,000.

Funding sources will include general revenue

funds, special assessments, and possible grants relating to Indian River SWIM Program.

VII. ST. JOHNS RIVER WATER MANAGEMENT DISTRICT'S APPLICANT'S HANDBOOK

The following exerpts are taken from the current (as of the date of this Conceptual Plan) Applicant's Handbook for the St. Johns River Water Management District. This document defines the criteria under which the Final Design Plan will be executed. The Section references are taken from the Handbook.

10.0 "Harm to the Water Resources of the District"

10.1 Harm to the Water Resources Standards

10.1.1 **The Governing Board has delineated standards and related criteria which must be met to demonstrate that the proposed activity will not be harmful to the water resources of the District. These standards and criteria have been developed to provide protection to the water resources of the District while also providing for responsible development of those resources.**

Powers given the Board of the WCDSB by the State Legislature to effect a surface water management system within its boundaries incorporate the following language:

In order to responsibly, efficiently, and effectively secure, operate, and maintain an adequate, dependable surface water management system, the Board of Directors, consistent with and

supportive of the State Water Policy, the State Water Use Plan, the State Land Development Plan, and the Regional Policy Plan shall:

(1) Establish a water management system which will accomplish objectives as follows:

(a) Prevent damage from flood, soil erosion, and excessive drainage.

(b) Promote the conservation, development, and proper utilization of surface and ground water.

(c) Preserve natural resources, fish, and wildlife.

(d) Maintain water quality in the district and the receiving waters from the district.

(e) Preserve and protect the natural systems in the district, Turkey Creek, the Indian River, and the St. Johns River.

(f) Purchase and establish conservation areas and passive recreation areas to protect the natural resources, including the sloughs, wetlands, and natural areas, which exist in the district or along the receiving waters, where the district finds it is appropriate for environmental protection or conservation of the natural resources. The district shall utilize the best management practices in implementing and operations its water management system.

10.1.2 To obtain a permit for the construction, alteration, operation or maintenance of a system, each applicant must give reasonable assurance that such activity

meets the following standards:

(a) Adverse water quantity impacts will not be caused to receiving waters and adjacent lands. No change in land use is proposed within the District except that related specifically to surface water management facilities. Construction activities within the WCDSB canals will use, as a minimum, all current FDOT standards for erosion protection. Final canal design templates are intended to improve maintenance capabilities and to reduce the erosion hazard. No adverse water quality impacts will caused to receiving waters and adjacent lands.

(b) Surface and ground water levels and surface water flows will not be adversely affected. Surface water flows will be changed to bring peak discharge rates in line with previous permitted conditions. Existing canals will not be excavated below existing structural control elevations within the WCDSB. Other than as may be required to meet permit requirements, MS-1 operations will not contravene previous SJRWMD requirements. Surface and ground water levels and flows will not be adversely affected.

(c) Existing surface water storage and conveyance capabilities will not be adversely affected. Existing surface water storage and conveyance capabilities are contained within the condition of the existing canal network. Changes will be required to accommodate permit limitations. Capabilities will not be adversely affected.

(d) **The system must be capable of being effectively operated.**
The WCDSB has effectively and continuously operated the existing system for over 60 years, the past 10 with MS-1 in place. No modifications to MS-1 operational capabilities are proposed. Channel improvements are intended to improve WCDSB operational activities.

(e) **The activity must not result in adverse impacts to the operation of Works of the District established pursuant to Section 373.086, F.S.**
No Works of the District are adversely impacted. Any activity that will potentially impact the Upper Basin plan will be subject to complete and full permit review and approval by SJRWMD.

(f) **Hydrologically related environmental functions will not be adversely affected.**
Hydrologically related environmental functions will not be harmed.

(g) **The activity is not otherwise harmful to the water resources of the District.**
The proposed activity is not otherwise harmful to the water resources of the District.

10.2 Harm to the Water Resources Criteria

10.2.1 **It is presumed that a system meets the standards listed in Subsection 10.1.2 if the system meets the following criteria:**

(a) **The post-development peak rate of discharge must not exceed the pre-development peak rate of discharge for the storm event as prescribed in Section 10.3.**

Pre- and Post-development comparisons do not apply for the greater part of the WCDSB. The WCDSB has an operational permit for MS-1 which calls for "a combined maximum discharge limitation on the navigation lock and water control structure of 3,000 cubic feet per second during storm events equal to or exceeding the 1-in-10 year, 24 hour duration design storm". The WCDSB reads this to mean that the Biblical Flood would also have a discharge limitation of 3,000 cfs and doesn't believe this to be the intent of the permit language.

A smaller portion of the WCDSB, approximately 2000 acres or 3 percent of the WCDSB, drains to Turkey Creek immediately downstream of MS-1 through WCDSB Canal C-82 thence to an unnamed tributary (Channel "D" on the recent Preliminary FEMA report for Brevard County). This portion will be subject to Pre- and Post-development comparisons although the differences will be minor as no land use changes are included as part of this proposal other than incidentals relative to WCDSB rights-of-way alterations.

(b) **The post-development volume of district runoff must not exceed the pre-development volume of direct runoff for systems as prescribed in Subsections 10.4.2 and 10.4.3.**

Volume limitations do not apply.

(c) **Floodways and floodplains, and levels of flood flows or velocities of adjacent streams, impoundments or other watercourses must not be altered so as to adversely impact the off-site storage and conveyance capabilities of the water resource (see Section 10.5).**
Floodways and floodplains will not be adversely affected in that activities within the existing canal system will generally include canal widening and reshaping. Activities outside existing canal rights-of-way will primarily include storage excavation. No encroachment is intended or planned other than what may be construed as incidental (minor) to, say, intermediate structure construction.

(d) **Flows of adjacent streams, impoundments or other watercourses must not be decreased so as to cause adverse impacts.**
Only insofar as the permit requirements for MS-1 call for a discharge limitation and as water quality treatment may be provided such that the initial flows off certain sites may be retained and/or detained, will flows offsite be decreased.

10.3 Peak Discharge

10.3.2 Storm Frequency:

The peak discharge requirement shall be met for the following frequency storms:

(a) For those systems which discharge directly into the St. Johns River north of Lake George, the Intracoastal Waterway, the Indian River, the Banana River, Mosquito Lagoon, or the Atlantic Ocean -- No peak discharge requirement.

(b) For all other areas of the District, except where separate basin criteria have been adopted (see Section 11.0) -- 25-year return frequency.

The WCDSB shall be designed for the 25-year return frequency as well as the Upper St. Johns basin criteria for the 10-year return frequency.

10.3.3 Storm Duration:

In determining rate of peak discharge, a 24-hour duration storm is to be used.

The 24-hour duration storm will be used for the above referenced events.

10.3.4 Aggregate Discharge:

Depending on the location and design of large systems where multiple off-site discharges are designed to occur, the District may allow the total post-development peak discharge not to exceed the pre-development peak discharge for the combined discharges rather than for each individual discharge. Such a consideration shall be made only if the combined discharges meet all other requirements of Chapter 40C-4, F.A.C., and discharge to the same receiving water body.

The WCDSB has two discharge points that will be incorporated into this plan; MS-1 controlling discharges from C-1 and the uncontrolled C-82. Both discharge to Turkey Creek. The former is subject to the permit discharge limitations of SJRWMD Permit No. 4-009-0030E.

10.3.5 Methodologies:

Peak discharge computations should consider the duration, frequency, and intensity of rainfall, the antecedent moisture conditions, upper soil zone and surface storage, time of concentration, tailwater conditions, changes in land use or land cover, and any other changes in topographic and hydrologic characteristics. Large systems should be divided into subbasins according to artificial or natural drainage divides to allow for more accurate hydrologic simulations. Examples of accepted methodologies for computation of runoff are as follows:

(a) Soil Conservation Service Method (see U.S. Department of Agriculture, Soil Conservation Service "National Engineering Handbook, Section 4, Hydrology," TR-55 or TR-20 users manuals).

(b) Santa Barbara Urban Hydrograph Method.

(c) U.S. Army Corps of Engineers HEC-1 Computer Programs.

(d) Other hydrograph methods approved by the District.

Hydrograph generation and hydraulic routing will be performed on the WCDSB through the use of Advanced Engineering Technologies, Inc.'s runoff hydrograph model (Advanced RUNHYD) and hydrodynamic routing model (Advanced ICPR). These models have previously been accepted for use by the SJRWMD.

10.3.6 Rainfall Intensity:

In determining peak discharge rates, intensity of rainfall values shall be obtained through a statistical analysis of historical long term rainfall data or from sources or methods generally accepted as good engineering practice.

Examples of acceptable sources include:

1. USDA Soil Conservation Service, "Rainfall Frequency Atlas of Alabama, Florida, Georgia, and South Carolina for Durations from 30 Minutes to 24 hours and return periods from 1 to 100 Years" January 1978; Gainesville, Florida.

2. U.S. Weather Bureau Technical Paper No. 49.

3. U.S. Weather Bureau Technical Paper No. 40.

4. U.S. Department of Interior, Bureau of Reclamation, "Design of Small Dams", 2nd Edition.

Rainfall intensities used for the WCDSB design

events are taken from the U.S. Weather Bureau Technical Paper No. 40. The appropriate values are 8.0 inches for the 10-year, 24-hour event and 9.0 inches for the 25-year, 24-hour event.

10.4 Volume

Not applicable for this application.

10.5 Storage and Conveyance

10.5.1 Criterion:

Floodways and floodplains, and levels of flood flows or velocities of adjacent streams, impoundments or other water courses must not be altered so as to adversely impact the off-site storage and conveyance capabilities of the water resource.

Off-site storage and conveyance capabilities relative to the floodways and floodplains, as defined by FEMA, will not be altered. Activities proposed by the WCDSB will not encroach upon or otherwise restrict off-site flood flows for the 100-year frequency event. As a result of the proposed channel improvements and excavated storage facilities it is expected, however, that a reduction in flood stages and, subsequently, flood flows from the WCDSB will occur.

10.5.4 Flow Velocity:

Good engineering practices shall be employed to minimize the flow velocity to avoid transport of soil particles and other suspended solids from one location and deposition in another location. Many difference measures, structural or non-structural, may be used to reduce erosion from the bottom and side slopes of a conveyance system or around the

control structures. However, velocity reduction measures and revegetation with naturally occurring species of the area should be considered before using other methods of bottom and side slope consolidation.

The routing model utilized will provide details relative to flow velocities within the canal network. As indicated in the discussion of the elements intended for design of the surface water management system, overall channel improvements are called for to increase the effective cross-sectional area of the canal. This feature is intended not only to enhance maintenance capabilities but to reduce flow velocities thus further reducing the erosion hazard.

10.5.5. Stabilization of Side Slopes:

Stabilization of side slopes is necessary in order to prevent erosion due to flow velocity and runoff from the banks. Good engineering practices, taking into consideration soil characteristics, flow and drainage characteristics, shall be employed. Again, the retardation of overland runoff and soil stabilization using naturally occurring vegetation coverage shall be considered before paving riprap, lining, energy dissipation and other structural measures are employed.

Side slopes of all reshaped canals will be graded to a flatter slope, 3:1 where feasible. Stabilization and revegetation will be critical to WCDSB operations and good engineering practices will be employed. Structural measures shall be used only where other measures are not adequate.

10.6 Low Flow and Base Flow Maintenance

10.6.1 Criterion:

Flows of adjacent streams, impoundments or other water courses must not be decreased so as to cause adverse impacts.

The SJRWMD permit authorizing operation of the MS-1 structure calls for minimum daily and monthly flows. In so far as this schedule has been maintained throughout the life of this and preceding permits, low flow and base flow maintenance will continue.

10.7 Environmental Considerations

10.7.1 Criterion:

Hydrologically--related environmental functions and water quality must not be adversely impacted.

In so far as hydrologically-sensitive areas, wetlands, and water quality parameters are impacted by the proposed plan of the WCDSB, all due consideration will taken to avoid or minimize adverse impacts. As previously discussed the WCDSB is presently working with the Turkey Creek Watershed Study team specifically to participate in and obtain information relative to water quality conditions within and downstream of the WCDSB. It is the intent of the WCDSB to use this information to arrive at reasonable and effective solutions to identifiable problems.

It is not anticipated that the WCDSB's plan will provide for full Chapter 17-25 compliance. Where it is reasonable and practical to do so, all efforts will be made to provide some measure of treatment. It is understood that future development within the

WCDSB, over which the WCDSB presently has limited control, is subject to the criteria of Chapter 17-25 (or variations thereof) through rules and regulations of SJRWMD, FDER, Brevard County, City of Palm Bay, and the City of West Melbourne.

11.0 Basin Criteria

11.1 Upper St. Johns River Hydrologic Basin

In addition to the design criteria described in Section 10.0 above, systems in the Upper St. Johns River Basin must meet the following criteria:

11.1.1 **System shall meet applicable discharge criteria for 10 year and 25 year frequency storms. On-site storage and outlet capacity should be designed for the 25 year storm. Outlet capacity design should be checked and further refined, if necessary, for the 10 year storm.**

As previously discussed, the WCDSB Surface Water Management Plan will incorporate both the 25-Year frequency storm event and the 10-Year frequency storm event.

11.1.2 Runoff Volume

Not applicable at this time.

11.1.3 Interbasin Diversion

(a) **A system may not result in an increase in the amount of water being diverted from the Upper St. Johns River Hydrologic Basin into coastal receiving waters.**

(b) **It is an objective of the District to, where practical, curtail diversions of water from the Upper St. Johns River Hydrologic Basin into**

coastal receiving waters.

Interbasin diversion already exists and has since the 1920's when the WCDSB, then known as the Melbourne-Tillman Drainage District, was first constructed. That construction resulted in a separation from the historic hydrologic connection to the St. Johns River and a diversion of storm water discharges to the Indian River through Turkey Creek. Discussions in recent years about a "return" to historic flow conditions have not borne much fruit. With the adoption of the Upper Basin Plan it would be anticipated that available "connections" to the St. Johns River from the WCDSB would be limited to pumped discharge occurring after peak flow and stage conditions in the St. Johns River has passed. Consideration for such an alternative within the WCDSB planning process indicated a significant storage requirement as well as significant pump capacity. It is expected at this point that little impact will occur relative to further changes in interbasin diversions.

TECHNICAL APPENDIX
WATER CONTROL DISTRICT
OF SOUTH BREVARD
GIS

Prepared By:

Hunter Services, Inc.
Orlando, Florida

Hunter No. 86985-0290
December 1989

TECHNICAL APPENDIX - THE WCDSB GIS

I. INTRODUCTION

During 1988-89, the WCDSB participated in the Turkey Creek Watershed Management Program under the funding of the federal Coastal Zone Management Program administered by FDER. This participation included the development of a conceptual Stormwater Management Plan (SWMP) for the WCDSB and also included the development of a geographic information system (GIS) for the WCDSB. This technical appendix will describe how the WCDSB GIS was developed and the geographic and tabular data that currently exists within the GIS. The GIS described in this appendix is used by the WCDSB to assist in stormwater engineering efforts as well as to improve day to day operations of WCDSB staff.

II. DEVELOPMENT OF THE WCDSB GIS

The WCDSB elected to use the PC ARC/INFO GIS software on IBM compatible PC's for the development of their GIS based on its availability at the District's engineer's office and on its compatibility with other project participant's software. Existing data from other Turkey Creek Watershed Management Program participants were utilized where possible and new geographic data were developed by the WCDSB to support the objectives of the GIS. These objectives were as follows:

1) To use the GIS for assessing water management options within the WCDSB and in updating the District's Stormwater Management Plan.

2) To provide an improved method of data storage and to increase the amount of data accessible to WCDSB staff.

3) To utilize the GIS in implementing day-to-day operation and maintenance activities and in reviewing permit applications submitted to the WCDSB.

Data which came from other Turkey Creek Watershed Management Program participants was converted to PC ARC/INFO format and refined or reclassified as necessary to meet the WCDSB objectives above.

The next section will describe each data coverage (or map layer) in the WCDSB GIS, outlining the data sources and procedures used to develop or refine the data so that they serve the purposes of the WCDSB.

III. GIS Data Coverage Descriptions

A. DRAINAGE BASINS AND SUBBASINS

Type of Data: Polygon

Map Features:

Major drainage basin boundaries and subbasin boundaries.

Classification System:

Major drainage basins identified by major canal systems. Subbasins identified by canal they drain to and adjacent subbasins.

Original Source of Data:

Map of existing system, WCDSB, October,1986.
FDOT Highway Drainage maps, various dates.
Site plan drainage maps, General Development Corporation, 1988.

Original Scale of Data: 1:24000

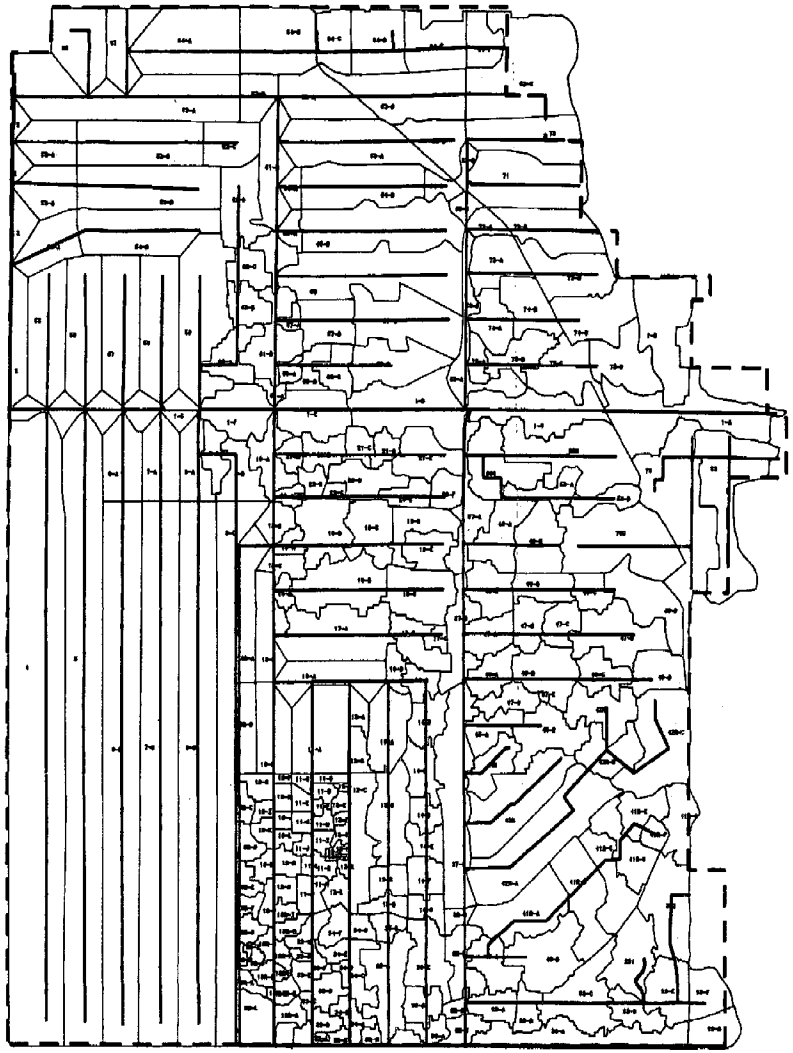
Date of Original Data Publication: 1986-88

Digitized By: East Central Florida Regional Planning Council

Digitizing Software: Autocad

Date of Digitizing: 1988

Other Notes: See Figure A



WCDSB Canal System With Drainage Subbasins

Subbasin Boundary

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Prepared for the Water Control District of South Brevard

Figure A

B. SOILS DATA

Type of Data: Polygon

Map Features:

Soils polygons with Soil Conservation Service detailed soil code.

Classification System:

Soil Conservation Service detailed soil survey codes (two-three character code).

Original Source of Data:

Soil Survey Maps published in the Brevard County Soil Survey, U.S Department of Agriculture, Soil Conservation Service, 1974.

Original Scale of Data: 1:20000

Date of Original Data Publication: 1974

Digitized By: East Central Florida Regional Planning Council

Digitizing Software: Autocad

Date of Digitizing: 1988

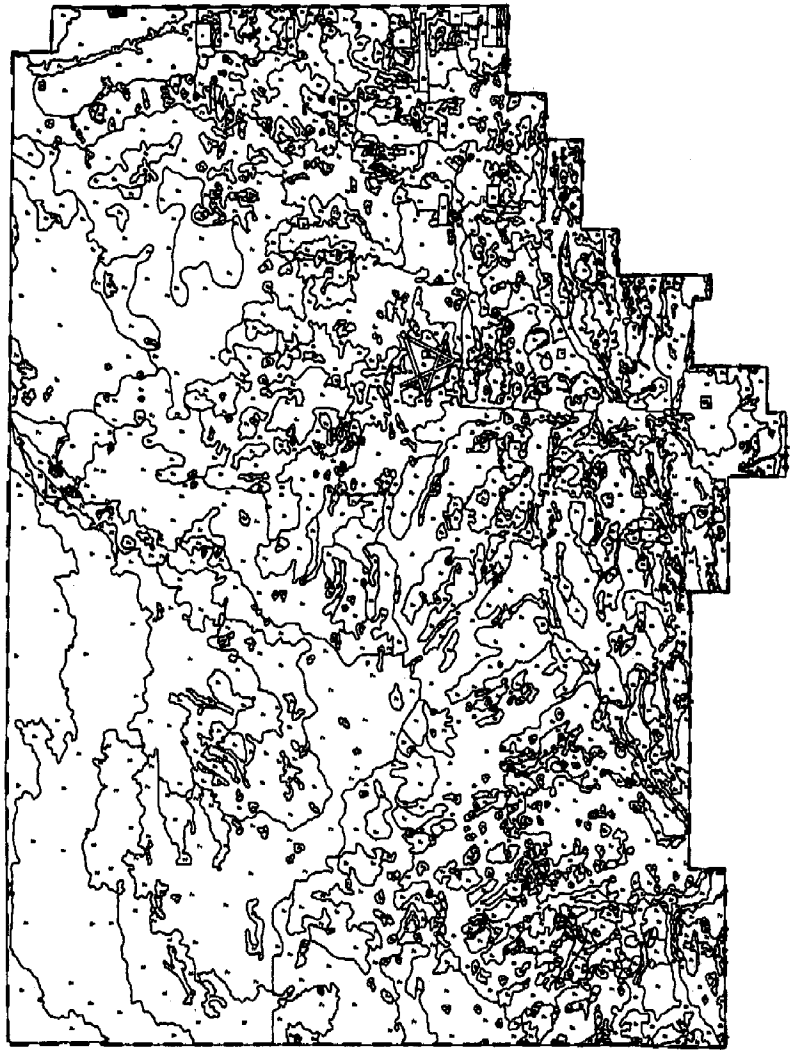
Other Notes:

Soil survey maps were georeferenced using section corners depicted on the maps. Photogrammetric distortions along soil survey map edges were uncorrected. Soils polygons which crossed survey map boundaries were edge matched based on a subjective "best fit" approach.

In 1989, a SCS soil scientist reviewed the quad scale (1:24000) plots of this data produced by ARC/INFO. He matched soil polygon boundaries to other geographic features on the quad sheets and pronounced them acceptable for WCDSB applications.

Soil hydrologic group classifications for each soil type are held in a related ARC/INFO data file.

See Figure B.



Soils Map of the WCDSB

Soils Boundaries

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure 8

C. CURRENT LAND USE

Type of Data: Polygon

Map Features:

Current land use polygons with associated land use code text. This land use data represents current land use in 1986-87.

Classification System:

For urban or cultural uses, the 1976 Florida Land Use and Cover Classification System was used. For non-cultural uses or natural vegetative cover, the 1985 Florida Land Use, Cover, and Forms Classification System was used.

Original Source of Data:

East Central Florida Regional Planning Council and the Marine Resources Council at FIT.

Original Scale of Data: 1:24000

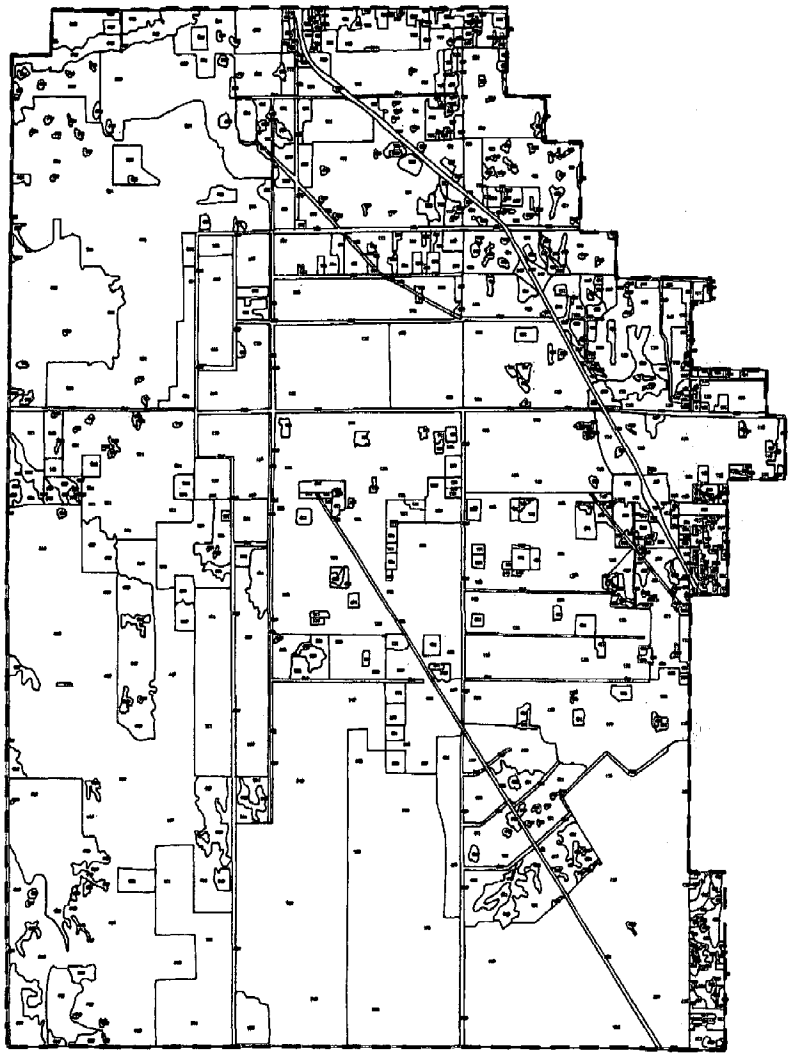
Date of Original Data Publication: 1986-87 aerial photos used. Verified with field surveys in 1988.

Digitized By: Marine Resources Council at FIT. Edited by the East Central Florida Regional Planning Council.

Digitizing Software: Autocad

Date of Digitizing: 1988

Other Notes: See Figure C



Current Landuse Map of the WCDSB (1986-87)

Landuse Boundaries

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure C

D. PROPOSED LAND USE

Type of Data: Polygon

Map Features: Proposed land use polygons.

Classification System:

Brevard County Future Land Use (generalized) Classification System. No future land use for areas within incorporated areas.

Original Source of Data:

Brevard County, Florida - Future Land Use Maps

Original Scale of Data: 1:24000

Date of Original Data Publication: September, 1988

Digitized By: Hunter Services, Inc.

Digitizing Software: PC ARC/INFO

Date of Digitizing: 1989

Other Notes: Figure D (not available)

E. TOPOGRAPHIC CONTOUR DATA

Type of Data: Arc (or line)

Map Features:

Five foot contour lines with corresponding elevation text.

Classification System: Five foot contours.

Original Source of Data:

United States Geological Survey 7.5 minute topographic quadrangles.

Original Scale of Data: 1:24000

Date of Original Data Publication: Varies with quad sheet.

Digitized By: Hunter Services, Inc.

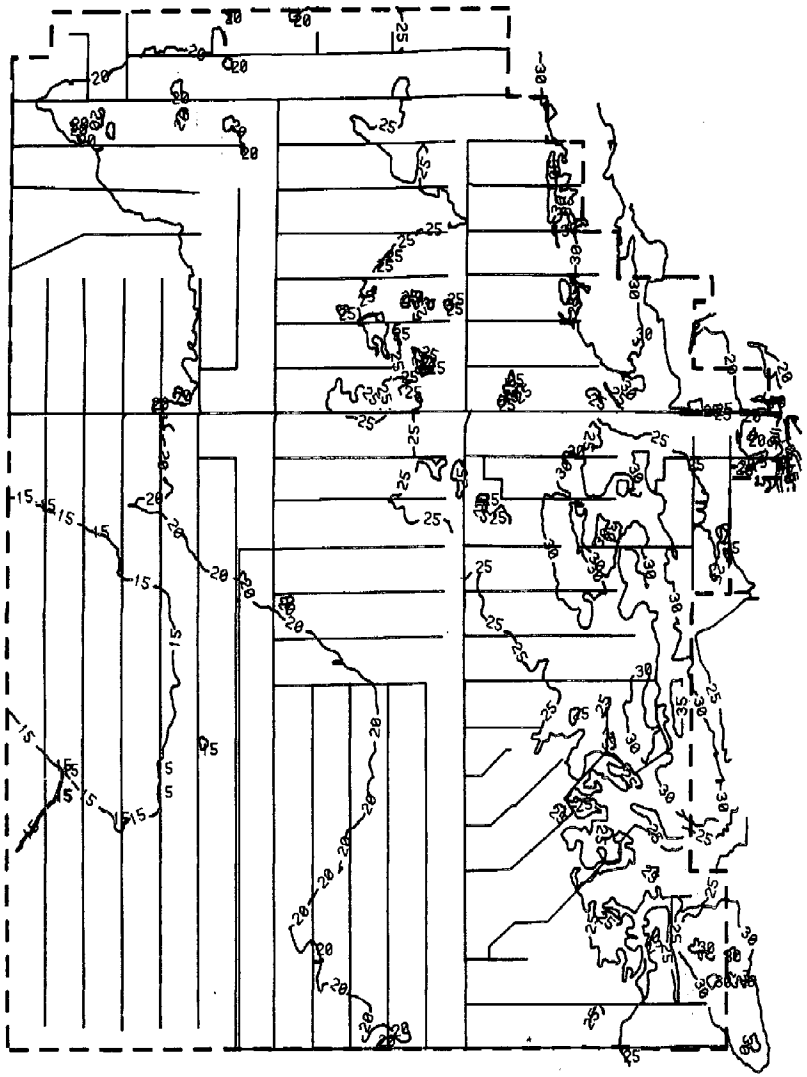
Digitizing Software: PC ARC/INFO

Date of Digitizing: 1989

Other Notes:

This is the best available topographic data available for the WCDSB, however it is inadequate for most District analysis needs. Currently, a multi-agency agreement is underway to obtain one foot contour information from a new aerial survey of portions of the WCDSB through photogrammetry.

See Figure E.



WCDSB Canal System with Topography

Contour Lines

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure E

F. CANAL SYSTEM CHARACTERIZATION

Type of Data: Arc (or line)

Map Features:

The entire canal system within the WCDSB's jurisdiction with corresponding canal identification text.

Classification System:

Each canal is broken into individual reaches with a "from node" (or upstream end) and a "to node" (or downstream end). Each reach has a modeling ID and a Hunter-assigned ID.

The Hunter ID is a six digit number with the first three digits representing the canal ID and the second three digits representing the reach ID.

Original Source of Data:

United States Geological Survey 7.5 minute topographic quadrangles and field verification. Black and white aerial photographs from the Real Estate Data, Inc. book (dated 1988) were used to confirm questionable areas.

Original Scale of Data: 1:24000

Date of Original Data Publication: 1988

Digitized By: Hunter Services, Inc.

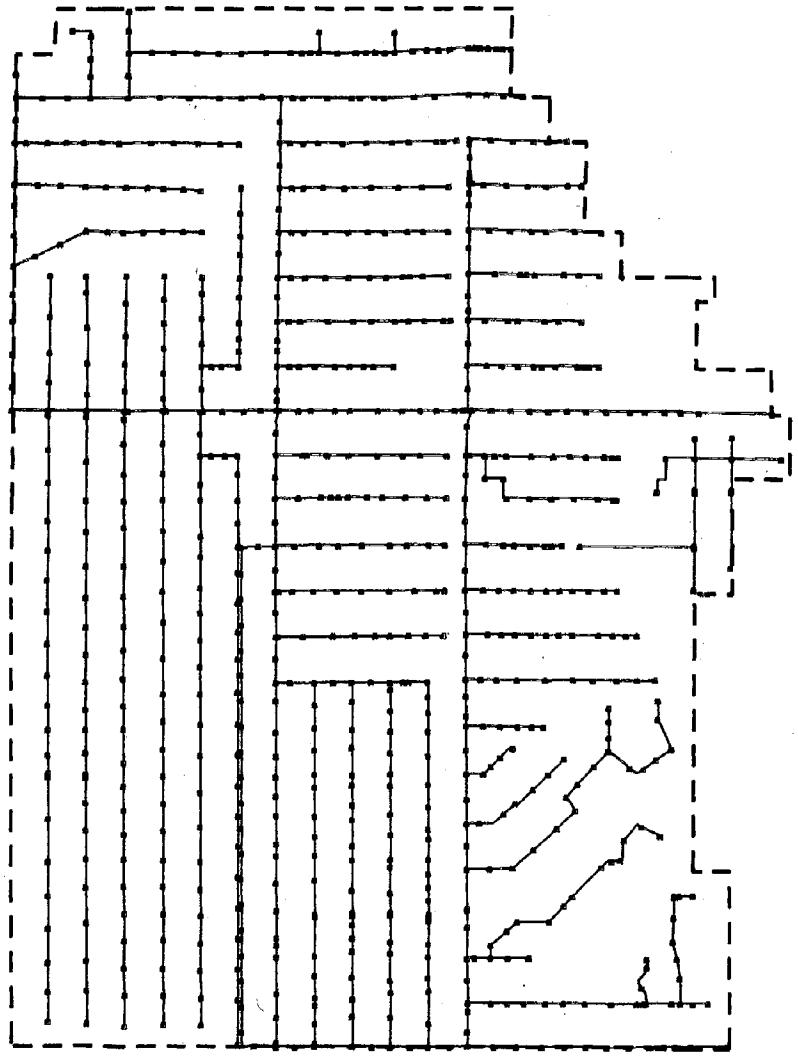
Digitizing Software: PC ARC/INFO

Date of Digitizing: 1989

Other Notes:

This coverage can be related to an expansion data file within INFO which holds information on individual canal reach characteristics.

See Figure F.



WCDSB Canal System with Modeling Reaches

Modeling Reach Endpoints

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure F

G. CANAL STRUCTURES

Type of Data: Point

Map Features:

All identified water management structures within the WCDSB canals and their corresponding ID numbers. (Does not include outfall structures.)

Classification System:

Canal structure ID numbers were assigned randomly on original maps by Hunter Services, Inc. They consist of three digits.

Canal structures are also identified within ARC/INFO by a six digit ID number. The first three digits represent the canal identifier for the canal on which the structure is located and the second three digits represent the structure ID described above.

Original Source of Data:

Water Control District of South Brevard, 1988.
Structure data field verified by Hunter Services, Inc. staff and by WCDSB personnel during 1988-89.

Original Scale of Data: 1:24000

Date of Original Data Publication: 1988

Digitized By: Hunter Services, Inc.

Digitizing Software: PC ARC/INFO

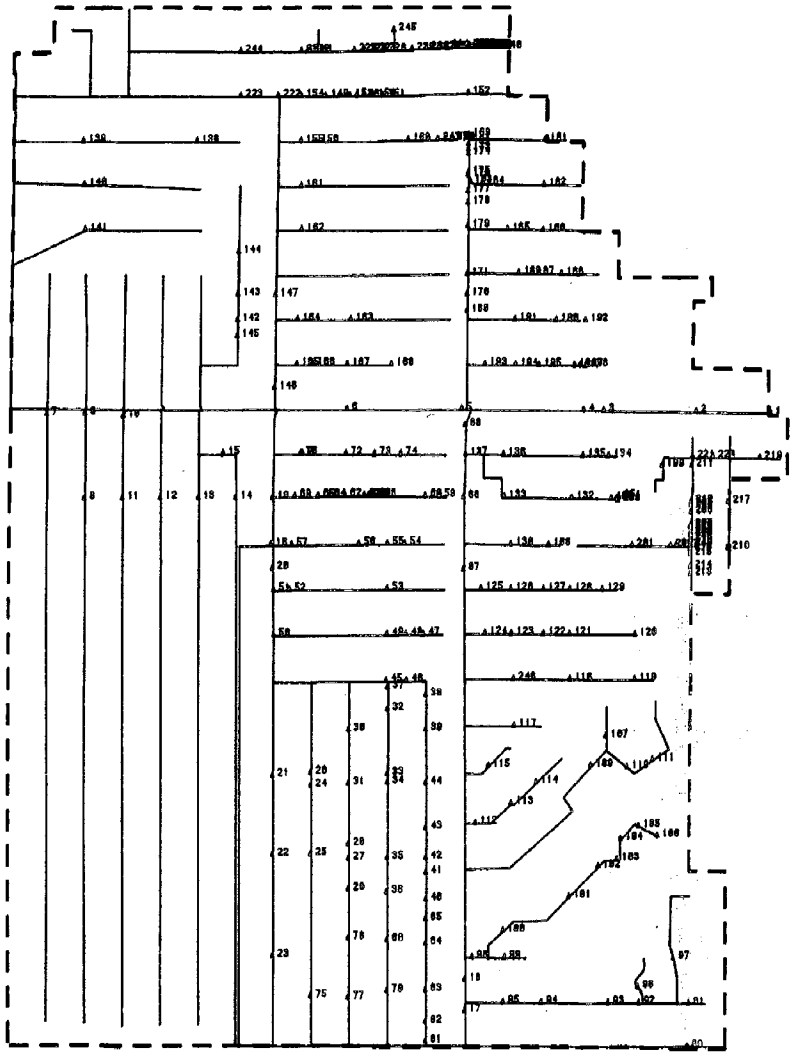
Date of Digitizing: 1989

Other Notes:

Canal structures include all bridges, culverts, and weirs in the canals of the WCDSB.

This coverage can be related to expansion files within INFO which hold information on canal structure specifications and locations.

See Figure G.



WCDSB Canal System with Canal Structures

Canal Structure

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure 6

H. DRAINAGE NETWORK

Type of Data: Arc (or line)

Map Features:

The drainage network which contributes to the WCDSB canal system.

Classification System:

This drainage network coverage consists of all ditches, swales, and other conveyance drainageways which contribute to the WCDSB canal system. For graphic purposes only; no associated data files within INFO.

Original Source of Data:

See 'Drainage Basins and Subbasin Boundaries' sheet. This coverage was originally part of that Autocad map drawing received from the ECFRPC.

Original Scale of Data: 1:24000

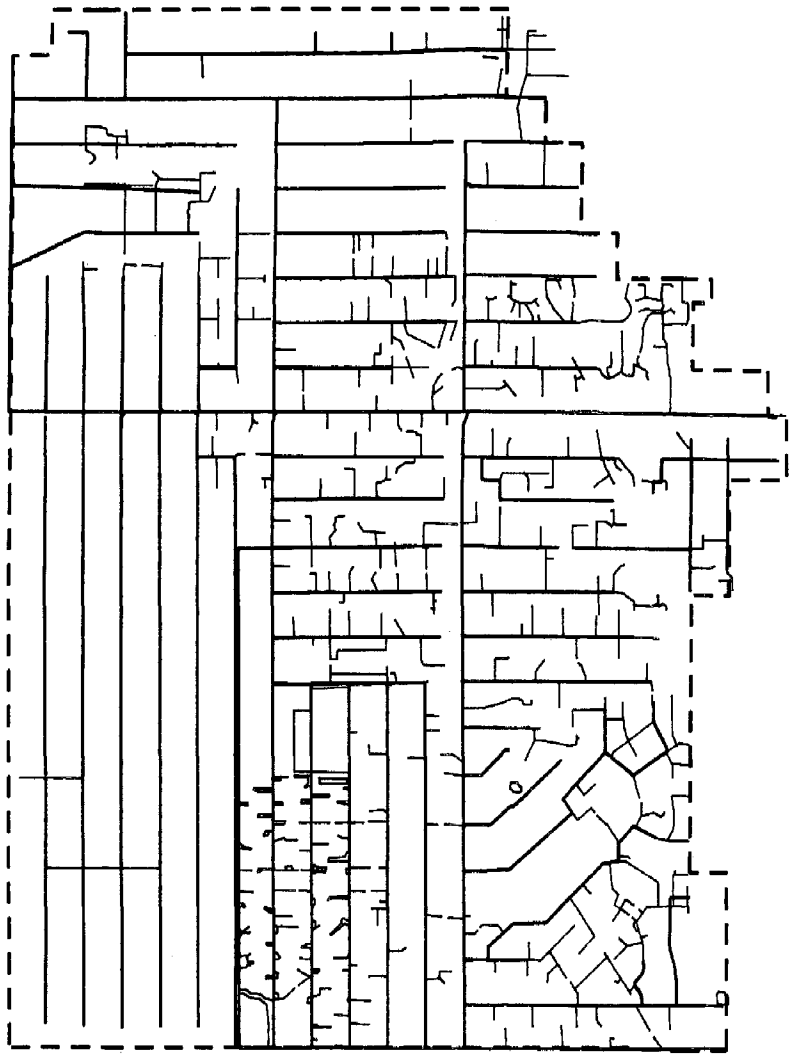
Date of Original Data Publication: 1986-88

Digitized By: East Central Florida Regional Planning Council.

Digitizing Software: Autocad

Date of Digitizing: 1988

Other Notes: See Figure H.



WCDSB Canal System with Drainage Network

Drainage Network to Canals

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Prepared for the Water Control District of South Brevard

Figure H

I. SECTION LINES

Type of Data: Polygon

Map Features:

All section lines which cover the WCDSB area with the corresponding section, township, and range identifiers for each section.

Classification System:

Section-Township-Range

Original Source of Data:

United States Geological Survey 7.5 minute topographic quadrangles.

Original Scale of Data: 1:24000

Date of Original Data Publication: Varies by quad sheet.

Digitized By: East Central Florida Regional Planning Council.

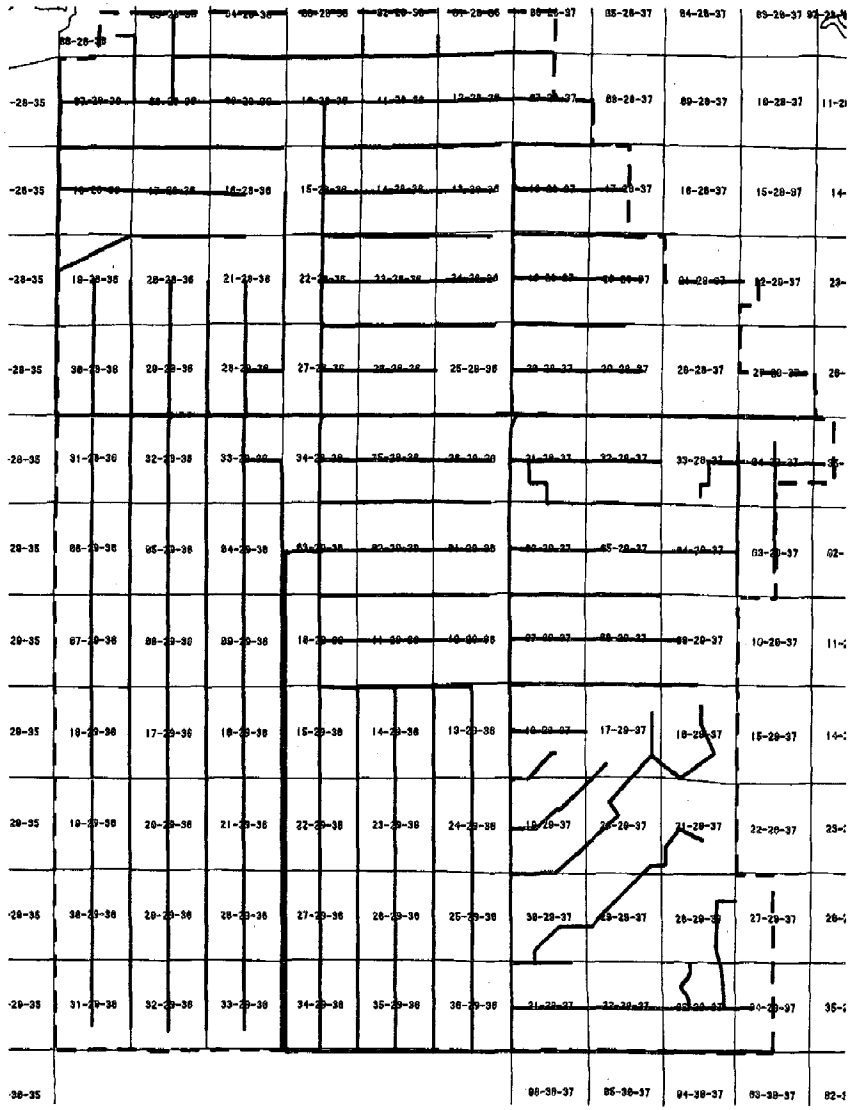
Digitizing Software: Autocad

Date of Digitizing: 1988

Other Notes:

When converted to ARC/INFO, this coverage did not line up with standard U.S.G.S. 7.5 minute topographic quadrangles. Therefore, during 1989, Hunter Services, Inc. redigitized all section corners from the quad sheets using ARC/INFO software and then snapped all section lines to these more accurate section corners.

See Figure I.



WCDSB Canal System with Section Line Grid

Section Lines

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure 1

J. QUADRANGLE BOUNDARIES

Type of Data: Polygon

Map Features:

The boundaries of each United States Geological Survey 7.5 minute topographic quadrangle.

Classification System:

This coverage is a master grid for all other coverages. The U.T.M. coordinates of each quad sheet corner represent the tics used to georeference all other coverages.

Original Source of Data:

U.S.G.S. 7.5 minute topographic quadrangle sheets.

Original Scale of Data: 1:24000

Date of Original Data Publication: Varies by quad sheet.

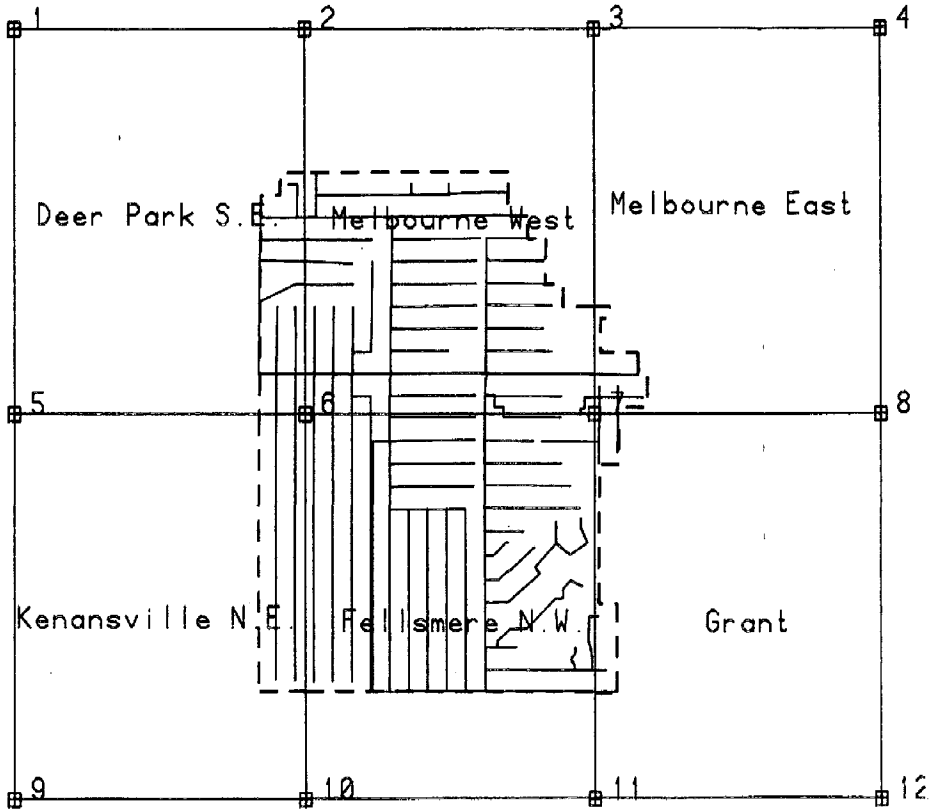
Digitized By: East Central Florida Regional Planning Council.

Digitizing Software: Autocad

Date of Digitizing: 1988

Other Notes: See Figure J.

WCDSB Canal System within Quad Boundaries



USGS Quad Boundaries

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:200000

2 0 2 4 6 MILE

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Figure J

K. WCDSB BOUNDARY

Type of Data: Polygon

Map Features:

The boundary of the Water Control District of South Brevard.

Classification System:

The boundary follows section lines or the 1/2 section or 1/4 section lines, as necessary.

Original Source of Data:

Legal description of the Water Control District of South Brevard's boundary mapped onto U.S.G.S. 7.5 minute topographic quadrangles.

Original Scale of Data: 1:24000

Date of Original Data Publication: October, 1986

Digitized By: Hunter Services, Inc.

Digitizing Software: PC ARC/INFO

Date of Digitizing: 1989

Other Notes:

This boundary may change during 1989-90 as the St. Johns River Water Management District acquires the southwest portion of the WCDSB.

See Figures A-J.

L. LOCATIONS OF CANAL CROSS-SECTIONS

Type of Data: Point

Map Features:

Each point represents the location where a canal cross-section was surveyed for the St. Johns River Water Management District.

Classification System:

Each point location is identified by a three digit ID number which corresponds to the SJRWMD survey information.

Original Source of Data:

St. Johns River Water Management District.
Locations of survey cross-sections were obtained in Florida State Plane coordinates. These coordinates were entered into ARC/INFO as UTM coordinates using the GENERATE and TRANSFORM commands.

Original Scale of Data: N/A (Tabular listing of coordinates)

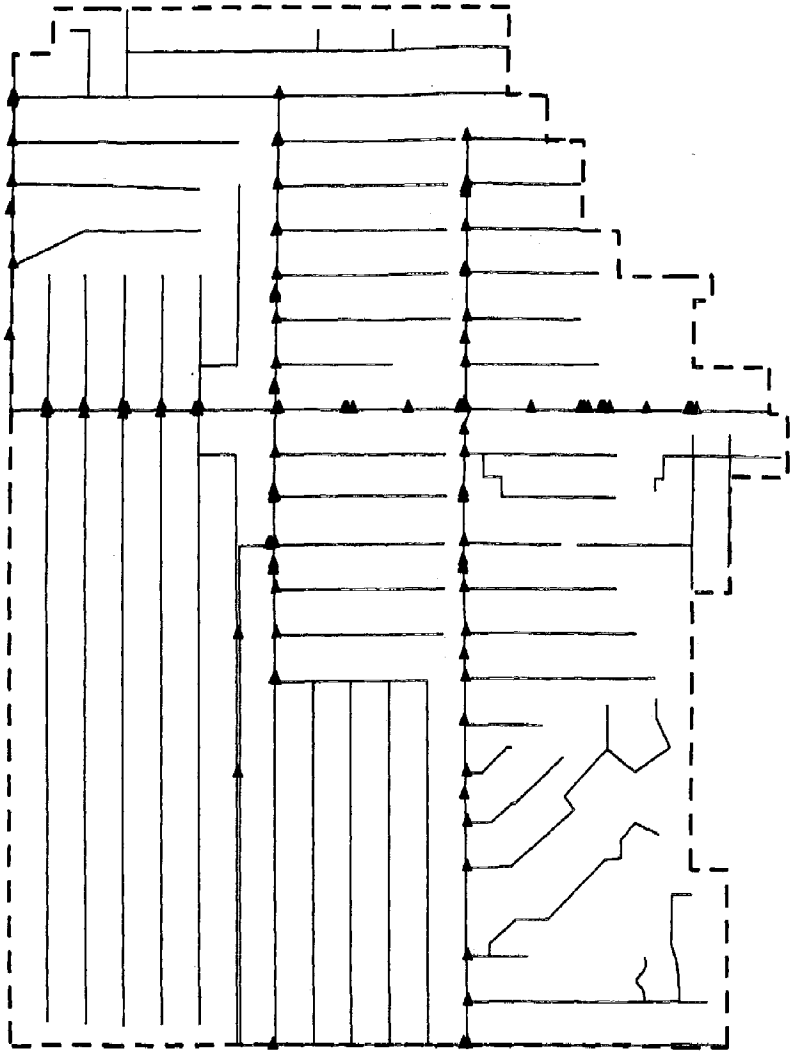
Date of Original Data Publication: December, 1988.

Digitized By: Hunter Services, Inc. (not actually digitized)

Digitizing Software: PC ARC/INFO

Date of Digitizing: 1989 (date of transformation from tabular to geographic data)

Other Notes: See Figure K.



WCDSB Canal System with SJRWMD Canal Cross-section Locations

Canal Cross-sections

WCDSB Canals

WCDSB Boundary

N

SCALE = 1:100000

1 0 1 2 3 MILE

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Figure K